Reviewing the use of non-monetary metrics/weights for use in decision-making of adaptation to climate change projects

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Abstract

To a large extent, the development of parameters appropriate to the economic assessment of climate change has been led to date by research undertaken in the climate change mitigation context. Primarily, these discussions have been centred on discounting, the role of equity weights, aggregation, and the role of monetary metrics compared with non-monetary metrics/weights - see e.g. Stern (2007) and subsequently Nordhaus (2007) and others.

The appropriateness of transferring practices to the adaptation context from other policy areas has not been investigated in detail. Specifically, the need for further investigation applies to the role of non-monetary metrics in economic assessment of adaptation. This includes communicating the effectiveness of alternative adaptation actions an input to established decision rules that use non-monetary metrics such as Cost-Effectiveness Analysis (CEA) and Multi-Criteria Analysis (MCA). This is especially relevant for the understanding of co-benefits that are difficult to even the the specifical ond on obtain operation, curch on the exercision the hold work hold to be hold to be the the specifical ond and builts. monetize from both a practical and an ethical perspective -such as the conservation of biodiversity, human health etc.

This poster illustrates work in progress as part of the FP7 ECONADAPT project, provides a synthesis of the available The poster interaction of the provided as plan entry of the provided and the provided at the p policy areas sources include the provident matrix of the provident management and unlets. The conclusion highlight key findings from reviewing the use of CEA tools that are relevant for further climate adaptation assessments and further work in the Econadapt project.

Cost Effectiveness Analysis and Multicriteria Analysis in Adaptation Assessments

Cost-Effectiveness Analysis (CEA) is a widely used decision support tool. It compares alternative options for achieving similar outputs (or objectives). In this regard it is a relative measure, providing comparative information between choices (unlike CEA, which provides an absolute measure). It has been widely used in environmental policy analysis, because it avoids monetary valuation of benefits, and instead quantifies benefits in physical terms. At the technical or project level, CEA can be used to compare and rank alternative options. The method identifies those options that deliver highest benefit for lowest cost (i.e. the most cost-effective). At the project, policy or programme level, where combinations of options are needed, CEA can be used to assess the most cost-effective order of options, and identify the least-cost path for achieving pre-defined policy targets.

Multi-Criteria Analysis (MCA) is a decision support tool that allows consideration of quantitative and qualitative data together in ranking alternative options. The approach provides a systematic method for assessing and scoring options against a range of decision criteria, some of which are expressed in physical or monetary units, and some which are qualitative. The various criteria can then be weighted to provide an overall ranking of options. MCA has been widely applied in the environmental domain. It has also been used as a complementary tool to support cost-benefit analysis in appraisal, to consider the performance of options against criteria that may be difficult to value or involve qualitative aspects.

Figure 1: Strengths and Weaknesses of non-monetary assessments in adaptation assessments*

	Cost Effectivenes Analysis	Cost Benefit Analysis
Key Strength	Lenante expressed in physical terms, theratore does not require montebry valuation of benefits. Increases applicability to non-markic sectors (c.g. acceystems) Relatively simple approach to apply and provides ranking and cutrust are are any to understand Frequenty used for mitigation, and thus approach widely recognised and has resonance with policy makers Use of cost curves can assess different policy largels and how to achieve these at least cost look kit nov to achieve groteststbonchits for available rosources, price with the motion.	Can combine quantitative and qualitative data, using monetary and non-monetary units, and can herefore consider a much which set of originary converted quantification is challenging or limited. I her method is relatively simple and transparent, and can be done at relatively low cost and within a limited time. Expertijudgement can be used very efficiently. It itroviose stakeholders and can be based on local knowledge. Thus increasing participation and acceptability of study results.
Key Weaknesses	Optimises to a single metric, which can be difficult to pick, Less applicable for cross-sectoral or complex risks, and does not capture all costs and benefits (attributes) for option apprecisal. Tonds to work bost with tochnical options, and can herefore omit or give lower priority to capacity building and adti(non-to-thoid) measures. A decuential nature of cost curves ignore-sportfloips of options and inter-linkages. Dessnot lend lisef is the consideration of uncertainty and adaptive management, londing to work with contral tendency.	Results need further interpretation and claboration in more detailed studies. There is a high degree of subjectivity involved e.g. different experisions yours different opticions and will provide different scores. Stakeholders may have lack of knowledge and can miss important options. It may be difficult to give consistent scores to the alternatives. Analysis of uncertainty often highly qualitative.

Method

- · As part of the FP7 ECONADAPT project a database of studies related with the economics of adaptation is been
- A total of 753 studies have been systematically reviewed to date
- Reviewed studies come from the grey and academic literature and have different geographical locations (see figure 2) and cover different policy areas relevant for adaptation assessments.
- · Screening of academic literature databases o SCOPUS (138), web of knowledge (211), EconBiz (36), EconLit (55)
- 65% grey versus 35% academic literature · Screening of grey literature:
- Major research projects: MEDIATION, ClimateCost, CLIMSAVE, ADAM
- Web-research on national and local studies Screening of CEA-studies in the database for non-monetary metrics



Middle-East Africa

Asia

ECONADAPT: Economics of adaptation to climate-change

BATH

Coordinator: University of Bath (UBAH) Project Contract No: FP7-ENV-2013-Two-Stage-603906-

Central & South America

Project website: htt

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Australia

Results

Out of a total 753 available sources, 84 and 71 studies illustrate an application of Cost-Effectiveness Analysis and Multicriteria Analysis respectively to rank adaptation options. The majority of economic assessments do still make monetary metrics to measure the effectiveness of the assessed adaptation options through the application of Cost Benefits Analysis.





Exclusively focusing on the application of non-monetary metrics in CEA, there are differences in application across adaptation In CEA, there are ointerences in application across adaptation policy areas. Human Health, Water Management, Agriculture and Civil protection and disaster management are the policy areas where CEA has been more applied. Arguably, this is related with the difficulty in performing CBA by attaching monetary values to intangible and mainly non-market effects that monetary values to intangine and mainly non-market effects characterize the effects of potential adaptition options in these areas (lives saved in Health or water quality improvements in water management). Common indicators and their units employed in CEA in selected adaptation policy areas are presented in figure 5.

Figure 5: CEA indicators employed for selected policy areas**



consense, co-covering () mean production/year) coop Adaption () animal for impairs famous increase of land under irrigation and mochanisation of rainfog outsistence land) (bycar)



Disability Adjusted Life Years averted (CIDALY)
Morbidity reduction range [%]



•Vater • Area of floodplain restored [ha] • Avoided flood risk [Ciyear] • Assets exposed [%] • Load reduction BOD, COD, N, P [kg load/ year]



Absolute SW over project (Fig. Served Wealth (SW), covers the monetary value of public Industructure, physic property and incomo loss [C] Filerian house-pite and the field values of project y transactions[Na] Assolute spaced [P] (val) - Subsidiance damage to buildings [NIA]



 Area of toodplain restored [ha]
Area of habital created maintained restored [ha]
Area of habital created maintained restored [ha]
Area soubainadly managed [ha]
Area soubainadly managed [ha]
Coreystems sateguarded [ha]
Increase in protected areas [%]
Increase in protected areas [%] Energy



Conclusions and Next Steps

The results provide a first review of application and a synthesis of available metrics for adaptation CEA assessme The review highlights key methodological issues and helps to illustrate some of the challenges in applying CEA in sectoral adaptation assessments with a comparison with similar approaches outside climate related as

Based on the further analysis of the ECONADAPT literature database, next steps will aim at framing the findings un based of the full and any so the ECONADAPT project. In this respect the discussion will aim to find causal relationships for certain variables/criteria between the reviewed studies that would allow us to draft further policy recommendations:

- · Expand the analysis with the exploration of the use of non-monetary metrics in MCA studies of adaptation options.
- Further conclusions about the use of non-monetary metrics in the adaptation literature: these include treatment of non-monetary metrics under different climate risks, evaluate if there exists a greater focus on non-technical options (including building capacity) and the need to consider uncertainty, as key methodological issues, along with the treatment of time-scales and ancillary effects.
- Specific guidance points to be developed on appropriate use of existing metrics, and new indicators proposed where adding value to adaptation assessments tailored specifically to the following thematic areas 1) Disaster Risk Management; 2) Economic project appraisal; 3) Policy impact assessment; 4) Macro-economic effects of adaptation; and, 5) International development.
- Finally, the results of this deliverable of the project will have also in mind lessons learnt from the application of CEA and MCA for the future development of the project's guidance document and toolbox.

Refe

Nordhaus, William D. 2007. "A Review of the Stern Review on the Economics of Climate Change." Journal of Economic Literature, 45(3): 686–702. Stern, N. (2007): The Economics of Climate Change – The Stern Review. Cambridge University Press, Cambridge.

* Source: modified from MEDIATION deliverables: MEDIATION technical briefing notes: htt

** Source: Own figure

• writinity relation range (%) • Frequency of home visits by NGC outroach staff (%) • Number of prevented dealits firrough heat waves (N/A) • Reduction in diamheat disease incidence (total numbers (cases averted)/year)