



Decision Support for Climate Change Adaptation under Uncertainty

Oliver Gebhardt, Miriam Brenck & Volker Meyer, Helmholtz-Centre for Environmental Research – UFZ, Department of Economics, Leipzig, Germany

ABSTRACT

The need to adapt to the primarily adverse effects of climate change presents decision makers with the challenge to determine which measures are appropriate and efficient to deal with these consequences. This is of particular importance as adaptation measures might be costly and resulting benefits hard to estimate due to the high level of uncertainty related to the changing climate conditions, resulting impacts and the effectiveness of adaptation measures. Under the condition of restricted resources and time an easy to apply technique is required to inform such decisions.

The Helmholtz-Centre for Environmental Research-UFZ has developed such a decision support tool, which not only facilitates the comparison of such measures on the basis of various criteria but also takes account of data uncertainties as well as different stakeholder preferences.

This tool includes a guideline proposing an appropriate assessment approach and a software for Probabilistic Multi-Attribute evaluation (PRIMATE), which is based on the multi-criteria analysis approach (stochastic) PROMETHEE. This method is particularly capable of dealing with uncertain, incomplete, heterogeneously scaled and inconsistent data. Uncertainties in criteria values are accounted for by using a Monte Carlo simulation. Furthermore, different criteria weighting sets reflecting varying preferences of distinct stakeholder-groups are considered simultaneously. The effects of these uncertainties are documented in the final results.

This comprehensive approach has been developed and tested in several projects dealing with various aspects of climate change adaptation at the regional and local level, e.g. water scarcity management, flood protection, rainwater percolation, heat stress reduction and soil erosion control.

The assessment approach and the methodological bases of PRIMATE are introduced. An in-depth case study is presented showing how practitioners can deal successfully with such complex climate adaptation decisions.