Targeting of Ecosystem Goods and Services: Directing Agri-Environmental Policy Innovation.

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Outline

- Background
- Problem Statement
- Objectives
- Study area
- Proposed methods
- Concluding remarks
Background

- The intensification of agriculture has yielded many harmful environmental effects such as water and air pollution, loss of wildlife habitats and landscape features, water depletion, soil degradation, etc.

- Driven by public concerns over the environmental impacts of agriculture many agri-environmental policies have been introduced.

- The Government of Canada and the provincial and territorial governments are investing $1.3 billion over last five years into Growing Forward programs(Agriculture & Agri-Food Canada).
The national farm stewardship program (CSFS) under the Growing Forward program is the primary policy approach to address environmental issues in Canada.

Environmental Farm Planning (EFP) and Agri-Environmental Group Planning (AEGP) are funded by Canada Saskatchewan Farm Stewardship program.

Under EFP and AEGP agricultural producers are encouraged to complete an assessment in order to identify environmental risks and opportunities on their operations and develop their own action plans to identify Best Management Practices (BMP) that address environmental risk on their operations.

• According to Babcock et al. (1997) a targeting scheme is a decision rule that can be used to select the land or other resources for a particular policy.

• Babcock et al (1997) introduced three major types of targeting mechanisms namely benefit maximizing; cost minimizing, and maximizing the benefits-to-cost ratio.
Taff and Runge (1987) has explained how available land parcels can be classified into four regions in the cost benefit plain.

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>I – High benefit, low cost</td>
<td>Targeting low cost land - region I, III</td>
</tr>
<tr>
<td>II – High benefit, high cost</td>
<td>Targeting high-benefit land - region I, II</td>
</tr>
<tr>
<td>III – Low benefit, low cost</td>
<td>Targeting land based on ratio of benefit to cost – region I, III (and II depend on fund availability)</td>
</tr>
<tr>
<td>IV – High Cost, low benefit</td>
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Benefit: I – High benefit, low cost; II – High benefit, high cost; III – Low benefit, low cost; IV – High Cost, low benefit.
Yang (2004), showed that the initial non-targeted framework used to select land for Conservation reserve program (CRP) was not been able to maximize the erosion reduction per acre. Introduction of EBI (Environmental Benefit Index) in 1990, was able to shift the focus of CRP from acreage enrollment maximization to net benefit maximization.

Yang et al, (2004) showed that in the presence of heterogeneous land quality, the land with higher erosion benefits and low rental payments should be targeted in order to guarantee the cost effectiveness of the Conservation Reserve Enhancement Program (CREP) program.
Background cont...


- Burger et al, (2006) has discussed the environmental benefits of targeting and argued that through targeting, conservation investments can be directed to those areas where the benefits are greatest relative to the costs, and thus can increase the cost effectiveness of the conservation programs.
Use of GIS

• In order to effectively implement policy targeting, the spatial heterogeneity of landscape should be effectively reflected by a tool.

• The following characteristics of GIS enables its usage in targeting lands for an environmental policy:
  • Ability to use mapping program and database interactively to analyse the characteristics of land
  • Ability to map multiple layers in mapping program
  • Ability to analyse the characteristic of land using various layers with overlay tool
Problem statement

- Given the size of the budget allocated to agri-environmental programs, and the often large and heterogeneous nature of agricultural landscapes, formulating efficient policy is a challenge.

- The focus of this research is to evaluate the effect of different agri-environmental targeting approaches on the provision of habitats for wildlife.
Specific objectives

• Review agri-environmental policy instruments and policy targeting initiatives to understand existing approaches.

• Develop a GIS database representation of a study region within an agricultural landscape.

• Develop a representative wildlife habitat conservation policy approaches to meet conservation objectives.
Specific objectives cont...

- Apply the habitat conservation policy approaches to the agricultural region using different targeting protocols.

- Review wildlife habitat outcomes and assess relative performance of policy and targeting outcomes.
  - Economics of targeting delivery will be analysed
  - Including comparison of administration cost of targeting delivery with non targeting delivery
Study area

The study area is RM 435, Agricultural landscape around Red berry Lake, North East of Saskatoon
The land parcels are defined by delineating a 100m wide buffer area around each wetland in Specific habitat focus approach.
Specific habitat focus approach

- **Benefit maximising approach** - land parcels within the delineated wetland buffer were selected based on the amount of native vegetative cover (native grass, shrubs and trees) within the delineated wetland buffer zones.

- **Cost minimizing approach** - land parcels within the delineated wetland buffer with the lowest per unit assessment value was selected, with no consideration of the area of native vegetation within the selected parcels.

- The **benefit-cost maximizing targeting approach** was implemented by calculating the ratio of the area of natural vegetative cover and assessed land value of the parcels in the buffer, and selecting those parcels with higher ratio.
Policy delivery mechanisms

- **Specific habitat focus approach**: This approach focuses on enrolling specific land parcels which are identified as suitable habitat for wetland dependent species. The land parcels are defined by delineating a 100m wide buffer area around each wetland in this method.

- **Habitat and surrounding quarter section focus approach**: This approach also focuses on the habitat sites identified in the first method described above. Rather than securing just the wetland and the associated 100m buffer area, the entire quarter section that contains the habitat is secured.
## Results of specific habitat focus approach

<table>
<thead>
<tr>
<th>Targeting method</th>
<th>Total land area secured in ha</th>
<th>The amount spent ($/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit targeting</td>
<td>4,023.55</td>
<td>1,492,181.75</td>
</tr>
<tr>
<td>Cost targeting</td>
<td>4,629.31</td>
<td>1,490,056.25</td>
</tr>
<tr>
<td>Benefit to cost targeting</td>
<td>4,491.21</td>
<td>1,481,701.67</td>
</tr>
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</table>
Land parcels identified under benefit targeting approach
Land parcels identified under cost targeting approach
Comparison of two targeting methods
Concluding remarks

- This research is important to show that through targeting, conservation investments can be directed to the land with the most potential for producing environmental benefits, and those areas where the benefits are greatest relative to the costs.

- The research will develop an approach to examine targeting of particular BMPs.

- This analysis needed to be strengthen the qualitative assessment of environmental benefits of the parcels of land secured under each of the approaches.

- Need to analyse administrative cost under targeting and non-targeting policy delivery.
Concluding remarks cont. ...

- Other than spending the budget on one approach the budget may be allocated towards a mixed approach.

As an example in the targeting of benefit land, a portion of the budget would be allocated for parcels with higher benefits and the remainder of the budget would be used to secure the neighbouring low cost land.
Thank you!