

Evaluation of eco-environment quality of the Loess Plateau Area based of Remote Sensing and GIS-A case study of Linfen City

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Abstract:

The Chinese Loess Plateau is suffering from severe soil erosion. The eco-environmental changes of the plateau are believed to be an important influence on global eco-environmental sustainability. The problem has attracted considerable attentions both from scientists and local government. This study includes the following aspects, the first one is interpretation based on Landsat Thematic Mapper data for Linfen city in 1987, 2000 and 2009. The second is to establish a evaluation index system based on analysis of the regional features of eco-environment and main environmental problems of Linfen City. The third is to make dynamic analysis of the eco-environmental changes of the region during the 1987-2009 period and identify the controlling factors.

Landsat Thematic Mapper (TM) data at a spatial resolution of 30 m were used for analysis. The satellite RS images were obtained from the Center for Observation and Digital Earth (CEODE), Chinese Academy of Sciences (CAS). The images in 1987 and 2000 were rectified by Transverse Mercator projection based on the images in 2009 after spectrum preparation of the images. To make the precision within 1 pixels, the accurate coordinative control points of the two systems were identified. Then the interpretation key was established based on the land use/cover survey in the study area. The images were classified into six primary environmental types (forest, water, grassland, farmland, construction land and unused land) and 12 sub-types using a visual image interactive interpretation method to obtain vector and attribute data.

Aiming at the regional features of eco-environment and main environmental problems of Linfen City, the synthetic evaluation index system including biological abundance index, vegetation cover index, water density index and land deterioration index was set up. Supported by GIS and taken the county as the evaluation unit, the regional eco-environmental information system database and the eco-environmental quality evaluation of Linfen were established. Based on the database and evaluation system, eco-environmental evaluation index method and spatial analysis were integrated into the eco-environmental quality evaluation in the study area.

The results showed that there were only 6 among 17 counties of the eco environment quality were in a middle level in 1987, while others were all in low level. In 2000, the condition continues to deteriorate and only 1 in 17 counties were in middle level of eco environment quality. Until 2009, the condition turned to better, and 4 of 17 counties were in middle level of eco environment quality.

From the amplitude of variation, YongHe county and Da Ning county were obvious in worse of eco environment from 1987 to 2000 but Gu Xian, FuShan, YiCheng and Anze were little better from 2000 to 2009. It can be concluded that the integral eco environment quality of Linfen city was in a low level, the highly intense human activities speeded up the degradation of regional eco-environments in 2000, and nearly 10 years of restoration of the ecosystem had achieved some success, but also need to further efforts.

Key words eco-environmental quality Evaluation Ecological index eco-environmental
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