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Assessment and forecast of changes in Land use and land cover in Bulandy district (Kazakhstan)

Long-term spatiotemporal analysis of land use and land cover (LULC), identifying the nature of transitions of its classes and assessing future developments, serve as essential and objective tools to evaluate sustainable development patterns of individual territories. This study aimed to investigate the change in LULC in the long term and determine the mutual transitions of its classes and their forecast until 2030 and 2050 in Bulandy district (Kazakhstan). The studies were performed on the Google Earth Engine Web platform. Landsat 5/7/8 images were used to obtain the LULC time series from 2000 to 2023. LULC classification was performed based on RF. The combined CA-ANN model and the MOLUSCE plugin were used to predict LULC changes by 2030 and 2050. Over the past 24 years, the area of pastures has changed the most in percentage terms (-15.74%), followed by arable land (+14.91%), the area of forests has changed slightly (-0.60%), the area of built-up land has increased by only +0.27%, and the area of water bodies has remained virtually unchanged. The most resistant to transition to other classes was Cropland, which simultaneously gained the most from other land classes and lost the least. The highest losses occurred in the Pasture class. The forecast showed that the area of Cropland will increase by 0.51% by 2030 and 9.05% by 2050. At the same time, the territory occupied by Pasture will decrease by 0.70% by 2030 and by 9.35% by 2050. The study results are a basis for assessing land use and sustainable development policies in the Bulandy district.This work has been funded by the Ministry of Agriculture of the Republic of Kazakhstan. IRN: BR 22886730.

Keywords: Land use and Land cover, classification, change detection, forecast, Bulandy district

Biography

Professor of the Department of Cartography and Geoinformatics, of Al-Farabi Kazakh National University, Almaty, Kazakhstan. Doctor of Biological Science (DRS), Professor of Biology of the Republic of Kazakhstan. Member of the International Union of Radioecology, Academician of: Academy and Kazakh National Academy of Natural Sciences of the Republic of Kazakhstan, International Academy of Informatization and National Academy of Agrarian Sciences of Kazakhstan. He actively participates in creating space technologies in Kazakhstan and commercialising its activities. His research interests include processing and analysing Remote Sensing data to form and develop Land use and Land cover classification and its forecast.

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