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Analysis and Evaluation of the Agro-potential of Inland Valleys in the Upper Ouémé Catchment (Benin, West Africa)

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Abstract

The fast growing population in all countries of sub-Saharan Africa demands an increase of food production. In some regions the arable land becomes already scarce and the degradation of soils progresses due to the shortening of the fallow period. Inland valleys offer an extensive, fairly unexploited potential for agricultural production, due to their higher water availability, lower fragility and higher fertility compared to the upland soils. In the last decade the Upper Ouémé catchment in central Benin is subject to high population growth caused by high fertility and high immigration rates. This causes an expansion of agricultural area, which leads to deforestation and shortage of available land for agricultural production. Therefore, the exploitation of inland valleys will become more important in this region. The presented study aims to analyse the present and future agro-potential of the inland valleys. To assess the surface of the inland valley area a multilevel approach is applied combining DEM-analysis, remote sensing and field mapping. Based on the field work a typology of inland valleys is carried out in order to extract representative inland valleys for each type, which are intensively investigated in terms of physical aspects. For evaluating the usability, socio-economic aspects as distance to the next market are taken into account. Based on these investigations the assessment of the present and future agro-potential is performed by an interdisciplinary modelling approach. The effects of future climatic and land use changes on the hydrology of the inland valleys are analysed using a hydrological model. As a result the temporal variability of the extent of the saturated area and the length of the period with sufficient water availability for cultivation in the inland valleys are used in the plant growth model. With this model different cultures are simulated in order to assess the potential yields. The work is carried out in close collaboration with local authorities. The results of this study will create a reliable base for the planning process of inland valley exploitation in the region.

Keywords: Agro-potential, hydrological model, inland valleys, plant growth model

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