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Overland flow generation on deep soils in Ethiopia (Lake Tana basin): role of soil texture and plough pan

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Different applications of rainfall/runoff models in Lake Tana basin (Ethiopia) tend to show that on hill slopes there are vast areas that yield a high runoff response and that behave as if the soil would be nearly impervious (up to 20 % of the hilly catchments). This is well beyond the area occupied by rock outcrops. Duricrusts or hardpans of pedogenetic origin are absent in this environment on basaltic rock with mild tropical climate: no silcretes, calcretes or even ferricretes are known to occur in the basin. Field observations show that runoff response from tilled farmlands can however be unexpectedly high, even when deep theoretically well drained Nitisols occur. In the rainy season, rills and ephemeral gullies are created and these often expose a rock-hard plough pan at some 15 cm depth. Due to repeated tillage at constant depth, the downward pressure of the tip of the ox-drawn ard plough compacts the soil aggregates that are located just below the tilled horizon. In this poster we will discuss the need to not only evaluate the effect of soil texture when interpreting rainfall-runoff relations, but also to investigate the structural and hydrological characteristics of such plough pans.