М.А. Гендельманның 110 жылдығына арналған «Сейфуллин оқулары – 19» халықаралық ғылыми - практикалық конференциясының материалдары = Материалы международной научно-практической конференции «Сейфуллинские чтения – 19, посвященной 110-летию М.А. Гендельмана»- 2023.- Т. I, Ч. IV. – P. 13-15.

UDC 502.131.1

SPATIO-TIME ANALYSIS OF LAND USE OF THE KORGALZHYN DISTRICT OF THE AKMOLA REGION IN THE FRAMEWORK OF THE CONCEPT OF SUSTAINABLE DEVELOPMENT

Grossul P.P., doctoral candidate, master of technical sciences Astana, S. Seifullin Kazakh agrotechnical research university

Analysis of spatiotemporal data (STD) in land use to determine sustainable development is an important task for the Republic of Kazakhstan. Kazakhstan has a large territory with various types of land and diverse ecological conditions. In addition, agriculture, mining, and transportation are the main sectors of the economy that require efficient use of land resources. One of the challenges facing the Republic of Kazakhstan is balancing socioeconomic development and preserving ecological sustainability [1]. Analysis of STD in land use can help the country's leadership make more informed decisions in this area. For example, analysis of STD can help determine optimal use of land resources in various sectors of the economy, taking into account their spatial and temporal dynamics. This will contribute to reducing the negative impact of economic activities on the environment and preserving the ecological sustainability of regions [2]. Additionally, analysis of STD can serve as a guide to identify priority development zones and highlight ecologically important areas for the efficient use of land resources and the preservation of biodiversity.

Google Earth Engine (GEE) platform was used to analyze land use in the Korgalzhyn district of the Akmola region. GEE is a cloud platform for automated analysis and processing of spatial data [3]. Using GEE, changes in land use and land cover in the Korgalzhyn district from 2010 to 2021 were analyzed. For this purpose, Landsat image classification was used based on the Random Forest algorithm [3], and net changes in five land use and land cover classes were determined [4].

The results showed that significant changes in land use and land cover have occurred in the Korgalzhyn district over the past 10 years (Figures 1 and 2).

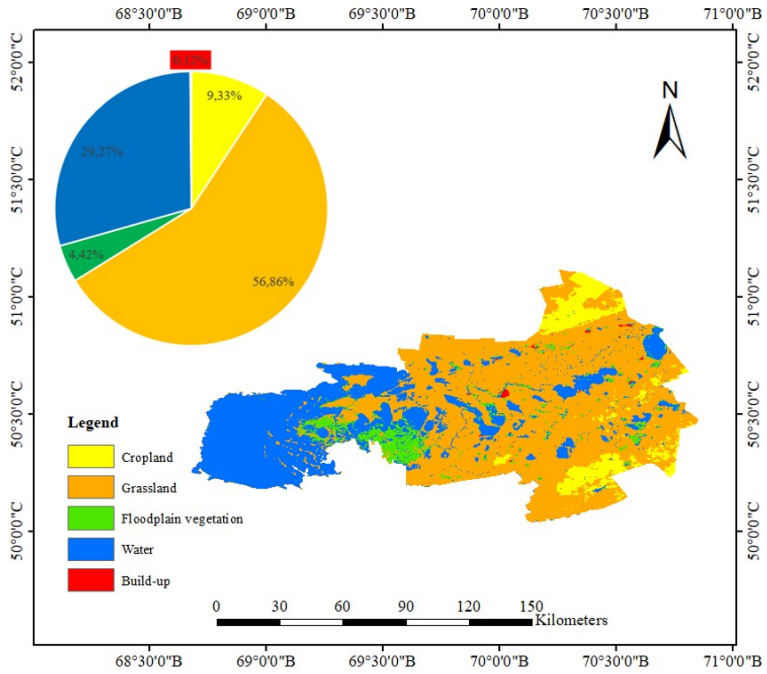

Figure 1 - Classification of the Korgalzhinsky district for 2010

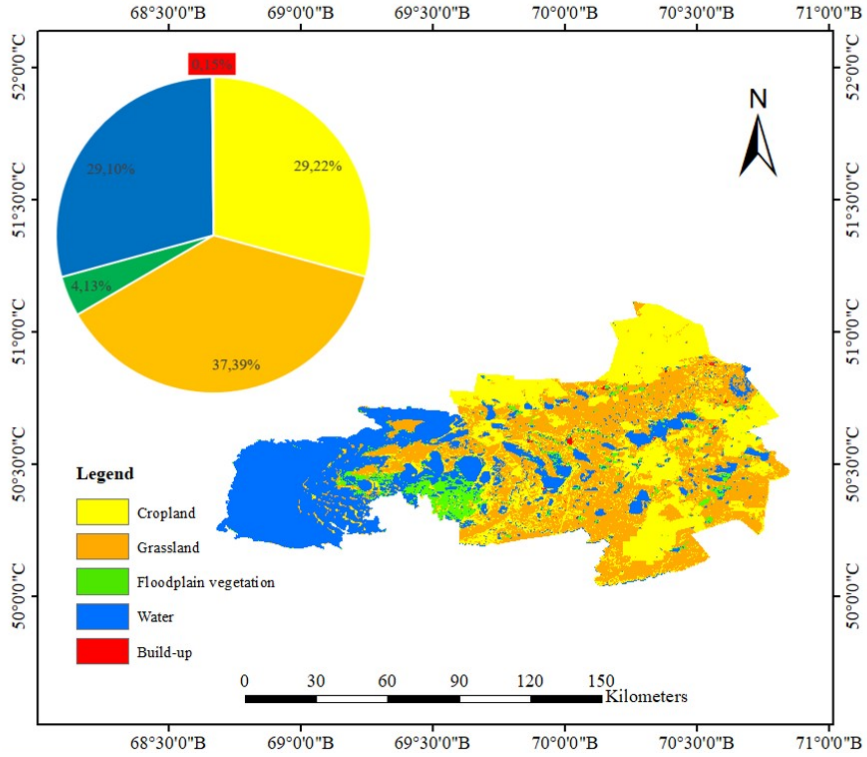

Figure 2 - Classification of the Korgalzhinsky district for 2021

The most noticeable change was the increase in cropland and the decrease in grassland. For example, over the study period, the area occupied by crops increased from 9.33 to 29.22%, while the proportion of grassland decreased from 56.86 to 37.39%. Other land classes such as floodplain vegetation, water, and built-up areas changed only slightly in absolute values over the observation period.

Thus, spatiotemporal analysis of land use and land cover on the GEE platform is an effective tool for determining net changes in land use and land cover [4].

However, it is necessary to consider some limitations of remote sensing technologies and the need for ground truth data for accurate analysis and decision-making.

In general, spatiotemporal analysis of land use has great potential for making informed decisions about land management and land cover. With the development of remote sensing technologies such as RS and GEE, it is possible to obtain objective, independent, instrumental information about the use of different land classes, which will contribute to the preservation of the environmental and economic well-being of regions [5,6,7].

The study was carried out within the framework of targeted program financing in the field of agriculture of the Republic of Kazakhstan, in accordance with the scientific and technical program "Study of the impact of state policy in the agricultural sector on the development of cooperative processes in the agro-industrial complex, sustainable development of rural territories and ensuring food security" IRN BR10764919 under the supervision of Doctor of Biological Sciences, Professor Alipbeki, O.

References

1 Alipbeki, O.; Alipbekova, C.; Sterenharz, A.; Toleubekova, Z.; Aliyev, M.; Mineyev, N.; Amangaliyev, K. A Spatiotemporal Assessment of Land Use and Land Cover Changes in Peri - Urban Areas: A Case Study of Arshaly District, Kazakhstan [Text] / Sustainability, - 2020. - №12. - P. 1556. https://doi.org/10.3390/su12041556.

2 Alipbeki, O.; Alipbekova, C.; Sterenharz, A.; Toleubekova, Z.; Makenova, S.; Aliyev, M.; Mineyev, N. Analysis of Land-Use Change in Shortandy District in Terms of Sustainable Development [Text] / Land, - 2020. - №9.- P. 147. https://doi.org/10.3390/land9050147

3 FAO. The Future of Food and Agriculture [Text] / Alternative Pathways to 2050; FAO: Rome, Italy, 2018. - 224 p.

4 Alam, A. Soil Degradation: A Challenge to Sustainable Agriculture [Text] / Int. J. Sci. Res. Agric. Sci. - 2014. - №1. - P. 50–55. ISSN: 2345-6795, doi:10.12983/ijsras-2014-p0050-0055.

5 Mirzabaev, A. Land Degradation and Sustainable Land Management Innovations in Central Asia [Text] / In Technological and Institutional Innovations for Marginalized Smallholders in Agricultural Development; Gatzweiler, F., von Braun, J., Eds.; Springer:Cham, Switzerland, 2016;doi:10.1007/978-3-319-25718-1_13.

6 Keesstra, S.; Mol, G.; de Leeuw, J.; Okx, J.; Molenaar, C.; de Cleen, M.; Visser, S. Soil-Related SustainableDevelopment Goals: Four Concepts to Make Land Degradation Neutrality and Restoration Work [Text] / Land, -2018. -№7. - P. 133. doi:10.3390/land7040133. 4.