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THE USE OF SPOT IMAGES FOR THE ASSESSMENT AND MAPPING OF GEOMORPHOLOGY AND LAND DEGRADATION BY SAVANISATION IN A WET-AND-DRY TROPICAL FORESTED ENVIRONMENT (LUBUMBASHI, SHABA, ZAIRE) (****)

Abstract: DE DAPPER M., GOOSSENS R. & ONGENA T., *The use of Spot images for the assessment and mapping of geomorphology and land degradation by savanisation in a wet-and-dry tropical forested environment (Lubumbashi, Shaba, Zaire).*

Digital SPOT image processing, combined with conventional panchromatic B&W airphoto interpretation and field observations, is used to survey and map geomorphological phenomena and land degradation by savanisation in the Lubumbashi area (Shaba, Zaire), a typical wet-and-dry tropical forested environment. The digital treatment includes LAI and biomass calculations, box classification, mask techniques and image stretching.

KEY WORDS: Aerial photo interpretation, Spot, Soil drainage detection, Land degradation, S. Zaire.

Riassunto: DE DAPPER M., GOOSSENS R. & ONGENA T., *L'uso delle immagini Spot per la cartografia geomorfologica e la valutazione della degradazione del suolo indotta da savanizzazione in un ambiente di foresta tropicale a stagione umida e secca (Lubumbashi, Shaba, Zaire).*

L'elaborazione digitale delle immagini SPOT, combinata con l'interpretazione di foto aeree convenzionali pancromatiche B&N, e con osservazioni di campagna, sono state utilizzate per rilevare e cartografare i fenomeni geomorfologici e la degradazione del suolo indotta da savanizzazione nella zona di Lubumbashi (Shaba, Zaire), un tipico ambiente di foresta tropicale caratterizzato da un'alternanza di periodi aridi e piovosi. L'elaborazione digitale comprende calcoli di biomassa e di indice di superficie foliare (LAI), classificazione «a scatola», e tecniche di miglioramento del contrasto e di mascheramento delle immagini.

TERMINI CHIAVE: Fotointerpretazione, SPOT, Difesa del suolo, Degradazione del territorio, Sud Zaire.

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INTRODUCTION AND MATERIALS

The aim of this paper is to explore the possibilities of SPOT-imagery to detect geomorphological phenomena and land degradation by savanisation in a typical wet-and-dry tropical forested environment. To achieve that goal, investigations are done on a digital SPOT-image covering about 3,600 km² in the Lubumbashi area of southern Shaba (Zaire) and dated 04 June 1986 (124-373). The satellite data are compared with field observations and with interpretations of conventional panchromatic B&W aerial pictures on scale 1/40,000 and dated 13 and 19 May 1954 (E'ville 2629-2636 and 2528-2536).

Lubumbashi is the capital of Shaba province and a booming town; its population quadrupled from 133,017 inhabitants in 1954 to 553,510 inhabitants in 1984 (WILMET & SOYER, 1982; SOYER & WILMET, 1983; LOOTENS DE MUYNCK, 1985). MALAISSE & alii (1980) estimated the annual deforestation caused by the Lubumbashi population's need for charcoal at 140 km² in 1980. According to SOYER & ALEXANDRE (1987) a subcircular area of 1,700 km² around Lubumbashi was already affected by deforestation in 1985.

To avoid the expansion of the human influence during the time gap between the taking up of the aerial pictures and the satellite image as much as possible, a remote test area covering 250 km² is chosen. It is part of the basin of the Upper Kifumanzi and located at some 40 km to the NNE of Lubumbashi, quite far from the railway and the road to Kolwezi and from the road to Kasenga.

ENVIRONMENTAL SETTINGS

The Kifumanzi River is an affluent of subsequently the