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Multi-scale Modeling of Land-cover Change and Ecosystem Service Values:A Case of the Yuzixi Catchment in Sichuan

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The Yuzixi Catchment is located in the core of the Panda Natural Reserves in western Sichuan Province, with an area of 1742 km². Due to influences of climate change and human activities, the land cover shows marked changes in the last decade. Using the land-cover data obtained from the remote sensing images of two years of 1986 and 1994, this paper developed two models based on the Markov Chain and Patch-dynamics approach, to simulate land-cover changes in the Yuzixi Catchment. Both models were verified using the land-cover data in 2002. Starting from the year 1994, the land-cover of the year 2002 was simulated in a time-step of 1 year and 8 years with these two models, respectively. Compared with the real land-cover data in 2002, it was found that the time scale had a marked effect on the simulation results, and the simulation error varied among different land use types. The simulation error of Patch-dynamics model of cultivated land (-8.2%/-5.6%), forest land (-0.5%/-0.4%), grassland (0.7%/0.4%) and residential area (-29.9%/-16.4%) is bigger based on one-year scale than eight-year scale, and their changing trends are unstable due to the significant effect of anthropogenic factors. By contrast, the simulation error of bush land (-1.5%/-1.7%) and ice land (27.3%/41.9%) is smaller based on one-year scale than eight-year scale, and the changing trends are stable because they are mostly affected by natural factors. The research results also show that the simulation results of Markov Chain model are similar to that of Patch-dynamics model. However, the simulation results of Patch-dynamics model are more stable and reliable.

【Key Words】 : **Sichuan Yuzixi Catchment Markov Chain model Patch-dynamics model multi-scale modelling**

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