

MASOOR in the Alpine Areas: Agent-based Modelling as a Tool for the Management Planning in Natura 2000 Sites

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Introduction

The European Commission is establishing a network of biotopes and habitats – called Natura 2000 – by decree of two directives, which all member states must comply with. Once established, adequate management shall ensure a favourable conservation status. Two research programmes founded by EU-grants, one in the Netherlands, Great Britain and France (called PROGRESS) and one in Austria, Slovenia, Germany and Italy (called AlpNaTour) are designing and assessing management plans in intensively used recreation and tourism areas. Both projects try to find cost efficient tools for data collection, analysis and management in different ecological environments (see Pröbstl et al. 2005, Elmauer et al. 2005).

In PROGRESS the research team used the agent-based modelling very successfully to show and to predict further deterioration in the protected sites. There the applicability of GPS, aerial photos, and agent-based modelling with the MASOOR program have been tested (Visschedijk & Henkens 2002). Against this background, the question was whether the use of the agent-based modelling could also be adapted to an alpine environment.

The alpine space is characterised by its close association with nature, several rare species and natural habitats of European significance, and a high proportion of conservation areas. It also hosts more than 120 million tourists a year, making it one of the most important leisure and recreation areas in Europe. Many leisure activities can

be pursued, and the economic potential is high. The sensitivity of alpine habitats and biotopes as well as the susceptibility of many species to disturbances, may lead to the potential for conflicts between the various land uses, especially tourism and conservation. The division of large, high quality habitats by regional and national borders adds further challenges to the planning processes and their implementation. Furthermore the alpine area is characterized by different activities like hiking, rock climbing, cross country skiing and others. Often, access to the mountainous areas is facilitated by cable car.

The management plan is the adequate and required instrument to protect Natura 2000 sites in the alpine environment. It should integrate ecological, social and economic interests. Progress on these issues requires a solid data base about ecological, local social, and visitor information, as well as analytical tools that integrate these data effectively into the planning process. Therefore we tested whether agent-based modelling could be a suitable tool for the management planning process in the alpine area.

Methods

To test agent based modelling in an alpine environment two test sites were chosen. The modelling was adapted for hiking in high mountainous areas at the Schneeberg and for crosscountry skiing at the Ötscher both located in the last foothills of the Alps about 150 kilometres southwards from

Vienna in Lower Austria. In both cases the model is based on GIS-mapping, an inquiry via questionnaire and GPS- information.

Results

Basically the combination of GPS and agent-based modelling is a suitable and helpful tool in several different locations and for different activities. The main advantages can be described as follows:

The operating expense for the data collection for the management planning process can be reduced. Furthermore agent-based modelling also contributes positively to a participatory planning process, because the use and the distribution of different user groups in the site can be visualized. Compared to a simple GIS based mapping, the disturbance and the regional distribution during the day or the season can be shown.

On the other hand there was a need to adapt the MASOOR program to the different ecological conditions and sites in the alpine area. An adaptation of the database for the model was necessary concerning

- the attributes of the paths,
- the different user groups,
- the access to the area (for ex. by cable car),
- the influence on the protected habitat types,
- the types of possible deterioration.

In summary, these new technologies offer promising directions, but significant amounts of further research will be needed to support the planning process in various protected sites all over Europe.

The use of agent-based modelling makes a remarkable contribution to reduce costs of the planning process.

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