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Evolution of Precipitation and Water Resources of Typical Mountainous Regions in China and Contrast with Socio-economic Factors

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China has paid great effort to fight against poverty in mountainous regions suffering disadvantages of unbalanced distribution between natural and socio-economic factors. The paper focuses on three typical mountainous regions under different climatic and geographic conditions and socio-economic development levels in China, the Taihang Mountain Areas (TMA, total area 140,000 km^2, average elevation 842m), Guizhou-guangxi Karst Areas (GKA, total area 140,000 km^2, average elevation 583m) and Hengduan Mountains Regions (HMR, total area 500,000 km^2, average elevation 3585m), and studies the evolution of precipitation and water resources from 1956 to 2014 in each region, as well as the contrast with regional population, Gross Domestic Product (GDP) and farmland area. The results indicate that, (1) In comparison with GKA and HMR in the southwest part of China, the total population, GDP and farmland area of TMA in North China are much higher, while the average annual precipitation and runoff depth are much lower with water resources utilization rate as high as 90.2%. Moreover, water resources of TMA significantly decrease by 42.1% since 2000 and regional development faces severe water shortage. (2) According to the unbalance index of typical mountainous regions by contrast of three groups of factors on water (precipitation, surface water resources and total water resources), socio-economy (population and GDP) and land (total area and farmland area), the mismatching degree of water and socio-economy is highest, followed by the water and land, indicating essential role of water and its uneven distribution in mountainous regions. For each region, the mismatching degree of water, socio-economy and land in HMR are highest, followed by TMA. In conclusion, the unbalance of water, land and socio-economy brings serious challenges for development in mountainous regions, and the situation may be getting worse under the impacts of climate change and human activities.