

SHOULD FUTURE CITIES BE COMPACT OR SPRAWLED? DEVELOPMENT OF AN ECO-INDICATOR TO ASSESS FUTURE URBAN PLANNING STRATEGIES

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ABSTRACT

Urban planning strategies can help mitigate climate change effects in cities and improve the quality of cities environment by providing a more sustainable development. However, there is still a debate on whether cities should be compact or sprawled.

This study aims to develop an eco-indicator to assess parameters affected by urban morphology -air quality, urban heat fluxes, urban heat island, mobility, ecological footprint and human exposure - to evaluate the most sustainable urban planning strategies under future climate. For that, a numerical modelling approach will be applied, including the WRF-UCM-CAMx air quality modelling system, adapted to urban areas with high spatial detail, the traffic model VISUM, and a carbon balance, for the Aveiro Region case study. Three urban morphology scenarios will be developed to assess the effects of urban planning strategies. The first scenario will represent the compact city, composed of several independent cores, where commuting outside each city core is not a necessity (sustainable cities). The second scenario will represent the same cores, but in this scenario, commuting is required (polycentric city). The third scenario will represent the dispersed city, without any core areas. All the scenarios will be compared with a reference scenario, which will consider the current urban morphology. Emissions for each scenario will be estimated, based on the land use changes imposed by each urban morphology, in three main activity sectors: transportation, residential combustion and industry. All scenarios will consider the average future technological mobility changes (i.e., car-sharing) for the future medium-term.

The main contribution from this research, the eco-indicator, will serve both decision maker and research communities, overcoming the existing gaps in this scientific field and supporting the best planning strategies for a healthy environment and wellbeing.

KEYWORDS: Air quality, Climate change, Urban Areas, Sustainable Development.

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