Project Update: October 2011

Spatial scale relationship between soil texture and water, land based livelihoods and vegetation richness

Soil water sampling was based on ziplogs, etiquettes, probe, soil data sheet, digital camera, munsell soil color chart and GPS placed in different elephant rangeland and land based livelihoods along the altitudinal and rainfall gradients. GPS unit helped in acquisition of geographic coordinates and elevation.

Soil texture was determined by hand tact; soil color was calculated basing on munsell soil color chart. Soil water was determined as the difference between soil moist weight and soil dry weight (HR %). Laboratory analysis was conducted in Oven 2000 Series during 24 hours of duration.

We hypothesized that land uses contributing to less surface cover would have a disproportionately large impact on water loss, because these land uses expose soil surface to solar radiation, and substantial evapotranspiration and nutrient loss can be observed and affect soil water texture. Also we hypothesized that topography can influence water loss at landscape scale since it affects soil characteristics.

Results indicate that soil water is higher (>10.0%) in lowlands of Luenha River where villagers practice horticulture on clay loan soils and highlands of Macossa covered by grasses_acacia nigrescens (clay soils) and grazing burned area on loam sandy soils influenced by regular rainfall.

Lower concentration (<5.0%) of soil water is also observed on low to high altitudes of acacia melifera_adansonia digitata (sandy soil), bricks (sand clay), mopane (sand loam), grazing area for goats (sand clay), cattle (sand clay), goats_cattle (sand clay), maize (loam sandy), maize_sorghum (sandy).

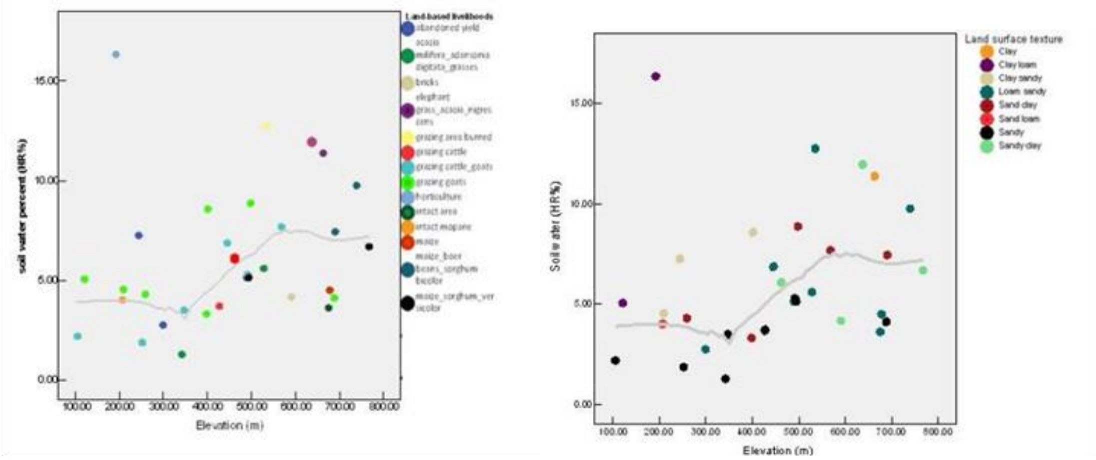
Areas grazed by goats denoted higher soil water content when compared to maize_boer beans cultivated areas. In addition, grazing goats located on lowlands exhibited lower water soil than those located in highlands. Furthermore, grazing goats on clay loam soils had more soil water content than grazing goats on sandy soils although located on the same lowlands.

Such results indicate the scope of: (1) in the same topographic unit different land uses can reveal a differentiation in soil water content. (2) The same land based livelihood type in the same topographic position it can reveals differentiation in soil water content.

At larger scale this depends on combination of history of land management practices (e.g. crops mixing, burning, irrigation, mulching, free and controlled grazing), texture of land surface (e.g. rocky, clay, sandy, loam), relative proximity to source of water (e.g. Luenha River).

At smaller scale it depends on relative location of land based livelihood with regard to rainfall gradient once again shaped by topographic gradient in our study area (e.g. Macossa compared to Guro District).

Thus, a rainfall adaptation model for agricultural production and elephant conservation should consider these geographical specifications in order to be successful applied. Before a full model is raised, a question remains: To which ecological threshold water availability distribution pattern and land use type's variability contribute in elephant habitat loss (size of patch and elephant rangeland richness)?



Left: Degree to which relationships between soil water availability and land based livelihoods distribution are affected by landscape heterogeneity. Right: Degree to which relationships between soil water availability and soil texture are affected by landscape heterogeneity.

Soil sampling techniques and materials


STARTING TIME
STOPING TIME
Series
2000
DONT TOUCH
SOIL SAMPLES