



## **Phosphorus contents and phosphorous sorption in soils of the Gilgel Gibe catchment, SW Ethiopia**

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The Gilgel Gibe reservoir, located on the edge of the Ethiopian Plateau, is threatened by siltation and nutrient imports, with phosphate concentrations being more than 50-fold higher than WHO guidelines. Phosphorus reaches the reservoir mainly adsorbed to eroded soil particles. At the same time, P availability for plant production is generally limited in strongly weathered volcanic soils due to their high P sorption capacity. The objectives of this study are therefore to determine the P contents and the P sorption capacity of the soils in the catchment, and to evaluate the influence of slope position and land use. Six catenas surrounding the reservoir (120 to 440 m long), either used as pasture or as arable land, were investigated. Topsoil samples were taken at three slope positions. Parent materials were basalt and rhyolite. Soil texture was clay, the clay content ranged between 41 and 88 %. The soils were moderately to very strongly acid with pH values of 4.6 to 5.9. Plant-available P (double lactate method), total P, Fe and Al (aqua regia digestion) as well as dithionite and oxalate extractable P, Al and Fe contents were determined. Batch experiments were conducted with 7 P concentrations ranging from 0 to 500 mg/l, and the adsorption isotherms will be evaluated using Freundlich and Langmuir models. First results showed that total P contents ranged between 0.2 and 0.5 g/kg soil. Total Fe and Al contents were extremely high with values of 36 to 85 and 29 to 80 g/kg soil, respectively. P contents were significantly correlated with Fe ( $r=0.68$ ) and clay ( $r=0.65$ ) contents ( $P<0.01$ ), which highlights the effect of the parent material. No plant-available P, however, was found in any of the soils, demonstrating the poor growth conditions. P sorption also mainly depended on the soil's Fe content. An influence of slope position or land use on either P content or P sorption capacity could not be detected.