Introduction and aim of this framework

In the semiarid and arid regions of the Okavango Basin, leading from the central highlands of Angola over the Kavango Region in Namibia to its delta in Botswana, the Soil-Plant-Airshphere Continuum (SPAC) plays a predominant role in the modification and partitioning of the soil water dynamics and balances. Several studies showed that up to 98% of the water input will be transferred back to atmosphere where only minor parts remain in deeper soil horizons or lead to groundwater recharge. The aim of this study is to develop a framework to analyse and assess the soil hydrological impact of site specific soil types and their distribution in combination with vegetation and land use characteristics. To derive soil hydrological properties, onsite soil surveys and soil hydrological measurement techniques together with laboratory experiments are applied. A nested modelling (1-D in 2-D) approach calibrated with field measurements (1-D) and validated with model outputs (2-D) give detailed information about point and site specific soil water balances.

Study sites

The study sites with 5 x 20 km² extend each are located along the Okavango riverside near Chitembo (northern Angola), Caiundo (southern Angola), Mashare (Namibia) and Seronga (Botswana) following a precipitation gradient with appr. 1500 mm in Chitembo and 350 mm in Seronga (Fig. 1). Soil substrates are dominated by deep Kalahari Sands in Botswana, southern Angola and Namibia where the north Angolan site shows tropical weathering of granites.

Methodology

All research sites are prestratified according to their geomorphological landscape structure as basis for the soil survey and the field measurements. The stratification based on a 300 m point grid over up to date areal photographs or satellite images (SPOT and Landsat).

Outlook

Within the project “The Future Okavango” the modelled as well as the measured soil hydrological data will be used as input parameter for a socio-economic valuation of Ecosystem Services and Functions (ES&F) in the Okavango catchment. The ongoing data acquisition started in 2010 and will be carried out the next two years.