



## **Response of ESV to Climate Change and Human Activities in the Yanqi Basin, Xinjiang, China**

Yusufjiang Rusuli, Halida Sidik, Adila Gupur, Jiang Hong, and Rayila Kadir

Institute of Geographical Science and Tourism / Xinjiang Key Laboratory of Lake Environment and Resources in Arid Zone, Xinjiang Normal University, Urumqi 830054, P. R. China (Yusupjan.Rusul@gmail.com)

**Abstract:** Ecosystem goods and services refer to the dependence of economic wealth and human well-being on natural systems. It is a common knowledge that the changing of structure and function of the ecosystem due to climate change and human activities. It is a priority issue to study on various spatiotemporal scales, the sensitivity of ecosystems to climate change and anthropogenic pressure in inland areas. In an effort to better understand the influence of climate change and human activities on ecosystem services, we evaluated the change in ESV of the Yanqi Basin in Xinjiang, China from 1973 to 2014 employing methods of MK, MK Sneyers, ESV and dynamic degree of LUCC. The Landsat images, digital elevation model (DEM) and metrological data were applied to assessing the ESV and its change. According to the degree of effects of the climate change and human activities, the research area was divided into two parts: the mountain area and the plain oasis area at a contour of 1400 m above sea level. According to type and affect, the land cover was classified as water, wetland, desert, fields, glacier, warm shrub grassland, cold meadow steppe and highland vegetation. We analyzed the relationship between the variation of ESV and precipitation, and evaporation and then quantitatively differentiated the influence of climate change and human activities on ESV. Results show that: (1) distinct change points of precipitation and evaporation in mountain and plain oasis of the Yanqi basin were detected by the MK–Sneyers test. The precipitation increased and the evaporation declined in mountain and plain oasis in the same way. Enlargement of agricultural areas to accommodate an increased population and socio-economic development was detected by conversion matrix of LUCC in oasis area. As a result, the variation of ESV was caused by climate change and human activities jointly; (2) the declining trend of ESV in the mountain area was mainly caused by shrinking of the glacier area; (3) ESV was decreased initially and increased afterwards taking 2004 as a turning point following the trend of increased precipitation and decreased evaporation. Combined effects of climate change and human activities are main cause of ESV variations in the past 40 years in Yanqi basin. The main reasons for increased ESV in plain oasis include enlarging the artificial oasis due to intensified human activities, and supporting favorable climate change (increased precipitation and decreased evaporation).

**Key words:** Climate change; Human activities; Ecosystem Service Value; Yanqi basin

**Acknowledgements:** This work was supported jointly by the Natural Sciences Foundation of China (No.41161007, No. 41461006), the Doctoral Start-up Foundation of Xinjiang Normal University (No.XJNUBS1528) and the Special funds for Key Laboratory of Xinjiang Uyghur Autonomous Region (No.2014KL016).