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Mitigation of land use conflicts in the surroundings of urban areas taking geology into account

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Due to their limited availability, the use of natural resources like groundwater, sand, gravel or soil often generates conflicts between different interest groups. These conflicts intensify in areas around growing cities, where space becomes increasingly valuable. As the resources mentioned above are related to geological structures, the key to mitigate these conflicts is the knowledge about the subsurface. To favour a sustainable use of geo-resources, the information of the subsurface has to be presented in a way that even non-experts who are usually involved in land-use decision processes can easily understand it.

An appropriate method was developed and tested in the south of Frankfurt (Germany) and is currently in use for the surroundings of Zaragoza (Spain) and Belo Horizonte (Brazil). In a first step, the available geological information is collected and a conceptual model of the geology established. These data are then processed and visualised with Gocad, a modern state-of-the-art 3D visualisation software, especially suited to fulfil geological requirements. However, this 3D model is not created automatically but geological expert knowledge which is integrated in the conceptual model serves as modelling constraint. Based on this geological model, valuable information like the volumes of exploitable deposits of sand and gravel or statements about the groundwater vulnerability can be computed easily. An example about the application of the Hölting Method for estimating the groundwater vulnerability in a porous aquifer using 3D-information is given.

The information derived from the 3D model can be made available through thematic

maps and introduced to a spatial planning process. However, information from other thematic maps regarding economical or ecological parameters is important as well and thus an integrative evaluation which takes into account all aspects is necessary. Therefore, a Spatial Decision Support System was conceptualized and implemented into a Geo Information System