A tool for improving land use: RUDIFUN

Arjan Harbers

What is the building density of your neighbourhood, how does it compare with those of other neighbourhoods and how can territorial evidence about building densities contribute to the ambitions of the No Net Land Take target?

PBL Netherlands Environmental Assessment Agency (Planbureau voor de Leefomgeving) has created a data set to use in comparing building densities nationwide and in conducting research on how building density influences various aspects of urban life, such as energy consumption, mobility, climate adaptation and public health.

Urban density is usually measured in terms of dwellings per hectare or inhabitants per square kilometre. These units, however, do not acknowledge the fact that dwelling sizes may vary greatly and that the urban fabric not only consists of dwellings, but also contains schools, shops, offices and factories.

That is why PBL developed the Spatial Densities and Mixed Use in the Netherlands (Rudifun) data set. For every urban block, neighbourhood and municipality, the data set provides the building density and the Mixed-Use Index, representing the extent to which residential uses are mixed with non-residential uses.

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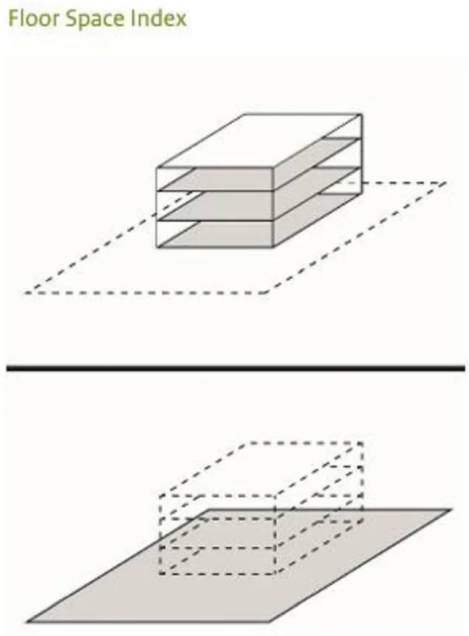
The Floor Space Index (FSI) provides the unit for building density, which is the gross floor space of the buildings related to the accompanying terrain surface. Instead of counting dwellings or inhabitants, it calculates the floor space of every building layer.

The initial version of the data set was released in 2019, and the data set is now being used widely in the Netherlands by researchers, policymakers, town and country planners, urban designers and architects. For instance, it has been used by municipal authorities

who can make comparisons between the brief of a future area development and existing areas with similar FSI and Mixed-Use Index values, and has been used to study the densification capacity of a given urban area.

Researchers may also use the data set to study the correlation between density or densification and real estate prices, travel behaviour or liveability. For example, researchers from Wageningen University and Research used Rudifun in a study of the correlation between urban fabric and carbon emissions. The Amsterdam University of Applied Sciences used the Rudifun data set to create a neighbourhood typology that can be used to allocate climate adaptation measures. PBL discovered that, in densely built-up municipalities, further densification leads to lower real estate prices, while, in less dense municipalities, densification leads to a price increase.

For instance, a building with five layers, each measuring 1 000 sqm, on a 5 000 sqm parcel has a building density of (5 × 1 000 sqm)/5 000 sqm = 1.0. A building with 10 layers of 500 sqm on a 1 000 sqm parcel has a building density of (10 × 500 sqm)/1 000 sqm = 5.0.



extract from the RUDIFUN 2022 report

Rudifun can be a tool that contributes to the ambitions of the no Net Land Take target because it can identify examples of neighbourhoods with particular densities and urban designers can learn from these examples and improve on them.

No Net Land Take

As building in high densities reduces the need for urban expansion, it is useful to know how we can design attractive, densely built-up neighbourhoods. In this way, Rudifun can be a tool that contributes to the ambitions of the no Net Land Take target because it can identify examples of neighbourhoods with particular densities and urban designers can learn from these examples and improve on them. It offers references for future city development based on territorial evidence. In this way, the Deltametropolis Association successfully applied Rudifun to find examples of urban densification projects in the Netherlands, which it can subsequently analyse regarding how the projects have dealt with the spatial, social and environmental impacts of densification.

Densely built-up areas can take on many forms. High density does not necessarily mean high-rise. After all, a neighbourhood with high-rise buildings can have the same level of building density as urban blocks with mid-rise buildings. The two neighbourhoods in the photographs – both in Amsterdam – have similar FSIs. Their appearances, however, differ enormously. One neighbourhood (Plan van Gool) has five-floor residential buildings in between large green spaces. The other neighbourhood (Van der Pekbuurt) mainly contains buildings with only three floors and has less public space. Both neighbourhoods have the same accommodation capacity in terms of floor space. It is up to the urban designers and the project developers which spatial layout they prefer.

The map illustrates the FSI in Amsterdam per urban block. Green indicates the unbuilt and sparsely built-up areas, yellow indicates medium densities and red indicates higher building densities. As can be expected, the city centre is the densest area, but there are also high-density clusters outside the city centre, such as the financial district and the redeveloped brownfields in former port areas.

Analysing building densities in urban areas is crucial for understanding urban development patterns, planning future projects and assessing the impacts of densification on various aspects, such as travel behaviour, real estate prices and quality of life. By providing territorial evidence, Rudifun can assist in identifying reference neighbourhoods and gathering data to inform decisions related to urban redevelopment.

The Rudifun data set is based on open data and is therefore free to download; it is updated every two years. To increase the opportunities to compare urban fabrics at the international level, we would encourage other countries to develop similar data sets.

Arjan Harbers, Martijn Spoon and Hans van Amsterdam (PBL Netherlands Environmental Assessment Agency)