Assessment of the anthropogenic component in the formation of extreme low-water periods based on remote sensing (case study for Russian south region)

Polina Mikhailukova, Maria Kireeva, Vlad Ilich, Alexey Sazonov, and Maxim Kharlamov

Extreme low flow periods on the rivers are one of the most hydrological hazards. The aim of the study is determine causes of these periods based on the analysis of in land use changes. The territory of research is Don river basin. There is an assumption that the changes of Don watershed determines the increased duration of low-water periods, degradation of the river system of the region and the hard deficit of water resources.

Authors analyzed archive of Landsat imagery for Don river basin for key time periods. The first key period is the middle 1970s – it was period of intensive land use on watershed. The second – is the middle 1990s characterized by decreasing rate of agriculture and increasing the area of abandoned lands. The third period is the middle 2000s when the rate of land use had started to increase. And the last period – 2014-2015 years, when low-water periods in Don river basin had become a disaster.

We create mosaic of satellite images for each period and then classified it for several classes – urban area, different type of agricultural fields, forest, ponds and reservoirs. The analysis of classification results is demonstrate land use dynamic during last 45 years. The watershed changes was one the many reason of losses of the snowmelt runoff, which together with climate changes greatly increased the low-water period in the Don river basin.