



The Impact of Climate Change on Ski Industry in China

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The development of ski industries would bring socio-economic benefits to mountain regions. At present, the ski industry in China is developing rapidly, and the number of ski areas is increasing dramatically. However, the understanding of the spatial pattern and driving factors for these ski areas is limited. Affected by climate change, the sustainable development of ski industry in China faces many challenges. This study collected detailed data about ski areas and their surrounding natural and economic factors in China. Criteria for classification of ski areas were proposed, and a total of 589 Alpine ski areas in China were classified into three types: ski resorts for vacationing (va-ski resorts), ski areas for learning (le-ski areas) and ski parks to experience skiing (ex-ski parks), with proportions of 2.1, 15.4 and 82.5%, respectively, which indicated that the Chinese ski industry was still dominated by small-sized ski areas. The theory and method of spatial autocorrelation were first used to analyse the spatial pattern and driving factors of ski areas. The results showed that ski areas in country-level cities had a positive spatial autocorrelation with a Moran's index value of 0.25. The results of Local Indications of Spatial Association (LISA) showed that ski areas were mainly concentrated in 3 regions: the Beijing-centred Yanshan-Taihang Mountains and Shandong Hill areas, the Harbin-centred Changbai Mountain areas and the Urumqi-centred Tianshan-Altay Mountain areas. The first location was mainly driven by socio-economic factors, and the latter two locations were mainly driven by natural factors. However, the average snow depth of 591 Chinese Alpine ski areas and non-operational snow fields varied from 0 cm to 18 cm in the winter, 69% of the ski areas had snow depths of less than 1 cm; 27.7% had snow depths of 1-10 cm, and only 3.3% had snow depths of more than 10 cm. The insufficient snow cover indicated that the natural snow resources in China hardly met the 100 days-principle, and the ski areas were primarily dependent on artificial snow, which increased the cost of skiing. The climate change will increase this risk, while not conducive to the sustainable development of the industry, especially in low-altitude and small sized ski areas. In the future, the government sector should strengthen supervision, develop a ski industry alliance, and promote the healthy and sustainable development of the ski industry in China.