

APPLICATION OF GEOINFORMATION TECHNOLOGIES IN THE STUDY OF CHANGES IN THE STRUCTURE OF LAND USE OF TERRITORIES BY MATERIALS OF MULTI-ZONE SPACE IMAGING

Victor B. Nepoklonov

Moscow State University of Geodesy and Cartography, 4, Gorokhovsky Per. St., Moscow, 105064, Russia, D. Sc., Senior Researcher, Consonant Head of the University, phone: (499)261-69-53, e-mail: vbnep@miigaik.ru

Denis A. Khabarov

Moscow State University of Geodesy and Cartography, 4, Gorokhovsky Per. St., Moscow, 105064, Russia, Ph. D. Student, Department of Space Monitoring and Ecology, phone: (499)267-27-72, e-mail: khabarov177@yandex.ru

Irina A. Khabarova

The State University of Land Use Planning, 15, Kazakova St., Moscow, 105064, Russia, Ph. D., Associate Professor, Department of Urban Cadastre, phone: (499)362-66-91, e-mail: irakhabarova@yandex.ru

The aim of the article is to develop graphical schemes of technological processes for the implementation of the main and alternative geoinformation methods in studying the replacement of the land use structure of territories based on the materials of multizonal space imaging. The research methods are geoinformation and comparative analysis. The article provides a review of scientific publications on the research topic, key indicators are proposed, on their basis a comparative analysis of the implementation of the proposed geographic information techniques is carried out. Using the proposed methods for determining changes in the land use structure of territories, both from materials from multizone satellite imagery and from data from national reports on the state and use of land in the Russian Federation, it becomes possible to judge the dynamics of urbanization of certain territories, as well as to make a forecast of changes in the land use structure.

Key words: geoinformation system, land use structure, assessment of the degree of urbanization, satellite imagery, geoinformation methodology, comparative analysis, rational nature management.

REFERENCES

1. Decree of the Government of the Russian Federation of 08.11.2018 No. 2413-r. On approval of the action plan for improving the legal regulation of land relations. Retrieved from http://www.consultant.ru/document/cons_doc_LAW_310650/ [in Russian].
2. The Land Code of the Russian Federation of October 25, 2001 No. 136-ФЗ (as amended on August 2, 2019). Retrieved from ConsultantPlus online database [in Russian].
3. Malinnikov, V. A., & Nguen, V. N. (2017). The use of Markov chains and Earth remote sensing data for predicting the conversion of land uses in large urban agglomerations. *Izvestiya vuzov. Geodeziia i aerofotosieemka* [*Izvestiya Vuzov. Geodesy and Aerophotography*], 5, 99–105 [in Russian].
4. Khabarov, D. A., & Sizov, A. P. (2017). Using the dynamics of the land balance of the Russian Federation to analyze their environment-forming properties. *Izvestiya vuzov. Geodeziia i aerofotosieemka* [*Izvestiya Vuzov. Geodesy and Aerophotography*], 3, 57–61.
5. Klyushin, P. V., Lepekhin, P. A., Lomakin, G. V., Savinova, S. V., Stolyarov, V. M., & Musaev, M. R. (2018). Efficient land use in the North Caucasus Federal Okrug. In *Sbornik materialov Vserossiyskoy nauchno-prakticheskoy konferentsii, posvyashchennoy 45-letiyu FGBOU VO DGTU* [*Proceedings of materials of the All-Russian Scientific and Practical Conference*

- dedicated to the 45th anniversary of the FSBEI HE DSTU] (pp. 52–57). Makhachkala: Dagestan State University Publ. [in Russian].
6. Zharnikov, V. B. (2017). Rational land use and basic condition of its realization. *Vestnik SGUGiT [Vestnik of SSUGT]*, 22(3), 171–179 [in Russian].
 7. Musaev, M. R., Shapovalov, D. A., Klyushin, P. V., & Savinova, S. V. (2016). Ecology of land use of agricultural land in the North Caucasus Federal District. *Iug Rossii: ekologiya, razvitiye [South of Russia: Ecology, Development]*, 11(2), 132–142 [in Russian].
 8. Vershinin, V. V., Murasheva, A. A., Shirokova, V. A., Khutorova, A. O., Shapovalov, D. A., & Tarbaev, V. A. (2016). The solutions of the agricultural land use monitoring problems. *International Journal of Environmental and Science Education*, 11(12), 5058–5069.
 9. Model Law on Strategic Forecasting and Planning for Socio-Economic Development, adopted by the International Assembly of States Parties to the Commonwealth of Independent States. Retrieved from ConsultantPlus online database [in Russian].
 10. Bobrov, E. A. (2011). Socio-environmental problems of large cities and their solutions. *Nauchnye vedomosti Belgorodskogo Gosudarstvennogo Universiteta. Seriya: Estestvennye nauki [Belgorod State University Scientific Bulletin. Natural sciences]*, 15(110), 199–208 [in Russian].
 11. Tiganova, I. A. (2015). Waterproof coatings: The evolution of urban engineering. *Arhitekton: izvestiya vuzov [Arhitekton: Izvestiya Vuzov]*, 51, P. 8 [in Russian].
 12. Lu, D., Weng, Q., & Li, G. (2006). Residential population estimation using a remote sensing derived impervious surface approach. *International Journal of Remote Sensing*, 27(16), 35–53.
 13. Coppin, P., Jonckheere, I., Nackaerts, K., Muys, B., & Lambin, E. (2004). Digital change detection methods in ecosystemmonitoring: A review. *International Journal of Remote Sensing*, 25(9), 1565–1596.

Received 14.01.2020

© V. B. Nepoklonov, D. A. Khabarov, I. A. Khabarova, 2020