Mountain pastures of Qilian Shan: plant communities, grazing impact and degradation status (Gansu province, NW China)

Alina Baranova (1), Udo Schickhoff (1), Wang Shunli (2), and Jin Ming (2)

(1) Germany, Hamburg University,CEN Center for Earth System Research and Sustainability Institute of Geography (earth0909@gmail.com), (2) Academy of Water Resource Conservation Forest of Qilian Mountains (AWRCFQM), Zhangye, Gansu Province, China

Qilian Mountains are the water source region for the low arid reaches of HeiHe river basin (Gansu province, NW China). Due to overstocking and overgrazing during the last decades adverse ecological ef¬fects, in particular on soil properties and hydrological cycle, are to be expected in growing land areas. Vegetation cover is very important to prevent erosion process and to sustain stable subsurface runoff and ground water flow. The aim of this research is to identify plant communities, detecting grazing-induced and spatially differentiated changes in vegetation patterns, and to evaluate status of pasture land degradation.The study area is located in the spring/autumn pasture area of South Qilian Mountains between 2600-3600 m a.s.l., covering five main vegetation types: spruce forest, alpine shrubland, shrubby grassland, mountain grassland, degraded mountain grassland. In order to analyze gradual changes in vegetation patterns along altitudinal and grazing gradients and to classify related plant communities, quantitative and qualitative relevé data were collected (coverage, species composition, abundance of unpalatable plants, plant functional types, etc.). Vegetation was classified using hierarchical cluster analyses. Indirect Detrended Correspondence Analysis (DCA) was used to analyze variation in relationships between vegetation, environmental factors, and grazing impact. According to DCA results, distribution of the plant communities was strongly affected by altitude and exposition. Grassland floristic gradients showed greater dependence on grazing impact, which correlated contrarily with soil organic content, soil moisture and pH. Highest numbers of species richness and alpha diversity were detected in alpine shrubland vegetation type. Comparing the monitoring data for the recent nine years, a trend of deterioration, species successions and shift in dominant species becomes obvious. Species indicating degrading site environmental conditions were identified. Most of the grasslands have become secondary vegetation, with a considerable percentage of unpalatable, toxic and often thorny or spiny shrub and herb species that have a lower grazing value and rarely form a closed vegetation cover, at least in loess slopes. To prevent further degradation of the grassland and to sustain the diversity of the plant species (affecting the carrying capacity pastureland) appropriate pasture management strategy should be implemented.