Photo: Pip Starr

"If emissions follow a business-as-usual scenario, sea level rise of at least two meters is likely this century. Hundreds of millions of people would become refugees." —Dr. James Hansen, Director NASA Goddard Institute, Adjunct Professor Columbia University

Climate Change Migration Management

Institute of Environmental Studies (IES)
UNSW, Sydney • 23 June 2010

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Presentation available:
http://luetz.com

Agenda

> *“For tomorrow belongs to the people who **PREPARE** for it today.”*
>
> *—African Proverb*

1. The Problem
2. The Context
3. The “Hot Spots”
4. The Conclusion

PLANET **PREPARE**

2008 World Vision Preparedness Study

P rotect Development
R esearch Priorities
E mpower Communities
P artner And Network
A dvocate Justice And Change
R einforce Disaster Defences
E ducate Children


Photo: Paul Willows/NASA

Intro

Island of Matsungan, Papua New Guinea

Matsungan, Papua New Guinea: Island Chief John Kela (right) standing on what he says was formerly dry ground. Photo: Johannes Luetz

Chief Kela: "What will the future hold for our children and grandchildren?" Island Chief John Kela (right) doesn't understand the science of climate change. But he sees that the ocean surrounding his island is rising.

Intro

Carteret Islander and Director of Tulele Peisa NGO, Papua New Guinea

Photo: Pip Starr

Ursula Rakova: "Storm surges regularly overtop our islands – then the sea and low-lying land become 'level.' The time for adaptation and mitigation has run out. The time for migration and relocation has come. Resettlement is underway. It is so sad to leave."

Intro

Group of "climate change refugees" who abandoned their coastal village "because of rising sea levels."

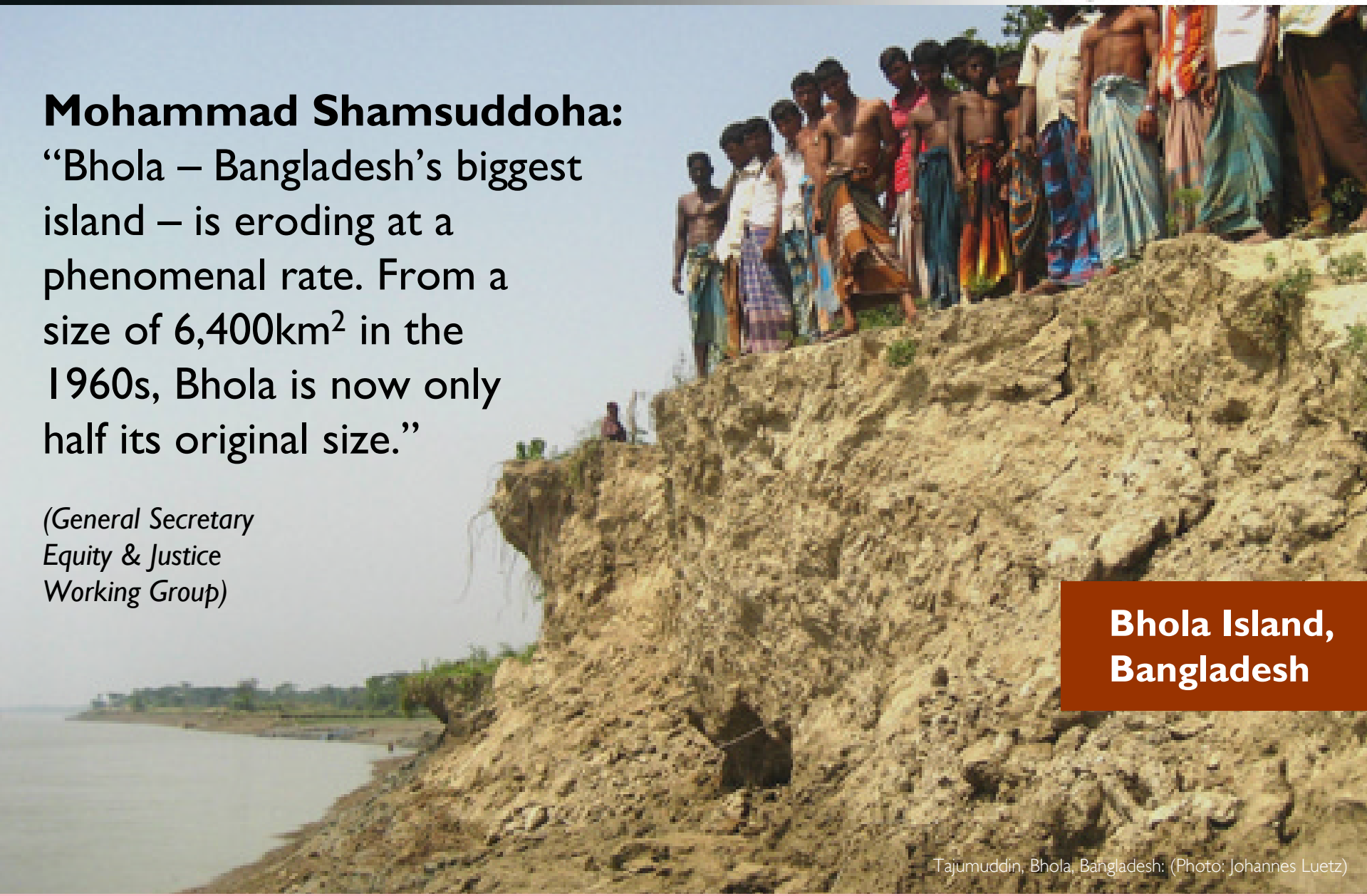
Intro

Albert Nai: "The bush is better than the beach!"
(At his new home with two of his grandchildren)

Intro

Mohammad Shamsuddoha:
"Bhola – Bangladesh's biggest island – is eroding at a phenomenal rate. From a size of 6,400km^2 in the 1960s, Bhola is now only half its original size."

(General Secretary Equity & Justice Working Group)



Bhola Island, Bangladesh

Tajumuddin, Bhola, Bangladesh: (Photo: Johannes Luetz)

Intro

Bhola Island, Bangladesh

Tajumuddin, Bhola, Bangladesh: (Photo: Johannes Luetz)

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. People are constantly moving back." Community elder Abdul Mannan (centre) points out signs of extreme erosion.

Intro

Abdul Mannan:
"People are constantly moving back. This family left last week. Only the toilet pit is left."

Bhola Island, Bangladesh

Tajumuddin, Bhola, Bangladesh: (Photo: Johannes Luetz)

I. Definitional Difficulties

Any other suggestions?

"climate refugees", "environmental refugees", "climate migrants", "climate exiles", "climate evacuees", "climate displacees/ dislocatees", "forced migrants", "climigrants" …

I. Definitional Associations

The Labels ▶ Societal Perceptions

"Refugee"

- "Refugee" good semantic fit: people literally "seek refuge"
- No choice
- Last resort
- Reactive
- Public empathy
- Perceived as "helpless"
- **"Victimisation"**

"Migrant"

- "Migrant" more matter-of-fact and legally precise
- Free will
- Form of Adaptation
- Proactive
- Public mistrust
- Perceived "freeloaders"
- **"Opportunism"**

I. Definitional Suggestions

ENVIRONMENTAL REFUGEES: *"... persons who can no longer gain a secure livelihood in their traditional homelands because of environmental factors of unusual scope, notably drought, desertification, deforestation, soil erosion, water shortages and climate change, also natural disasters such as cyclones, storm surges and floods. In face of these environmental threats, people feel they have no alternative but to seek sustenance elsewhere, whether within their own countries or beyond and whether on a semi-permanent or permanent basis." (Myers and Kent 1995, pp 18-19)*

ENVIRONMENTAL MIGRANTS: *"Environmental migrants are persons or groups of persons who, for compelling reasons of sudden or progressive changes in the environment that adversely affect their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad" (International Organization for Migration IOM, 2007).*

I. More Suggestions

CLIMATE CHANGE REFUGEE: *"... an individual who is forced to flee his or her home and to relocate temporarily or permanently across a national boundary as the result of sudden or gradual environmental disruption that is consistent with climate change and to which humans more likely than not contributed." (Docherty and Giannini, 2009)*

CLIMATE REFUGEE: *"... people who have to leave their habitats, immediately or in the near future, because of sudden or gradual alterations in their natural environment related to at least one of three impacts of climate change: sea-level rise, extreme weather events, and drought and water scarcity." (Biermann and Boas 2007, 2008)*

I. Definitional Difficulties

" there could be perhaps as many typologies as there are papers on the subject. "
(Richard Black, 2001)

2. Disaggregational Disasters

Problems:

1. No direct "causal link" of linear nature between environmental degradation and population displacement
2. Cannot uncouple "contributing causes"
3. Factors interrelated: environmental degradation triggers migration – migration causes environmental degradation
4. Future fallout depends on actions taken today

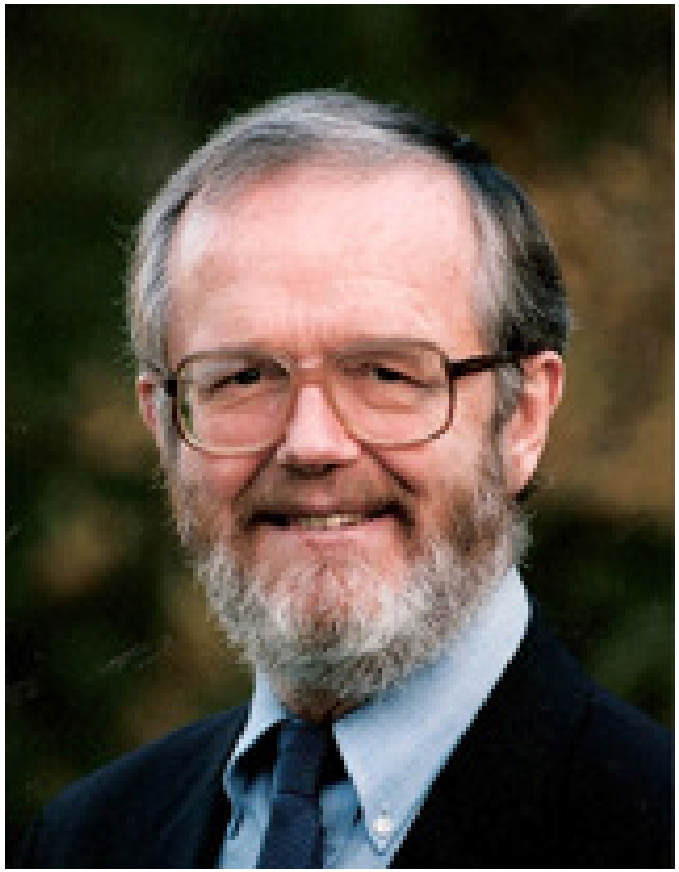
Bottom Line ▶ A relative causal attribution is very difficult to establish

3. Predictive Pandemonium

Country or Region as analysed by Myers and Kent	Projected number of "environmental refugees"
Bangladesh	13 million
Egypt	16 million
China	73 million
India	20 million
Island States	1 million
"Agriculturally Dislocated"	50 million
Total	173 million

(Myers and Kent, 1995)

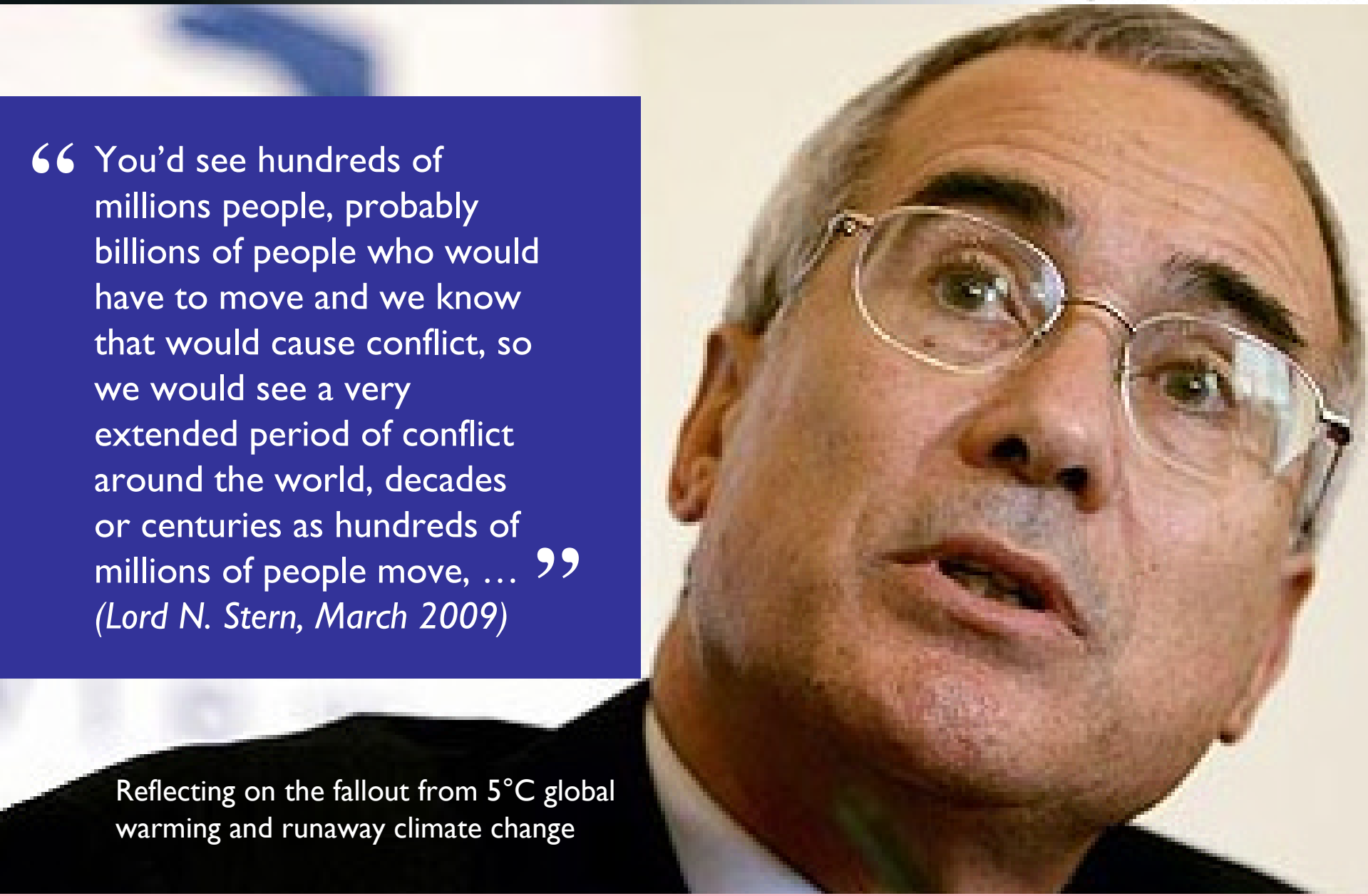
Voices: Norman Myers



"When global warming takes hold, there could be as many as 200 million people overtaken by disruptions of monsoon systems and other rainfall regimes, by droughts of unprecedented severity and duration, and by sea-level rise and coastal flooding."

(Norman Myers, 2005)

Voices: Nicholas Stern



> “You’d see hundreds of millions people, probably billions of people who would have to move and we know that would cause conflict, so we would see a very extended period of conflict around the world, decades or centuries as hundreds of millions of people move, …”
> *(Lord N. Stern, March 2009)*

Reflecting on the fallout from 5°C global warming and runaway climate change

Voices: H.J. Schellnhuber CBE

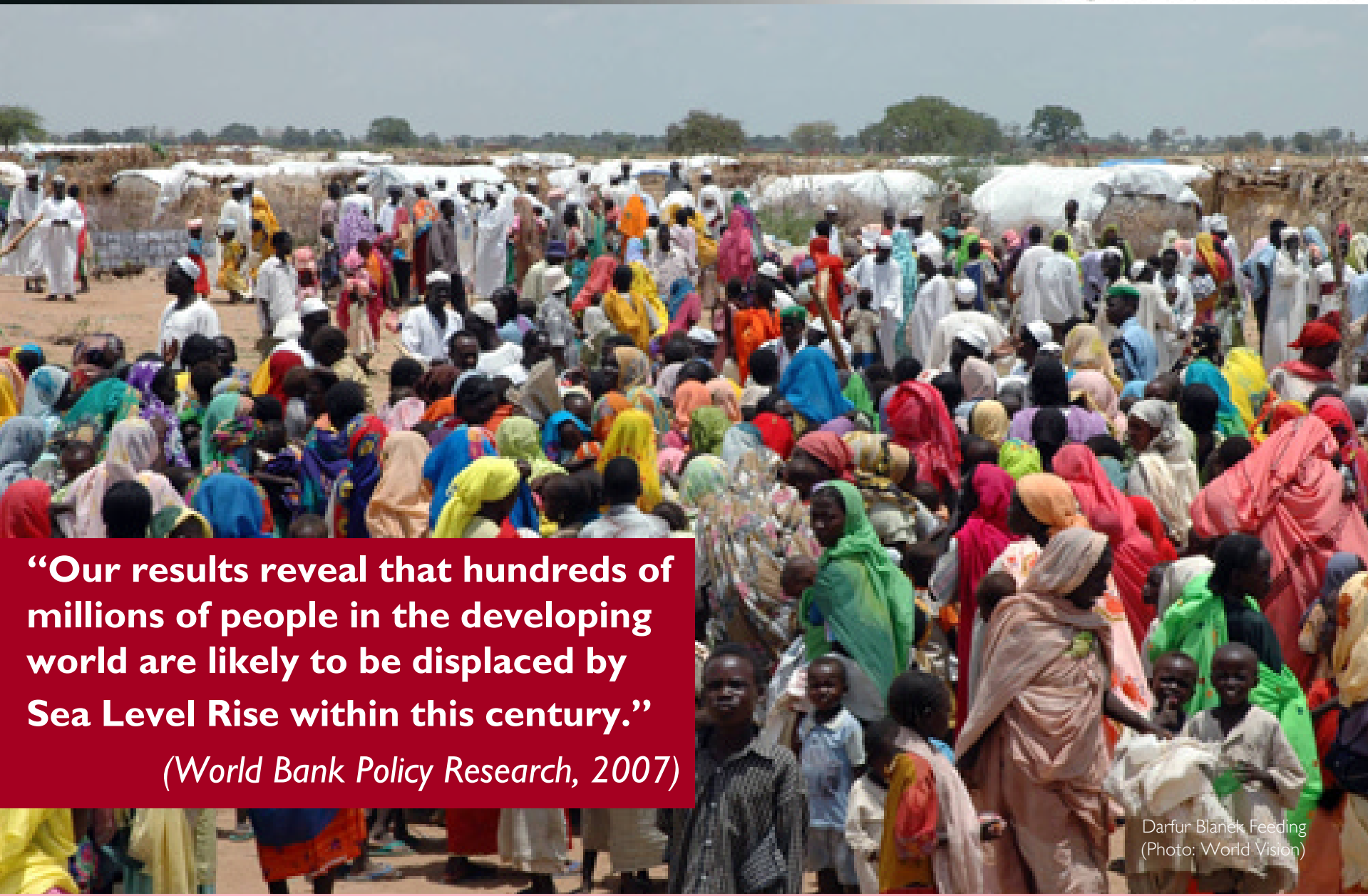
"When we talk about a one metre rise in global sea level we are also talking about 500 million people who are going to have to look for new homes. So far we don't have any instruments to manage this."

(Professor Hans Joachim Schellnhuber CBE, Director Potsdam Institute for Climate Impact Research, Chairman German Advisory Council on Global Change WBGU, Senior Advisor to the German Government, 2008)

3. Predictive Pandemonium

Source	Projection	Timeframe
IPCC (2001)	150 million	2050
Myers (1995 and 2005)	200 million	2050
Myers (2006)	250 million	2050
Nicholls (2004)	50-200 million	2080
IOM (2009)	200 million	2050
Stern Review (2006)	150-200 million	2050
Christian Aid (2007)	1 billion	2050

Summary



"Our results reveal that hundreds of millions of people in the developing world are likely to be displaced by Sea Level Rise within this century."

(World Bank Policy Research, 2007)

Darfur Blanket Feeding
(Photo: World Vision)

4. Legal Limbo

Under international law, a "refugee" is a person who...

"... owing to well-founded fear of persecution for reasons of race, religion, nationality, membership of a particular social group or political opinions, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country, or who, not having a nationality and being outside of the country of his former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it."

—1951 Convention relating to the Status of Refugees, Art. 1A(2), 1951, as modified by the 1967 Protocol).

4. Legal Limbo

Currently accepted definition of "IDPs"

"... persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized State border."

—Guiding Principles on Internal Displacement, E/CN.4/1998/53/Add.2.)

4. Legal Limbo

Possible scenarios

1. Rapid onset disaster
2. Environmental degradation
3. Loss of state territory
4. Armed conflict over shrinking resources

Protection gaps

☑ HRL ☑ GPID ☒ Refugee

☑ HRL ☒ GPID "forced" unclear

☑ HRL ☑ GPID ☒ "Stateless?"

☑ HRL ☑ GPID ☑ Refugee Convention applicable

Implication: wait until crisis affords "most protection"???

HRL = Int'l Human Rights Law, GPID = Guiding Principles on Internal Displacement, Refugee =1951 Convention, amended by 1967 Protocol

5. Ghastly Gaps

> “The objective of public policy should not be to prevent migration, but rather to ensure that it can take place in appropriate ways and under conditions of safety, security and legality … [which] makes it all the more urgent to carry out in-depth micro-level empirical research to understand the changes that are taking places, how they affect various groups, and what response strategies their groups adopt.”

—S. Castles, In: Afterword: What Now? Climate-induced Displacement after Copenhagen, [Ed.] Jane McAdam, 2010 [Forthcoming]

Problem Summary

Problem Components

1. Definitional Difficulties
2. Disaggregational Disaster
3. Predictive Pandemonium
4. Legal Limbo
5. Ghastly Gaps

Problem Implications

- ☒ NO agreed definition
- ☒ NO agreed attribution
- ☒ NO agreed forecasts
- ☒ NO agreed framework
- ☒ NO input from primary stakeholder (exceptions: EACH-FOR, etc.)

Agenda

> *“For tomorrow belongs to the people who **PREPARE** for it today.”*
>
> *—African Proverb*

1. The Problem
2. The Context
3. The “Hot Spots”
4. The Conclusion

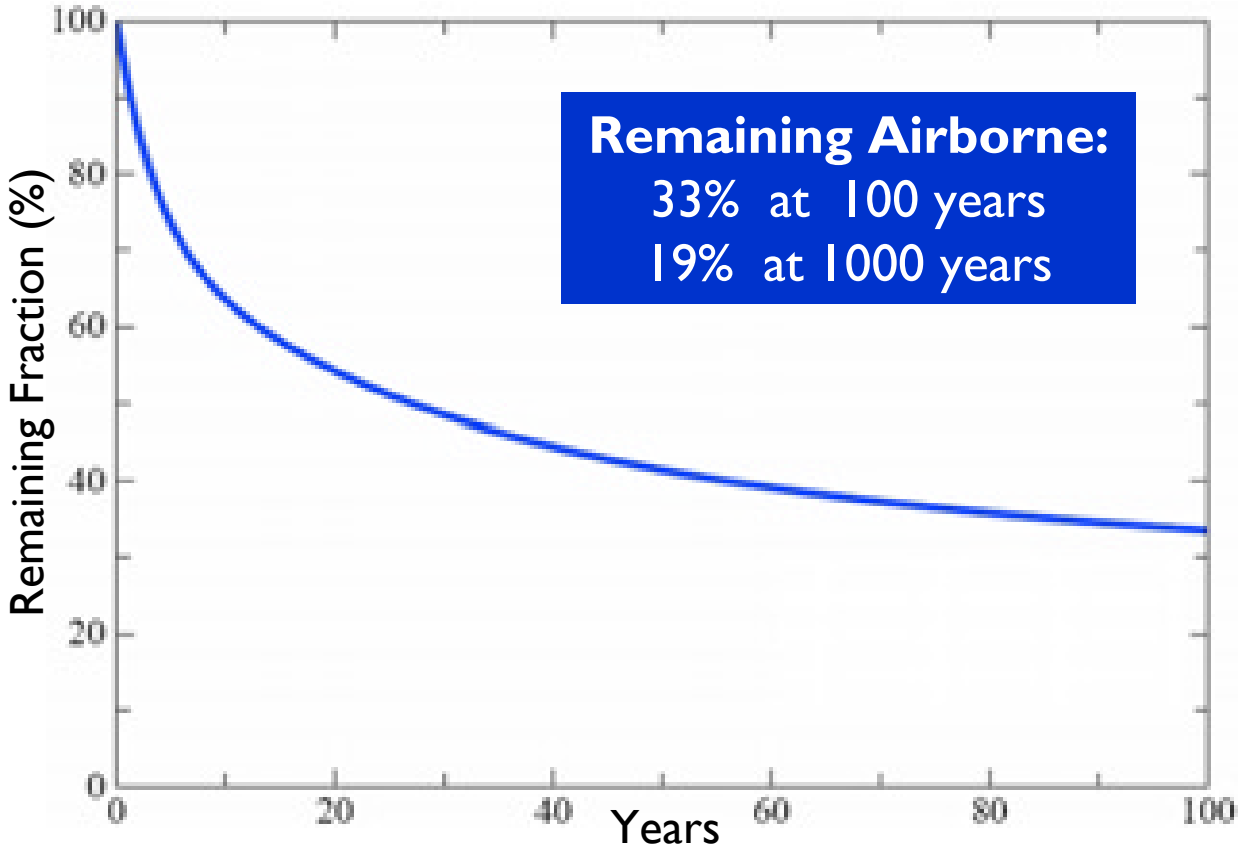
The Context

The problem of forced displacement emerges within the wider context of global trends:

- Climate Change
- Environmental Decay
- Population Growth
- Urbanisation
- Globalisation
- Poverty, Disparity,
- Etc.

1. Longevity of CO_2

Slow decay of fossil fuel CO_2 emissions



Fraction of CO_2 airborne after emission by fossil fuel burning:

2110: 33% CO_2
3010: 19% CO_2

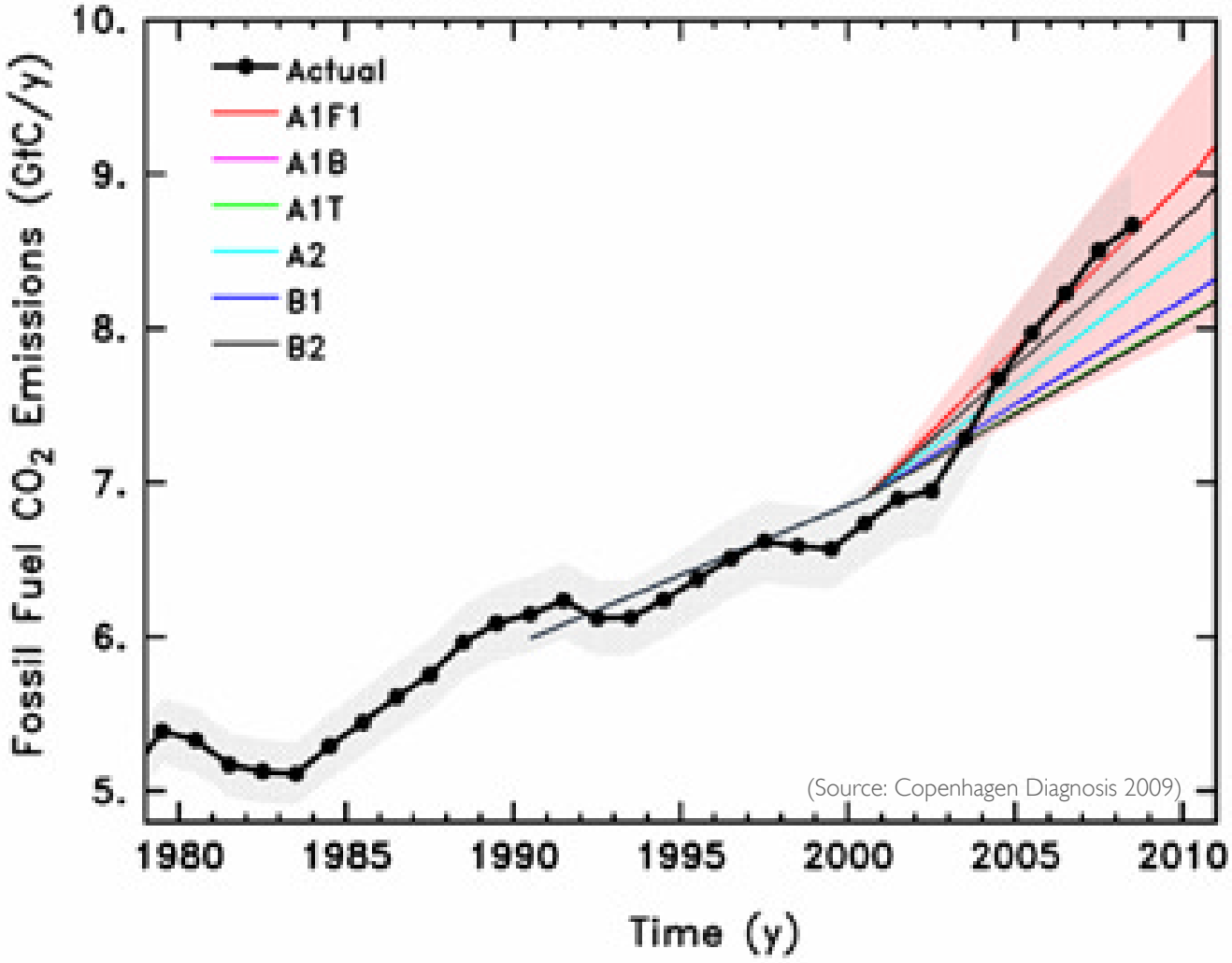
The fraction of CO_2 remaining in the air, after emission by fossil fuel burning, declines rapidly at first, but 1/3 remains in the air after a century and 1/5 after a millennium.

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

2. Environmental Degradation

Deforestation in the Amazon

Global CO_2 emissions from fossil fuels

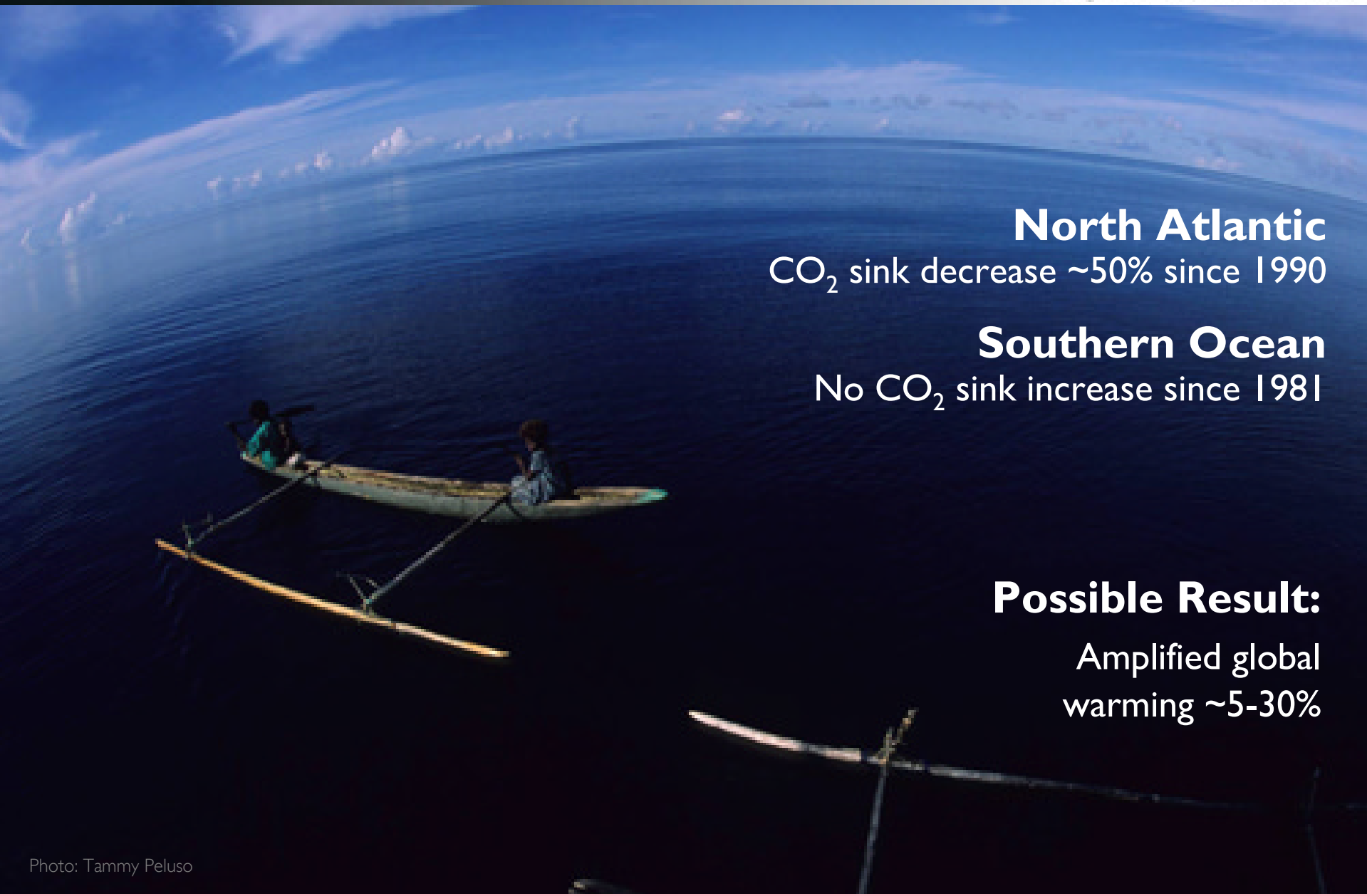


Annual CO_2 Increases:

1990s: 1.5 ppm CO_2
Now: 1.9 ppm CO_2

Emissions in 2008: 40% higher than in 1990

4. Declining CO_2 Removal



North Atlantic

CO_2 sink decrease ~50% since 1990

Southern Ocean

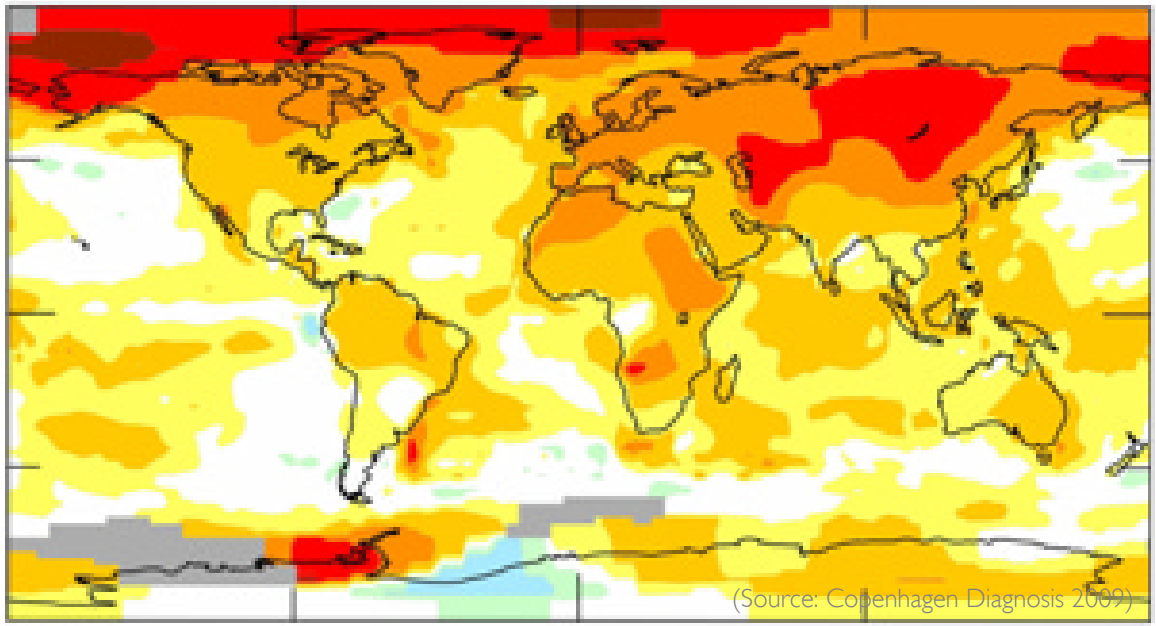
No CO_2 sink increase since 1981

Possible Result:

Amplified global warming ~5-30%

Photo: Tammy Peluso

Mean temperature change between 1950's and 2000's



Among top 10 warmest years
2001
2002
2003
2004
2005
2006
2007
2008
2009

6. Rogue Weather

Storms

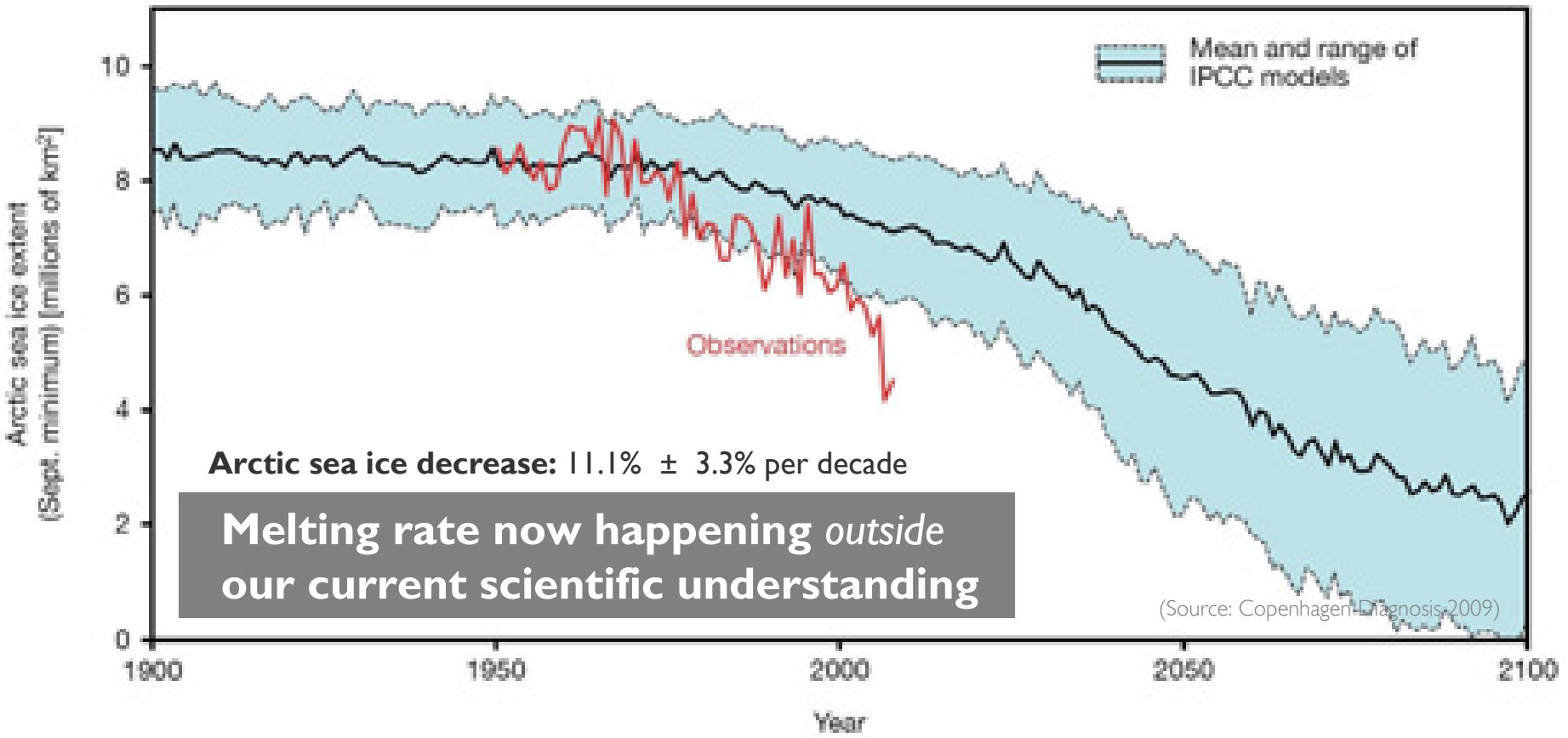
"What we are witnessing is not an aberration, but rather a 'curtain raiser' on the future. These events are not abnormal; they're what I call the 'new normal.' The number of recorded disasters has doubled from approximately 200 to over 400 per year over the past two decades. Nine of out every ten disasters are now climate related. Last year, my office at the UN issued an unprecedented 15 funding appeals for sudden natural disasters, five more than the previous annual record. 14 of them were climate-related."

—Sir John Holmes, UN Under-Secretary General for Humanitarian Affairs and Emergency Relief Coordinator.

Photo: Kirill Putchenko

UNSW
THE UNIVERSITY OF NEW SOUTH WALES

Observed and modeled Arctic sea-ice decline

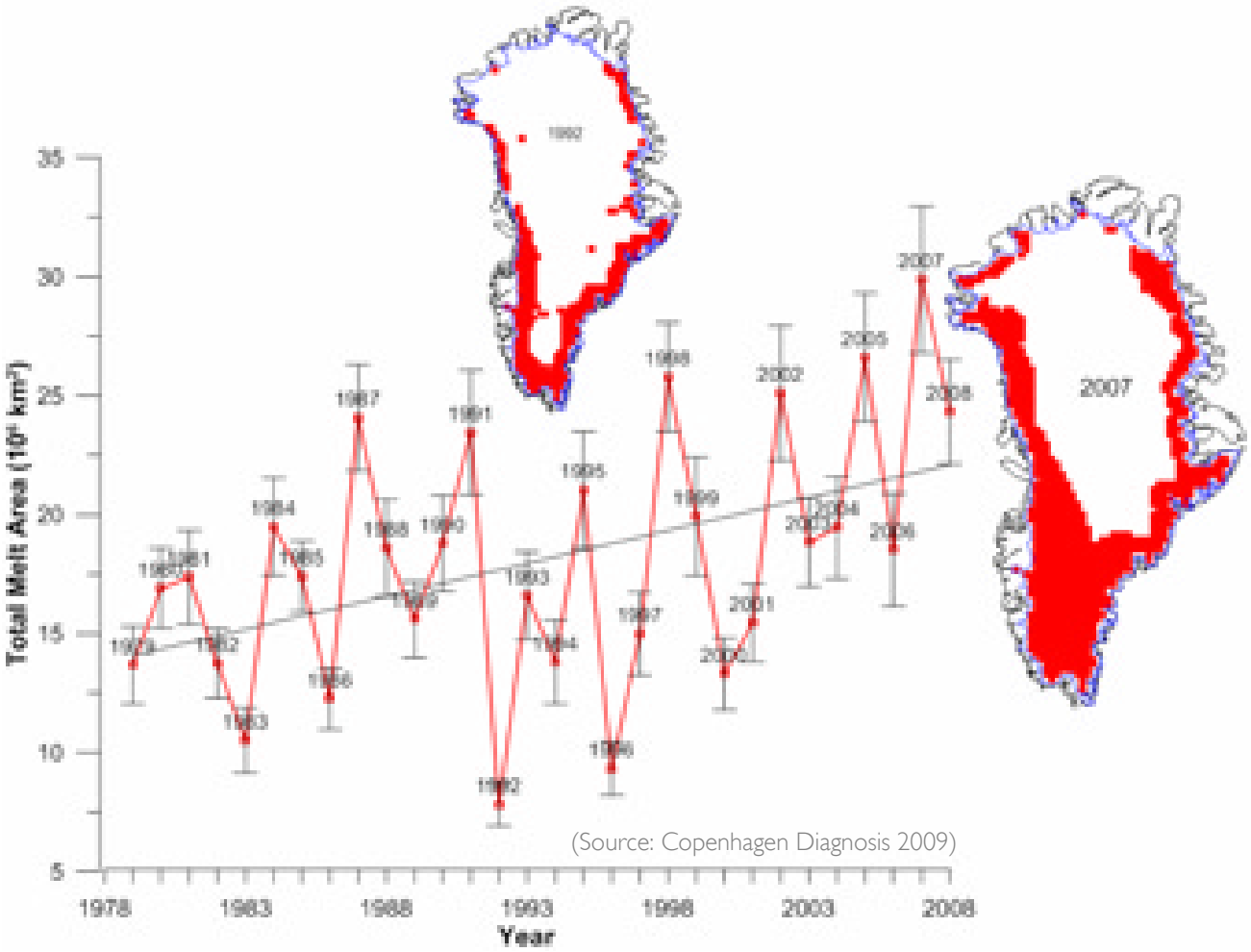


Arctic sea ice decrease: 11.1% ± 3.3% per decade

Melting rate now happening *outside* our current scientific understanding

(Source: Copenhagen Diagnosis 2009)

Greenland ice-melt since 1979

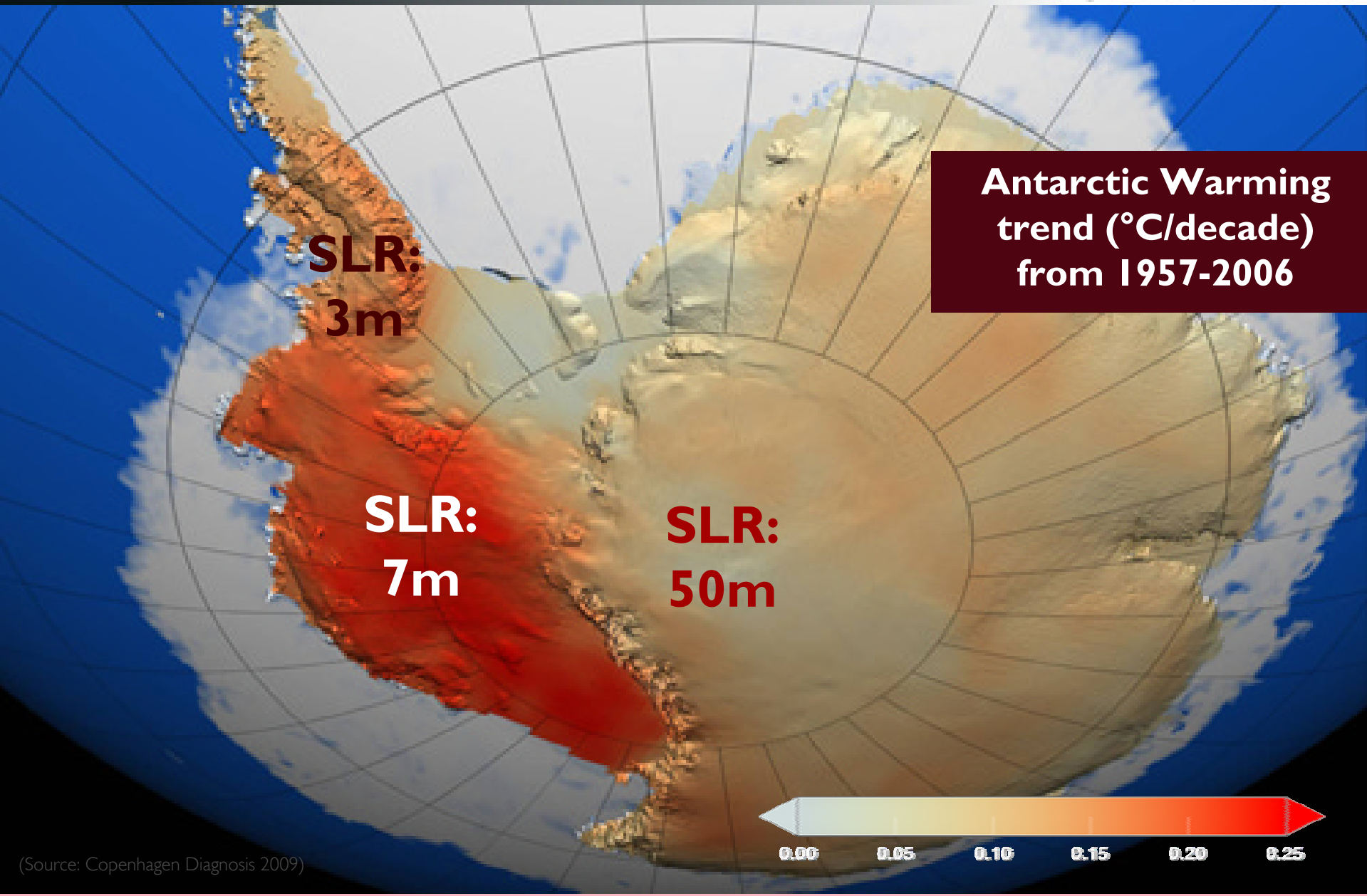


2002-2009:
Greenland ice mass loss doubled

2007:
melting area 50% of total ice sheet

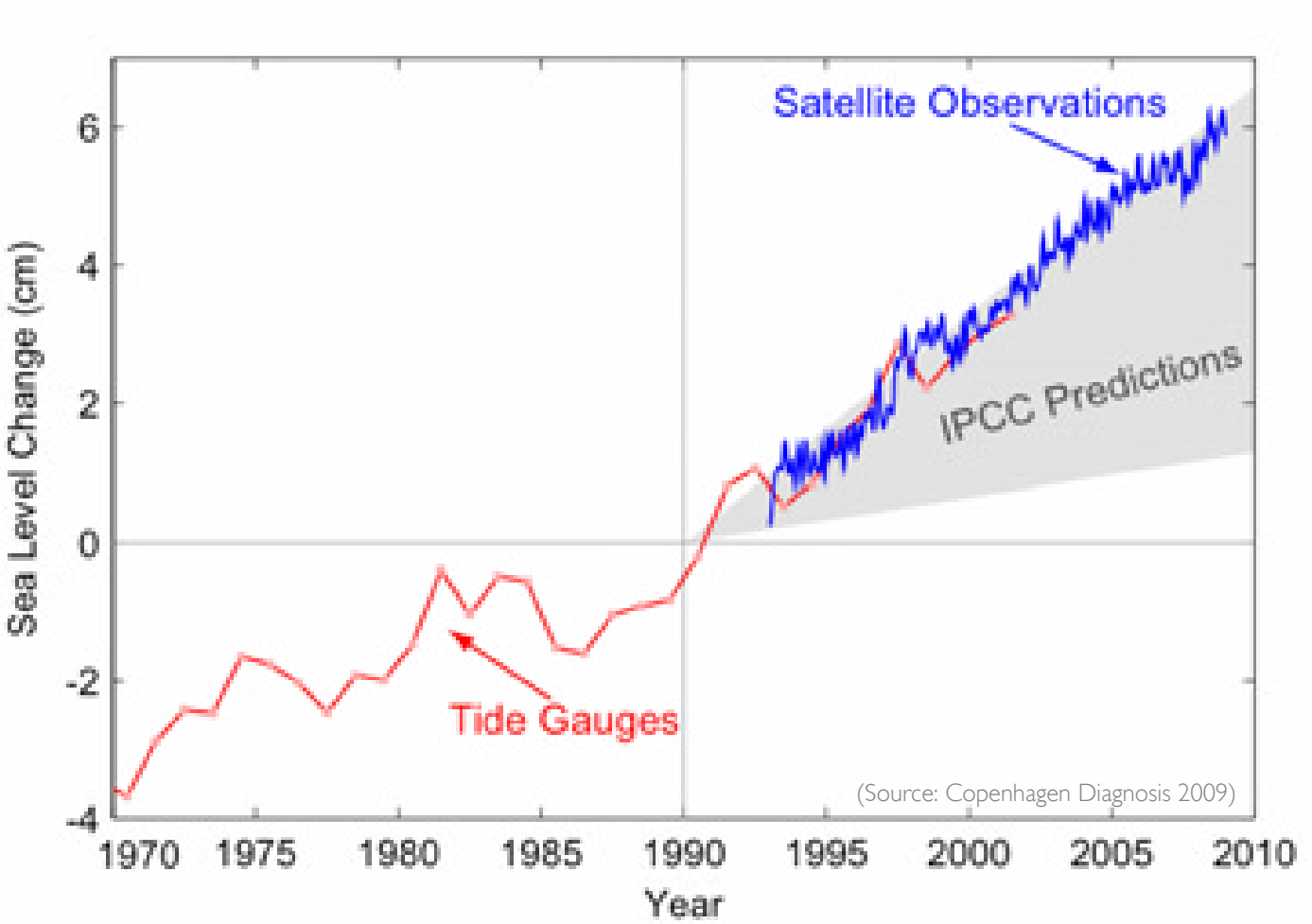
6.6 metres:
Greenland's total SLR potential

7. Sea Level Rise



(Source: Copenhagen Diagnosis 2009)

Global sea level change 1970-2010

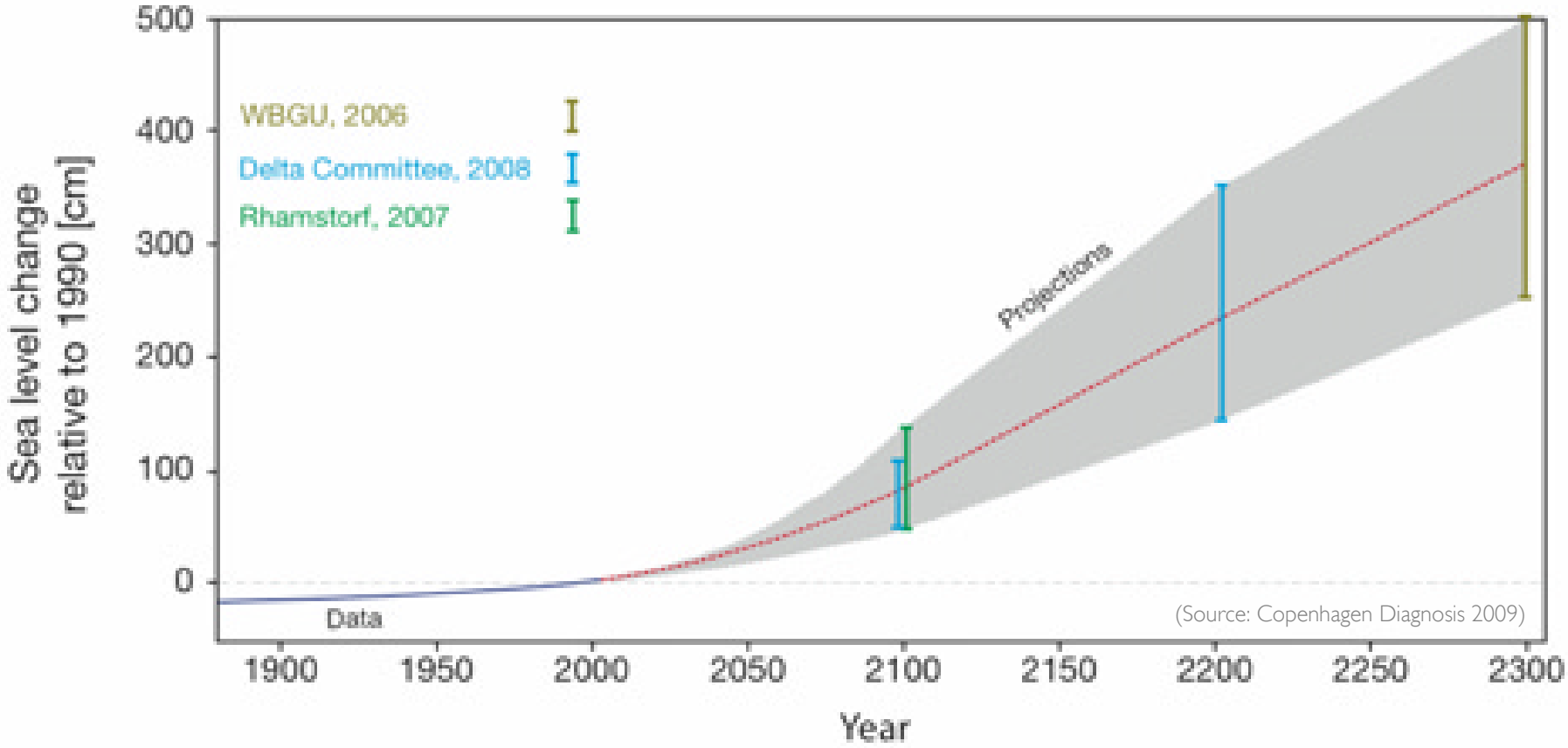


SLR by 2100: 1-2m

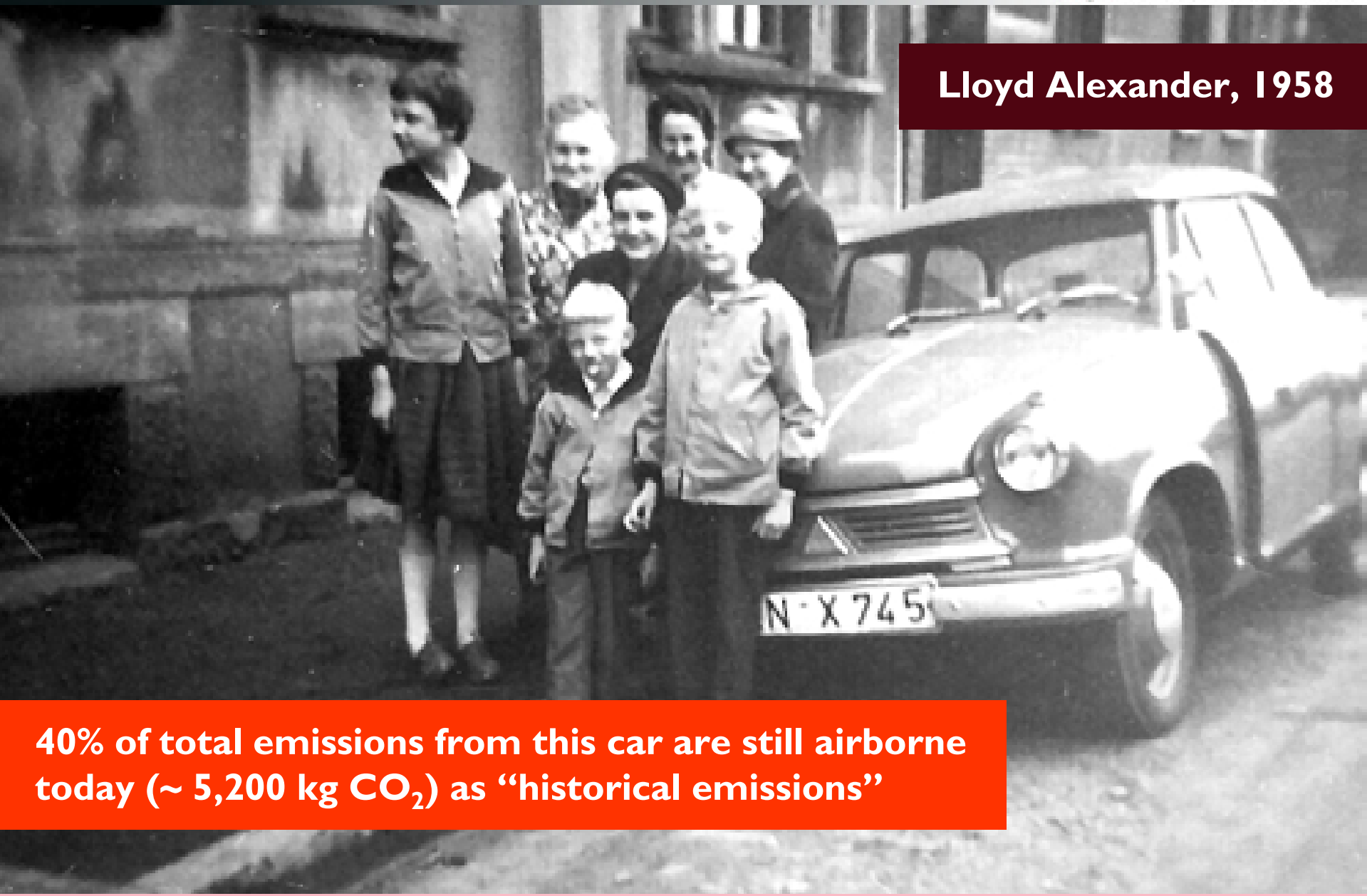
Last 15 years: 5cm SLR ~ 80% faster than IPCC

SLR by 2300: up to 5m

Future sea-level projections



8. Historical Emissions



40% of total emissions from this car are still airborne today (~ 5,200 kg CO_2) as "historical emissions"

8. Historical Emissions

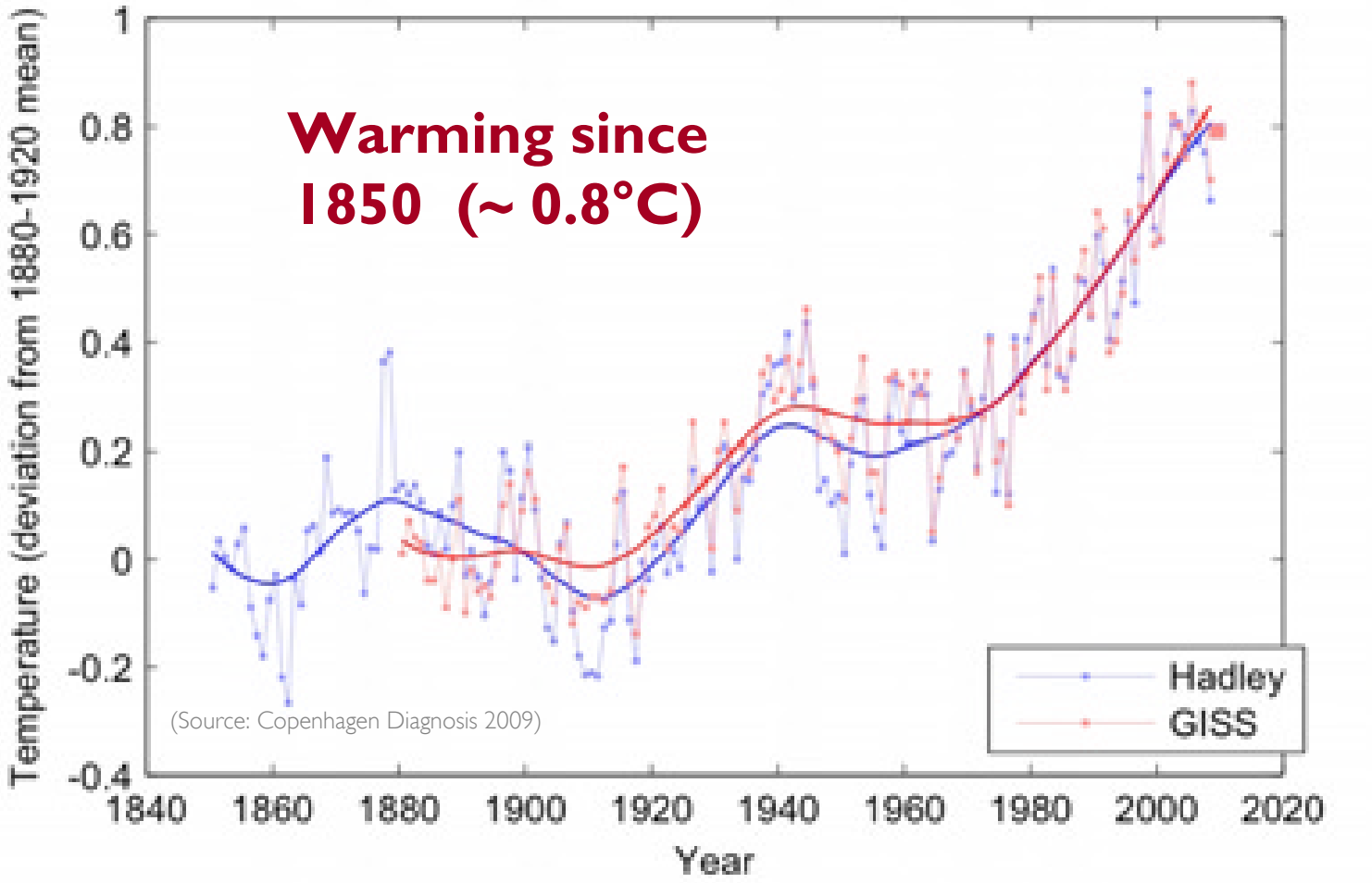
Cumulative CO_2 Emissions 1850-2006

Rank	Country	Mt CO_2e	% 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%**

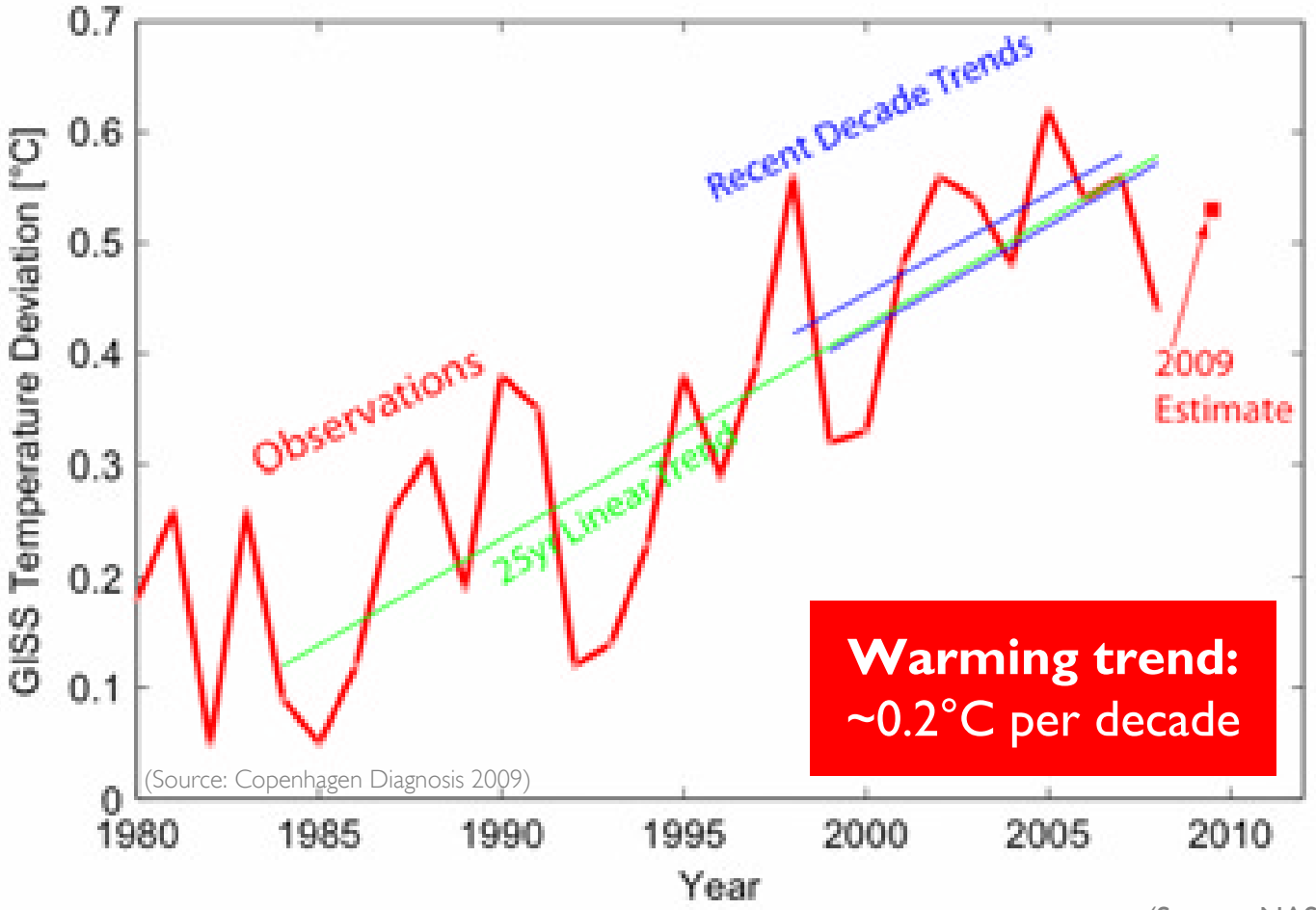
CAIT, World Resources Institute
CAIT GHG data are derived from CDIAC, EDGAR, EIA, EPA, Houghton, IEA, and WB.

1.3°Celsius

Global average temperature 1850-2009



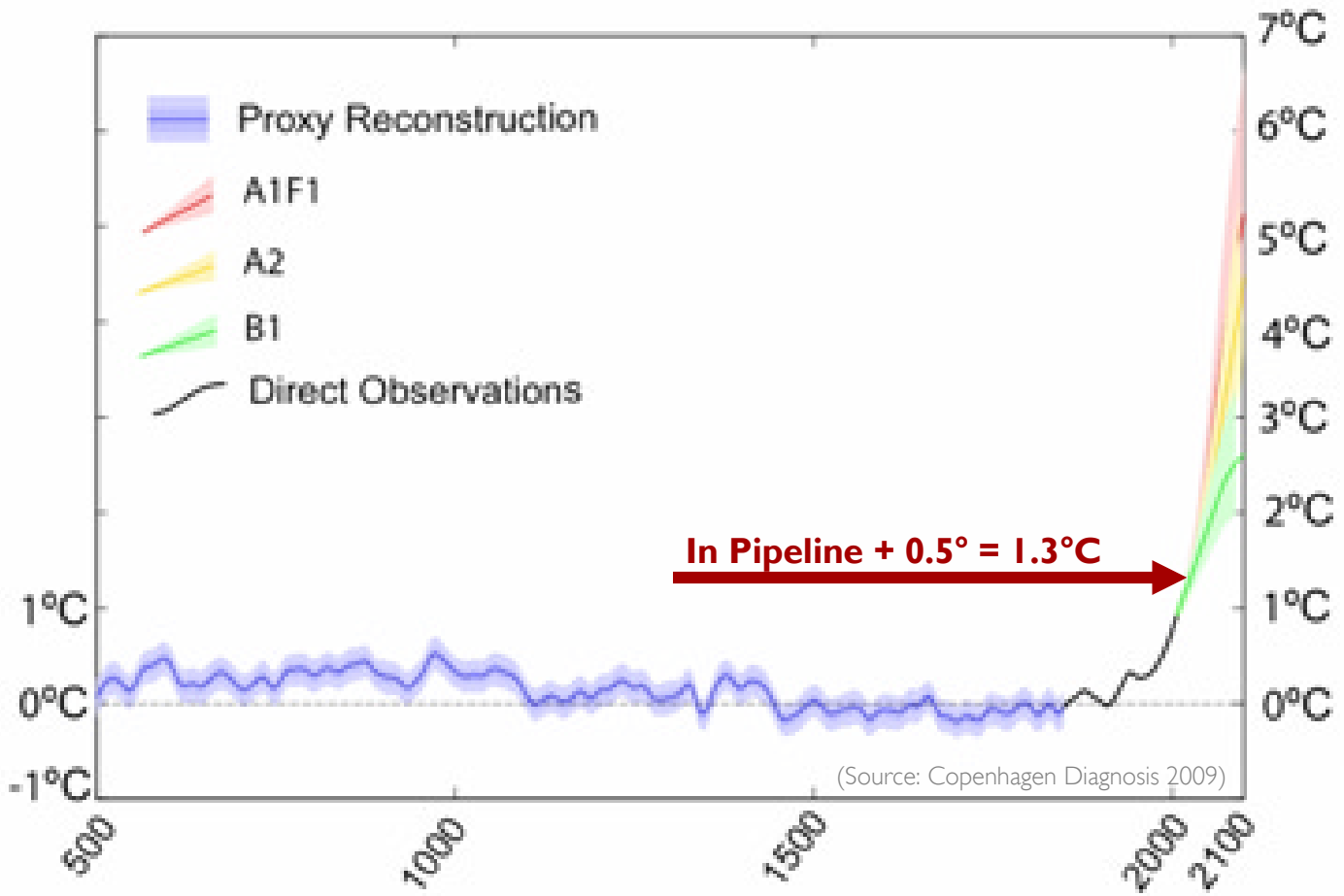
Global temperature change 1980-2009



Decadal-Scale Warming

(Source: NASA GISS data)

Reconstructed, observed and future warming projections



9. Inertia of Climate System

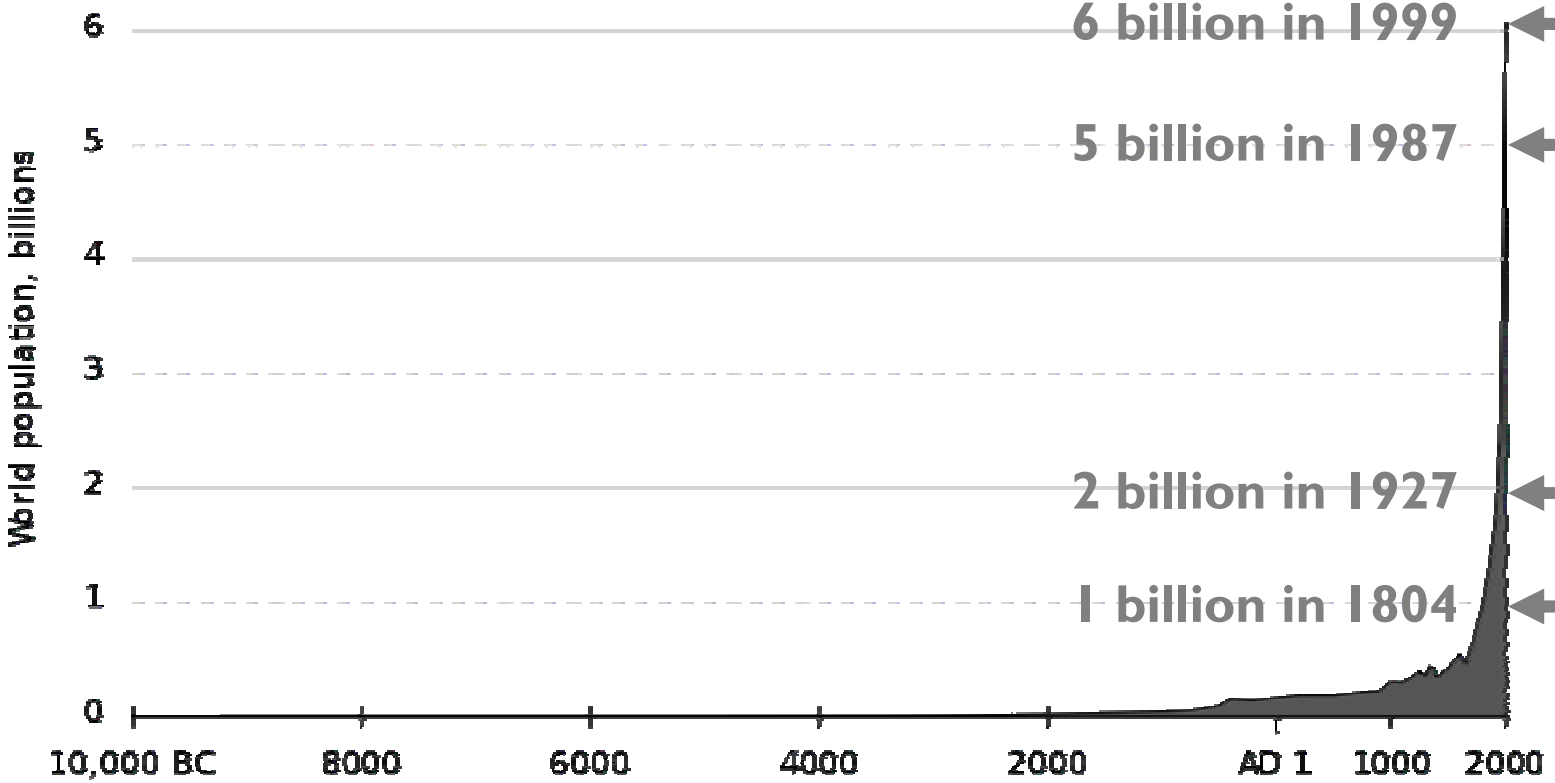
> “There is a window of opportunity for avoiding the most damaging climate change impacts, but that window is closing: the world has **less than a decade** to change course. Actions taken – or not taken – ...will have a profound bearing on the future.”

2007/2008 UN Human Development Report

10. Population Pressures

9.2 billion in 2050

Global Population in 2010 is 6.8 billion



Ten Pressures

Longevity of CO_2

Environmental Degradation

Accelerating CO_2 Emissions

Declining CO_2 Removal

Escalating Temperatures

Rogue Weather

Sea Level Rise

Historical Emissions

Inertia of the Climate System

Population Pressures

One Remedy

L ongevity of CO_2

E nvironmental Degradation

A ccelerating CO_2 Emissions

D eclining CO_2 Removal

E scalating Temperatures

R ogue Weather

S ea Level Rise

H istorical Emissions

I nertia of the Climate System

P opulation Pressures

Agenda

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>
> *—African Proverb*

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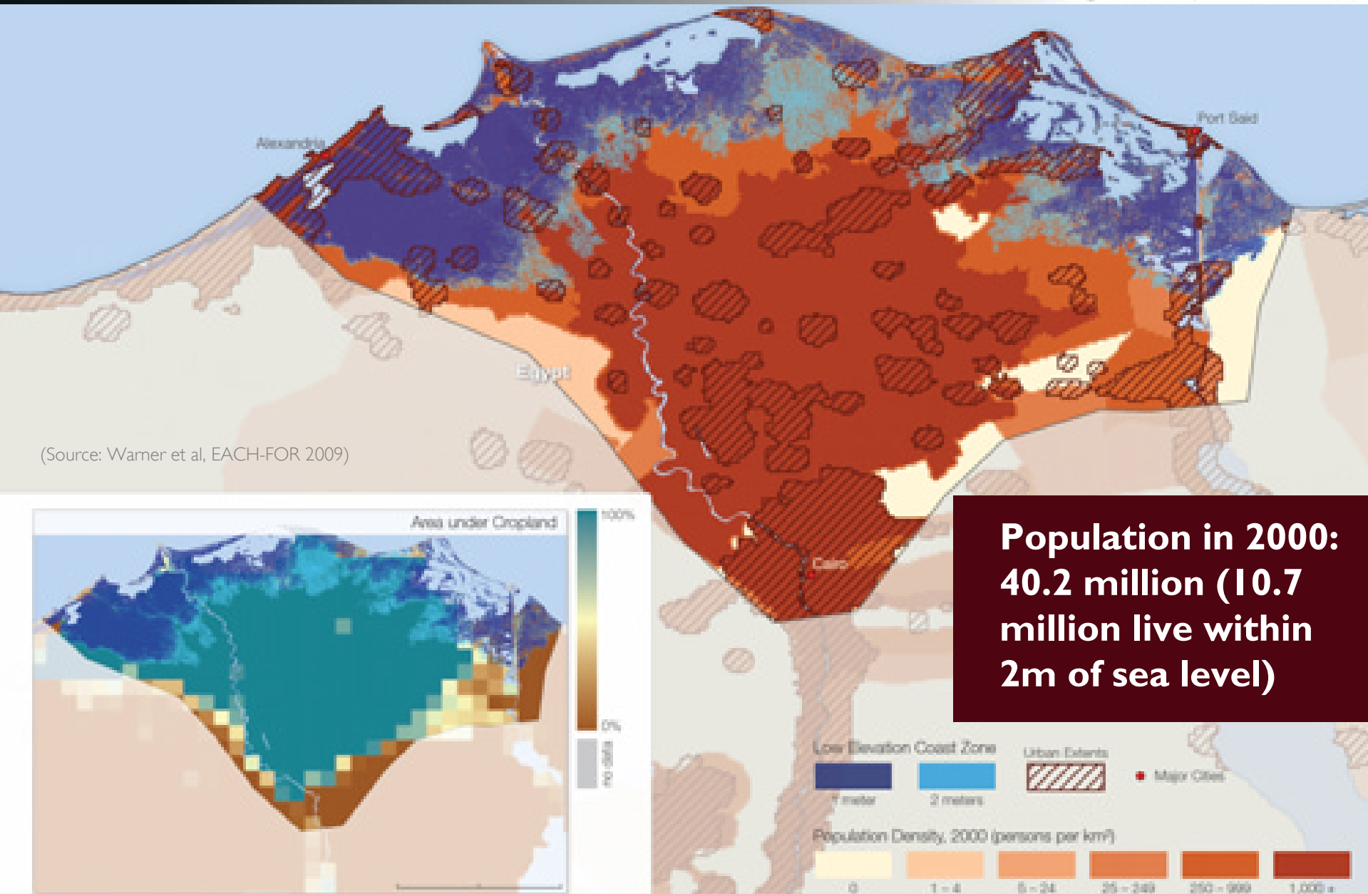
Threatened Deltas

(Source: Nicholls and Wong, IPCC 2007)

Relative vulnerability of coastal deltas: population potentially displaced by current sea-level trends to 2050 (Extreme > 1 million; high 1 million to 50,000; medium 50,000 to 5,000)

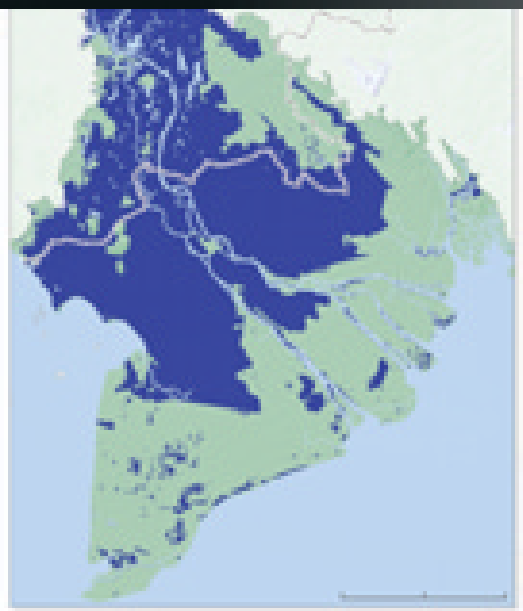
Egypt: Nile Delta

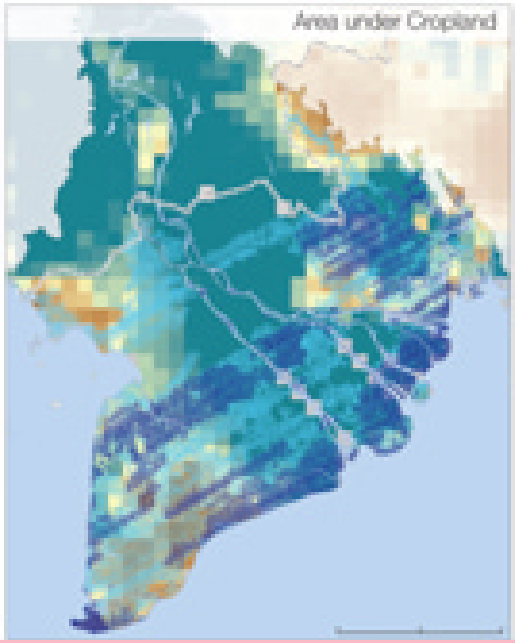


(Source: Warner et al, EACH-FOR 2009)

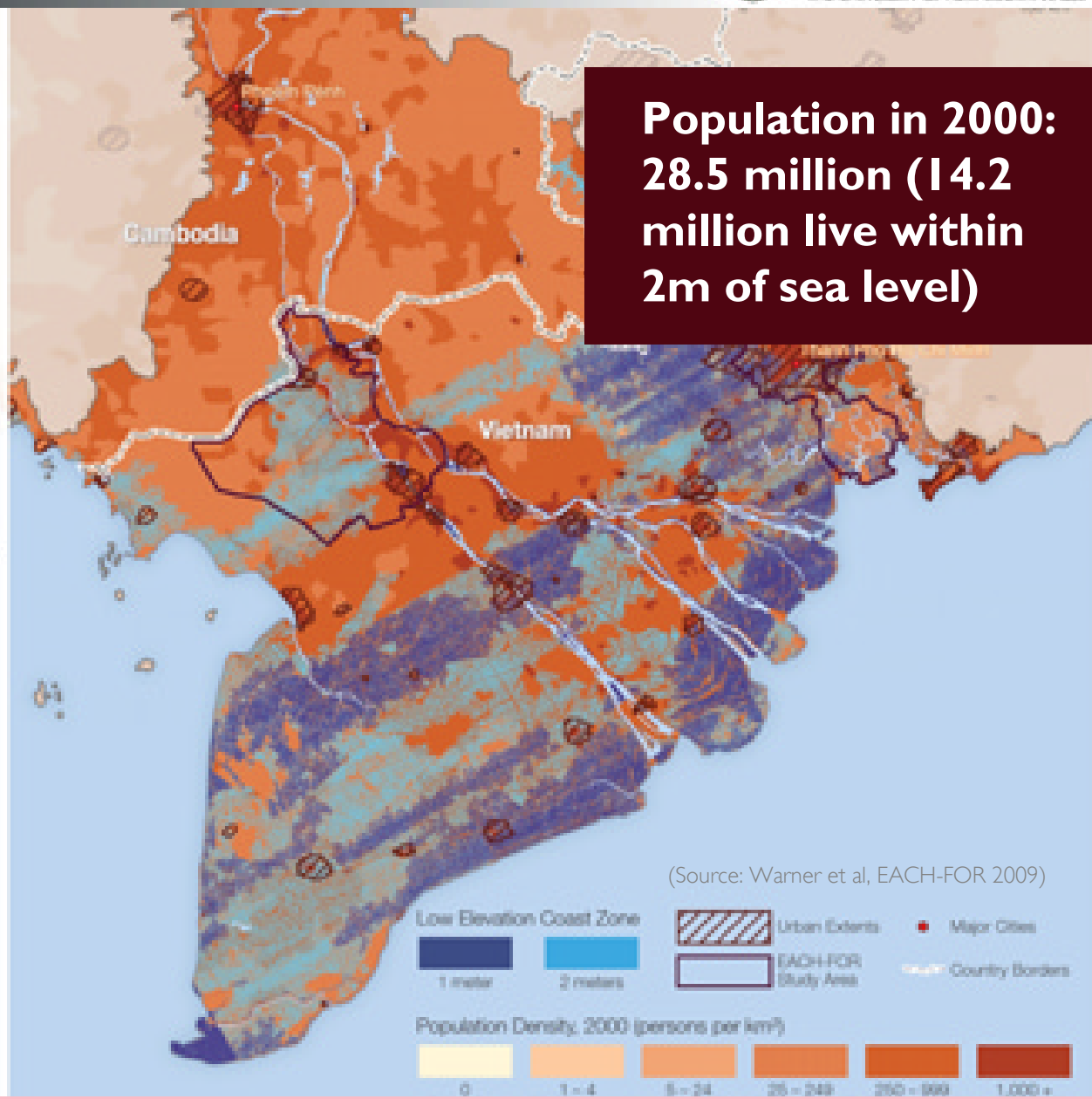
Population in 2000: 40.2 million (10.7 million live within 2m of sea level)

Vietnam: Mekong Delta

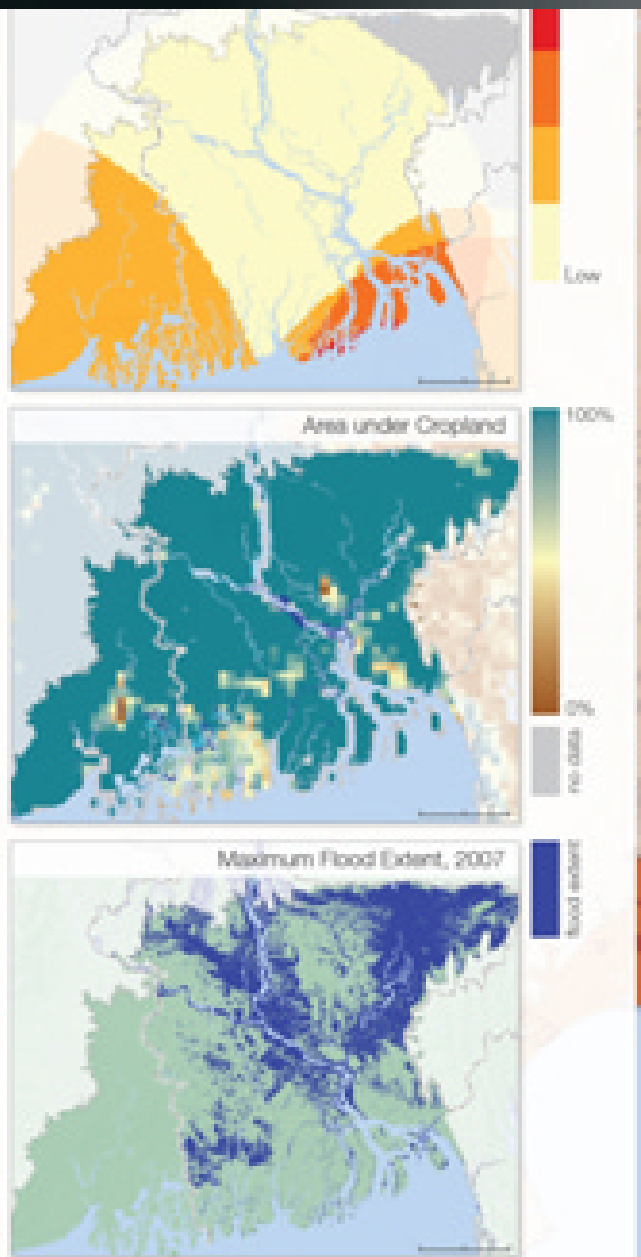




Population in 2000: 28.5 million (14.2 million live within 2m of sea level)



The Ganges Delta



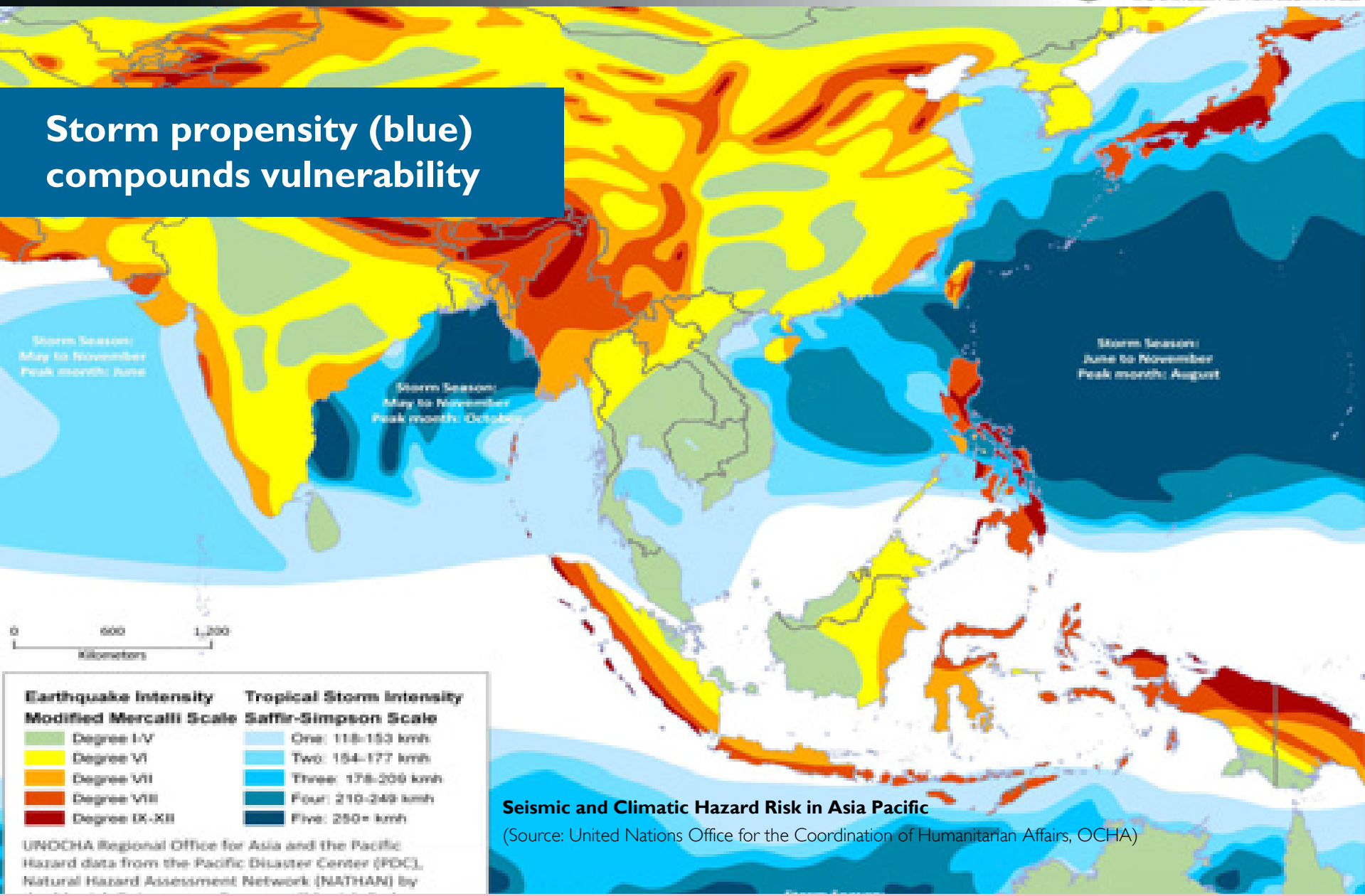
Population in 2000: 144 million (at least 10 million live within 2m of sea level)

India
Dhaka
India
Kolkata
Low Elevation Coast Zone
1 meter
2 meters
Urban Extents
EACH-FOR Study Area
Major Cities
Country Borders
(Source: Warner et al, EACH-FOR 2009)
Population Density, 2000 (persons per km²)
0
1 - 4
5 - 24
25 - 249
250 - 999
1,000 +

EARTHQUAKES, STORMS

UNSW
THE UNIVERSITY OF NEW SOUTH WALES

Storm propensity (blue) compounds vulnerability



Seismic and Climatic Hazard Risk in Asia Pacific

(Source: United Nations Office for the Coordination of Humanitarian Affairs, OCHA)

Irrawaddy Delta

Storm Surges: Most lethal aspect of wind storms. Hydrological conditions can lift sea level by multiple metres and drive a massive flood of sea water many kilometres inland.

Irrawaddy Delta

World Bank Natural Disaster Hotspots Report:
"By far the most certain aspect of climate change that will influence surge characteristics is global-mean-sea-level-rise … The overall conclusion is that the surge hazard will evolve significantly during the 21century."

Small Island States

Water Vulnerabilities

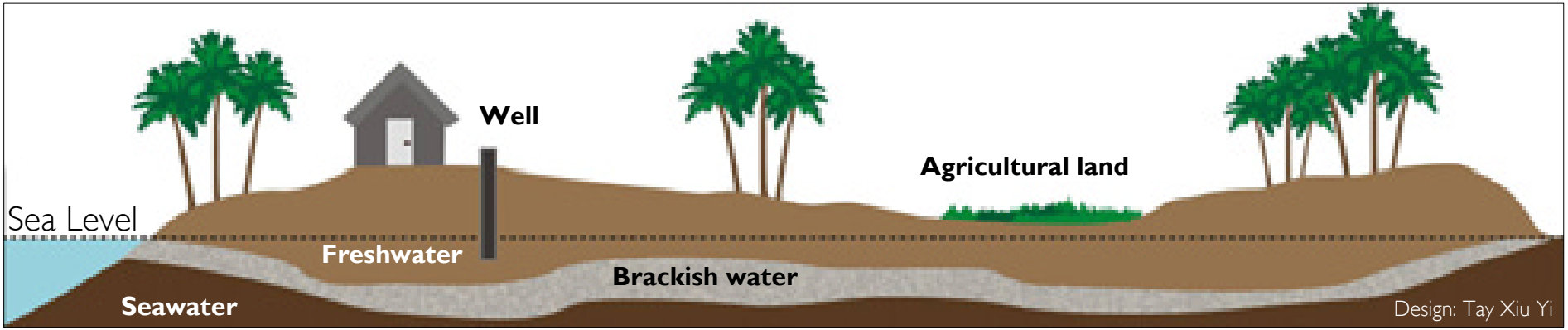
Island near Fiji (Photo: Wikipedia)

Intergovernmental Panel on Climate Change (IPCC)

Fourth Assessment Report, 2007: "By mid-century, climate change is expected to reduce water resources in many small islands … to the point where they become insufficient to meet demand during low-rainfall periods."

Small Island States

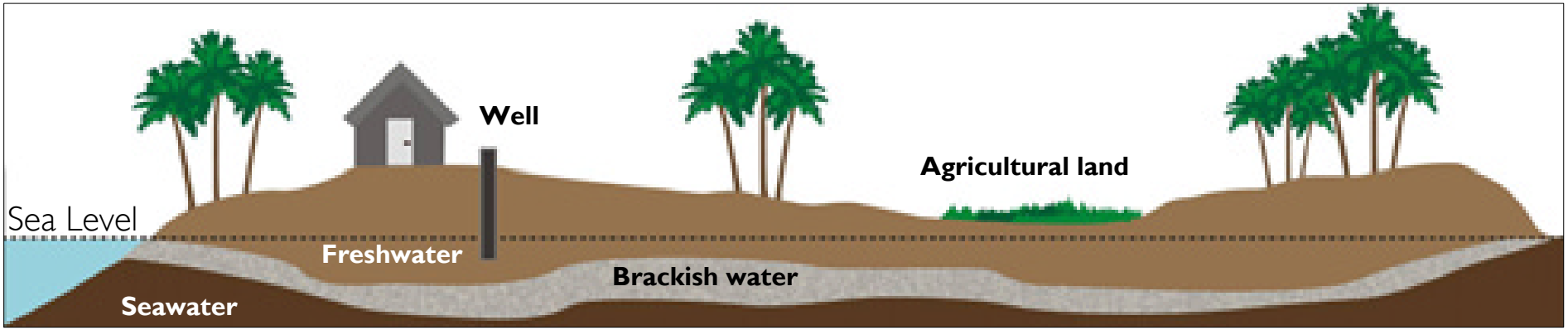
Figure 1: Normal sea level



Island Submergence

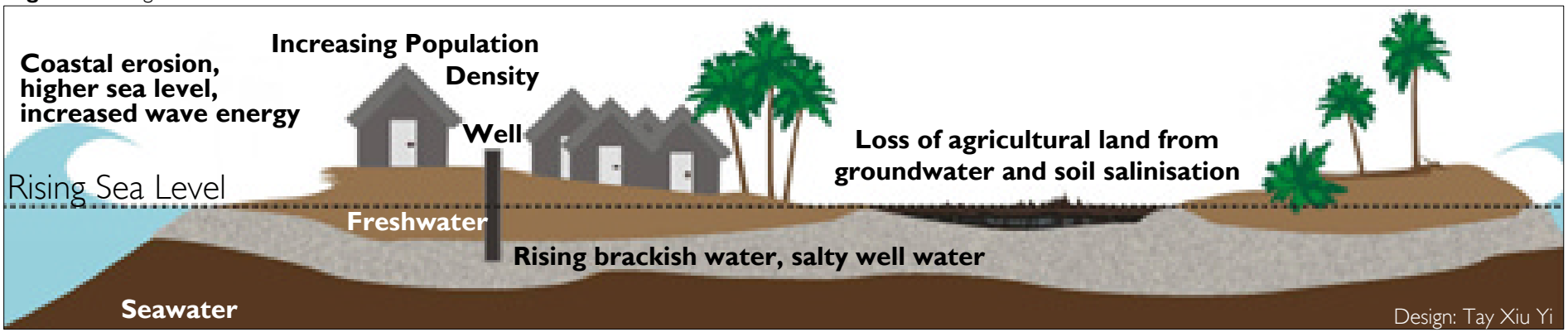
Small Island States

Figure 1: Normal sea level



Island Submergence

Figure 2: Rising sea level



Small Island States

Luke Rutsie (36), Petats: "The well water tastes very salty – islanders now use it only for cooking and bathing."

Small Island States

Island of Pororan: Contaminated Closed Well

Papua New Guinea, island of Pororan, contaminated closed well

Photo: Johannes Luetz

Francis Giran (59), Pororan: "The well water has become salty and unfit for consumption. This World Vision-built pump is brown with rust."

Small Island States

Mosquito breeding swamps

CARTERET ATOLL

Photos: Tulele Peisa, Courtesy Pip Starr and Ursula Rakova

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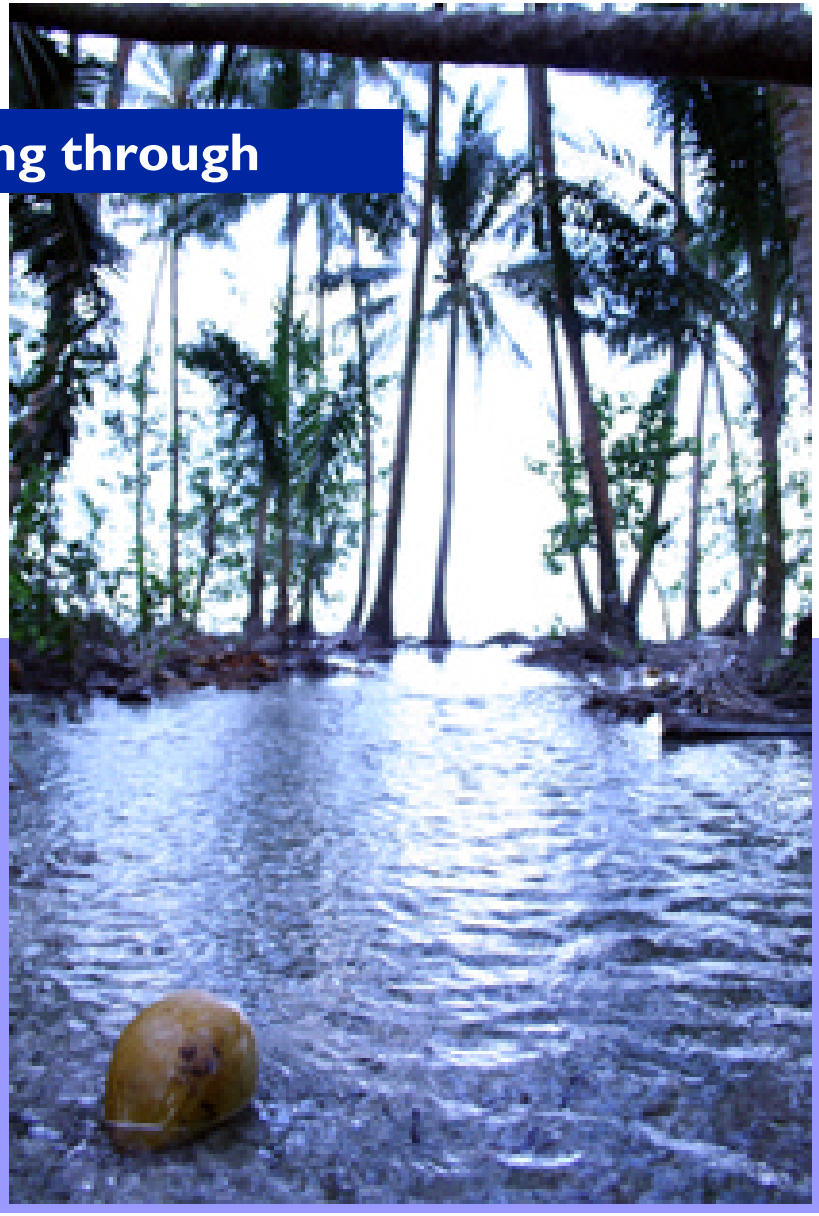
Slicing through



CARTERET ATOLL

Photos: Tulele Peisa, Courtesy Pip Starr and Ursula Rakova

Small Island States

Ursula Rakova, Carteret Islander and Director of Tulele Peisa NGO, Papua New Guinea

Huene, Carteret Atoll

Photo: Pip Starr

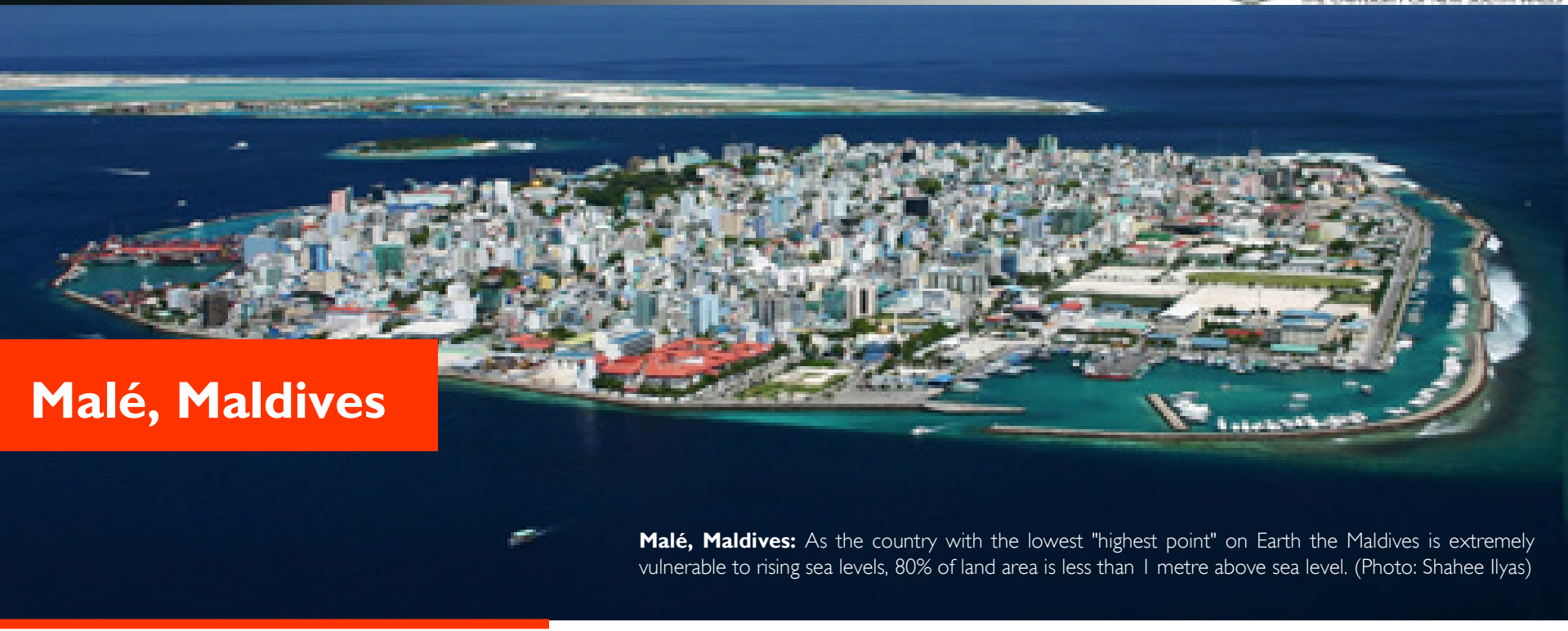
Ursula Rakova: "After Huene was sliced in two, my family settled on Huene One (right). There are three houses there. On Huene Two (left) there are only gardens. The channel keeps widening."

ISLAND ADAPTATION
THROUGH SEA WALLS?

Small Island States

Island Fact 1: uninhabitable long before submergence
Island Fact 2: difficult to "adapt/protect" long-term
Island Fact 3: eventually evacuation only escape route
Island Fact 4: 10 million islanders affected in Asia Pacific

Small Island States



Malé, Maldives

Malé, Maldives: As the country with the lowest "highest point" on Earth the Maldives is extremely vulnerable to rising sea levels, 80% of land area is less than 1 metre above sea level. (Photo: Shahee Ilyas)

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

Small Island States

Island of Dhuvafaaru, Maldives
(Photo: Johannes Luetz)

Small Island States

Dhuvafaaru, Maldives

Island of Dhuvafaaru, Maldives
(Photo: Johannes Luetz)

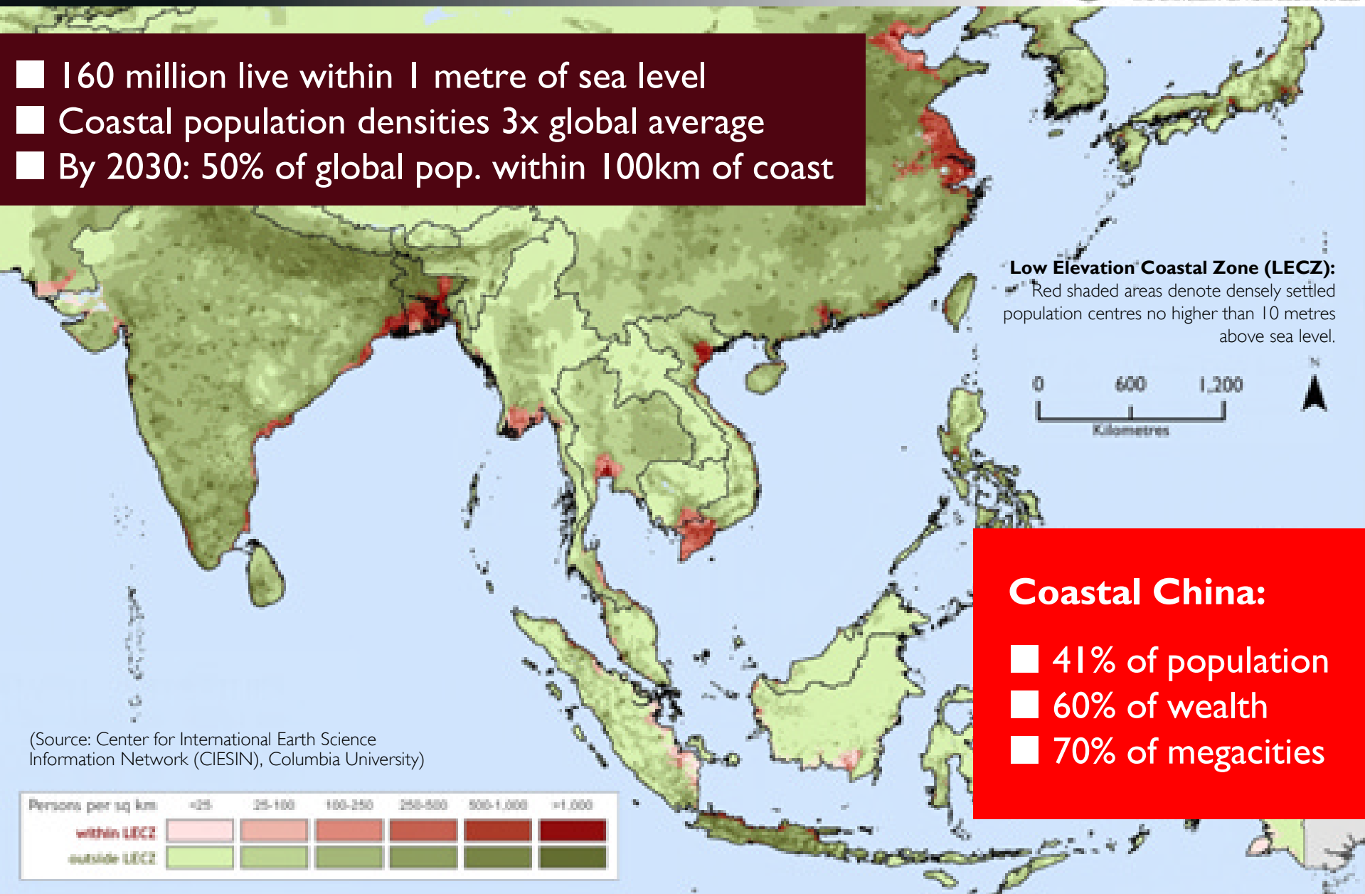
Small Island States

Dhuvafaaru, Maldives

Island of Dhuvafaaru, Maldives
(Photo: Johannes Luetz)

Coastal Megacities

- 160 million live within 1 metre of sea level
- Coastal population densities 3x global average
- By 2030: 50% of global pop. within 100km of coast



(Source: Center for International Earth Science Information Network (CIESIN), Columbia University)

Coastal China:

- 41% of population
- 60% of wealth
- 70% of megacities

Coastal Megacities

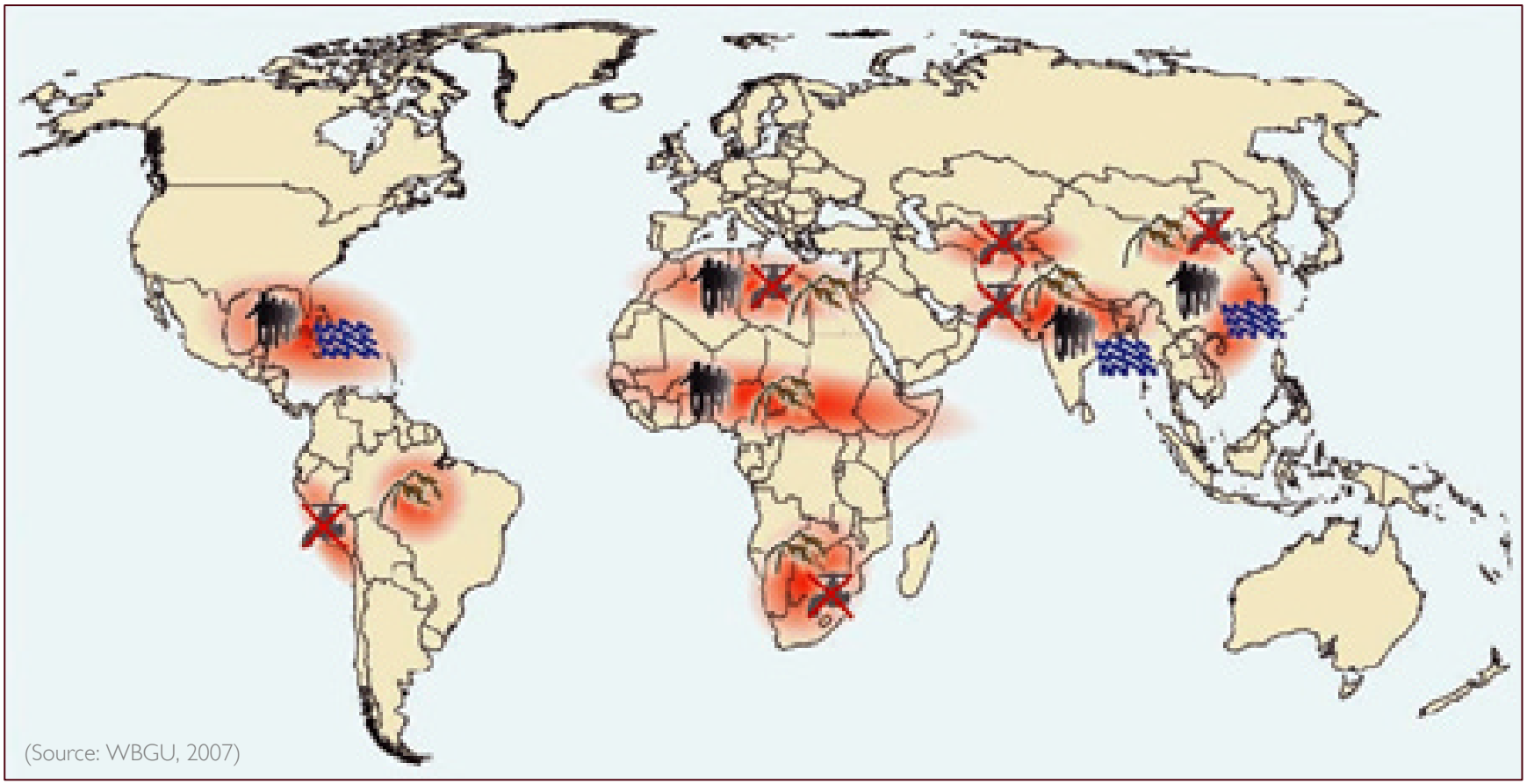
Jakarta: One of many cities that needs to prepare for sea level rise. With 40% of the city below sea level, there have already been calls to relocate the Indonesian capital to Bandung, 180km away.

Coastal Megacities

Jakarta: With its 13 rivers floods in Jakarta can be devastating. The February 2007 flood made 450,000 people homeless. More than 70 percent of the city was inundated.

"Hot Spots"

Video stream: http://news.bbc.co.uk/2/hi/science/nature/8394324.stm



Glacier Threat

"Hot Spots" Summary

Four "Hot Spot" Categories:

1. Densely settled deltaic regions
2. Low-lying small island developing states (SIDS)
3. Coastal megacities (e.g. China)
4. Glacier-fed / water-stressed inland regions

Agenda

> *"For tomorrow belongs to the people who **PREPARE** for it today."*
>
> *—African Proverb*

1. The Problem
2. The Context
3. The "Hot Spots"
4. The Conclusion

More Fieldwork Data

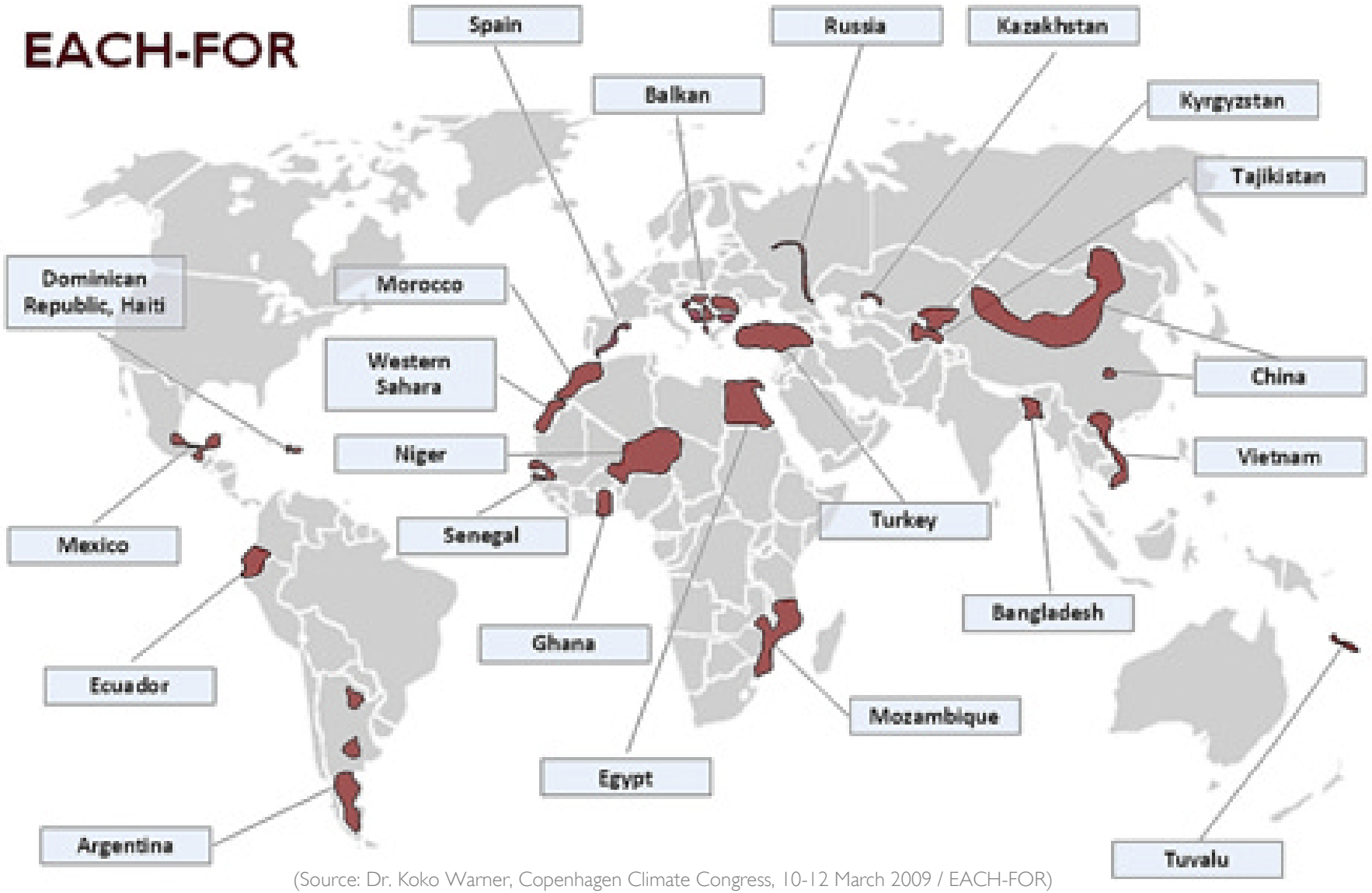
The need for empirical research

- prompted European Commission to sponsor a first-time ever global scoping study of **e**nvironmen**t**a**l** **ch**ange and **for**ced migration scenarios (www.each-for.eu)

- 23 case studies investigate migrant characteristics and origins, links with environmental change and coping capacity to climate change

(Source: Dr. Koko Warner, Copenhagen Climate Congress, 10-12 March 2009 / EACH-FOR)

Cutting Edge Research



(Source: Dr. Koko Warner, Copenhagen Climate Congress, 10-12 March 2009 / EACH-FOR)

Synthesis / Summary

- top-down research
- "expert" analysis
- desk-based research
- fragmented picture
- **"Lecturing"**

- bottom-up research
- affected people
- hot spot field analysis
- holistic approach
- **"Enquiry/ Learning"**

Closing the Knowledge Gap

> “Top-down bureaucratic rationality may not achieve much when it comes up against very different ways of thinking and living. All the more reason why we need far more local-level research, to inform strategies for responding to climate-induced displacement.”

—Stephen Castles, In: Afterword: What Now? Climate-induced Displacement after Copenhagen. Book’s closing/concluding sentence. [Ed.] Jane McAdam, 2010 [Forthcoming]

Closing the Knowledge Gap

At micro / local-level ascertain preferred:

- Terminologies
- Locations
- Solutions

Thank You!