Comparative Analysis of Soil Erosion and Land Degradation in different Scales
- A Case Study of the Southern Ethiopian Rift Valley -

- Poster -

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Different shapes of soil erosion and land degradation occur area-wide in the southern Ethiopian Rift Valley. Distinct population growth causes an increase of land use intensity. Due to inappropiate cultivation techniques soil erosion and land degradation becomes an worsening problem on agricultural areas.

Small scale soil erosion features like rills and little channels recur periodically on tillage areas, but are regularly levelled by ploughing and cattle tread. Contrary, large erosion features like gullies or area-wide degradation forms remain permanently, varying in extent. They can be characterised by an extension of 10 m minimum width and an incision of at least 1 m depth. The base level of erosion in the areas of investigation is, in general, composed of a weathered but morphologic hard layer and shows no or sparse vegetation.

According to their horizontal extension large degradation forms can be identified visually on air photographs and satellite images; a differentiation of these areas is as well possible due to differences in distribution of the spectrum of the surface reflectance within and beyond the degraded areas.

If superimposed on the digital elevation model as well as soil parameter the classified areas appear area-wide in relation with smooth slopes, convex profile curvature, parallel to channels and particularly where Vertisols and Andosols occur above a compacted pyroclastic layer. The limited thickness of these top soils reaches a maximum of 80 cm. The erosion of the top soil is accelerated by the pyroclastic layer causing an impermeable bed. After the erosion of the top soil, the pyroclastic layer and accordingly the covered fossil soil start to erode as well. The protective function of the pyroclastic layer against erosion of the uncompacted fossil soil gets lost: First incision, and after reaching the erosion base, lateral erosion and undercut of the pyroclastic layer starts. On top of the uncovered erosion base a lateritic crust can arise and stop incision, or dependent on water availability, the Saprolite will be eroded further but slower than the fossil soil.