

INVITED SPEAKER PRESENTATION

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# GIS in vector borne diseases

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From Parasite infections of domestic animals in the Nordic countries – emerging threats and challenges. The 22nd Symposium of the Nordic Committee for Veterinary Scientific Cooperation (NKVet) Helsinki, Finland. 7-9 September 2008

## Introduction

Since its origin in the late 1980's, the development of geographical information science and of geographical information systems (GIS), the toolset enabling to conduct this type of research, has now reached the necessary maturity to be considered a main stream application: GIS evolved from the status of 'a promising tool' to the status of 'a tool achieving its promises'. To maintain this status the entire chain of events from data collection to data analysis must be adapted to the specific needs and requirements of spatial analysis.

## From spatial data sampling to spatial information systems

Avia-GIS is a consulting company specialized in the development of agro-veterinary and public health information systems. In Figure 1 below the developed approach enabling the integration of the different steps required for the development of data driven spatial information systems is depicted. In this paper a selection of obtained results are shown when applying this approach to the field of vector borne diseases.

First the principal of statistical spatial distribution models is highlighted using the example of *Rhipicephalus appendiculatus* in Kenya, a tick transmitting East Coast fever in cattle. The need for representative ground data obtained using a robust spatial sampling strategy is highlighted and the example of how this was achieved in MODIRISK, a project aiming at mapping mosquito species and biodiversity patterns in Belgium, is given.

Spatial model outputs using observed presence and absence data for *Aedes albopictus*, an invasive species in (Southern) Europe, obtained through an international network of scientific collaborators, are then compared to potential distribution maps computed using a multicriteria

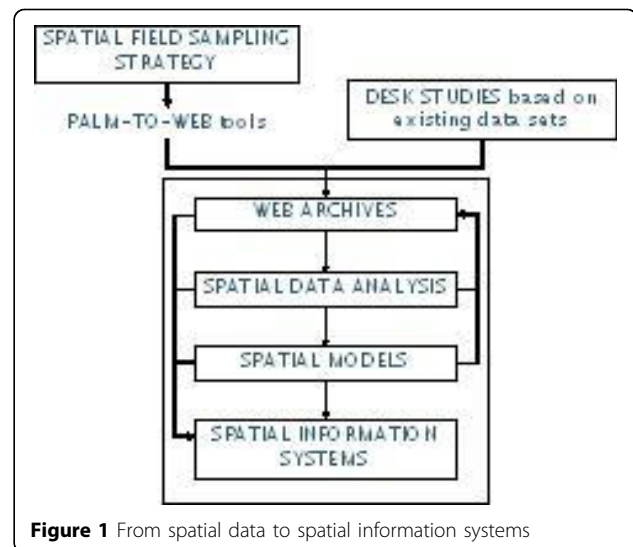


Figure 1 From spatial data to spatial information systems

decision analysis approach (MCDA) based on expert knowledge. The limits and complementary value of both approaches are discussed.

The impact of wind on the dispersal of airborne vectors of disease is illustrated using as an example the current invasion of Europe by bluetongue (BTV8) through endemic midges. Understanding these dispersal patterns is an important step toward adding a dynamic component to such models and increase their predictive potential as part of planning tools for control measures: e.g. protection of cattle through focussed vaccination. Ongoing work on the development of an airborne trapping device will further improve our knowledge of the 3D distribution patterns/ behaviour of the airborne midges and therefore the quality of the developed models.

Finally the example of Vet-geoTools is used to show how an integrated spatial veterinary information system

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can contribute to the improved management of veterinary outbreaks.

### Conclusion

It is concluded that the development of such an integrated approach using state of the art tools is essential to extract maximal value of geographical information science outputs. This can only be achieved through combining state of the art research with state of the art tool development: a perfect meeting place, and play ground, for academic groups and innovative SME's.

### Further reading

Information on all projects and outputs mentioned above can be downloaded directly from the Avia-GIS website at: <http://www.avia-gis.com>

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