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Gully erosion in Moldova: evolution, importance and control

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Soil erosion and landslides are major environmental problems in the Republic of Moldova, resulting in long-term impacts on land productivity and sustainable development of rural areas. Soil erosion occurs on about 1.5 million hectares of agricultural land. Erosion possible limits on agricultural land range from 3 t/ha to 180 t/ha. The weighted average in the country is 18.5 t/ ha/year. But once in 50-100 years the mentioned limits may be exceeded. Combination the physical-geographical complicate conditions with intensive agricultural activities on the slopes led to the development of linear (depth) erosion, from initial sheet and rills to entire systems of gullies and ravines. Depth erosion affects most powerful the slope land (60%) of southern steppe and central silvo-steppe zones of Moldova. Gullies refers to erosion forms named "agrierosional", which forms most often on slopes with a length of 500 m and inclination greater than 3°, pants occupied with vineyards and orchards. Annually on these slopes are formed 700-800 new gullies, with length of 50-70 km and an area of 300 hectares. As a result of the inadequate soil cultivation the gullies parameters are increased, that concentrates water runoff, intensifies soil erosion, forming corrugation on the soil surface and increase land and environment degradation.
The first gullies inventory in Moldova was carried out in 1911, the following in 1965 and 1982. After this period their area was annual included in the land cadastral sheet. If in the 1911 the total number of gullies made up 9543 with an area of 14434 hectares, in 1965 was increased on average by 3.5 times and in the southern areas more than 10 times. Gullies density of the republic made up in 1911 - 0.42 unites/km2, in 1965 increased by 3 times and in some districts by 5-6 times. After 1965, a part of the land affected by gullies was gradually transformed from farmland into forest resources. This measure contributed to significant changes in agricultural land by reducing sudden decrease to the 1982 the index by gullies affection.
The study of gullies intensity growth was achieved from 1966 in the main regions of Moldova. From 256 objects (gullies): 30% constitute those with weak growth (up to 0.3 m per year); 25% - with moderate growth (0.3-0.5 m) and 45% - with strong growth (0.5-1.5 m). There is no gully where would deprive their expansion process. Multiannual average growths of gullies are in large ranges - from 0.53 m on the Dniester Plateau to 1.48 m on the South Moldavian Plain.
On the 1 January 2016 in the Republic of Moldova was registered 12031 hectares with gullies. Following active growth of depth erosion their total area annually increases with 300 hectares and the total destroyed land with 450-500 hectares. Linear and volume growth forecast of ravines (gullies) in different natural conditions of Moldova will be taken into consideration in designing of hydro-technical antierosion constructions and schemes to combat gullies erosion.
Consequently, there is a need for erosion monitoring, special researches, experimental and modelling studies of gullies as a basis for predicting the effects of environmental change on gully erosion rates, implementation of measures to combat soil depth erosion in Moldova.

Keywords: Agriculture activities, Erosion control, Gully erosion, Slope, Republic of Moldova