DETERMINATION OF THE MARGINALITY INDEX FOR AGRICULTURAL LAND USE FOR WESTERN AFRICA USING FUZZY LOGIC

J. Röhrig, G. Menz, J. Richters

Remote Sensing Research Group (RSRG), University Bonn, Meckenheimer Allee 166, D-53115 Bonn, Germany

E-mail: julia@rsrg.uni-bonn.de

ABSTRACT: A precise knowledge and the identification of agricultural marginal areas as well as of the potential of previously uncultivated land are very important considering issues of global change and food security. Hence, the marginality index for agricultural land use have been defined on a global scale by the Potsdam Institute for Climate Impact Research (PIK) together with the Max Planck Institute for Meteorology. Therefore, various environmental conditions are taken into account, quantified and summed in one index using fuzzy logic technique. But global data with a spatial resolution of $0.5° x 0.5°$ can represent only a v ery general idea about distribution and degree of agricultural marginality attaining merely little information to develop and implement preventive measures for regional decision makers. Thus, we have analysed whether the approach with very embolden results on a global scale is feasible on a regional scale, too by using same but spatially higher resoluted influencing factors and the fuzzy logic based algorithm. For this regionalisation of the approach, the region of Western Africa was chosen due to its variety of environmental conditions and the generally traditional agricultural land use without or with merely low capital- and energy-intensive management methods. Thus, the natural constrains of agricultural potential represents the conclusive factors determining yields. Furthermore, societies are formed strongly by agriculture and gives still work to the majority of people.

Our outcome shows, that the approach comes out with very satisfying results on a regional scale, too. The natural agricultural potential as well as the risk of environmental degradation due to agriculture of Western Africa can be reflected precisely by the marginality index for agricultural production with a spatial resolution of $0.05° x 0.05°$.