Projected impacts of climate change on hydrology, water resource use and adaptation needs for the Chu and Talas cross-border rivers’ basin, Central Asia

INTRODUCTION

The transboundary Chu and Talas rivers, with total annual discharge of some 4,000 km³ in the southernmost region of Central Asia, are among the basins of highest importance for international cooperation. The significance of water resources for agriculture, industry and human wellbeing drives a high degree of activity for the effective management of water resources. In the context of climate change adaptation, the Chu and Talas are particularly interesting basins, as they are highly susceptible to changes in temperature and precipitation, and therefore need to be addressed at the transboundary level.

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The Kazakh-Kyrgyz research cooperation in the framework of this project led to the greater exchange of information and experience. Not only, it contributed to the preparation of the National Communications under the United Nations Framework Convention on Climate Change but also to the protection of the national action plans for climate change adaptation in Kazakhstan.

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METHODS

Using a common approach for the Kazakhstan and Kyrgyz Republic parts of the basins, scientists assessed the observed long-term trends, variability and projection of future climate change and the resulting water resources impacts. Long-term data sets for temperature and precipitation were used for the period 1961-2010 in order to determine the historical trends in climate variables. Temperature and precipitation data were then extrapolated for two future periods: 2021-2050 and 2051-2080, and the significance of the observed trends was evaluated. The impacts of climate change on hydrology were assessed by developing and testing hydrological models for the Chu and Talas river basins. The cooperative approach continued to identify both climate and water-related parameters, with an emphasis on existing models, and resulted in the identification of future needs and the development of an overall set of adaptation measures and recommendations.

RESULTS

Knowledge gaps and research needs

The climate change adaptation needs of the basin are presented in two main dimensions: the adaptation needs of the basin with respect to climate change and the water-related parameters, with an emphasis on existing models, and resulted in the identification of future needs and the development of an overall set of adaptation measures and recommendations.

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PRACTICAL RELEVANCE

Current water management challenges in the basins include a degraded condition of the irrigation systems and a deficient regional economic situation that persist even significant improvement or rehabilitation efforts. Most of the water is being used in agriculture, where the current water efficiency is low and taxes are high.

The transboundary basins of the Chu and Talas river basins in Kazakhstan and Kyrgyzstan fall within the political and administrative division of water resources management that is currently based on national administrative jurisdiction. The cross-boundary cooperation between Kazakhstan and Kyrgyzstan is aimed at creating the potential for collaborative water management in the future. The current project on water management aims at achieving a clear and operational understanding of the water system's interdependencies and the identification of critical issues related to the effective management of water resources.

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The project's contribution to the United Nations Framework Convention on Climate Change (UNFCCC) and the implementation of the National Adaptation Program of Action (NAPA) will be to provide a framework for the adaptation planning and implementation of new and existing climate change related actions in the two countries. The project also aims to enhance the knowledge and awareness of climate change impacts and adaptation options in the form of capacity building and training activities.