



IMPETUS Benin

Land use change and its impacts

G. Menz¹, H.-P. Thamm¹, M. Judex¹, A. Krüger², K. Born², V. Orekan¹ and M. Jansens³

¹ Remote Sensing Remote Group, Institute of Geography, University of Bonn, Meckenheimer Allee 166, Bonn
² ZFL, Center for Remote Sensing of Land Surfaces, Walter-Flex-Str.3, 53113 Bonn, Germany

³ Institute of Geophysics and Meteorology, University of Cologne, Kerpener Str. 13, Cologne, Germany
⁴ INRES, Institut für Nutzpflanzenwissenschaften und Ressourcenschutz (INRES), Pflanzen- und Gartenbauwissenschaften, Bereich Pflanzen- und Gartenbauwissenschaften, Auf dem Hügel 6, 53121 Bonn, Germany



Introduction

The land use and land cover in West Africa is subject to severe changes (LUCC) within the last decades. Reasons therefore are manifold. On the one hand there is a strong population growth; on the other hand there are climate changes, exhausted soils, and uncontrolled exploitation of forest. Within IMPETUS there was an intensive investigation of the LUCC, the underlying process dynamics, and the consequences to the different subjects (agriculture, climate, hydrology etc.). Based on that knowledge several models and decision support systems have been developed to estimate the impact of measures on the land use and land cover to give a support for decision makers and other stakeholders in Benin. By means of the approximation of future land use it is possible to answer questions concerning production systems and local rainfall response.

Future land use pattern: LUMIS

Why dealing with future land use pattern?

- Arable land will be a scarce resource in Benin
- Necessity for sustainable land management
- Detection of hot spots of critical development



Goals of the system to estimate future land use pattern:

- Estimation of future land use / land cover pattern under different boundary conditions
- Providing management options by using LUCC models
- Getting sound information concerning LUCC in order to allow decision making with respect to a sustainable development

User of the DSS for future land use

- Authorities to design appropriate measures
- NGOs for developing strategies for hot spots of critical development
- Scientist of other fields (hydrologists, meteorologists) to get information of the LUCC as input for their models



Impact of land cover change on precipitation: ILUPO

Why dealing with the question of local scenario rainfall variability?

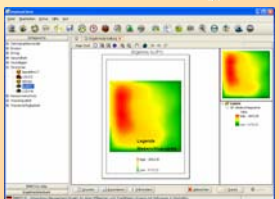
- Local rainfall is the source for all general question concerning water availability
- Influence on the water budget for the local population as well as for farming etc...

Goals of the system to estimate future rainfall variability :

- Estimation of local areas with a potential risk for wet and dry spells
- Generation of local rainfall time series with a high spatial and time resolution

User of the IS for future rainfall variability

- Scientist to import further adapted rainfall amounts (in case of further model development)
- National weather service to provide knowledge and development
- Scientist of other fields (hydrologists, geographers)



Bushfire dynamics: IMABFIRE

Why dealing with the question of bushfire?

- Every year more than 75% of the area of central and north Benin are affected by bush fires
- Late bush fire contributes to soil degradation
- Bush fire have influence on the carbon and nutrient cycle
- There are laws and regulation mechanisms concerning bush fire



Goals of the systems concerning bush fire:

- Monitoring system – temporal - spatial pattern of land use and land cover with high resolution satellites
- Modelling bush fire under different conditions for a sustainable land management

User of the systems concerning bush fire:

- Authorities to enforce the regulation mechanisms
- Agricultural departments to ensure sustainable management of bush fire
- Scientists to estimate the influence different management options



Production systems under climate change: FARMADAM

Why is it necessary?

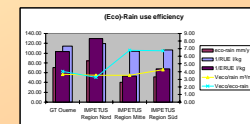
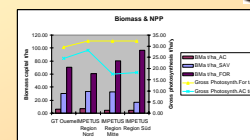
- Changing precipitation patterns will occur
- Biomass production is strongly related to the precipitation
- Optimising the production under changing climatic condition

Goals of the FARMADAM

- Creating a DSS system for optimising production systems under changing climate systems
- Assessing the related biomass, NPP and ecovolume
- Getting information about the rain use efficiency for optimising production

User of FARMADAM:

- INRAP
- Communes
- Agricultural support centres



Summary

To face the challenge of strong land use and land cover changes, comprehensive interdisciplinary research was done to assess the LUCC, understand and the underlying processes and to set up models to assess the impact on the ecosystem and the socio-economic conditions

Based on scientific sound results spatial explicit monitoring and decision support systems were set up. They are comparatively easy to use so that decision makers can evaluate the impact of different measures and/or changing boundary conditions. So optimised and sustainable measures can be found and applied.



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