

Overview of the technical paper and the synthesis report

Potential Costs and Benefits of Adaptation

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Background

- Low evidence base on adaptation economics
 - AR4 reported literature on adaptation costs and benefits '*quite limited and fragmented*'
 - Quantitative information (OECD, 2008) focused on a few sectors (notably coasts)
- But number of more recent studies commissioned: reporting 2009-2010

- Emerging literature (EEA, 2007; OECD, 2008) on methodological issues
 - Reveals complex issues with economics of adaptation
 - Highlight that approaches and methods still evolving

Objectives of the Technical Paper

- Raise awareness of latest studies
- Investigate key methodological issues
- Discuss the approaches and methods used
- Discuss the strengths and weaknesses - application and outputs
- Consider the evidence base in light of the new studies

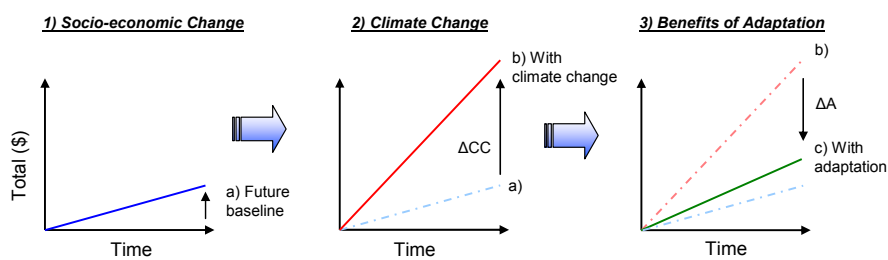
Costs and Benefits of Adaptation

Different aggregation and governance levels, addressing separate policy questions:

- Global level
 - Scale of adaptation and also specific input to finance negotiation discussion
- National level
 - National adaptation financing needs. National response, planning and prioritization
- Regional or local level
 - Design and prioritization of adaptation policies, programs and projects (appraisal)

The Theoretical Framework

Simplified assessment of costs and benefits of adaptation



Source: Adapted from Boyd R. and A. Hunt (2006)

But translating this into practice is less simple

Adaptation versus Mitigation

- Mitigation
 - Common single goal across all sector - to reduce GHG emissions
 - Benefits independent of location or technology
 - Common metrics (tCO_2 or $\$/tCO_2$) allow prioritisation across sectors and options

- Adaptation
 - Different goals between and even within sectors
 - Responding to different climate parameters, different impacts
 - Benefits (and costs) are location and technology specific
 - Different possible ambition levels
 - No common metrics of physical benefits – the only overall common metric is \$
 - And.....

Methodological challenges with Adaptation

- Uncertainty
 - Baselines
 - Climate projections
 - Reversibility, flexibility and adaptive management
- } Uncertainty
- Time horizon and discount rates
 - Non-monetary costs and benefits
 - Adaptation – mitigation linkages
 - Cross-sectoral linkages
 - Economic wide impacts
 - Hard vs. soft adaptation
 - Ancillary effects
 - Public versus Private
 - Limits of Adaptation
- } Economic Valuation
- Equity
- } Equity

Review of existing studies

Global level

Small number of studies, which adopt one of three main types of approaches

1. Investment and financial flow (I&FF) analysis – costs only
2. Scenario based Impact Assessment (IA)
 - Both input to negotiation discussion
3. Global Economic Integrated assessment model (IAM) analysis
 - Costs and benefits of adaptation (PV) – high benefit:cost ratio
 - Longer time analysis - policy mix between mitigation and adaptation

Global I&FF / IA

Study	Cost of Adaptation	Regional coverage	Time frame
World Bank (2006)	\$ 9 to 41 billion/year	Developing countries	Present
Stern (2006)	\$ 4 to 37 billion/year	Developing countries	Present
	\$15 to 150 billion/year	Developed countries	Not specified
Oxfam (2007)	Min. \$ 50 billion/ year	Developing countries	Present
UNDP (2007)	\$ 86 to 109 billion/year	Developing countries	2015
UNFCCC (2007)	\$ 28 to 67 billion/year	Developing countries	2030
	\$21 to 104 billion/year	Developed countries	2030
	\$ 44 to 166 billion/year	Global	2030
Parry et al (2009)	2 to 3 times UNFCCC	Global	2030
World Bank (2009)	\$ 78 to 90 billion/year	Developing countries	2010 to 2050

Discussion of Global Studies

- Estimates can only really be treated as indicative
 - I&FF have similar assumptions, constraints, coverage and omissions
 - IAMs use simplifying assumptions, particularly on adaptation
- Most global studies yet to deal adequately with uncertainty
 - I&FF largely ignore uncertainty. Some IA include limited uncertainty (climate)
- Major gaps on issues of economic valuation
 - I&FF and IA studies largely omit biodiversity and ecosystem services
 - All studies omit soft adaptation and adaptive capacity
- Inadequate treatment of equity - though challenging at the global level

National level

Increasing number of studies – many focused on financing or economics

- UNFCCC NEEDS project
- UNDP Assessment of Investment and Financial Flows to Address Climate Change
- Regional Economics of Climate Change Studies (RECCs)
- EACC Country studies

- Recent national level assessments that estimate adaptation costs, or costs and benefits

Wide Range of Models/Methods in Use

- Economic Integrated assessment model (IAM) analysis
- Computerized General Equilibrium (CGE) models
- National level Investment and financial flow (I&FF) analysis
- Bottom-up impact assessment
- Vulnerability based assessment
- Adaptation assessment

- Also alternative decision support approaches: e.g.
 - risk assessment, cost-benefit analysis, cost-effectiveness, multi-criteria analysis

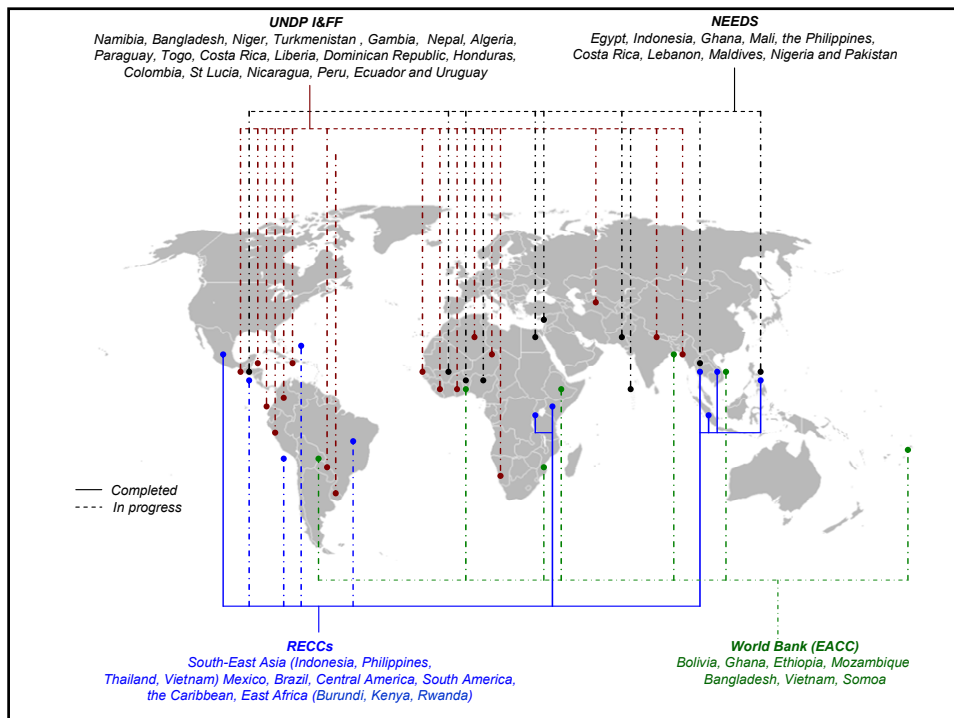
Wide Range of Methods in Use

- Economic Integrated assessment model (IAM) analysis ----- South East Asia RECC
- Computerized General Equilibrium (CGE) models ----- Brazil RECC
- National level Investment and financial flow (I&FF) analysis --- UNFCCC / Sweden (07)
- Bottom-up impact assessment ----- UK (06); PESETA (09)
- Vulnerability based assessment ----- NAPAs
- Adaptation assessment

- Also alternative decision support approaches: e.g.
 - risk assessment, cost-benefit analysis, cost-effectiveness, multi-criteria analysis
 - Micronesia ----- UK ----- Netherlands (Routeplanner)

Discussion of National Assessments

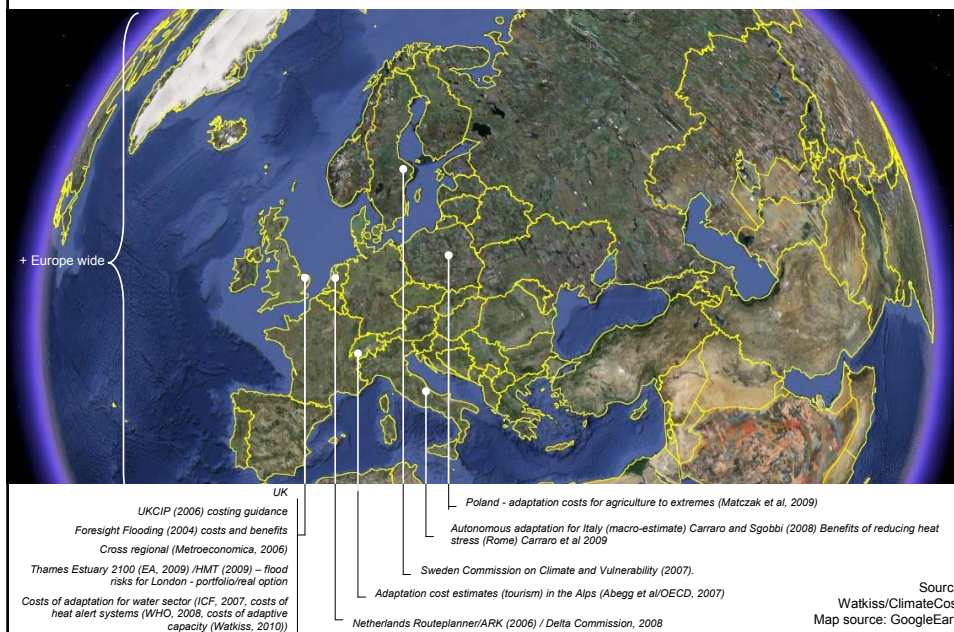
- Diversity of approaches makes comparison difficult – often different metrics
- Some studies moving to more explicit consideration of uncertainty, at least for climate
 - However, still little consideration wider uncertainty, flexibility and adaptive management
- Some studies improving economic valuation (links A-M), soft options, wider economics
 - But still little on cross-sectoral, ancillary, private sector, limits of adaptation
- Remains little analytical analysis of equity issues
- Number of national studies imply much larger adaptation costs than the global studies
- Considerable emerging literature over next 6 months



Local level

- Increasing number of studies
- Show that easier to address the methodological challenges at this spatial scale
 - Examples with options value, attribution and baseline, uncertainty, etc
- Emerging evidence base show range of different applications, e.g. recent European reviews (ClimateCost/EEA)

Europe – Adaptation Economic Studies (ClimateCost Project)



Approaches for Assessing Adaptation

Investigated different methods and approaches and strengths and weaknesses

- Best approach will vary with objective
- But there is potential for using combination of approaches
 - Multiple approaches to build lines of evidence
 - Combination of methods
 - But also combining aggregation level – grounding (validating) local in national
- Also reviewed emerging literature on adaptation assessment
 - Implications for economic studies

Adaptation Assessment

1. Uncertainty – inputs and outputs of any analyses are highly uncertain.
 - Unknown future scenario, large model variation (+/-), impact range, value uncertainty
 - Essential to recognise this uncertainty, not to ignore it, but not a reason for inaction
 - Requires move away from 'predict and optimise' to decision making under uncertainty
2. Consider adaptation as a process of social, institutional and organisational learning
 - Recognise adaptation as a process as well as an outcome (not just technical options)
3. More focus on short-term issues with grounding in existing vulnerability and policy
 - Less focus on long-term scientific (impact) assessments – more on practical, short-term
 - Further round the 'policy cycle' – looking to inform adaptation not justify mitigation

Challenge is to Translate this into Economics

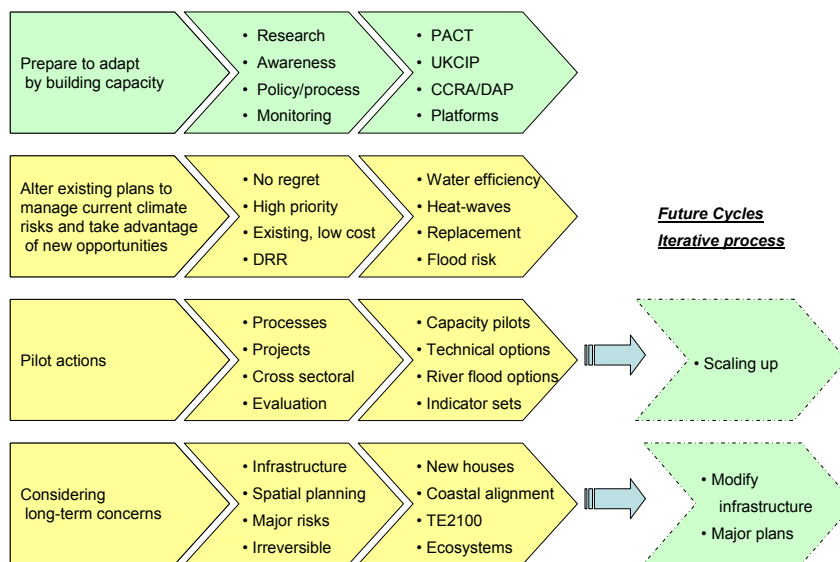
- What does this mean for economic studies?
 - A need to do things differently
 - Focusing on where it is economically rationale to act, given uncertainty
 - Especially often investing now to provide benefits in the future

An Economic Rationale.....

Where might we focus on early action that makes economic sense

- Building adaptive capacity
- Focusing on win-win, no regret or low cost measures
 - justified by current climate conditions or involving minimal cost
- Encouraging pilot actions to test promising responses (act then learn then act)
- Identifying those long-term issues that require early investigation
 - infrastructure / long-term issue - noting may not require action now

Examples



Assessment Methods

Option for Assessing Adaptation	Adaptation Type		
	Adaptive Capacity	No regrets	Longer-term priorities
Formal cost-benefit analysis	✓	✓✓	✓✓
Non-formalised cost-benefit analysis	✓✓	✓✓✓	✓✓
Cost-effectiveness analysis	✓	✓	✓✓✓
Multi-criteria analysis	✓✓	✓✓	
Portfolio theory	✓	✓	✓✓✓
Pathway analysis			✓✓✓
Adaptive capacity assessment	✓✓✓		
Risk management methods		✓✓	✓✓✓
Scenario-based approaches		✓	✓✓
Technological assessments		✓	✓✓
Normative policy assessments	✓	✓	✓
Identifying learning in individuals/organisations	✓✓	✓	✓
Participatory techniques	✓✓	✓	✓
Social learning	✓✓	✓	✓

- Analysis of these different aspects requires different approaches
- Complementary portfolio needed

Final thoughts

- Low evidence base but growing rapidly
- Different challenges at various aggregation levels
 - also different challenges between global regions
- Furthering the economics of adaptation is an essential priority
 - But is complex and likely to involve us doing things differently
 - Considering uncertainty with iterative approach and adaptive management, adaptation as a process, moving to grounded policy analysis
- Economics can help us to understand where and when to act
- Priority to advance more on the ground evidence and analysis