The spatial statistical generalization of information for regional land-use management in Ukraine

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General methodology

Development of technologies for remote sensing are allowed to generate a thematic products of classification, which formed the basis of land use cover (Chuvieco, 1999). These are the basis for land-use management of natural resources and regional planning. European program CORINE has established a single land use cover for Europe on the basis of approved standards. Ukraine in this project did not participate, so a long time accurate data of land use were not available for the territory of Ukraine. This situation has changed with the release of a Chinese global product GlobeLand30, which allows us to estimate the distribution of land use in Ukraine and neighboring countries, as well as to draw parallels with the CORINE data. GlobeLand30-2010, mapping product of global land cover at 30-meter spatial resolution derived from remote sensing images in 2010 is produced.

The dataset covers land area from 80° N to 80° S, consists of 10 land cover types, namely cultivated land, forest, grassland, shrubland, wetland, water bodies, tundra, artificial surfaces, bareland, permanent snow and ice.

The classification images used for data generation of GlobeLand30-2010 are mainly 30m multispectral images, including Landsat TM and ETM + multispectral images and multispectral images of Chinese Environmental Disaster Alleviation Satellite (HJ-1). Cloudless images acquired over vegetation growing seasons within ± 1 year from 2010 were selected. In case the area missing suitable images, the time frame is extended.

Formation program management of natural resources and land use in Ukraine has four levels of organization: national, regional, district, local. At each level, there is a correction of management programs and input data

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used for decision-making in land management. Land uses data are common information basis for management decisions at these levels.

However, at different organizational levels, there are contradictions, which are the main causes of imbalances in the distribution of different types of land use on different territorial levels of government, inconsistency of goals of individual subjects of management, the need for a synthesis of information at higher levels of governance.

To solve these problems it was carried out data processing for land uses and territorial units each level of management. We have downloaded the tile data, which cover the territory of Ukraine. It was further carried out building the tile mosaics and crop it on the border of Ukraine. The obtained data were processed using ArcGis ArcTollbox. The group zonal analysis was used as the main types of analysis tools, which allows to obtain summary statistics for multiple datasets. Zoning is performed using a tool Tabulate Area, which calculates the cross table space between the two sets of data and outputs the table. to raster data set of land cover and vector set of administrative units were used as an the input data. Polygons village councils were used at the local level, polygons cities and districts - at the district level, polygons regions of Ukraine - at the regional level. The results were evaluated relative to zoning average values in Ukraine, regions and districts. The main statistical characteristics that describe the distribution are averages, amplitude, and dispersion of parameters. Also of great importance are the methods of classification used in the construction of cartograms. This approach allows to consider and agree on goals of land management and land use planning at different territorial levels, because it makes it possible to compare the parameters both between the administrative units of the same level, and between the region and its subdivisions.

For all units it was also calculated the Shannon index, which indicates to the diversity of forms land uses, which helps to take into account administrative units with a low level of diversity related to anthropogenic influence (Nagendra, 2002, Ramezani, 2012). The low value of the Shannon index is characteristic of eastern regions of Ukraine, where it is associated with a high level of urbanization and the southern regions, where the level of agricultural land can reach 80-90%. (Fig.1)

Another area of research is related to the need for a generalization of data to speed up the calculations statistic at the regional and national level. In this case, you need to increase the size of the raster cells, which affects the accuracy of calculations and their redistribution between classes. This requires selection of an optimum cell size of the raster, wherein the relationship between the accuracy of the result and the processing speed will be optimal.

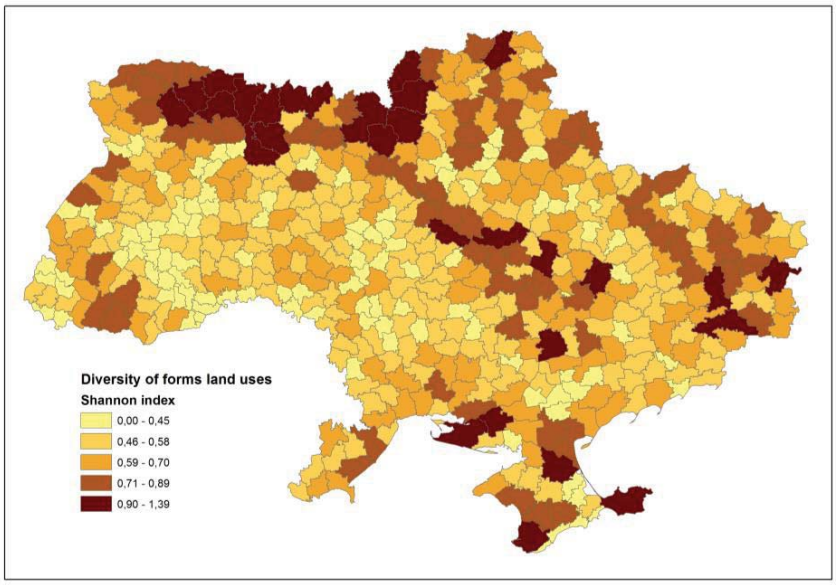

Figure 1. Diversity of forms land uses by the Shannon index in districts of Ukraine.

Current land cover data is one of the basic products the classification big data. They are used as the basis for the management of territorial development at different levels of regional governance. Thanks to International efforts today Ukraine has access to the land cover data with high resolution, but we need that Ukrainian research have been passed on the system basis and have been integrated into the European Research Area. Land cover data provide the basis for the zonal statistics in vertical and horizontal cross-section for the entire territory of the country, which should be used in developing plans for the land use of the territory and the nature conservation.

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