

# Fine-scale geospatial data supporting the assessment of SDGs: Practical examples

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- 4. Combining census data and satellite imagery to generate a novel, consistent time-series of **population grids** (1961-2021).
- **Conclusions**

# Introduction

The analysis of the territory benefits largely from **fine-scale geospatial data**. This allows depicting and characterizing locations and **differentiating dynamics often hidden** when working at aggregated scales.

Besides the most traditional sources like national official institutes, census and satellite, the **combination of official with unconventional data sources** coming from the web, is enhancing territorial analysis. Many of these new sources provide **high-resolution thematically harmonized data**.

The **monitoring and assessment of Sustainable Development Goals (SDGs)** can be supported by the use of these fine-scale geospatial data sets. The following slides overview **four already implemented examples** and corresponding links developed by JRC.B3 – Territorial Development unit.

# 1. Real-estate price data

- Immobiliare.it is real-estate platform displaying data on prices, housing characteristics and municipal socio-economic indicators in Italy.
- Data available at country, regional, municipal, neighbourhood and individual listing levels.
- Integration with socio-economic and other fine-scale geospatial information.

- SDG 11 (target 11.1)

Ensure access for all to adequate, safe and affordable housing and basic services, and upgrade slums (by 2030).

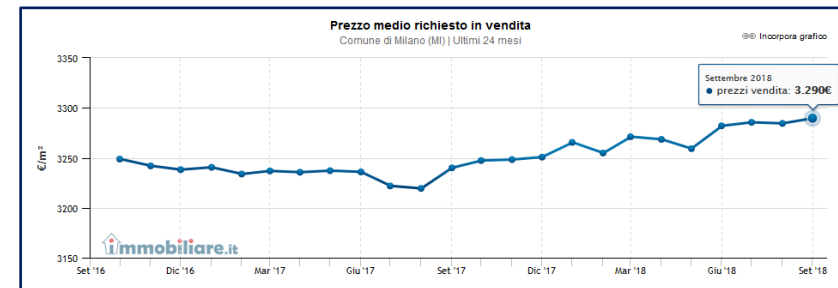
- SDG 1

End poverty in all its forms everywhere.

# Real-estate platform: immobiliare.it

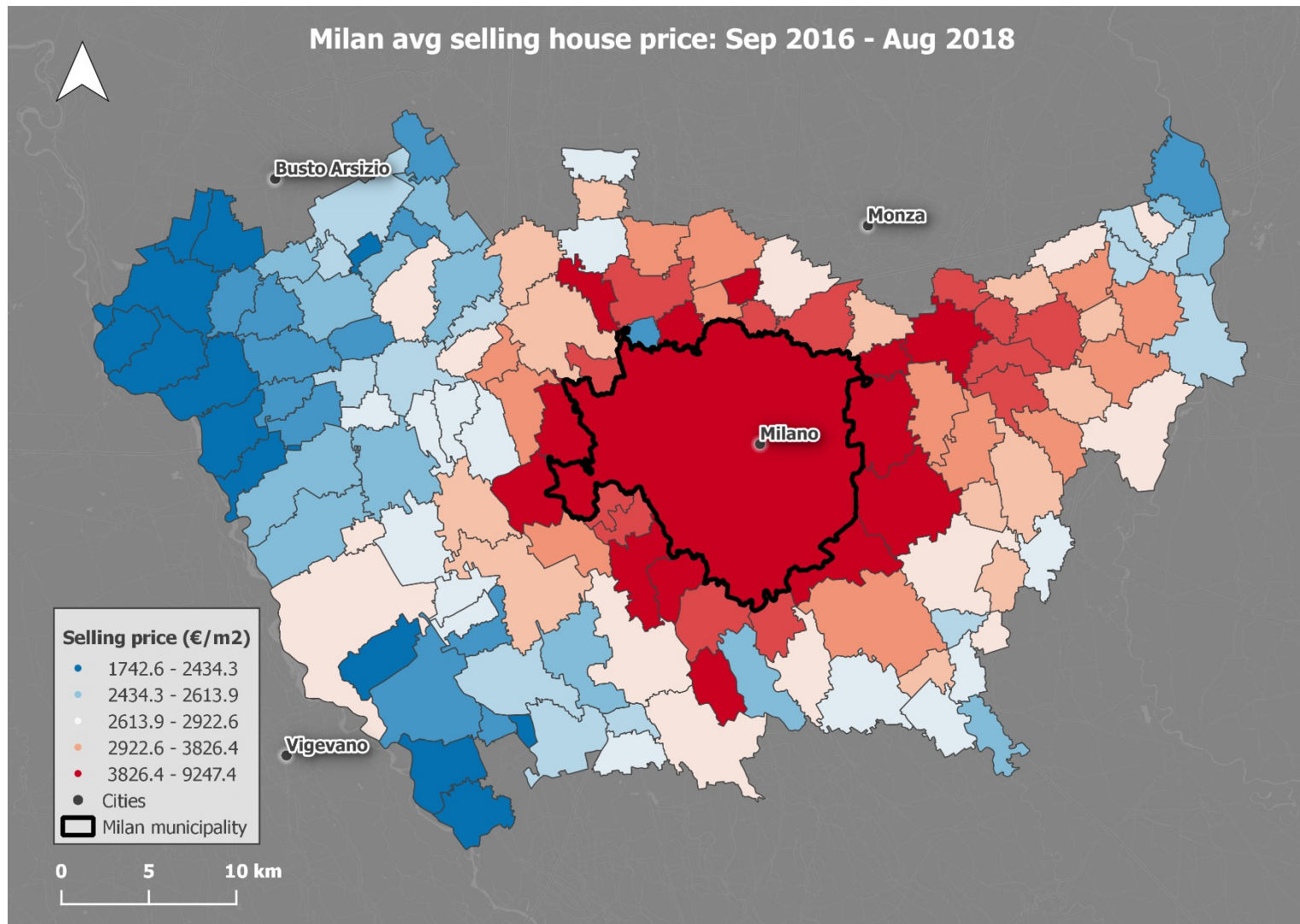
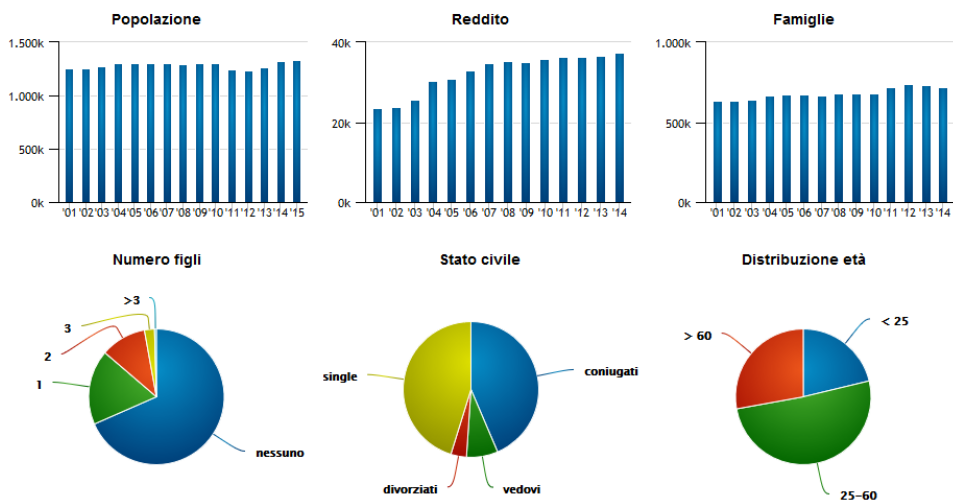
▪ Milan FUA made of 134 LAU2s.

▪ Individual real-estate data: 49308 ads (Feb 2019).

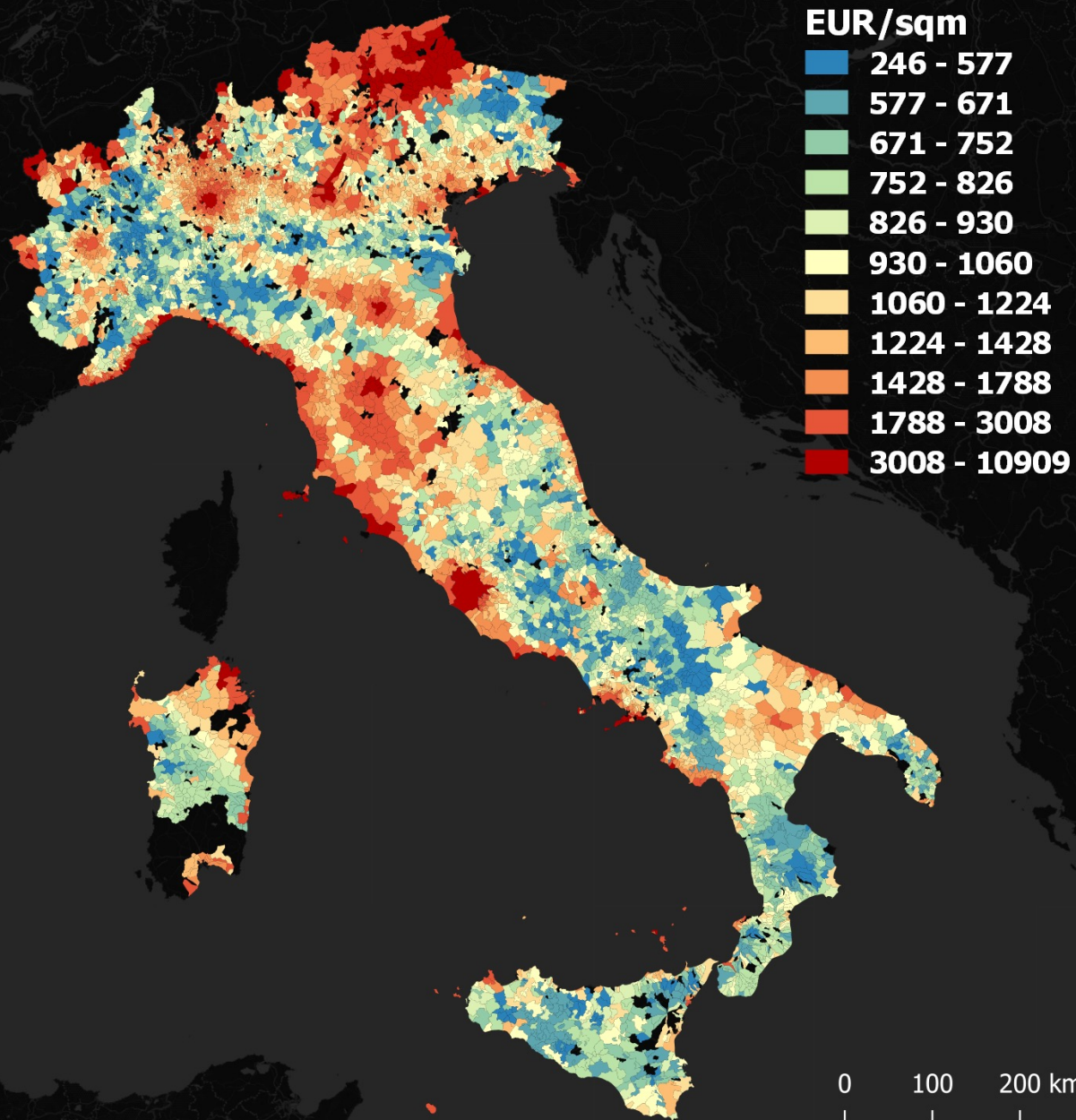


Indicatori socio-demografici del comune di Milano

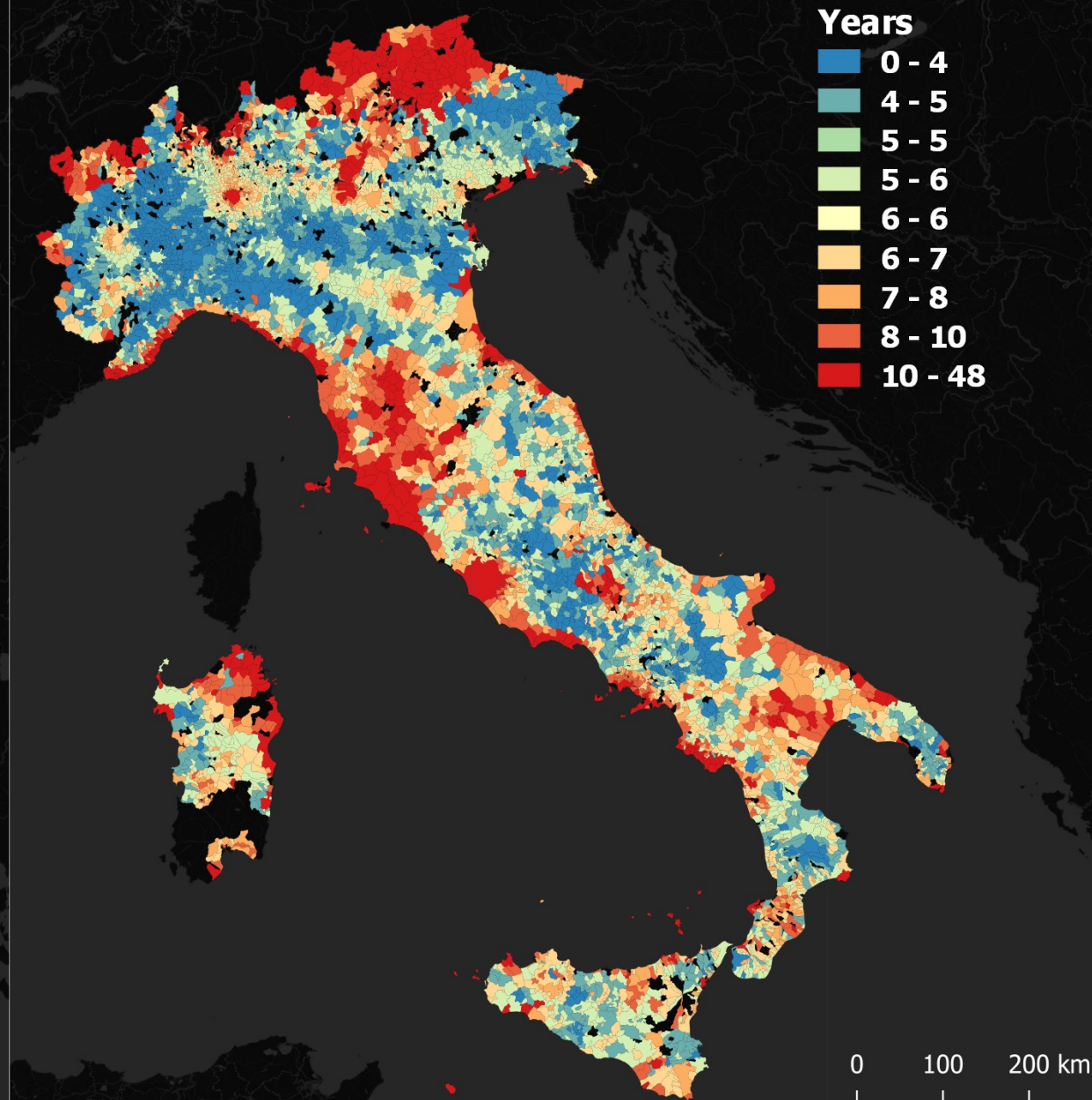
I grafici seguenti si propongono di fornire una sintesi degli aspetti demografici e socio-economici che caratterizzano la popolazione residente nel comune di Milano. Per alcune informazioni di particolare interesse sono inoltre analizzati i cambiamenti nel tempo: in particolare vi sono informazioni più dettagliate a proposito della popolazione residente, che al momento dell'ultima rilevazione ha raggiunto i 1.337.155 abitanti, del reddito medio e del numero di famiglie residenti all'interno del territorio del comune di Milano.



# Selling asking price: February 2018



# Income years needed to buy 100sqm apartment: 2018



# Milan selling houses

Listings: 13 761 houses

## House

Price

Area

Total Rooms

Bathrooms

Floor

Construction Year

Energy Class

Heating

Air Conditioner

Parking place

State

Type

Typology

## Neighbourhood

Distance to education

Distance health

Services Accessibility

Population 2015

Accessibility

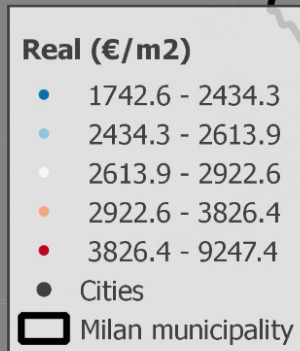
Distance centre

Distance metro

### Extra features:

Min-Max price;  
Monthly payment;  
Advert date;  
Availability;  
Condominium cost;  
Cadastral;  
Characteristics

## Milan: selling real listings (€/m2)



## Prediction:

### Define standard house:

**Area:** 100m<sup>2</sup>  
**Bathroom:** 1  
**Floor:** 2  
**Energy Class:** Low  
**Auto:** No parking  
**Air Con:** None  
**Heating:** Centralized  
**State:** Excellent  
**Typology:** Apartment  
**Type:** Intera proprietá classe immobile signorile

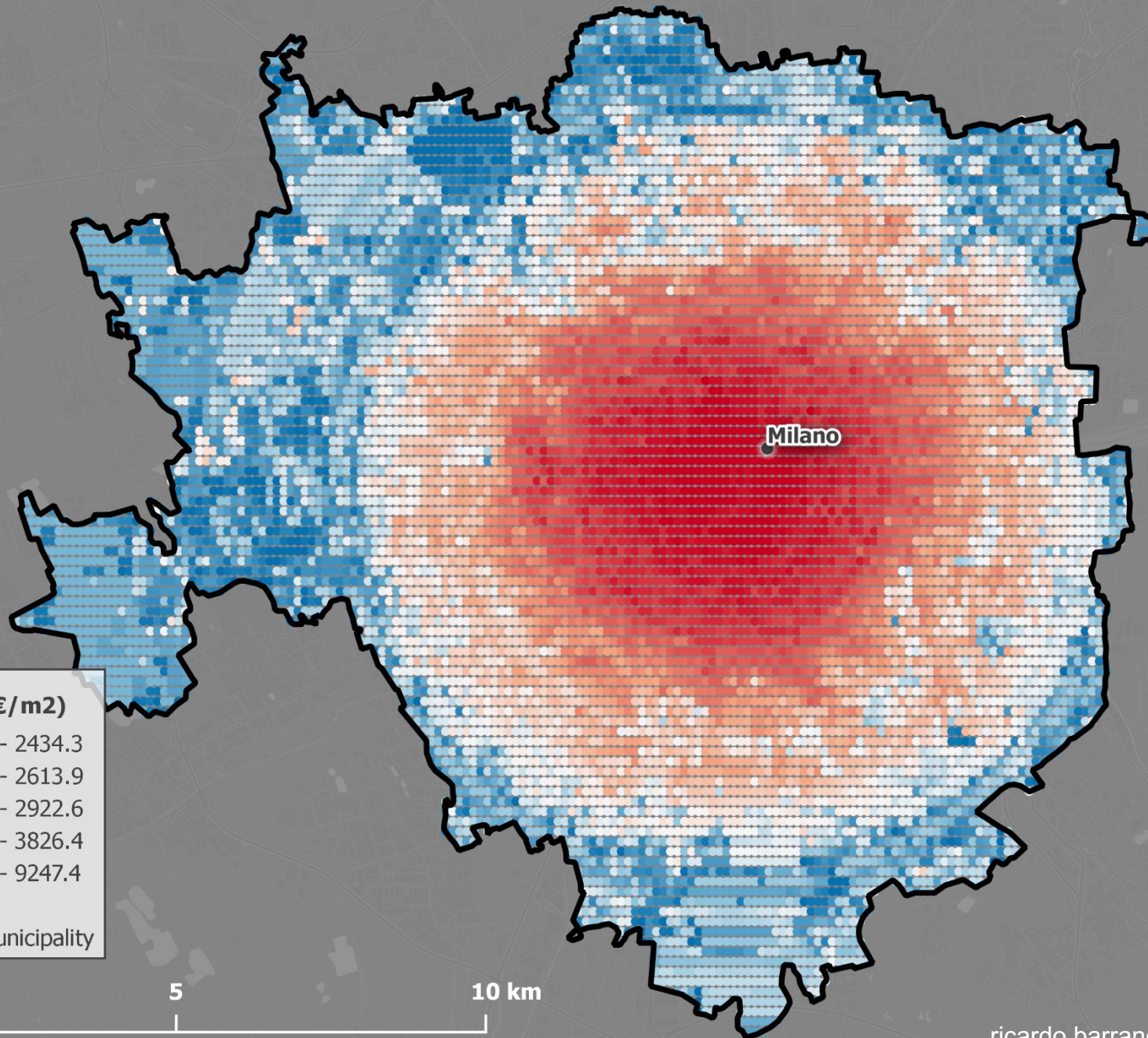


Predict house price  
at each location



EUR/m<sup>2</sup> grid  
100x100 m

## Milan: selling prediction grid (€/m<sup>2</sup>)





## 2. Digital accessibility

- Broadband access and performance are provided by Ookla®.
- Global fixed broadband and mobile network performance metrics at the grid level (grid size of 18 arc-seconds).
- Geospatial statistics and data integration with traditional data sources on population and income.

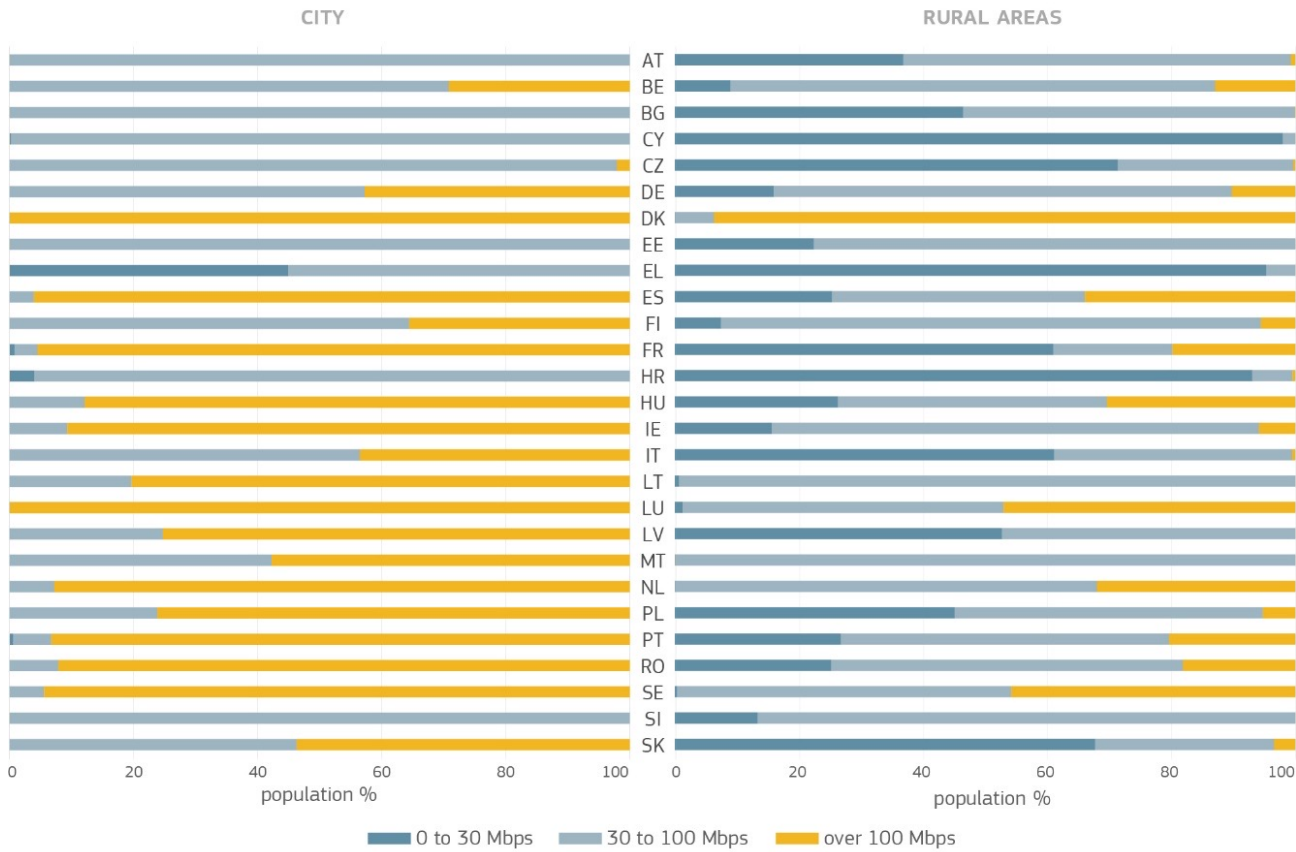
- SDG 9 (target 9.c)

Increase access to information and communications technology and strive to provide universal and affordable access to the Internet.

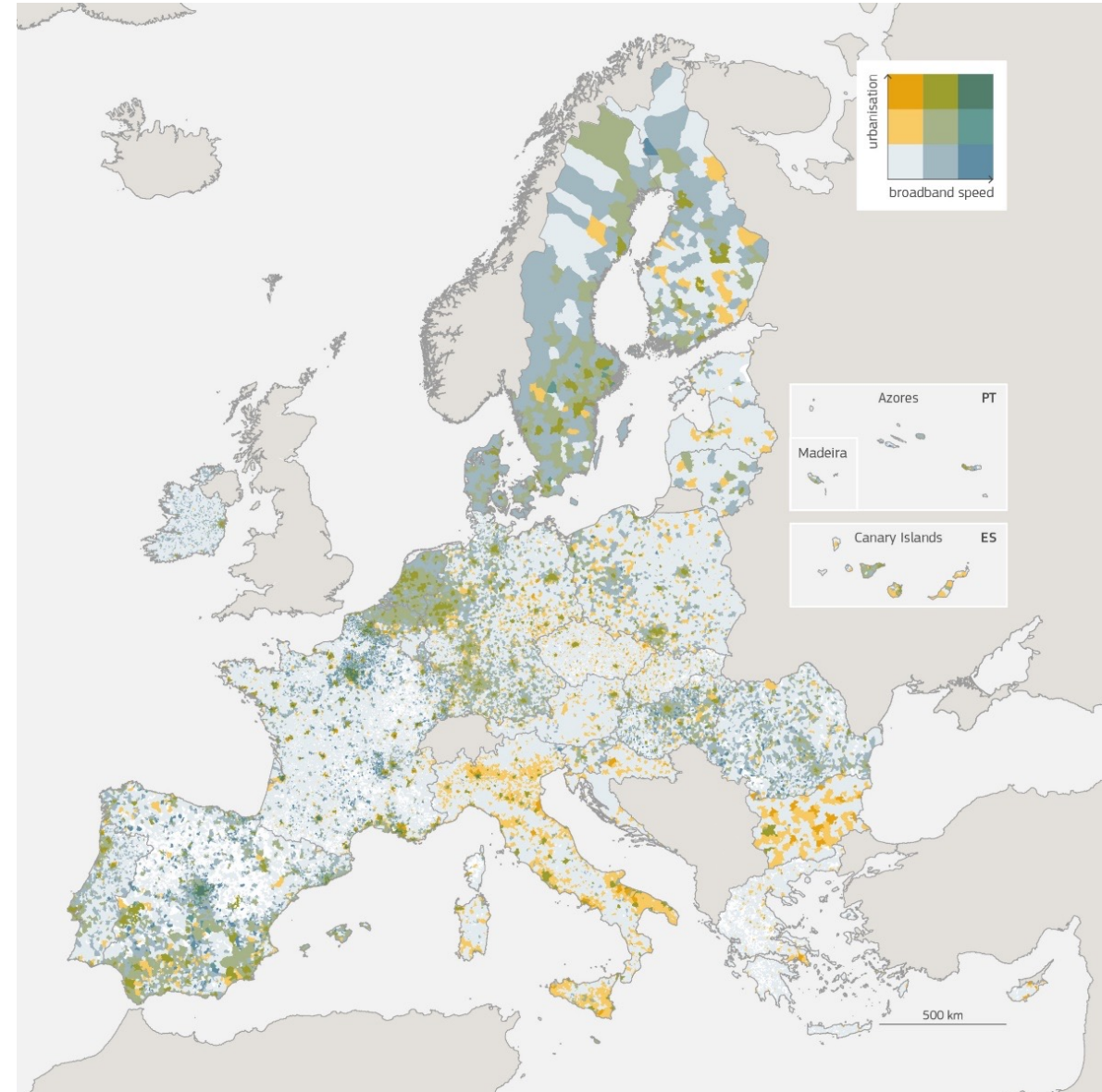
- SDG 10 and 17

Use of enabling technologies to reduce inequality of opportunity to achieve sustainable development.

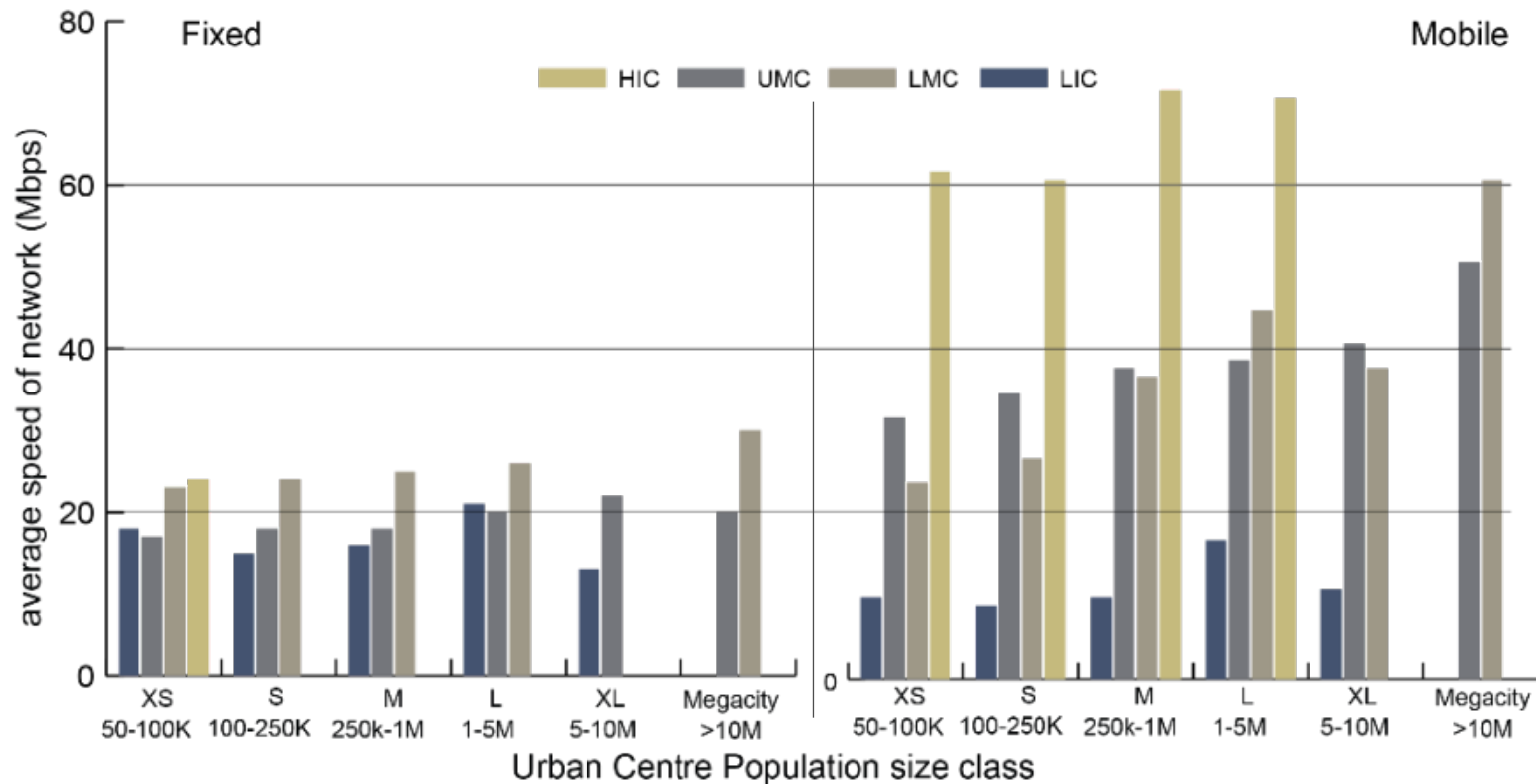
# 2. Urban-rural digital divide



• Source: Proietti, Sulis, et al. (2022)



# Digital inequalities across world cities



- Relationship broadband quality, income, and population size for world cities
- Income and urbanisation appear as drivers for access to better connections and higher speed

• Source: Melchiorri, Sulis, et al. (forthcoming)

# 3. Tourism activities

- TripAdvisor and Booking are online tourism platforms with user-generated content.
- Web-scrape individual listings locations and associated fields: hotels, restaurants, attractions and vacation rentals.
- Combining web-scraped tourism activities and official statistics to assess tourism density, intensity, seasonality, diversity and disaggregated existing indicators.

- SDG 8 (target 8.9)

Devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products (by 2030).

- SDG 12 (target 12.b)

Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products.

- SDG 13 (target 13.2)

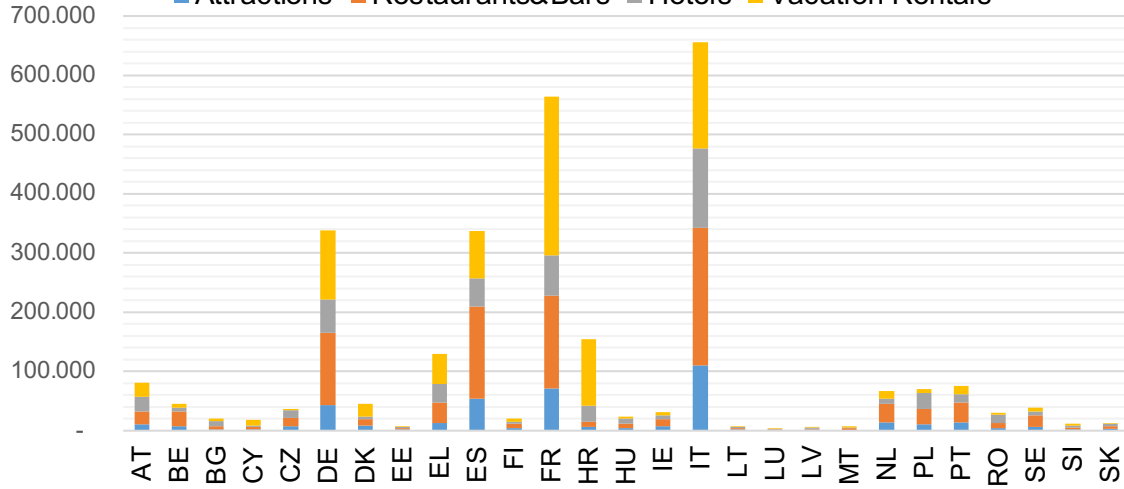
Integrate climate change measures into national policies, strategies and planning.

- SDG 11 (target 11.1) - indirect

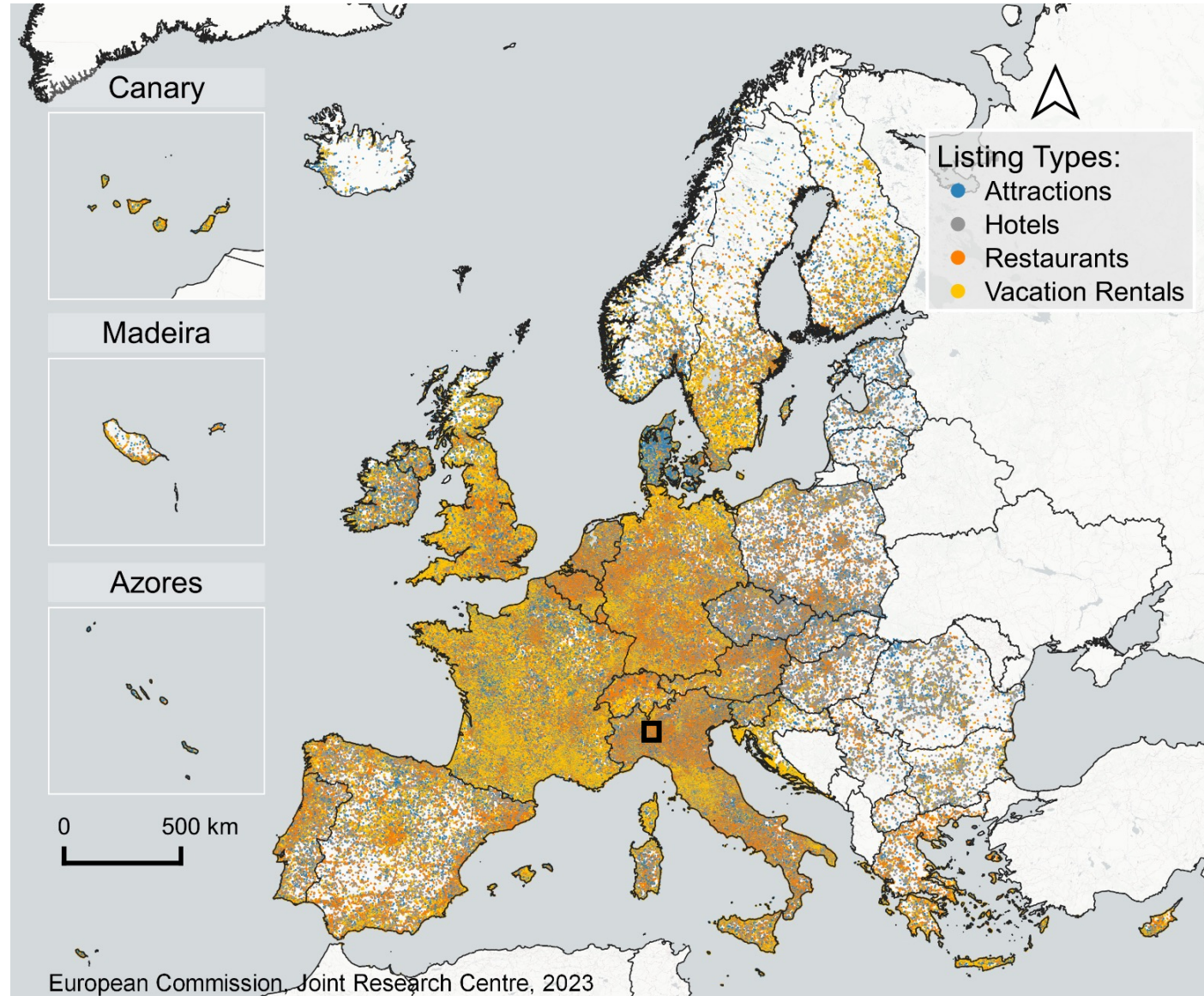
Ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums (by 2030).

# EU27 TripAdvisor: 2023

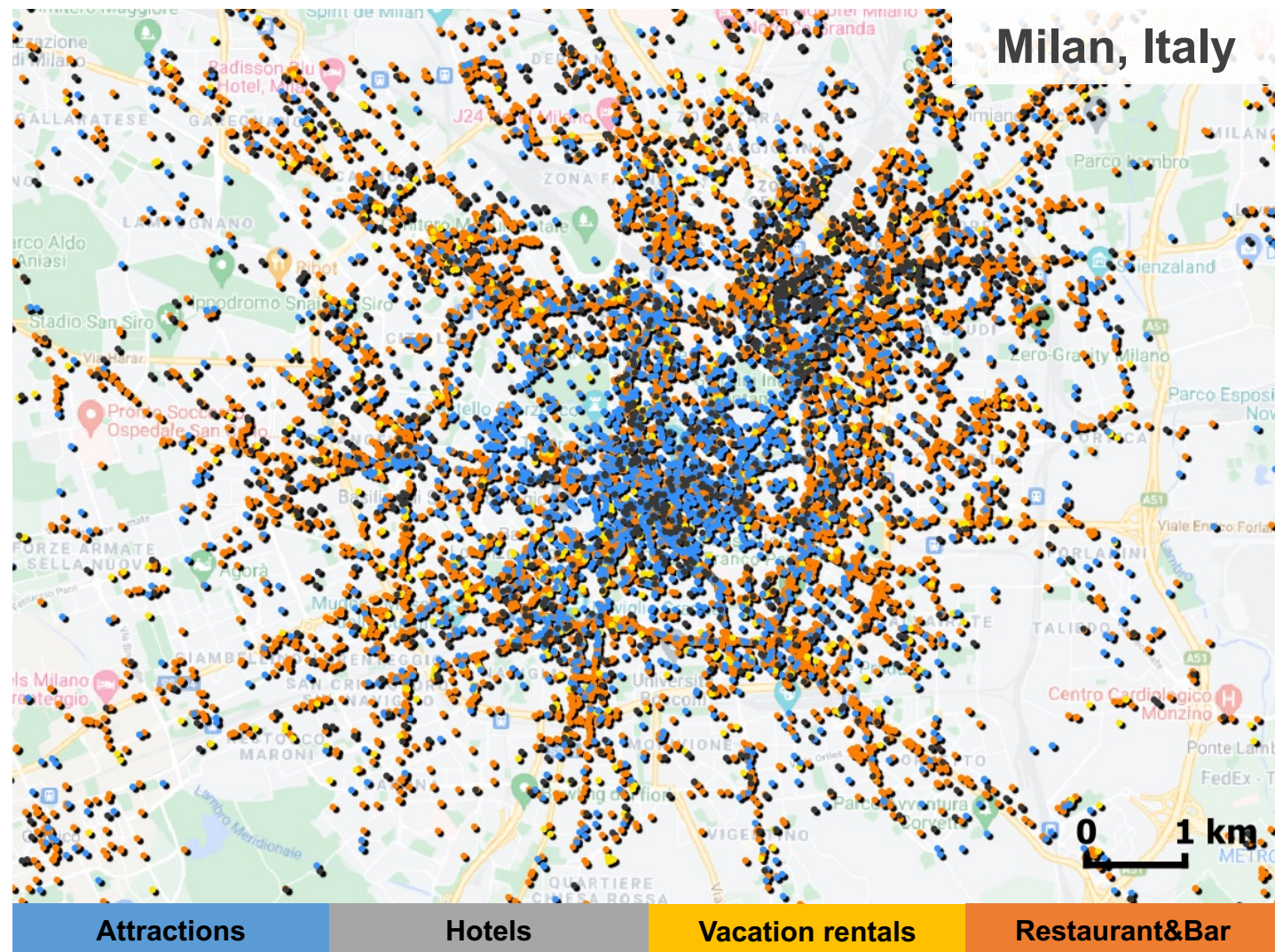
Attractions Restaurants&Bars Hotels Vacation Rentals



Listing types	EU27 2017	EU27 2021	ALL 2023
Attractions	183,704	384,864	515,304
Restaurants & Bars	723,462	920,600	1,171,410
Hotels	315,658	509,388	592,219
Vacation Rentals	368,391	436,573	1,106,558
<b>Total</b>	<b>1,590,586</b>	<b>2,251,425</b>	<b>3,385,491</b>



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### Associated fields:

- # Reviews
- # Rooms
- Keywords
- Price/cost...

### Increase coverage of accommodation statistics:

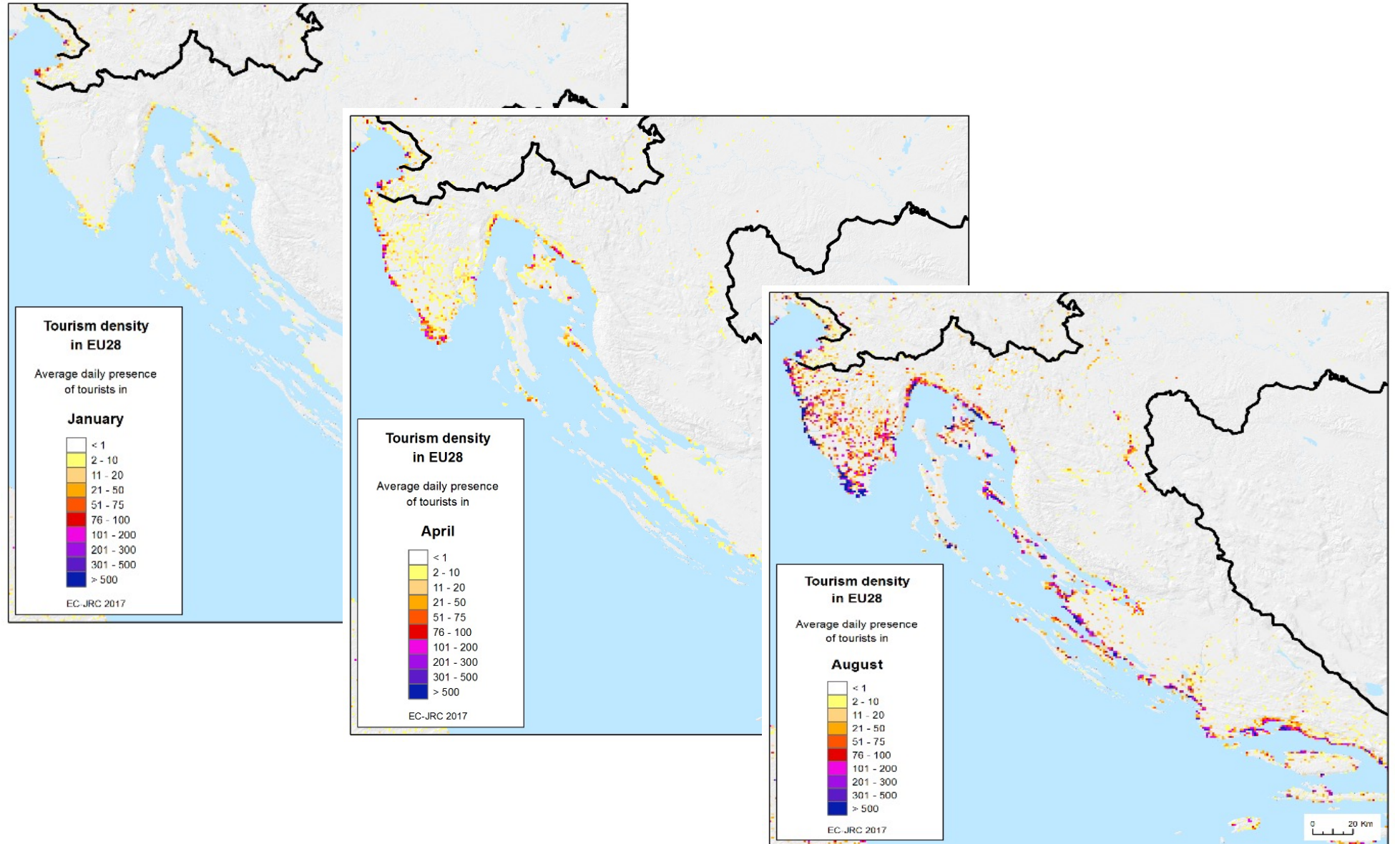
- Significant part of rented accommodation is not included in the accommodation statistics that NSIs transmit to Eurostat.

### High-resolution data sources:

- Used in spatial disaggregation of existing indicators;
- Combined with other sources allows creating new indicators.

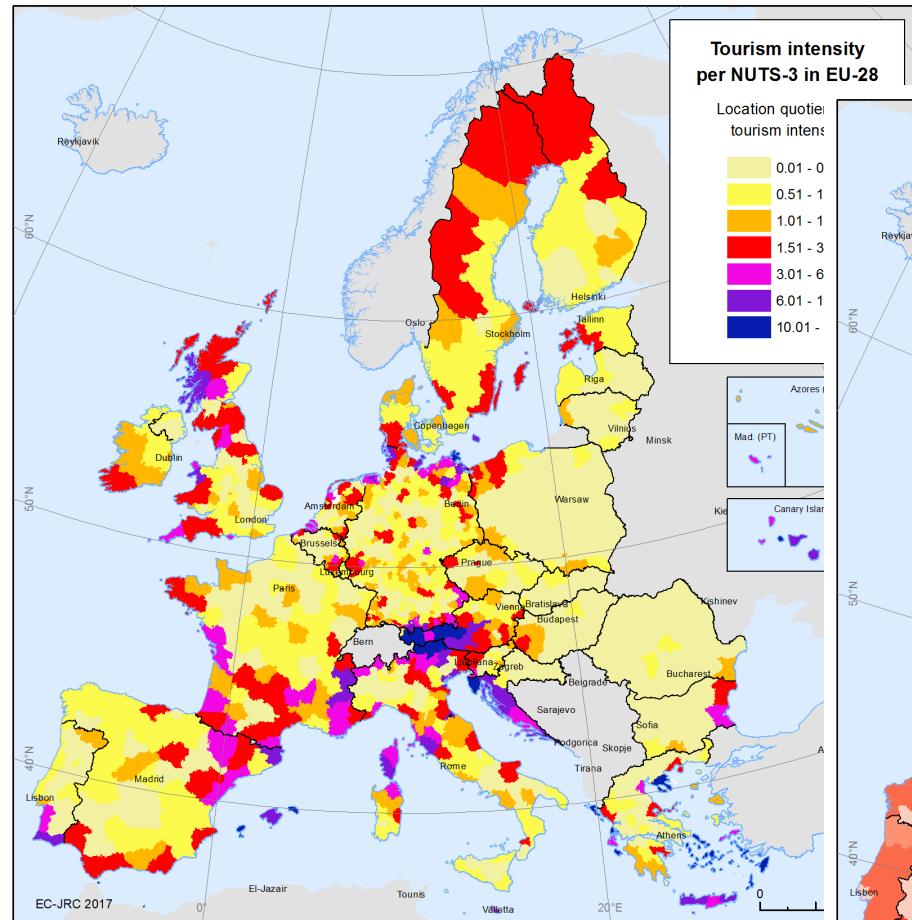
# 3. Tourism density and seasonality

## Monthly tourism density in Croatia

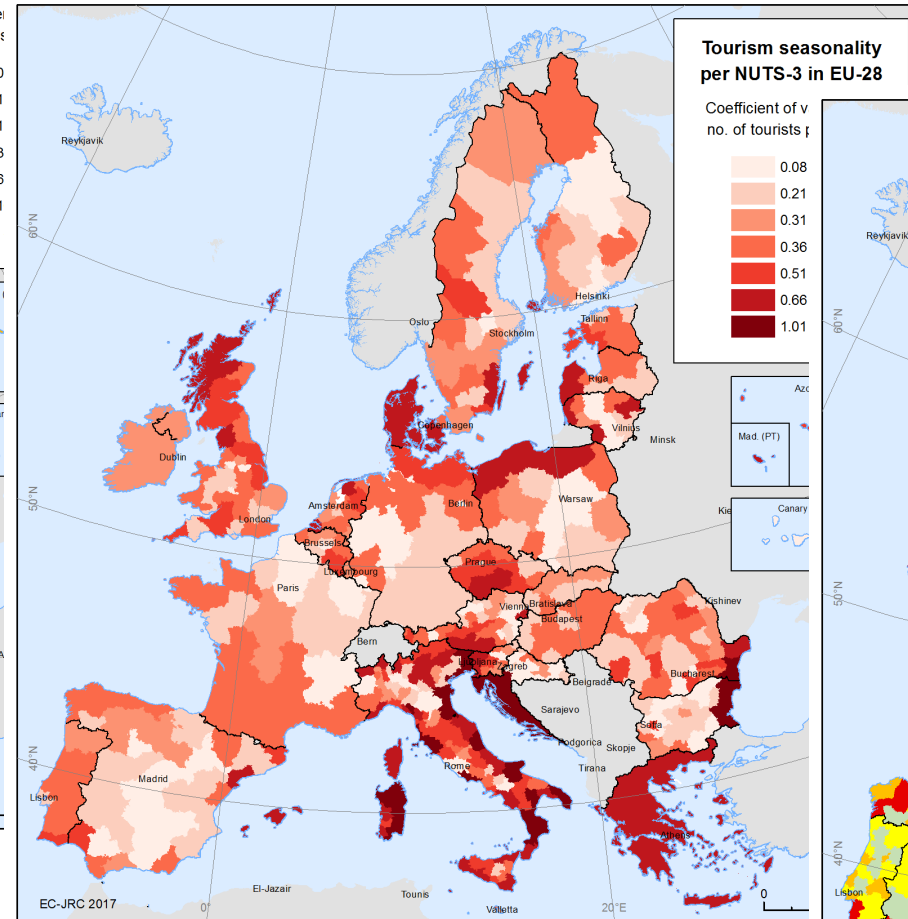


# 3. Intensity, Seasonality and Vulnerability

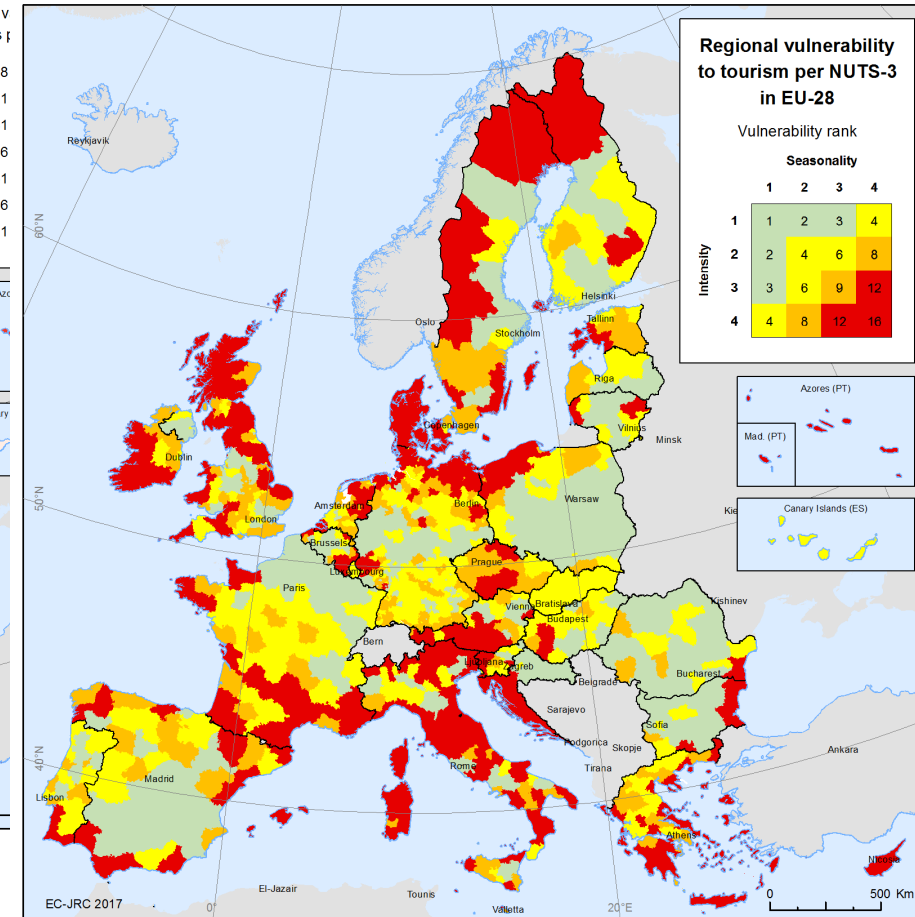
## Intensity



## Seasonality



## Vulnerability

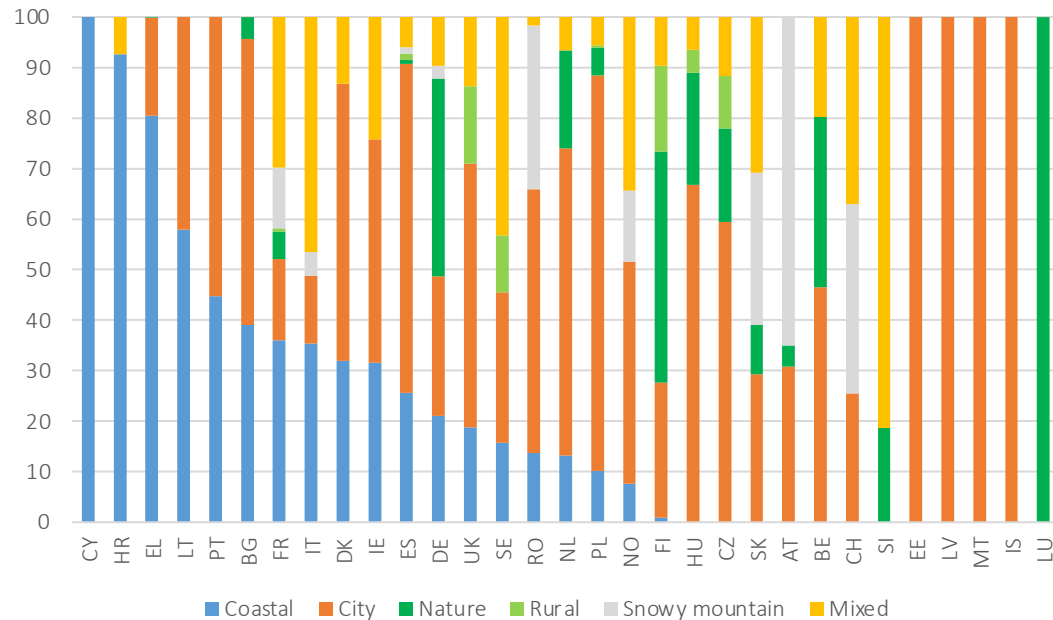




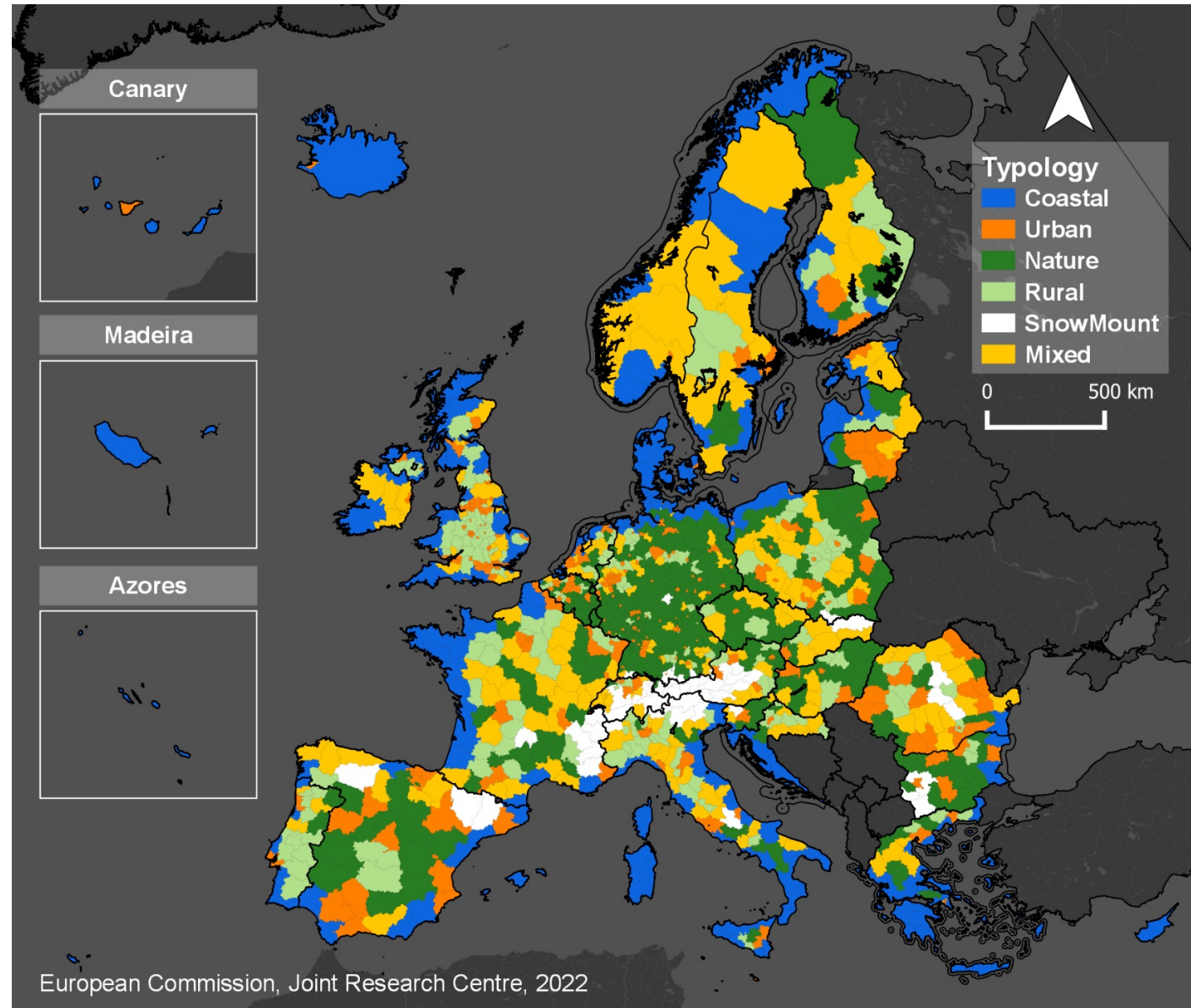
# 3. EU Regional typologies

- EU regions classified based on hotel location patterns and geographical criteria.
- Distinct profiles concerning tourism intensity and seasonality.
- Assessing Climate Change impact on tourism.

Share of nights spent per typology in 2019 (NUTS2)



Source: Batista e Silva, Barranco et al. (2021)



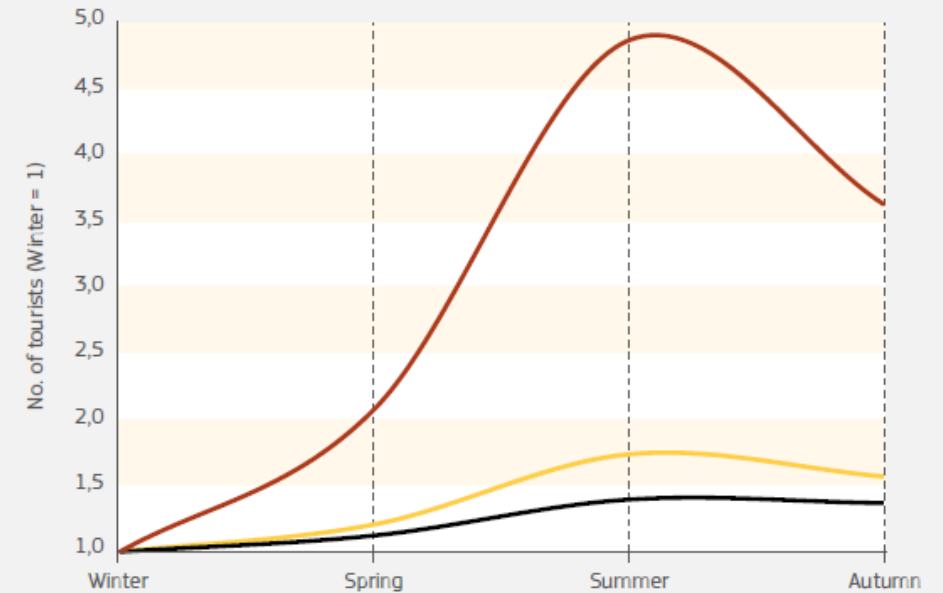
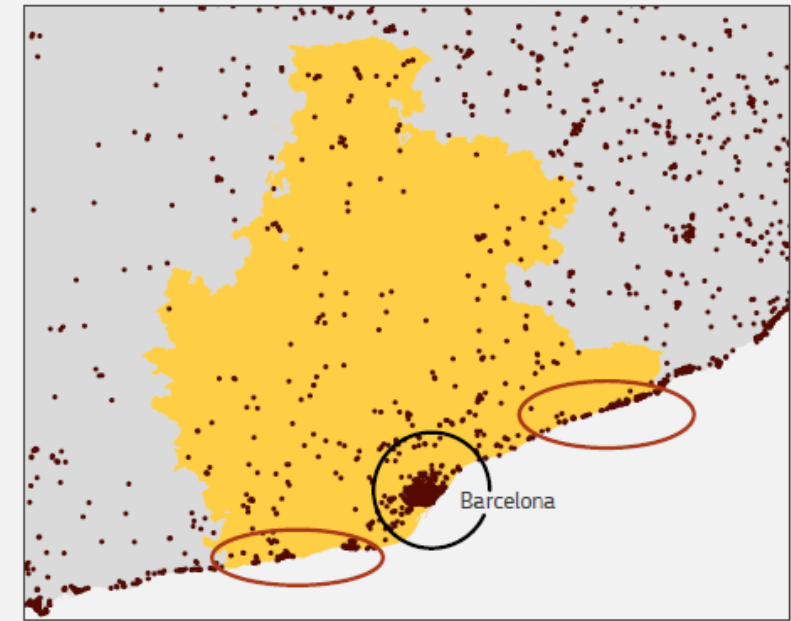
European Commission, Joint Research Centre, 2022

# Fine-scale tourism seasonality

## Intra-regional variation

The province of Barcelona shows very **distinct patterns of seasonality between the city and the nearby coastal areas** (just a few kilometers apart).

Fine-scale estimates based on time-tagged customer reviews of tourism accommodation establishments.



● Region ● City ● Coast

Figure 11. Seasonality curves at sub-regional level for the province of Barcelona. The orange dots in the map are locations of tourist accommodation establishments for which we obtained time-tagged customer reviews.

## 4. Population grids

- Generate consistent and complete pan-European grid time-series.
- Assess the Degree of Urbanisation for the period 1961-2021, to calculate urbanization rates per country and decade.
- Statistical analysis of population location preferences, to inform the modelling of urbanization scenarios.

- SDG 11 (target 11.3)

Enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries (by 2030).

- SDG 13 (target 13.2)

Integrate climate change measures into national policies, strategies and planning

### Indirect links to several SDG

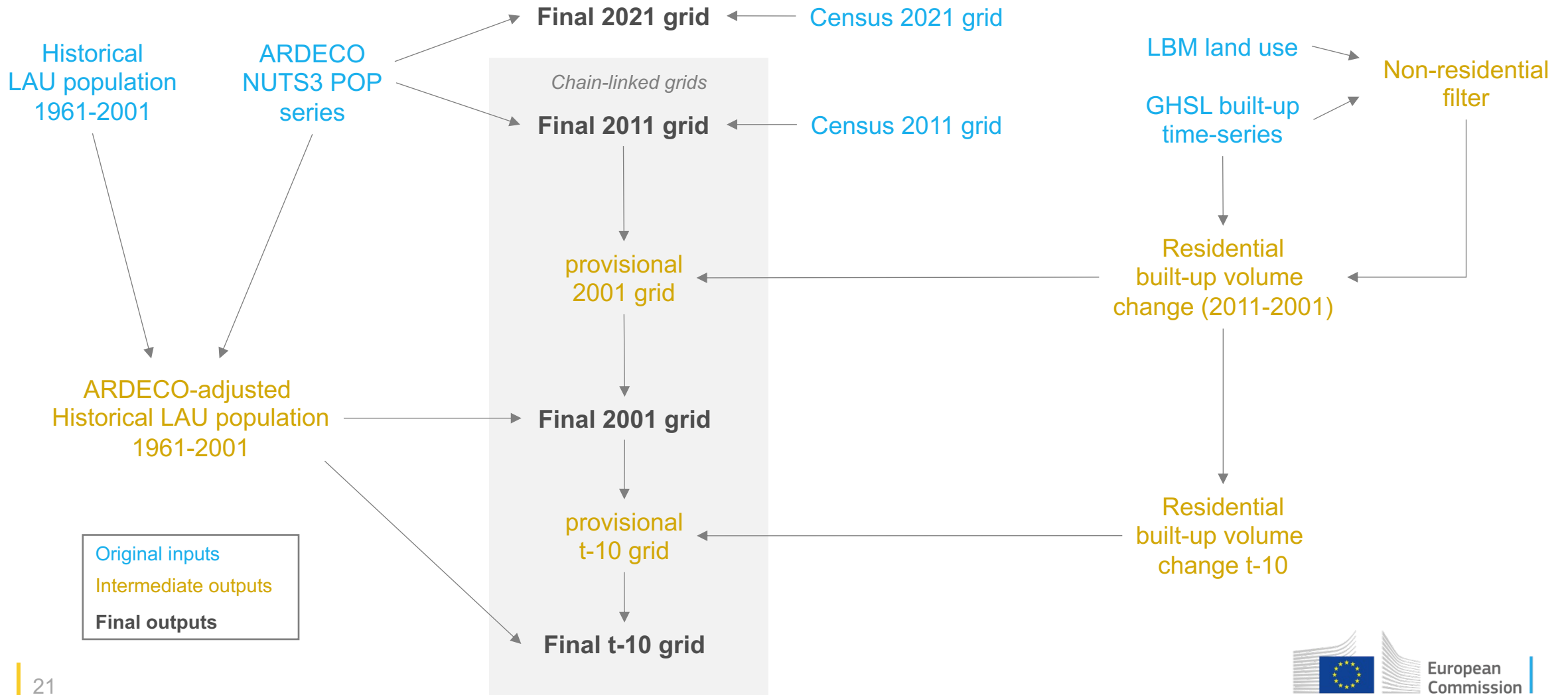
Important for assessing SDGs at local level, as population is often a denominator for many indicators.

# 4. Materials and methods

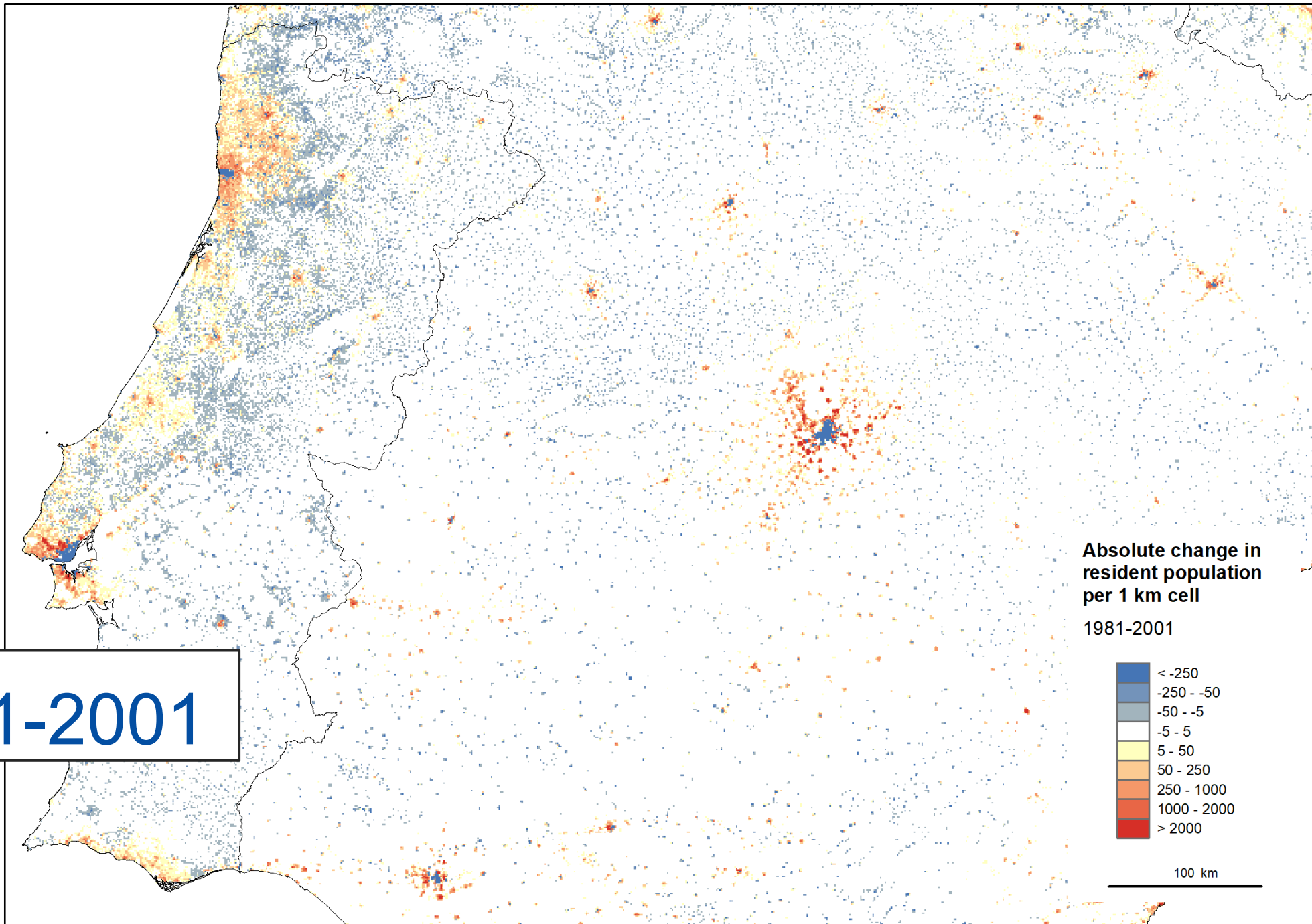
## Data

<b>Target geometry</b>	EU Reference 1 km grid
<b>Population data</b>	<ul style="list-style-type: none"><li>▪ NUTS3: ARDECO / Eurostat demographic series</li><li>▪ LAU totals: Historical time-series (REGIO/ESTAT)</li><li>▪ Population grids 2011, 2021: Eurostat (Geostat/Census grids)</li></ul>
<b>Land use / land cover data</b>	<ul style="list-style-type: none"><li>▪ GHSL time series, 100 m (for change in built-up)</li><li>▪ LUISA Base maps (2012, 2018) (CORINE-enhanced), 100 m (for distinction between residential and non-residential areas)</li></ul>

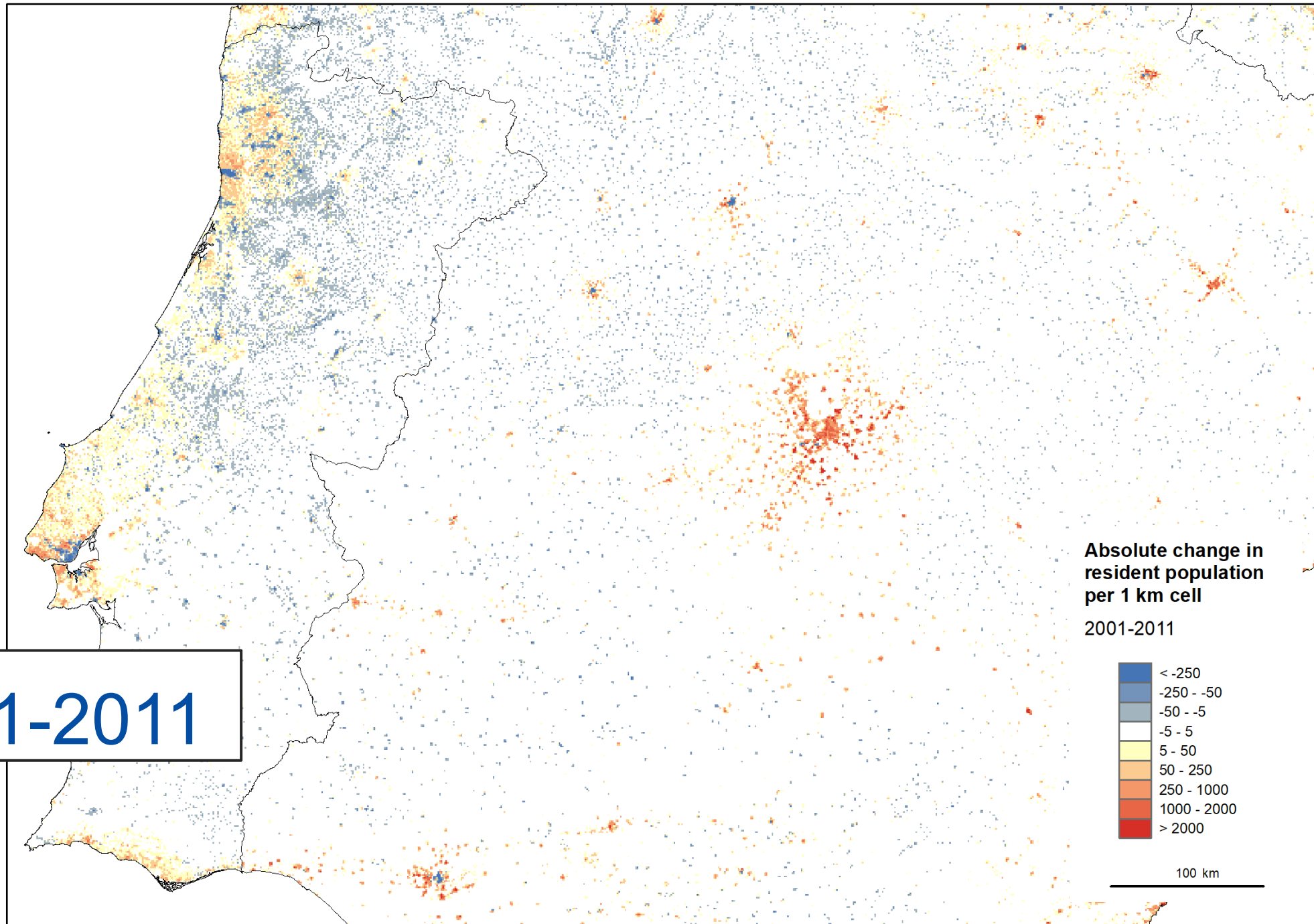
# 4. Materials and methods



1981-2001

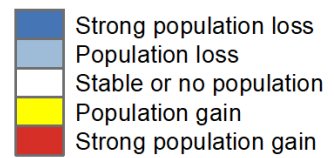


2001-2011

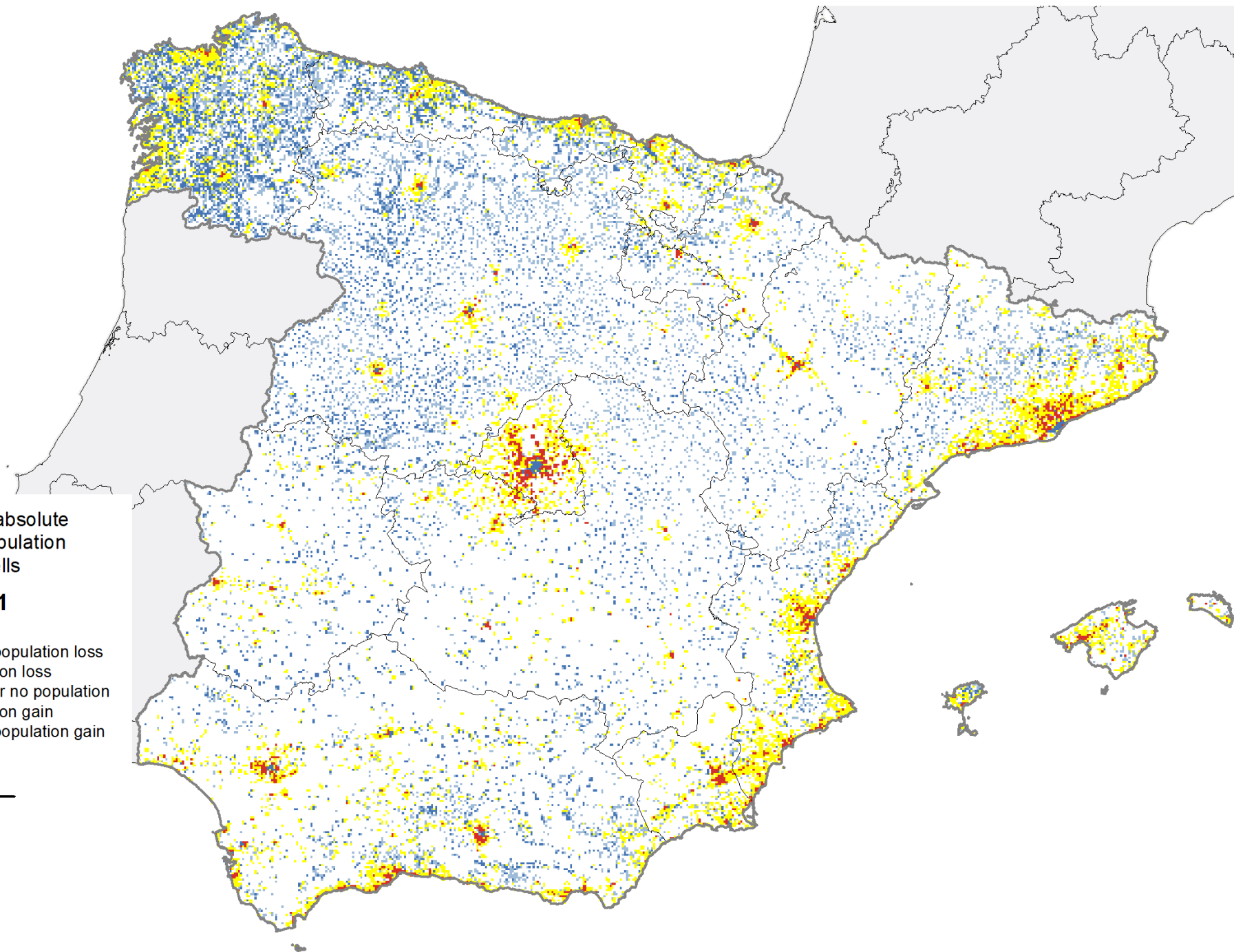


Change in absolute  
resident population  
per 2 km cells

**1981-2021**



100 km





# Conclusions

The four studies presented have **strong direct and indirect links with several SDGs**. They are real applied examples of how fine-scale spatial data can be used to monitor and evaluate:

- Access to adequate and affordable housing;
- Increase information technologies and reduce inequality on accessing Internet;
- Monitor and implement sustainable tourism and integrate climate change measures;
- Enhance inclusive and sustainable urbanization and human settlement planning.

Examples	Sustainable Development Goals	Targets
Real-estate price data	11 - Cities 1 - End poverty in all forms	11.1
Digital accessibility	9 - Infrastructure, Industrialization 10 - Inequality 17 - Partnerships	9.C
Tourism activities	8 - Economic Growth 12 - Sustainable consumption and productions 11 - Cities (indirect) 13 - Climate Action	8.9 12.B 11.1 13.2
Population grids	11 - Cities 13 - Climate Action Indirect links to several SDGs	11.3 13.2

# Thank you

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