30th APDR CONGRESS

July 19-21 2023 University of Minho, Braga

Assessment of Net Land Take in the Lisbon Metropolitan Area – Portugal

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TÉCNICO LISBOA

July 2023

Concepts

Land take -> assesses the surface of agricultural, forest, semi-natural and natural areas, wetlands and water bodies that have been transformed into artificial land in a given period. Soil sealing is considered the most intense form of land take.

Land re-naturalisation or **restoration ->** is the reverse process of land take. It assesses the surface of artificial land that has been transformed into non-artificial land in a given period.

Net Land Take -> accounts for the difference between land take and land re-naturalisation.

Monitoring net land take allows us to assess how far we are from the **European target of zero net land take by 2050**[1,2]. This target aims to protect soils and safeguard the services they provide through more sustainable land use, which involves reducing the consumption of undeveloped land[3].

A reduction in net land take is only attainable through the **reuse of artificial land**, which avoids land take, or an **increase in the re-naturalisation of non-artificial land**. When land take cannot be avoided, measures to compensate for the loss of ecosystem services should be implemented.

[1] European Commission. Roadmap to a Resource Efficient Europe. COM/2011/571 Final; Brussels. 20 September 2011.
[2] European Commission. EU Soil Strategy for 2030. Reaping the Benefits of Healthy Soils for People, Food, Nature and Climate. COM/2021699 Final; DG Environment, Brussels. 17 November 2021.
[3] Build Europe. No Net Land Take by 2050 Solving the Unsolvable–10 Solutions for an Improved Management of European Land. 13 January 2022, p. 32.

Study goals

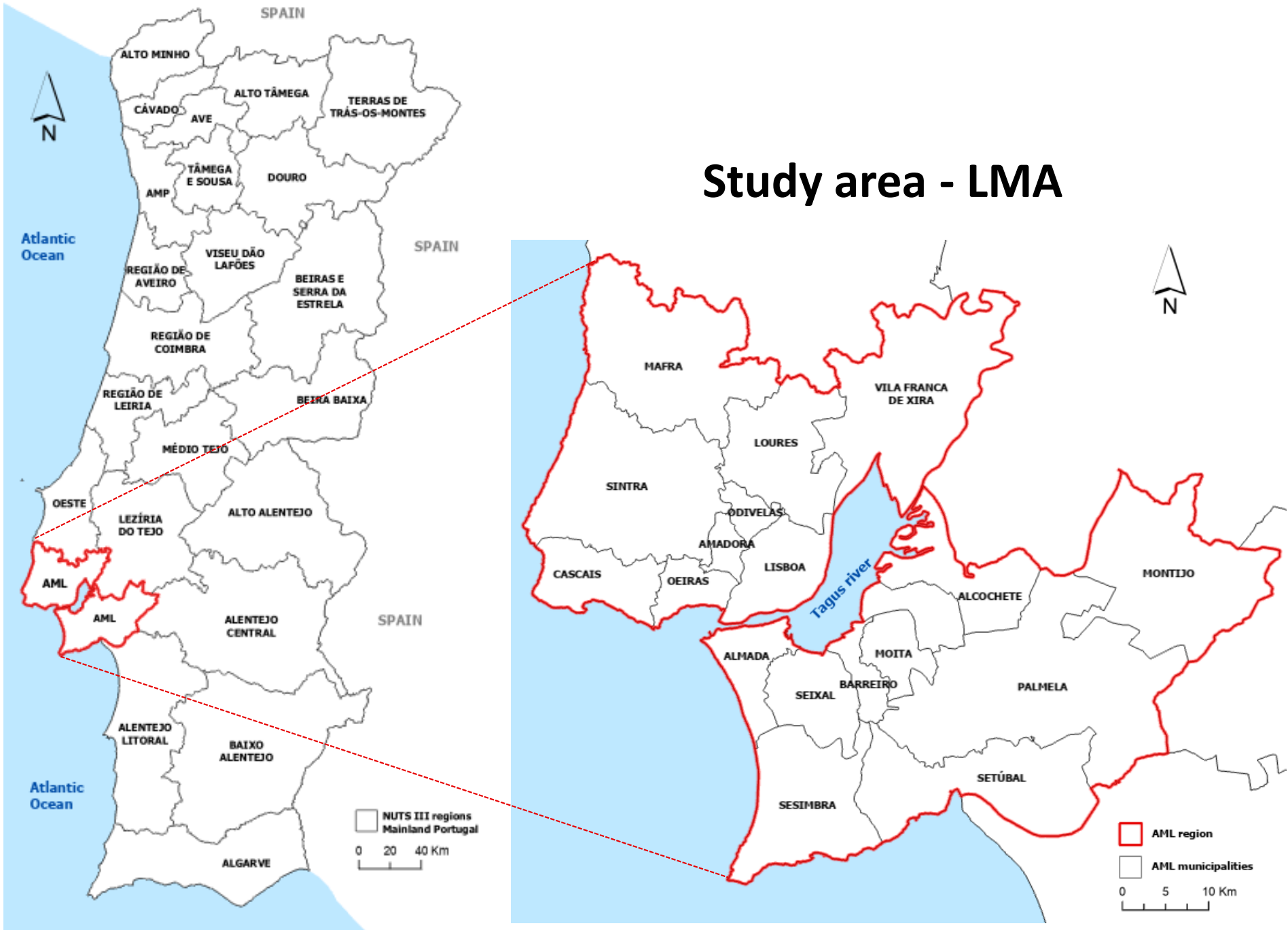
This study assesses land cover and land use changes **between 2007 and 2018** in the Lisbon Metropolitan Area (LMA), aiming to:

I. Assess the situation of the LMA and its municipalities regarding the **2050 target**;

II. Deepen the knowledge about **the drivers of net land take in LMA** to support the setting of regional and local targets, which have not been defined yet;

III. Raise awareness among decision-makers and public authorities about the processes addressed.

Study area - LMA

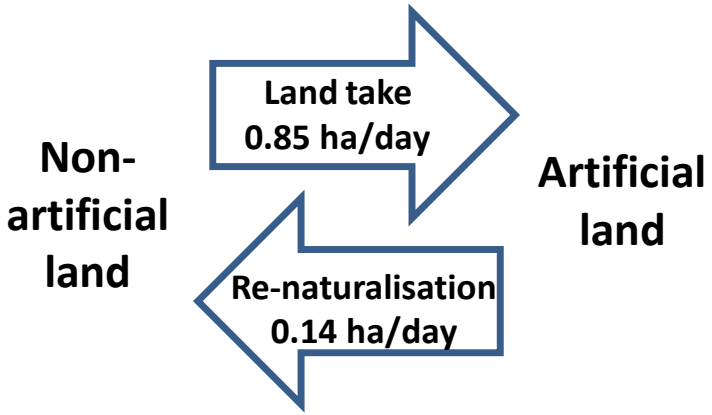


Land take, land re-naturalisation and net land take

Between 2007 and 2018, the **land take rate** in LMA was 1021 m^2/year.km^2, i.e., an **average daily consumption of 0.85 ha** of non-artificial land.

The area of artificial land that was re-naturalised in LMA was tiny (5.2 Km^2) compared to that transformed into artificial land (33.9 Km^2). Thus, the **re-naturalisation rate in LMA was only 0.14 ha/day** (158 m^2/year.km^2).

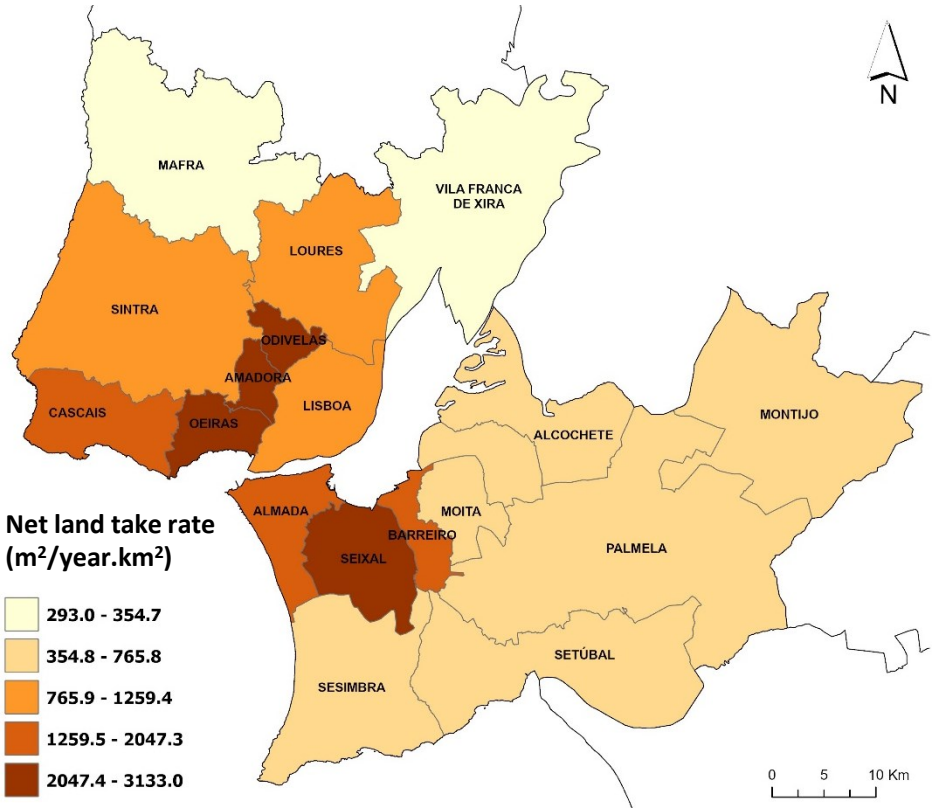
The balance of these two processes results in a **net land take of 0.7 ha/day** (863 m^2/year.km^2).



Land take, land re-naturalisation and net land take

- The municipalities with the **highest net land take rates** were Seixal, Oeiras, Odivelas and Amadora (3133, 2890, 2485 and 2471 m^2/year.km^2, respectively).

- The **lowest land take rates** were observed in Mafra and Vila Franca de Xira (<400 m^2/year.km^2).

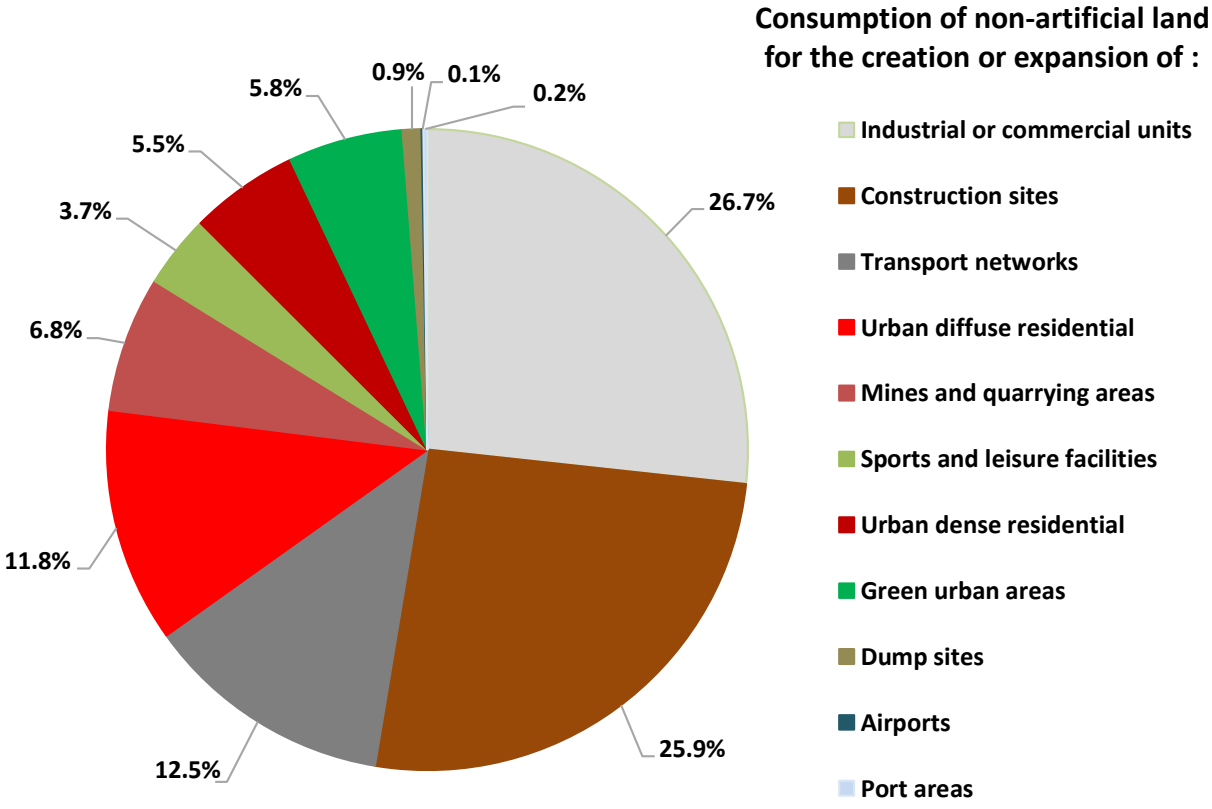


Net land take rate by LMA municipalities, 2007-2018 (m^2/year.km^2)

Drivers of land take

- Industrial and commercial units (27%)
- Construction sites (26%)
- Transport networks (13%)
- Urban diffuse residential (12%)
- Mining and quarrying areas (7%).

These five processes accounted for **84% of non-artificial land consumption**.



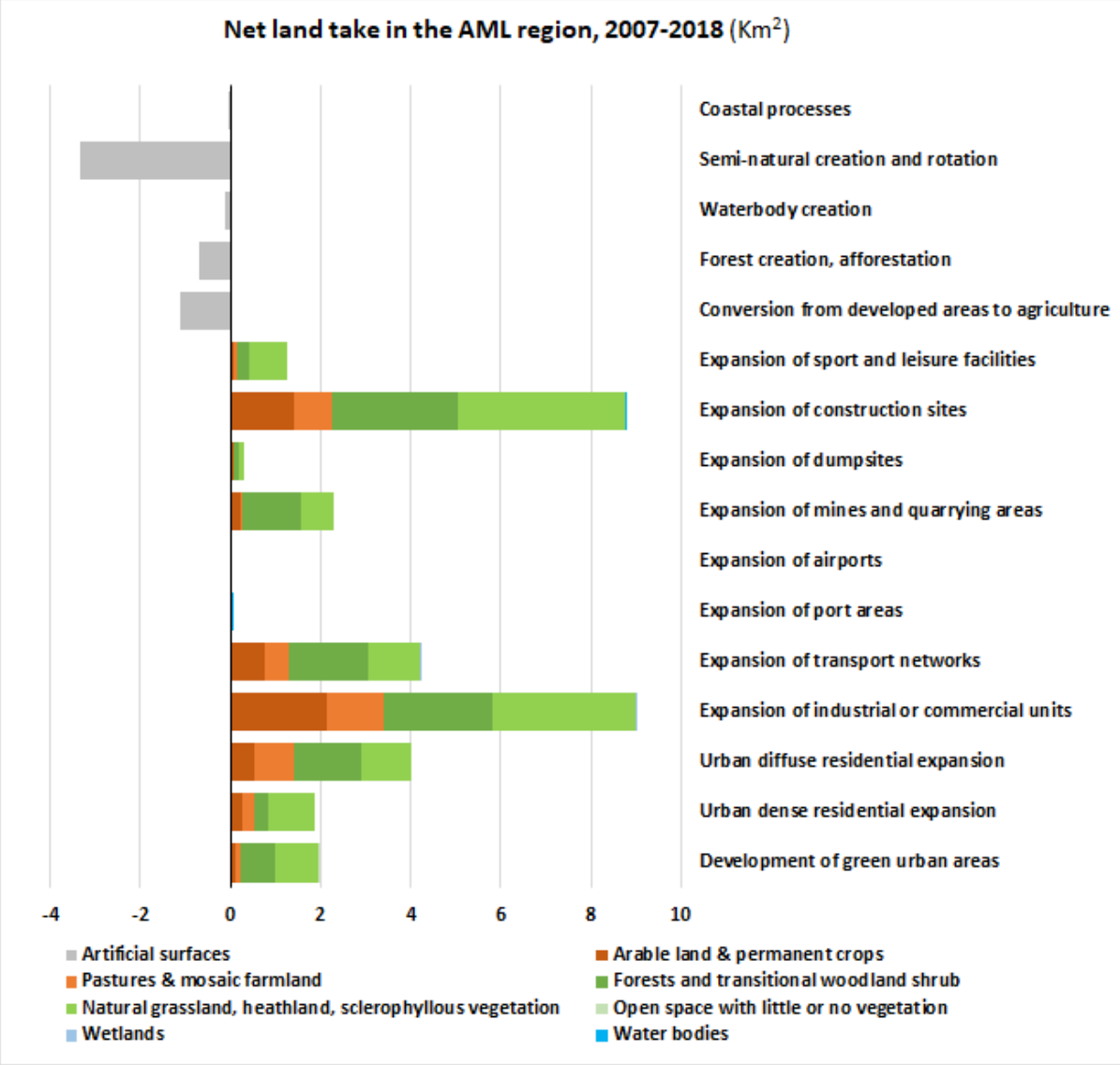
Drivers of land take in the LMA, 2007-2018 (%)

Land cover types transformed by net land take

The main land cover types expended by **land take** in LMA were:

- Natural grassland, heathland, and sclerophyllous vegetation (38%);
- Forests and transitional woodland shrub (33%);
- Arable land and permanent crops (17%);
- Pastures and mosaic farmland (12%).

Re-naturalisation in the LMA has created mainly semi-natural (64%), agricultural (21%) and forestry (13%) areas.

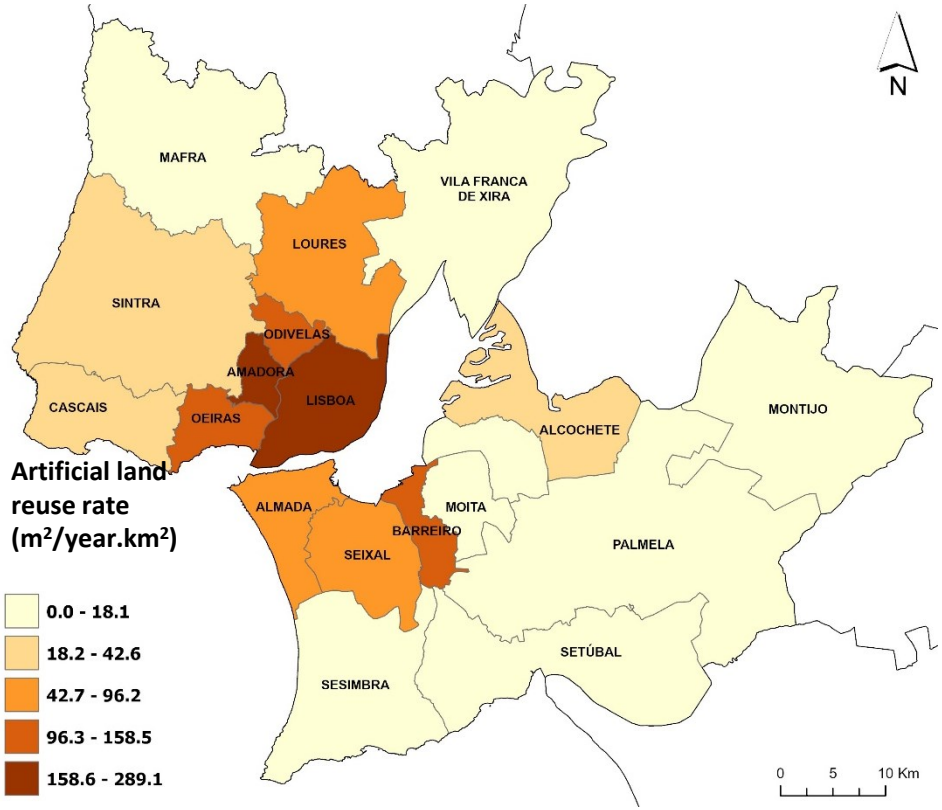


Land surface transformed by land take and land re-naturalisation and land cover types consumed by each in the LMA, 2007–2018 (km²)

Reuse of artificial land

In the period under review, the **average daily reuse of artificial land** in the LMA was **0.03 ha**, amounting to an annual recycling rate of 38 m^2/year.km^2.

- The municipalities with the **highest artificial land recycling rates** in the LMA were Amadora, Lisboa, Barreiro, Oeiras and Odivelas (289, 267, 159, 140 e 123 m^2/year.km^2, respectively).
- The municipalities with the **lowest artificial land reuse** were Moita (which did not recycle artificial land in that period), Sesimbra, Montijo and Palmela (< 8 m^2/year.km^2).

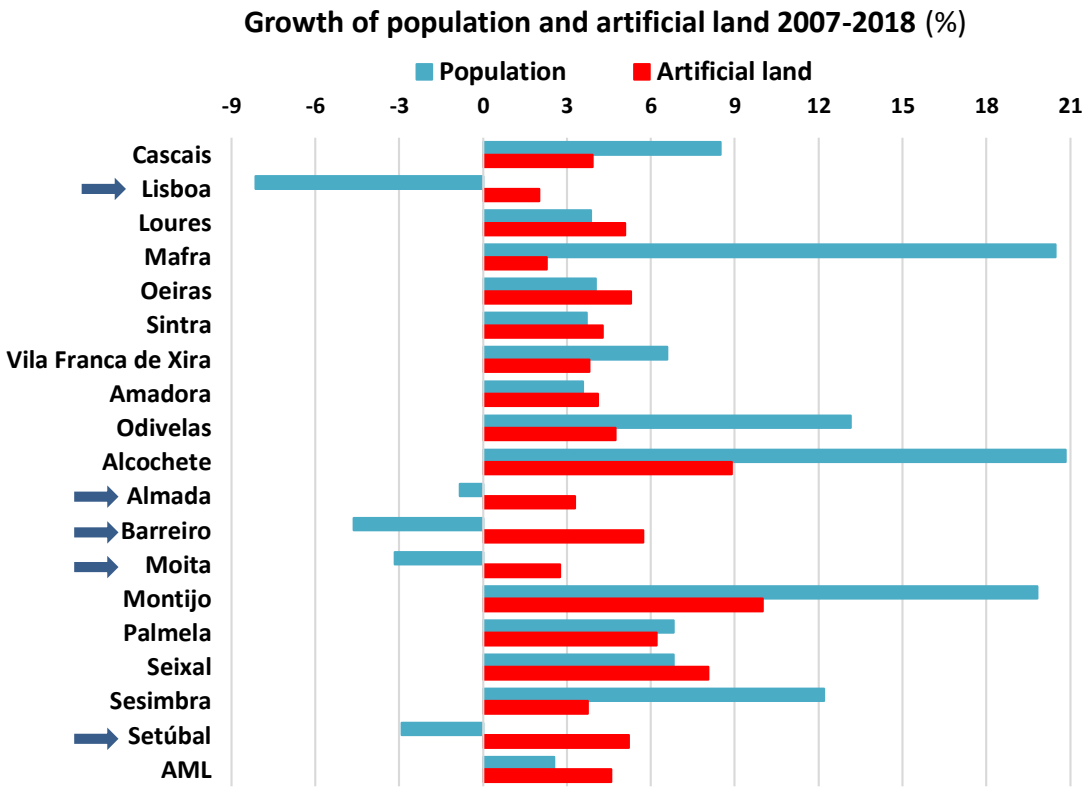


Artificial land reuse rate by LMA municipalities, 2007-2018 (m^2/year.km^2)

Growth of population and artificial land

In the period 2007-2018, the artificial land expanded in all LMA municipalities, as well as in the region.

- In 5 municipalities (Lisboa, Almada, Barreiro, Moita and Setúbal), **the expansion of artificial land was coupled with a population decrease.**



Growth of population and artificial land by LMA municipalities and the region, 2007-2018 (%)

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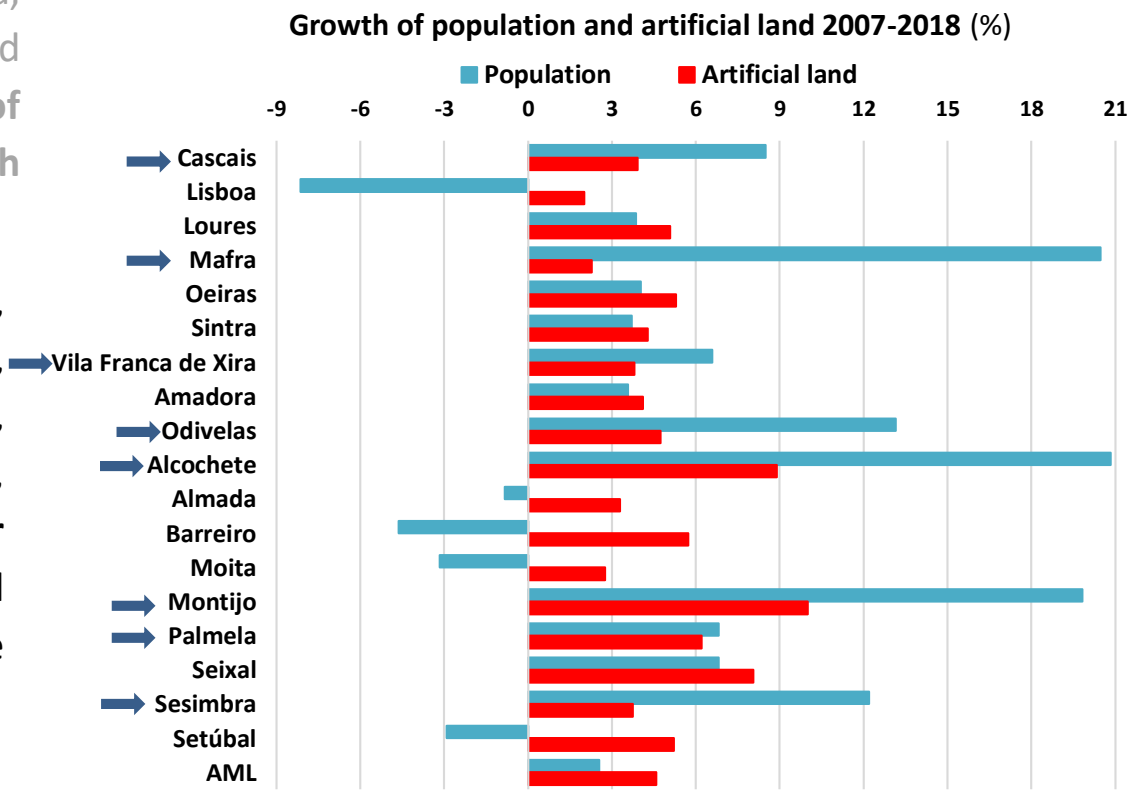
- In 8 municipalities (Cascais, Mafra, Vila Franca de Xira, Odivelas, Alcochete, Montijo, Palmela and Sesimbra), **population growth was faster than that of artificial land**, and there was a decrease in the artificial area per capita.



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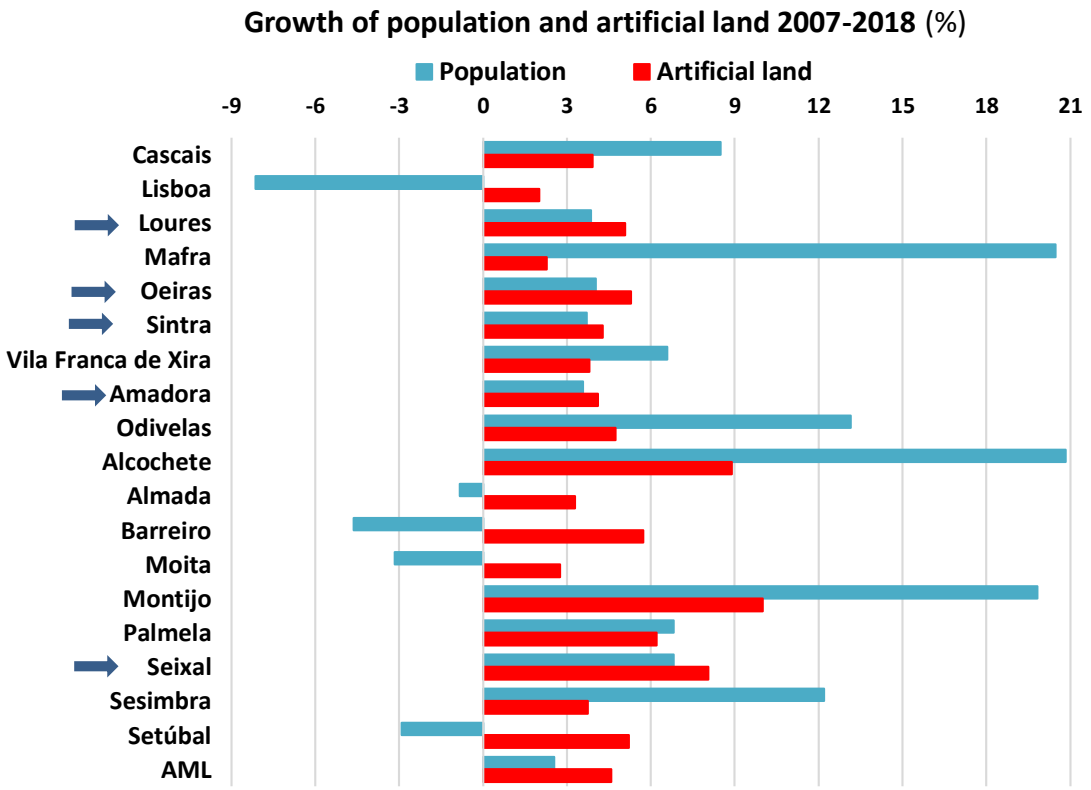
- In 5 municipalities (Loures, Oeiras, Sintra, Amadora and Seixal) and the LMA, **population growth was lower than that of artificial land.**



Growth of population and artificial land by LMA municipalities and the region, 2007-2018 (%)

Land take and land use regulation

In Portugal, the 1990s were marked by the scarcity or ineffectiveness of land use regulation policies.

In the 2007-2018 period:

- retraction in the expansion of construction as a result of the effects in Portugal of the global economic and financial crisis
- several land management instruments with a more objective view on the land use regime were already in force.

Land take and land use regulation

- 2014 (**General Framework Law for Public Policy on Land, Spatial Planning and Urbanism**)

  reinforced the concern to regard the soil as a scarce resource whose use must be rationalised: the need to contain urban expansion and dispersed construction and to encourage urban rehabilitation and regeneration instead of new construction.

- 2015 (**legal regime of spatial management instruments)**

  extinguishing the operative category of urban developable land.

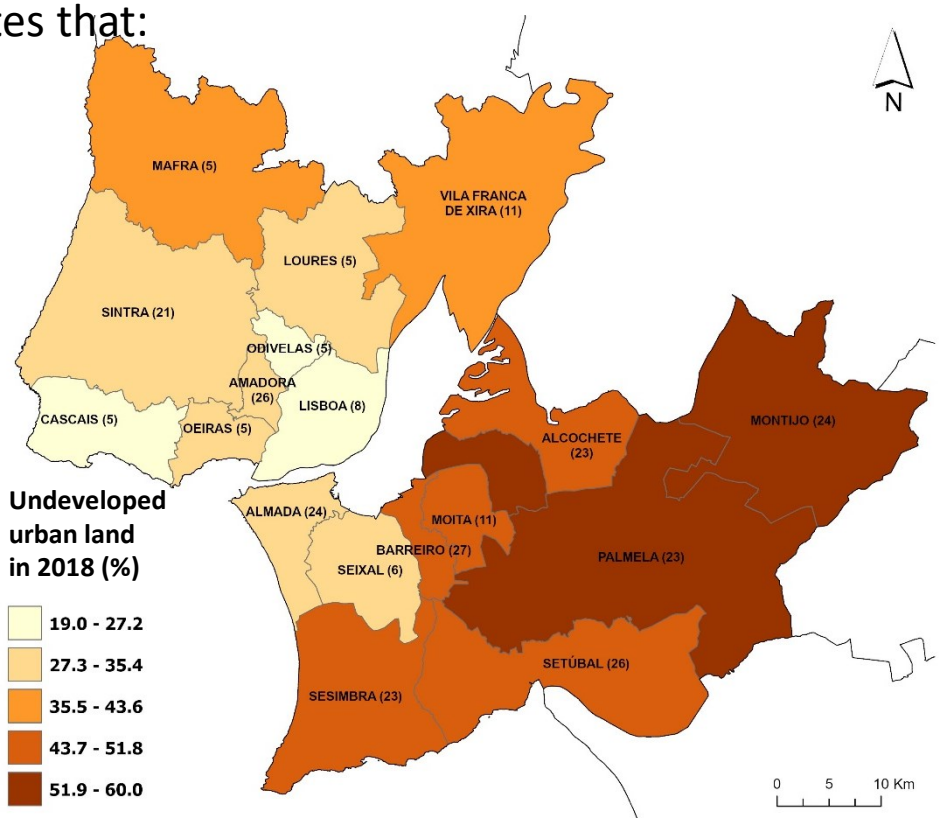
- 2015 (**regulatory decree on the criteria for the classification and qualification of soil)**

  exceptionality of the reclassification of rural land into urban (avoiding the expansion of urban perimeters), demonstration of the economic and financial sustainability of this transformation, through demographic indicators and the levels of supply and demand of urban land.

Land take and land use regulation

The proportion of land classified as urban in the municipal plans in force in the LMA, which was undeveloped in 2018, indicates that:

- The municipalities of LMA South (excluding Almada and Seixal) evidenced **higher percentages of urban land that was not developed** in 2018.
- Some of the most recent municipal master plans in LMA (Oeiras, Loures, Mafra and Seixal) still displayed relatively high percentages of undeveloped urban land in 2018.



Urban land that was not developed in 2018 by LMA municipalities (%)
The number in brackets represents the age (no. years) of the municipal master plan in force.

Conclusions (1/2)

- Between 2007 and 2018, the **increase in artificial surface area** in the LMA was mainly intended for infrastructure (expansion of industrial and commercial sites, areas under construction and transport networks).

- The **net land take rate** during this period (0.7 ha/day) **still needs to decrease** to meet the European target by 2050.

- In line with the recommendations of the EU Soil Strategy, the LMA should **set quantitative targets** (regional and local) for net land take reduction by 2030 and monitor its progress.

Conclusions (2/2)

- Alongside the dissemination of the European target among local decision-makers, **tighter control mechanisms should be implemented** to curb the consumption of non-artificial land in all municipalities. These mechanisms should ensure that housing and infrastructure needs are fully met by **reusing artificial land** inside urban perimeters.

- The **reuse of artificial land** may be most critical in the eight municipalities under population growth pressure but is just as essential in the remaining municipalities for **preserving the ecosystem services** provided by non-artificial areas in urban areas.

Additional information related to this study is available at:

- Nicolau R, Condessa B. Monitoring Net Land Take: Is Mainland Portugal on Track to Meet the 2050 Target? Land. 2022; 11(7):1005. https://doi.org/10.3390/land11071005
- Nicolau R, Condessa B. (2022). "Monitoring Net Land Take in Europe". Encyclopedia. https://encyclopedia.pub/entry/25077
- Indicators on soil artificialisation available from the Observatory of Spatial Planning and Urbanism: https://observatorioindicadores.dgterritorio.gov.pt

The presenter is grateful for the Foundation for Science and Technology's support through funding UIDB/05703/2020 from the research unit CiTUA - Centre for innovation in Territory, Urbanism and Architecture.