The **CLIMSAVE** Project

Climate Change Integrated Assessment Methodology for Cross-Sectoral Adaptation and Vulnerability in Europe

Summary of the report describing the adaptive capacity methodology

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The report describing the adaptive capacity methodology sets out the way in which the CLIMSAVE project is developing a way to define, measure and use the concept of "adaptive capacity" within the Integrated Assessment Platform. It explains the issues and existing work in this area, and sets out a number of steps to be taken in order to develop an adaptive capacity model for CLIMSAVE. This methodology has now been implemented (see Report on the Coping Capacity Index) with some adjustments as the work has co-evolved with the method for defining and measuring vulnerability and the further development of the IAP.

The definition of adaptive capacity is difficult and contested, and has been described as "an intellectual quagmire" (Patt et al., 2009). We draw on the diverse literature to develop a working definition that serves a useful purpose in CLIMSAVE. Adaptive capacity is closely related to wealth, in its broadest sense, and wealth is closely related to well-being. Vulnerability, in turn, can be thought of as the prospect of suffering a decline in well-being due to impacts that available wealth does not allow us to avoid. We distinguish three separate concepts, defining *adaptation* as the means of enhancing coping capacity and reducing vulnerability to future climates, *adaptive capacity* as the ability to carry out such adaptation, and *coping capacity* as the ability to deal with climate changes (including variability and extremes) as they happen. Vulnerability in the future is then a function of exposure, sensitivity and coping capacity, and adaptation can act to alter any of these.

To make the Integrated Assessment Platform (IAP) as realistic as possible, while maintaining flexibility for users, we needed to consider ways of measuring both adaptive and coping capacity. Adaptive capacity is needed to set limits on the amount of adaptation – in the IAP, the changes in the adaptation sliders – that is considered feasible within any given scenario. In our framework, this depends on the capitals available. However, it was decided that platform users' choices should not be strictly constrained by the availability of adaptive capacity: strictly limiting the options on the basis of estimated capacities would leave too

few options open to users. Instead, they are warned that their decisions might be unrealistic in the light of available capitals in the scenario by moving outside the green 'credible' adaptation area of the slider.

Coping capacity, the capacity to cope or adapt spontaneously to conditions within a future time slice, is not represented by the meta-models in the IA Platform. The platform models the land use and various outputs associated with average conditions in the future time slices, but does not directly reveal the ability of future populations to deal with these conditions, their variability and associated extreme events.

It was not feasible to develop a complete model of coping capacity and how adaptation influences the severity of impacts and the vulnerability of future populations to particular risks. However, we could develop indices of this capacity that can help interpret platform outputs. Drawing on the literature, we argue that the best approach for CLIMSAVE is to consider four types of capital stock that together make up the wealth of nations: human, social, manufactured and financial capital. This approach is relatively simple to understand and is well suited to use in stakeholder workshops alongside creation of exploratory scenarios – the aim is to enhance the storylines, not predict outcomes.

Adaptive potential is the maximum amount of adaptation possible, for any given combination of socio-economic and climate scenarios. This can be calculated by testing all possible combinations of adaptation options, accounting for capital constraints and coping capacity. This is not directly part of the adaptive capacity work, but will be considered further in CLIMSAVE work on cross-sectoral comparison and cost-effectiveness.

Recommendation for the assessment of current adaptive capacity

Practical considerations mean that it will be simpler to derive separate feasibility ranges for each scenario and adaptation option pairing. There is no need to derive strict limits based on capitals, or to specify in detail the capital requirements of each option. It is sufficient to flag to platform users those ranges of adaptation options thought to be feasible and consistent with the socio-economic scenario under consideration. When carrying out this work, it may be discovered that there are mutual incompatibilities, which will need to be dealt with on a case-by-case basis

Recommendation for the assessment of future coping capacity

Measuring coping capacity presents a more significant challenge. The ability to cope with climate change and reduce vulnerability is closely related to the definition of vulnerability. The development of the coping capacity method must interact with the development of the methodology for identifying vulnerability hotspots, and adjustments may be required in an iterative process of indicator development. The recommended next steps are:

- Construct data series for the capital components and determine centroids for each capital type for 'very low', 'low', 'mid', 'high' and 'very high' levels.

- Select candidate capital indicators from existing data series, and assess these in terms of (a) their co-linearity and (b) our ability to project them.
- Generate rules linking candidate indicators to capitals.
- Decide on the best set of indicators / rules for quantifying the capitals.
- Determine clusters of 'typical' capital values with short descriptions of the kind(s) of area(s) / situation(s) it represents.
- Develop rules for linking these clusters to coping capacity.
- Revisit this analysis for specific threats and receptors: how do the generic capitals translate to the specific coping capacity for each threat / receptor?

In practice, the above steps have been somewhat modified as the work has co-evolved with the vulnerability method and platform development, as explained the report on the final coping capacity index.

Patt AG, Dazé A, Suarez P (2009). Gender and climate change vulnerability: What's the problem, what's the solution? The Distributional Effects of Climate Change: Social and Economic Implications. Ruth M, Ibarrarán M (eds). Edward Elgar, Cheltenham, UK, pp. 82–102.