

Simulating the evolution of potential natural vegetation due to long-term climate change and its effect on the water balance of the Hanjiang River basin, China

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Abstract The dynamics of potential natural vegetation in the 21st century and its possible impact on the water budget of the Hanjiang River basin were assessed in this study. Based on the predictions of the IPCC-SRES climate scenarios from the PRECIS regional climate model, changes in plant functional types (PFTs) and leaf area index (LAI) were simulated via the Lund-Potsdam-Jena dynamic global vegetation model. Subsequently, the predicted PFTs and LAI were used in the Xinanjiang vegetation–hydrology model for the rainfall–runoff simulations. The results show that in the 21st century the forest PFTs will be gradually degraded and replaced by the grass PFT, and overall the basin-averaged LAI will decrease. Accordingly vegetation transpiration and evaporative loss of the intercepted canopy water will tend to drop, while soil evaporation may rise sharply. As a result, total evapotranspiration will increase moderately, with a slight increase in annual runoff depth. These both result from higher annual precipitation.

Key words vegetation; climate change; LPJ-DGVM; Xinanjiang hydrologic model