# Assessment of regional eco-environmental vulnerabilities ---A case study in Mongolia

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Eco-environmental vulnerability assessment is an important means to diagnose regional eco-environmental problems and identify key influential factors. It is also an important and indispensable part of eco-environment management and improvement. Since eco-environmental vulnerability involves many disciplines such as ecology, geography, land science and environmental science, etc. Some scholars think that vulnerability of the ecosystem is mainly determined by natural factors, and some think that vulnerability is related to the "utilization" of ecosystems by human beings. In short, eco-environmental vulnerability is a relative concept, and it is the result of the combined effect of natural and human factors. The major characteristics of eco-environmental vulnerability include vegetation degradation, loss of biodiversity, soil erosion, desertification, salinization, reduction of land productivity, increased frequency and intensity of disasters, and increased environmental pollution, etc., and there are obvious regional differences in the manifestations and influential factors.

The main influential factors of regional eco-environmental vulnerability can be summarized into the following three aspects: (1) Natural geographical conditions: in some regions such as the boundary area of desert, low vegetation coverage and poor stability of the ecosystem due to the influence of topographic, geological and climatic conditions directly lead to a vulnerable eco-environment; (2) Ecosystem sensitivity: in some regions such as the dry lands and permafrost areas, etc., since the ecosystem is very sensitive, the original ecological balance will be easily broken and very difficult to recover; (3) Human activity disturbance: in some regions such as the urban areas, intensive human activities lead to degradation of land, loss of biodiversity, environmental pollution and other problems, and eventually lead to the extremely easy deterioration of the ecological environment.

Mongolia is one of the largest inland country in arid and semi-arid areas. Based on the analysis of the formation mechanism of eco-environmental vulnerability, this study uses multi-source data and spatial analysis technology to systematically assess the eco-environmental vulnerability in Mongolia. The disturbance of human activities changes the stable state of the ecosystems, intensifies local and short-term changes, and becomes the main cause of regional ecological degradation. Overgrazing is the main cause of grassland degradation in human activities, especially in the surrounding areas of Ulaanbaatar city in the central part, where the overgrazing rate exceeds 50%. In addition, human economic activities such as exploitation of mineral resources and development of biological and tourism resources etc. have also brought serious damage to the grassland ecology, causing grassland degradation, wetland disappearance and desertification etc.

Based on the analysis of the formation mechanism of the vulnerable ecology in Mongolia, 10 evaluation indices including landform, climate, vegetation, and human disturbance are designed at three hierarchies, the ecological vulnerability in Mongolia and the spatial distribution characteristics thereof are evaluated. In terms of spatial distribution, the area of slightly and mildly vulnerable zones mainly distributed in the northern and western mountainous areas and southern desert areas. The area of moderately vulnerable zone mainly distributed in the steppe areas of east-central, south-central and northwestern Mongolia. The area of severely vulnerable and extremely severely vulnerable zones is obvious, mainly distributed in the

 

surrounding areas of Ulaanbaatar city in the central part of the country, the surrounding areas of large-scale mining bases in the south and the edge of the deserts. Due to the vast area of Mongolia and the significant differences in regional climate changes, there are still too many uncertainties, which affected the vulnerability of ecosystems.

Keywords: Eco-environmental vulnerabilities, Overgrazing, Grassland degradation

 