

LECTURE 2\_23:

APR. 3, 2014

# COURSE REVIEW & EXAM HINTS

# Exam Details

2

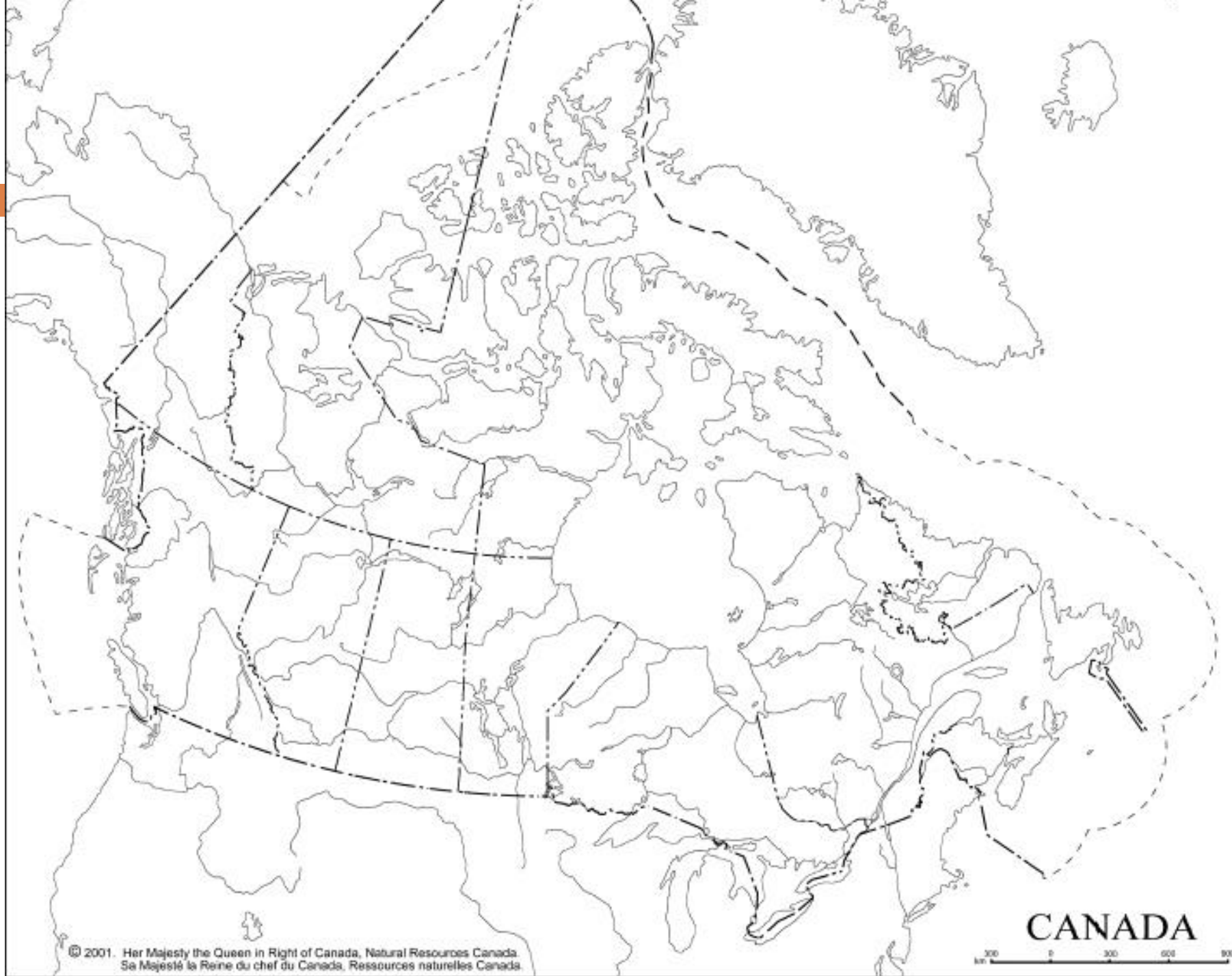
## □ **Final Exam**

- Tuesday, April 8<sup>th</sup>, 9 am to noon
- Location: Sanders Field House
- Cumulative from January
- Coverage:
  - 50% of content of exam is pre-Midterm
  - 50% of content of exam is post-Midterm
- Multiple Choice / True False Section (120 marks)
- Map Literacy Section (30 marks)

# Map Literacy

3

- 90 places covered in 6 classes
- 30 on final exam
- Will use map on following page



CANADA



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Sa Majesté la Reine du chef du Canada, Ressources naturelles Canada.

# Key topics: chapter 7 (Climate Change) – 3 lecs.

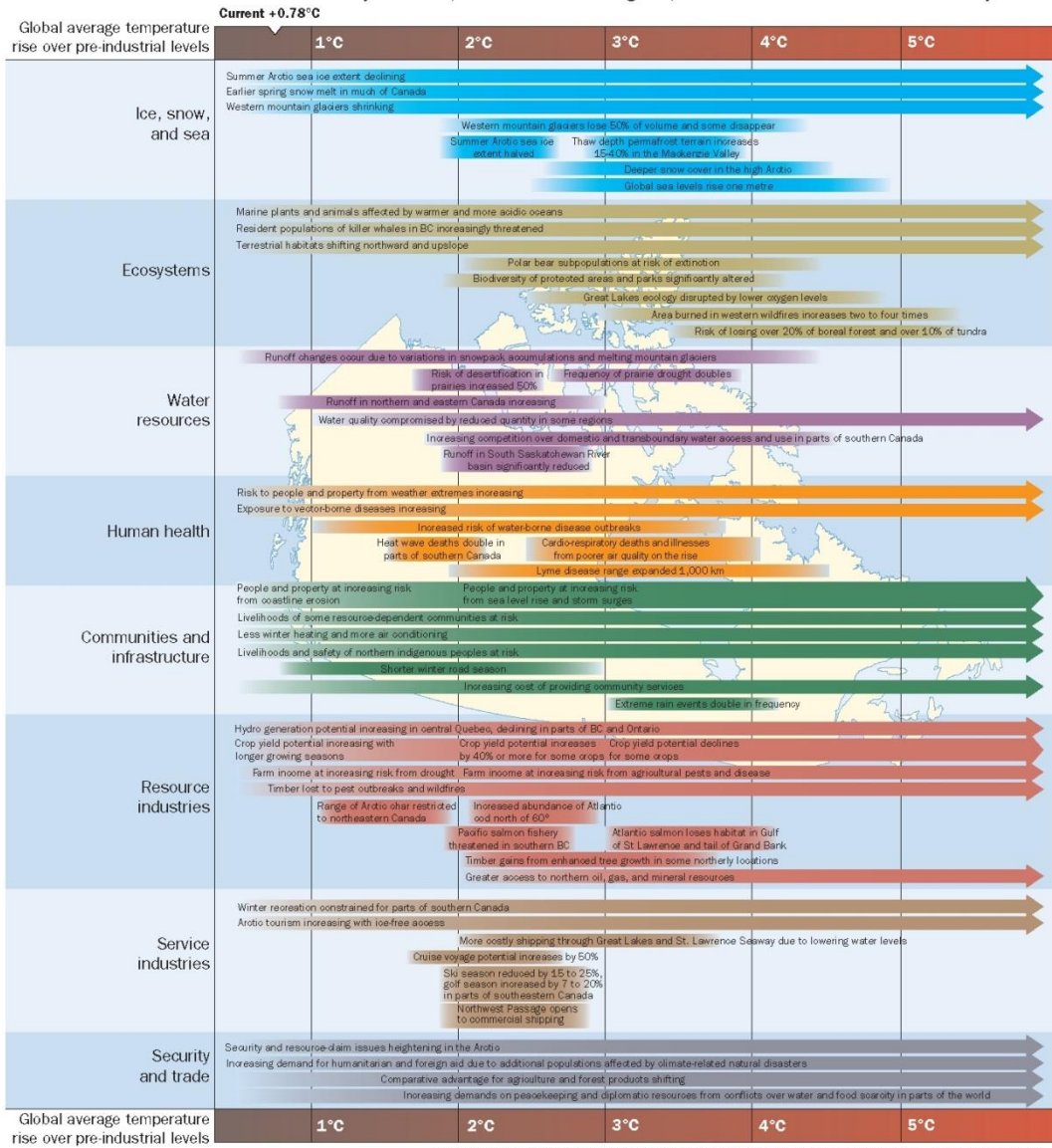
5



- Definitions:
  - ▣ weather, climate, climate change, global warming, greenhouse effect, GCMs,
- Nature of Climatic Change
- Scientific Evidence of Climatic Change
- Figure 7-6:
  - ▣ Summary of expected impacts in Canada over the 21<sup>st</sup> Century
- *Specific Impacts* {Terrestrial Systems; Agriculture; Freshwater Systems; Fisheries; Cryosphere; Oceans and Coastal Systems; Infectious Diseases}
- Other important global impacts {Ozone depletion; Global Sea Level Rise}
- Communications about Climatic Change
- Adaptation to Climate Change:
  - ▣ Case study: The Maldives and ADAPT-Asia Pacific
- Global & National Responses to Climate Change
  - ▣ Kyoto Protocol

## DEGREES OF CHANGE

A summary of the impacts of climate change expected in Canada over the 21st century



The beginning of each colour bar indicates the temperature at which each impact is expected to begin

Forecast within indicated range  
Trend likely to continue, potentially intensifying

The NRTEE's Degrees of Change diagram (above) is a summary of the impacts of climate change expected in Canada over the 21st century. It shows both risks and opportunities for Canada from different levels of global warming above pre-industrial levels. Each category in the diagram is an important part of our country's environment and economy, and only contains climate change impacts that we are confident could occur, as documented in scientific literature. Each regional map takes a climate change impact and illustrates what it might look like across that specific region. Not all expected impacts of climate change are shown here. Nor is the diagram a prediction. It does not account for time lags between global temperature change and the response of our physical environment. Even if actions limit global temperature increases to just 2°C by 2050, climate change impacts will continue to build up for decades due to the slow response of Earth systems. Adapting to these impacts to reduce or avoid harm is not shown on the diagram but would lessen their effects.

# Summary of Impacts

Figure 7.6:

Summary of the impacts of climate change expected in Canada over the twenty-first century. Source: NRTEE (2010).

From: Dearden and Mitchell (2012)

# Key topics: chapter 7 (Climate Change) – 3 lecs.

7



- Definitions:
  - ▣ weather, climate, climate change, global warming, greenhouse effect, GCMs,
- Nature of Climatic Change
- Scientific Evidence of Climatic Change
- Figure 7-6:
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- ***Specific Impacts*** {Terrestrial Systems; Agriculture; Freshwater Systems; Fisheries; Cryosphere; Oceans and Coastal Systems; Infectious Diseases}
- Other important global impacts {Ozone depletion; Global Sea Level Rise}
- Communications about Climatic Change
- Adaptation to Climate Change:
  - ▣ *Case study*: The Maldives and ADAPT-Asia Pacific
- Global & National Responses to Climate Change
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# Key topics: chapter 8 (Oceans and Fisheries) – 2 lecs

8

- Ocean Productivity {upwelling; co uptake}
- Ocean Circulation {thermocline; thermohaline circulation; surface currents and deep ocean circulation}
- Coral Reefs {benefits and environmental challenges}
- Fisheries Management Challenges
- Fisheries (mis)Management collapse
  - ▣ Case Study: Northern Cod Fishery, Atlantic Canada





# Key topics: chapter 9 (Forests)

## – 3 lecs

9

- Boreal Forest – its value
- Canadian Boreal Forest Agreement
- Canada's forested ecozones
- Forest Ecosystem Services and Products
- Forest Management Practices
  - ▣ Commonly practiced silvicultural methods in Canada {Clear-cutting; Seed tree; Shelterwood; Selection}
- Improved FMPs
  - ▣ **Case study:** BC Forest Practices Code
- Environmental Impacts of Forest Management Practices
- Social Impacts of Forest Management Practices
- *Compare/Contrast with “New Forestry” practices*
- **Case Study:** Peel River watershed (YK)
  - ▣ Conservation efforts; challenges



# Terrestrial Ecozones of Canada

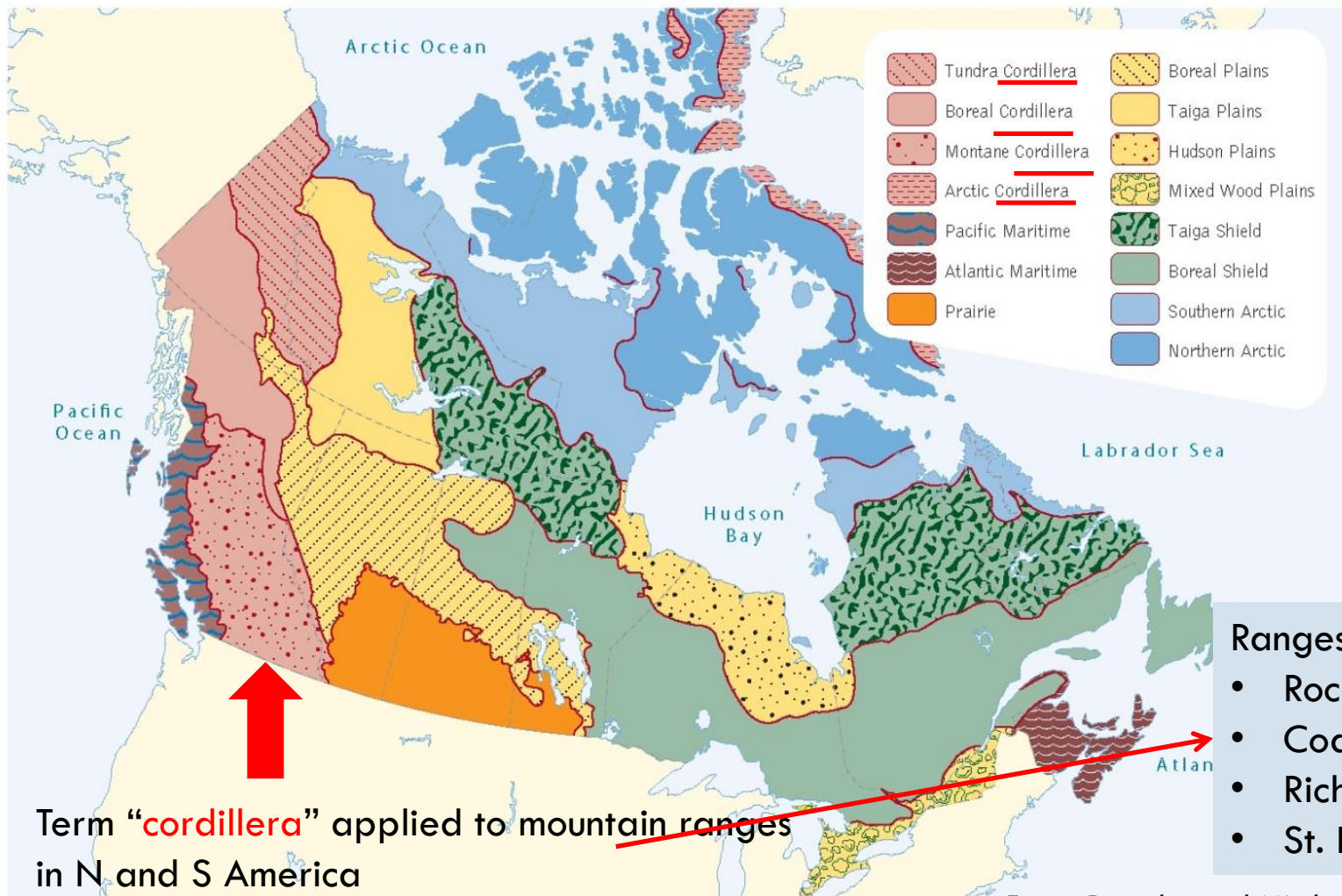


Figure 9.2 | Terrestrial ecozones of Canada. Source: Wiken (1986).

From: Dearden and Mitchell (2012)

# Key topics: chapter 9 (Forests)

## – 3 lecs

11

- Boreal Forest – its value
- Canadian Boreal Forest Agreement
- Canada's forested ecozones
- **Forest Ecosystem Services and Products**
- **Forest Management Practices**
  - ▣ Commonly practiced silvicultural methods in Canada {Clear-cutting; Seed tree; Shelterwood; Selection}
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- Environmental Impacts of Forest Management Practices
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- *Compare/Contrast with “New Forestry” practices*
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# Key topics: chapter 10 (Agriculture) – 2 lecs.

12

- Challenges around feeding an increasing population
- Arable Land
- Impacts of Global Climate Change
- Intensification of Production
- Competition for viable agricultural land
  - With urbanization
  - With bio-fuel production
- Trends in Canadian Agriculture
- Environmental Challenges for Agriculture in Canada
  - {Land Degradation; Soil Erosion; Soil Compaction, Acidification & Salinization; Organic Matter & Nutrient Losses; Biocides; Biomagnification; }
- Sustainable Food Production & Organic Farming
  - {Integrated Pest Management; Integrated Plant Nutrient Systems; No-Till/Conservation Agriculture}



# Key topics: chapter 11

## (Water) – 3 lecs

13

- Key components of the hydrological cycle
- Water diversions, with examples
  - {dams: WAC Bennett; Old Man River; La Grande; Columbia River; Revelstoke Dam}
  - {floodways: Winnipeg; Neebing-McIntyre}
  - {inter-basin transfers: Kemano; Nechako River}
- Water Quality
  - Monitoring by Environment Canada in partnership with other jurisdictions;
  - Point / Non-point pollution sources
  - Great Lakes
- Water Security
  - Walkerton and subsequent inquiry
- Water as Hazard
  - Flooding {floodplains; case studies: Red River; Nechako/Fraser R. Bow R. (Calgary 2013 floods)}
  - Drought {types of; e.g., Palliser's Triangle}
- Heritage Rivers
- Great Lakes Water Quality Agreement



# Water Diversion

## □ Dams

- (~900 large ones in Canada)

## □ Inter-basin diversions

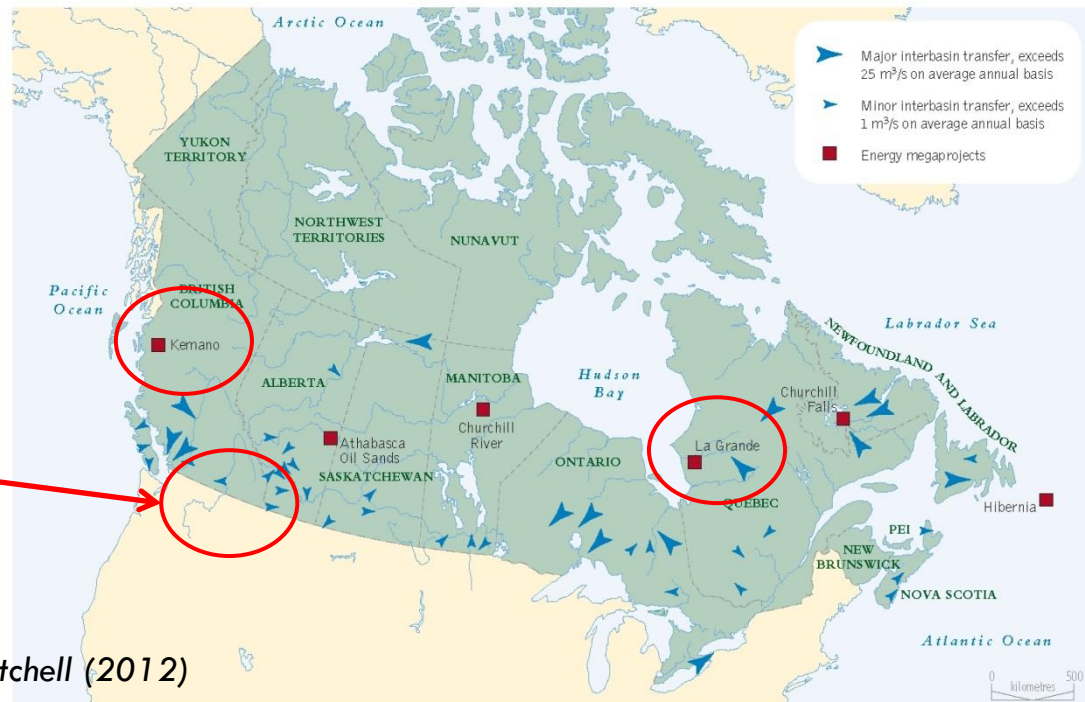
- (~60 large ones in Canada)

~333 (Quebec)

~149 (Ontario)

~131 (British Columbia)

Columbia



From: Dearden and Mitchell (2012)

Figure 11.1 | Hydroelectric megaprojects in Canada. Source: Adapted from Day and Quinn (1992: 16).

# Key topics: chapter 11

## (Water) – 3 lecs

15

- Key components of the hydrological cycle
- Water diversions, with examples
  - {dams: WAC Bennett; Old Man River; La Grande; Columbia River; Revelstoke Dam}
  - {floodways: Winnipeg; Neebing-McIntyre}
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Chapter 11  
Water

# Key topics: chapter 13 (Urban Environmental Management) – 4 lecs

16

- State of cities and urbanization trends
- Definitions:
  - Urban forms (urban, suburban, exurban, rural)
  - Housing types (single family, multi-family)
  - Sustainability (broadly, goals of a sustainable community)
- 4 factors needing attention to meet the challenges of **sustainable urban development**:
  1. Urban Form;
  2. Transportation
  3. Energy Use
  4. Waste Management





# Key topics: chapter 13 (Urban Environmental Management) – 4 lecs

17

- Urban issues (**physical**)
  - Sprawl
  - Farmland loss
  - Air pollution
  - Air quality
  - Urban heat island
  - Hydrological impacts
- Urban issues (**socio-economic**)
  - Changing economic functions
  - Declining and aging cities vs Rising cities
  - Immigration to and within cities
  - Gentrification
  - School closures



- Urban issues (**political**)
  - Urban growth boundaries
  - Farmland protection vs development rights (e.g., Ontario Green Belt)
  - Neighbourhood preservation vs freeway construction
  - Transit
- Urban issues (**environmental / solutions/best practices**)
  - Sustainability
  - Transit-oriented developments (e.g., Vancouver's Regional Town Centres)
  - Walkability
  - Intensification
  - Smart Growth
  - Brownfield Development
  - Green Building Practices
  - LEED<sup>1</sup> (and other) green building certificate systems

# Key topics: chapter 14 (Endangered Species and Protected Areas) – 2 lecs

18

- Biodiversity
- Extrinsic vs Intrinsic values of natural areas;
- Importance of Biodiversity
- Stressors for Biodiversity
  - ▣ Explored via Case Study of BC
  - ▣ “Taking Nature’s Pulse: the Status of Biodiversity in British Columbia”  
(Austin, et al., 2008, published by Biodiversity BC)
- Responses to Biodiversity Losses
  - ▣ International Responses
  - ▣ National Response
  - ▣ Protected Areas



Chapter 14  
Endangered Species  
and Protected Areas

# Key topics: chapter 15 (Making It Happen) – 1 lec

19

- Millennium Ecosystem Assessment
- Millennium Development Goals (set 2000 for targets to be reached at 2015)



# Millennium Development Goals (MDGs)

- Recall from chapter 1, these are:
  1. Eradicate extreme poverty and hunger;
  2. Achieve universal primary education;
  3. Promote greater gender equality and empower women;
  4. Reduce child mortality;
  5. Improve maternal health;
  6. Combat HIV/AIDS, malaria, and other diseases
  7. Ensure environmental sustainability
  8. Develop a global partnership for development
  
- These were set at a UN summit in 2000 by world leaders, with agreed targets to be met by 2015

# MDGs targets and indicators

**Table 1.1 | Ensuring Environmental Sustainability: MDG Targets and Indicators**

## Targets

Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources

Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss

Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation

By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers

## Indicators

- Proportion of land area covered by forest
- Carbon dioxide emissions, total, per capita and per \$1 GDP (PPP)
- Consumption of ozone-depleting substances
- Proportion of fish stocks within safe biological limits
- Proportion of total water resources used
- Proportion of terrestrial and marine areas protected
- Proportion of species threatened with extinction
- Proportion of population using an improved drinking water source
- Proportion of population using an improved sanitation facility
- Proportion of urban population living in slums

Source: UNs Millennium Development Goals.

*From: Dearden and Mitchell (2012)*

# Global Responses needed

- ***Developing countries*** to improve 'quality of life', health and wealth etc
- ***Developed countries*** to reduce consumption to more sustainable levels?
- Have these occurred?
- Canada used to have a reputation of an environmental leader ... that has been lost in the past decade

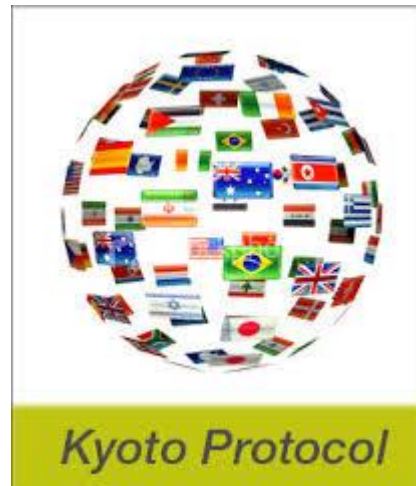
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# Global Leadership

- Responses to sustainable development (Rio UN Summits 1992 and 2012)
- Responses to climate change (Montreal Protocol on CFCs, Kyoto Protocol on greenhouse gas emissions, IPCC: Intergovernmental Panel on Climate Change...)
- Regarding conservation ... Stockholm Convention on Persistent Organic Pesticides; Convention on Biodiversity

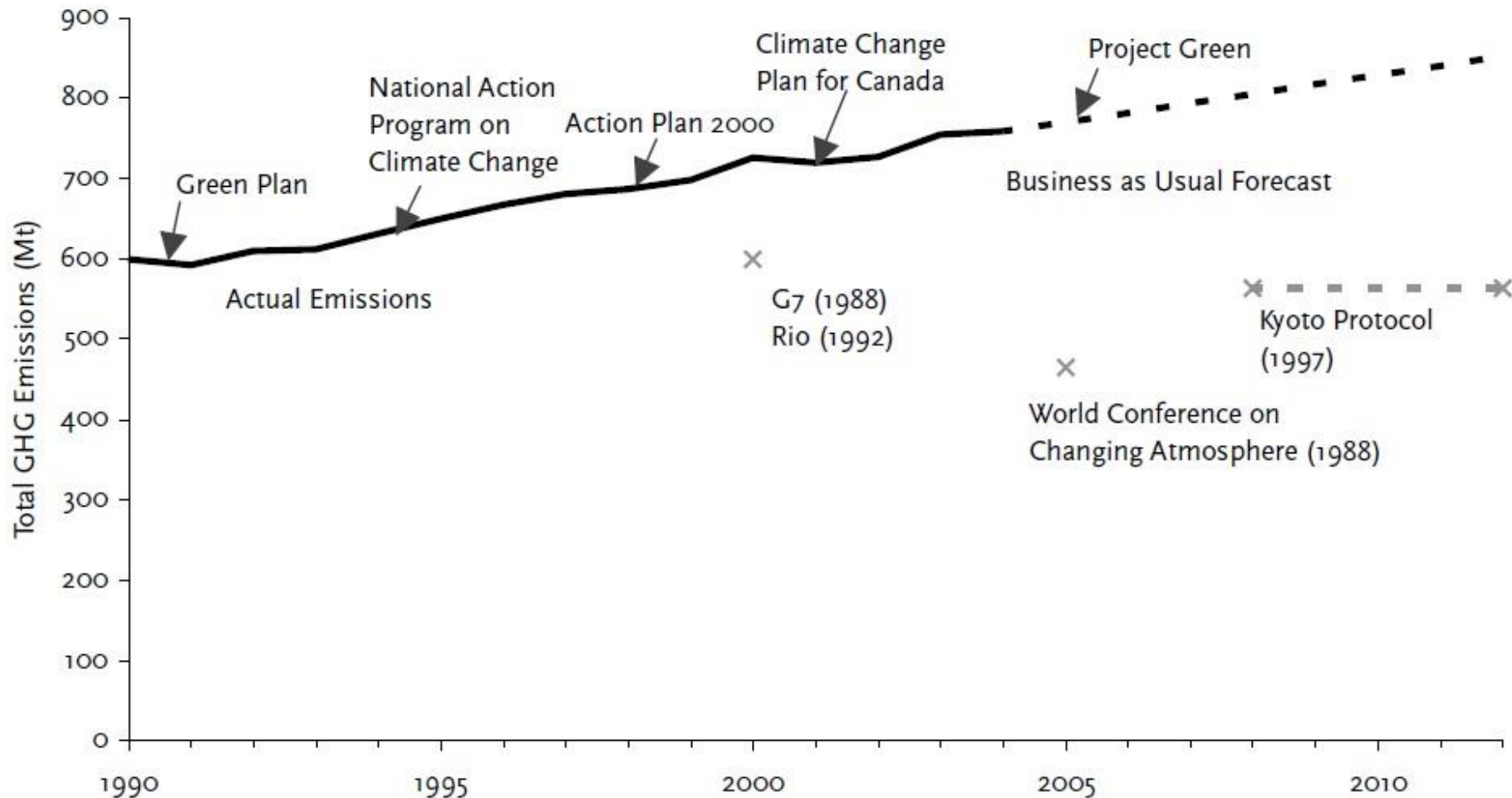




# Global Responses needed

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# Greenhouse Gas Emissions in Canada, 1990–2004, and International Commitments to Reduce Greenhouse Gas Emissions



From an essay by : Mark Jaccard, circa 2007. **Canada's Kyoto Delusion: the evidence is finally forcing us to admit we have done nothing.** (M.J. is Professor of Resource and Environmental Management at Simon Fraser University)

# “Five environmental issues to watch in 2014” (from lecture 2\_1)

1. The Keystone decision
2. The CO<sub>2</sub> conundrum
3. The insurance files
4. The algae blooms
5. The litigation question

Source: *Toronto Star*, Jan 03, 2014