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Analyzing the Shifts of Land Use for Agricultural Land Planning under Climate Change– A Case Study of Northern Yilan County, Taiwan

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Taiwan belongs to the edges of sub-tropical and tropical climate zones, and has been indicated as a high risk edge area by international climate change researches. According to the Intergovernmental Panel on Climate Change (IPCC), Taiwan is threatened by global warming, changes of rainfall pattern, sea level rising and high frequency and influence of extreme weather, which will result in great impacts to agriculture industry and the future of food security. Unfortunately, along with the rapid economic development and urbanization in Taiwan since the 1960's, agricultural land use has become less competitive to industrial, commercial, and residential types of land uses under land use competition. Therefore, to effectively enhance the resilience and conserve the agricultural lands which under the threats of climate change and the competitions of other types of land use, Taiwan's Spatial Planning Act (promulgated on 2016/1/6) enlists Agricultural Development Zones, one of four major functional zones in National Spatial Plan, into demarcated functional zone and applying land use control. The zoning plan is expected to be completed by every city and county before the year of 2022, and one of the major issues is to consider the land use function changes of different locations. By comparing the 2007 and 2016 land utilization maps investigated by National Land Surveying and Mapping Center (Taiwan), this study is able to identify the 10-year changes of agricultural lands of northern Yilan county. To further investigate the spatial distribution of agricultural land changes, spatial analysis techniques such as multi-distance spatial cluster analysis (Ripley's K Function) and point pattern analysis (Kernel density) are employed to analyze the spatial clustering of changes. The spatial analysis results overlays with climate change related and hazard risk maps, such as flooding, landslide, soil liquefaction, to support the decision making of future agricultural land planning and agriculture development zoning plan.

Keywords: agricultural land, land use changes, climate change, spatial analysis