

Should the uncertainty in climate scenarios limit adaptation?

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ECMWF - Reading (UK), May 6-9, 2008**

WCRP

ESSP DIVERSITAS IGBP IHDP WCRP

*“The underlying goal of the summit is no less than to prepare a blueprint to launch a **revolution** in climate prediction.”*

“... climate models will ... play an important, and perhaps central, role in guiding the trillion dollar decisions that the ... world will be making to cope with the consequences of changing climate. ... adaptation strategies require more accurate and reliable predictions of regional weather and climate extreme events than are [currently] possible”

A conundrum ...

if adaptation needs accurate and precise climate prediction

...

**and if regional climate prediction is
laughable/uncertain/imprecise ...**

**then do we give up on adaptation?
(or wait for the revolution?)**



'Adaptation needs accurate and precise climate prediction'

*"The effectiveness of pro-active adaptation to climate change often **depends on the accuracy** of regional climate and impact projections, which are subject to substantial uncertainty."*

[Füssel, H-M. 2007]

**But how widespread is this view
– among scientists, science funders, decision-
makers?**



Climate Scientists' Perspectives

*“It is ... **essential** that GCM predictions are accompanied by quantitative estimates of the associated uncertainty in order to render them **usable** in planning mitigation and adaptation strategies.”*

[Murphy.J. et al. 2004]

*“It is ... **vital** that **more detailed** regional climate change predictions are made available both in the UK and internationally so that **cost-effective adaptation** and appropriate mitigation action can be **planned**.”*

[Met Office Hadley Centre 2007]



Science Funding Agency Perspective

*“NERC-funded science must play a leading role in the development of **risk-based predictions** of the future state of the climate – on regional and local scales, spanning days to decades. Advances in climate science ... are **necessary** to develop the high-resolution regional predictions **needed** by decision makers ... for adaptation and mitigation strategies.”*

[NERC Science Strategy 2007-2012]



Decision-Maker Perspectives

“[Adaptation] plans will only be effective to the extent that climate science can provide ... agencies with climate scenarios that describe a range of possible future climates that California may experience, at a scale **useful** for regional planning. **Reducing uncertainty** in projections of future climates is **critical to progress** ...”

[Hickox,W.H. and Nichols,M.D. 2003]

“Adaptation to climate change will require further research to predict the impacts at regional level **in order to enable** ... public and private sectors actors to develop cost-effective adaptation options

EU Commission ‘[Winning the battle against climate change](#)’



So What are the Limits to Climate Prediction?

Uncertainties in climate prediction arise from:

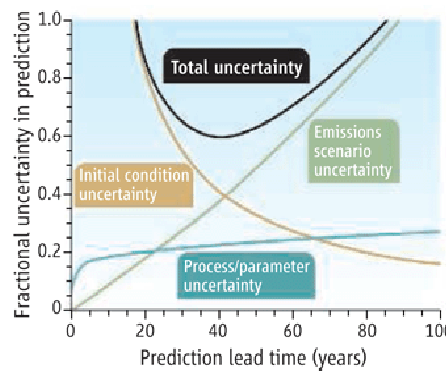
Lack of knowledge (Epistemic uncertainty)

- Parameter uncertainty
- Structural uncertainty

Randomness (Natural stochastic uncertainty)

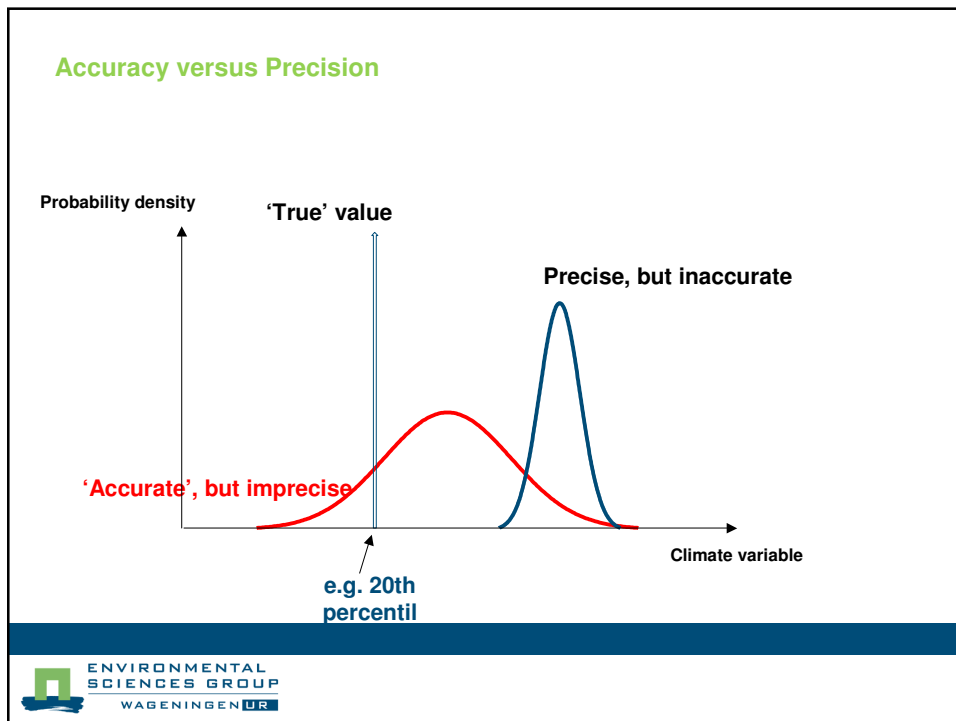
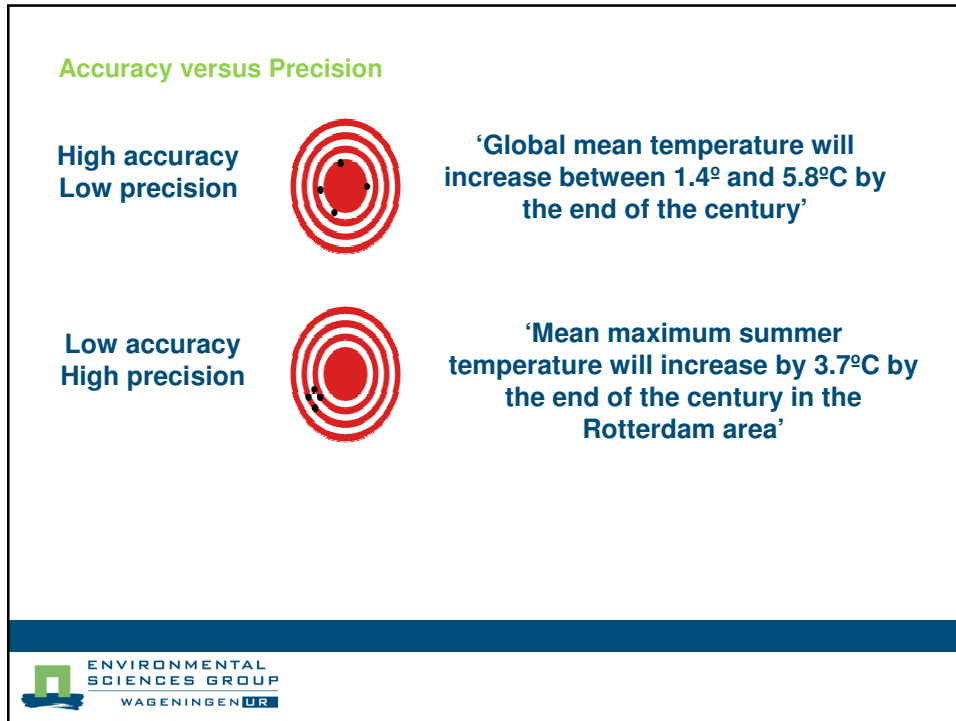
- Initial conditions uncertainty

Human actions (Human reflexive uncertainty)



Cox and Stephenson, *Science*, 2007





So is Climate Adaptation Therefore Limited?

Not if we understand the wider contexts in which adaptation has to take place ...

... spatial planning, technical regulation, economic priorities, cultural preferences, risk psychology, adaptive management, risk management.....

Adaptation



Hazard



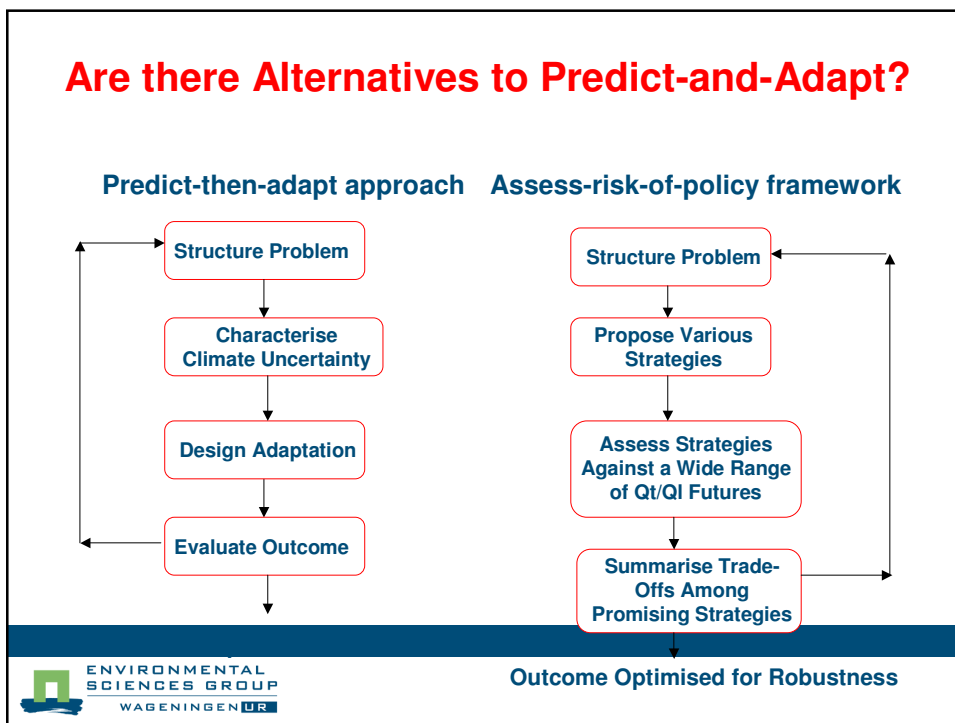
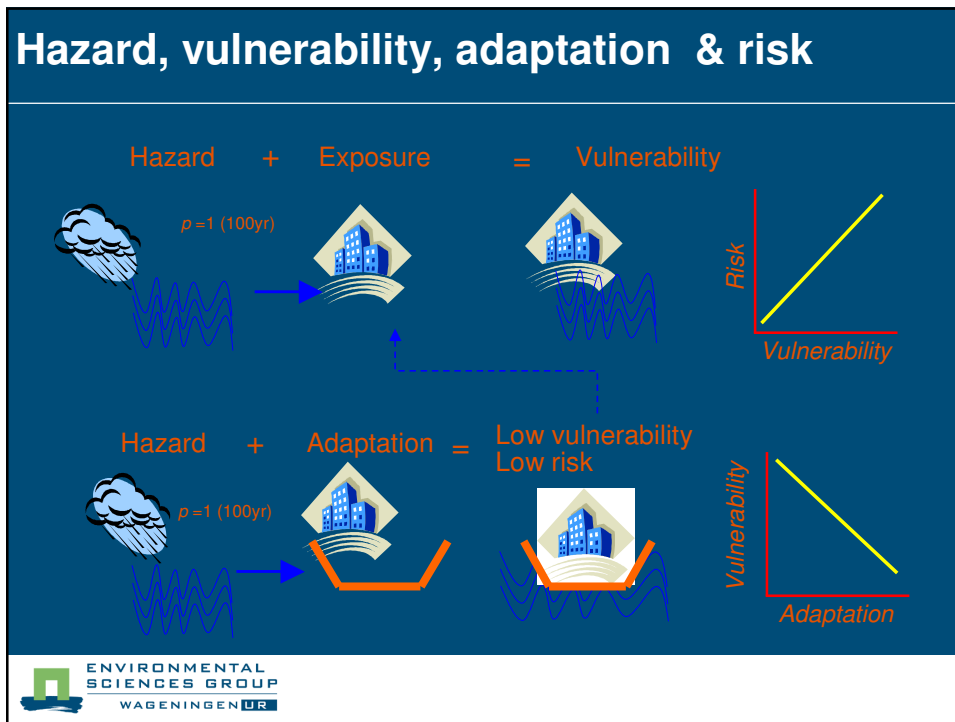
Exposure

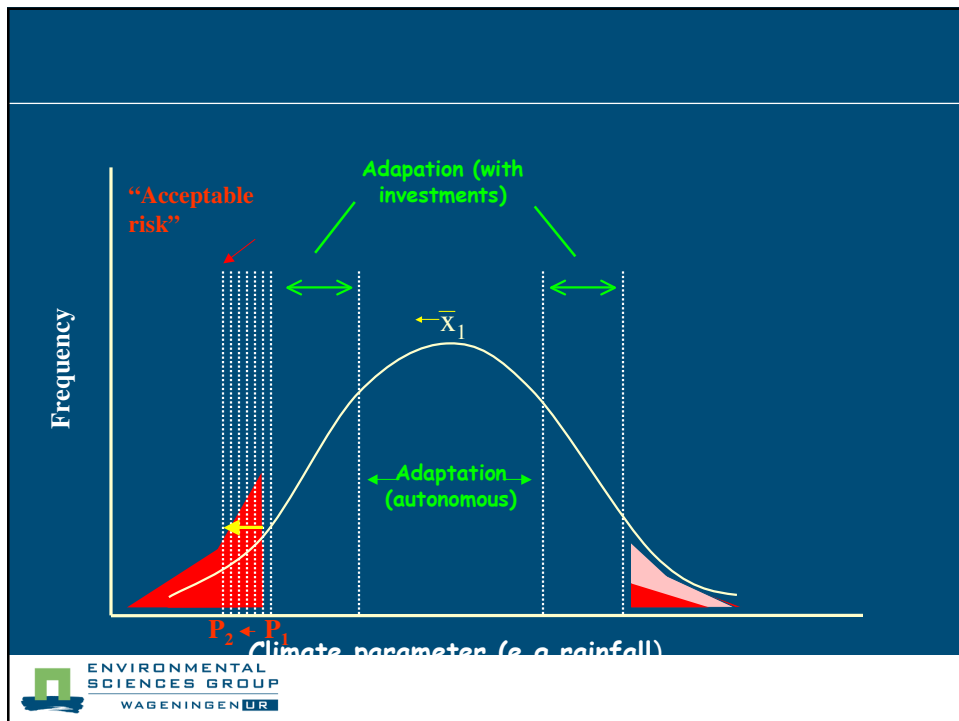
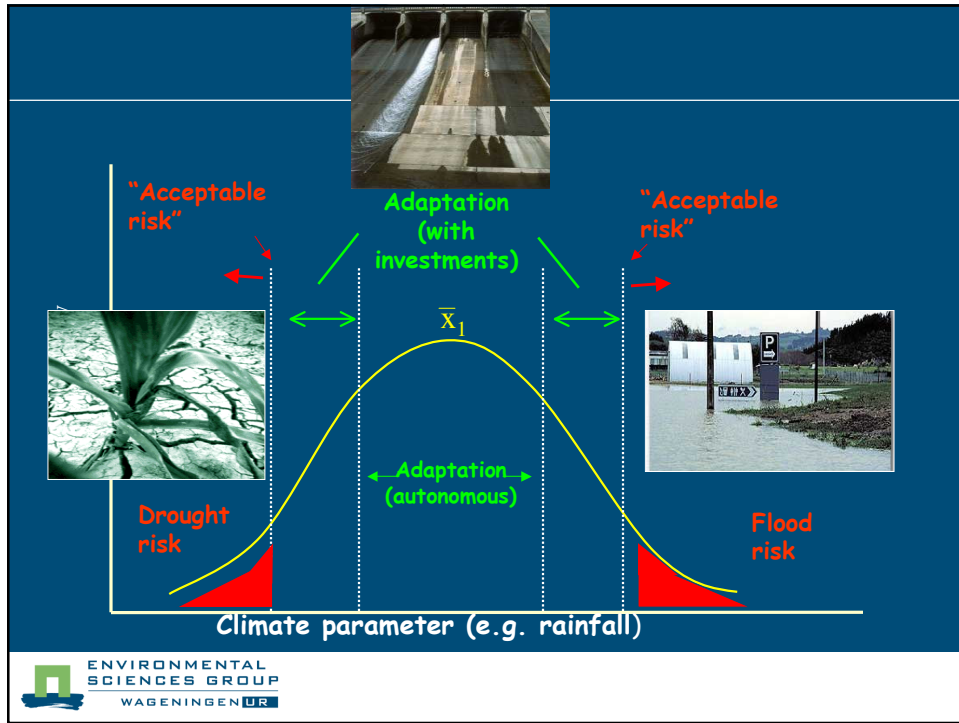


adaptive capacity

Impact

vulnerability





We argue that the epistemological limits to climate and ESM predictions **should not be** interpreted as a limit to adaptation, despite the widespread belief that it is ...

... climate adaptation strategies **can be** developed in the face of deep uncertainties



Thank you

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