

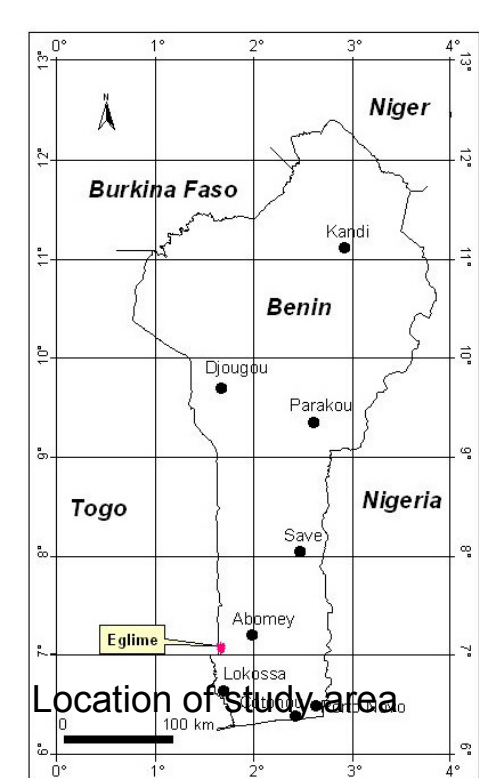
Monitoring of land use intensification and linkage to soil erosion in Nigeria and Benin, West Africa

B. Junge¹, R. Abaidoo¹, D. Chikoye¹, T. Alabi¹. & K. Stahr²

Problem and Objective

The increasing demand to feed the growing population in Sub-Saharan Africa (SSA) (annual growth rate 2.3 %, 2000-2004, World Bank 2006) leads to intensified land use. Not adapted farming practices result in land scarcity and soil degradation (Hudson, 1995, Lal, 1997). Enhanced land use planning is necessary to conserve soil resources, its productivity and to contribute to food security. Remote sensing data facilitate the study of environmental changes (Duadze, 2004). This study presents the use of remote sensing approaches for monitoring changes in land use and soil erosion in a tropical savanna environment of SSA.

Methodology



Study area:

Village: Eglimé (N 7°15', E 1°86'), Benin
Crops: cassava, maize, oil-palm, cotton
Tillage: performed manually (hoe)

Remote sensing data:

- Aerial photo (16.1.1982),
- IKONOS (1.12.2000) (1 m + 4 m resolution)

Analyses of

1. Historical and current land use

- Digitizing and labelling of fields on images
- Unsupervised classification of IKONOS (Envi 4.1)
- Ground truthing of interpretation (Sept. 2006)

2. Soil erosion

- Digitizing of linear features on IKONOS images
- Mapping distribution of current gullies with GPS



Tab. 1: Areas of different land use types in Eglimé in 1982, 2000 (ha)

Land use classes	1982	2000
Oil-palm, high density	18.6	90.3
Oil-palm, low density	13.5	17.4
Arable land	46.6	210.3
Settlement	3.9	14.9
Total	82.5	332.9

2. Increase of soil erosion

Linear erosion features such as gullies could not be detected on aerial photos from 1982 but on panchromatic IKONOS images from 2000. The comparison with gullies previously mapped by using the GPS shows an increase of the gully length within the last years (Fig. 2).

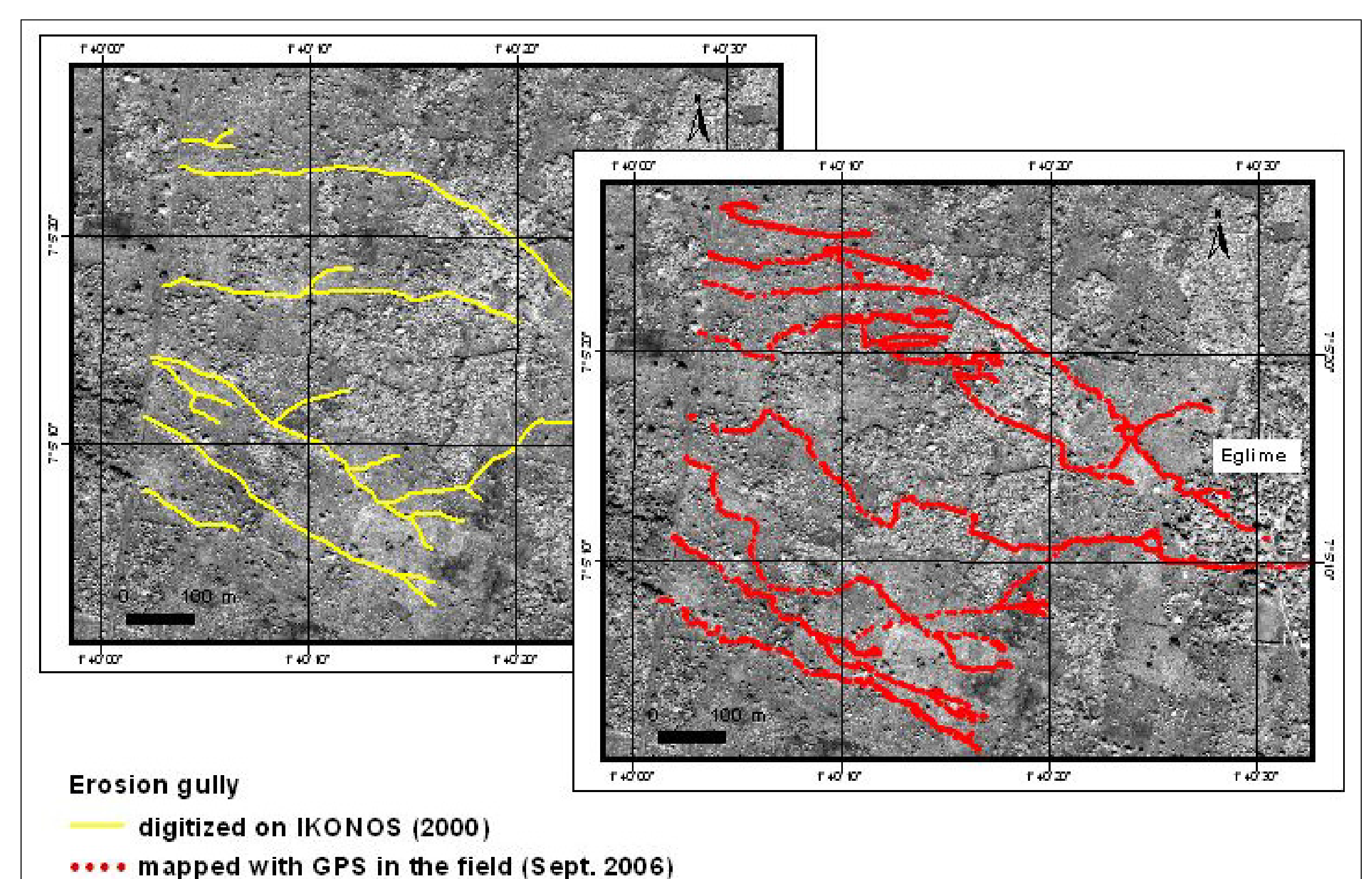


Fig. 2: Distribution of erosion gullies in Eglimé in 2000 and 2006

Results and Discussion

1. Intensification of land use

The interpretation of the remote sensing data shows a large expansion of the cultivated area around the settlement of Eglimé within the last decades. There is a large increase of arable land especially used for cropping (Fig. 1, Tab. 1).

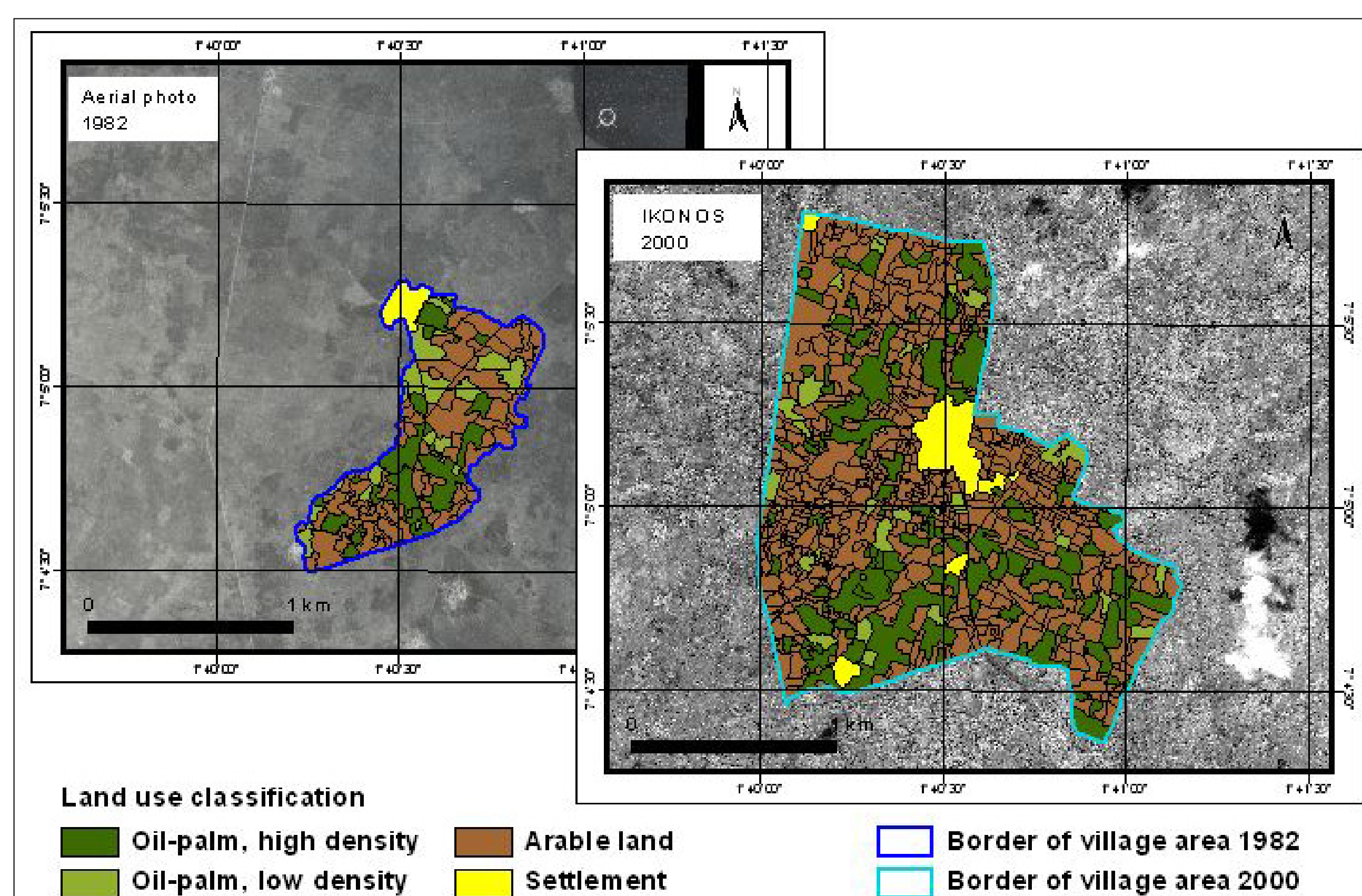


Fig. 1: Land use around the settlement of Eglimé in 1982 and 2000

Summary and Conclusion

- The analysis of remote sensing data is useful to monitor changes in land use within time
- facilitates to capture location and development of erosion features

Remote sensing approach therefore

- is an important tool for enhanced land use management
- serves as basis for installing soil conservation technologies
- contributes to reduction of soil degradation and maintenance of soil productivity
- copes with the increased demand for food in SSA

References

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¹ International Institute of Tropical Agriculture (IITA), Ibadan/Nigeria, b.junge@cgiar.org

² Institute of Soil Science and Land Evaluation, University of Hohenheim, Stuttgart/Germany