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Forecasting Social and Economic Impacts from Climate Change on Farming Systems in Riparian Countries of the Jordan River – A Combined Model-based Approach

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Abstract

Estimations from research on Global Climate Change anticipate significant shifts in precipitation and temperatures in the Jordan River watershed. The consequences will unfold in an area with a high variety of institutional, social and economic conditions, which makes it an exemplary case for the need of combined modelling approaches for prognoses on socio-economic impacts. A team of German, Israeli, Jordanian and Palestinian scientist started such a combined approach in 2005 under the umbrella of the GLOWA Jordan River Project, funded by the BMBF. Thorough analyses of the situation of land and water use led to the choice of specific models for the three concerned countries, but revealed simultaneously potential “masking effects” by changes in the institutional and managerial frame conditions. The combined approach takes these effects into account by modelling on two tracks. The first track considers land and water as national production factors and determines the optimal use of these resources by maximising the added value. Modelling on this track for Israel, which diverts its current shares of the Jordan River waters via the National water carrier and distributes it for additional irrigation in most regions of its territory, relies on a production function model. Modelling for Jordan is based on a regional LP model that is more adequate for the use of water for fully irrigated agriculture. The second track focuses on farming systems and enterprises and tries to predict the best decisions of farmers with regard to their economic success. A Ricardian model serves this purpose on the Israeli side, while LP-based farm-household models are more suitable for impact analyses in Palestinian and Jordanian farming systems. First results from modelling on track 1 show, that improvements in the institutional set-up and management of water still have a leeway that may probably equalise expected impacts from Climate Change. Results from track 2, however, indicate that both, impacts from Climate Change as well as changes in institutions and management, will lead to a clear distinction between winners and losers among the highly heterogeneous farming systems in the study area.

Keywords: Agriculture, climate change, farming system, Jordan Valley, modelling