

The economics of transformational adaptation

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Research field “Climate and environmental economics: Economic analysis of climate change adaptation and mitigation policies”

Research question 1 | Cluster 2

Links to showcases Birk 2, Sass 1, Sass 2, Steiner 1

Background: While incremental transformation is understood as an extension of existing adaptation action, so-called transformational adaptation takes place at much larger scales or intensity, is truly new to a region or sector, or requires a substantial change of place or relocation (Kates et al. 2012). Due to this nature, transformational adaptation often requires collective action, with fundamental change in behavior and in institutions. The need for transformational adaptation arises either because of large vulnerability of certain groups/regions or because of severe climate change (+4 °C and beyond).

Goal: While limited research on transformational adaptation is available at the sectoral level, mostly in the context of agriculture (Leclère et al. 2014; Rickards and Howden 2012) and flood management (Colloff et al. 2016), economic research has so far focused only on incremental adaptation (OECD 2015). Given the non-marginal nature of transformative adaptation, this showcase will focus therefore on transformative adaptation as a problem of collective action with potential winners and losers.

Methods and disciplinary background: Drawing on institutional economics, transformation theory, and social science, this showcase will combine economic modelling (e.g. game theory) with empirical methods for generic cases of transformational adaptation such as changes in the acceptable levels of flood or drought hazard, or novel institutions and funding mechanisms e.g. for sustainable water management. In addition to the economic costs and benefits of transformational adaptation, intangible values (e.g. values of culture and place) for specific groups (O’Brien and Wolf 2010), as well as different decision frameworks (such as robust decision making), will be integrated in the modelling framework.

References:

- Colloff, M.J., S. Lavorel, R.M. Wise, M. Dunlop, I.C. Overton, and K.J. Williams. 2016. “Adaptation Services of Floodplains and Wetlands under Transformational Climate Change.” *Ecological Applications* 26 (4): 1003–17.
DOI:10.5061/dryad.2js61.
- Kates, R.W., W.R. Travis, and T.J. Wilbanks. 2012. “Transformational Adaptation When Incremental Adaptations to Climate Change Are Insufficient.” *Proceedings of the National Academy of Sciences of the United States of America* 109 (19): 7156–61.
- Leclère, D., P. Havlík, S. Fuss, E. Schmid, A. Mosnier, B. Walsh, H. Valin, M. Herrero, N. Khabarov, and M. Obersteiner. 2014. “Climate Change Induced Transformations of Agricultural Systems: Insights from a Global Model.” *Environmental Research Letters* 9 (12).
- O’Brien, K. L., and J. Wolf. 2010. “A Values-Based Approach to Vulnerability and Adaptation to Climate Change.” *Wiley Interdisciplinary Reviews: Climate Change*, n/a-n/a
- OECD. 2015. *Climate Change Risks and Adaptation*. OECD Publishing.
- Rickards, L., and S. M. Howden. 2012. “Transformational Adaptation: Agriculture and Climate Change.” *Crop and Pasture Science* 63 (3): 240.