Adaptation to climate change in the mountain regions of Central Asia: Assessment of the current knowledge

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The mountains of Central Asia, extending over 7000 m a.s.l. and accommodating diverse and complex natural and managed systems, are very vulnerable to climate change. They support valuable environmental functions and provide key ecosystem goods and services to the arid downstream regions which strongly depend on the melting snowpack and glaciers for the provision of water by the transboundary rivers starting in the mountains. Strong climate change adaptation (CCA) action is required to increase resilience of the vulnerable, low-income communities in the region. Our knowledge of the CCA actions in the mountains of Central Asia is limited in comparison with other mountainous regions. The aim of this study is to assess the existing adaptation projects and publications and to identify gaps in adaptation efforts by conducting a systematic review of the peer-reviewed literature published in English language. To be selected, the papers had to comply with the following criteria: (i) publication between 2013 and 2019; (ii) explicit focus on CCA in the mountain ranges of Central Asia; (iii) explanation of adaptation options; (vi) a clear methodology of deriving suitable adaptation options. Following the initial screening and subsequent reading of the publications, complying with the specified criteria, 33 peer-reviewed articles were selected for final analysis. This is considerably lower than the number of publications on the European Alps, Hindu-Kush – Himalayas, and the Andes. The number of publications on Central Asian mountains has declined since 2013.

The research is heavily focused on the problem of water resources, especially water availability at present and in the future 70 % of the analysed papers addressing these issues. These are followed by the papers considering adaptation in agriculture and in managing biodiversity. A critical finding is the lack of publications on adaptation to hazards and disasters including glacier outburst floods, mudflow, and landslides which are common and comparatively well-researched hazards in the Central Asian mountains, experiencing rapid deglaciation. About 50 % of the papers address the transboundary nature of the impacts of climate changes on water resources and land management reflecting the transboundary nature of the Central Asian catchments and the
tensions which exist across the region but are especially prominent in the Aral Sea basin.

We conclude that while there is ample evidence of climate change and its impacts in the mountains of Central Asia and many publications mention the need for adaptation, a very limited number of publications explicitly focus on CCA and how it can be delivered.