



Runoff and sediment response to erosion control measures in a 300 ha cultivated catchment (Belgium)

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In order to reduce soil erosion and its downstream effects, policy actions have been taken, especially in Flanders (Belgium). These actions provide subsidies to the municipalities, landowners and farmers in the hilly regions of Flanders to implement erosion control measures. The reduction of severe soil erosion in the hilly regions of Flanders and the mitigation of muddy flooding of villages are the main goals or objectives of these policy actions.

Numerous measures (e.g. grass bufferstrips, grassed waterways, small retention dams,...) have been installed in the Melsterbeek pilot catchment (circa 200 km²) since 2002. Since 2005 the local water agency has started a monitoring program in order to assess the effects of the control measures installed. This monitoring is both qualitative (e.g. field observations) and quantitative (e.g. monitoring of a well-equipped 300 ha cultivated catchment).

Between 2002 and 2004 a grassed waterway, covering an area of 12 ha, as well as three earthen dams were installed in the 300-ha catchment. Rainfall-runoff events have been measured between 2005 and 2008. Runoff peak discharge at the outlet of the 300 ha cultivated catchment was reduced by more than 60 % with mitigation measures. Furthermore, runoff was buffered for 5 to 12 hours behind the dams, and the lag time at the outlet of the catchment was thereby increased by 75 %. Reinfiltration was mainly observed within the grassed waterway during low intensity storms. In contrast, the reinfiltration during intense storms was very low. No (ephemeral) gully has formed in this catchment since the installation of the control measures, thereby reducing erosion and interrill phenomenon. Specific sediment yield dropped from 3.5 t ha⁻¹ yr⁻¹ to a mean of 0.5 t ha⁻¹ yr⁻¹ after the installation of the control measures. Hence, sediment transfer from the cultivated dry valley to the alluvial plain should dramatically decrease.

The control measures served their purpose by preventing severe soil erosion and muddy flooding in the downstream village despite the occurrence of several extreme rainfall events. Similar measures should therefore be installed to protect other flooded villages of the Belgian loess belt and comparable environments.