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Using Remote sensing to assess impact of mining activities on land use land cover

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Remote sensing is the process of detecting and monitoring the physical characteristics of an area by measuring its reflected and emitted radiation at a distance (typically from satellite or aircraft). Special cameras collect remotely sensed images, which help researchers "sense" things about the Earth [1].

The main advantages of remote sensing are its ability to cover large areas, high temporal frequency, and lower cost compared to ground based investigation and monitoring.

Mining area caused a great deal of changes in landscape structure and enormous environmental disturbances, among them open-pit coal mine is one of the greatest landscape altering activities, and it's difficult to restore surface coal mine to the original ecological landscape [2].

Accurate information on mining land use and land cover change are crucial for monitoring and environmental change studies.

In this research, the authors present an estimation of the areal expansion of coal mine and the associated change in the Land use land cover in (V.D. Yalevsky) coal mine area in Prokorvisk city at Kamerovo region of Russia, between the years 1992 to 2019, using Remote sensing satellite imagery (Landsat 4 and Landsat 8 OLI).

The study reveals significant change and decrements in LU/LC categories in the study area, such as: forest area rate to 25.35 km^2, water bodies to 0.94 km^2, agriculture to 98.48 km^2, road to 10.80 km^2. However big increment in the rate of mining area to 100.72 km^2 and grass cover 34.86 km^2 during the study period. Accuracy assessment performed for the study which is (90.18% for 1992, 93.41% for 2006 and 88.69%.

The results show that, Remote sensing technology and satellite data can be efficiently used to enables identification, delineating, monitoring, and changes in surface land use land cover in the mining areas. On the other hand the mining activity in the area highly affected the form and landscapes of the area especially in forest and agricultural areas.

The maps produced from remote sensing data can provide timely and valuable information for subsequent assessment of the impact of the mining activity in the area. In addition the use of remote sensing plays an ever-increasing role in the management of mining land. It provide information and statistical data for assessing ecological, habitat diversity and land cover change while a mine is in operation, which can be used for formulating policies, decision makers and guidelines for post-mining land management, reclamation, monitoring, and landscape characterization.

References

1) www.usgs.gov (USGS science for a changing world)

2) Hendrychova, M., Kabrna ., M. An analysis of 200- year-long changes in a landscape affected by large-scale surface coal mining: History, present and future // Applied Geography. 2016, Vol. 74, P. 151-159. DOI: 10.1016/j.apgeog.2016.07.009
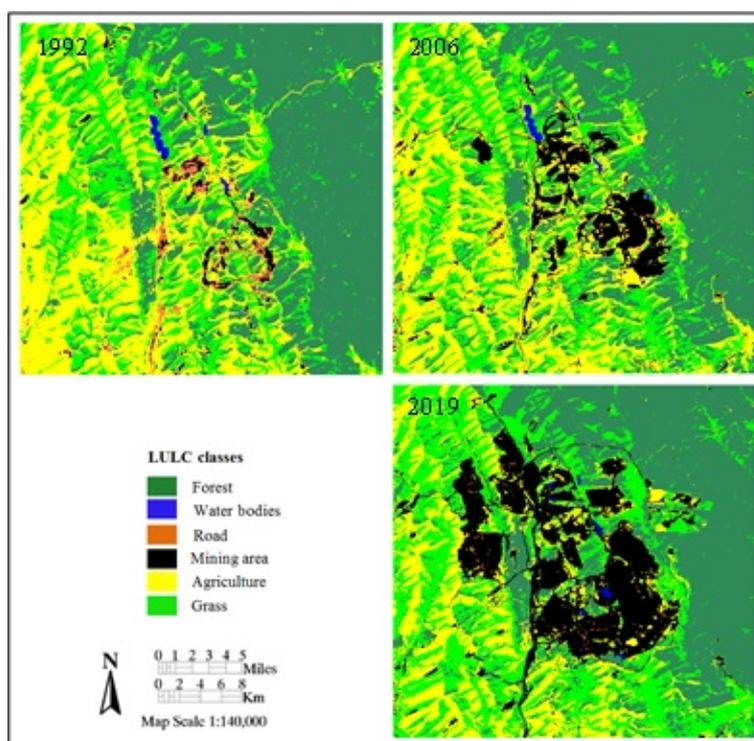
Illustrations

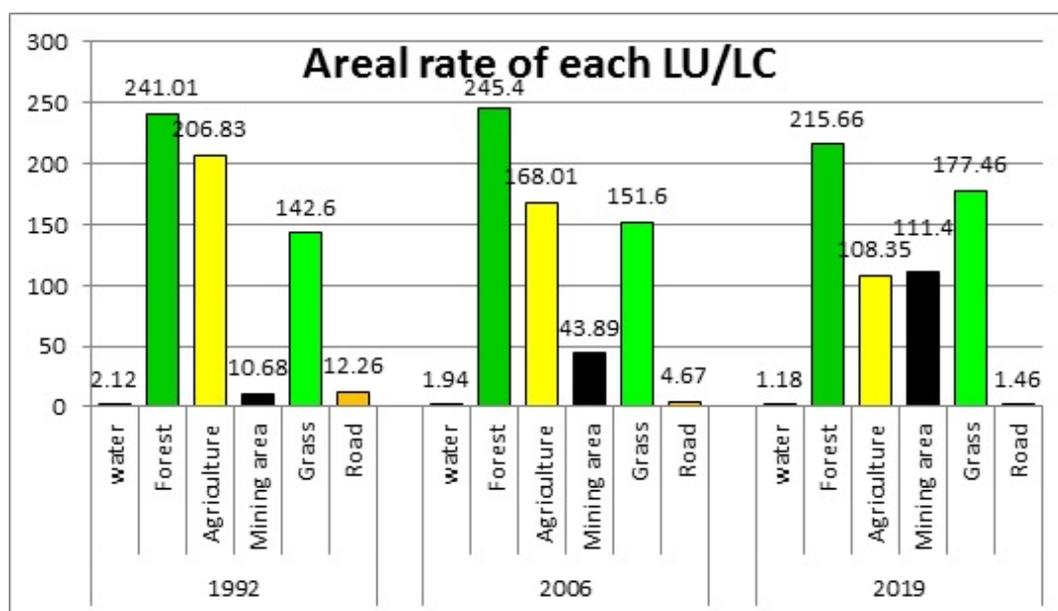**Рис. 1.** Land use land cover maps of the study area 1992, 2006 and 2019.

Рис. 2. Rate of each land use land cover classes according to the years 1992, 2006 and 2019

Рис. 3. The geographical location of the study area