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An expeditious risk analysis of intense rainfall events in low mountain ranges of Central German Uplands under the aspect of a sustainable and decentralised flood retention

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Abstract:

Due to increasing settlement pressure, intensifying pressure as a result of the utilisation of flood-threatened surfaces and also in consequence of the climate change with its effects even on local scales an accumulation of flood events is to be expected.

Areas that have not been influenced by flood events in the past, like low mountain ranges, can certainly be affected in the near future. Against this background applicable solution and adjustment strategies are required in practice to mitigate such events or to even prevent them.

The key aim of the research activities is the development of a standardised and expeditious risk analysis of intense rainfall events in low mountain ranges of Central German Uplands under the aspect of sustainable and decentralised flood retention and protection.

Hydrologic characteristics, expressed by the 'run-off-coefficient' and the 'surface roughness', for clearly defined biotope types of German low mountain ranges should be derived with the help of already existing standardised soil/utilisation/vegetation units.

According to the current state-of-the-art of flood models land use changes do not have great impact on the slow-flowing, large flood events in widespread watersheds. On the contrary, small, swift-flowing floods in small watersheds can be influenced by land use or management changes.
Thus, the focus of the research work is aimed on these small quick flood events. However, also differentiated information for the solution of flood problems in large watersheds can be reached by the summation of statements about small watersheds.

The development of a standardised planning method (incl. the GI-System implementation) for the optimization of the drain regulation serves for the reduction of the flood danger.
Land use and vegetation is so optimised in adaptation to soil and land management and by taking into account prevailing drain roads that an essential contribution to the regulation of the surface run-off can be performed.
The aimed procedure has to use above all the combination of soil and vegetation data which are valued as relevant to allow a quick and Germany-wide application.

In general the run-off of rainwater from land surfaces is characterised by the run-off coefficient and the roughness of the surface. The run-off-coefficient is derived from the basic information as vegetation unities, soil properties and types of land use and can be divided in different classes. The evaluation of the roughness takes place according to basic vegetation formations (e.g. lawn locations, humid locations, forest locations) or surface types of the soils with lacking vegetation (public thoroughfares, initial soils). By variation of run-off-coefficient and roughness about vegetation and land use proposals are designed for a buffering of the rainwater run-off.