

ECOLOGICAL SITUATION ON THE TERRITORY OF MURAVLENKO OIL FIELD (WESTERN SIBERIA, YNAO) BASED ON REMOTE SENSING DATA

Mikhail V. Yakutin

Institute of Soil Science and Agrochemistry SB RAS, 8/26 Akademician Lavrentiev Avenue, Novosibirsk, 630090, Russia, D. Sc., Assistant Professor, Leading Researcher, Laboratory of Biogeocenology, phone: (383)363-90-25, e-mail: yakutin@issa-siberia.ru; Siberian State University of Geosystems and Technologies, 10, Plakhotnogo St., Novosibirsk, 630108, Russia, Professor, Department of Ecology and Environmental Management

Andrei G. Sharikalov

Siberian State University of Geosystems and Technologies, 10, Plakhotnogo St., Novosibirsk, 630108, Russia, Ph. D. Student, Department of Ecology and Environmental Management, phone: (383)361-08-86, e-mail: sharikalov.andrey@gmail.com

The article analyzes the state of ecosystems on the territory of Muravlenkovsky oil and gas field, located in the Purovsky district of YNAO, in the Northern taiga subzone of the West Siberian plain. The study of the field was carried out using remote sensing data of the Earth. The work used satellite images of Landsat 5 TM in 1987 and Landsat 7 ETM+ in 2007. As a result of the analysis of the ecosystem dynamics on the territory of the Muravlenkov license area, it was found that the process of oil and gas field development has the strongest impact on forest ecosystems, which are the most vulnerable. As a result of oil spills, large areas of the field are turned into man-made wastelands. The study showed that the use of remote sensing Data makes it possible to conduct geocological monitoring of license areas of hydrocarbon production in the taiga zone of Western Siberia.

Key words: Western Siberia, Yamal-Nenets Autonomous district, PU-rovsky district, Muravlenkovskoye oil and gaz field, Northern taiga, oil and gas reserves, remote sensing of the Earth, ecosystem, monitoring.

REFERENCES

1. Panov, G. E., Petryashin, L. F., & Lisyanyi, G. N. (1986). *Okhrana okruzhayushchey sredy na predpriyatiyakh neftyanoy i gazovoy promyshlennosti [Environmental protection at the enterprises of the oil and gas industry]*. Moscow: Nedra Publ., 244 p. [in Russian].
2. Vasiljev, S. V. (1998). *Vozdeystvie neftegazodobyvayushchey promyshlennosti na lesnye i bolotnye ekosistemy [Impact of oil and gas industry on forest and swamp ecosystems]*. Novosibirsk: Nauka Publ., 136 p. [in Russian].
3. Chizhov, B. E. (1998). *Les i nef't' Khanty-Mansiyskogo avtonomnogo okruga [Forest and oil in the Khanty-Mansi Autonomous district]*. Tyumen: "Mandrika" Publ., 144 p. [in Russian].
4. Zerkalj, O. V. (1999). Evolution of the biosphere of adjacent territories under the influence of the oil and gas complex. *Gornyy informatsionno-analiticheskiy byulleten' [Mining Information and Analytical Bulletin]*, 6, 30–32 [in Russian].
5. Chandra, A. M., & Ghosh, S. K. (2008). *Dstantsionnoe zondirovanie i geograficheskie informatsionnye sistemy [Remote sensing and geographical information system]*. Moscow: Tekhnosfera Publ., 312 p. [in Russian].
6. Sedih, A. D. (1996). *Ekologicheskie problemy gazovoy promyshlennosti [The environmental problems of the gas industry]*. Moscow: Neft' i gaz Publ., 25 p. [in Russian].
7. Souza, C. M., Roberts, D. A., & Cochrane, M. A. (2005). Combining spectral and spatial information to map canopy damage from selective logging and forest fires. *Remote Sensing of Environment*, 98, 329–343.

8. Kennedy, R. E., Yang, Z., & Cohen, W. B. (2010). Detecting trends in forest disturbance and recovery using yearly Landsat time series: 1. LandTrendr-Temporal segmentation algorithms. *Remote Sensing of Environment*, 114, 2897–2910.
9. Zhu, Z., Woodcock, C. E., & Olofsson, P. (2012). Continuous monitoring of forest disturbance using all available Landsat imagery. *Remote Sensing of Environment*, 122, 75–91.
10. Yakutin, V. M., Van, A. V., & Sharikalov, A. G. (2013). Dynamics of the areas ecosystems on the territory of Mamontov oil field (West Siberia). *Izvestiya vuzov. Geodeziya i aerofotos'emka [Izvestiya Vuzov. Geodesy and Aerophotography]*, 4/S, 167–170 [in Russian].
11. Sharikalov, A. G., & Yakutin, M. V. (2014). Analysis of the state of taiga ecosystems using the methodology of automatic decoding. *Izvestiya Altayskogo gosudarstvennogo universiteta [News of Altai State University]*, 3/1, 123–127 [in Russian].
12. Petrov, V. P. (2003). *Administrativno-territorial'noe delenie Tyumenskoy oblasti (XVII–XX vv.) [Administrative and territorial division of the Tyumen region (XVII–XX centuries)]*. Tyumen: TyumenNII Giproga, 304 p. [in Russian].
13. Dudnikov, N. F. (1996). *Purovskiy variant: kniga, posvyashchennaya 65-letiyu Purovskogo rayona [Purovsky version: a book dedicated to the 65th anniversary of the Purovsky district]*. Moscow: Vilad Publ., 158 p. [in Russian].
14. Muravlenko field (n. d.). Retrieved from http://mklogistic.ru/muravlenkovskoe_mes-torojdenie [in Russian].
15. Kleshchev, K. A., & Shein, V. S. (2010). *Neftnyanye i gazovye mestorozhdeniya Rossii: spravochnik: Kn. 2, Aziatskaya chast' Rossii [Oil and gas fields of Russia: Vol. 2, Asian part of Russia]*. Moscow: VNIGNI Publ., 711 p. [in Russian].
16. Wolfe, R. E., Nishihama, M., Fleig, A. J., Kuyper, J. A., Roy, D. P., Storey, J. C., & Patt, F. S. (2002). Achieving sup-pixel geolocation accuracy in support of MODIS land science. *Remote Sensing of Environment*, 83, 31–49.
17. Asner, G. P., Hicke, J. A., & Lobell D. B. (2003). Per-pixel analysis of forest structure. Vegetation indices, spectral mixture analysis and canopy reflection modeling. In *Remote Sensing of Forest Environments. Concepts and Case Studies* (pp. 209–254). Boston, Dordrecht, London: Kluwer Academic Publishers.
18. Gis-Lab: NDVI. Theory and practice (n. d.). Retrieved from <http://gis-lab.info/qa/ndvi.html>.
19. Gonzalez, R., & Woods, R. (2006). *Tsifrovaya obrabotka izobrazheniy [Digital image processing]*. Moscow: Tekhnosfera Publ., 1072 p. [in Russian].
20. Trifonova, T. A., Mishchenko, N. V., & Krasnoshchekov, A. N. (2005). *Geoinformatsionnye sistemy i distantsionnoe zondirovanie v ekologicheskikh issledovaniyakh [Geographic information systems and remote sensing in environmental studies: textbook for universities]*. Moscow: Academic Project, 352 p. [in Russian].
21. Sharikalov, A. G., & Yakutin, M. V. (2011). Geoecological analysis of the state of anthropogenic ecosystems. *Vestnik SGGa [Vestnik SSGA]*, 3(16), 95–100 [in Russian].
22. Sharikalov, A. G., & Yakutin, M. V. (2012). Dynamics of forest ecosystems in the territories of hydrocarbon deposits in the subzone of the Northern taiga of Western Siberia. In *Sbornik materialov Interekspo GEO-Sibir'-2012: Mezhdunarodnoy nauchnoy konferentsii: T. 2. Distantsionnye metody zondirovaniya Zemli i fotogrammetriya, monitoring okruzhayushchey sredy, geoekologiya [Proceedings of Interexpo GEO-Siberia-2012: International Scientific Conference: Vol. 2. Remote Sensing Methods and Photogrammetry, Environmental Monitoring, Geoecology]* (pp. 61–66). Novosibirsk: SSGA Publ. [in Russian].
23. Solntseva, N. P. (1998). *Dobycha nefi i geokhimiya prirodnykh landshaftov [Oil extraction and geochemistry of natural landscapes]*. Moscow: MSU Publ., 376 p. [in Russian].
24. Baklanov, A. V., Medvedev, A. Yu., & Ismagilov, T. R. (1998). Geoinformation modeling of the ecological state of the territories of oil deposits. *Kriosfera Zemli [Cryosphere of the Earth]*, 2(3), 61–69 [in Russian].

25. Buzmakov, S. A., & Kostarev, S. M. (2003). *Tekhnogennyye izmeneniya komponentov prirodnoy sredy v neftedobyvayushchikh rayonakh Permskoy oblasti [Technogenic changes in the components of the natural environment in the oil-producing areas of the Perm region]*. Permian: Permian University Publ., 171 p. [in Russian].

26. Ermilov, O. M., Griva, G. I., & Moskvina, V. I. (2002). *Vozdeystvie ob"ektov gazovoy promyshlennosti na severnyye ekosistemy i ekologicheskaya stabil'nost' geotekhnicheskikh kompleksov v kriolitozone [The impact of the gas industry in Northern ecosystems and the ecological stability of geotechnical systems in cryolithozone]*. Novosibirsk: SB RAS Publ., 148 p. [in Russian].

27. Moskovchenko, D. V. (1998). *Neftegazodobycha i okruzhayushchaya sreda: ekologo-geokhimicheskiy analiz Tyumenskoy oblasti [Oil and gas production and environment: ecological and geochemical analysis of the Tyumen region]*. Novosibirsk: Nauka Publ., 112 p. [in Russian].

28. Soromotin, A. V. (2010). *Vozdeystvie dobychi nefti na taezhnye ekosistemy Zapadnoy Sibiri [Impact of oil production on the taiga ecosystems of Western Siberia]*. Tyumen: Tyumen State University Publ., 320 p. [in Russian].

Received 06.06.2019

© M. V. Yakutin, A. G. Sharykalov, 2019