

Combining GIS with Fuzzy Logic and Scenario Planning to Deal with Demographic Change. A Case Study on Medical Supply in Rural Germany

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SUMMARY

Demographic transition in rural Germany is characterized by aging and population decline and poses daunting challenges for all levels of administration. It leads to far-reaching consequences on the local level, for example with regard to the infrastructures of medical, social and technical care. An appropriate handling of demographic change requires tools that are able to deal with its spatial and temporal variability as well as its scale dependency. Geographic information systems (GIS) are suitable as a basis for corresponding software solutions; at the same time, the extension of existing GIS functions appears necessary. For demographic transformations on the local level, especially uncertainties and fuzziness regarding future developments and/or the incomplete data situation pose challenges that have to be taken into account by proper tools. In this paper, the utilization of fuzzy logic and scenario planning for the extension of GIS in the above-mentioned context is introduced and a case study is used to describe its combined application. The case study focuses on medical care for aging people in rural Bavaria. The implementation uses the combination of several software packages: QGIS, Parmenides EIDOS, and self-developed DEWIS loc.

By using fuzzy logic, scenario planning and GIS jointly, human decisions can be taken into account in the analyses and uncertainties can be countered. In the case study presented, the linking of the individual software tools was loose. We intended to develop a more integrated software in the sense of a spatial decision support system. A core challenge on the way to a spatial decision support system for municipal planning is the identification of more suitable threshold values and their processing with fuzzy logic.

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