



Spatial assessment of gully density in the zone of intensive agriculture of the European part of Russia

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Gully erosion is one of the most active geomorphic processes and one of the major cause of land degradation worldwide. Gullies within the European part of Russian are observed mostly within the arable lands. Latest assessment and mapping of the gully density for the European Russia was undertaken during 1970th. Spatial assessment of the contemporary gully density was undertaken for five key river basins of the European part of Russia: Mesha (55°53' N, 50°14' E), Ulema (55°05' N, 48°40' E), Samara (52°11' N, 53°49' E), Medveditsa (52°10' N, 45°21' E), Veduga (51°34' N, 38°39' E), using high resolution space images for identification of active gully length and gully head density. The studied river basins are located in the four natural zones: a) zone of mixed and broadleaf forests (Republic of Tatarstan); b) forest-steppe zone (Voronezh region); c) steppe zone (Saratov and Orenburg regions). It is plain with absolute altitudes in the range 140-266 m. Annual precipitation is 550-600 mm with more precipitation falls during the warm period of year in the Eastern river basins (Republic of Tatarstan, Orenburg region) - 250-360 mm. Gullies were recognized in the satellite images and delineated. The information about gullies was extracted by using visual image interpretation. The autumn and spring satellite images are the most informative for the mapping of the active gully pattern within the study area, because it is easier to identify active gully head-cuts and walls. Field verification of the data in the key areas of the Republic of Tatarstan, Orenburg and Voronezh regions was performed for the correction of gully maps produced by interpretation of satellite images. The result of the study are maps of gully density for each of the key basin. The highest average density of gullies (0,09 km/km² and 0,04 km/km²) are observed for the Republic of Tatarstan river basins, and the lowest - in the studied basin of Saratov region (0,01 km/km²). The maximum total length of the gully network (191,1 km) corresponds to the river basin in the Republic of Tatarstan, the minimum - 14,25 km (Voronezh region). Considerable reduction (3 fold) of the gully density since the 1970th was found for the all studied river basins. Reasons of the gully density reduction are discussed.