

The Impact of Policies on Land Use

Developing Indicators for Environmental, Social and Economic Sustainability

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The European Commission (the executive agency of the European Union) seeks to improve its understanding of the impact of policies on sustainability. Therefore, it is sponsoring a large research project called SENSOR, aimed at designing tools for the *ex-ante* evaluation of policies related to multifunctional land use. In other words, the project develops methods to predict the impact of such projects on sustainability – seen under its social, economic and environmental aspects.

The project is implemented by a consortium of 35 research institutes from 15 EU member countries; this consortium was later expanded to include 6 institutes in China and Latin America, in order to develop a more comprehensive toolbox which can also be of use outside Europe.

A central concern in SENSOR is the identification and modelling of suitable indicators for sustainability. Two sources are used for identifying indicators: one from the world of policies, the other a scientific concept from the discipline of landscape ecology. The policy document is the Impact Assessment Guidelines of the European Commission; it contains a large number of ‘issues’ which are considered relevant aspects of sustainability. The scientific concept is that of land-use functions; nine of these have been defined. Based on these two sources, a draft list of potential indicators has been drawn up, ranging from aggregate income (economic) to tourism pressure (social) and nitrate deposition (environmental).

The problem now is to model the impact which policies might have on each of these indicators, which impact we are expected to project for each of 570 regions in Europe. A set of models is used to do this, including a macroeconomic model, sectoral models for agriculture and forestry, and *ad-hoc* models for tourism, urban development, and transport infrastructure. These models are linked to each other and to the land-use simulation model CLUE. The output of these various models is partly in the form of scores on variables at different spatial levels, partly in the form of land-use change on a grid of 1-km² cells. This output is then included in equations modelling each individual indicator. The impact of land-use change (triggered by a policy) on a particular environmental indicator, for instance, is based on the characteristics of the location in combination with such variables as deposition of nitrates in the soil or groundwater extraction rates. For social and economic indicators, however, land use change is less important as an intervening variable. There, the causality is mostly parallel: a policy may lead both to reduced employment in agriculture and to abandonment of agricultural land.

The most interesting aspects of the project (and also those which contain the greatest potential for tension) are the linking of different models, the interdisciplinary approach, and the ambition to make the system user-friendly to policymakers. Those challenges are still being met: the project is due for completion by the end of 2008.