

Chapter 21

Assessment and Management of Suburbanization Pressure on Landscape in the Munich Region



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Abstract In growing cities and suburban regions, availability of resources and landscape quality is becoming increasingly scarce. We present an analytical exploration of the remaining suitabilities and of the spatial boundaries for further settlement and infrastructure development in the highly dynamic and densely populated region of Munich in southern Germany. We processed existing geodata, land use data and environmental data on the regional scale to determine the remaining potentials and limitations for further settlement development. In doing so, gradients of high to low suitability as well as areas of strict exclusion were distinguished. These generalized and region-wide results were applied and assessed in detail in a subregional development process. There, cross-disciplinary work and inter-municipal coordination were fundamental prerequisites to substantially foster the steering of land use and the avoidance of unstructured growth, resource exploitation and landscape degradation. The political will for landscape preservation strategies and the courage for increasing cooperation in spatial development are the fundamental prerequisites from the municipal to the state level. In the past, several associations for landscape protection were established in the Munich region. Facing the ongoing strong settlement growth, decisive collaboration, enhancement and extension of those activities and initiatives will be required. To support such activities, the above-mentioned spatial analyses and scenarios in inter-municipal processes, projects and regional spatial planning have to be applied and deepened in order to consolidate these processes instead of remaining or falling back into local individualisms. Those are by no means suitable to master the spatial and environmental challenges of today.

Keywords GIS · Inter-municipal cooperation · Landscape quality · Landscape protection · Land use · Regional planning · Spatial development · Spatial planning · Settlement and infrastructure development · Suburbanization · Urban sprawl

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21.1 Introduction

The greater Munich Region (or Planning Region 14), comprised of the city of Munich and 186 municipalities in Bavaria, Southern Germany, is one of the fastest growing regions in Germany and in Europe. The stark growth observed, e.g. in the past decade (inhabitants +16%) has resulted in a strong pressure on the region's landscape, natural and cultural resources, intensification of land use and threats to the quality of life. Most of these changes have been driven by population growth and movements, and in consequence settlement and infrastructure developments (Mattos 2007). This tendency will continue at least in the near future, as for the whole region about 350,000 new inhabitants are predicted from 2015 to 2035 (Bayerisches Landesamt fuer Statistik 2019). The scarcity of developable land within the boundaries of the city of Munich has led to extremely high property prices, increased requirements on technical and social infrastructure and restrictions on the ability of low-income populations to settle in Munich (Clark and Moonen 2014). As the city runs out of space for settlement growth, the housing backlog increases, dwelling and settling of companies in the suburban space becomes an alternative, with additional pressure on the regional landscape, increasing travel distances and competition for the most attractive locations.

In this article, we present three approaches related to this complex challenge: (a) the development of GIS suitability models to point out the restrictions as well as to assist in detecting the remaining environmentally compatible settlement potentials, (b) the cross-disciplinary and inter-municipal awareness-rising and steering of further growth and (c) the politically supported establishment and networking of regional landscape initiatives.

21.2 GIS Suitability Models

In face of the Munich Region's planning challenges, intensive spatial data processing is required, where logical sequence of tasks (geoprocessing workflows) must be performed and documented. Geographic information systems (GIS) are essential in this effort, providing the necessary tools for spatial analyses. GIS models facilitate and increase the efficiency of geoprocessing by automating the workflows. *ModelBuilder*, a component of Esri's ArcGIS platform, is a visual programming language for interactively building geoprocessing models on a graphical interface (Allen 2011) (Fig. 21.1). Easy to use, it allows to create and change models by connecting individual geoprocessing tools into a workflow.

Using data created for the Landscape Development Concept of the Munich Region LEK14 (Regierung von Oberbayern 2009; Schaller and Schober 2007), and based on the development goals and principles defined by Bavarian authorities, a framework of GIS models was created to assess settlement suitability and potential future settlement development scenarios in the region, updating and upgrading

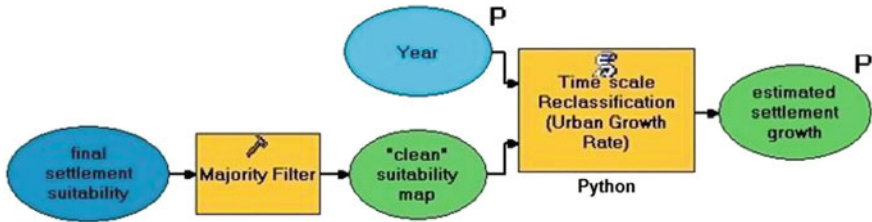


Fig. 21.1 Example of geospatial model in *ModelBuilder's* graphical interface

existing preliminary models, testing technologies and methodological approaches that could contribute to the regional planning (Mattos 2007; Schaller and Mattos 2009; Schaller et al. 2009).

Ten settlement development models were designed and implemented in ArcGIS *ModelBuilder*: (1) eight 'individual' suitability models address relevant aspects of settlement development (exclusions, restrictions, physical environment suitability, land cover/land use suitability, socio-economic suitability, proximity to infrastructure, proximity to recreation and scenery beauty) (Fig. 21.2); (2) one main

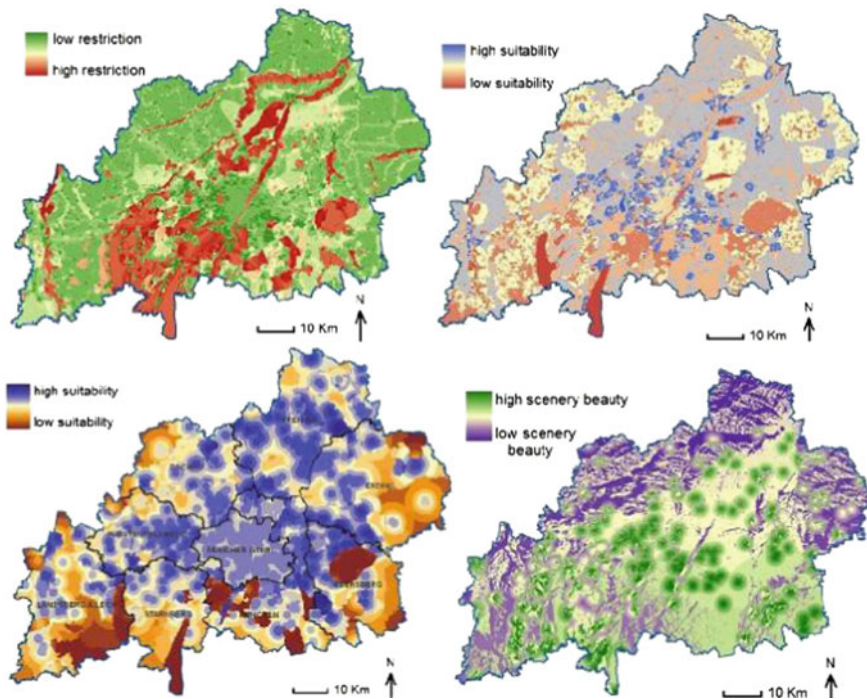


Fig. 21.2 Examples of individual suitability models: restrictions (top, left), land use (top, right), socio-economic (bottom, left) and scenery (bottom, right)

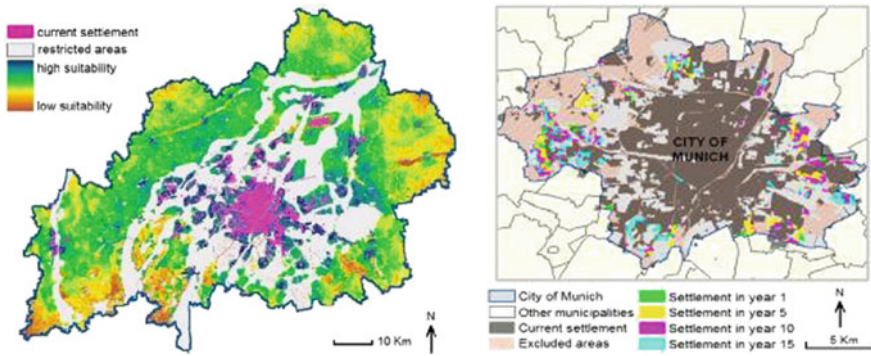


Fig. 21.3 Main suitability model (left) and example of suitability-based spatial allocation of new settlements for a population growth scenario in the city of Munich (right)

suitability model combines and weights the outputs of the eight individual models, adjusts them to each of the four intra-regional groups of municipalities identified with distinct characteristics and development trends and generates a settlement suitability map for the region (Fig. 21.3); (3) a final ‘dynamic’ model adds a timescale to assess the potential future settlement development in the region based on the suitability mapping and on different prognoses of population growth—‘high migration’, ‘stagnation’ and ‘airport expansion’ (construction of a third runway) scenarios.

21.3 Application in a Subregional Spatial Development Process

These analytical and generalized results were applied and exploited for the north-eastern part of Region 14, the area surrounding the Munich airport (Sweco GmbH et al. 2017). The aim was to determine the effects of the expected growth upon inhabitants, transport and spatial quality and to propose adequate actions. Based on the data of LEK14, on the study presented above, and with additional data sets, e.g. from traffic forecast, we examined (1) how population, economy, workplaces and traffic will develop prospectively until 2030, (2) the resulting challenges for spatial planning in the fields of settlement and transport as well as for nature, landscape and land consumption and (3) the resulting fields of action and possible measures to solve conflicts and to master the current and prospective challenges.

We performed a survey among the participating municipalities, where we asked for their policies in settlement development, for their approaches in solving problems caused by steadily increasing traffic and for their efforts to preserve agricultural land use, nature and landscape.

The analyses of the survey results showed that the municipalities exhibited only few activities to guarantee a long-term sustainable spatial development. Above all, their readiness to collaborate in committed problem-solving was very low in rural parts of the region and somewhat higher in developed and suburbanized areas, probably because of higher pressures as well as the insight that one municipality alone will not master these complex challenges any more.

In a series of feedback workshops and future workshops with mayors, county officials, large companies and superior authorities, a common understanding of the spatial qualities, of the common challenges and main targets for the subregion's future was developed.

As a method for getting a common understanding of the subregion, a set of scenarios (business as usual; rigorous land-saving; development along public transport axes and public transport nodes; Fig. 21.4) was elaborated and discussed. It turned out that there is a common will to find sustainable solutions in the sense of the third scenario, being considered achievable through joint efforts. An urgent task is to overcome the 'egoisms' of the individual municipalities and to establish a stronger common regional planning policy with sound steering functions going beyond the communities' administrative boundaries, rather than a regional plan that predominantly collects the merely individual intentions of the municipalities. Together *fields of action* and finally *recommendations for actions* were prepared by the experts and then discussed, refined and suggested to the political and administrative representatives.

Workshop discussions of the scenarios in Fig. 21.4 showed that scenario 3 was favoured by almost all political representatives. Whilst scenario 1 implies a continuation of planning only on the level of the individual municipalities, and finally badly ordered suburban structures, scenario 2 implies the contrary: any further use of open space for settlement development as well as any extension of roads would immediately be stopped in favour of a concentration of development inside the urban fabric and in favour of a consistent extension of public transport systems instead the motorized individual traffic.

The clear vote for scenario 3 resulted, on the one hand, from safety mindedness (wish for continuation of the high economic prosperity) and, on the other hand, from the insight that current problematic trends in land use and traffic will require changes in political decision processes and consequently in planning. Therefore, scenario 3 was considered a compromise between continued growth (housing, commercial and industry allocation) and a stronger sustainable, resource-saving development, well-ordered spatial structures and landscape preservation.

Which steps are required to put scenario 3 into practice? In the next chapter, we will present how municipalities of the Munich Region tried to preserve landscapes in the past and until today. Many municipalities are engaged in the preservation of exceptional landscapes but at the same time they still consider the 'normal landscapes' just a spatial resource, if not an obstacle for settlement development. Facing the ongoing suburbanization processes and still growing traffic problems, however, we will furthermore argue where the municipalities and the region as a whole

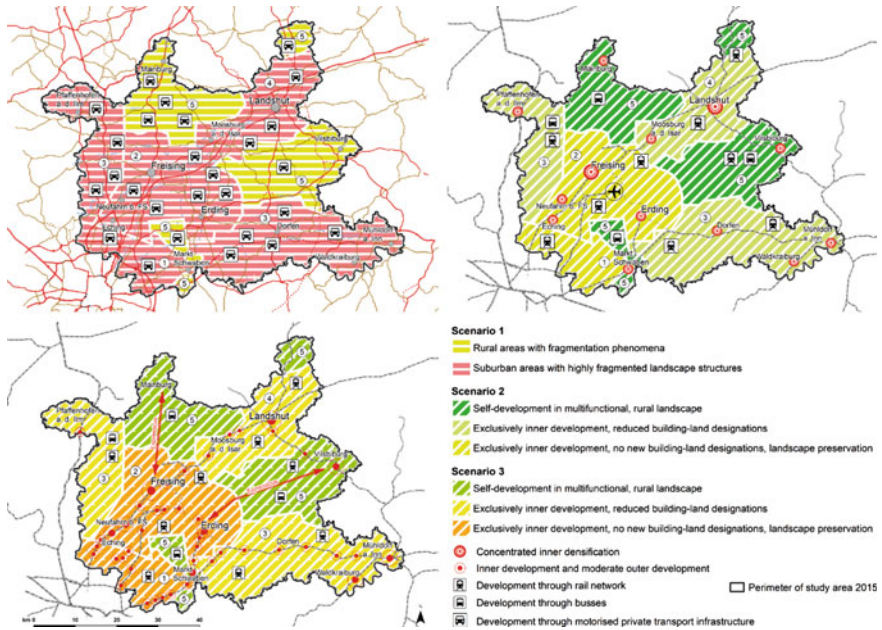


Fig. 21.4 Three future scenarios for a subregion north-east of region 14 Munich. Top left: scenario business as usual (1), with ongoing uncontrolled suburbanization, driven by motorized individual transport. Top right: contrast scenario (2), with rigorous land-saving and change to public transport systems. Bottom left: realistic scenario (3), development along public transport rail axes and rail nodes, with directed and qualified settlement development in subcentres and with preservation of extensive regional open spaces

should go in the long run in order to conduct environmental preservation in the entire remaining open space.

21.4 Regional Strategies for Preservation of Open Spaces and Landscapes

In the past decades, municipalities of different subregions around Munich had founded landscape associations: Isar Valley Association; Heathland Association; Dachau Moss Association; Association for Recreation Areas (Isartalverein 2019; Heideflaechenverein 2019; Erholungsflaechenverein 2019 and Verein Dachauer Moos 2019). The associations’ purposes are the protection of outstanding landscapes against pressure from settlement growth, from road construction or from negative effects of recreation, but as well to offer the growing population suitable spaces for recreation. The meaning of those landscape associations is invaluable, as they effectively preserved substantial open spaces from being suburbanized or

overexploited in other ways. Doubtlessly the regional tradition of landscape associations is a great success story, a great benefit and a valuable heritage for the region.

However, the pressure in its different manifestations still holds on and even gets stronger. For example, some municipalities feel forced to modify the boundaries of legal nature conservation areas in order to gain more space for the development of residential and business areas. Also, there are long lists of planned new road constructions or road extensions, evidently leading to even more motorized traffic and new settlement allocation in exterior areas. This is why the municipalities as well as the planning region should not just live from their former achievements: the preservation of typical, paradigmatic landscapes through the work of the landscape associations will not be enough anymore. Instead, the municipalities have to go further. They also have to increase the awareness for the 'normal landscapes' or the 'everyday landscapes', because they are particularly exposed to the urban sprawl. The foundation of additional landscape initiatives for normal landscapes however will become as important as those for the exceptional landscapes.

As very promising new examples, two subregions recently made big steps forward as the respective communities started inter-municipal cooperation (RES Regional Development Strategy Fuerstenfeldbruck County; Regional Management Munich South-West). They implemented coordinated land use planning processes by integrating landscape preservation, settlement allocation, infrastructure development and joint social infrastructure. Landscape preservation played a key role when these inter-municipal processes were set up. Now, the processes shall be continued, land use planning shall be done more jointly and greater consideration shall be given to landscape issues.

Together, the areas of the landscape associations and new spatial initiatives form a considerable network around Munich, as Fig. 21.5 shows.

Besides the territories of the landscape associations protected by agreement, there are also formally, respectively, legally protected areas based on nature conservation laws (like Natura 2000/FFH, Nature Conservation Areas/NSG, Landscape Protection Area/LSG) and on the Regional Plan (e.g. Greenways/Gruenzuege), as shown in Fig. 21.6. As mentioned above, the boundaries of at least the LSG do not seem absolutely secure. Similarly, and already more regularly, the Greenways' extensions are getting reduced little by little with each updating, not least because on the official maps they are not delimited by sharp boundaries but by open hatches. We realize that the protective status of restrictive legal categories is not absolutely guaranteed. Even there, open spaces tend to be reduced and landscape qualities as well as ecosystem connections and functions tend to be lost.

The tendencies of disappearance of open spaces depicted so far call for more emphasis especially on the societal and political level. For the realization of the commonly desired scenario 3 (compare Fig. 21.4 and explanations), as well as for effective long-term protection of open spaces, we consider the following political and organizational steps indispensable:

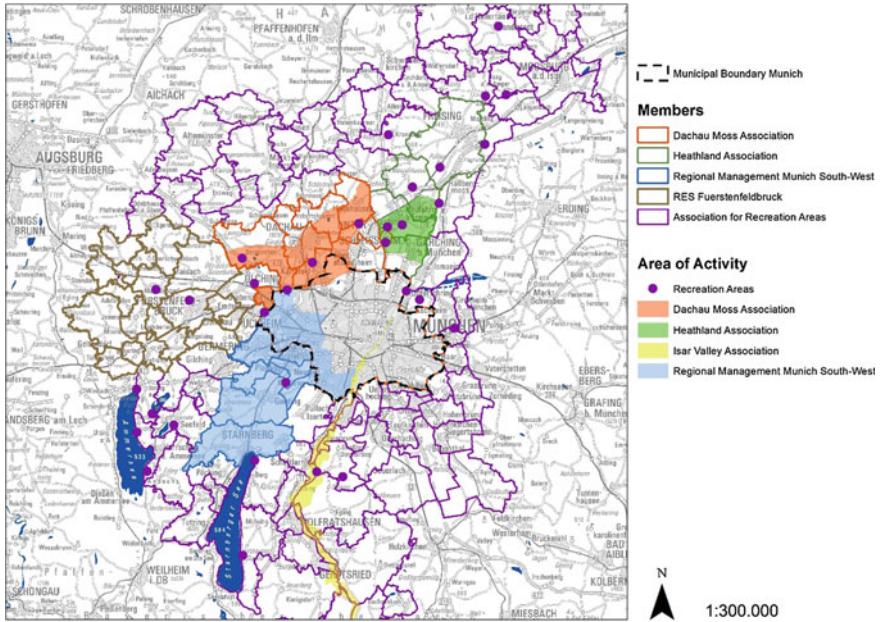


Fig. 21.5 Overview of the territories of the landscape associations as well as of new space-related initiatives (PSU, own cartography)

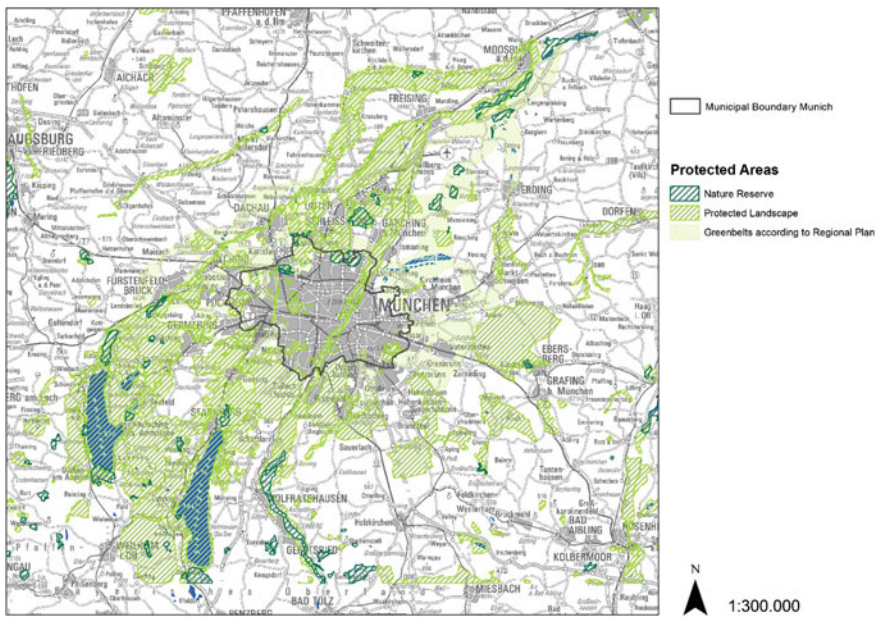


Fig. 21.6 Overview of legally protected areas and regional greenways (PSU, own cartography)

- Instead of just individualistic planning of the communities, inter-municipal planning policies should be established for all relevant types of land use, i.e. integrated spatial planning (like RES Fuerstenfeldbruck and Regional Management South-West). This will minimize competition, strengthen collaboration and synergetic effects among municipalities and will finally lead to better coordinated, more sustainable and clear spatial structures.
- For explicit consideration and awareness of the landscapes, the established landscape associations in the Munich Region should be developed further by connection and extension of their territories, as well as by connection of the associations among each other, and by integrating further regional initiatives and NGOs.
- The landscape associations' contributions, suggestions and demands to land use policy have to have a strong compliance within the planning activities of region and subregions. This will require some organizational and regulatory structures (governance mechanisms).
- In the sense of subsidiarity, governance mechanisms on regional and inter-municipal levels should be channelled and facilitated by the Federal State and the Federal Republic. Furthermore, effective spatial planning instruments along with clearly defined steering competences instead of ongoing deregulation are urgently needed.

To push ahead and to feed the political process, deepening professional studies should be carried out (see also above, GIS Suitability Models), such as spatio-temporal analyses, detection of patterns of land use change, potentials or losses of ecosystem services and capabilities, as well as joint recommendations for actions in landscape networks, land-saving settlement allocation and sustainable mobility systems. All those open spaces worth to be preserved should be clearly delimited in order to finally be saved, managed and enhanced for the next generations.

21.5 Conclusions

1. GIS suitability models help to identify and visualize suitable areas for settlement development, to locate and quantify consequences of alternative developments and to reduce uncertainties about the future.
2. They allow to integrate various information in a systematic way generating quantified, georeferenced, visual outputs.
3. They are invaluable foundations for effective spatial planning, for expert planning and for political decision support.
4. Inter-municipal processes with discussion of alternative development scenarios should be initiated as they can substantially strengthen the municipalities' awareness for joint responsibility and their capacity for action.

5. As a result, the foundation of landscape initiatives, landscape associations or the inter-municipal work on spatial strategies and management structures stresses the public importance and ensures continuous effort in landscape policy.
6. Participatory and integrative processes based on voluntary commitments cannot replace a top-down spatial planning system: in the long run, both approaches (subsidiarity principle) are indispensable for maintaining the quality of space and landscape.

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