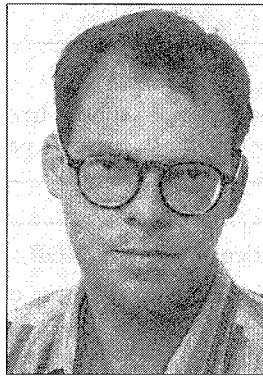## Dissertation

Alfred Colpaert successfully defended his PhD-thesis in Geography; *'Satellite data and environmental GIS, from remotely sensed data to geographical information'* on May 30th 1998, at the University of Oulu, Finland.

Colpaert (b. 1957) comes from Kruiningen in the Netherlands and he has studied at the universities of Utrecht and Oulu. At the latter university he has been employed since 1986. Since 1995 he has collaborated with the reindeer research station at Kaamanen (Finnish Game and Fisheries Research Institute) on themes related to reindeer pastures. This co-operation has resulted in the mapping of the winter pastures of reindeer management areas in Finland using remote sensing and GIS techniques. The work is now extended also to map the summer pastures.

His doctorial thesis is based on the following papers:

I. Colpaert, A. 1993. Land use mapping with Landsat 5 TM Imagery: a case study from Hailuoto, Finland. – *Fennia* 171 (1): 1–23.

II. Colpaert, A., Kumpula, J. & Nieminen, M. 1995. Remote sensing, a tool for reindeer range land management. – *Polar Record* 177: 235–244.

III. Kumpula, J., Colpaert, A., Kumpula, T. & Nieminen, M. 1997. Suomen poronhoitoalueen talvilaidunvarat. (English abstract: The winter pasture resources of the Finnish reindeer management area). – *Kala- ja riistaraportteja* nro 93.

IV. Colpaert, A. & Tornberg, R. 1996. Modeling winter habitat of goshawks (*Accipiter gentilis*) using GIS and remote sensing. – *In: Second Joint European Conference & Exhibition on Geographical Information, Barcelona, Spain 1996, Conference Proceeding*, pp. 447–456. IOS Press, Amsterdam.

Abstract: The goals of the thesis were to study the use of medium resolution satellite data for land use/cover mapping in high latitude areas and to assess the value of satellite imagery as a data source for use in Geographical Information Systems (GIS). All four papers were based upon land cover classifications of Landsat TM imagery. Paper I was a general purpose land use inventory of the island of Hailuoto. Papers II and III dealt with the inventory of the Finnish reindeer herding area. Paper IV was concerned with the habitat use of goshawks. Extensive field data sets were used as ground truth for the supervised classification and final accuracy assessment. The classified images were integrated in the ARC/INFO GIS system for visualization and spatial analysis.

For land cover studies in northern Finland, Landsat TM images proved to be a valid data source. Landsat TM images were of medium spatial resolution (30 meter) which make them suitable for monitoring large areas. The spectral resolution of Landsat TM was able to distinguish between the major boreal forest types. Temporal resolution of all passive remote sensor systems measuring reflected solar energy was limited due to cloudiness and the short duration of the summer in northern areas. The major problem encountered was related to inaccurate classification of mires. To improve accuracy, an algorithm based on ARC/INFO raster functions and peat land raster data was developed. By combining satellite data and other spatial data sources in a GIS-remote sensing environment accurate land cover information can be generated at reasonable cost. These data can be used as input for further spatial analysis and modeling.