

**LINKING ENVIRONMENT AND AGRICULTURE RESEARCH NETWORK
ANNUAL REPORT 2010-2011**

Peter C. Boxall
Network Leader
Department of Rural Economy
University of Alberta

Network Annual Report
May 2011



An Introduction from the Network Leaders

The second year of operation of the Linking Environment and Agriculture Research Network (LEARN) involved the completion of a number of projects initiated in the first year and participation in a variety of workshops, conferences and other networking events. In addition, we designed and launched the LEARN website. Beata Montgomery, who was welcomed last year as the LEARN Network Administrator continued to ensure that the myriad of budgetary and other administrative issues ran in an efficient manner.

On the research front, two new projects were funded in 2010-2011 making a total of 12 ongoing research projects during this fiscal year. Our two commissioned papers will be coming into fruition, and a further one was solicited from Dr David Zilberman. LEARN was also involved in proposals for pilot conservation auctions in Manitoba, and an additional proposal on evaluation of market based instruments applied to address in agri-environmental issues. We will discover if these were funded midway through 2011-2012.

Communication efforts have also started to take shape. In addition to the LEARN website (<http://www.ales.ualberta.ca/re/LearnNetwork>), a series of various graphic art tools were designed to enhance presentations and form covers for LEARN sponsored publications. These are now available on the website for researchers to use. A number of papers presented at the first LEARN sponsored workshop in Victoria were reviewed and bundled to form a special issue of the *Canadian Journal of Agricultural Economics* which will appear in print in June 2011. LEARN also sponsored a session at the World Congress on Environmental and Resource Economics in Montreal in June 2010, and another session on conservation auctions was organized by the network leader at the same event. The second network meeting was also held at this event in Montreal.

One important event was the First Annual National Agricultural Policy Conference held in Ottawa in January. This event was organized by a consortium including the five ERCA networks, the Canadian Agricultural Economists Society and Agriculture and Agri-Food Canada. The event included a poster session which was intended to showcase network funded research. LEARN members and students had four posters presented at this event. Over 350 delegates attended this conference and there are plans to make this event an annual one.

In the next year, members, partners and others can look forward to a LEARN workshop held in conjunction with the International Water and Resource Economics Consortium (IWREC) in Banff in June 2011. These events will precede the Annual Meeting of the Canadian Agricultural Economists Society which is meeting at the same facility jointly with the Western Agricultural Economics Association. A whole week in Banff – if you are a serious applied economics enthusiast!!

We are planning additional workshops for future years and input on topics and locales from members and partners is welcomed.

1. Introduction

Network Objectives – LEARN activity is framed around development and analysis of economic policy in the area of agriculture and the provision of environmental goods and services (EGS). Network research will assist in the development of:

(1) improved understanding of the adoption of farm level management practices for the supply of EGS, (2) development and analysis of market based instrument programs for the provision of EGS, and (3) the valuation of change in EGS both for policy implementation as well as outcome monitoring. The expectation is that these elements will be integrated in the research program, leading to improved integration of policy analysis, implementation and evaluation from a multidisciplinary perspective.

However, LEARN is more than a research organization and is dedicated to communication and networking through the hosting and co-hosting of workshops, conferences and other fora. Central to this philosophy is the expectation that network research funds will form seed funds to leverage additional funding from other organizations. We hope that many of these organizations and individuals therein will become partners in the network to increase the potential for networking and learning outcomes. Many already are as you will see in this report.

Two recent initiatives highlight partnership potential. The first is one of the funded projects in the period 2009-2010 that has linked LEARN with Environment Canada's Species at Risk concerns in what is the South of the Divide Project located in southwestern Saskatchewan.. The multiple species at risk (Multi-SAR) recovery strategy within Saskatchewan's Milk River Watershed provides a unique opportunity to study the opportunity costs of protecting multiple species' critical habitat within the dry mixed grass and mixed grass prairie of south-western Saskatchewan. The project involves developing a model that will provide insight into the opportunity or real costs incurred or potentially incurred by landowners and land managers as a result of species recovery stewardship initiatives.

The second involves the linkage of LEARN with a recently formed Institute for Land Use Innovation at the University of Alberta. This institute holds similar goals and objectives as LEARN and through philanthropic donations is planning to test the application of market based instruments to enhance EGS provision on agricultural landscapes.

2. Membership and Partners

This year LEARN welcomed to the fold three new members (Drs Tracy Stobbe, Scott Jeffrey and Van Lantz) and five new partners from Environment Canada and the Saskatchewan Watershed Authority. We now have 28 members and 21 partners.

List of Members and Partners as of April 2011:

Members		Partners	
Name	Organization	Name	Organization
Al Weersink	University of Guelph	Al Mussell	George Morris Centre
Ben Bradshaw	University of Guelph	Bob MacGregor	Agric. & AgriFood Canada
Brady Deaton	University of Guelph	Hugues Morand	Agric. & AgriFood Canada
Chad Lawley	University of Guelph	Ian Campbell	Agric. & AgriFood Canada
Chokri Dridi	University of Alberta	Sarah Kalff	Agric. & AgriFood Canada
Christine Rawluk	University of Manitoba	Aurelie Mogan	Agric. & AgriFood Canada
Don Flaten	University of Manitoba	Ryan Prescott	Agric. & AgriFood Canada
Elena Bennett	McGill University	Brenda Brindle	Government of Alberta
Emmanuel Yiridoe	Nova Scotia Agricultural College	Tom Goddard	Government of Alberta
Gary Kachanoski	University of Alberta	Jim Stalwick	Government of Sask.
Gary Johnson	University of Manitoba	Darryl Finnigan	Government of Ontario
Henning Bjornlund	UNISA & University of Lethbridge	Mike Kennedy	Pembina Institute
James Vercammen	University of British Columbia	Lota Dabio Tamini	IRDA
Jim Unterschultz	University of Alberta	Esther Salvano	Government of Manitoba
John Parkins	University of Alberta	Shane Gabor	Ducks Unlimited Canada
Kees van Kooten	University of Victoria	Ela Kinowska	Environment Canada
Ken Belcher	University of Saskatchewan	Monica Drozd	Environment Canada
Kurt Klein	University of Lethbridge	Yves Bourassa	Environment Canada
Paul Thomassin	McGill University	Luis Leigh	Environment Canada
Peter Boxall	University of Alberta	Tom Harrison	Sask. Watershed Authority
Scott Jeffrey	University of Alberta	Mark Wayland	Environment Canada
Steve Clark	Nova Scotia Agricultural College		
Sumeet Gulati	University of British Columbia		
Wanhong Yang	University of Guelph		
Vic Adamowicz	University of Alberta		
Marian Weber	Univ. of Alberta & Alb. Innovates		
Tracy Stobbe	Trinity Western University		
Van Lantz	Univ. of New Brunswick		

3. LEARN Funded Research

Funded Projects Completed in 2011

The 10 projects funded in the first year of operations have drawn to a close and reports are expected to be submitted by the end of May. This reports will be available on the LEARN website soon thereafter. The majority of these projects involved funding graduate students.

- Explaining Agri-Environmental Stewardship Adoption in Canada: A State of Knowledge Review (*Bradshaw and Yang*)
- Do Farmland Ownership Patterns Explain Variation in Farmland Rental Rates? (*Deaton and Weersink*)
- Border Tax Adjustments on Food Imports (*Gulati*)
- Ecological Goods and Services in BC Agriculture: Studying Nutrient Management in the Lower Fraser Valley (*Gulati*)
- A Performance-Based Approach to Agri-Environmental Policy in Canada: Development and Comparative Assessment (*Belcher*)
- Review of the Literature on Control of Nutrients in Several Watersheds (*Johnson*)
- Climate Change Impacts on Waterfowl Habitat in Western Canada (*van Kooten*)
- Water Cultures and Irrigation Farming in Alberta (*Parkins*)
- Farm Level Production Information and BMP Preferences (*Thomassin*)

New Projects Funded in 2010-2011

Due to the fact that considerable funding was allocated in the previous round, there were less financial resources available to fund new projects. Two were funded in this fiscal year.

Project 1: Valuation of Ecosystem Services Produced on Agricultural Lands for the Beaver Hills Initiative Pilot Tradable Development Credit Program

- Location: university of Alberta
- Research Team: Dr Marian Weber, Dr Peter Boxall, Katherine Packman
- Duration: April 2010 - March 2012

We will partner with Strathcona County and the Beaver Hills Initiative (BHI) to develop a choice experiment to value and test policy options for maintaining ecosystem services (ES) produced on agricultural lands in the Beaver Hills/Cooking Lake Moraine Area. The results will be used to

develop a pilot Transfer of Development Credit (TDC) Program to conserve ES values produced on agricultural lands. The Beaver Hills area, located in central Alberta, is an extensively treed, upland area consisting of rolling to hummocky terrain rich in native wetlands and aspen dominated Boreal mixed wood forest habitat. The Beaver Hills is valued by area residents and Albertans for its ecological significance and contribution to natural capital – the area supports a high diversity of vegetation, waterfowl, mammals and birds and is a critical source of surface and ground water. Although past land use in the Beaver Hills has mainly been restricted to agriculture, the ecosystem is threatened by increasing demand for recreational, urban, and country residential land use and requires special consideration for conservation. The BHI is a collaboration comprising the five municipalities within the Beaver Hills/Cooking Lake moraine, federal and provincial land management agencies such as Elk Island National Park, plus non-governmental organizations with interests in the area to promote a regional approach to land management in the moraine through a common land use/management framework.¹

In 2007, the BHI completed a study which reviewed the feasibility for an inter-jurisdictional TDC program to support the ESs being provided on agricultural lands in the BHI area. A TDC program allows landowners in areas with valued natural capital (conservation areas) to sell development credits to developers in areas targeted for intensive economic growth (receiving areas). On the basis of the study, Strathcona County in partnership with Alberta Research Council initiated a 3 year pilot TDC program to test the design of a TDC program to conserve ES on agricultural lands in the BHI area. TDC programs involve tradeoffs between relaxed development restrictions in areas targeted for more intensive urban on the one hand, and increased restrictions on agricultural land use on the other. The success of a TDC program depends on publicly acceptable goals and objectives. The identification and public valuation of development/conservation tradeoffs is critical to establishing acceptability of the program to the wider public, as well as to determining program options that will be acceptable to both developers and agricultural landowners.

In this study we will develop a choice experiment to examine the public's preferences for protection of ES on agricultural lands in the BHI through increases in urban density or relaxation of other urban development constraints that could be used as incentives to encourage developers to pay for TDC credits from agricultural landowners. The results of this study will be directly used to develop and support design options for the pilot TDC program in the BHI area. Tradeoffs for ES are usually evaluated based on giving up development opportunities. In this case, tradeoffs will be assessed in terms of increased development options, many of which are perceived to be 'negative'. In addition, the program options which respondents will choose from will have specific winners and losers in terms of municipal zoning, therefore we will gain an understanding of the distributional aspects of designing these programs, particularly in

¹ The BHI is applying to be recognized as a UNESCO International Biosphere Reserve.

terms of NIMBY, and how these might be mitigated in program design. Finally, this study will allow us to prioritize conservation as well as development objectives in the BHI.

Project 2: Valuing Agricultural Land Assets in the System of National Accounts: A Hedonic Pricing Approach

- Location: McGill University
- Research Team: Dr Paul Thomassin, Rene Roy
- Duration: April 2010 - March 2011

Over the last three decades increased emphasis has been placed on taking into account the impact on the environment, and natural capital in particular, in public decision-making with the concept of sustainable development. The importance and role of natural capital generated a debate in the economic literature over the degree of substitutability for natural capital with the concepts of weak and strong sustainability. The common element with both weak and strong concepts of sustainability is the principle that there is a need for the long-term maintenance of the capital stock. The implication for natural capital differs, however, depending on which of these extreme positions is taken or whether one falls on the continuum between these extreme positions. On a practical note, considerable effort has been put into linking the economy with the environment through a system of accounts (Statistics Canada 2006; UN 2003) which would augment the current system of national accounts.

The maintenance of capital, and specifically natural capital, is particularly relevant for the agriculture sector and for agricultural policy makers. The agricultural land resource base is important for the overall profitability of the sector. Policy makers should be taking into account changes in the quantity and quality of the agricultural land resource in the development of agricultural policy. Linking the natural capital; i.e. the agricultural land resource base, with the system of national accounts; i.e. the economy, is one means of identifying this impact.

Linking the agricultural land resource base, i.e. the natural capital, to the economy requires that the agricultural land resource base be considered as an asset account where changes in the asset can be accounted for in both physical and monetary terms. In order to do this, the asset account requires an opening inventory of agricultural land and a closing inventory that can be measured in physical terms; both quantity and quality. The opening and closing inventories can then be valued and the change in inventory can be valued. Estimating the change in the value of the natural capital asset is important because it is policy relevant to decision-makers, is more readily applicable to policy decision-making, and has long term implications for the sustainability of the sector.

The study will be innovative in terms of the method used to value the opening and closing inventories of agricultural land. A hedonic pricing approach will be used to estimate the value of the agricultural land inventory. Hedonic pricing is a means of estimating the implicit price of the attributes of a good (Hidano 2002; Haab and McConnell 2002). Hedonic pricing uses market data to estimate the implicit prices of the attributes, and thus is a reveal preference approach for valuing the inventory; i.e. the natural capital.

The following procedure will be used. First, the opening and closing inventories of agricultural land in Quebec will be estimated. This will include both the quantity and quality dimension of the agricultural land resource base. Second, arms-length agricultural land transactions from across the province will be collected. Third, the quantity and quality of the agricultural land involved in the transaction will be identified through a GIS procedure that links the location of the agricultural land transaction with soil productivity of the land. Fourth, a hedonic pricing model will be estimated that will estimate the implicit price of the characteristics of the agricultural land. Fifth, the opening and closing inventory of the agricultural land resource base will be valued with the implicit prices estimated from the hedonic pricing model. Sixth, the change in the value of the agricultural land asset account will be estimated and policy implications will be identified.

Training of Graduate Students

LEARN supported 13 graduate students and 1 research associate this past year. Two of these students have defended their theses and are expected to complete their degrees in the spring of 2011.

Related Research: Commissioned Papers, Thought Pieces, and Other Research (2010-2011)

1. Payment for Ecosystem Services Policies (Dr. David Zilberman, University of California – Berkeley)
2. Social Norms and Wetland Drainage on Farmland in Western Canada: A Literature Review and Research Prospectus (Dr. John Parkins)

4. LEARN Networking: Conferences, Workshops and other Activities

- A. The University of Victoria in conjunction with the University of Alberta, the ERCA-LEARN and Ducks Unlimited Canada hosted a workshop on “Wetlands Management, Economics and Policy” at the Hotel Grand Pacific in Victoria, British Columbia, January 13-15, 2010. Selected papers from the workshop will be published in a special issue of the *Canadian Journal of Agricultural Economics* devoted to wetlands management, economics and policy in June, 2011. Please see the next section for the titles and authors of these papers.

- B. LEARN organized two sessions at the 4th World Congress on Environmental and Resource Economics, held in June 2010 in Montreal.

Clean Energy Policies and the Economics of BioFuels (approximately 60 attended)

Chair: Peter Boxall

1. Carbon abatement in the fuel market with biofuels: Implications for second-best fuel taxes.
Presented by C. Crago and coauthored by M Khanna

2. Domestic policies for global externalities: Technology mandates versus performance standards in the transportation sector.
Presented by D. Rajagopal and coauthored by G. Hochman, D. Zilberman and D. Kammen

3. Quantifying biomass availability and land use change in the agriculture sector from renewable energy production: Implications for sustainable resource use.
Presented by S. Smith

4. The effect of a proportional renewable energy mandate on the use of a nonrenewable resource. Presented by J-P. Amiques and coauthored by U. Chakravorty

Designing Markets for Conservation Offsets and Tenders (approximately 50 attended)

Chair: Peter Boxall

1. Auctioning conservation contracts in the presence of externalities: Theory and simulation of joint-bidding in the uniform price auction.
Presented by Raphael Calel

2. Third-parties in development offset markets: What brings them in?
Presented by Althea Coggan and coauthored with Edwin Buitelaar

3. Opportunity costs as a determinant of participation in payments for ecosystem service schemes
Presented by Tobias Wünscher and coauthored with Stefanie Engel
 4. Reverse auctions for spatially contiguous habitat management
Presented by Simanti Banerjee
- C. LEARN held its annual meeting at the World Congress in Montreal – 10 members and partners were present at this meeting.
- D. LEARN, along with the other ERCA networks, organized a major policy conference in Ottawa title The Future of Farms and Food in Canada: First Annual Canadian Agriculture Policy Conference. The LEARN session included presentations by David Zilberman and Kees van Kooten. In addition four LEARN sponsored posters were presented along with one from the previous FLP network (under the LEARN Banner). The poster titles and presenters are shown in the next section.

5. Research Outputs during the Reporting Period

Presentations:

Adamowicz, W. 2011. Wetlands Economics. Keynote presentation to the Alberta Institute of Agologists Annual Meeting. Banff, Alberta. March 2011.

Adams, T. Sustainable Food for Cities. AESOP (Brighton, UK) Second Sustainable Food System Planning Workshop. October, 2010. (coauthors T Moreau, K Mullinix, A Fallick, P Condon)

Adams, T. Climate Change, Urban Agriculture and You. Simon Fraser University's Local Food Box Dialogue (Vancouver, BC). December, 2011.

Baird, J. Social norms and values: context for implementing performance-based instruments. Presented at Alberta Agriculture and Rural Development December 2, 2010. (coauthors K Belcher and M. Quinn)

Baird, J. Agricultural property rights and water quality. Presented at Indianfarm Creek Watershed Group. December 2, 2010.

Baird, J. Performance-based instruments for managing agricultural water quality: social values as indicators of suitability. Presented at School of Environment and Sustainability, University of Saskatchewan. November 19, 2010. (coauthors K Belcher and M. Quinn)

Baird, J. Performance-based instruments for managing agricultural water quality: social values as indicators of suitability Presented at the Faculty of Environmental Design, University of Calgary. November 17, 2010. (coauthors K Belcher and M. Quinn)

Boxall, P.C. Public policy and valuation: An empirical, pragmatic, and hopefully accurate case study. Presented at the 5th Annual Choice Modelling Workshop, July 22nd 2010, Adelaide SA Australia.

Boxall, P.C. Wetlands, Conservation and Land Use. Presented at the 2010 Annual Meeting of the Alberta Agricultural Economists Society, May 6th 2010, Red Deer.

Boxall, P.C. Wetlands Conservation, BMPs and Economic Incentives to Change Land Use. Presented at the East Kootenay Conservation Program's Workshop on "The Economics of Private Land Conservation," October 27th 2010, Cranbrook BC.

Entem, A., W. Adamowicz and P. Boxall. 2011. Project Presentation at South of the Divide workshop, Saskatoon, SK. Jan. 28, 2011.

Withey, P. Bioeconomic Modeling of Wetlands and Waterfowl in Western Canada: Accounting for Amenity Values. Presented at the 2010 AAFA, CAES & WAEA Joint Annual Meetings, held in Denver, CO, 25 – 27 July, 2010. (coauthors: G. Cornelis van Kooten and Linda Wong).

Poster Presentations

Baird, J.M., Belcher, K., and Quinn, M. 2011. Social norms and values in agricultural water quality management. The Future of Farms and Food in Canada Conference. Ottawa, ON, January 13-14, 2011.

Bryan, J., B. Deaton, and A. Weersink. 2011. An empirical examination of landowner characteristics, social capital, and farmland rental rates in southern Ontario. The Future of Farms and Food in Canada Conference. Ottawa, ON, January 13-14, 2011.

Entem, A., W. Adamowicz and P. Boxall. 2011. An opportunity cost model for species at risk with Saskatchewan's Milk River Watershed. Confor West 2011 Graduate Student Conference. Jasper AB, February 3-6, 2011).

Gulati, S. and T. Adams. 2011. A Border Tax Adjustment Study: Calculating and Pricing the Carbon FoodPrint of Foods Imported to Canada. The Future of Farms and Food in Canada Conference. Ottawa, ON, January 13-14, 2011.

Packman, K., M. Weber, and P.C. Boxall. 2011. Evaluation of Objectives for a Transfer of Development Credit Program: The Beaver Hills Initiative (BHI). The Future of Farms and Food in Canada Conference. Ottawa, ON, January 13-14, 2011.

Stobbe, T. 2011. Valuation of Negative Externalities in the Urban Fringe: The Effect of Propane Cannons on Nearby Neighbours. The Future of Farms and Food in Canada Conference. Ottawa, ON, January 13-14, 2011.

Publications:

Lee, M., H. Barbolet, T. Adams, and M. Thompson. 2010. Every Bite Counts: Climate Justice and BC's Food System. Canadian Centre for Policy Alternatives, BC office.

van Kooten, G. Cornelis, Patrick Withey and Linda Wong, 2011. Bioeconomic Modelling of Wetlands and Waterfowl in Western Canada: Accounting for Amenity Values, *Canadian Journal of Agricultural Economics*. Article first published online 28 Jan. 2011. DOI: 10.1111/j.1744-7976.2010.01216.x

Weersink, A., B. Deaton, J. Bryan and K. Mielke. 2011. Consider interest rates in land deals. *Ontario Farmer* April 12 2011.

Withey, Patrick and G. Cornelis van Kooten, 2011. The Effect of Climate Change on Optimal Wetlands and Waterfowl Management in Western Canada, *Ecological Economics* 70(4): 798-805.

Withey, Patrick and G.C. van Kooten, 2011. The effect of climate change on wetlands and waterfowl in Western Canada: Incorporating cropping decisions into a bioeconomic model. Submitted to *Environmental & Resource Economics*, February.

Wong, Linda, G. Cornelis van Kooten and Judith A. Clarke, 2011. The Impact of Agriculture on Waterfowl Abundance: Evidence from Panel Data. Submitted to *J of Environmental Economics and Management* February.

Canadian Journal of Agricultural Economics Special Issue on Wetlands 2011, sponsored by LEARN: Papers were originally presented at the International Workshop on Wetlands Management, Economics and Policy held at the Hotel Grand Pacific, Victoria B.C., 13-15, January 2010. Workshop organized by University of Victoria, Resource Economics and Policy Analysis Research Group and LEARN with sponsorship from Ducks Unlimited Canada and Agriculture and Agri-Food Canada.

Boxall, P.C. and G.C. van Kooten, **Protecting and Restoring Wetlands: The Way Forward.**

Rashford, B.S., C.T. Bastian and J.G. Cole, **Agricultural Land Use Change in Prairie Canada: Implications for Wetland and Waterfowl Habitat Conservation**

Kim, S.G., S. Cho, and R. K. Roberts, **Identifying Priority Areas for Wetlands Restoration along the Louisiana Coast under the Coastal Wetlands Planning, Protection, and Restoration Act of 1990**

R.D. Simpson, **Allocating Land for an Ecosystem Service: A Simple Model of Nutrient Retention with an Application to the Chesapeake Bay Watershed**

Hill, M.R.J., D.G. McMaster, T. Harrison, A. Hershmillier and Trevor Plews, **A Reverse Auction for Wetland Restoration in the Assiniboine River Watershed, Saskatchewan**

Fernandez, L., **Economic Incentives to Prevent Aquatic Invasive Species in Wetlands**

Yu, J. and K. Belcher, **An Economic Analysis of Landowners' Willingness to Adopt Wetland and Riparian Conservation Management**

van Kooten, G.C., P. Withey, and L. Wong, **Bioeconomic modeling of wetlands and waterfowl in Western Canada: Accounting for amenity values** (NOTE - also listed above under Dr. van Kooten's publications)

Pattison, J., P.C. Boxall and W.L. Adamowicz, **The Economic Benefits of Wetland Retention and Restoration in Manitoba**