

Case Study 2 – Economic effects of adapting critical infrastructure

► **Contribution to the research questions 1 and 3:**

1. to develop and test an approach to assess climate change risks that covers both the short-term need for ‘adjusting’ within the current societal framework and the possible need for long-term and large-scale efforts of ‘societal transformation’
3. to develop and test an applicable framework for analyzing how societal change can affect local climate change vulnerabilities, how to conduct an integrated assessment of the combined effect of potential climate and societal changes, and how to better understand the socio-economic consequences involved in local climate change adaptation

- This case study considers the socio-economic dynamic development to provide a meaningful risk assessment regarding climate change impacts on critical infrastructure.

Three national socioeconomic scenarios based on the SSPs are used in this analysis to integrate socio-economic model results into Impact Chain risk assessment and to address uncertainties regarding future socio-economic development. The scenarios differ in several details such as population development, economic development, energy use, modes of transport and so forth. The macroeconomic model PANTA RHEI will be used to calculate the macroeconomic effects of climate-related impacts on infrastructure and adaptation in the context of different societal developments according to the SSPs. Economic effects here are more than the sum of individual climate-related damages. In addition to direct effects, indirect and induced effects are considered in the macroeconomic model in a fully integrated way. The results of the modeling are presented using various socioeconomic indicators, such as GDP, employment, or production, so that they are comparable and can be used as decision-supporting information.

Thus, this case study links the impact chain method with macroeconomic modeling to provide quantitative values for the qualitative strands of the impact chains. In addition, the macroeconomic modeling provides the identification of further intermediate effects and additional effects that may not yet have been encountered in the qualitative development of the impact chains. This results in a consistent quantification of a range of possible macroeconomic outcomes for selected climate change impacts on critical infrastructure and different adaptation measures under altered socioeconomic scenario assumptions.