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*Soil erosion, runoff and loss of soil organic matter
under maize cultivation in a mountainous region
in Northwest Vietnam*



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Diplomarbeit

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under maize cultivation in a mountainous region in
Northwest Vietnam*

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6 Summary

Most people in Northwest Vietnam ensure their livelihood with agriculture. Their mountainous homelands are especially prone to erosion. Erosion is highly correlated with soil fertility decline and therefore endangers the agricultural productivity.

The purpose of the thesis was the quantification of erosion, runoff and loss of soil organic matter in steep (45 %) hillside maize cropping systems. The erosion processes on three sites with different parent materials (lime, clayey shale and marley sediment) were described, analyzed and compared with each other. The effect of increasing slope length from 8 m towards 16 m and 24 m on runoff and soil loss was evaluated. SOM contents of collected sediment was determined and compared with the top soil carbon stocks to assess erosion induced changes in soil fertility. Furthermore, the interrelation of land management practice on runoff and soil loss was analyzed and recommendations from the literature were reviewed to adapt the current cropping system and sustain the agricultural productivity of the research sites.

More than 80 % of annual water induced erosion was concentrated on the onset of the cropping season. Soil cover was low and mean rain intensity was higher compared to the rest of the rainy season. The erosion results show big differences between the three study sites. The soil losses ranged from less than 1 to 47 and more than 146 Mg ha⁻¹ year⁻¹. It was assumed that beside geology and soil properties, especially the land management had a strong influence on erosion. Contour ploughing increased the surface storage area for runoff, and buffered erosion processes. Early seeding, dense plant spacing and fertilizer application resulted in fast crop development and soil cover, which mitigated erosion. A cumulative slope length effect could only be observed during heavy rainfall events. Losses of SOM were correlated with the annual soil loss amount. The sediment showed no significant differences in SOM compared to the topsoil. Therefore a preferential erosion of SOM was not observed.

Erosion mitigating measures should be applied during the onset of the cropping season to increase the soil cover. A minimum of 50 % soil cover should be reached to gain an effective protection against erosion and runoff.