Graphical Instruments for a timely adaptation to Climate Change

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Despite all research efforts, climate change remains unpredictable in the long term. Climate change unpredictability raises serious concerns for policymakers that prepare long-term policies. To guarantee that climate adaptation policies perform satisfycingly despite the unavoidable uncertainty, adaptive policies might be used. Adaptive policies are designed to be adapted over time in response to how the future is actually unfolding. Signposts are used to track exogenous developments that critically affect the performance of a plan, and when pre-specified triggers are reached the policy is adapted. This so-called monitoring system is used to gather evidence of change, on the basis of which a policy is adapted. The ability of the monitoring system to effectively detect change is pivotal to the success of the whole adaptive policy.

A decision-maker would like to have sufficient confidence about the future capacity to adapt the policy on time. On time means adapting the policy not too early for that incurs unnecessary costs, nor too late which incurs avoidable damages. The capacity to adapt the policy on time is to be tested before the adaptive policy is implemented. Despite the substantial and growing attention by researchers for supporting the making of climate adaptation decisions under uncertainty, the ex-ante evaluation of the degree to which the monitoring system enables timely adaptation has been largely overlooked.

We present innovative graphical instruments to assess ex-ante the level of confidence that a monitoring system for adaptive policies will offer at the moment at which adaptation is required: the Trigger-Power-Significance (T-PS) plot and the Trigger-Consequences (T-C) plot. These instruments explore the interplay between the possible trigger values of a given signpost and the level of confidence about the need for adapting the policy. We illustrate how these instruments can be used to test the effectiveness of a monitoring system, and how they can be integrated into the process of designing an adaptive policy.

The use of the proposed instruments and approach are demonstrated using a case study of designing an adaptive policy for coastal flood protection in the Netherlands. This application shows the effectiveness of these instruments in evaluating ex-ante the capacity of a monitoring system to provide the information required to adapt on time with sufficient confidence, and redesign it if this is not the case.