



## **Impacts of historic climate variability and land use change on winter wheat climatic productivity in the North China Plain during 1980-2010**

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As one of the most populous countries, China has policies protecting the amount of land available for crop production, but it does not consider the quality of land. Thus, an important issue is the impact on crop production by land use change under such policies and by notable climate variability during the past decades. Using a productivity attenuation method, we estimated the climatic productivity of winter wheat (WWCP) in the North China Plain, based on land use classification data and daily weather data from 1980 to 2010. Impacts of historic climate variability and land use change on WWCP were quantified. Results indicate: (1) on average, WWCP for newly-increased dry land was lower than that for the lost land, which may result in reduced land quality associated with conversion. (2) In recent years, the increasing area of dry land provided sufficient wheat yield to compensate for the loss resulted from reduction of WWCP. (3) Both historic climate variability and land use change decreased WWCP, but the effects of the latter (within -1%) were less than those of the former (about -3%). Given the scarce land resource and rapidly growing food demand, the approach through expanding the area of cultivated land to maintain grain yield is not a long-term guarantee of food security. Thus, cultivated land conservation policy should shift from protecting land quantity into preserving land productivity. In addition, agriculture policies should further emphasize the critical role of adaptation strategies in coping with climate change. Obtaining higher yield production will depend upon adopting adaptation measures which could effectively mitigate effects of dramatic climate change or even take advantage of possible climate conditions.