Afforestation and Climate Change: Government of Canada's Work Activities
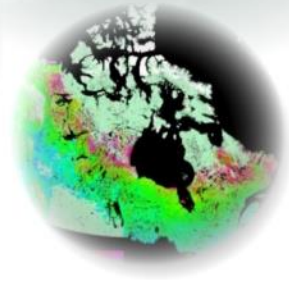
Australia Bioenergy Association
March 26, 2004

Background

- As a result of the Kyoto Protocol, renewed interest in afforestation in Canada – now has a new economic and environmental dimension.

- Canada's afforestation activities focus on lands that were cleared for agriculture in the early 1900's.

- Lands tend to be unsuitable (i.e., unprofitable) for farming and have been abandoned.

- Small amount of afforestation occurring in Canada seems to be driven by a mix of objectives – watershed protection, fibre production and site rehabilitation.

- Policy Question - Will the potential market benefits of carbon be enough to encourage additional A/R in Canada?

Background (cont.)

○ The Government of Canada (GoC) is exploring the potential for afforestation to derive both environmental and economic benefits

○ GoC interested in encouraging A/R through market mechanisms to help achieve its GHG emission reduction targets

○ To help support this policy objective, two GoC A/R related initiative are underway:

– Feasibility Assessment of Afforestation for Carbon Sequestration (FAACS) initiative

– Forest 2020 Plantation Demonstration and Assessment (PDA) initiative

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FAACS Initiative Overview

FAACS Overview

○ GoC's first steps to achieving Kyoto outlined in the *Government of Canada's Action Plan 2000 on Climate Change*.

○ Included in Action Plan 2000 was the Feasibility Assessment of Afforestation for Carbon Sequestration (FAACS) initiative

○ A three year initiative that focuses on exploring afforestation carbon sequestration opportunities.

○ Main Objective:

– Collect information to help assess the feasibility of afforestation as an effective measure in responding to Kyoto

○ Expected Results:

– Information and tools to inform policy decisions

– Analysis on the use of large-scale afforestation as an effective climate change mitigation measure

FAACS Work Plan

1. Land Assessment and Information Development
   - Evaluate existing information / Fill information gaps
   - Develop modeling tools to predict land availability and afforestation uptake

2. Afforestation Pilot Projects
   - Test afforestation interest and participation rates
   - Obtain feedback from landowners and industry

3. Other Linkages
   - Develop measurement and monitoring tools
   - Enhance public education and outreach
   - Conduct economic and social impact assessments

- Results will feed into the development of an Afforestation Feasibility Report

Research Activities

- Current information and model development projects:
  - Historical afforestation 1990 to 2002 in Canada
  - Responsiveness of landowners to various afforestation incentives
  - Economic benefits and costs information collection
  - Afforestation Land Suitability Model (G&Y predictions)
  - Carbon Budget Model work to track carbon stock change from afforestation activities
  - National guidelines (i.e., Protocols) to estimate project level carbon sequestration
  - Developing a National reporting system for A/R projects
  - Afforestation Economic Model and Information System

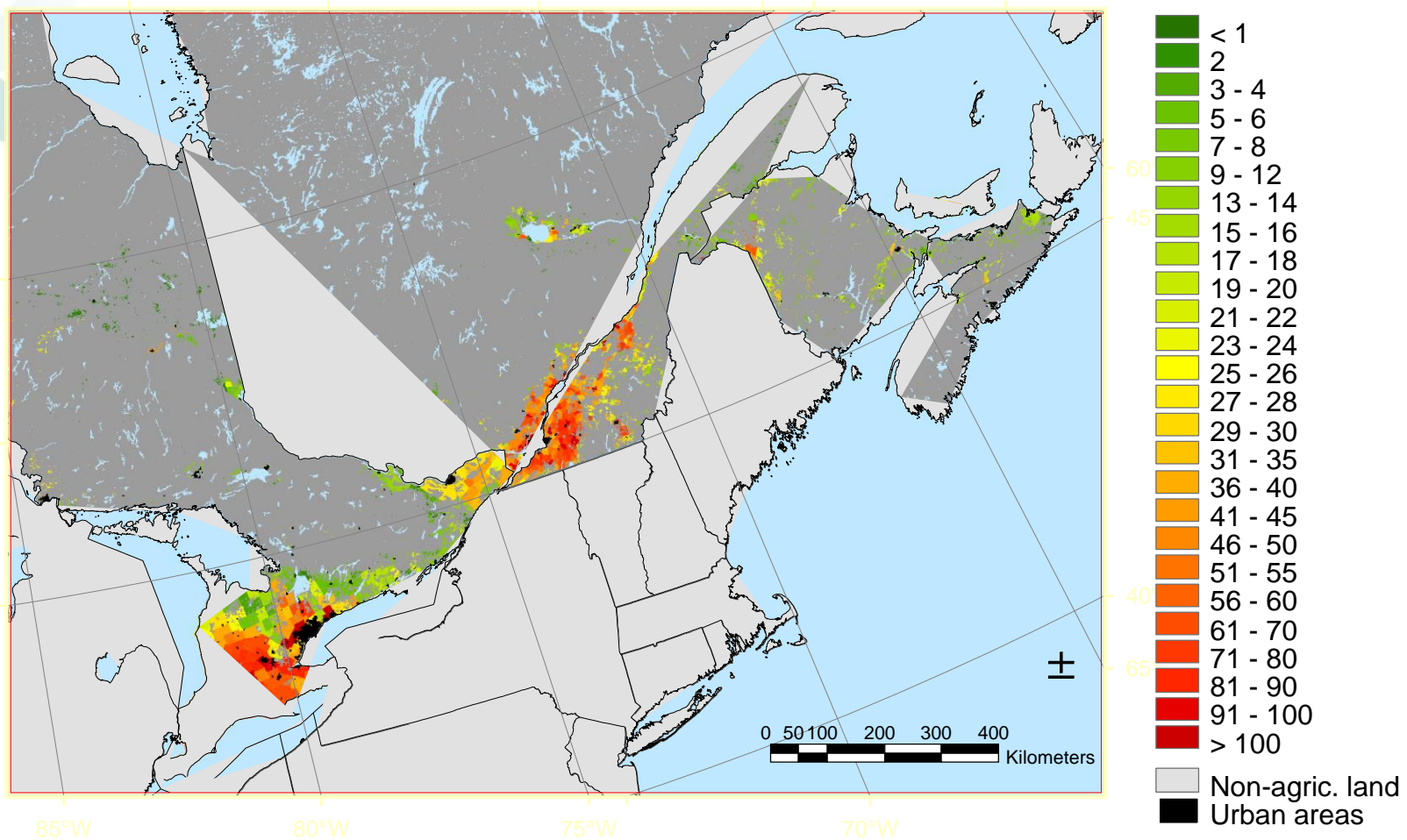# A/R Economic Model

Model Overview
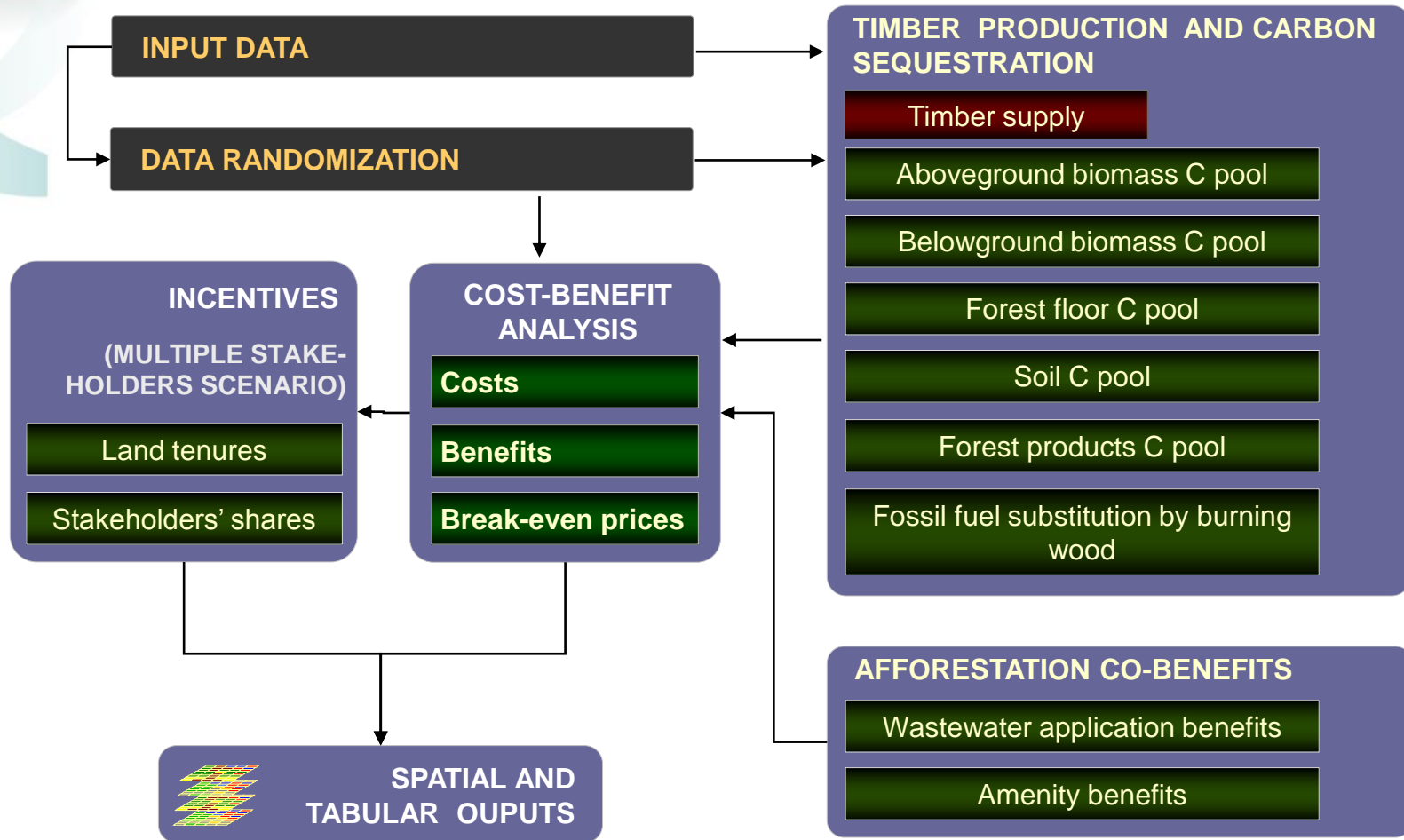
Example of Model Results


EXAMPLE FOR EASTERN CANADA

Mean values, $ per tonne CO_2

Legend:
- < 1
- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- 13 - 14
- 15 - 16
- 17 - 18
- 19 - 20
- 21 - 22
- 23 - 24
- 25 - 26
- 27 - 28
- 29 - 30
- 31 - 35
- 36 - 40
- 41 - 45
- 46 - 50
- 51 - 55
- 56 - 60
- 61 - 70
- 71 - 80
- 81 - 90
- 91 - 100
- > 100
- Non-agric. land
- Urban areas

0 50 100 200 300 400 Kilometers

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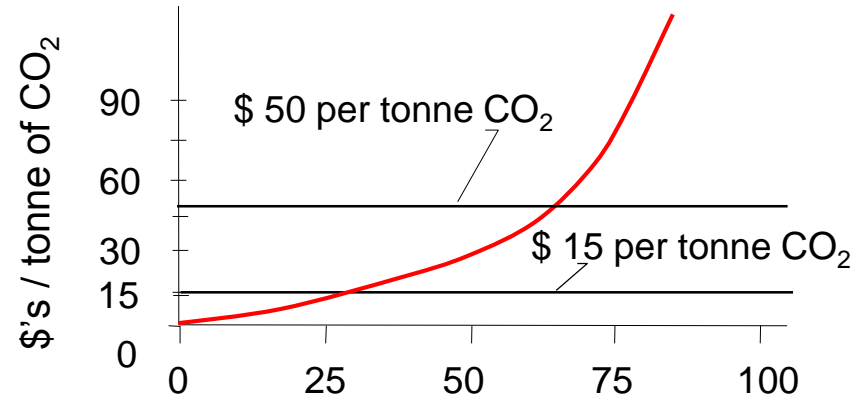Canadian Forest Service / Service canadien des forêts

Land vs CO_2 Values

AREA OF LAND ECONOMCIAL ATTRACTIVE FOR AFFORESTATION

EASTERN CANADA SCENARIO: 20 m³ / ha / yr

EASTERN CANADA SCENARIO: 12 m³ / ha / yr

Per cent of Total Agricultural Land
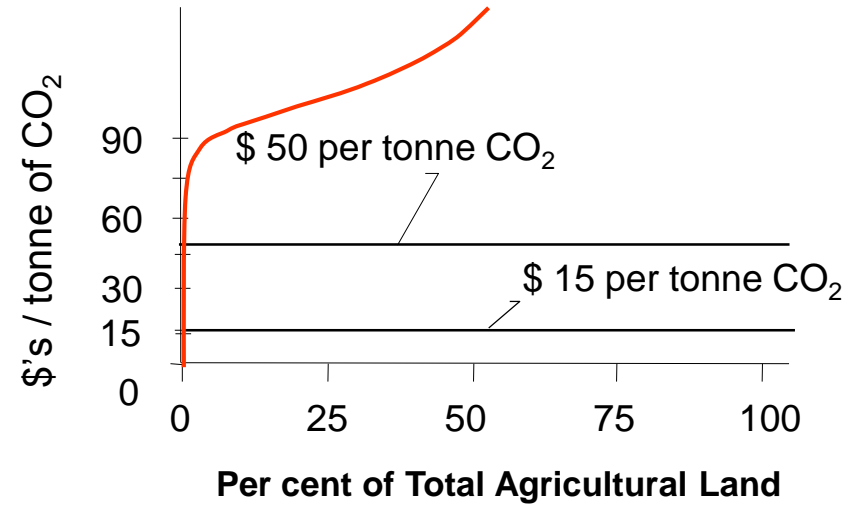
Preliminary Observations

- From a biological perspective, significant amount of land available for afforestation in Canada
- Only a subset of this land is economically feasible (incorporating both carbon and fibre values)
- Broad scale afforestation in Canada seems to be profitable if:
  - focus on fast growing species > 12 m³ / ha / yr at 20 yr rotation (economics very sensitive to growth rates)
  - market exists for carbon and prices need to be moderate
  - long term credit (beyond 5 year commitment period) system exists
  - carbon market transactions costs can be minimized
- Need to explore how the values from other co-benefits influence the afforestation economics

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Forest 2020 PDA Initiative Overview

F2020 PDA Overview

- *Climate Change Plan for Canada* – August 2003
  - Budget 2003: $1 billion to support the federal investment in climate change mitigation actions

- Forest 2020 Plantation Demonstrations
  - Two-year, $20 million, fast growing plantation investigation

- Objective
  - Demonstrate fast growing plantations across Canada and explore potential investment models to attract funds for future plantations

- Two Key Components
  - Investment Mechanism Options and Feasibility – policy, economics and science considerations
  - Fast Growing Plantation Demonstrations – regional partnerships with key players…e.g., governments, conservation groups, woodlot associations, etc.

Investment Mechanisms

○ Goal:

– Assess economics of fast growing plantations and explore potential investment models and approaches to attract funds for future plantation

○ Planned Activities

– Economic assessment – are fast growing plantations a viable investment and what are the investment risks?

– Improve biophysical and economic information on fast growing plantations – limited information currently exists

– Investigate and develop options / approaches to attract private investment

• Types of investment models?

• Requirements for an efficient capital market environment?

• What is the role for the Federal Government and Others?

Demonstrations

- Goal
  - Establish fast growing plantation demonstration sites (6,000 ha)

- Planned Activities
  - Plantation demonstrations are being delivered at a regional level
  - Identify partners for delivery
  - Tree stock acquisition (fast growing species)
  - Identify suitable land for demonstrations (eligible under Kyoto)
  - Site preparation and plantation establishment (Spring / Fall)
  - Information collection and demonstration activities

- Current Status
  - Selecting partners for regional delivery
  - Some land has been identified and site preparation underway (very small amount)
  - Secure planting stock and prepare for Spring 2004

Initiative Key Outcomes

○ Showcase the use of fast growing plantations to help contribute to Canada's GHG emissions reduction commitments.

○ Improve the knowledge and infrastructure to support the establishment of future plantations in Canada

○ Test how afforestation projects would work in a domestic offset trading system

○ Identification of realistic set of investment mechanisms and approaches to encourage private investment in Canadian plantations

Concluding Comments

- Significant amount of work in Canada examining opportunities to encourage afforestation to address climate change and fibre supply needs

- Interest in pursuing market-based approaches to encourage action – helps ensure long term solution

- Developing information and tools to help policy makers, industry, landowners understand potential afforestation returns – address market information needs

- Working in partnership with other levels of government, industry and associations to evaluate the merits of pursuing afforestation as an effective climate change mitigation activity

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For More Information

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ANNEX
Afforestation Research
Project Descriptions

Historical Afforestation

○ **Description**

– Quantify past afforestation in Canada (1990 to 2002)

– CFS Forestry Centres working in partnership with jurisdictions, private sector, and conservation organizations to document historical afforestation

– Data is stored in a national database and will be used to derive carbon sequestration impacts

○ **Expected Outputs**

– Data on afforestation from 1990 to 2002 (location, annual planting estimates, species, etc.)

– Carbon sequestration impacts over 2008 to 20012

Incentives Review

- **Description**
  - Determine the practical set of economic incentives that make sense for Canada
  - Study incentive successful and unsuccessful mechanisms from Canadian and foreign experiences
  - Explore the barriers facing Canadian afforestation

- **Expected Outputs**
  - Phase 1 - Report of potential afforestation incentives mechanisms
  - Phase 2 - Report on favourable Canadian incentive options

Rural Landowners Survey

- **Description**
  - Environics Research Group completed National Survey of Rural Landowners – Spring 2003
    - `http://www.stewardshipcanada.ca/documents/national rurallandownersurvey2003.pdf`
  - Focus on land stewardship including question on afforestation activities and incentives
  - Supplementary analysis to drill down on the results

- **Expected Outputs**
  - Series of reports - effects of different economic incentives and land availability

Economic Modeling

○ **Description**

– Development of a spatially explicit cost-benefit afforestation information system

– The system examines the link between the biology and economics of afforestation on agricultural lands inclusive of uncertainty in biology and economics

– Identify land and conditions / assumptions for economically attractive afforestation investments

○ **Expected Outputs**

– Spatially explicit economic model of afforestation potential

– Economic tool for research, industry and governments

– Tabular output and colour coded maps are both produced

– Scenario analysis – "What if?" tool

Land Suitability Modeling

○ **Description**

– Development of an evaluation system that matches tree species with site characteristics

– Prairie-wide pilot system based on GIS and spatial biogeoclimatic input to analyze various tree species on different sites

– The model will produce land suitability classifications and yield potential estimates – linkages with economic model

○ **Expected Outputs**

– Land suitability and classification model

– Coarse scale growth and yield predictions

– Project report and manual

Risk Assessments

○ **Description**

– Conduct a science risk assessment workshop on fast growing plantations

– Assess and quantify plantation specific risks

• Insects, disease, fire, drought, etc

○ **Expected Outputs**

– Fast Growing Plantation Risk Assessment Report

– Results will feed into the Carbon Budget Model afforestation module and economic model parameters

Incentives Pilots

○ **Description**

– Establish information collection partnerships with provinces, industry and landowner associations

– Obtain feedback from landowners on a range of incentives to expand forest cover

– Feedback collected from surveys and workshops

○ **Expected Outputs**

– Test responsiveness of landowners to various incentives

– Quantitative data and documentation of attitudes

– Report on pilot findings

○ **Description**

– Develop tools to track carbon stock change from afforestation activities

  • Afforestation module for the Carbon Budget Model (CBM-CFS) to estimate carbon impacts

– Develop a national database to store afforestation events

○ **Expected Outputs**

– Information tools to estimate afforestation carbon stock changes

– National database to store afforestation activities - linked into CBM-CFS

A/R Project Reporting System

- **Description**
  - Development of a national reporting system for A/R projects
  - An internet based reporting tool to facilitate national reporting and carbon modeling

- **Expected Outputs**
  - Internet based afforestation/reforestation project reporting tool

Afforestation M&M Protocols

○ **Description**

– Development of a set of national guidelines to assist land managers in estimating carbon sequestration from A/R projects – Afforestation protocol example

– Protocol will include guidelines for: site assessment, measurement and monitoring of growth and yield, and site parameters for carbon accounting

○ **Expected Outputs**

– Example of a carbon measurement, monitoring and verification protocol for A/R projects