

LECTURE 2_4:

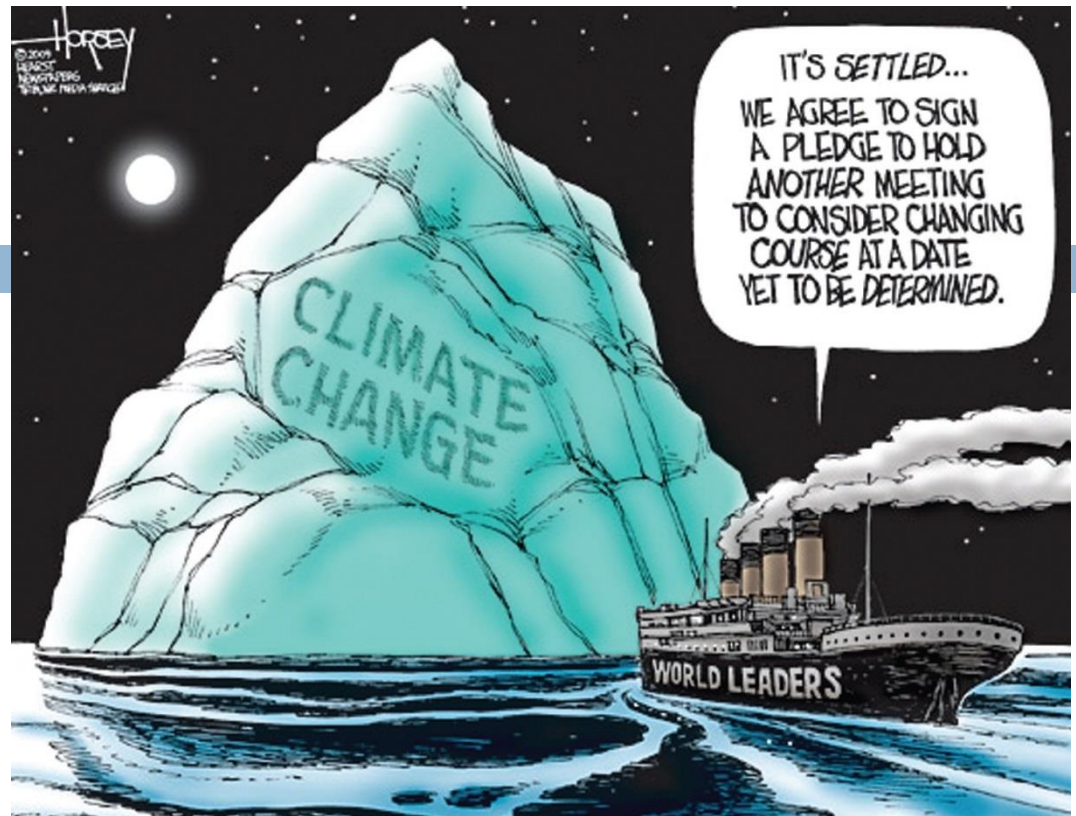
CLIMATE CHANGE

ADAPTATION TO, RESPONSES TO, COMMUNICATION ABOUT...

Text Reference: Dearden and Mitchell (2012), pp. 218-233.

T. Randall, Lakehead University, WA 2014

Outline



From: Dearden and Mitchell (2012)

- Communications about Climatic Change
- Adaptation to Climate Change:
 - *Case study:* The Maldives and ADAPT-Asia Pacific
- Global & National Responses to Climate Change
 - Kyoto Protocol

Recall from Dr Stewart's lecture 14 Fall term: Climate Change Adaptation: Initial Considerations

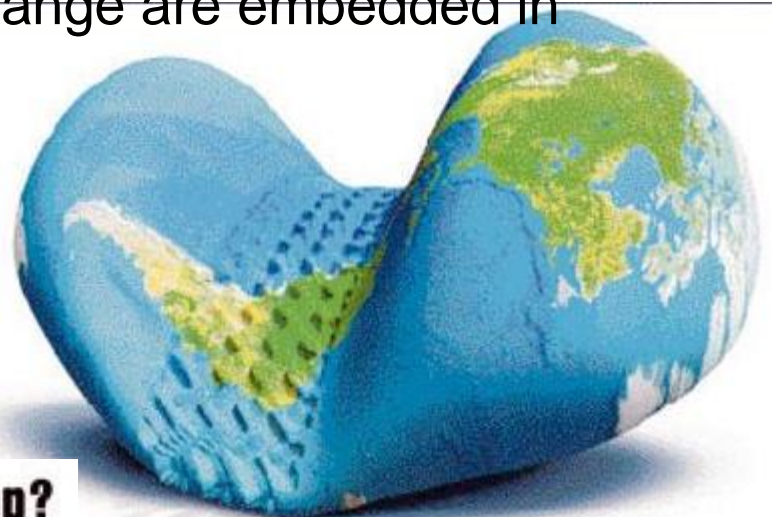
- **Five types of adaptation** are usually recognized:
 1. Prevent the loss by adopting measures that reduce vulnerability
 2. Tolerate the loss by doing nothing and absorbing the cost of losses when they happen
 3. Spread or share the loss by distributing the costs over a larger population, such as through insurance
 4. Change the affected activity by ceasing to do certain things or by shifting to other activities; and
 5. Change the location of the activity by moving to a less vulnerable location

Communicating Global Change

- Challenges for communicating information or understanding about global change:
 - Global change is a **complex issue**
 - **Uncertainties exist** regarding almost every aspect of the global change issue
 - The **impacts of global change will be heavier on people in less developed countries and on future generations**
 - The basic causes of global change are embedded in current values and lifestyles



What was that bump?



Adaptation Measures (1 of 3)

- Convenient to discuss adaptation measures in three groups
 1. **Protective Measures** – typically structural measures to protect property, buildings and infrastructure



Hurricane Resistant "Louisiana Lift House"
Launched 2011

Adaptation Measures (2 of 3)

2. **Accommodation** – a mix of approaches:
 - ▣ Redesign of structures to reduce vulnerability
 - ▣ Zoning land use so as to direct only low capital investments to vulnerable areas
 - ▣ Rehabilitate natural protective features (like coastal dune systems)

** Cautionary point ... stabilizing natural ecosystems is counter to their being natural and thus variable ... and may cause greater harm than good.



Adaptation Measures (3 of 3)

- Convenient to discuss adaptation measures in three groups
- 3. **Retreat** – seeks to avoid vulnerability
 - Relocate buildings and other infrastructure from highly vulnerable areas



North Carolina Homes being taken by the Atlantic Ocean August 2011

Maldives, Ground Zero for Climate Change Impacts

Posted by [Jon Bowermaster](#) on October 15, 2011



Case Study (Adaptation to CC)

The Maldives



National Adaptation to Climate Change

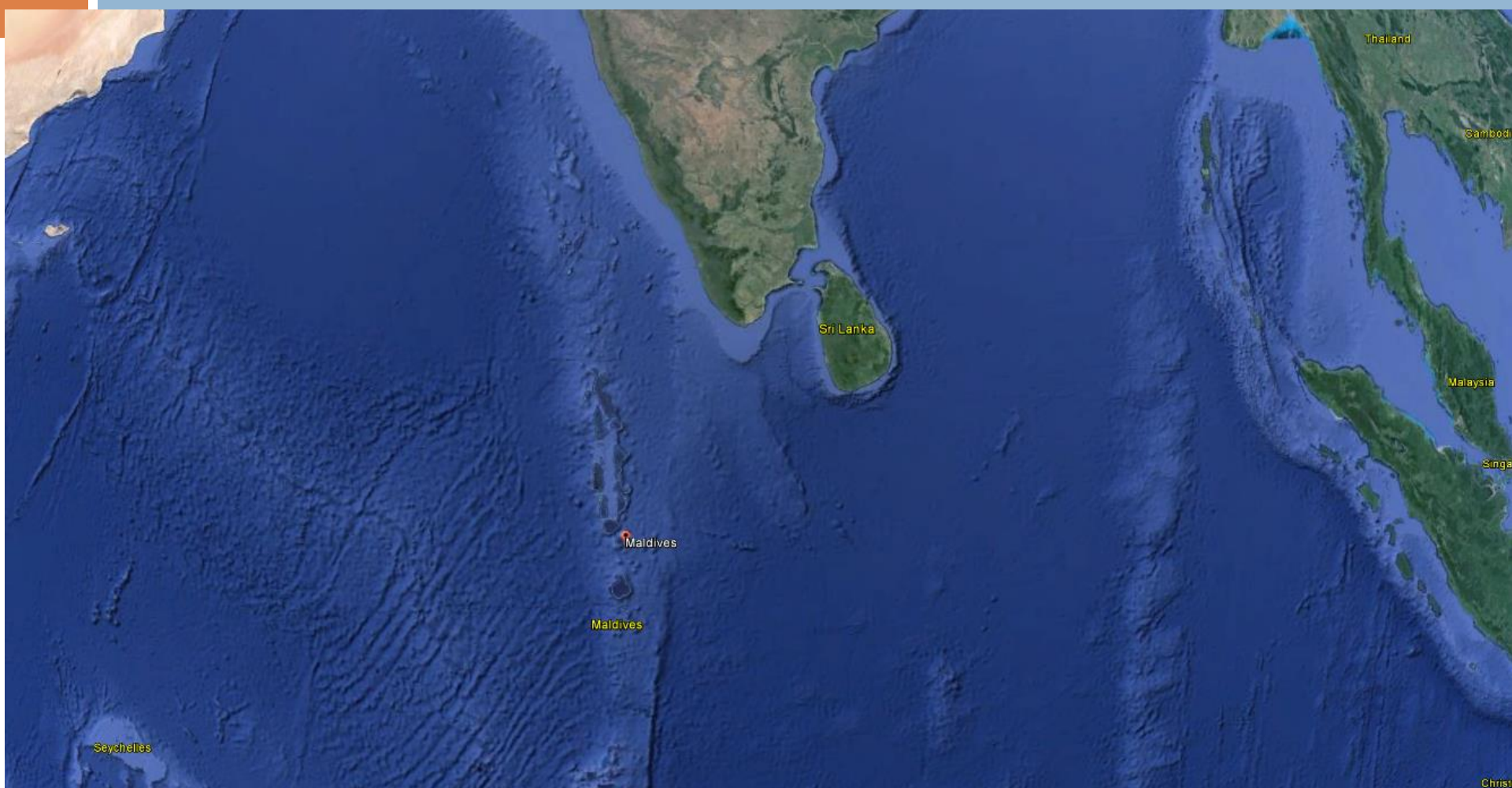
*A background paper prepared by the
Ministry of Housing, Transport and Environment
for the
Maldives Partnership Forum (MPF)
to be held in Maldives, 23-24 March 2009*

Government of Maldives (March 2009)

<http://www.maldivespartnershipforum.gov.mv/pdf/Adaptation%20to%20Climate%20Change.pdf>

Low-lying island nation in the Indian Ocean (Maldives) is planning to re-locate should predicted sea level rise occur. From: Dearden and Mitchell (2012)

Maldives, Indian Ocean



Google Earth image accessed: January 15, 2014

The Maldives

- Population (est. 2012)
328,536
- A nation of atolls (~1,200 islands, 200 inhabited)
- World's lowest country
 - max natural elevation of only 2.4 m. asl.
 - >80% of land base composed of coral islands that rise less than 1 m. asl.
- Economy
 - Fishing & Tourism
- Third most vulnerable nation to sea level rise



Google Earth images accessed: January 15, 2014



Maldives: Nature of vulnerability

1. (to) Global Sea Level Rise
2. Increase in high intensity rainfall events (expected doubling of their frequency)
3. Projected 1.5°C increase in maximum daily temperature by 2100
4. Increase in the intensity and frequency of cyclonic activity (i.e., hurricanes)

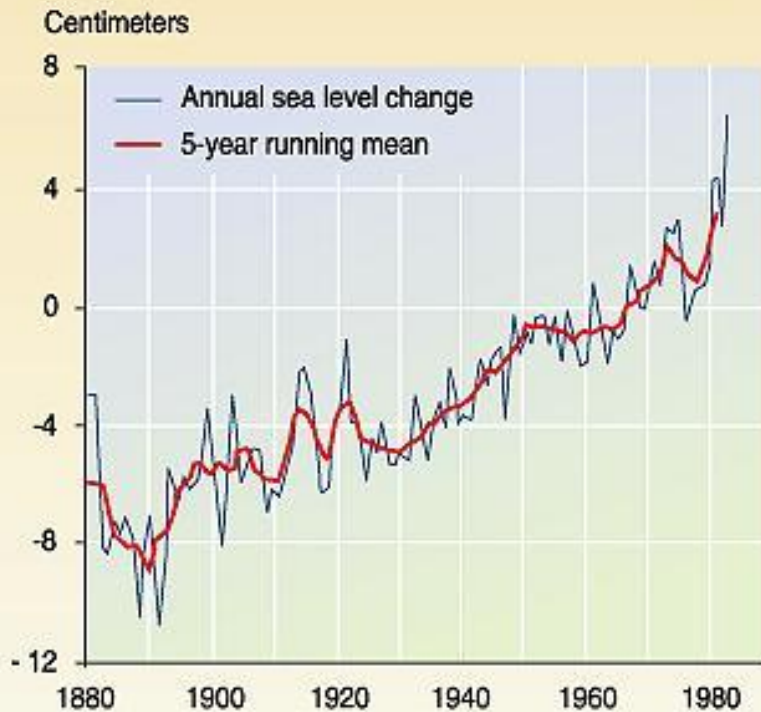
Government of Maldives (March 2009)

<http://www.maldivespartnershipforum.gov.mv/pdf/Adaptation%20to%20Climate%20Change.pdf>

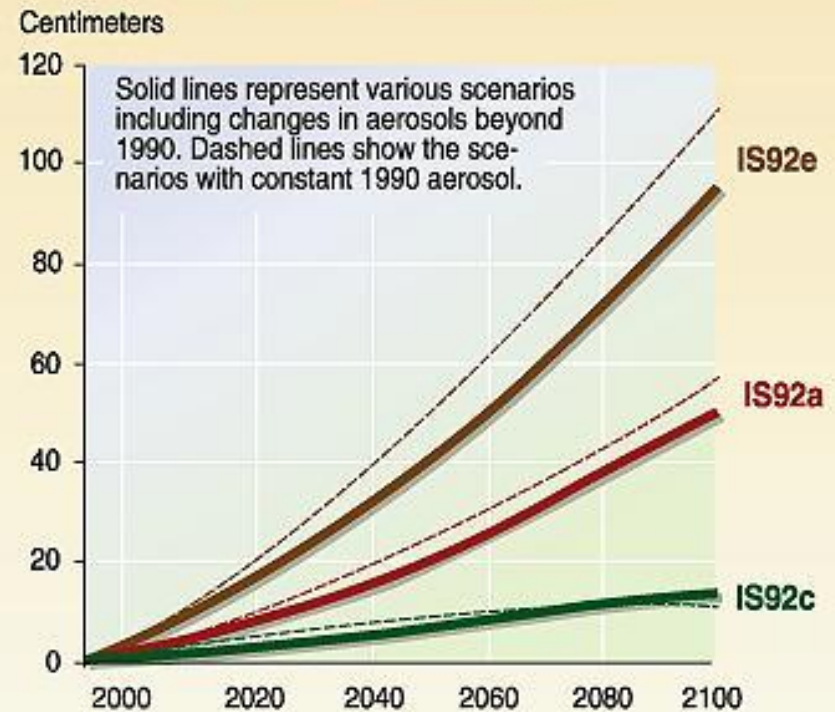
Sea Level Changes (Observed & Forecast)

Sea level rise due to global warming

Sea level rise over the last century



Sea level rise scenarios for 2100



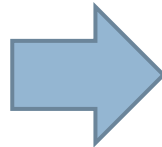
Sea Level Changes

Predictions of sea level rise in responses to a modeled rise in global temperature by 2100 (compiled by Mallory Carpenter 2009)



Author(s)	Area of Study	Modeled Temp. Change (C)	Minimum Prediction	Maximum Prediction
Alley, R. B. <i>et al.</i> (2005)	Greenland	5°	40 cm	50 cm
Aunap, R. <i>et al.</i> (2001)	Estonia	2.3-4.5°	n/a	100 cm
Begin, Y. and Robichaud, A. (1997)	New Brunswick	n/a	20 cm	40 cm
Bray, M. J. and Hooke, J. M. (1997)	England	n/a	n/a	50 cm
Daniels, R. C. (1992)	South Carolina	1-5°	25 cm	200 cm
Ely. C. and Jorgenson, T. (2000)	Alaska	n/a	10 cm	90 cm
Fitzgerald, D. M. <i>et al.</i> (2008)	Conceptual	n/a	20 cm	60 cm
Harvey. N. and Woodroffe, C. (2008)	South Australia	n/a	33 cm	110 cm
IPCC (2001)	Conceptual	1.8 °	9 cm	88 cm
NRC (2007)	Canada	1.4°	9 cm	88 cm
Nicholls, R. J. (2002)	Global	n/a	23 cm	96 cm
Senior C. A. <i>et al.</i> (2002)	England	n/a	9 cm	88 cm
Shaw, J. <i>et al.</i> (1998)	Canada	2°	n/a	49 cm
Thumerer, T. <i>et al.</i> (2000)	England	1.5°	49 cm	94 cm
USGS (2000)	Eastern USA	n/a	15 cm	95 cm

IPCC predicts
9 to 88 cm by
2100



+
Storm Surge

The Maldives

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Google Earth images accessed: January 15, 2014



Global Responses to CC

Kyoto

International Climate Change Adaptation
Funds

Kyoto Protocol

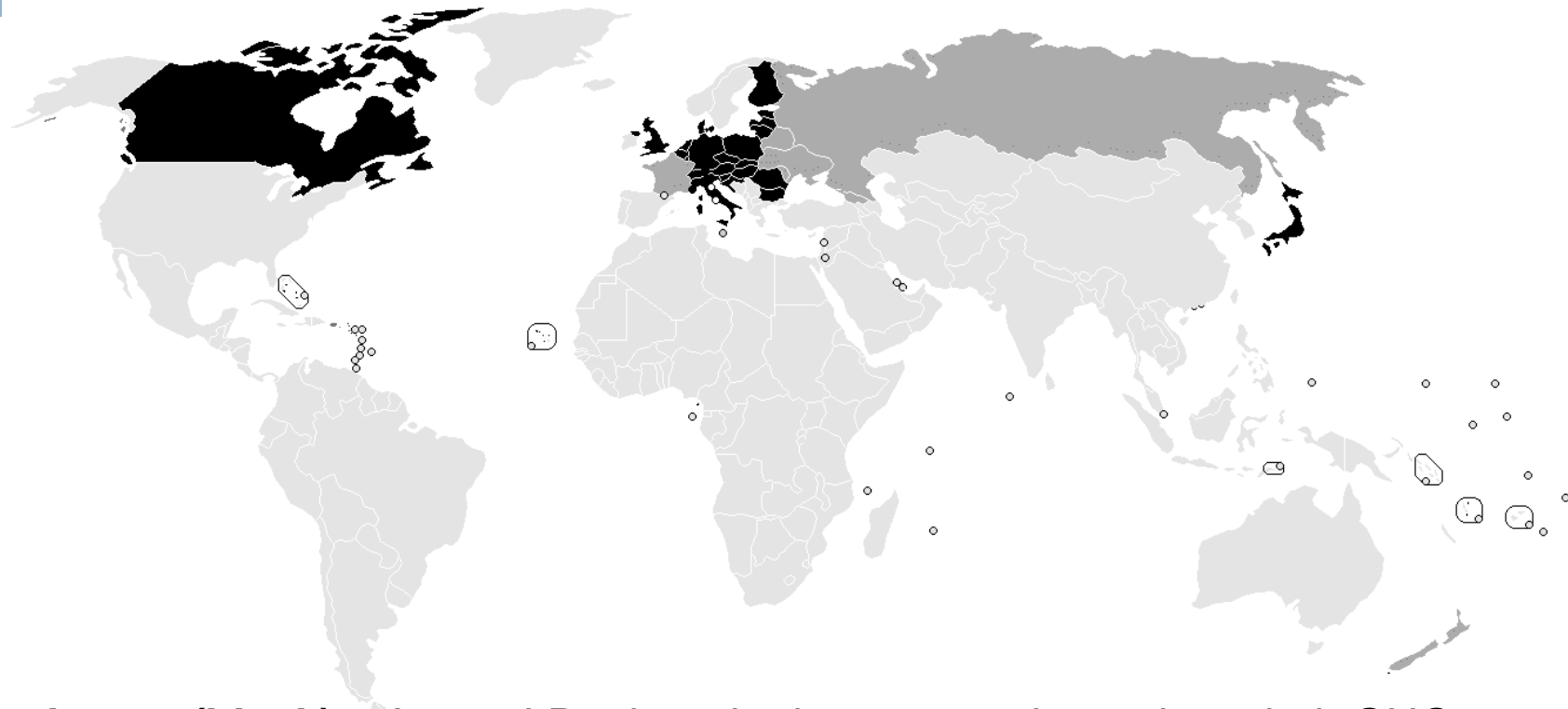
- an **international agreement** reached in Kyoto, Japan, in 1997 that targets 38 developed nations as well as the European Community to ensure that their **emissions of six (6) greenhouse gases** (GHGs) do not exceed their assigned amounts
- These GHGs are: Carbon dioxide (CO₂); Methane (CH₄); Nitrous oxide (N₂O); Hydrofluorocarbons (HFCs); Perfluorocarbons (PFCs); and Sulphur hexafluoride (SF₆)
- came into effect in 2004 when **55 countries accounting for 55%** of 1990 global carbon dioxide emissions ratified it
- Who did not sign Kyoto?

Kyoto Protocol

Specific Features of the Kyoto Protocol

- **Legal Basis**
 - ▣ Commitments are legally binding on nations under international law
- **Assigned Amounts**
 - ▣ For 2008–12, overall average emissions are to be 94.8 per cent relative to 1990 levels
- **Greenhouse Gases**
 - ▣ The protocol identifies six greenhouse gases

Initial Kyoto Protocol participation map (commitment period 2008-2012)

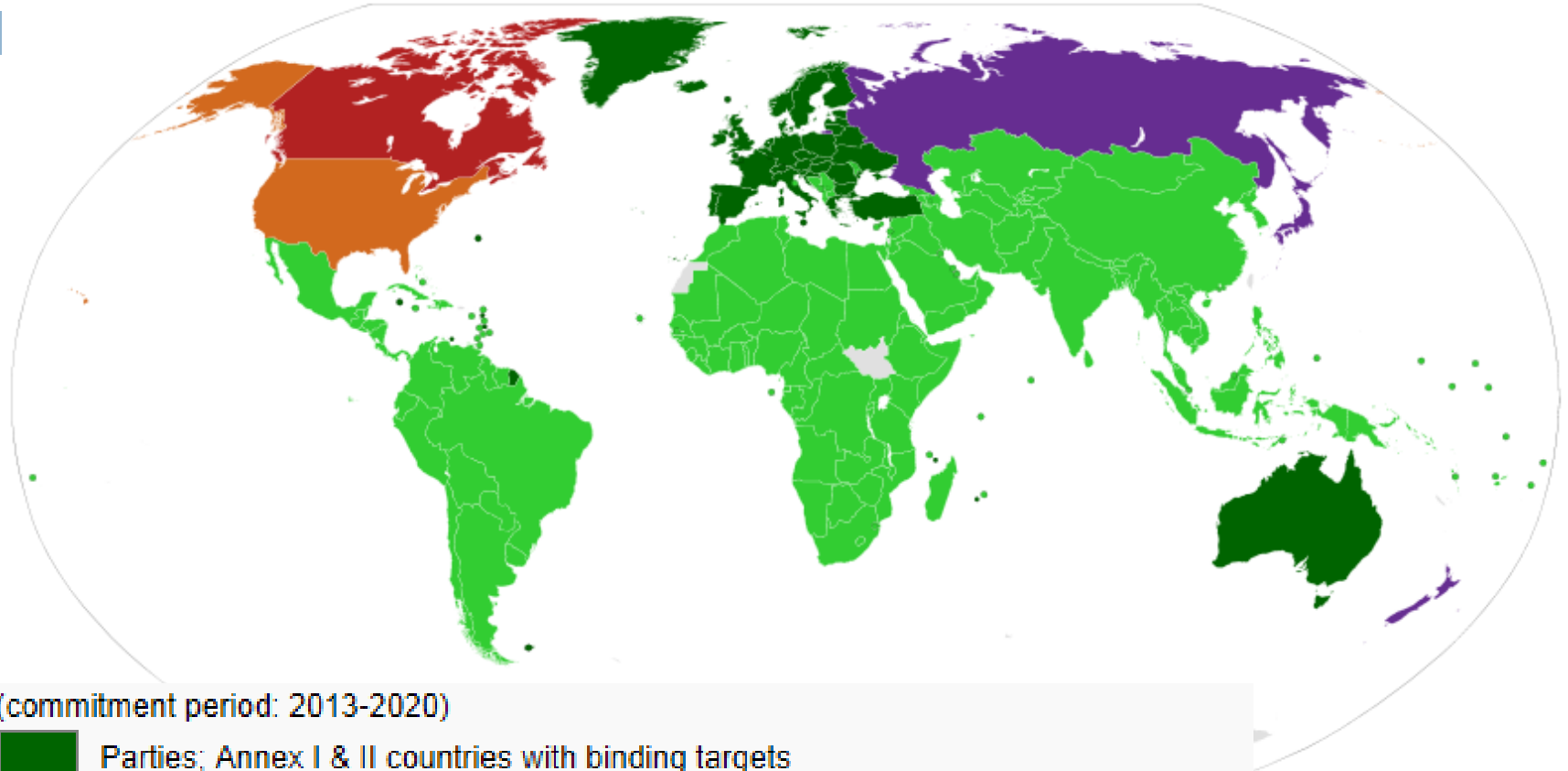


Dark grey (black) = Annex I Parties who have agreed to reduce their GHG emissions below their individual base year levels







Grey = Annex I Parties who have agreed to cap their GHG emissions at their base year levels

Pale grey = Non-Annex I Parties who are not obligated by caps or Annex I Parties with an emissions cap that allows their emissions to expand above their base year levels or countries that have not ratified the Kyoto Protocol

Kyoto Protocol participation map (commitment period 2013-2020)



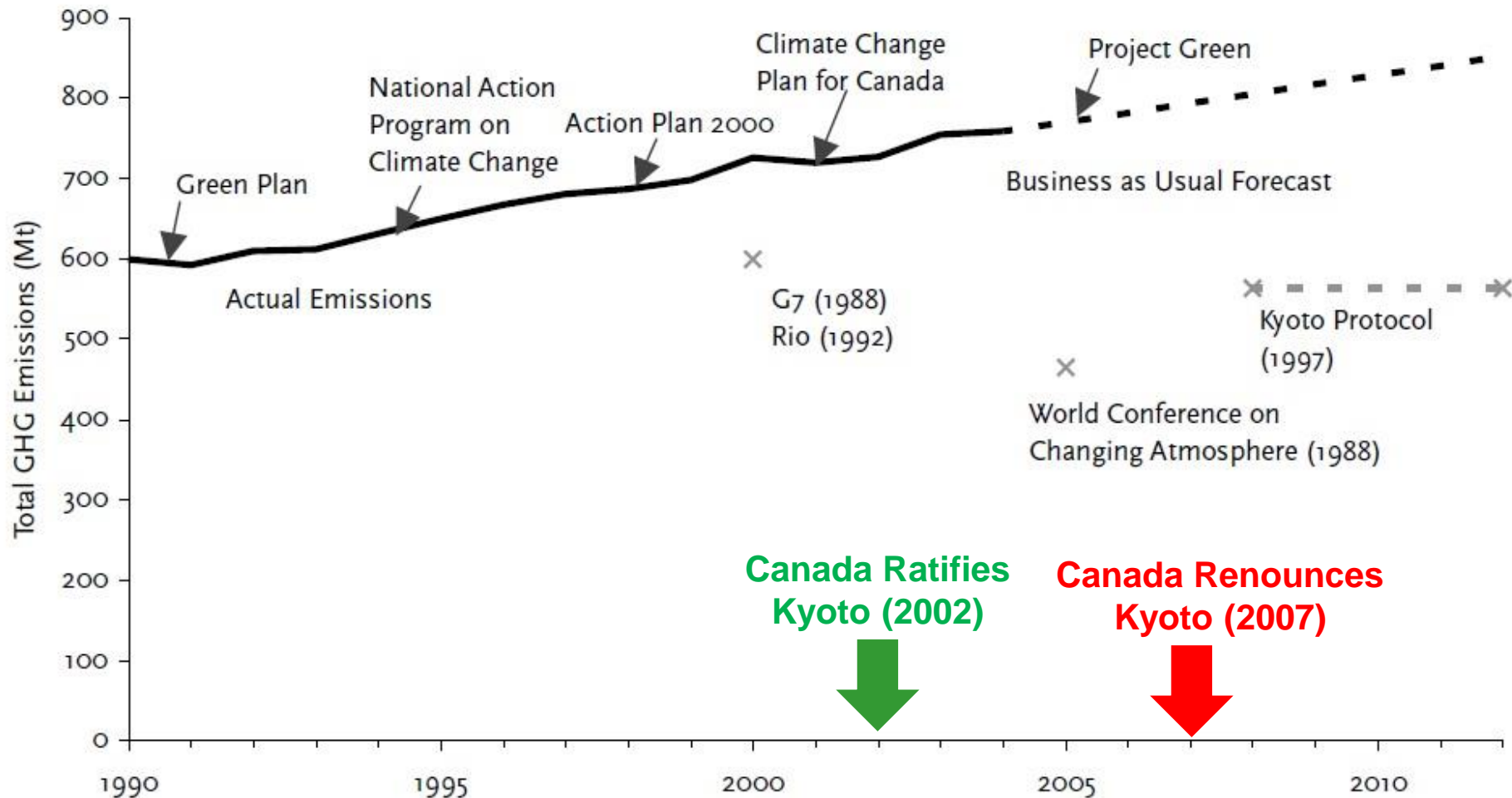
(commitment period: 2013-2020)

-  Parties; Annex I & II countries with binding targets
-  Parties; Developing countries without binding targets
-  States not Party to the Protocol
-  Signatory country with no intention to ratify the treaty, with no binding targets
-  Countries that have renounced the Protocol, with no binding targets
-  Parties with no binding targets in the second period, which previously had targets

Kyoto Protocol – Canada's approach to ...

- **Canada ratified** the Kyoto Protocol in **2002** without a clear plan on how it would be implemented in Canada, under *then*-Prime minister Chrétien
- By 2004, it became clear that Canada would not meet its commitments under Kyoto
- In 2007, the **Harper government rejected the Kyoto Protocol**, instead preferring the **voluntary approach** to emissions endorsed by the AP6 (Asia-Pacific Partnership on Clean Development and Climate)

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)



USAID
FROM THE AMERICAN PEOPLE

ADAPT
ASIA-PACIFIC

EU pledges further €4million for climate change adaptation in the Maldives

Release date: Dec 5 2013

The European Union has today revealed it is to release an additional €4 million to address climate change in the Maldives.

World Bank Supports Building Resilient Coastal Communities in Samoa

Release date: Dec 27 2013

... a US\$14.6 million grant to help 45,000 Samoans who live in coastal communities adapt to climate change and climate variability. The **Enhancing the Climate Resilience of Coastal Resources and Communities Project** will develop and implement immediate adaptation activities to protect the lives and livelihoods of the people; protect infrastructure and environment; and increase awareness of climate change impacts and adaptation activities among communities, civil society and government.

<http://www.adaptasiapacific.org/content/about-adapt-asia-pacific>



USAID
FROM THE AMERICAN PEOPLE

ADAPT
ASIA-PACIFIC

- With funding through USAID's Regional Development Mission for Asia (RDMA)
- Purpose:
 - to help nations in Asia and the Pacific obtain financing from international climate change adaptation funds
 - designed to share information and best practices about climate fund requirements



USAID
FROM THE AMERICAN PEOPLE

ADAPT
ASIA-PACIFIC



Maldives

<http://www.adaptasiapacific.org/content/about-adapt-asia-pacific>

References

- Dearden, P and Mitchell, B. 2012. *Environmental Change and Challenge*, Fourth Edition, Don Mills, Ontario: Oxford University Press {chapter 7}
- 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)
- Maldives, Government of, 2009. *National Adaptation to Climate Change*. Prepared by the Ministry of Housing, Transport and Environment for the Maldives Partnership Forum, March 2009, <http://www.maldivespartnershipforum.gov.mv/pdf/Adaptation%20to%20Climate%20Change.pdf>.
- Natural Resources Canada 2007. "Towards Adaptation: Case Studies in British Columbia" (date accessed January 14, 2014) <http://www.nrcan.gc.ca/environment/resources/publications/impacts-adaptation/reports/assessments/2008/ch8/10393>