

Danger Risk Assessment for Mudflow Process in the Duruji River Basin

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The Duruji River basin stands out in the whole southern Caucasus for the extent, frequency, associated economic damage and the degree of danger risk of its mudflow processes. Geological source area of the mudflow formation is mainly located above the greenbelt, hence formation of the solid mass is effected by a range of slope-failure processes, such as: rockfall, rock avalanche, landslide, snow avalanche, solifluction, slope erosion, etc.

According to the special engineering researches and stationary observations performed by the “Sakgeologia” in the Duruji River basin, on the average, over 1 hectare area about 1000-3500 tons of solid mass is moved out from the unstable slopes of the catchment basin annually. The amount of solid mass accumulated in the source area reaches up to 1.0-1.5 millions of cubic meters. A total, anticipated reserve of solid mass exceeds 500 millions of cubic meters.

In the Duruji River basin, like in the whole Kakhети region Caucasus Mountains, high density (1.8-2.5 g/cm³) structural rheology flows of stone and mud are formed. In these flows, quite a big (2-5 meters and larger) stones can be found mainly in the transit-accumulation and sometimes in the accumulation areas. For example, in a result of the transformed disastrous mudflow in 1889, a 200 ton dacite stone was moved to the accumulation area, in Kvareli, in the Duruji River. The stone is now on the Red List, as a unique geo-touristic phenomenon.

Currently the most effective measure performed for mudflow prevention in Kvareli is a river embankment. After its construction, mudflows have taken place for several times, but the town was not affected. But, after cessation of regular riverbed cleaning actions in 1990, the river hypsometric level has raised and exceeded the topography of the town itself, which causes new risks. Currently, in order to avoid the impact of mudflows on the populated area of the town, stone gabion baskets, so-called “McAfer constructions”, are placed at the ridge of the dam, at a point where the river comes out of the canyon.