

zones. The output from this indicator is a map showing the noise contours for the selected transport link (it could be road or railroads) in the study area.

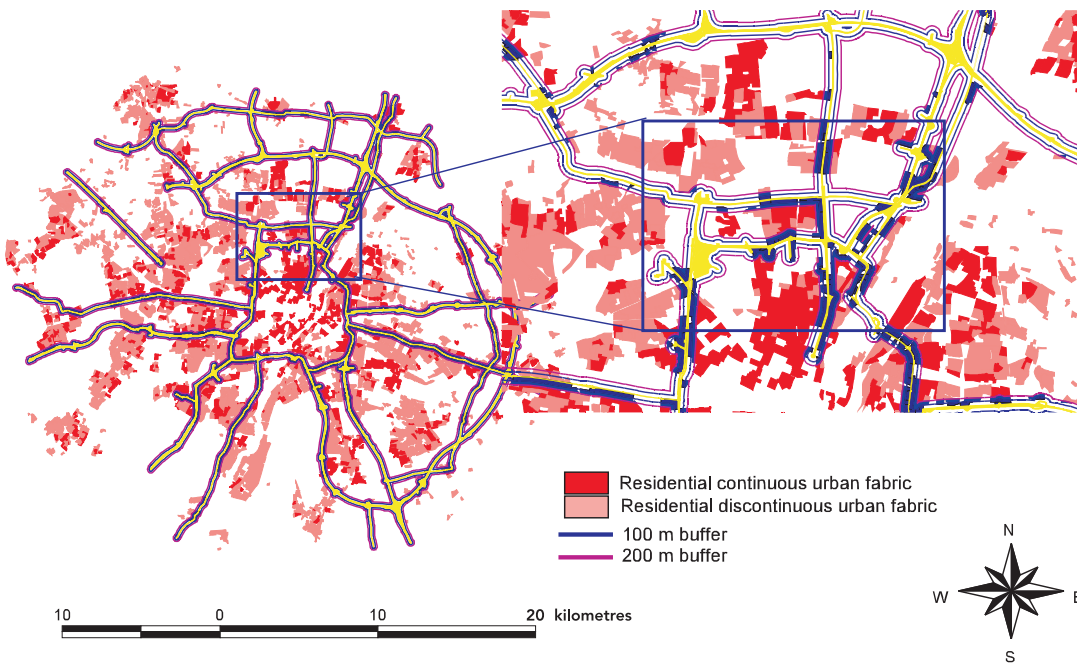
This methodology has been refined and simplified to provide support to the European common indicators project. Indicators B8 (noise pollution) is defined as

the share of population exposed to long-term high level of harmful environmental noise.

Within the Murbandy/Moland project a buffer around noise sources (Figures 5.28 and 5.29) has been calculated. It is immediately possible to calculate the population living within that buffer, and therefore exposed to high levels of environmental noise.

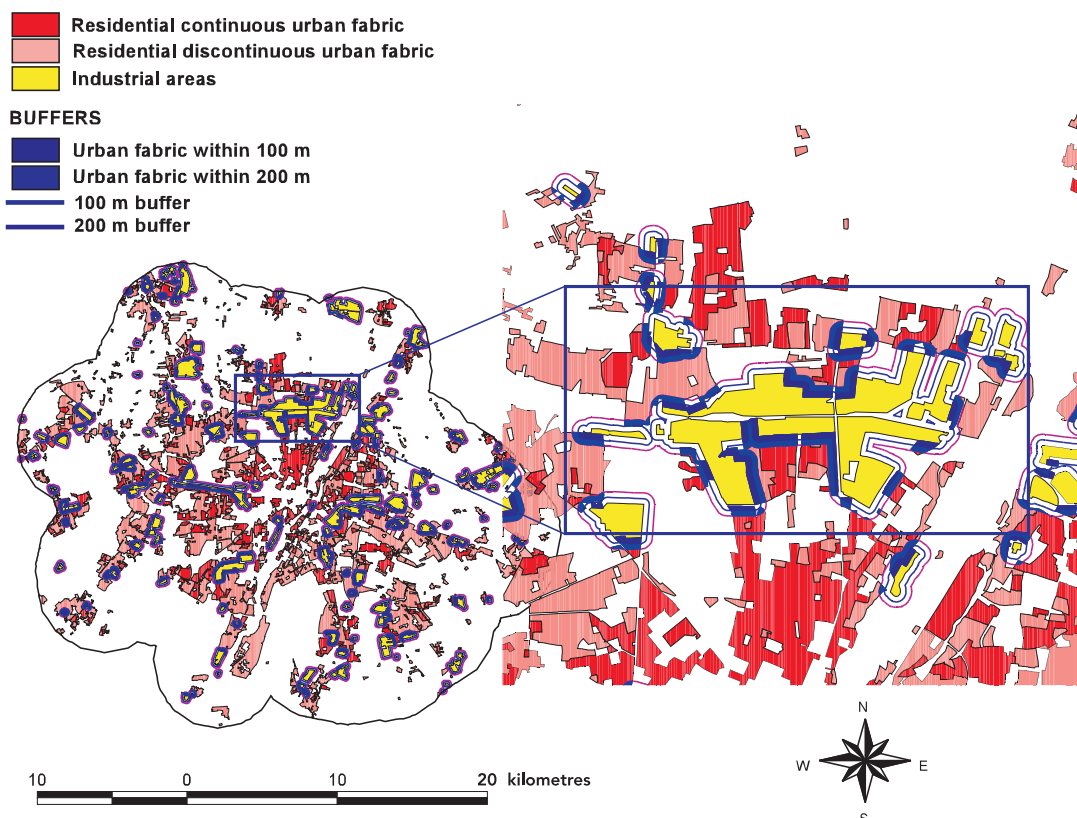
Munich — population to harmful noise from motorways

Figure 5.28



Munich — population exposed to harmful noise from industrial sources

Figure 5.29



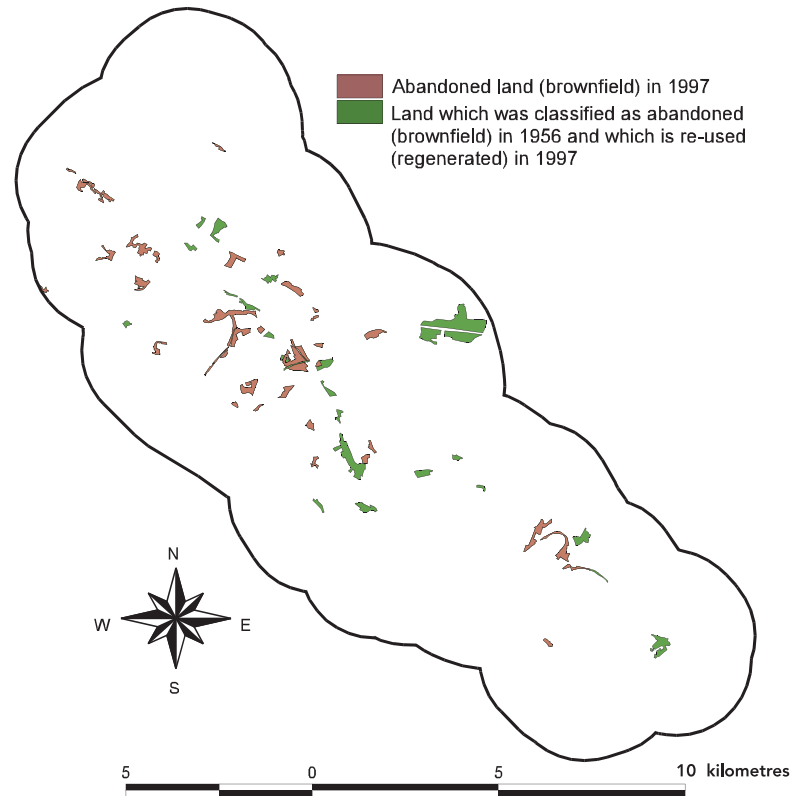
5.2.3. Indicator B9: Sustainable land use

This indicator represents sustainable development, restoration and protection of land and sites in the municipality.

A typical application of the Murbandy/Moland databases^{57e} for the computation of the above indicator is the identification of past brownfield sites, and their current re-use those.

Figure 5.30

City of Bilbao, Spain — brownfield development



Note: The picture displays in brown colour the current — 1997 — brownfield sites ('abandoned land'). The polygons with different colours represent land that was classified as 'abandoned' (= brownfield) in 1956, and that is now classified with a different land use typology. Every single coloured (except brown colour) polygon was brownfield in 1956. The legend shows the current land use class corresponding to each polygon.

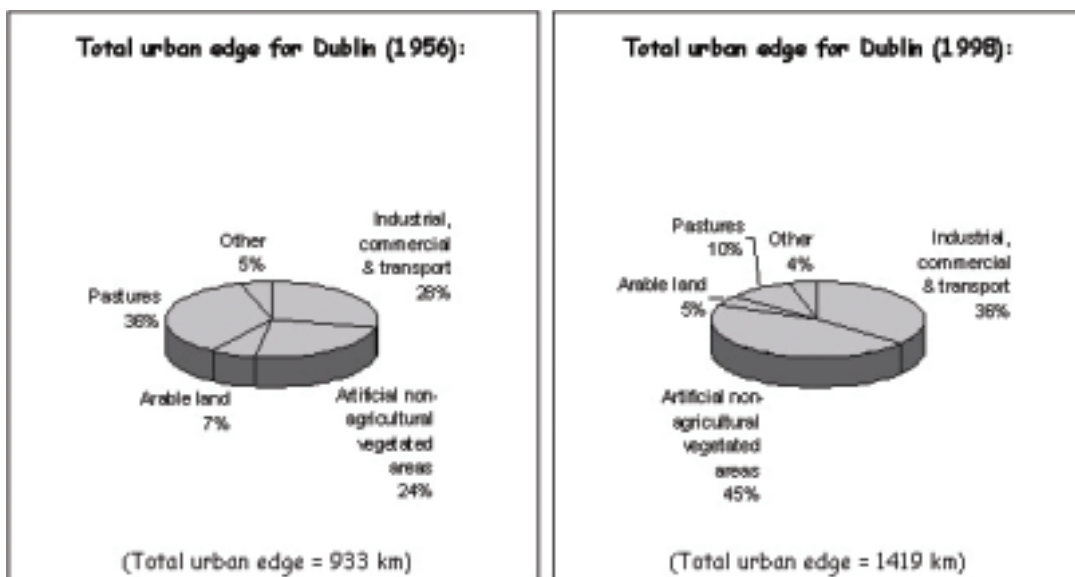
5.3. Fragmentation of urban landscapes

Analysis of changes in the spatial structure or 'fragmentation' of urban landscapes can provide a deeper understanding of the impacts of past, current and future EU policies on urban environments, and can thus contribute to the formulation of policies and strategies aimed at promoting sustainable urban development. By analysing the fragmentation of urban landscapes, basic indicators related to the quality of life for citizens, as well as information on the impact of urbanisation on nature and biodiversity, can be derived. By presenting the results of the fragmentation analysis in the form of maps and tables it is visually possible to compare different cities, and different parts of the same city, in terms of their landscape fragmentation characteristics.

Landscape fragmentation can be quantified by analysing the properties and configuration of the spatial elements or 'patches' that make up the landscape. As part of the Murbandy/Moland project, a methodology for quantifying and monitoring the fragmentation of urban landscapes is being applied to eight European cities — i.e. Bratislava, Dresden, Dublin, Helsinki, Milan, Munich, Prague and Vienna. In Murbandy/Moland, changes in landscape fragmentation are measured using a landscape structural analysis software (Fragstats) that has been adapted for use with the Murbandy/Moland land use databases. The software takes as input a raster map of the land cover types in the area of interest, and computes various metrics that quantify different aspects of landscape fragmentation.

Urban edge analysis for Dublin

Figure 5.31



One aspect of landscape fragmentation that is particularly important in urban environments is the composition of the 'total urban edge'. The total urban edge refers to the total length of the edge between the land use class 'urban fabric' and all other land use classes in the landscape. Analysis of the composition of the total urban edge is used to identify the land cover classes that are directly adjacent to urban fabric. This information can be used to derive indicators for comparing different cities in terms of, for example, the potential negative impacts of traffic corridors on residential areas. The change in the composition of the total urban edge in Dublin between the 1950s and 1998 shows a large increase in the amount of edge between 'urban fabric' and 'artificial non-agricultural vegetated areas' (i.e. mainly green urban areas). This indicates that much of the new urban fabric in Dublin has occurred adjacent to green urban areas, indicating more pleasant living conditions for citizens in these areas, but also the sprawl of residential functions.

'Edge-contrast' is a landscape fragmentation metric that reflects the degree of contrast between vegetated and non-vegetated surfaces: edges between vegetated and non-vegetated surfaces have high edge-contrast, while edges between vegetated and vegetated surfaces, or between non-vegetated and non-vegetated surfaces, have low edge-contrast. From the point of view of quality of life for citizens, areas of urban fabric that have high edge-contrast are generally more desirable than areas of urban fabric that have low edge-contrast. This is because living conditions are usually more pleasant for citizens who reside

next to vegetated areas (e.g. forest, green urban areas), than for citizens who reside next to non-vegetated areas (e.g. industrial areas, transport corridors). On the other hand considering the overall urban area an increase in edge may depict a dissemination of residential areas, and the phenomenon of urban sprawl.

Fragmentation maps, presenting the change in the spatial distribution of edge-contrast for urban fabric in Dublin, from 1956 to 1998, show that most of the new urban areas in Dublin have a high edge-contrast (as shown by green in Figure 5.32). This means that most of the urban development in Dublin has occurred next to vegetated areas, indicating favourable living conditions for citizens. However, it is also clear that most of the urban development in north Dublin (i.e. north of the River Liffey) has a low edge-contrast (as shown by cyan and blue). This means that most of the new urban fabric in north Dublin has occurred next to non-vegetated areas, suggesting less favourable living conditions for citizens. In fact, these results reflect quite accurately the contrasting socio-economic situations of the two halves of Dublin, which has traditionally been divided between the less affluent north and the more affluent south. Thus, north Dublin has significant areas of low-cost housing (including high-rise apartment complexes) and industrial and commercial developments, while south Dublin is largely characterised by expensive residential properties, generally located in green leafy suburbs, with many nearby gardens, parks, and sport and recreation facilities, sprawling throughout the adjacent rural hinterland.

Figure 5.32 Edge-contrast for urban fabric in Dublin

