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Land Cover Dynamics and Climate Variability in Côte d’Ivoire as Crucial Determinants for Agriculture and Biodiversity

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Abstract

Especially in climate sensitive regions, where irrigated agriculture is the main source of food security and income, concerns about the variability in rainfall, its temporal and spatial distribution, must be taken very seriously. This seems to be particularly true of West Africa where e.g. significant alterations in precipitation during the great Sahelian drought of the early 1970s and 1980s affected several countries.

In Côte d’Ivoire (Ivory Coast) essential anthropogenically induced land cover changes took place during the past five decades. At the same time, the country suffered from a rainfall deficit at least for the last three decades. The environmental impact on the Ivorian socio-economy and natural biodiversity, however, remains ambiguous. In frame of the BIOTA-West Africa scientific research network funded by the German Ministry for Science and Education (BMBF) a multi-scale monitoring concept was designed, combining most suitable and advantageous features of remote sensing and bioclimatic ground observations in order to examine the following focal points: (i) monitoring of large scale vegetation dynamics, (ii) change detection of vegetation and land surface characteristics (particularly human induced changes of different degradation intensity), and (iii) the importance of changes within biosphere – atmosphere interactions.

Results of this paper support the idea that regional variability in precipitation is considerably linked to significant changes in vegetation cover. Furthermore, the analysis of remote sensing and ground observation data revealed that a strong decrease of monthly amounts of precipitation, as observed during the extraordinary El Niño event of the years 1982–83, led to a pronounced response of the vegetation in southern and northern Côte d’Ivoire. Among other authors we conclude that besides variations in sea surface temperatures (SST) and anomalies of the Intertropical Convergence Zone (ITCZ) also the impact of ENSO events may affect circulation patterns in West Africa via oceanic-atmospheric teleconnections.

Keywords: BIOTA-West Africa, climate variability, El Niño, Ivory Coast, land cover changes, NDVI, vegetation dynamics