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"Development on the margin"

Assessment of Biomass Production Potential on Salt-affected Land. A Soil and Terrain Database Case Study (SOTER), Badin District, South of Pakistan

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Abstract

Good and appropriate advice to biomass production potential on salt-affected land requires a good knowledge of soil resources and soil salinity/alkalinity. The decreased site productivity calls for an information system on soil resources, which permits the analysis of land suitability, potential production for food and energy, environmental impact of land use and identification of suitable measures. The data structure for the delineation of the land resources was organised according to the Soil and Terrain Digital Database (SOTER) manual, which includes observations, analytical attribute data and GIS based spatial terrain data. On the highest level, five so called terrain units could be distinguished. The main differentiating criteria were landforms, degree of salinity/sodicity and groundwater level. The Badin District, southern region of Pakistan is characterised by an arid tropical climate. A soil and digital database was established to evaluate the ability of land units to support crops and tree production. Soil transects and a topographic map was combined to provide information on spatial variability of salt affected soils, terrain type, and land use. The FAO/ITC (Land Suitability Classification) was used to identify crop specific constraints to salt tolerant tree (*Eucalyptus camaldulensis*, *Prosopis juliflora*, *Acacia nilotica*) and crops (cotton, rice and wheat) production. The land index of salt affected soils in the study area turns out to be moderately suitable to unsuitable for selected crops and trees. The results show that the low index values are due to chemical limitation levels (degree of salinity, sodicity, and organic carbon). In addition, unfavourable climatic conditions determine the suitability of the region for crops and tree production. The ranking of the suitability and biomass/yield potential of the crops for Badin District was in the order cotton < wheat< rice, and for the trees *Prosopis* < *Acacia* < *Eucalyptus*. Appropriate management and possible crop and tree species selection by farmers increase the yield potential significantly. The results obtained from this study indicate that the integration of GIS and application of FAO Ghent Evaluation could provide a good database and guide map for decision maker determined crop substitution in order to achieve better agricultural production.

Keywords: Badin, land evaluation, salt-affected land, SOTER

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