

ECONADAPT

The Economics of Adaptation



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The Economics of climate change adaptation:

Introduction to ECONADAPT

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Overview of Presentation

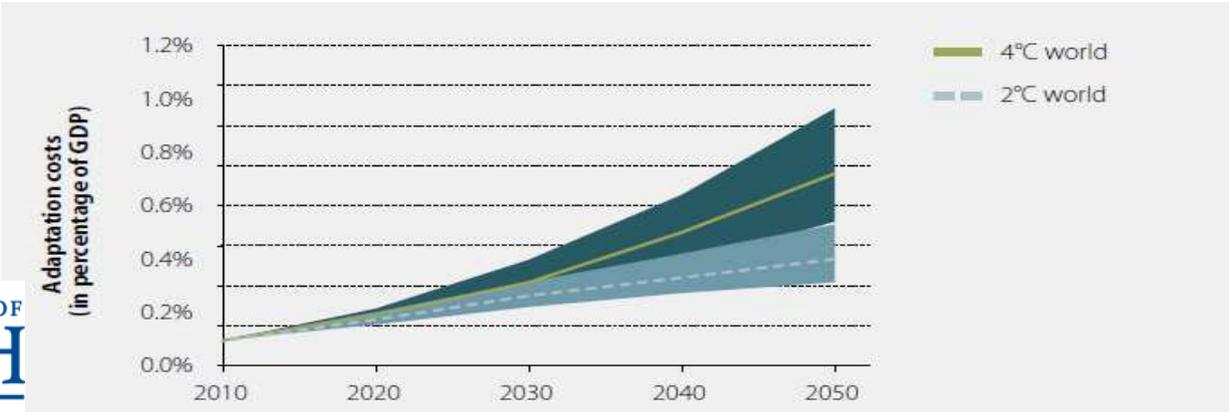
- Context: the need for climate change adaptation economics
- Overview of research in ECONADAPT
- Costs and Benefits of Adaptation: Evidence, Lessons and Policy Insights

Rationale for economic data on adaptation

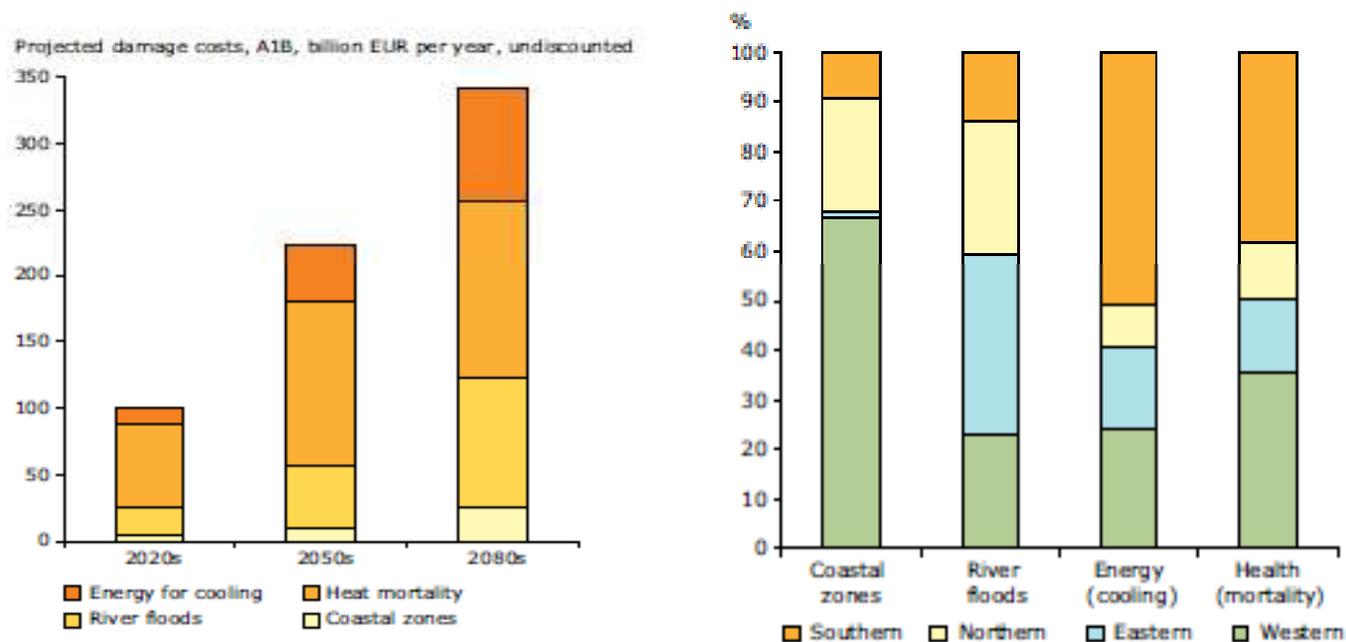
- In 2000+, adaptation cost data to inform UNFCCC negotiations re size of LDC Adaptation Fund
 - highlighted need for better methods/data
- Slow progress of GHG emission reductions & agreement of mitigation targets
 - growing recognition of need to commit resources to adaptation in developed countries

Adaptation cost estimates for LDCs: 2010-2050, dry scenario, \$bn

Region	US\$ Billion	Sector	US\$ Billion
East Asia & Pacific	17.9	Infrastructure	13.0
Central Asia	6.9	Coastal zones	27.6
Latin America & Caribbean	14.8	Water supply and flood protection	19.7
Middle East/ North Africa	2.5	Agriculture, forestry, fisheries	3.0
South Asia	15.0	Human health	1.5
Sub-Saharan Africa	14.1	Extreme weather events	6.4
Total	71.2	Total	71.2



EU Damage Costs of Climate Change Impacts



Current Research Themes: ECONADAPT EC Research Project

The project frames the overall research by asking two questions, each addressed in a separate but linked work stream.

- First, what are the key methodological advances needed to improve the economic assessment of adaptation?
- Second, how can improved economic methods and tools be applied in the context of the big adaptation decisions facing Europe in the next decade?

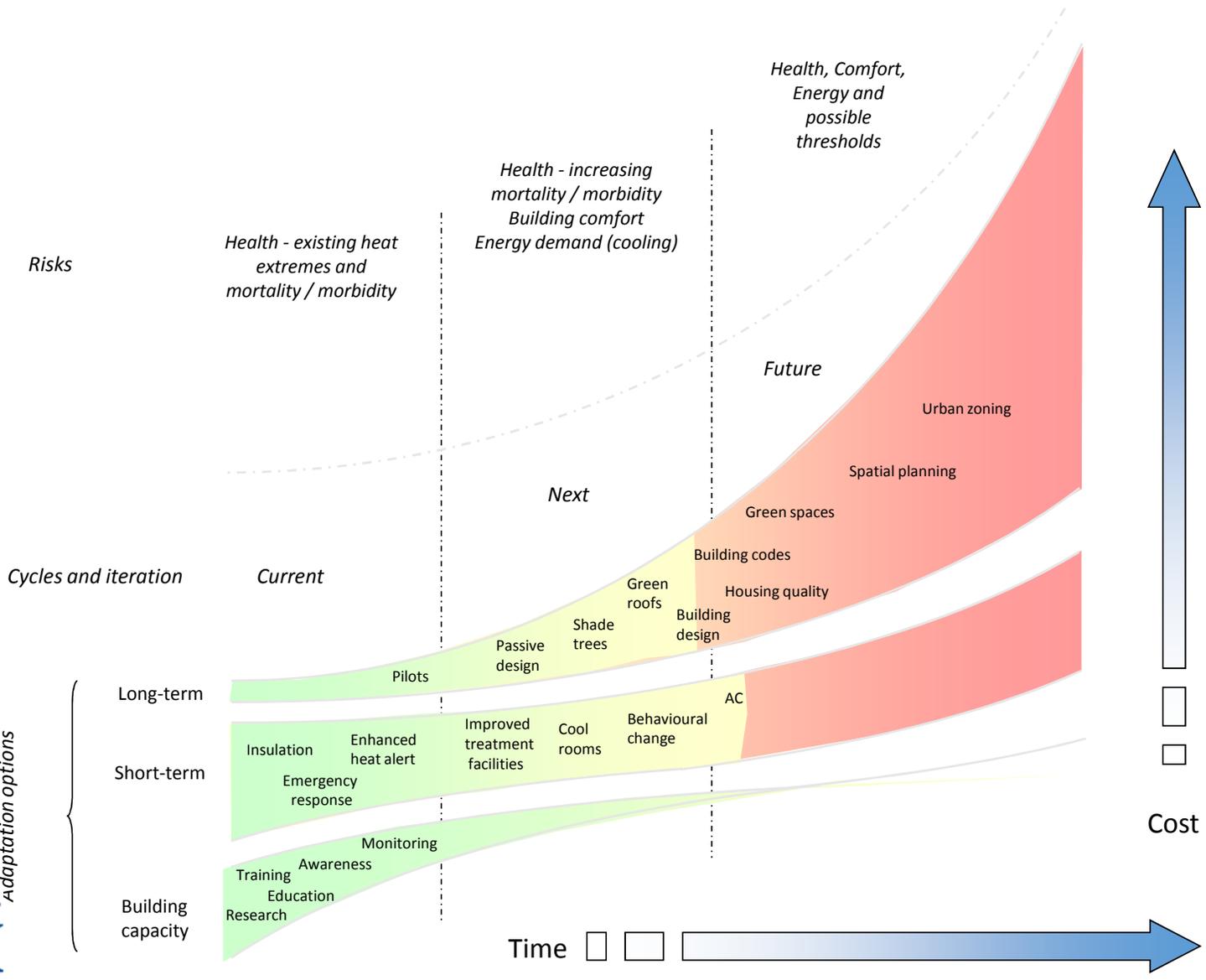
Outstanding Methodological Issues: Examples

- Uncertainty
 - CC risks: which, how large, when?
 - Are existing decision-making tools still appropriate?
- Attribution of costs to climate change vs development
 - What are the additional costs/benefits? Important for budgetary planning
- Long time scales: discounting and future preferences
 - Growing risks over time
- Treatment of adaptive capacity in economic analysis
 - Some expenditures enable future adaptation indirectly; weigh against spending on options with direct benefit
- Financial vs economic costs
 - Role of non-technical options and measurement of non-market costs/benefits

Outstanding Methodological Issues: Economic Decision Support

- Existing tools used in economic decision support are not well suited for adaptation
- Cost-benefit analysis, cost-effectiveness analysis and multi-criteria analysis all limited, particularly in relation to treatment of uncertainty
- Emerging new economic decision support tools better address uncertainty
 - Real Options, Robust decision making, Portfolio analysis, Iterative Pathways
 - What methods applicable, in which conditions?

Adaptation options



ECONADAPT: Key Policy Domains

- **Apply methodological advances in key European Adaptation decision areas likely to need advanced adaptation economics:**
 - Disaster risk (reduction) from climate extremes
 - Policy Appraisal – notably large infrastructure
 - Policy impact assessment – notably major mainstreaming
 - Macro-economics of adaptation
 - European international adaptation assistance

Disasters

- Current climate variability already leads to high economic costs in Europe, with major floods a particular concern.
- Climate change is likely to affect these extremes and they are likely to be among the highest costs of CC in Europe in the short-term, thus early focus for adaptation.
- Case studies at European level:
 - Modelling to generate estimates of fiscal consequences in near term
 - Test economic case for alternative approaches to disaster risk management

Project Appraisal

- A major priority is to include adaptation into economic appraisal for large infrastructure projects.
- This includes baseline investment (climate risk screening) as well as new investments primarily designed to address climate change, ensuring this takes sufficient account of future uncertainty.
- Case studies - coasts (Bilbao) and floods (Prague)

Policy Impact Assessment

- The mainstreaming of adaptation in policy appraisal requires additional elements to current regulatory impact assessment, as well the need to address scale and time preference issues.
- Case study on European agriculture
 - How should future CAP reform accommodate climate change risks and adaptation in its design?

Macro-economics of adaptation

- There is increasing interest in the macro-economic effects of adaptation.
- This is linked to competitiveness, growth and public finances.
- However, such application involves challenging scale and aggregation issues
- Analysis with CGE models – looking at both autonomous and planned adaptation

International Adaptation Assistance

- One of the major flows of adaptation funding is from Europe to developing countries.
- The effective use of adaptation economics involves, e.g., the context of development objectives, transfer of methods, as well as treatment of equity.
- Case studies in Africa (Rwanda, Tanzania)

ECONADAPT Toolbox

- Gives guidance -based on the methodological tasks and the case study examples - to help application of the economic assessment of adaptation
- Includes a data-repository on cost and benefit estimates and guidance for potential for transfer.
- 2-track approach.
 - information for a technical audience
 - more accessible, light-touch, approach – for use by a wider (non-economist) audience.

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Costs and Benefits of Adaptation: Evidence, Lessons and Policy Insights

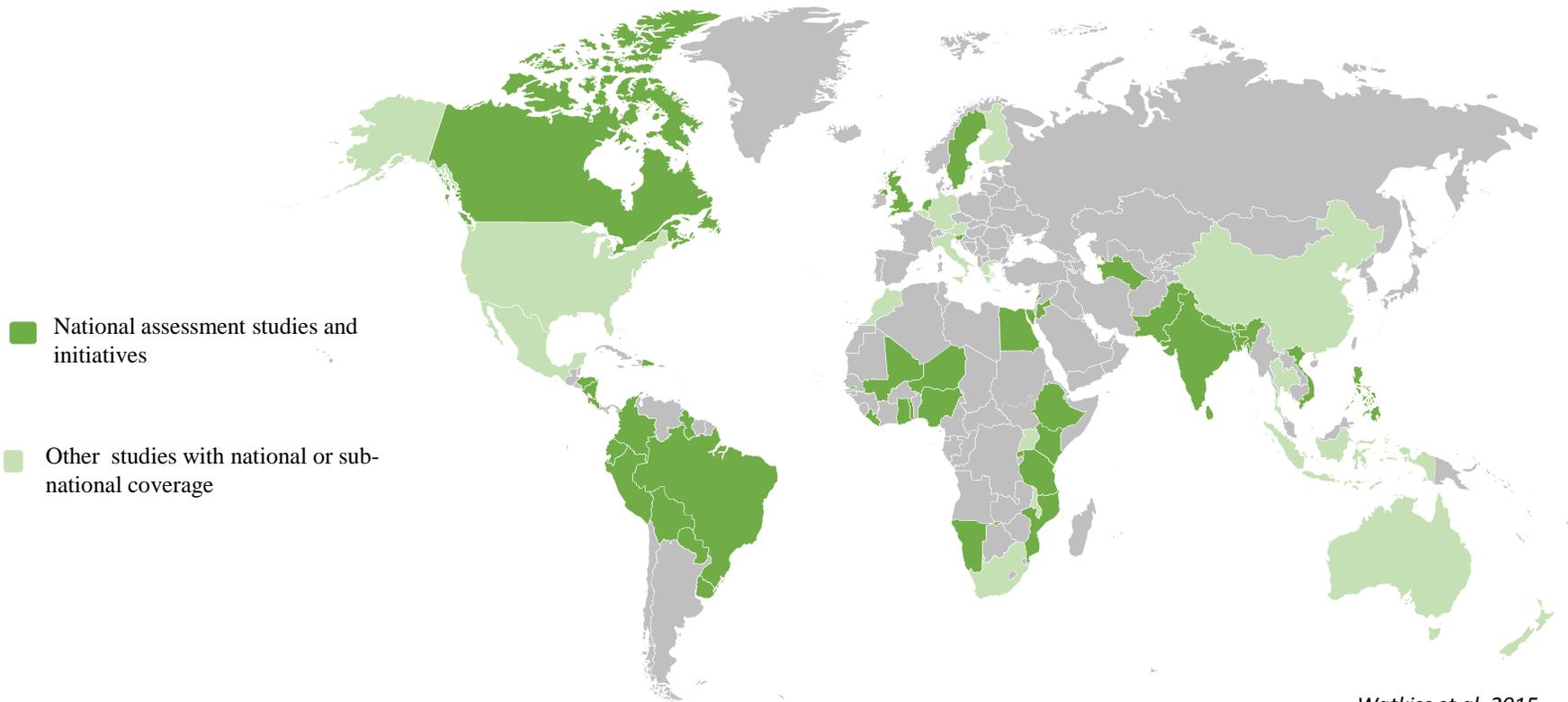
State of knowledge on Costs/Benefits

- Previous reviews – including IPCC 5th AR - report a low evidence base on the costs and benefits of adaptation
- But over the last few years, information base grown very strongly
 - Global initiatives (e.g. World Bank EACC, UNFCCC NEEDS, OECD, UNDP)
 - National initiatives (National Adaptation Plans, etc)
 - Risk, sector and project based assessments
- ECONADAPT undertaken comprehensive review – built an ‘Inventory of studies’ - identified > 600 relevant studies

Coverage



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Watkiss et al. 2015

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Update of 2008 review

Risk / Sector	Coverage/ Discussion	Cost estimates	Benefit estimates
Coastal zones and coastal storms	Comprehensive coverage at global, national and local level in impact assessment and policy studies + low regret options decision making under uncertainty.	✓✓✓	✓✓✓
Floods including infrastructure	Growing cost and benefit estimates in a number of countries and local areas, particularly river flooding. Some evidence on low regret options and non-technical options. Some applications of decision making under uncertainty.	✓✓	✓✓
Water management	Emerging supply-demand studies at the national level. Focus on supply, engineering measures. Some examples of decision making under uncertainty.	✓✓	✓
Other infrastructure	Several studies on road and rail infrastructure. Examples of wind storm and permafrost.	✓	✓
Agriculture	Benefits of farm level adaptation, and some benefits and costs at global and national level. Evidence emerging on low regret adaptation, including climate smart agriculture.	✓✓	✓✓
Over-heating (built environment, energy and health)	Good cost information on heat-alert schemes. Increasing coverage of autonomous costs* associated with cooling. Growing evidence base on low-regret options (e.g. passive cooling).	✓✓	✓
Other health risks	Increasing studies of preventative costs for future disease burden (e.g. water, food and vector borne disease), but partial.	✓	✓
Biodiversity / ecosystem services	Low evidence base, with a limited number of studies on restoration costs and costs for management of protected areas for terrestrial ecosystems.	✓	
Business, services and industry	Very few quantitative studies available, except for tourism.	✓	

Watkiss et al, 2015

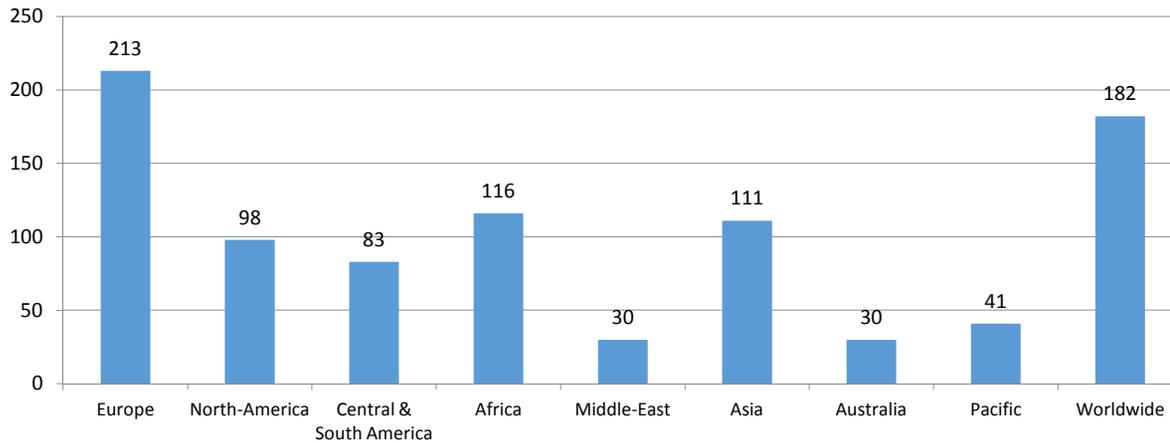
Breakdown

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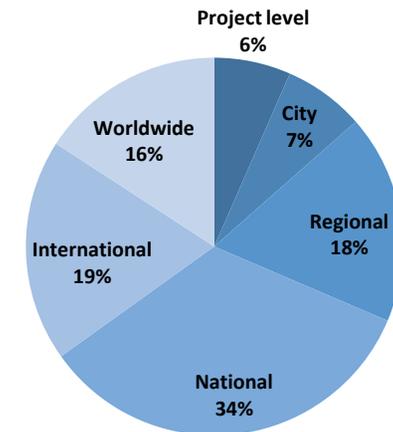


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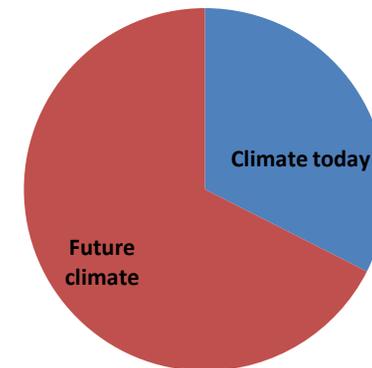
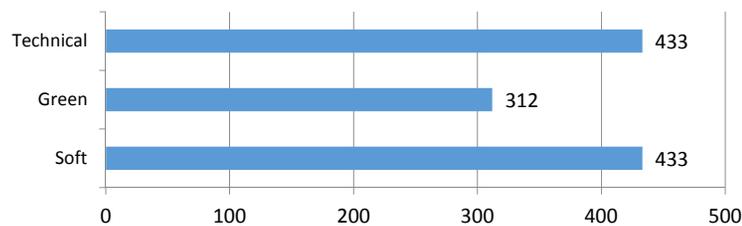
Geographical area (total 653, multiple answers possible)



Scale (total: 653)



Adaptation measures (total 653, multiple answers possible)



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Some Insights

- Information base on the costs and benefits of adaptation has significantly grown in recent years – higher coverage but still partial – still major gaps
- Estimates of costs increase as move to implementation
 - Integrating opportunity and transaction costs
 - Considering multiple risks and uncertainties
 - Facing additional economic, information and regulatory barriers
- More information but transferability remains challenging

Assessing costs and benefits

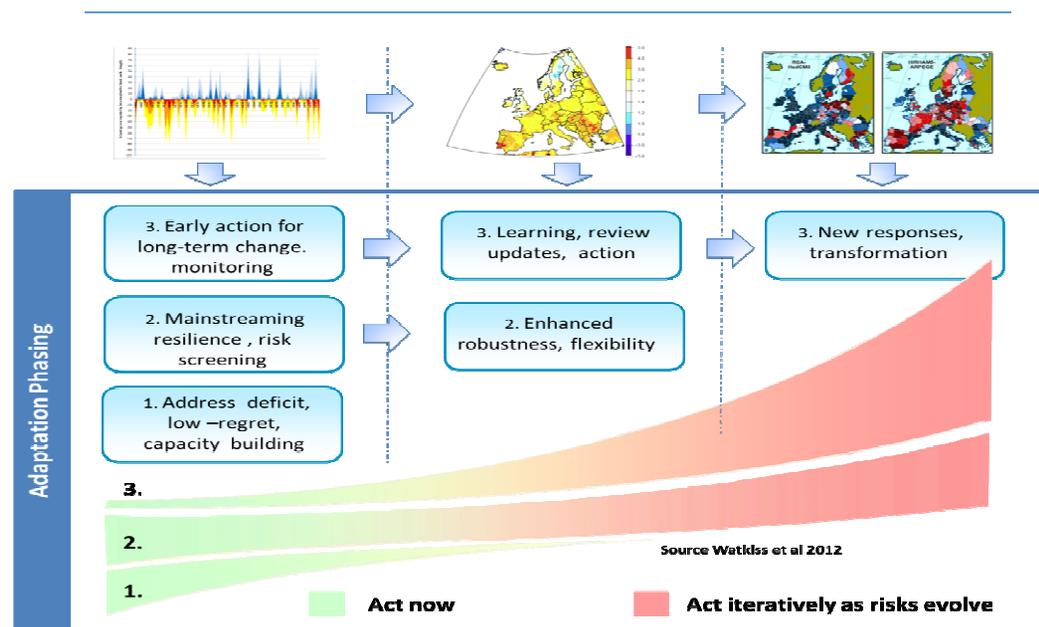
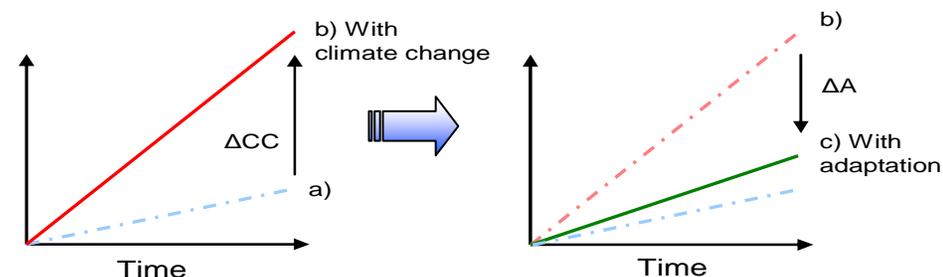
- Analysis of literature shows methods are changing
- Three shifts identified
 - From science-based impacts to policy first adaptation-assessment
 - From impact assessment to iterative climate risk management
 - From prediction to decision making under uncertainty

What does this mean?



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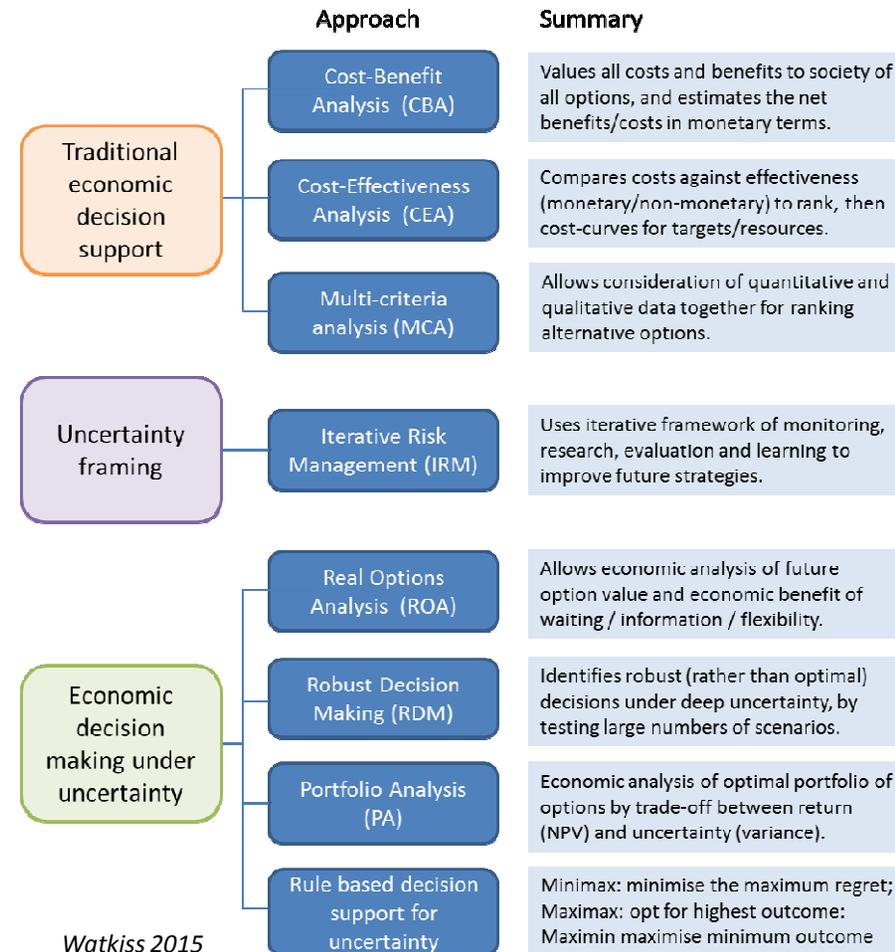
1. Impact-assessment studies (classic)
2. Iterative climate risk studies
 - Building blocks on timing and Phasing
 - Different types of options
 - Decision under uncertainty
 - Focus on early adaptation and low regret
 - Mainstreamed



Watkiss 2015

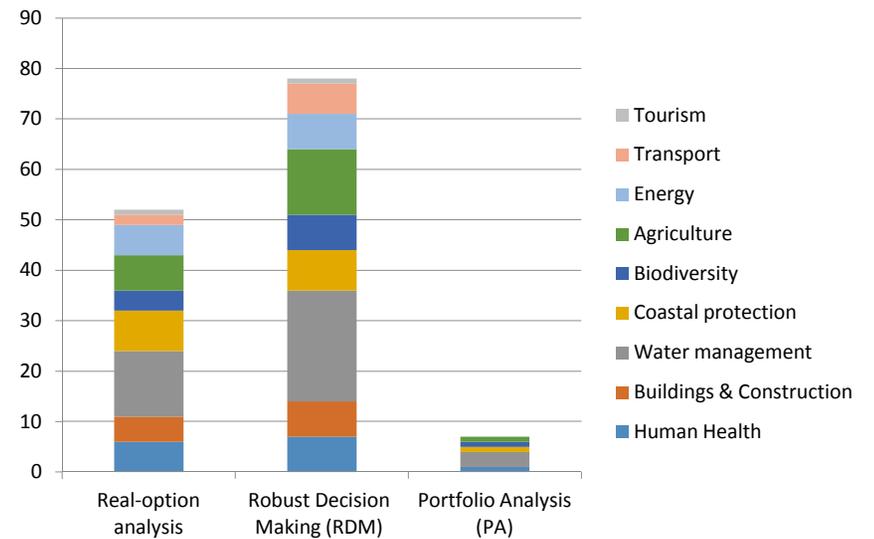
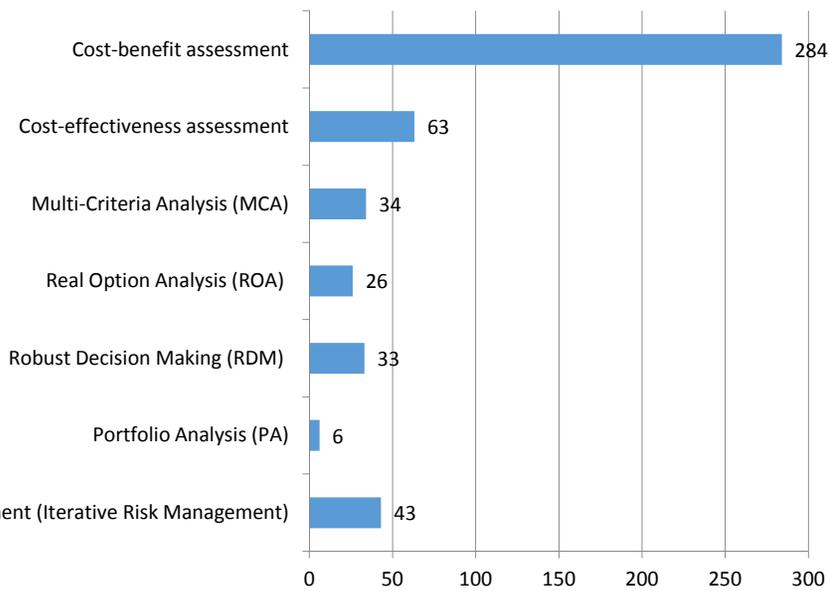
Methodological insights

- Studies use different methods and select different options which vary in timing and phasing
- They lead to different costs (and benefits) and different information needs
- From perspective of policy maker, need to know which one to look at / using !
- Econadapt is developing guidance



Watkiss 2015

Decision making under uncertainty



In conclusion

- Evidence base is growing
 - There is no single 'cost' of adaptation
- Moving to new methods and approaches
 - Alters the method, options and costs – care in using information
- Decision support for decisions evolving
 - But critical to look at pragmatic approaches and existing policy
- Published in e-book at www.econadapt.eu

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