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Mapping assessment of gully erosion in the east of the Russian plain

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Abstract

Detailed-scale mapping of gully network based on the river basin approach was carried out for the eastern part of the Russian Plain using remote sensing data. The total number of selected catchments was 4575, average catchment area - 37.5 km 2 . GIS map of regions with different degree of gully dissection was created based on the produced geospatial database on the gulliy density in elementary catchments. Eight types of gully dissection were recognized in the studied area. Average gully density was estimated at 0.21 km/km 2 , with local highs up to 2-2.3 km/km 2 in some basins between the rivers Volga and Tsivil, at the right bank of the lower Kama and in the upper part of the right side of the Sviyaga River valley. Strong gully dissection (0.5-1.0 km/km 2) is the dominating category characteristic for 28.3% of elementary catchments. More than a quarter of all the elementary catchments located in the southern taiga subzone of Udmurt Republic and forested part of Mari El Republic demonstrate the absence or sporadic occurrence of gullies. The interpretation of repeated space and aerial images for two time intervals allowed to determine the changes of gully length in the north-western part of studied area at the end of the XX century. It was found that during the 23-25-year time interval, the total length of gully network in the Udmurt Republic decreased by 2%. Decline of gully erosion activity was observed mainly in the southern half of Udmurtia, which is marked by the higher degree of gully dissection. Rise of gully erosion exhibited by the appearance of new gullies on the previously non-eroded slopes was found in the northern part ofUdmurtiaandinthe Kilmez' River basin.

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Keywords

Catchments, Dynamic, Gully dissection, Interpretation, Mapping

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