



Analysis of Multiple Impacts of Global Change on Water Utilization Using ANN Model - A case study in North-West China

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Availability of water resources is one of the most fundamental factors that affect socio-economic development as well as environment. This is especially true in arid areas of China where this effect has always been highlighted by composition of vegetation and limited biosphere cycle. On the other hand, uncontrolled water utilization often causes desertification and disappearance of oases. Many oases in arid areas nowadays face threats from both changing climate and impacts from human activities such as the increase in stressful water demand. A sound adaptation strategy towards global change necessitates a better understanding of changes due to these two sources of impacts.

In this study, a typical inland river basin, Shiyang river basin, located in the arid Northwest of China, is studied aiming to reveal the key driving factor (using factor analysis) that threatens the local oasis ecology in view of water utilization change under climate, the land use change and human activity impact during the last 50 years and in the coming decades. Various climate change scenarios as well as socio-economic scenarios (including policy orientated) are combined and analyzed. An ANN model is developed to reveal the complicated relationship between regional water utilization and multiple driving factors, i.e. climatic variables, land use and vegetation, socio-economic development etc. The model also makes use of remote sensing data to take into account the land use change coincident with local socio-economic development. In the meantime, risk due to uncertainty in climate model downscaling is also analyzed and incorporated in order to make the analysis more robust.

The study shows that the ANN model is able to quantify the contribution of these driving factors to the regional water utilization, which is of great utility in support of making effective adaptive measures for water-scarce area in view of global changes.