

# **Adaptation to Climate Change**

(Some) Policy and Economic perspectives

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*Adaptation to Climate Change in the European Alps*  
*Wengen, 4-6 October 2006*

# ADAPTATION

- 
- What is it ?
  - Why all the fuss about it ?
  - Is it for real ?
  - How well are we doing ?
  - How much does it cost ?
  - What are its limits ?
  - Where do we go from here ?

*Response, in natural or human systems, to actual or expected climate stimuli or their effects, which moderates the harm or exploits beneficial opportunities*

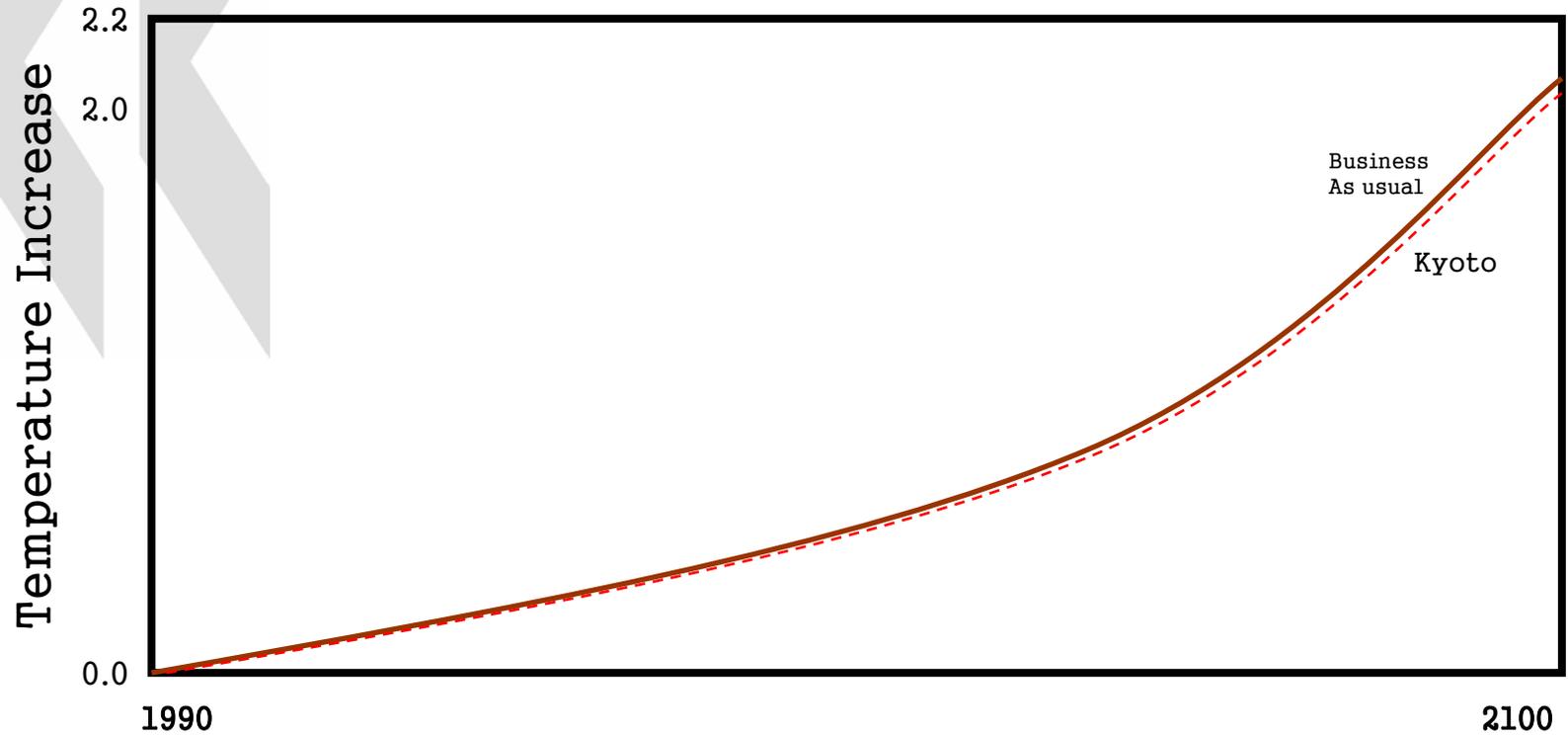
		Anticipatory	Reactive
Human Systems	Private	<ul style="list-style-type: none"> <li>· Purchase of insurance</li> <li>· Construction of house on stilts</li> <li>· Redesign of oil-rigs</li> </ul>	<ul style="list-style-type: none"> <li>· Changes in length of growing season</li> <li>· Changes in ecosystem composition</li> <li>· Wetland migration</li> <li>· Changes in farm practices</li> <li>· Changes in insurance premiums</li> <li>· Purchase of air-conditioning</li> </ul>
	Public	<ul style="list-style-type: none"> <li>· Early-warning systems</li> <li>· New building codes, design standards</li> <li>· Incentives for relocation</li> </ul>	<ul style="list-style-type: none"> <li>· Compensatory payments, subsidies</li> <li>· Enforcement of building codes</li> <li>· Beach nourishment</li> </ul>
Natural Systems			

IPCC 2001

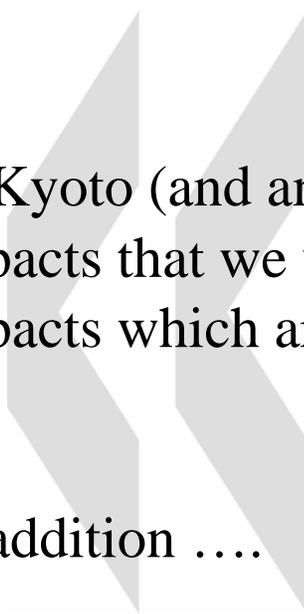
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## *The World With And Without Kyoto ....*



Source: Reproduced from Wigley 1998

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- Kyoto (and any follow-up measures) will do little to alter climate impacts that we will experience over this century – i.e. we need to adapt to impacts which are already locked-in

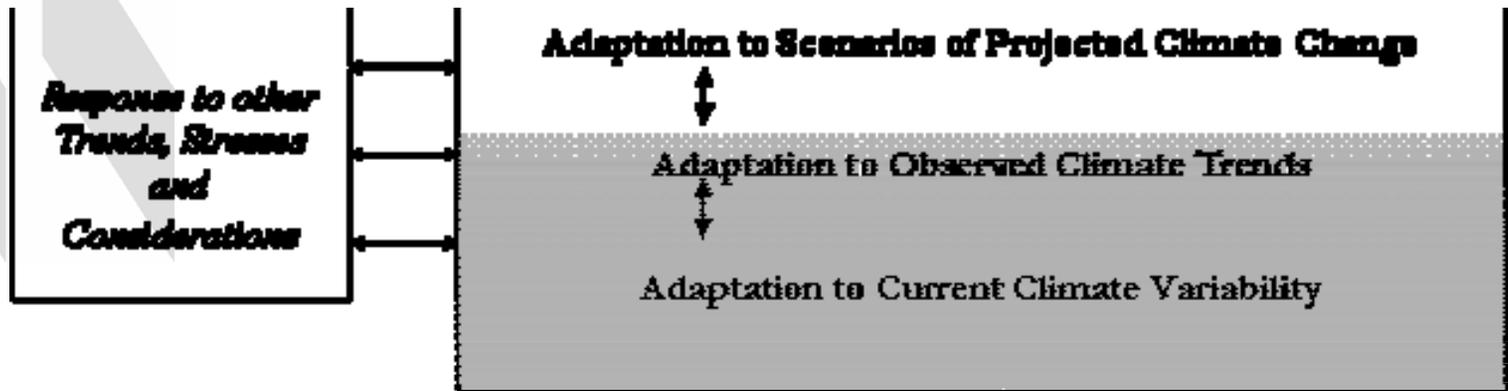
In addition ....

- Adaptation is the best “shared agenda” to engage with developing countries on future international commitments
- Further, as Hurricane Katrina and the 2003 European heat-wave clearly show, even developed countries have a long way to go on adaptation

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## Three Levels of Adaptation Responses



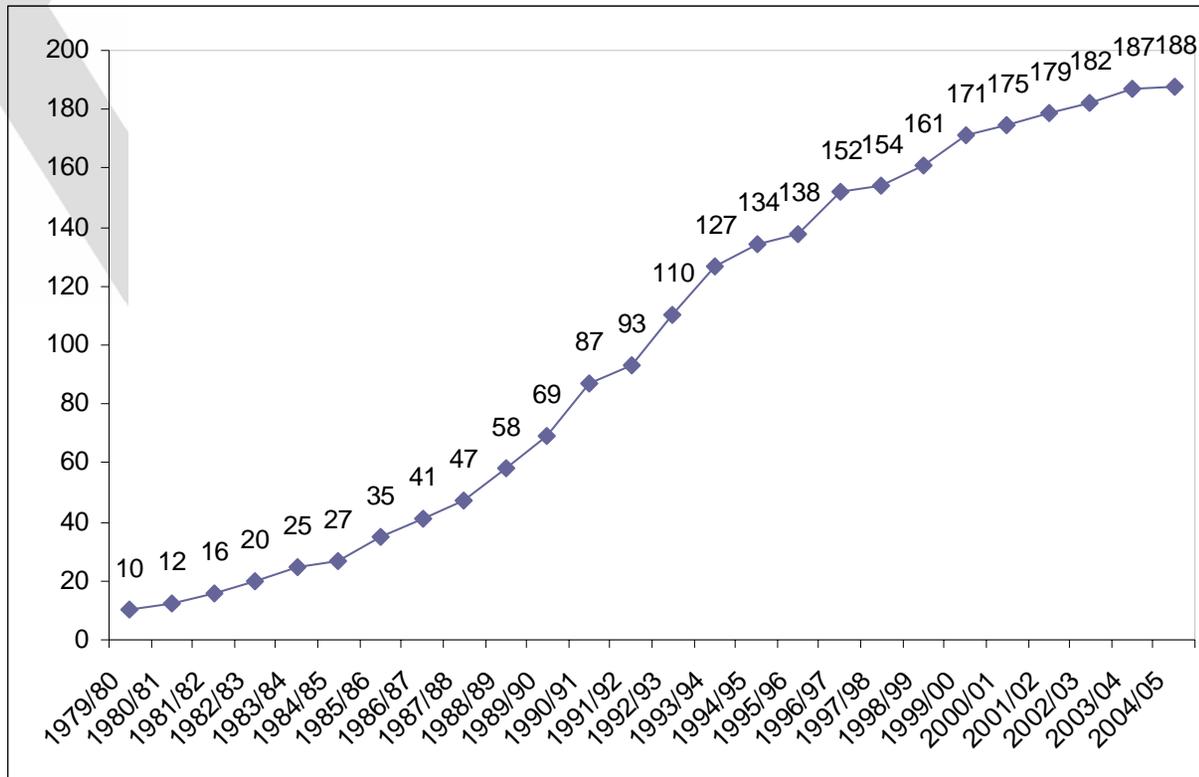
Source: Agrawala 2005

## Observed Adaptations to Climate Variability

- Societies have a long record of coping with climate (and climatology) ... crop diversification, water storage, migration, insurance, zoning etc.
- New developments (since the early 1980s) include specific anticipatory adaptations to seasonal to interannual climate variability --- as a result of improvements in remote sensing, climate monitoring, and forecasting climate on seasonal to interannual time-scales (ENSO)
- Examples include use of climate monitoring/forecast information in famine early warning, water resource management, livelihood choices and farming practices, planning for disease outbreaks, etc.

# Observed Adaptations to Creeping Trends in Climate

## Number of French Ski Stations with Artificial Snow-making Equipment



Source: Direction du Tourisme, 2006

# Observed Adaptations to Creeping Trends in Climate

## Other Examples ...

- Heat wave alert plans (Toronto, Chicago, Shanghai, France)
- Insurance premium adjustments in hurricane zones
- Updating of risk standards, hazard maps etc.

# Observed Adaptations to Creeping Trends in Climate

## *Niche Example 1*



# Observed Adaptations to Creeping Trends in Climate

## *Niche Example 2: Tsho Rolpa Glacial Lake (Nepal)*

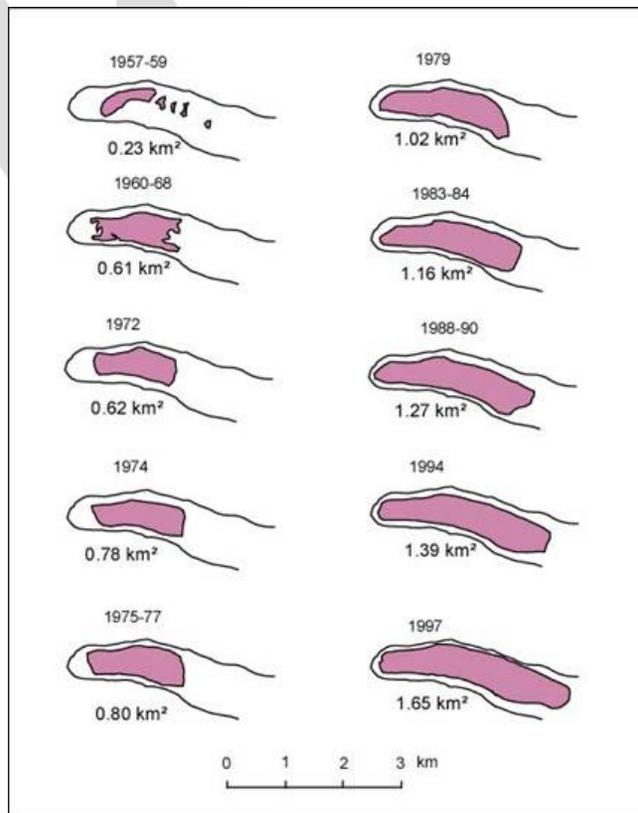


Figure 2



Source: DHM, Nepal

# Observed Adaptations to Creeping Trends in Climate

## *Niche Example 2: Tsho Rolpa Glacial Lake (Nepal)*



Source: DHM, Nepal

# Observed Adaptations to Creeping Trends in Climate

## *Niche Example 3: Surfside (Texas)*



## Observed Adaptations to **Future** Climate Change

➤ Decisions with a long-term footprint may need to take future climate change into account *now*

➤ Several niche examples at the infrastructure / sea-level rise interface:

*Confederation Bridge (Canada)*

*Copenhagen metro*

*Deer Island (Boston) sewage facility*

*Coastal highway (Micronesia)*

*Konkan Railway (India)*

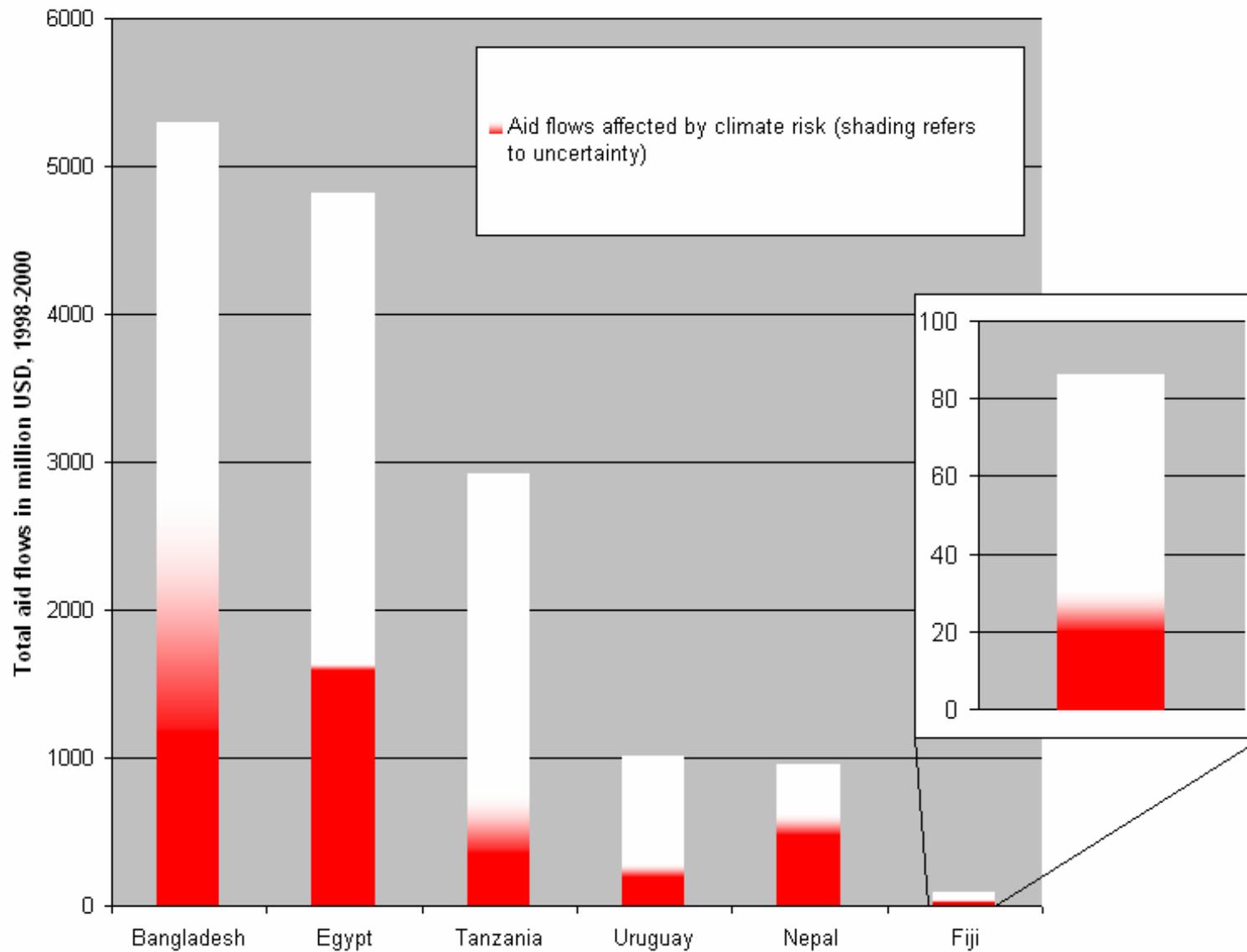
➤ Climate change also being considered as part of review of New York water supply infrastructure, and the Thames Barrier

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- Despite significant progress, there remains a significant “adaptation deficit” even with regard to current climate.
- This deficit exists especially in poor countries *and* within poor sections of rich countries
- There are also numerous examples where
  - Private adaptations impose adverse social externalities (all adaptation is not always good for everyone)
  - Adaptations to moderate risks actually enhance vulnerability to larger events
- Adaptation to longer term climate change is still in its infancy – despite “showcase” examples

# Developing countries: Significant investments remain vulnerable to climate risks

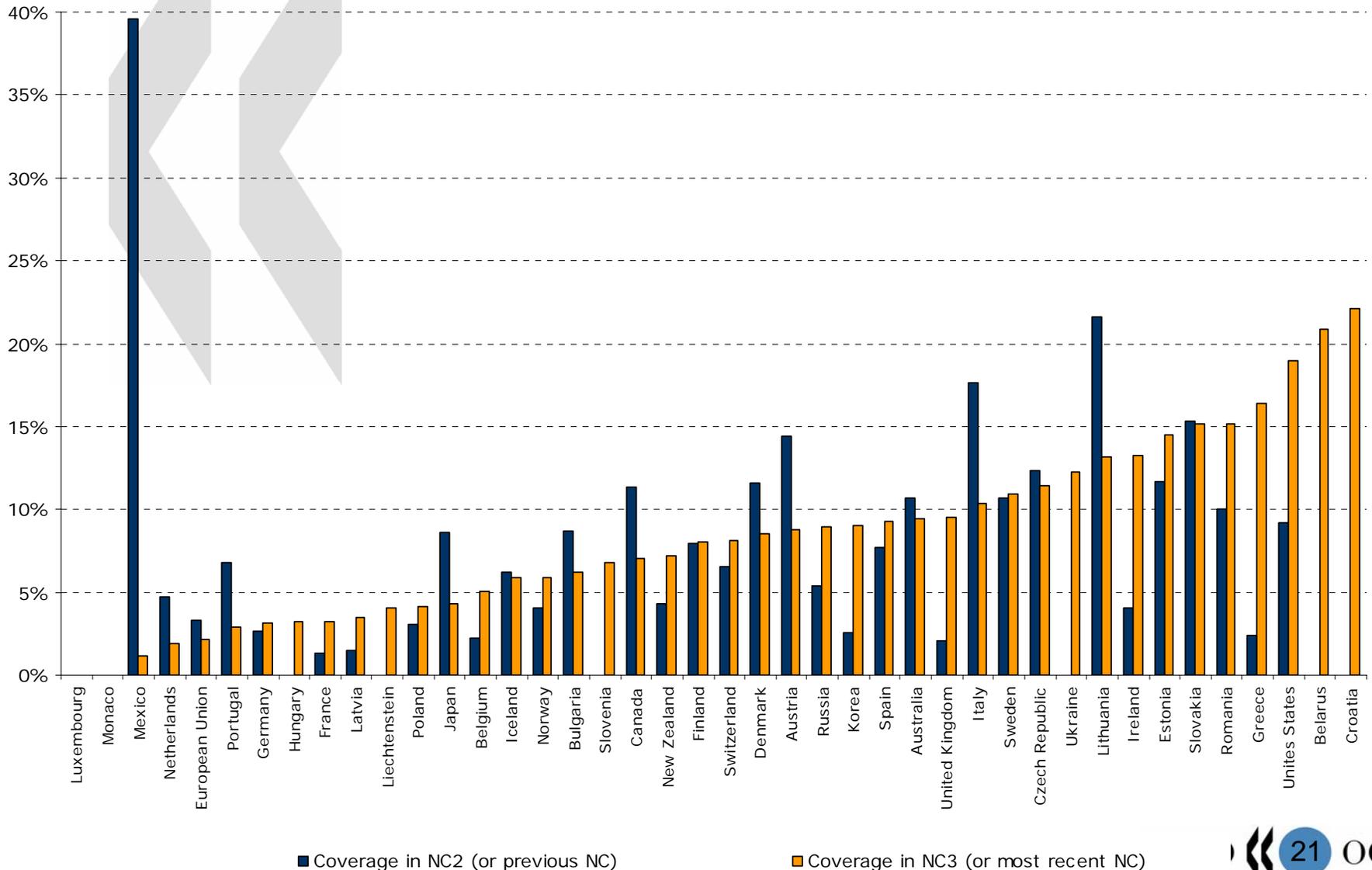


Yet ....

- Climate risks (including current variability) are generally ignored in national development/sectoral policies, donor strategies, and development projects
- A recent World Bank analysis of its own portfolio echoes OECD results --- 30-40% projects potentially vulnerable to climate risks, while only 2% of project documents mention climate

# Developed countries: Mitigation still dominates the climate policy agenda

## Mitigation vs. Impacts/Adaptation in National Communications



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- **Project level costs** --- Case specific (and often meaningless outside the particular context)
- However, the proliferation of many adaptations (e.g. artificial snowmaking) must imply they must be cost-effective – at least for the private sector.
- Open question whether all social externalities have been factored in such estimates of costs and benefits

## ➤ Sectoral/regional costs and benefits :

### *Non-monetised Adaptation benefits - Agriculture*

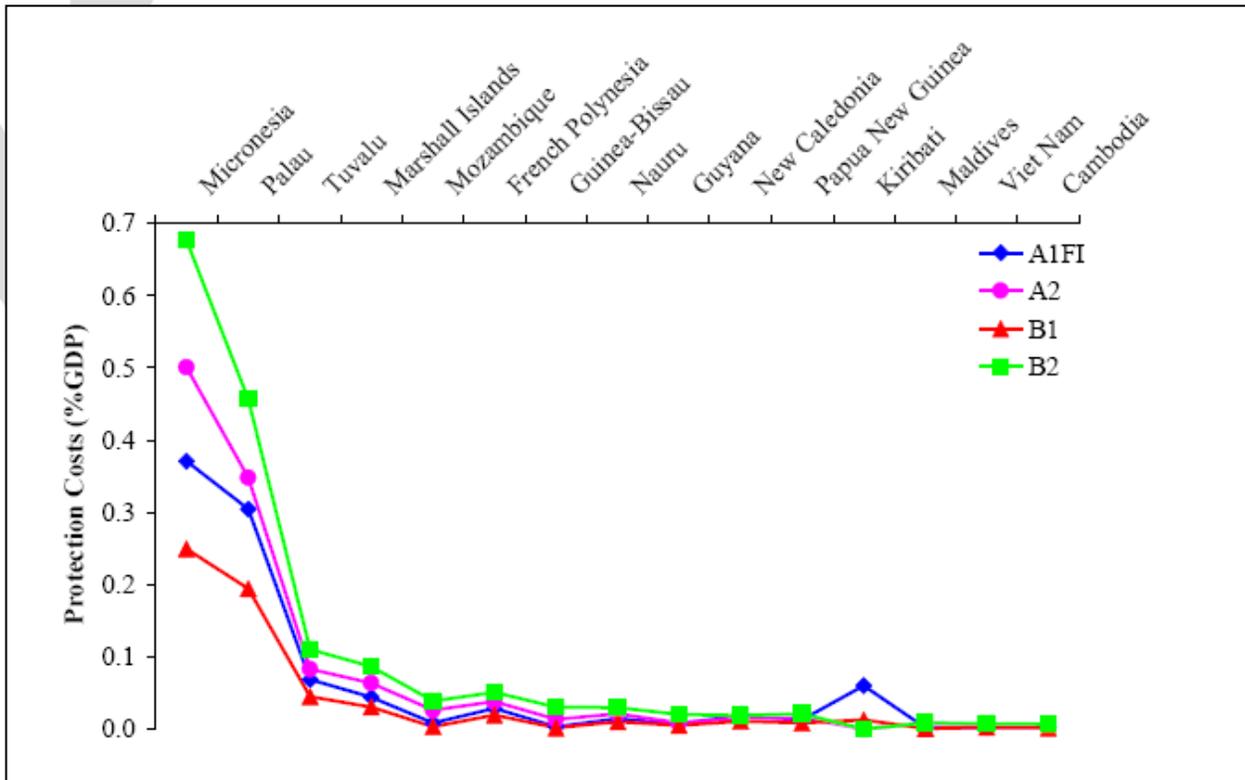
**Adaptation benefits in 2050 induced by changes in planting dates for maize, soybean and wheat crops across the globe**

Area	<u>Impacts</u>		% change due to adaptation
	w/o adaptation	with adaptation	
	<u>Yield changes</u>		
Asia	-12%	-8%	33%
North America	-23%	-12%	48%
South America	-29%	-18%	38%
Europe	-23%	-13%	43%
Australia	-26%	-19%	27%
Africa	-35%	-27%	23%

Source: Tan and Shibasaki 2003

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## Coastal protection costs in 2080 as a percentage of GDP for most affected countries under the four SRES worlds (A1F1, A2, B1, B2)



Source: Nicholls and Tol 2006

## Quantification of sectoral/regional adaptation costs and benefits

- Exist only for a very *limited number* of cases ----- coastal protection to sea level rise (costs and/or benefits), space cooling/heating (costs), agriculture (benefits)
- Often extrapolated from (dated) source studies, from a few developed countries
- Problems of identification of the adaptation component embedded within broader responses, valuation, aggregation, discounting

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## Limits to Adaptation

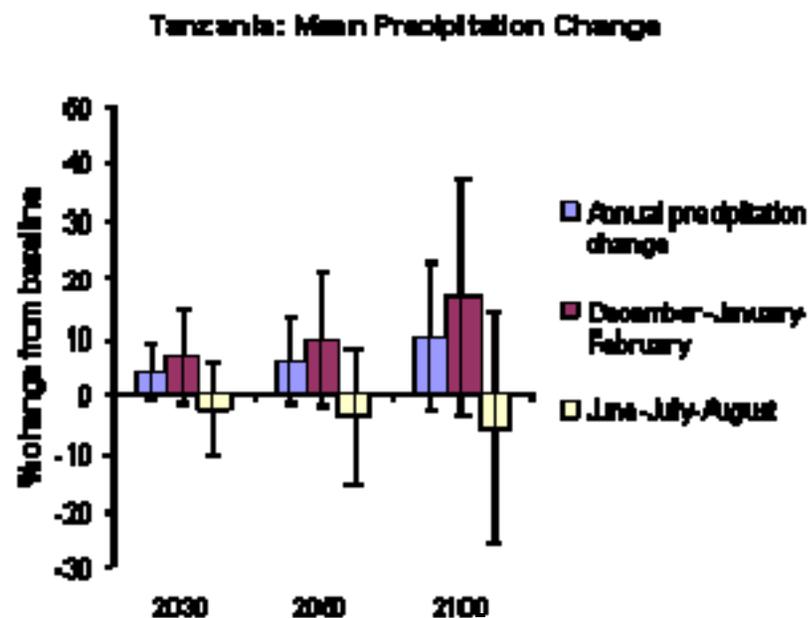
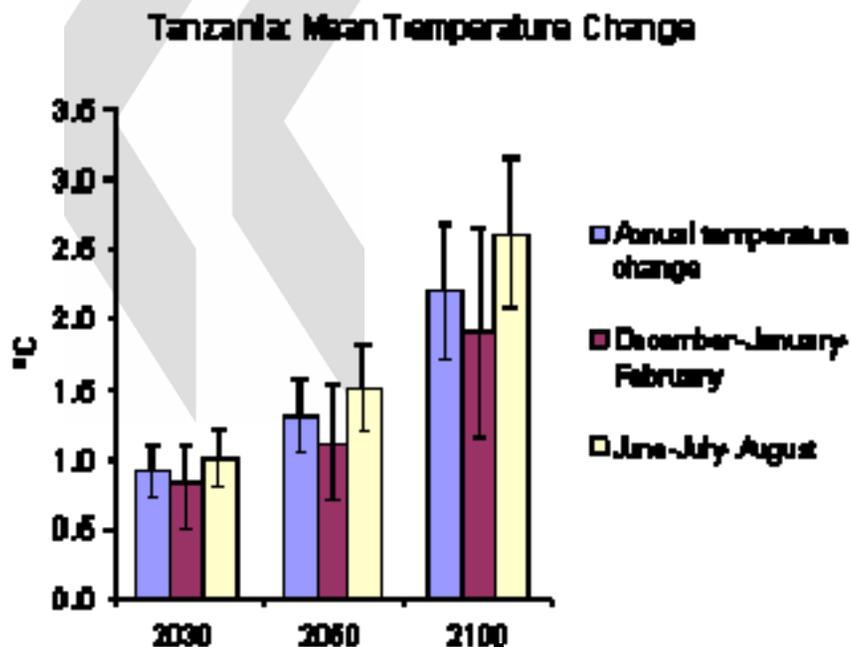
- Too much focus at the international level only on the Financial limits/constraints to adaptation. Other limits are perhaps even more critical – even if we had all the money in the world.
- **Systemic Limits:** We might be able to adapt in an aggregate Darwinian sense, but some ecosystem species, human systems and cultures might be lost in the process.
- The higher the rate and/or magnitude of climate change, the more the systems that will be “adapted out of existence”.

## Limits to Adaptation

➤ **Informational Limits:** The climate variables and spatial scales with the *most relevance* for adaptation decisions are generally the ones projected with the *least certainty* (e.g. precip, extremes, weather within the climate, local scales)

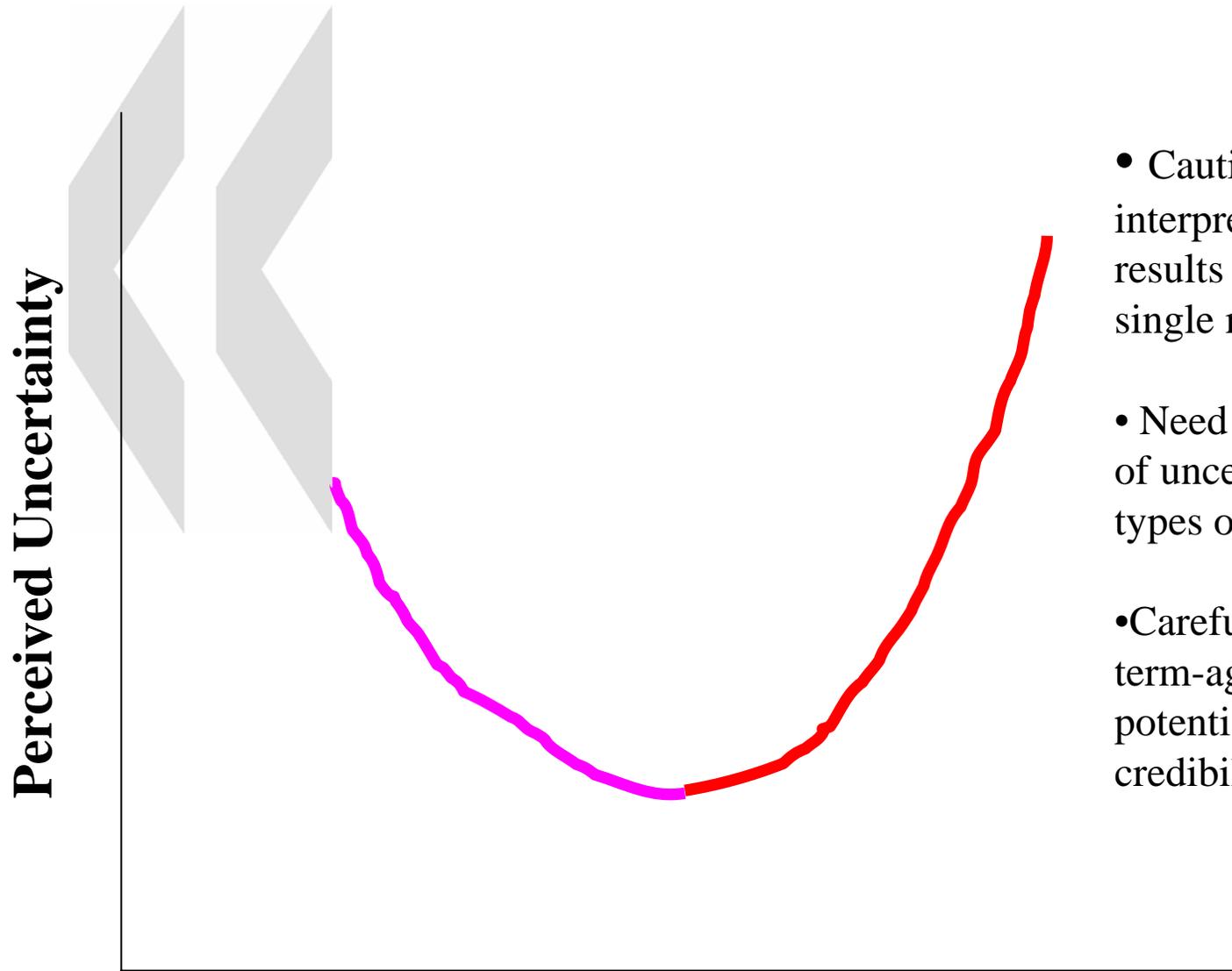
# Uncertainty: An Example from Recent OECD Work

(comparing spread of projections from 17 climate models)



Source: Smith et. al 2005

# *Inadequate/Improper Communication of Reliability of Climate Projections*



- Caution against over-interpretation of model results – particularly from single models
- Need to differentiate levels of uncertainty in different types of projections
- Carefully balance short term-agenda setting against potential loss of long-term credibility

GCM modelers

Communicators/  
Impelementors

End users

OECD



OCDE

**Distance from knowledge producer** →

## Other Limits/Barriers to Adaptation

- Sectoral planners already face a “mainstreaming overload” from agendas ranging from public health to sustainable development competing for attention.
- Many planning horizons are 3-5 years (or less) and may not be the best vehicle for long-term climate risk reduction
- Adaptation might also be less attractive than more visible investments such as disaster recovery and where funding modalities are better established.
- Adaptation might also divert scarce resources from more pressing priorities, complicate operating procedures, and raise implementation costs

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## Some Priorities for the Way Forward on Adaptation

- *Making climate information more relevant and usable*
  - Multi-model projections, clear articulation of uncertainties
  - Emphasis on implications at the scale at which development decisions are made
  - Need national / regional priority rankings [instead of catalogues] for key climate change impacts based on urgency, certainty, timing, and the significance of the resource affected

## Some Priorities for the Way Forward

- *Developing and applying climate risk screening tools*
  - Two tiered screening: broad overview followed by more sophisticated screening for projects/activities where climate change might particularly need to be taken into account
  
- *Identifying and using appropriate Entry Points for factoring in climate considerations in development activities [budgetary processes, EIAs, Hazard Maps, etc.]*

## Some Priorities for the Way Forward

- Better information on *costs, costs, COSTS*
- *Greater emphasis on implementation, as opposed to the formulation of new plans*