



# A Blueprint for Forest Carbon Science in Canada 2012–2020

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Natural Resources  
Canada

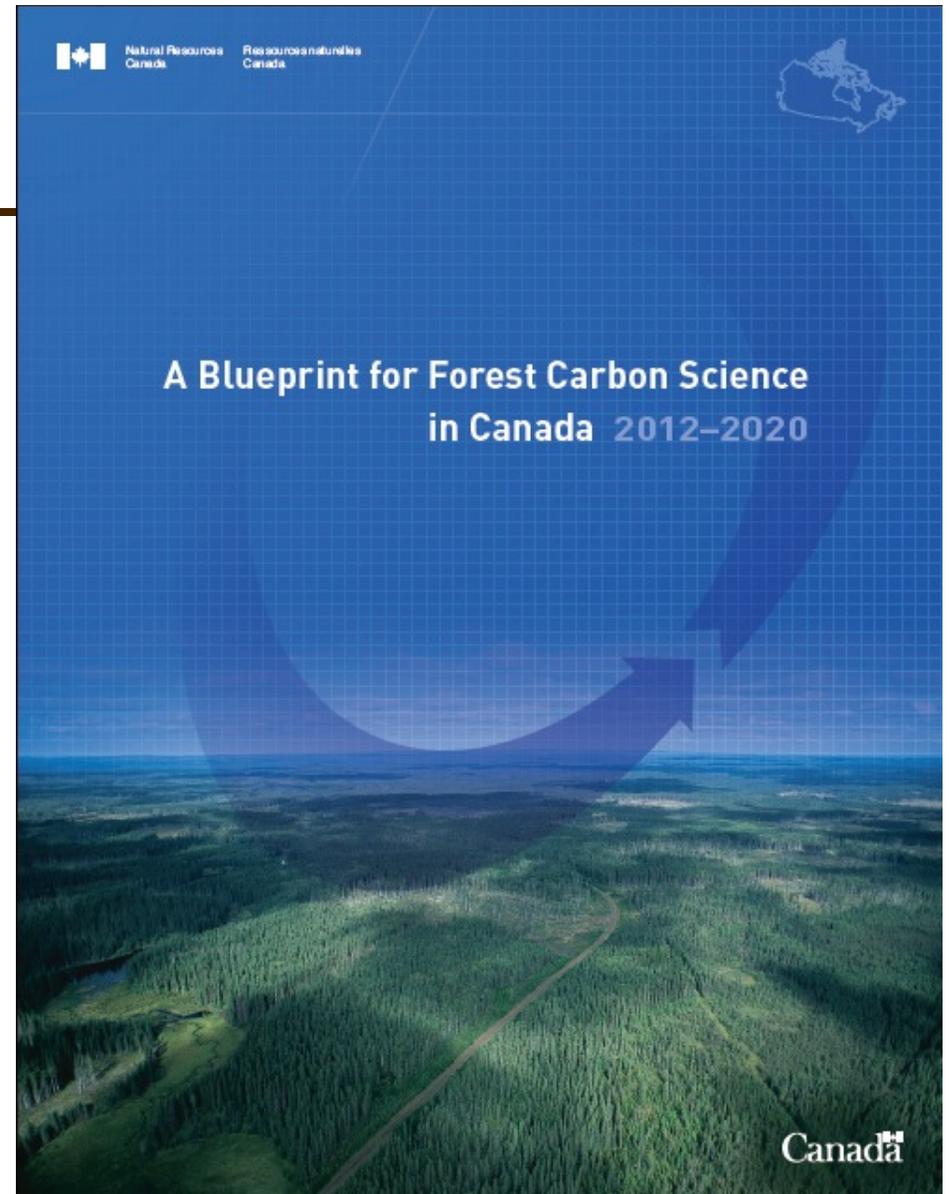
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# Outline

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- Background
- Process
- Forest Carbon Science and Policy Needs
- Research Activities, Infrastructure, and Institutional Arrangements
- Implementing the Blueprint



# Background

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- Bottom-up process designed to
  - Identify policy drivers and related science science questions,
  - Identify and communicate research priorities to CFS and other agencies (provinces, funding agencies, universities),
  - Increase efficiencies through focus and coordination of research,
  - Offer a vision for the way forward.
- Scope excluded cost scenarios
- Focus on forests & forest sector with links to other sectors
- Process led by Canadian Forest Service science and policy communities, and involved other federal departments, provincial agencies and academia



# Process

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- Process started in 2010
- Involved over 80 forest C scientists & policy analysts.
- Two workshops to:
  - delineate science and policy C issues
  - get feedback from the policy and research communities
- Three successive drafts subjected to a broad review process
- Publication in December 2012



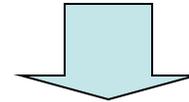
# Structure

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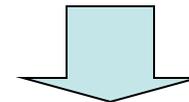
	Policy Themes			
Science Themes	X	X	X	X
	X		X	X
	X		X	X
	X			X



10 Science Questions  
29 Goals and related activities



Data Acquisition, Monitoring & Experiments  
Date Storage & Distribution  
Data Analysis, Integration & Synthesis  
Knowledge Transfer



Implementation and Vision



# Forest Carbon Science and Policy Needs

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- Past success of forest C science based on close cooperation between science and policy communities.
- Facilitated by national-scale integrating framework.
- Canada as global exporter of wood products accountable to our domestic and international clientele.



# Forest Carbon Science and Policy Needs

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## Four policy themes to inform science needs:

1. Climate-responsible forest stewardship
  - Sustainable management of forests under climate change
2. Domestic and international reporting requirements
  - Criteria and Indicators, UNFCCC, FAO, State of Forest reporting.
3. Policies & rules that reflect Canada's forest characteristics
  - Very large forests, low population density, mostly boreal, with large-scale disturbances and extensive forest management
4. Climate change mitigation
  - Contribution of forest management and forest products to mitigation



# Forest Carbon Science and Policy Needs

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## Four science themes ...

1. Improved estimates of current GHG sources and sinks in Canada's forests
2. Improved estimates of the effects of global changes on Canada's future forest C
3. Improved estimates of the impact of Canada's forests on the global climate system
4. Improved estimates of the contribution that Canada's forests can make to climate change mitigation

**... with 10 questions and 29 research goals.**



# Research Activities, Infrastructure, and Institutional Arrangements

Achieving science and policy goals requires

- substantial institutional & infrastructure support, and
- development and maintenance of expertise.

## DATA ACQUISITION: MONITORING, OBSERVATIONS, AND EXPERIMENTS

Forest inventories	1.1, 1.2, 1.3, 3.1, 3.2, 4.1, 4.3
Remote sensing	1.1, 1.3, 3.1
Field studies	1.1, 1.2, 2.1, 2.2, 3.2, 4.3
Flux towers	1.1, 1.2, 1.3, 2.1, 3.2
Measurements of atmospheric C	1.3



## DATA STORAGE AND DISTRIBUTION

Databases and information systems	1.1, 1.2, 1.3, 2.1, 4.2, 4.3
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## DATA ANALYSIS, INTEGRATION, AND SYNTHESIS

Bottom-up ecosystem modeling	1.1, 1.2, 1.3, 2.1, 2.2, 3.2, 4.1, 4.2
Top-down atmospheric modeling	1.3
Economic modeling	4.1, 4.2, 4.3



## KNOWLEDGE TRANSFER

Knowledge transfer	All science questions
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# Research Activities, Infrastructure, and Institutional Arrangements

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Demonstrate how support contributes to each science question.

SCIENCE QUESTIONS	DATA ACQUISITION: MONITORING, OBSERVATIONS, AND EXPERIMENTS					DATA STORAGE AND DISTRIBUTION	DATA ANALYSIS, INTEGRATION, AND SYNTHESIS		
	Forest inventories	Remote sensing	Field studies	Flux towers	Measurements of atmospheric CO <sub>2</sub>	Databases and information systems	Bottom-up ecosystem modeling	Top-down atmospheric modeling	Economic modeling
3.1 How does the influence of forest C fluxes on climate compare to the influence of other processes and properties related to forest cover?	+	+							
3.2 What will be the contribution of Canada's forests to the future global GHG budget?	+		+	+			+		
4.1 What activities in forest ecosystems can best contribute to mitigation objectives?	+						+		+
4.2 What actions involving harvested wood products can best contribute to mitigation objectives?						+	+		+
4.3 What actions involving bioenergy from forest biomass can best contribute to mitigation objectives while ensuring the sustainability of biomass harvesting?	+		+			+			+

# Implementing the Blueprint

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- **Eleven actions to implement the Blueprint**
  1. Strengthen **networking** and knowledge exchange
  2. Improve **framework** for C data integration, synthesis, & analysis
  3. Quantify with reduced uncertainty impacts of **environmental drivers** on forest C dynamics
  4. Quantify with reduced uncertainty the impacts of **human activities** on forest C dynamics
  5. Expand forest C budget analyses to Canada's **entire forest**
  6. Improve spatial coverage and accuracy of **forest inventory**



# Implementing the Blueprint

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- **Eleven actions to implement the Blueprint (continued)**
- 7. Generate **annual statistics** on areas affected by fires, insects and diseases, forest management, and land-use changes
- 8. Enable **spatial and temporal extrapolation** of C fluxes
- 9. **Integrate** forest C science into larger-scale C assessments
- 10. Assess biophysical & **economic implications** of mitigation options in the forest sector
- 11. **Train** the next generation of C science experts



# Implementing the Blueprint

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## Vision for an Integrating System for Forest C Science in Canada

The 2<sup>nd</sup> generation forest C monitoring and reporting system:

1. is spatially explicit with a high spatial resolution;
2. includes both managed and unmanaged forests;
3. is updated annually with disturbance, human activity and climate information;
4. represents global change impacts on C dynamics;
5. includes harvested wood products, sequestration, and storage and mitigation economics; and
6. has other features outlined in the vision.



# Status

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- Blueprint was released in December 2012
- Sustained core funding in CFS for C science and related activities
- Blueprint contributing to coordination of future research
- Presented as an integrating framework for multi-scale and multi-institution activities
- Recognition that the implementation of the integrating framework will serve many other needs
- → evolution to “Integrated Systems Approach to Forest Science and Policy” where carbon is one of several issues that will be addressed



# Acknowledgements

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- Financial support of the Canadian Forest Service.
- Thanks to the forest carbon science and policy communities for their involvement and contributions without which this Blueprint would not have been possible.



# Thank you

English:

<http://cfs.nrcan.gc.ca/publications?id=34222>

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