

Mapping scenarios Modelling and designing future land use

Summary

Land use models are important tools for gaining insight into the spatial consequences of policy proposals and spatial interventions. Design exercises can throw up inspiring images that stimulate creative thinking about spatial development issues and how to resolve them. When exploring future land uses, therefore, combining modelling and design methods can be highly rewarding.

Background

Modelling land use is not in itself a new phenomenon, but the models have changed dramatically over the last few decades. Developments in computer technology and geographic information systems have brought the possibility of making 'maps of the future' within easy reach.

Such models have been used a number of times in the development of Dutch policies, but they have never been used in combination with design exercises. The Netherlands Institute for Spatial Research decided to investigate what could be gained by combining the two approaches. The main research questions were: How can spatial scenarios be constructed using various modelling research and design methods? How comparable are the resulting scenarios? In what ways do the methods correspond, or are they entirely different? To what extent can the methods be combined to form a new approach to planning? Answers to these questions were sought in a study of the future of the rural areas in the province of Noord-Brabant.

The three methods

The case study employed three methods, which were then compared: land use modelling using the Land Use Planner (*Ruimterscanner*), spatial design using the Rasterplan program and the AGORA method of spatial design.

The *Land Use Planner* integrates existing spatial data and model forecasts to produce a map showing the possible future use of space. The model takes account of the degree to which a location is suitable for a certain use. It can be used to explore competing claims on the use of land, analyse problem areas and estimate the spatial impacts of policy measures. The Land Use Planner produces output at regional and higher scales. A limitation of the method is that it cannot be directly linked to the scale at which the spatial processes actually take place.

Rasterplan is a software package for allocating future land use claims to specific locations. Quantitative claims on land arising from a scenario form the specifications for the design; the qualitative aspects of the scenario may also provide guidance. Future locations for housing, employment and nature conservation were determined by consulting the New Map of the Netherlands (*Nieuwe Kaart van Nederland*), which incorporates all adopted plans and projects as well as existing land uses.

The AGORA method does not concern itself so much with mapping the most plausible future, but seeks to visualize a spatial concept within the limits of the stated objectives. Using baseline geographical information the designer analyses the study area and develops initial ideas for achieving the stated objectives. The underlying principle in this analytical, GIS-supported allocation method is the multifunctional use of land.

Similarities

Important similarities between the modelling and design methods can be found in the nature of their results and the use to which they can be put. None of the methods produce an exact forecast or detailed plan for the future. The results are maps that can be used as tools for structuring information and ideas about the future use of space at regional and higher scales. All the approaches examined are able to translate a quantitative spatial planning task into a land use scenario.

Differences

There are also considerable differences between the methods. The Land Use Planner relies on the user to define the locations suitable for certain types of land use within a scenario; the final allocation of uses to locations is performed by an allocation algorithm. In the Rasterplan and AGORA methods it is the user who determines how land uses are allocated. The design-led approaches, therefore, give the user a greater role and more freedom of choice than the Land Use Planner method. But this also means that the results of the design-led methods are more difficult to check and reproduce. The Land Use Planner program – and to a lesser extent the Rasterplan program – requires a considerable dataset in order to work properly, whereas the amount of available data is much less of a constraint in the AGORA method, in which the final result depends much more on the creativity and regional knowledge of the designer. Lastly, the three approaches work at clearly different scales: the design-led approaches are primarily suitable for the local and regional scales, while the Land Use Planner is most effective at a regional or national scale.

Applications

The Land Use Planner was found to be more suitable when the plausibility of the output is a key concern, for example when existing spatial trends are projected forwards or when the pattern of land uses in different scenarios must be calculated in a consistent manner. The model can also play a significant role in determining the potential impacts of spatial interventions or different policy options. Design-led approaches are better for generating new solutions and are more appropriate where the element of uncertainty is greater, as in studies for regional restructuring, developing alternative policy options and visualizing spatial development scenarios. Mapping spatial development issues in a way that brings them to life is more important in these cases than attempting to provide an accurate or most probable spatial scenario.

New opportunities for planning

The research reveals that combining a modelling approach with a design approach can be highly rewarding. Where, for example, the Land Use Planner indicates a high degree of uncertainty surrounding the future of a particular area, a design approach can be used to zoom in on that area and generate possible solutions. These can then be entered as options for analysis by the land use model. This interaction between analysis and potential design solutions raises their overall performance to produce more profound and convincing analyses and more elegant, creative solutions.