



Changes in human and economic vulnerability to climatic disasters under economic development at the provincial level in China

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Previous studies have reported that economic development can contribute to reducing vulnerability to natural hazard-induced disasters. However, there exist considerable variations in the association between economic growth and vulnerability, especially at the sub-country scale. Based on climatic disaster impact (fatalities and direct economic losses (DEL)) and economic data for 31 provinces in China from 1990 to 2015, trends of disaster impact and vulnerability (indicated by mortality and DEL rates) were detected using the Mann–Kendall trend test at the province level. Next, the relationship between income and vulnerability was characterized. At the provincial level during 1990–2015, there was a clear transformation of the climatic disaster impact landscape from high average annual fatalities to high average annual DEL. Both the mortality and the DEL rates presented downward trends for most provinces. The magnitude of vulnerability decrease was higher in the economically developed provinces compared to the underdeveloped provinces, and vulnerability declined nonlinearly with income increase. A vulnerability trap appears to exist approximately below 1,600 US\$ for income—above this threshold, a province’s vulnerability significantly decreased. Economic development is correlated with human and economic vulnerability to climatic disasters but the casual link between economic development and vulnerability reduction needs further investigation. Our findings suggest that shortening the transitional period from the low income trap and reducing inter-provincial disparity of economic development may be powerful tools for reducing vulnerability to climatic disasters, especially for economically underdeveloped regions. These should also be important considerations in developing efficient adaption strategies for climate change.