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Strategic Planning for Equitable Territory Development: the case of sustainable water and wastewater infrastructure in Northeastern Portugal

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Urban Growth without Sprawl

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1. Research Objectives

Main

Assessing adoption of European Union and National Sustainable Development Strategies (EUSDS, ENDS 2015, PIENDS 2015, PNPOT, PEESAAR) for understanding infrastructure sustainability in the light of :

Operational Objectives

- Environmental protection
- Social equity and cohesion
- Economic prosperity

To be tested on a dry region with low water levels and with increasing needs for infrastructure development and upgrade

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Coastal / Interior Areas Divide

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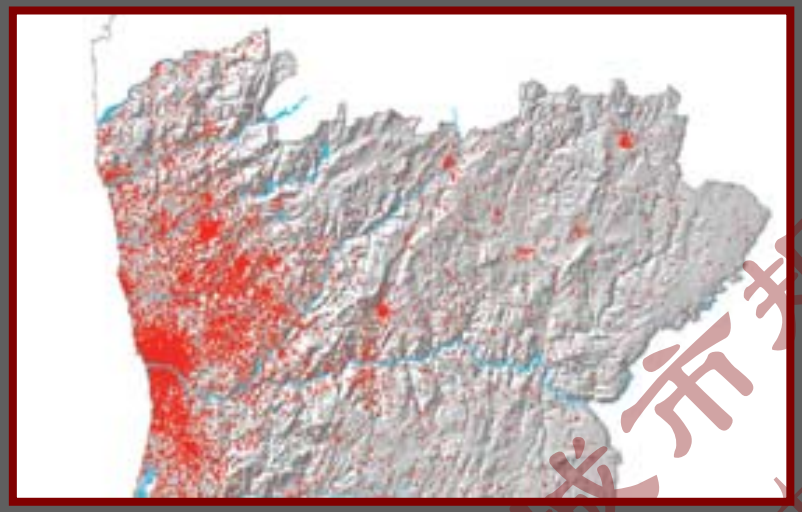

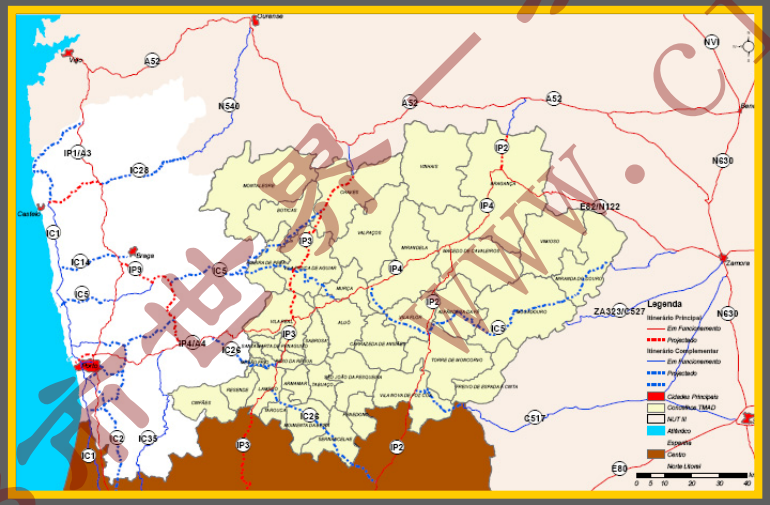

- Urban development is unbalanced between interior and coastal areas
- Northeastern Portugal continues to struggle with a chronic lack of critical mass fundamental to generate the desired levels of urban growth and development
- Accessibilities were improved, particularly during the 1990-2000 decade
- Transportation to areas of low population density is disappearing

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2. Sustainable Development:
2.1. European context

2001 → Endorsement of the first European Union Sustainable Development Strategy

By 2005 → Unsustainable trends continued to worsen

Implementation still a problem

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2. Sustainable Development:
2.1. European context

2006 → Adoption of the renewed European Union Sustainable Development Strategy (EUSDS)

Key Objectives

- Environmental protection
- Social equity and cohesion
- Economic prosperity
- Meeting of international responsibilities

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2. Sustainable Development:
2.1. European context

2007 → The Leipzig Charter on Sustainable European Cities: sustainable urban policies

Assessment of strengths and weaknesses in each city/neighborhood

→ Coordination of housing, economics, infrastructure and services

↓

Modernization of the technical infrastructure networks, namely for water and wastewater service

Early-stage improvements adapted to changing requirements

→ For → Meeting future needs at a high quality level

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2. Sustainable Development:
2.2. Portuguese strategies

2007 → Approval of the Portuguese National Strategy for Sustainable Development for 2015 (ENDS 2015) and Plan of Implementation (PIENDS 2015)

Goals

- Increase Country's competitiveness
- Increase Country's attractiveness
- Increase levels of economic, social and environmental development and responsibility

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2. Sustainable Development:
2.2. Portuguese strategies

2007

Approval of the Portuguese Program of the Policies for Land-Use Planning (PNPOT) and the Strategic Plan for Water Supply and Wastewater Collection and Treatment (PEAASAR 2007-2013)

PEAASAR 2007-2013

PNPOT

Includes territorial equity in terms of infrastructure

ENDS 2015

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2. Sustainable Development:
2.2. Portuguese strategies

2007

Approval of the Portuguese Program of the Policies for Land-Use Planning (PNPOT) and the Strategic Plan for Water Supply and Wastewater Collection and Treatment (PEAASAR 2007-2013)

PNPOT

Includes territorial equity in terms of infrastructure

E201NDS 5

PEAASAR 2007-2013

Water supply and wastewater collection for the majority of the population, at high quality levels, reasonable prices and using necessary funding and investing

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2. Sustainable Development: 2.2. Portuguese strategies

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PEAASAR 2007-2013

Operational Objectives

- Water supply: 95% coverage
- Urban wastewater collection and treatment: 90% coverage (minimum 70%)
- Guarantee integral recuperation of service costs
- Promote private national and local entrepreneurship
- Meet objectives of National and European regulations for environmental and public health

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3. Selected Portuguese municipalities: 3.1. Area background

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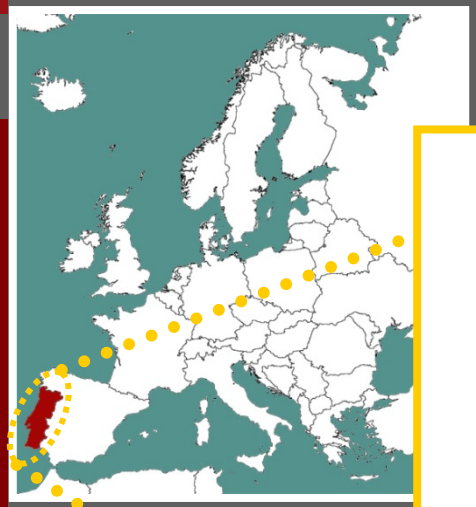

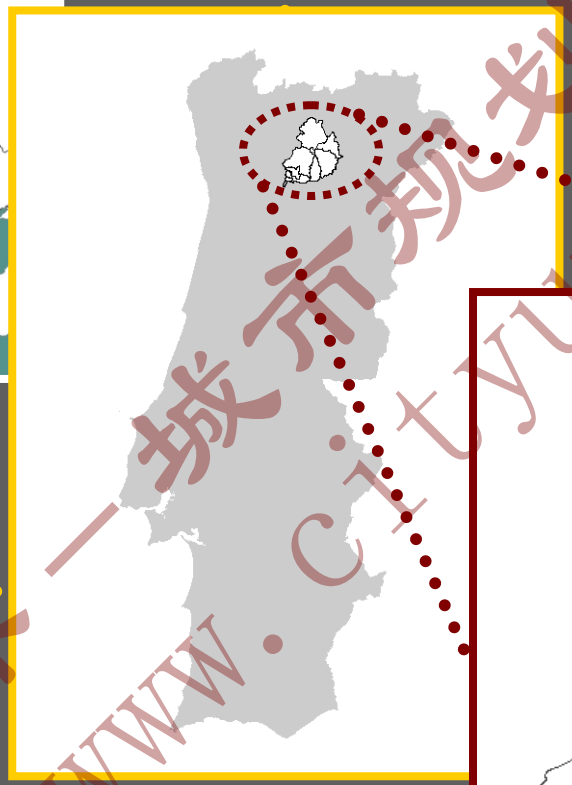

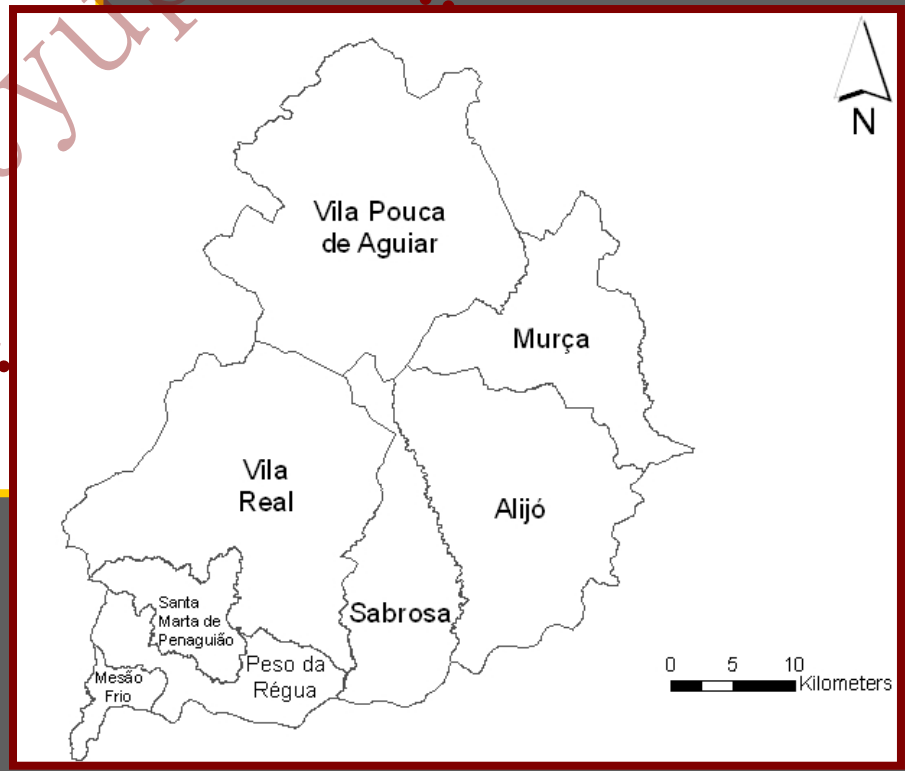

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3. Selected Portuguese municipalities: 3.1. Area background

- Complex topography and morphology
- Severe climate variations across the region and throughout the year
- Region is prone to severe drought episodes and flooding is frequent in some locations
- Great natural and cultural heritage

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3. Selected Portuguese municipalities: 3.1. Area background

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- A sparsely populated area with a population density of 43 inhabitants per km^2 (national average: 115)
- Declining and aging population
- Mean unemployment rate of 4.43%, above national average of 4.03%
- Region amongst the poorest in the Country, contributing less than 3% of the GDP

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3. Selected Portuguese municipalities: 3.1. Area background

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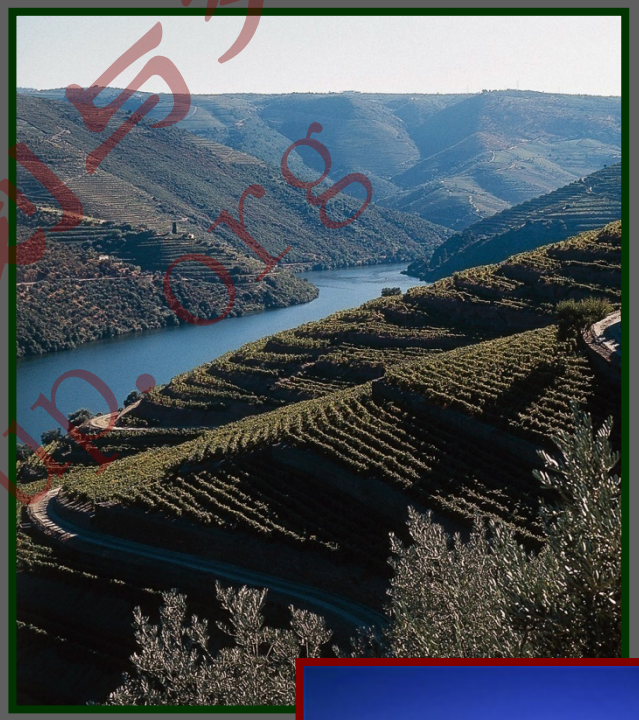
- Agriculture and tourism are main economic activities
- Agricultural activities have been declining despite increase in land productivity
- Trends supported by the complementarity between agricultural, forestry and tourism land uses
- Global regression of the agro-forestry uses and expansion of barren land
- Tourism activities have been improving and expanding



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2. Selected Portuguese municipalities: 2.1. Area background

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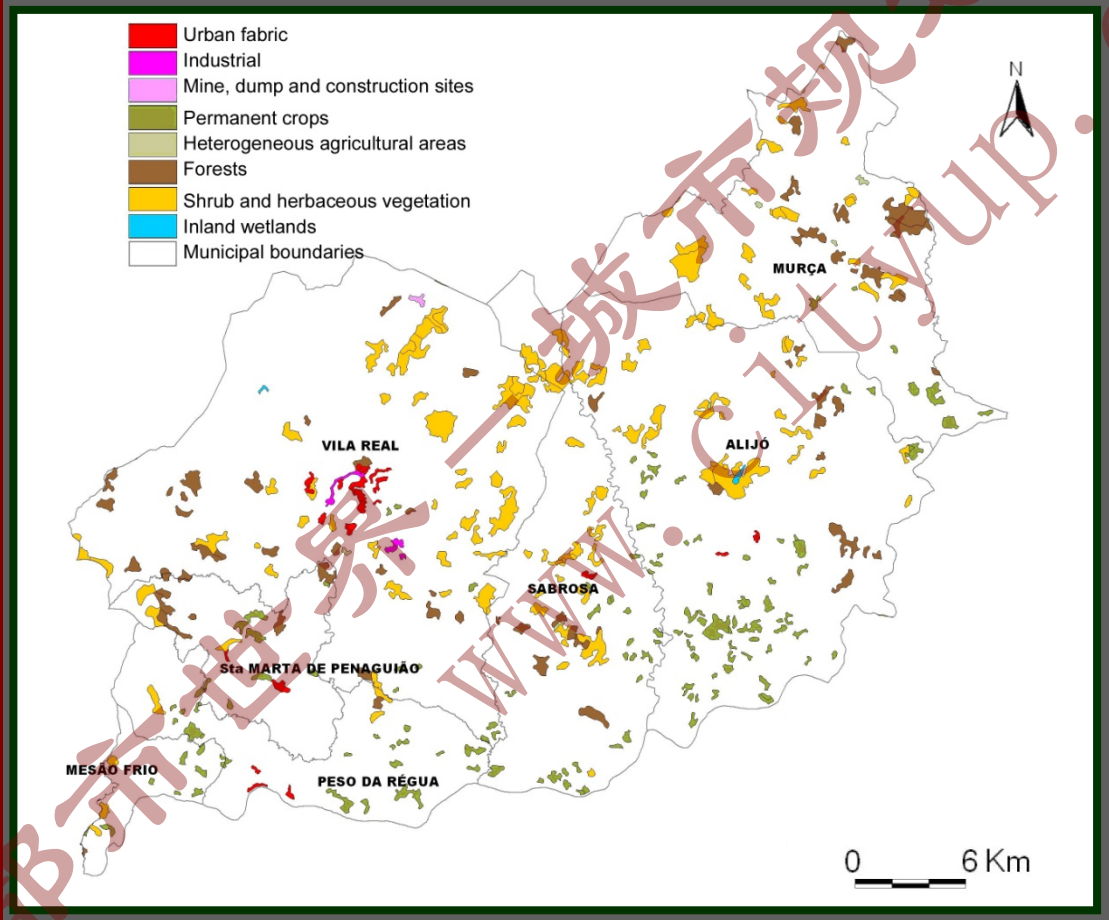
- Increase in low density urban uses between 1990 and 2000



- Urban uses continue to have little expression in the study area
- Population clusters are not limited to areas identified per urban uses
- Small dimension and scattered nature limits accessibility to service by infrastructure networks

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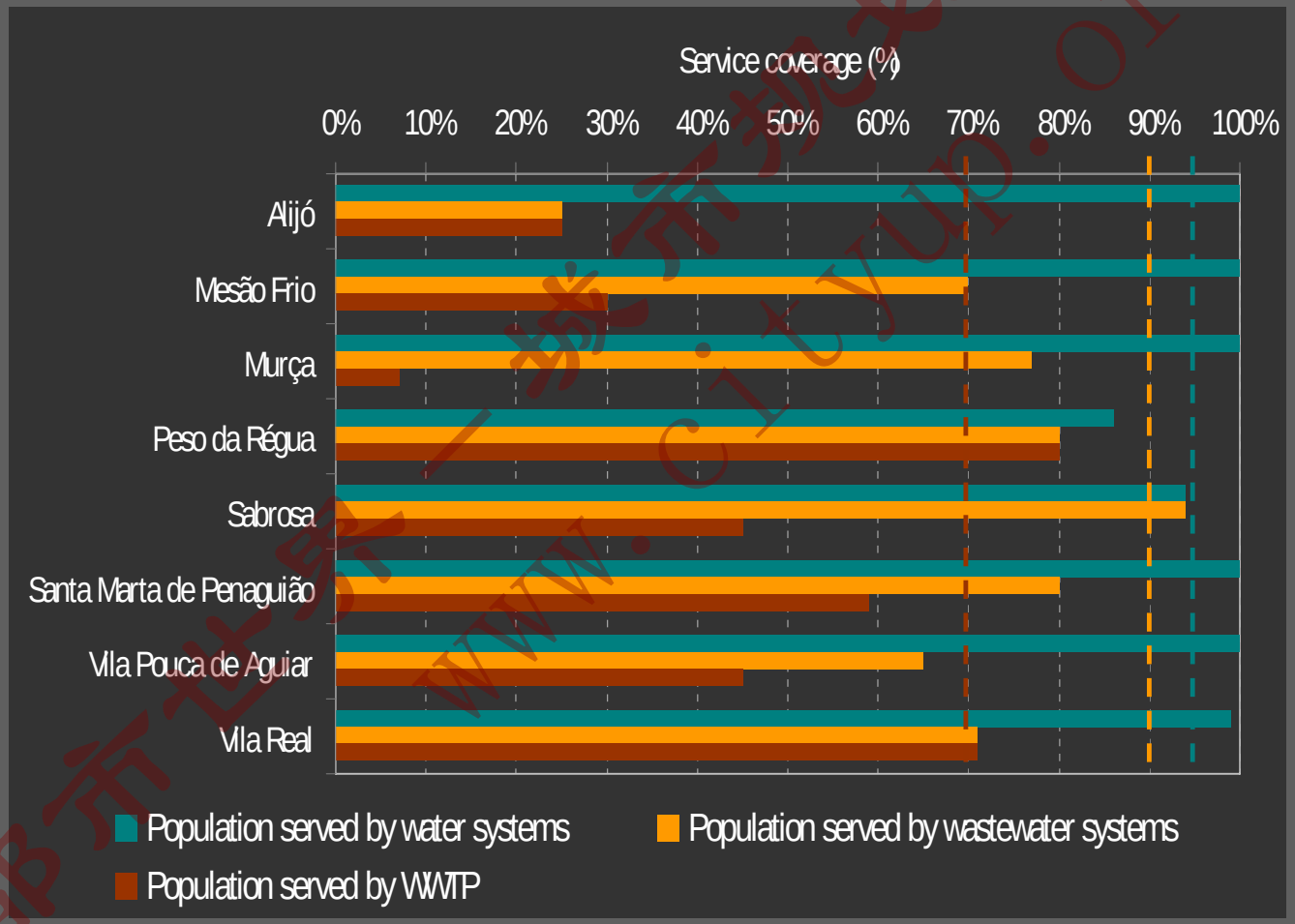
3. Selected Portuguese municipalities: 3.1. Area background

- Water and wastewater systems benefitted from World Bank funding in the 1980s and continued later on to expand and upgrade



- Minimum water service coverage standards exceeded
- Wastewater service coverage exceeds national average

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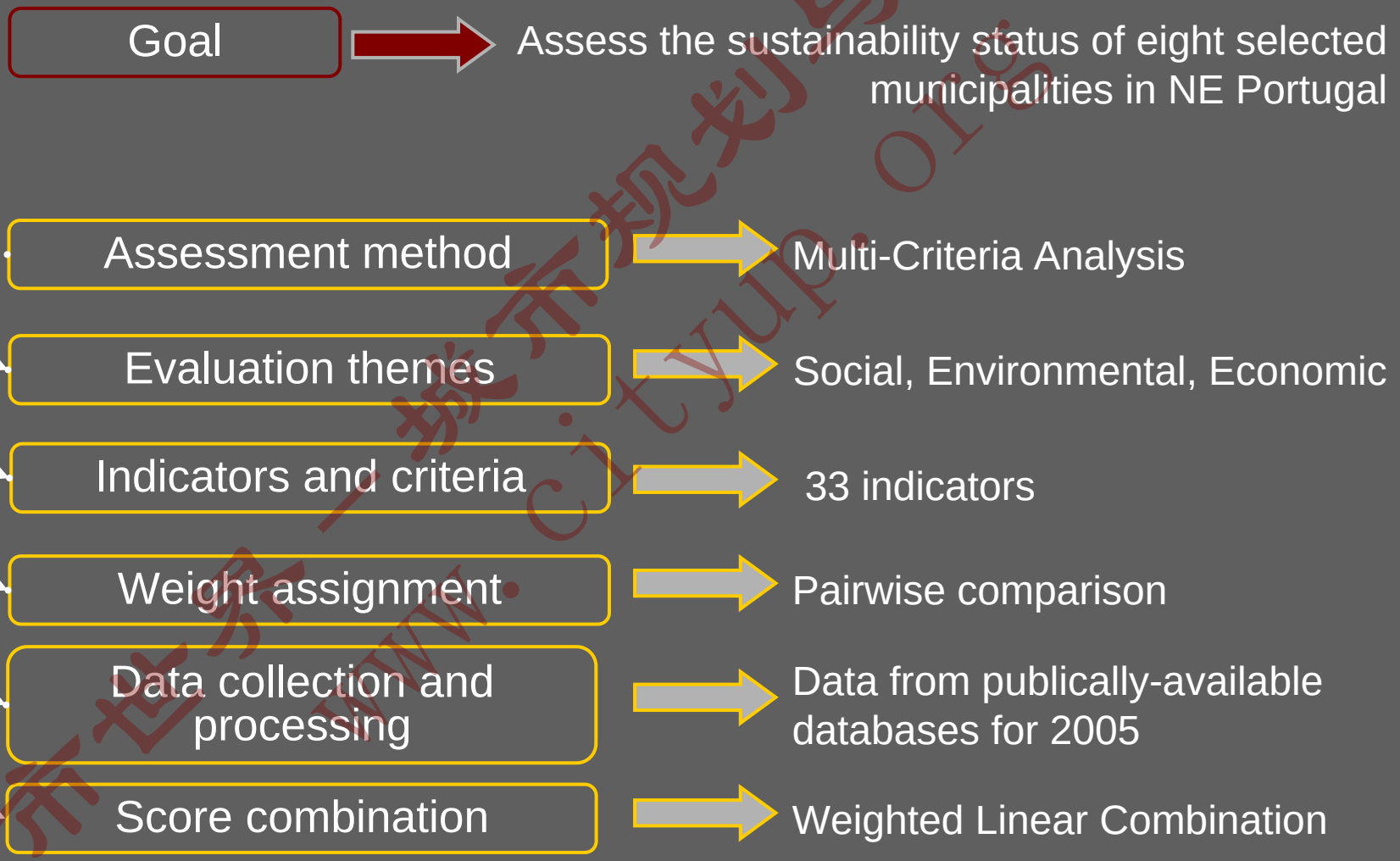
3. Selected Portuguese municipalities:
3.2. Sustainability assessment methodology



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3. Selected Portuguese municipalities:
3.2. Sustainability assessment methodology

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- **1. Social** $\omega_i = 1/3$
  - 1.1. General characterization (0.167)
  - 1.2. Accessibility (0.833)
- **2. Environmental** $\omega_i = 1/3$
  - 2.1. Water (0.293)
  - 2.2. Wastewater (0.293)
  - 2.3. Wastewater treatment facilities (0.293)
  - 2.4. Solid waste (0.073)
  - 2.5. Electrical energy use (0.047)
- **3. Economic** $\omega_i = 1/3$
  - 3.1. Expenditure – percentages (0.203)
  - 3.2. Expenditure – per capita (0.124)
  - 3.3. Revenue – percentages (0.063)
  - 3.4. Revenue – per capita (0.038)
  - 3.5. Revenue over expenditure (0.572)

4. Results and Discussion

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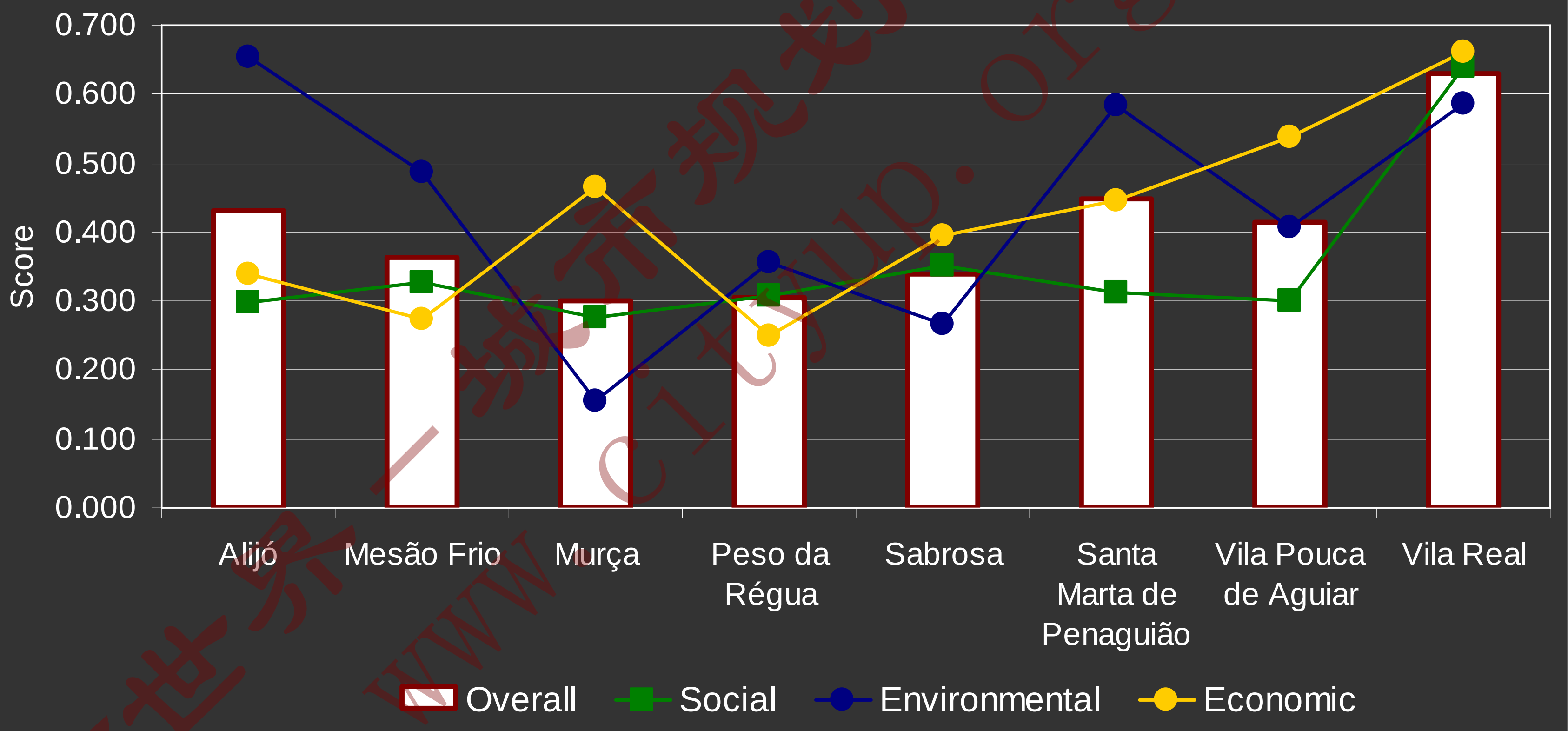

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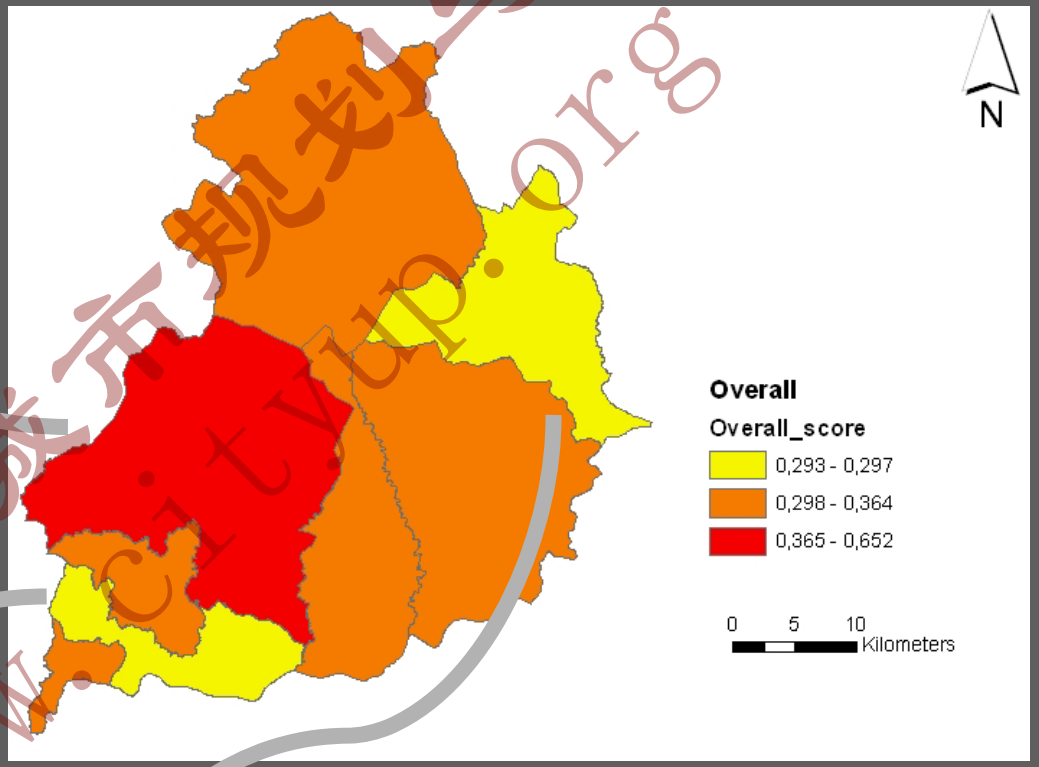
4. Results and Discussion

Vila Real was the most sustainable municipality in 2005



Peso da Régua and Murça were the least sustainable municipalities in 2005

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4. Results and Discussion

- Vila Real exhibits:
  - The largest of the urban areas within the study area
  - High population numbers and densities
  - Population growth dynamics similar to regional and national trends
  - Younger population
  - Better service in terms of transportation
  - 100% wastewater treatment in WWTP

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4. Results and Discussion

- Murça and Peso da Régua exhibit:
  - Declining populations
  - Lack of water treatment plants within the municipal boundaries
  - Majority of the wastewater treated in collective septic tanks
  - Harsher topography

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5. Conclusions

- Land uses and human occupation are defined by the region's topographic and climate features
- Infrastructure networks are likewise limited
- Population clusters are not limited to areas identified under urban uses; their small dimension and scattered nature limits accessibility to service by infrastructure networks
- Harsh natural factors combined with observed population dynamics represent major hindrances to the implementation on improved levels of service

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Thank you

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