

Human impacts



Intro (2008)

**Island of Matsungan,
Bougainville/PNG**

Chief Kela: “What
will the future hold for
our children and
grandchildren?”

Island Chief John Kela (right) standing on what he says was formerly dry ground.

Photo: Johannes Luetz

Intro (2008)



**Bhola Island,
Bangladesh**



Tajumuddin, Bhola, Bangladesh: Photo: Johannes Luetz

Bhola Island, Bangladesh

Abdul Mannan: “The place where I was born lies 5 kilometres out in the sea. I’ve already moved my home and family four times.” Community elder Abdul Mannan (centre) points out signs of erosion.

Intro (2008)

Abdul Mannan:

“People are constantly moving back. This family left last week. Only the toilet pit is left.”

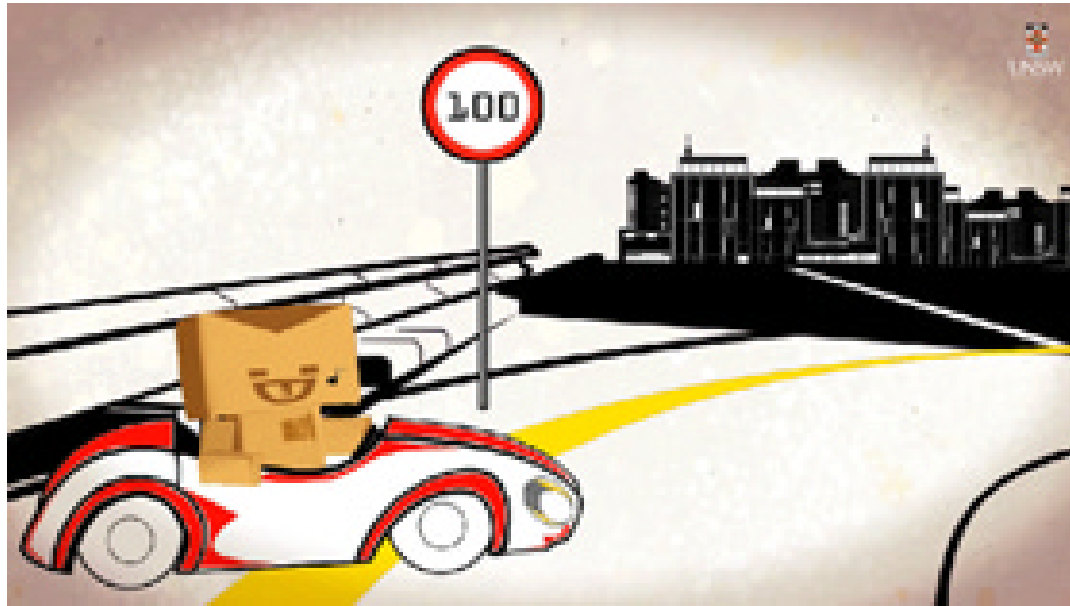
Bhola Island,
Bangladesh

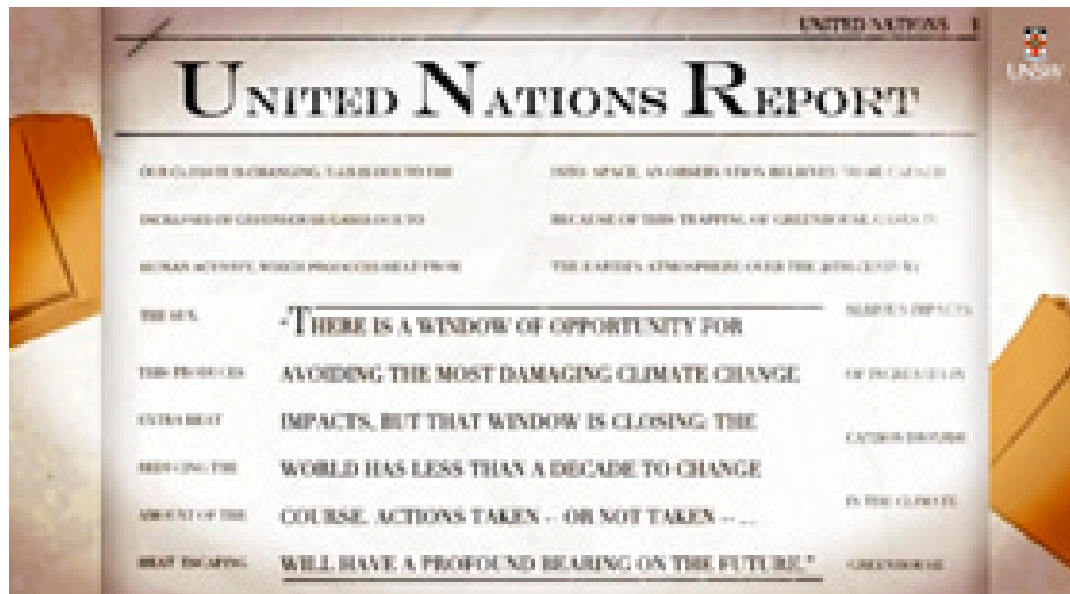
UNSW-produced video scripted for Leadership Networks for Climate Change (LNCC) to explain that climate change cannot be stopped overnight; early action is therefore urgent.



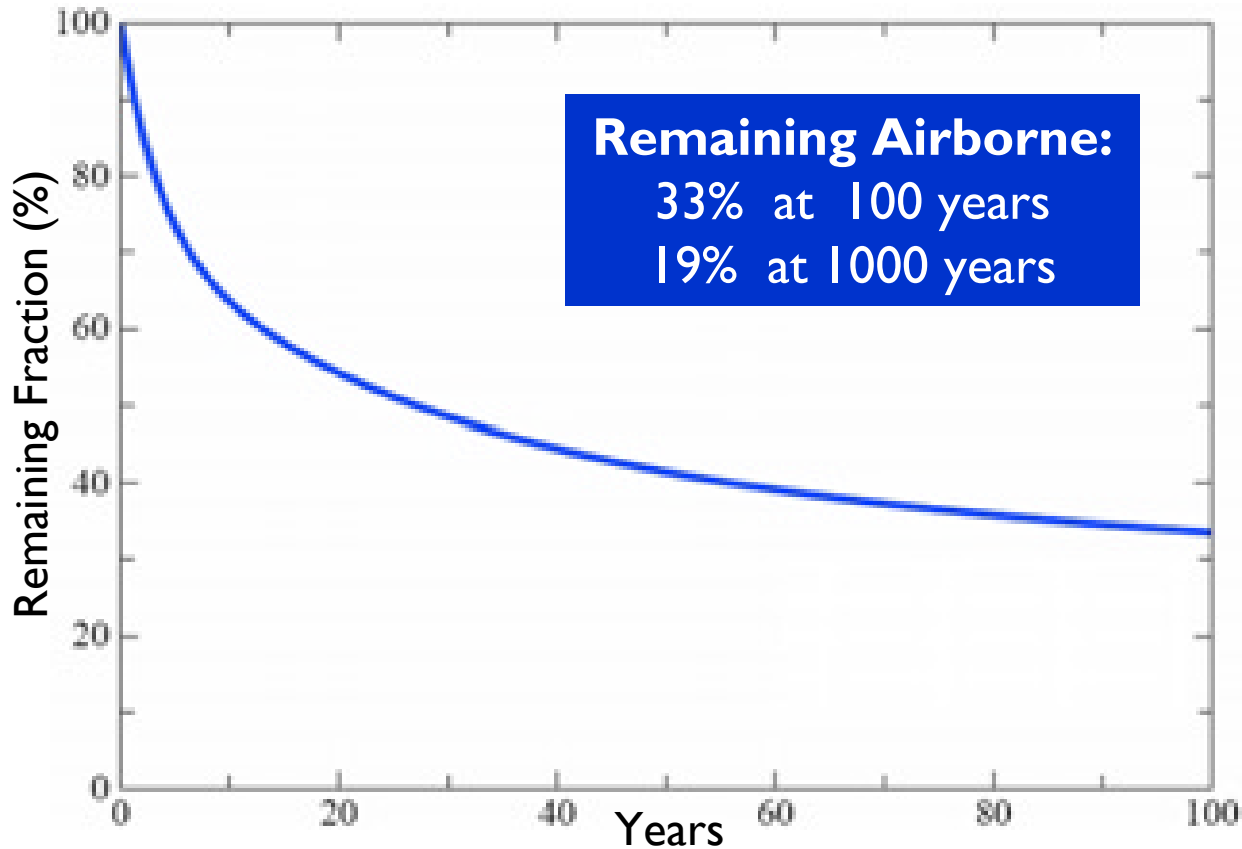
<http://tv.unsw.edu.au/video/hit-the-brakes>

Stopping distance





Slow decay of fossil fuel CO₂ emissions



The fraction of CO₂ remaining in the air, after emission by fossil fuel burning, declines rapidly at first, but 1/3 remains in the air after a century and 1/5 after a millennium.

(Hansen, J, 2007, *Atmos. Chem. Phys.* **7**, 2287-2312).

Canada trip (2010) Boeing 767-300



**1t Jet Fuel Burned
= 3.157t CO₂ Emissions**

Photo: Adrian Pingstone

Top of Atmosphere as seen from space at 335km altitude
(Photo: NASA Earth Observatory)

**Per-capita emissions 2010: 1.4t CO₂
(2110: 460kg, 3010: 260kg)**

*** 2.7 (Radiative Forcing
Index, RFI) = ~ 3.8t CO₂**



“Granny Maria” – 1958

Lloyd Alexander, 1958



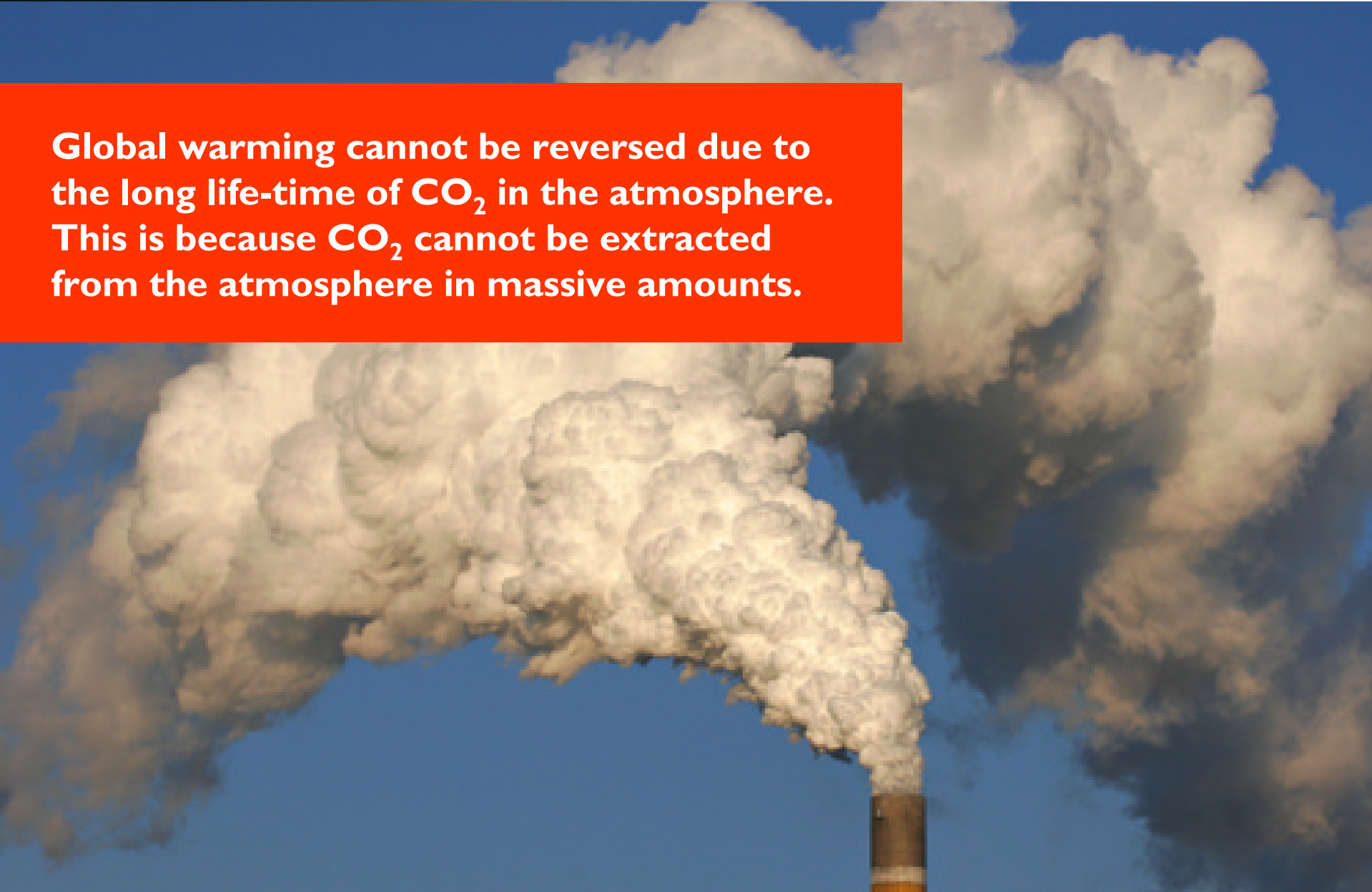
40% of total emissions from granny's 1st car still airborne today (~ 5,200 kg CO₂) as "historical emissions"

Cumulative CO₂ Emissions 1850-2006

Rank	Country	Mt CO ₂ e	% of World Total
1	United States of America	333,747.8	29.00%
2	European Union (27)	305,750.1	26.57%
3	China	99,204.2	8.62%
4	Russian Federation	93,081.6	8.09%
5	Germany	[80,377.0]	[6.99%]
6	United Kingdom	[68,235.8]	[5.93%]
7	Japan	44,535.2	3.87%
8	France	[32,278.6]	[2.81%]
9	India	27,433.6	2.38%
10	Canada	25,133.1	2.18%
Top 10	Cumulative Total	928,886	80.71%

CAIT, World Resources Institute
 CAIT GHG data are derived from CDIAC, EDGAR, EIA, EPA, Houghton, IEA, and WB.

Global warming cannot be reversed due to the long life-time of CO_2 in the atmosphere. This is because CO_2 cannot be extracted from the atmosphere in massive amounts.





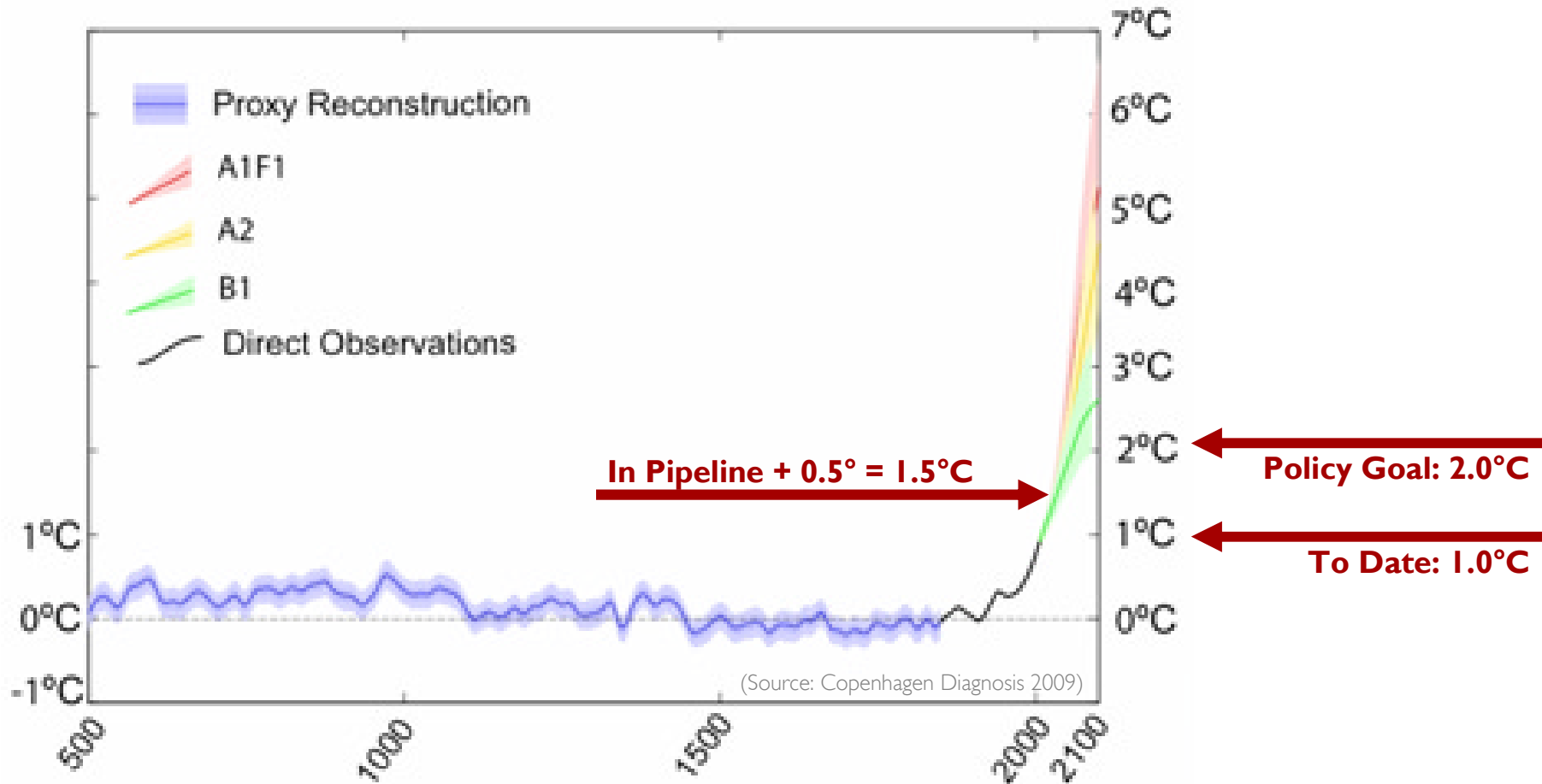
Global warming can be completely stopped. The temperature at which global warming will finally stop depends mainly on the total amount of CO₂ released into the atmosphere since industrialisation.

**The sooner
emissions stop,
the lower the
final warming
will be.**

**Zero Emissions?
Zero Regrets!**



Reconstructed, observed and future warming projections





Available resources:

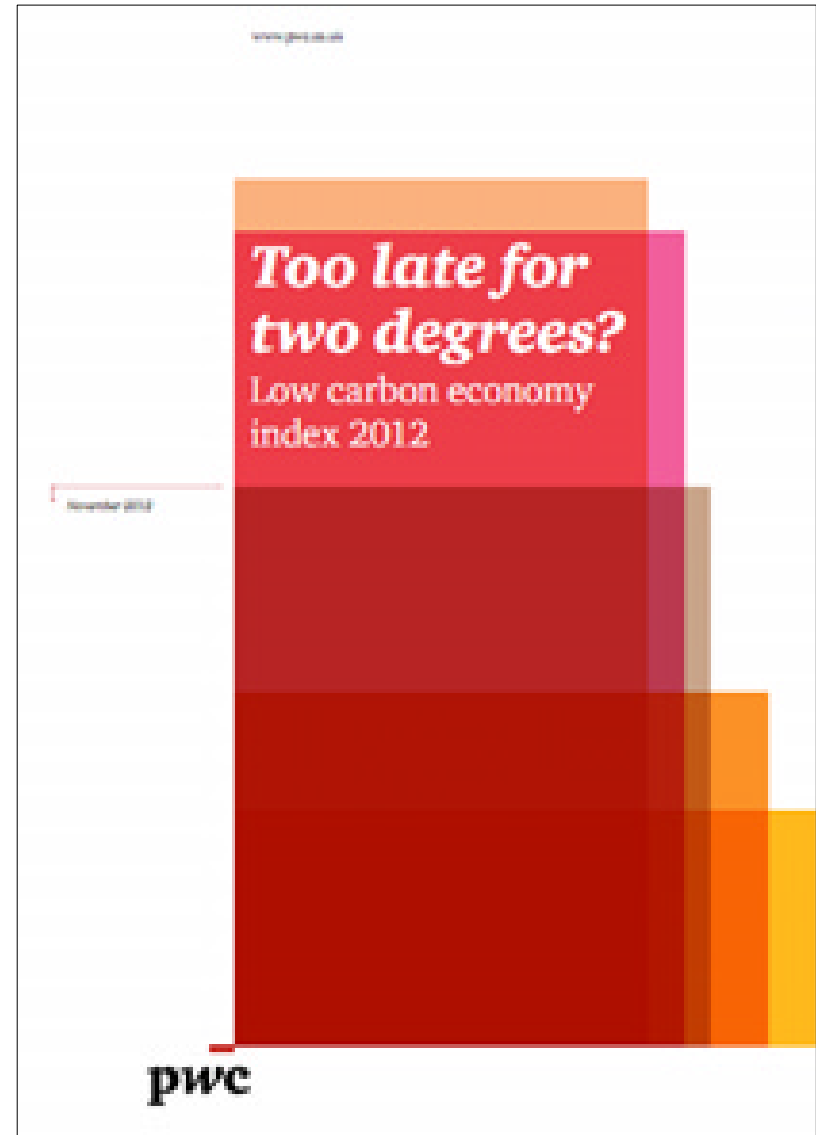
- Audio files
- Presentation files

Conference

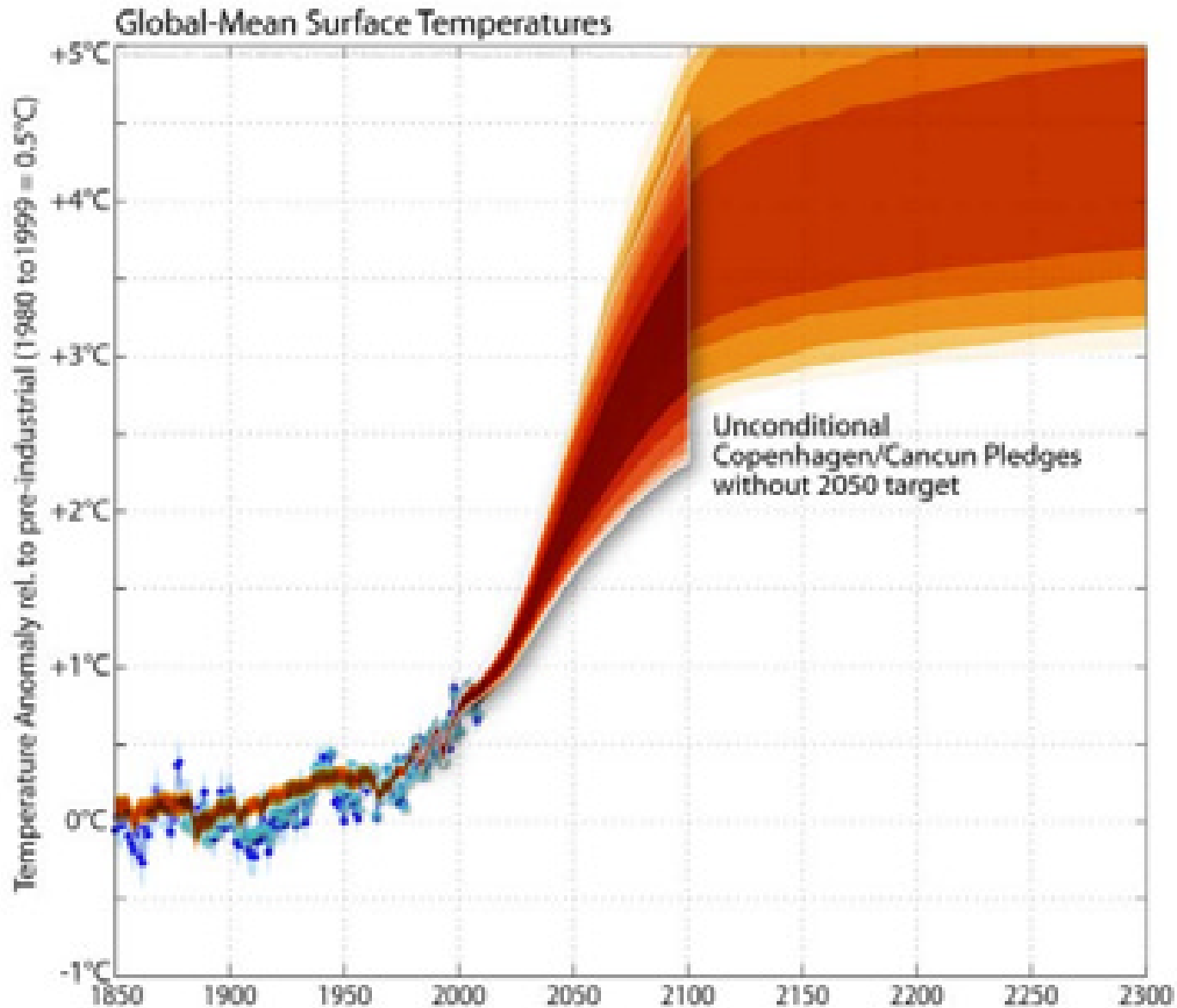
12-14 July 2011, Melbourne

FOUR DEGREES OR MORE? AUSTRALIA IN A HOT WORLD

www.fourdegrees2011.com.au



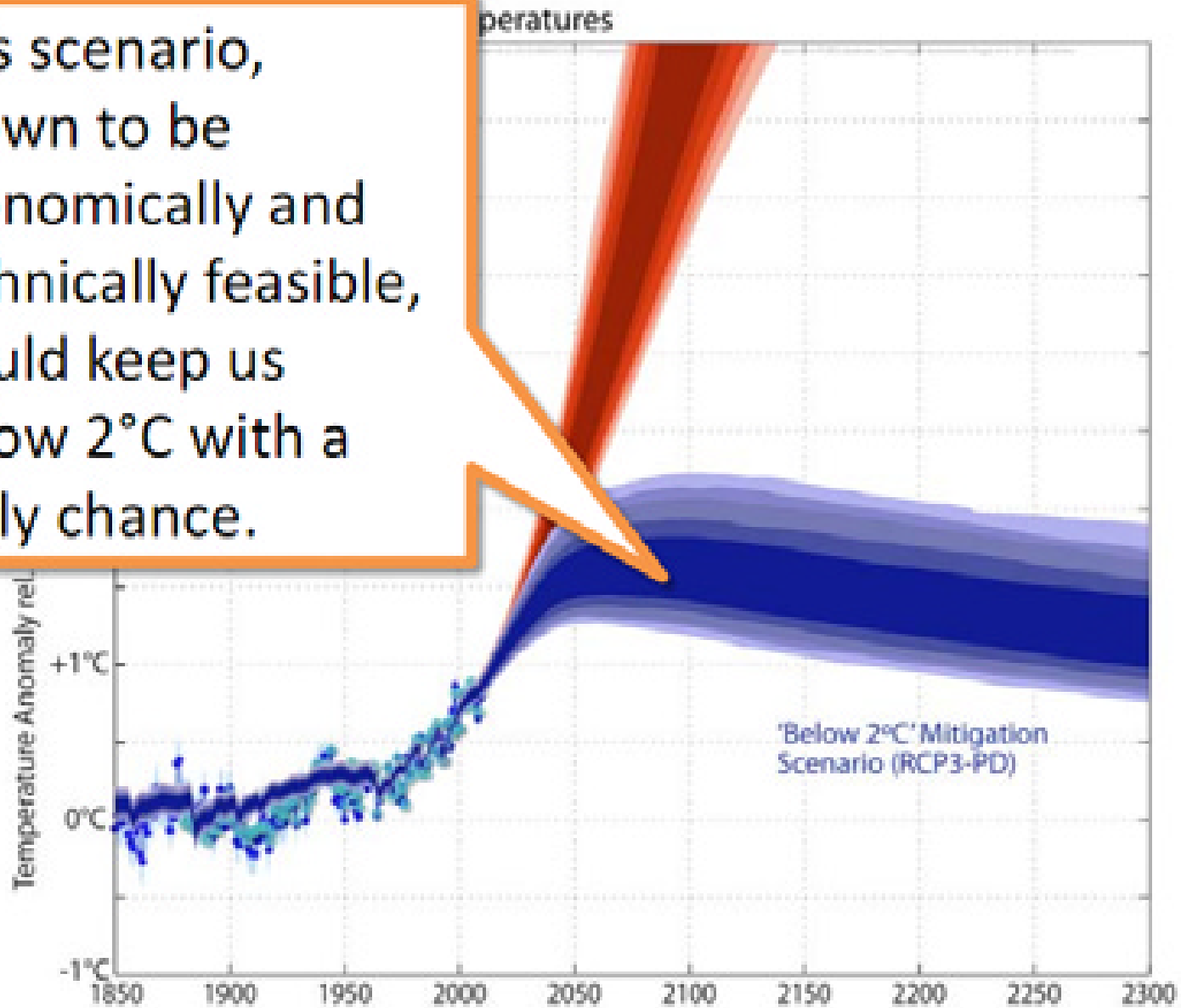
Copenhagen implemented



Based on: Rogelj et al., Nature, 2010

Source: Meinshausen 2011, presentation available:
<http://www.fourdegrees2011.com.au/presentations/>

This scenario, shown to be economically and technically feasible, would keep us below 2°C with a likely chance.



Source: Meinshausen 2011, presentation available:
<http://www.fourdegrees2011.com.au/presentations/>

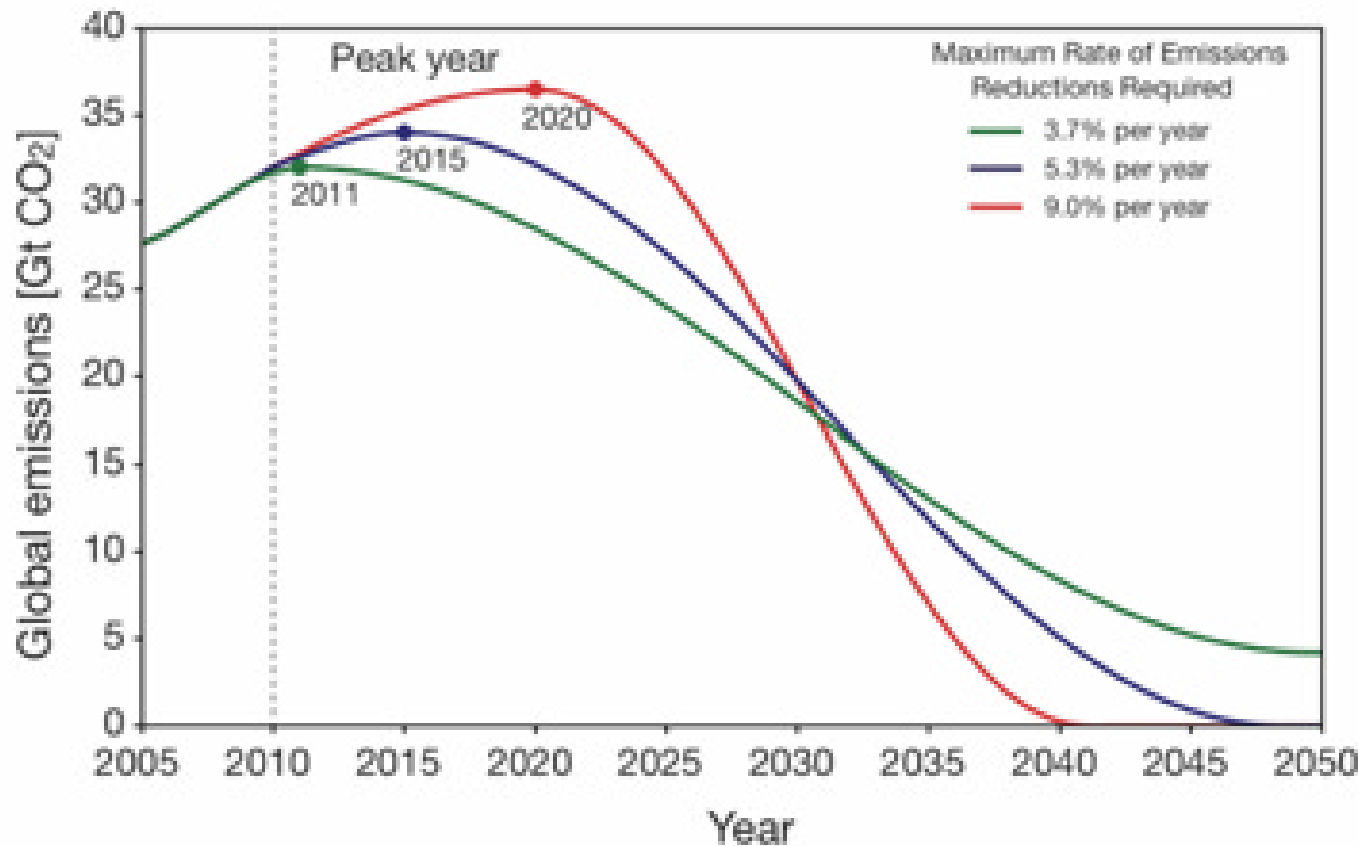
File Local Data: HADCRUT3 - GCMO (EAM), 2007, orange-hatched area: future projection modified as in Meinshausen et al. 2009, Nature

“ **Mitigation:**

Technological change and substitution that reduce resource inputs and emissions per unit of output. Although several social, economic and technological policies would produce an emission reduction, with respect to **Climate Change, mitigation means implementing policies to reduce greenhouse gas emissions and enhance sinks.** ”

—Intergovernmental Panel on Climate Change, 2007:
Fourth Assessment Report; Synthesis Report, p. 84.

Exemplary emissions pathways which remain within 750Gt and leave a 67% chance of limiting global warming to 2°C



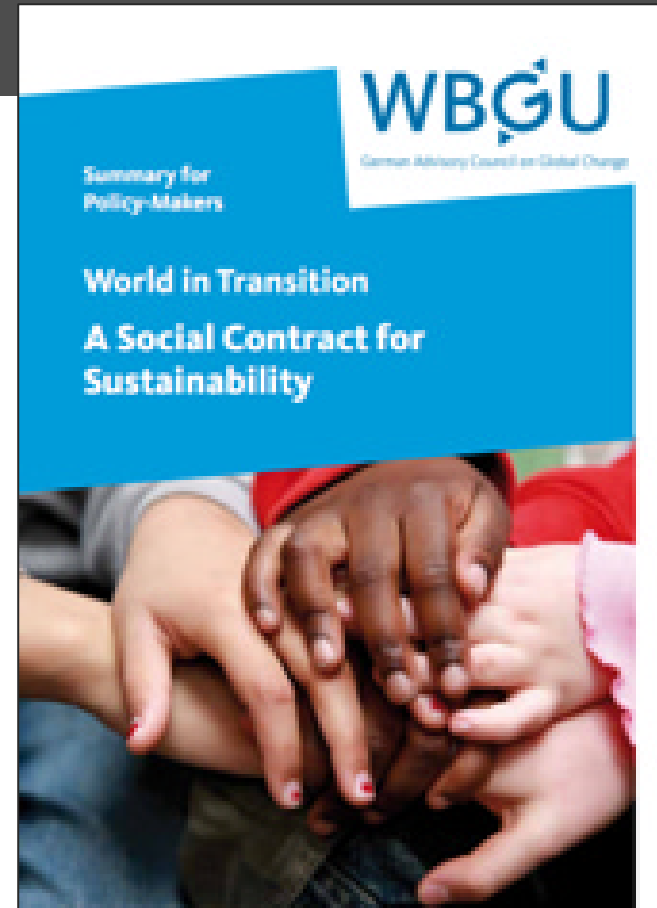
Solving the climate dilemma: The budget approach; WBGU Special Report 2009

Mitigation

World in Transition: Social Contract for Sustainability

Flagship Report 2011

<http://www.wbgu.de/en/home>



“ **Adaptation:**

Initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects. Various types of adaptation exist, e.g. anticipatory and reactive, private and public, and autonomous and planned. Examples are raising river or coastal dikes, the substitution of more temperature-shock resistant plants for sensitive ones, etc. ”

—Intergovernmental Panel on Climate Change, 2007:
Fourth Assessment Report; Synthesis Report, p. 76.

Pilot Study: Tulun Atoll, Bougainville/PNG

Show field research video footage:


File PNG I:

18:00 (1min) – Han Island

19:20 (15sec) – drowning trees

22:45 (45sec) – coconut, land lost

26:00 (30sec) – flooded sea walls



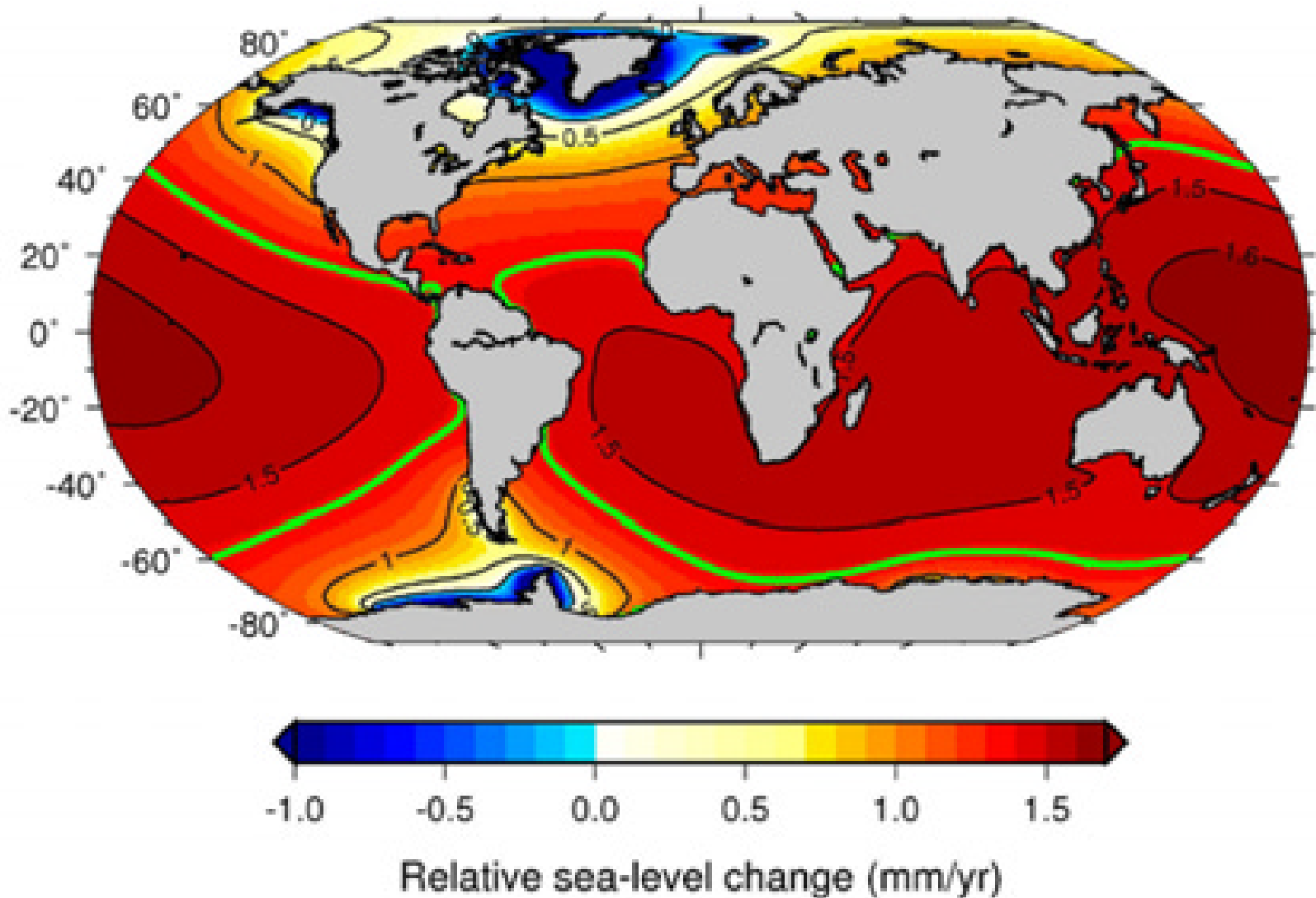
Circling Han Island in “banana boat” – coconut tree stump, evidence of sea level rise and diminishing island size ...

“

This [is] about the injustice of sea level rise ... on average you have about a metre of sea level rise by 2100, ... all over the globe. But the ... very vicious thing is, that this sea level rise will be distributed in a highly inhomogeneous way across the planet. [...] Elementary physics – if Greenland is losing mass, that means its gravitational pull for seawater will be diminished – that means, around Greenland, sea level may even drop, in particular for the north-eastern part of the American continent, while ... the Pacific Islands ... that haven't done anything to contribute to global warming, will again get the brunt of it, will get all the water which is released from Greenland. [...] And those who are most responsible for that, northern Europe, northern America, will be spared sea level rise, at least for a while. So you see nature can be extremely unfair, if humanity is sort of provoking that injustice.

”

Professor John Schellnhuber CBE, Director Potsdam Institute for Climate Impact Research, Chairman German Advisory Council on Global Change WBGU, Senior Advisor to the German Government, Session 1 at ~ 51:00
@ <http://www.fourdegrees2011.com.au>



Source: Bamber and Riva 2010.

World Bank 2012, "Turn Down the Heat", p. 33

Adaptation





Island of Buka

ISLAND ADAPTATION THROUGH SEA WALLS?

Photo: Johannes Luetz



Tulun Atoll

Photo: Pip Starr



**Abandoned
houses**

Bolivia



Photo: Johannes Luetz

Failing harvests



Erosion



Social cost of migration

Photo: Johannes Luetz

Bridge... to the past



Show field research video footage:

File name “Bangladesh I”:
55:00 (1min) – Bridge to “nowhere”



Abdul Mannan, 2011

Photo: Johannes Luetz

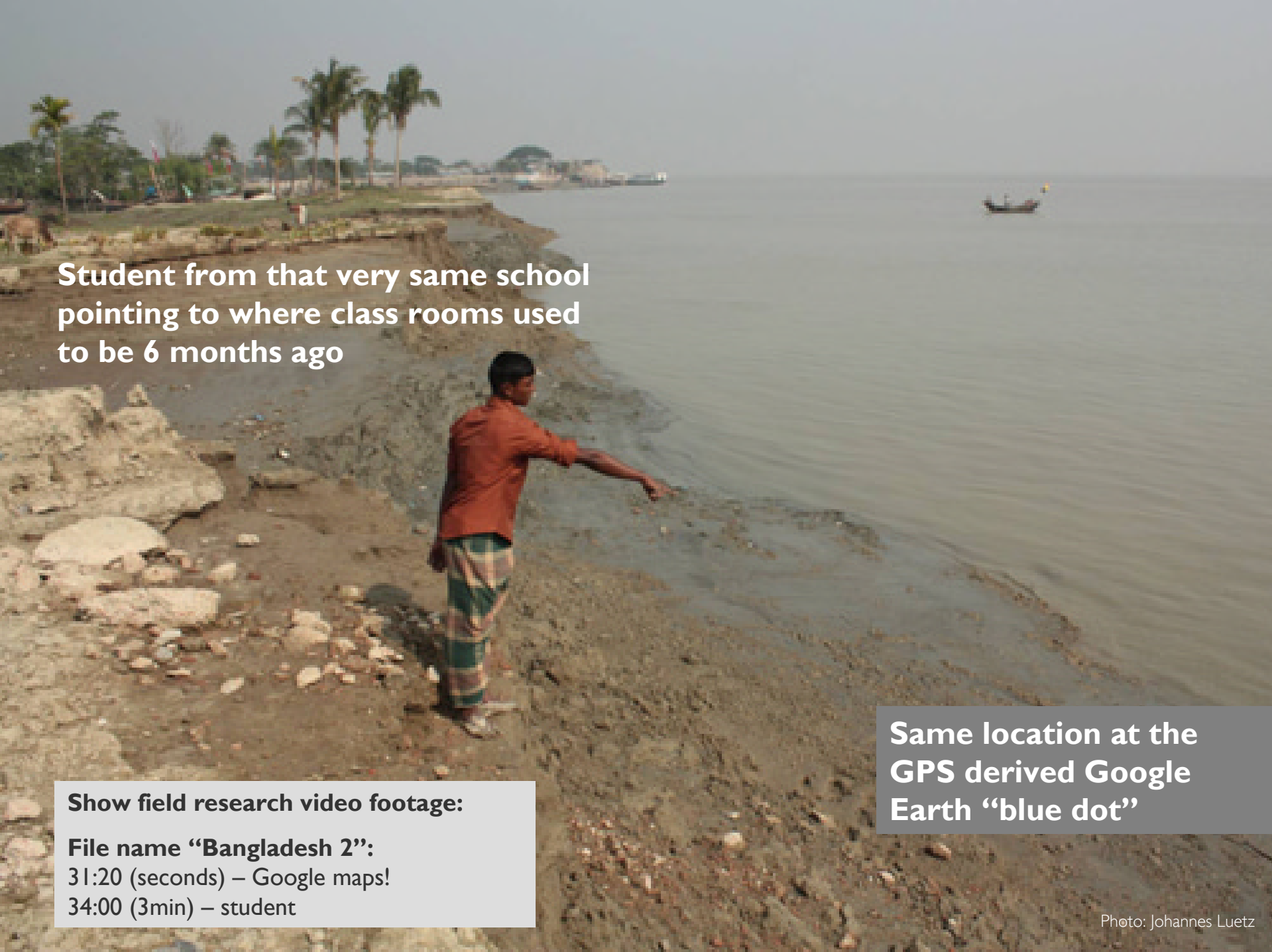
BlackBerry

<http://goo.gl/maps/IhuUJ>



← Google Earth: School building still visible

Blue dot indicates
our GPS position
100m from shore

A photograph of a young man in a brown shirt and a green and white striped lungi standing on a sandy beach. He is pointing his right arm towards the water. In the background, there are palm trees and a small boat on the water. The sky is overcast.

**Student from that very same school
pointing to where class rooms used
to be 6 months ago**

Show field research video footage:

File name “Bangladesh 2”:

31:20 (seconds) – Google maps!

34:00 (3min) – student

**Same location at the
GPS derived Google
Earth “blue dot”**



**Md. Faruk, migrant from Bhola Island
interviewed in Dhaka**

Show field research video footage:

File name “Bangladesh 5”:

46:00 (1min) – Dhaka tenants, settlements

59:00 (30sec) – Bhola-CEGIS (6km@61min)

00:00 (3min) – INDIA I: erosion/ accretion

Outside





Adapted from Milliman *et al.* (1989).
Presentation by Sir John Houghton 7 Sep 2011



A
Hathirushi



Abandoned island





Show field research video footage:

File name “Maldives 4”:

04:00 (1 min) – Abandoned Hathifushi Island

23:00 (1 min) – Skipper, stuff, storm surge

48:00 (1 min) – Faridhoo: highest point on M.



Malé, Maldives

Malé, Maldives: With 80% of land area less than 1 metre above sea level, the Maldives is extremely vulnerable to rising sea levels. Photo: Shahee Ilyas

Mohamed Nasheed, President Maldives, 2009:
“We do not want to leave the Maldives, but we also do not want to be climate change refugees living in tents for decades.”



2.1.2012

Show field research video footage:

File name “Maldives 5”:

40:00-47:00 (7min) – Minister Aslan Interview

File name “Maldives 6”:

18:30 (45sec) – Hulhumalé from the air

Figure 6.24: An average Maldivian island protrudes less than one metre above sea level.



Figure 6.25: Contingency Adapted Raised Island with three to five metre elevation.



Illustrations: © Bluepeace Maldives

“ The only near certain conclusion we can draw from the changing climate and people’s response to it is that there is little time left in which to act. Therefore my plea is that **adaptation** is made at least equal in importance to policy-driven attempts to **reduce emissions**. ”

—James Lovelock, 2009; p. 75:
The Vanishing Face of Gaia