Inaugural Symposium on
Science and Public Policy

Friday, September 25, 2015, 15:00 – 18:00h
McGill University Faculty Club
Reports from Trottier Fellows in Science and Public Policy:

Elena Bennett, Lea Berrang Ford, and Catherine Potvin

Proposed activities from the ‘new’ Trottier Fellows:

Jeff McKenzie, Tony Ricciardi and Nancy Ross

Round Table Discussion on
Issues in Science and Public Policy:

Elena Bennett, Lea Berrang Ford, Catherine Potvin, Antonia Maioni and Nigel Roulet

Reception
Liberally adapted from Kingdon ‘Agendas, Alternatives and Public Policies’, Longman.
Get Science Right

The federal government’s science policy isn’t working for Canadians.
Scientists are being muzzled, programs are being cut, and Canada’s research capacity is falling further behind other countries. It’s time for a new direction.

Join the campaign for a science policy that puts the public interest first and builds upon the proven strengths of academic and government research.

What will you do?

- Take action
- Do nothing

The future of science and research in Canada is in jeopardy.

Muzzling scientists could harm our health, safety and environment.
To serve the public interest, government scientists must be free to speak with Canadians about their research.

Basic research drives real innovation and job growth.
Investment in discovery-driven research should be restored to levels spent 10 years ago so Canada can remain competitive.

Scientists and researchers, not CEOs and politicians, should decide what research projects are worth funding.
Funding decisions and research granting agencies should be free from political and corporate influence.

Evidence, not ideology, should inform policy.
The federal government should reinvest in its own research programs like the Census, and create a Parliamentary Science Officer to provide unbiased advice on scientific policies, priorities, and funding.
Reports from the Trottier Fellows:

Elena Bennett

McGill School of Environment and Department of Natural Resource Sciences
The Montérégie Connection

Elena M. Bennett

@ElenaBennett
Goal: Communities making proactive decisions to design a resilient, multi-functional landscape

How: Understand ecosystem services & how they are affected by landscape configuration
Working with local stakeholders
Learning from the past and assessing the present...to plan the future

PAST

PRESENT

FUTURE

Land Use/Land Cover

Ecosystem services

Biodiversity

Scenario 1

Scenario 2

Scenario 3
Maple syrup
C sequestration
Soil P retention
Soil org matter
Cottages
Water Quality
Tourism
Nature appreciation
Forest recreation
Crop production
Deer kills
Pork production
Raudsepp-Hearne, Peterson, Bennett 2010 PNAS
The Role of Landscape Composition and Configuration

Lamy, Liss, Bennett, and Gonzalez. In review
Renard et al. PNAS In Press
THE WHAT IF MACHINE

\[ f_a = \frac{f(x_0 + 1) - f(x_0 - 1)}{2} \]

\[ f_b = \frac{f(m + 1) - f(m - 1)}{2} \]

\[ f_{xx} = \frac{f(x_0 - 1) - 2f(x_0) + f(x_0 + 1)}{4} \]
Scénario 1

TROP, C’EST COMME PAS ASSEZ
Scénario 2

LE PLEIN D’ÉNERGIE
Scénario 3

UNE VIE DE FRICHE
Scénario 4

VIRER AU VERT
Scénario 2 : Le plein d’énergie

Qualité esthétique

Aujourd’hui

Scénario 2
Partners: Thank you!

Students:
• Ciara Raudsepp-Hearne
• Matt Mitchell
• Kate Liss
• Martine Larouche
• Carly Ziter
• Dorothy Maguire
• Kyle Teixeira-Martins
• Bronwyn Rayfield
• Cecile Albert
• Delphine Renard
• Sylvester Delmotte

Collaborators:
• Jeff Cardille
• Andy Gonzalez
• Martin Lechowicz
• Jeanine Rhemtulla
• Chris Buddle

Montérégie Farmers et Vergers - Yvan Savaria, Francois Brodeur, Lamoureux Noel, Cyrille Beaudreault, Marcel Viens, Louis-Alexandre Gurtin, Claire Lavoie, Ghyslain Lamontagne, Daniel Lussier, Genevieve Blain, Yves Bessette, Andre Palardy, Rosaire Bernard, Andre Jelbert
Au Pavillon de la Pomme, Verger Barber, Verger Boucher et Fils, Verger Gauvin, Verger Gingras, Verger Kessler, Verger MacLean, Verger Messier, Verger Riquita, Verger St-Paul

Max Bell Foundation
NSERC CRSNG
Reports from the Trottier Fellows:

Lea Berrang Ford

Department of Geography
CLIMATE CHANGE & HEALTH

White House Climate Change Summit Highlights Health Dangers

The human body isn't immune to the fallout from global warming.
Climate change is the greatest challenge (2009) and opportunity (2015) to health this century.

Costello, Lancet
THE CHALLENGE FOR PUBLIC HEALTH: ADAPTATION

• Are we adapting to climate change?
• What does adaptation ‘look’ like?
• Can we track adaptation?
Launch of TRAC3: Tracking Adaptation to Climate Change Consortium

✓ McGill University (Canada)
✓ Wageningen University (Netherlands)
✓ 3 pillars

1. Adaptation metrics
   Lea Berrang Ford

2. Case-studies
   James Ford

3. Policy theory
   Robbert Biesbroeck

TRAC3 Launches!

TRAC3 was launched in 2014 to link a growing network of researchers working to advance approaches to tracking progress on adaptation to impacts of climate change. Our goal is to explore the conceptual dimensions of adaptation tracking, develop innovative methods for measuring adaptation progress across scales, and develop our understanding of what drives adaptation leaders.
TRAC3 PUBLICATIONS

COMMENTARY: NATURE CLIMATE CHANGE | VOL 5 | NOVEMBER 2015 |

Adaptation tracking for a post-2015 climate agreement

J.D. Ford, L. Berrang-Ford, R. Biesbroek, M. Araos, S. Austin and A. Lesnikowski

National-level factors affecting planned, public adaptation to health impacts of climate change

A.C. Lesnikowski 1,4, J.D. Ford 5, L. Berrang-Ford 4, M. Barrera 6, P. Berry 5, J. Henderson 5, S.J. Heymann 5, 7, 8

Climatic Change (2014) 124:441–450
DOI 10.1007/s10584-014-1078-3

What drives national adaptation? A global assessment

Lea Berrang-Ford 1, James D. Ford 1, Alexandra Lesnikowski 1, Carolyn Pouliainen 1, Magda Barrera 6, S. Jody Heymann 5

Reg Environ Change DOI 10.1007/s10584-014-076-7

Systematic review approaches for climate change adaptation research

Lea Berrang-Ford 1, Tristan Pearce 1, James D. Ford 1

Adapting to health impacts of climate change: a study of UNFCCC Annex I parties

A.C. Lesnikowski 1, J.D. Ford 5, L. Berrang-Ford 4, J.A. Paterson 1, M. Barrera 6, 9 and S.J. Heymann 5

Mitig Adapt Strat Glob Change (2011) 20:277–293
DOI 10.1007/s11027-011-9491-x

How are we adapting to climate change? A global assessment

Alexandra C. Lesnikowski 1, James D. Ford 1, Lea Berrang-Ford 4, Magda Barrera 6, Jody Heymann 5

DOI 10.1007/s11027-013-9491-x

Original Article

Adaptation to climate change in the Ontario public health sector

Jaclyn A. Paterson 1, 10, James D. Ford 1, Lea Berrang-Ford 4, Alexandra Lesnikowski 1, Peter Berry 5, Jim Henderson 1 and Jody Heymann 5

Paterson et al. BMC Public Health 2012, 12:452
https://www.biomedcentral.com/1471-2458/12/452

The 4Cs of adaptation tracking: consistency, comparability, comprehensiveness, coherency

James D. Ford 1, Lea Berrang-Ford 4

Mitig Adapt Strat Glob Change DOI 10.1007/s11027-014-9627-7

Open Access
ADAPTATION IN THE CANADIAN PUBLIC HEALTH SECTOR

Figure 1. Expected health risks posed by climate change by region.

Table 4. Adaptation plans and initiatives in Canada’s largest municipalities.

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Adaptation Plan Available</th>
<th>Health Adaptation Initiative(s) Reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calgary, AB</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Edmonton, AB</td>
<td>-</td>
<td>√</td>
</tr>
<tr>
<td>Montreal, QC</td>
<td>-</td>
<td>√</td>
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<tr>
<td>Ottawa, ON</td>
<td>-</td>
<td>√</td>
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<tr>
<td>Toronto, ON</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Vancouver, BC</td>
<td>√</td>
<td>√</td>
</tr>
</tbody>
</table>

Austin et al.
LOCAL PUBLIC HEALTH ADAPTATION NEEDS

With climate change, heat could be the big threat given our ageing population. I am concerned about knowing where vulnerable groups are and if they have social support. I am unsure if the vulnerable groups will be taken care of and of the adequacy of the current system to ensure appropriate responses to these peoples’ needs to be assessed (Municipal public health official).

There is no way of monitoring the success of our extreme weather program. We need an evaluation strategy - every year we question the validity of this. Nowadays, you have to have research-based evidence of effectiveness and climate related extreme events (Municipal public health official).
Environment

Climate change links all countries and humans on the planet as few other issues do. The effects of human activity on climate in one country impact social, economic, and environmental systems far beyond its borders. Rising temperatures and extreme weather events, accelerated sea level rise, shifts in plant and animal ranges, and spread of heat-related diseases are already having significant effects and are predicted to worsen in the future.

The WORLD Policy Analysis Center and McGill University’s Climate Change and Adaptation Research Group have developed a globally comparative, quantitatively comparable database on climate adaptation policies worldwide. Our findings about adaptation to risks, actions taken by countries in different adaptation areas, and the inclusion of people with varying needs in planning and implementation are displayed on the maps in this section.

Global Adaptation Index

Education
Health
Adult labor and working conditions
Child labor
Poverty
Equal rights and discrimination
DRIVERS OF ADAPTATION

What drives national adaptation? A global assessment

Lea Berrang-Ford · James D. Ford · Alexandra Lesnikowski · Carolyn Poutiainen · Magda Barrera · S. Jody Heymann

Funding for adaptation may be ineffective in countries with poor governance.
Policy partners:

- Public Health Agency of Canada (PHAC)
- Health Canada (HC)
- International Development Research Centre (IDRC) of Canada
2015 UNFCCC COP 21 (Paris) Side Event
2015 Workshop: Second generation Global Adaptation Index (AI 2.0)

Attending:

ADB
ASIAN DEVELOPMENT BANK

WORLD RESOURCES INSTITUTE

UCLA FIELDING SCHOOL OF PUBLIC HEALTH
WORLD POLICY ANALYSIS CENTER

ND-GAIN
NOTRE DAME GLOBAL ADAPTATION INDEX

IISD
International Institute for Sustainable Development

IIED
International Institute for Environment and Development

OURANOS

WAGENINGEN UR
For quality of life
Reports from the Trottier Fellows:

Catherine Potvin

Department of Biology
ACTING ON CLIMATE CHANGE

Solutions from Canadian Scholars
The Climate regime

- FCCC 1992
- Kyoto 1997
- Kyoto Enter into force 1997
- Montreal 2005
- Copenhagen 2009
- Paris-Climate 2015

Enter into force

MONTRÉAL 2005 Sustainable Canada Dialogues

@dialoguescanada @dialogsustainab
In 2100 [CO$_2$] ~ 574 ppm
Climate change scenarios over the next 100 years according to IPCC scenarios
Towards a low carbon sustainable Canada
A POSSIBLE TRANSITION PATHWAY

Long-term target of 80% emissions reduction by 2050.
Medium-term target 26–28% below 2005 levels by 2025.

<table>
<thead>
<tr>
<th><strong>SHORT TERM</strong></th>
<th><strong>MIDDLE TERM</strong></th>
<th><strong>LONG TERM</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POLICY ORIENTATION 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Put a price on carbon.</td>
<td></td>
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<tr>
<td><strong>POLICY ORIENTATION 2</strong></td>
<td></td>
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<tr>
<td>Include aggressive goals for low-carbon electricity production in federal and provincial climate action plans.</td>
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<tr>
<td><strong>POLICY ORIENTATION 3</strong></td>
<td></td>
<td></td>
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<tr>
<td>Integrate the oil and gas production sector in climate policies.</td>
<td></td>
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<tr>
<td><strong>POLICY ORIENTATION 4</strong></td>
<td></td>
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<tr>
<td>Adopt a multi-level energy policy with energy efficiency and cooperation in electrification at its core.</td>
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<tr>
<td><strong>POLICY ORIENTATION 5</strong></td>
<td></td>
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<tr>
<td>Alleviate the pathways to a coal-free future.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Adopt either a national carbon tax or a national cap and trade program.
- Adopt ambitious sectorial targets for low-carbon electricity production.
- Support interprovincial electricity transportation infrastructure.
- Eliminate all direct and indirect subsidies to the fossil fuel industry.
- Develop a clear regulatory framework coherent with the transition to a low-carbon economy.
- Develop a national energy policy with long-term plans for transitioning to low-carbon energy.
- Implement efficiency targets for energy use in the extractive industry.
- Ensure government efficiency standards and procurement.
Put aggressive goals for low-carbon electricity production in the federal and provincial climate action plans.

@dialoguescanada @dialogsustainab
Total energy consumed in 2012

- Renewables: 5.8%
- Nuclear: 9.1%
- Hydro: 10.8%
- Coal, coke, oven gas: 7.1%
- Oil: 36.4%
- Natural gas: 30.8%
Energy usage

Fifth: transport

Sixth: Landuse planning

Seventh: buildings
Moving towards sustainability

Building on visions for the future

@dialoguescanada @dialogsustainab

@ Judith DesBrisay
Eight: Natural Assets

Nineth: Managing natural resources

Tenth: Governance

@dialoguescanada @dialogsustainab
Transition to a low carbon economy

-26% of 2005
100% low carbon electricity
-80% in 2050

Total emissions (Mt CO₂ eq.)

Years

2010 2015 2020 2025 2030 2035 2040 2045 2050 2055

@dialoguescanada @dialogsustainab
Directly met with over 50 policy-makers, including two Prime Ministers, two provincial Ministers, two Provincial Deputy Ministers and 15 Members of Parliament (Federal).

Referenced in more than 85 print and online articles; 44 radio interviews; three television segments; our scholars gave 20 conferences over two months.
Launching a second report
October 8th 2015 in Toronto

FACEBOOK:
https://www.facebook.com/mcgillatwork

http://www.sustainablecanadadialogues.ca
@dailoguescanada @dailogsustainab
Proposals from the new Trottier Fellows:

Jeff McKenzie

Department of Earth & Planetary Sciences
Groundwater in the Canadian Arctic: New Tools for Climate Change Policy

Jeffrey McKenzie
Earth and Planetary Sciences
2015-2017 Trottier Fellow
How is Climate Change Affecting the Arctic?

Ex. 1: Surficial Drying and Wetting

Ex. 2: Increasing Arctic River Discharge

Ex. 3:
Economic Impacts: Carbon Dioxide and Methane emissions from thawing permafrost will cost at least $43 trillion USD.
New Numerical Model to Address Arctic Groundwater Changes
As a Trottier Fellow, my goal is to transform our technical advances for groundwater into a tool for policy questions in the Arctic.
How to achieve this goal?
1) Involvement of Northern stakeholders.
2) Develop guidelines and best practices for model usage.
3) Application to a Northern test site.

Jeffrey McKenzie
jeffrey.mckenzie@mcgill.ca
Proposals from the new Trottier Fellows:

Tony Ricciardi

McGill School of Environment and Redpath Museum
The Science and Management of Microplastic Pollution in Freshwater Ecosystems

Anthony Ricciardi
Associate Professor
Redpath Museum / McGill School of Environment
What are Microplastics?
Small (<5mm) polymer particles: beads, pellets, flakes, fibres

Where do they come from?
• Products of fragmentation of larger plastic debris
• Manufactured for \textit{industrial use} (e.g. biotechnology, microscopy)
• ...or \textit{domestic use} (e.g. cosmetics; textiles)
Neutrogena Deep Clean Gentle Scrub

Gentle Scrub

Oil Free

Microbeads gently exfoliate,

Neutrogena

125mL
2012: Microplastics found in the Great Lakes

Microplastic pollution in the surface waters of the Laurentian Great Lakes

Marcus Eriksen\textsuperscript{a,*}, Sherri Mason\textsuperscript{b,1}, Stiv Wilson\textsuperscript{a,2}, Carolyn Box\textsuperscript{a,3}, Ann Zellers\textsuperscript{c,4}, William Edwards, Hannah Farley\textsuperscript{b,1}, Stephen Amato\textsuperscript{a}
Microplastic pollution in St. Lawrence River sediments

Rowshyra A. Castañeda, Suncica Avlijas, M. Anouk Simard, and Anthony Ricciardi
Why the concern?

• Small enough to be ingested by aquatic animals
• Readily adsorb toxic contaminants (e.g. PCBs) and can transfer these to animals that ingest them
• Impacts on animal physiology and behaviour

*This content aligns with the reference provided in the image.*
The regulatory response:

Govt of Canada: Microbeads in consumer products listed as a toxic substance (Aug 1, 2015)


USA: Cosmetic microbeads banned in several states (e.g. Illinois, New Jersey, Minnesota, Wisconsin, California).

Overseas: Bans on microbeads proposed in Europe and Australia.
Our objectives

1. Determine the diversity, abundance and potential sources of microplastics in the St. Lawrence River and Great Lakes tributaries.

2. Test the extent to which different kinds of microplastics are consumed by fish.

3. Develop rapid and reliable monitoring methods to assess the efficacy of future regulation.
Proposals from the new Trottier Fellows:

Nancy Ross

Department of Geography
Urban Policy Prescriptions to Increase Walking

Nancy Ross
Professor of Geography

Associate member: Department of Epidemiology and Biostatistics; Institute for Health and Social Policy
The Broader Public Health Policy Landscape

January 11, 1964

September 9, 2015
Interest in the Walking-Friendliness of Places

• 399 articles in Medline with the search term “walkability” in title/abstract
• Term first appeared in Medline in 2000
• Conceptually very appealing: walking is a low-cost, low barrier-to-entry activity
• Jurisdictions around the world are struggling to find policies that increase physical activity and reduce obesity
The Burden of Chronic Disease From Obesity is in the Middle of the Distribution, Not the Tails

Walkable Neighbourhoods Account for an Additional 766 Steps Per Day

Forest plots of the previous studies conducted on the association between GIS-assessed measures of walkability based on street connectivity, land use mix, and/or residential density and pedometer and/or accelerometer-assessed steps per day (mean differences in steps/day between high and low walkability neighborhoods, 95% credible intervals).

Suburbs Are Surprisingly Walkable if You Add Public Transportation

Public Transit Network, Montreal, QC Canada

Distance and minutes walked by commuters to and from transit

<table>
<thead>
<tr>
<th></th>
<th>No transfers</th>
<th>2 Transfers to Metro</th>
<th>2 Transfers to City Bus</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>City bus</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance (km)</td>
<td>1.2</td>
<td>2.5</td>
<td>1.7</td>
</tr>
<tr>
<td>Minutes Walked</td>
<td>13</td>
<td>26</td>
<td>19</td>
</tr>
<tr>
<td>Steps</td>
<td>1200</td>
<td>2500</td>
<td>1700</td>
</tr>
<tr>
<td><strong>Commuter train</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Distance (km)</td>
<td>3.28</td>
<td>4.6</td>
<td>3.8</td>
</tr>
<tr>
<td>Minutes Walked</td>
<td>36</td>
<td>50</td>
<td>42</td>
</tr>
<tr>
<td>Steps</td>
<td>3280</td>
<td>4600</td>
<td>3800</td>
</tr>
<tr>
<td><strong>Metro</strong></td>
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<tr>
<td>Distance (km)</td>
<td>1.9</td>
<td>3.2</td>
<td>2.5</td>
</tr>
<tr>
<td>Minutes Walked</td>
<td>21</td>
<td>35</td>
<td>27</td>
</tr>
<tr>
<td>Steps</td>
<td>1900</td>
<td>3200</td>
<td>2500</td>
</tr>
<tr>
<td><strong>Suburban bus</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Distance (km)</td>
<td>1.6</td>
<td>2.8</td>
<td>2.1</td>
</tr>
<tr>
<td>Minutes Walked</td>
<td>17</td>
<td>31</td>
<td>23</td>
</tr>
<tr>
<td>Steps</td>
<td>1600</td>
<td>2800</td>
<td>2100</td>
</tr>
<tr>
<td><strong>Peripheral bus</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance (km)</td>
<td>2.4</td>
<td>3.7</td>
<td>3.0</td>
</tr>
<tr>
<td>Minutes Walked</td>
<td>27</td>
<td>41</td>
<td>33</td>
</tr>
<tr>
<td>Steps</td>
<td>2400</td>
<td>3700</td>
<td>3000</td>
</tr>
</tbody>
</table>

What Makes a Neighbourhood Walkable? The View From 35,000 Feet
Plans for the Trottier Funding

• Research: the view from the ground – identifying local features of highly walkable places; understanding the socio-demographic environments of walkable neighbourhoods in Canada; social survey research in neighbourhoods stratified by walkability/walking levels

• Policy research in the classroom
Promoting Inter-sectoral policy activity and knowledge uptake

Active transportation promotes public health in ways that influence many academic disciplines and policy actors:

- Reduces air pollution
- Reduces fatal motor vehicle accidents
- Increases exercise
- Increases social contact
Thank You

• Doctoral students: Samantha Hajna, Rania Wasfi
• Collaborators on the Trottier Fellowship: Prof. Sebastien Breau, Dr. Kaberi Dasgupta, Prof. Ahmed El-Geneidy, Prof. Kevin Manaugh
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