土地利用转型下的西安市景观格局演变特征及驱动力分析

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摘 要:【目的】随着城市化建设的快速发展以及人口数量的持续增长，造成土地利用急剧变化，致使城市生态系统和居民生活质量受到了巨大的挑战，而景观格局时空演变是土地利用变化最直接的体现，也是景观生态学研究的重点和热点，因此对景观格局演变及其驱动分析的研究显得尤为迫切。【方法】本文以陕西省西安市为研究区域，借助地理学、景观生态学、规划学等相关学科的理论，在 ArcGIS、Fragstats 和 SPSS 等软件的支持下，对该研究区 1990 年、2000 年、2010 年和 2020 年时间跨度为 30 年的 4 期数据按照国家标准 GB/T 21010-2017《土地利用现状分类》进行土地利用分类并制作出土地利用类型图，获取土地利用信息并计算土地利用转移矩阵、土地利用动态度等指标。其次使用斑块类型、板块类型水平以及景观水平上的景观指数分析陕西省西安市景观格局数量变化特征且采用移动窗口法得到多种景观指数的空间分布,深入分析西安市 30 年间景观格局空间特征的动态变化。进而使用 SPSS 的主成份分析探究土地利用景观格局变化的影响因素，并结合现有的研究成果给出可持续发展意见。【结论】（1）草地、耕地和林地是优势景观类型，三者面积占比超过 85%，具有重要生态功能的景观类型（林地、草地、水域）占比达 52.38%，建设用地达到 13%。（2）1990—2020 年，土地利用变化显著，耕地面积持续减少，草地面积先减少后增加但整体呈现减少趋势，林地、水域、建设用地、未利用地面积增加，耕地向草地、建设用地、林地，草地向耕地和林地、建设用地，以及林地和耕地向草地为主要的转化类型，由于城市不断发展进步，建设用地对农田耕地的占用，导致耕地逐渐减少，其他土地类型均开始向建设用地转移。土地利用变化过程总体上呈现人地矛盾日益突出、区域土地资源利用压力大等主要问题（3）不同景观类型之间转移特征明显，空间聚集程度降低，破碎化加强，形状更为复杂，景观优势度降低，异质性增加。（4）社会经济发展、农业生产和政策导向是景观格局演变的主要驱动因素。其中，社会经济发展是耕地向建设用地转化的主要驱动力，政策因素是引起林地和耕地发生转移的根本原因。

关键词：土地利用；景观格局；时空演变；驱动力；西安市

Analysis of the evolution characteristics and driving forces of Xi'an landscape pattern under land use transformation

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Abstract: 【Objective】 With the rapid development of urbanization construction and the continuous growth of population number, the rapid change of land use has led to great challenges to the urban ecosystem and the quality of life of residents, and the temporal and spatial evolution of landscape pattern is the most direct embodiment of land use change, and it is also the focus and hot spot of landscape ecology research, so the research on landscape pattern evolution and its driving analysis is particularly urgent. 【Methods】 Taking Xi'an City, Shaanxi Province as the research area, with the help of theories of geography, landscape ecology, planning and other related disciplines, and with the support of ArcGIS, Fragstats and SPSS, the four phases of data in the study area with a time span of 30 years in 1990, 2000, 2010 and 2020 were classified according to the national standard GB/T 21010−2017

"Classification of Land Use Status" and a land use type map was produced. Obtain land use information and calculate indicators such as land use transfer matrix, land use dynamics, and more. Secondly, the landscape index at the patch type, plate type level and landscape level was used to analyze the quantitative variation characteristics of landscape pattern in Xi'an, Shaanxi Province, and the spatial distribution of multiple landscape indices was obtained by moving window method, and the dynamic changes of landscape pattern spatial characteristics in Xi'an City in the past 30 years were analyzed in depth. Then, the main component analysis of SPSS was used to explore the influencing factors of land use landscape pattern change, and the sustainable development opinions were given based on the existing research results. 【Conclusion】 (1) Grassland, arable land and woodland are the dominant landscape types, accounting for more than 85% of the area, 52.38% of the landscape types with important ecological functions (woodland, grassland, water area), and 13% of the construction land. (2) From 1990 to 2020, land use changed significantly, cultivated land area continued to decrease, grassland area first decreased and then increased but the overall trend of reduction, forest land, water area, construction land, unused land increased, cultivated land to grassland, construction land, forest land, grassland to cultivated land and forest land, construction land, and forest land and cultivated land to grassland as the main transformation type, due to the continuous development and progress of the city, the occupation of farmland cultivated land by construction land, resulting in a gradual decrease in cultivated land. Other land types have begun to move to construction land. The process of land use change generally presents major problems such as increasingly prominent human-land contradictions and high pressure on regional land resource utilization: (3) The transfer characteristics between different landscape types are obvious, the degree of spatial aggregation is reduced, fragmentation is strengthened, the shape is more complex, the landscape dominance is reduced, and the heterogeneity is increased. (4) Socio-economic development, agricultural production and policy orientation are the main driving factors for the evolution of landscape pattern. Among them, socio-economic development is the main driving force for the transformation of cultivated land to construction land, and policy factors are the fundamental reasons for the transfer of forest land and cultivated land.

Keywords: land use; landscape pattern; spatiotemporal evolution; driving force; Xi'an City