Tackling climate change impacts in the context of sustainability: the livelihood index as an integrative framework

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Climate change will have consequences for human livelihoods, deriving from multiple direct and indirect impacts. Knowledge on sectoral impacts is increasing, e.g. the water the sector, however this knowledge remains fragmented and an integrative framework to assess the consequences of sectoral climate impacts on human livelihoods is missing. Further, adaptation needs to adapt to the expected climate impacts should be linked to goals of sustainable development.

We introduce a modelling framework to quantify relevant livelihood dimensions, based on an extensive, interdisciplinary literature review. The applied fuzzy methodology allows translating the concept of livelihoods into a measurable framework, while retaining relationships and processes along the chain of aggregation. The framework includes a range of aspects including natural, infrastructural as well as societal resources. A quantification of these requirements can provide insights to several important issues in human-environmental systems. On the one hand it allows linking and integrating sectoral climate impacts, enabling cross-sectoral comparison. On the other hand, it paves the way towards addressing issues of sustainability, by focussing on the fulfilment of needs, which is a core component of the sustainability concept.

On the basis of several climate change scenarios, we exemplify our approach by calculating the consequences of changes in water availability for human livelihoods over the course of the century. We present results from a global assessment at country-level, as well as more detailed insight from several country case studies at sub-national resolution.