

# Land cover changes as a reflect of Man-Nature relationship evolution

## A case study on River Leça Basin, North of Porto Urban Region

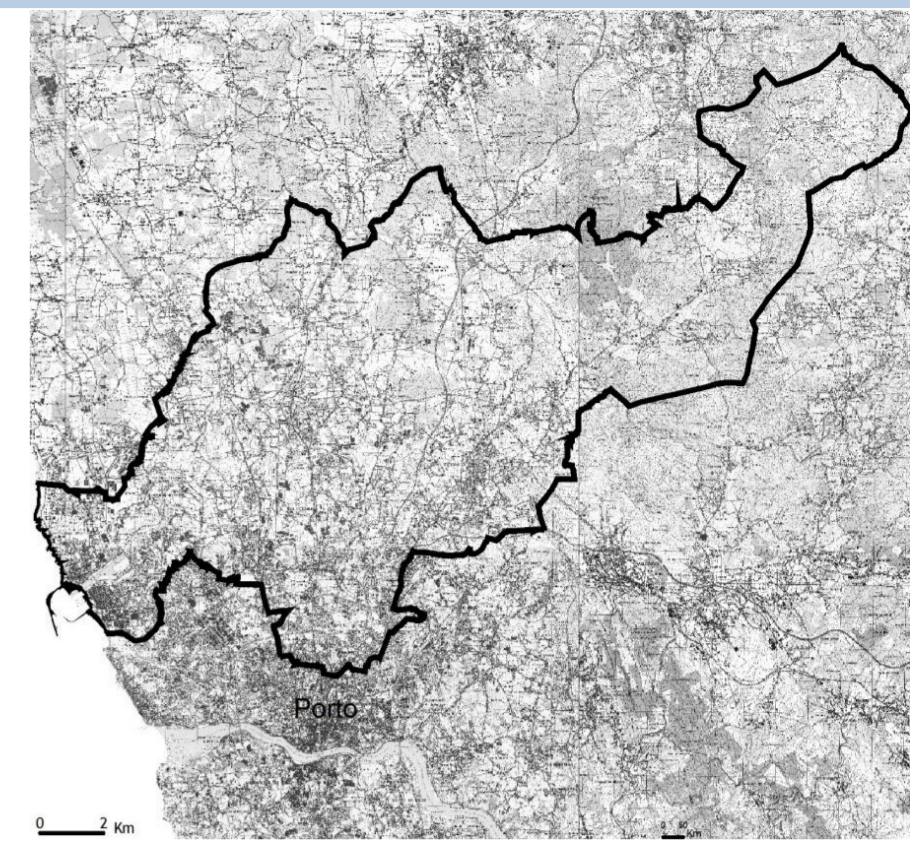
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### SUMMARY

**Background** Landscapes are shaped by complex relationships between human population, social structure, and environmental conditions. They are, therefore, a result of the complex relationship between societies and nature, which has varied over time. The analysis of the landscape patterns at successive time moments can, therefore, be a reflection of the different ways of interaction between man and Nature, like relationships of dependence and harmony, of control, of degradation or of search of sustainability. This contribution intends to identify these different stages in the relationship between society and the river in River Leça Basin.

**Methods** Using land cover maps, we build diagrams that reflect the territorial organization in three different time moments corresponding to different stages of development of the River Basin Leça and the Oporto's metropolitan region: 1950's, 1980's and 2000's.

**Results** These diagrams allow us to conclude on the gradual distancing and alienation for the river as a fundamental and structural unit of the territorial unit. Moreover, despite this devaluation of the river as part of the territory identity, we defend the need of a strategy to promote the opportunities that are intrinsic to river systems, (landscape connectivity, spatial coincidence of cultural and natural resources,...). Concluding, we stress the need of invert the trend of increasingly neglecting the River Leça, foreseeing it as a strategic infrastructure for the sustainable development of the basin and of Oporto's metropolitan region.



The Leça hydrographic basin is a little basin (185 Km<sup>2</sup>) located in the north of Porto urban region. With different degrees of insertion in the metropolitan dynamics, we can find there contrasted landscape typologies, more urbanized or more rural

### LAND COVER CHANGES AND THE THREE STAGES IN THE RELATIONSHIP BETWEEN SOCIETY AND THE RIVER: DEPENDENCE , DOMINATION, DEGRADATION

- two main urban centers, with linear development across the main roads
- factories concentrated mainly in urban centers
- dominance of a rural structure
- central role of small "family agro-forestry holdings"
- fragmented rural landscape
- society depends on agriculture and on local natural resources

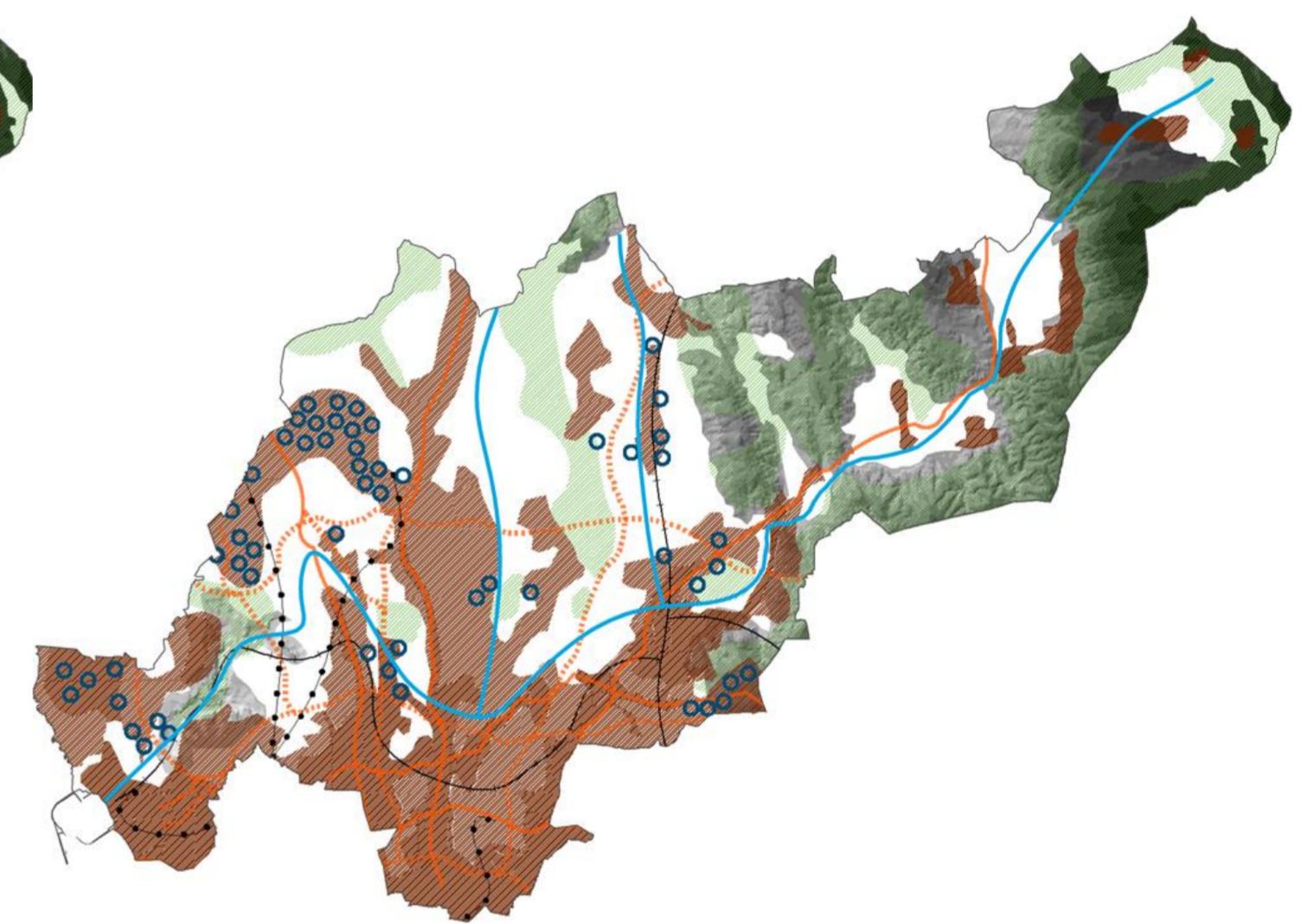
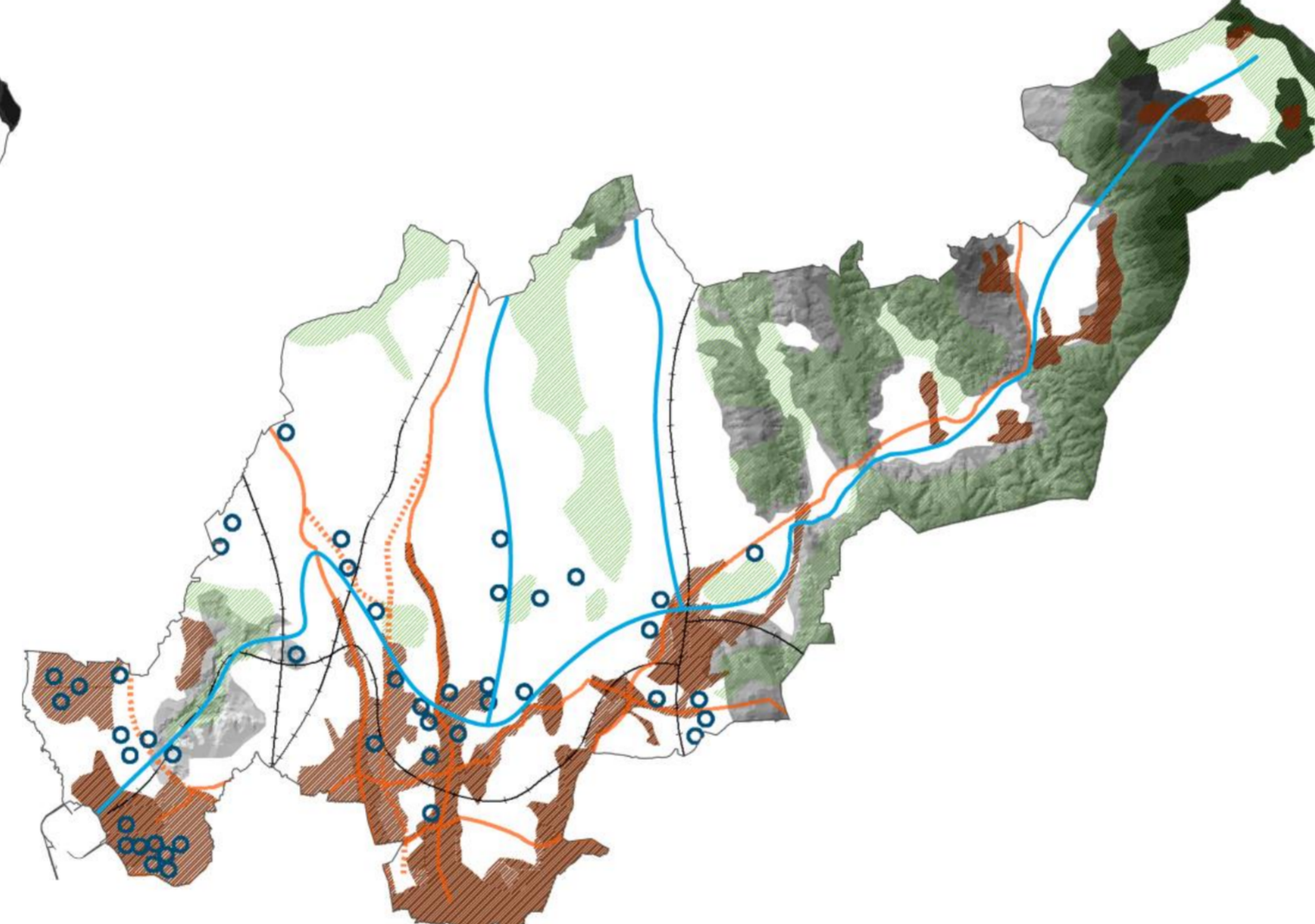
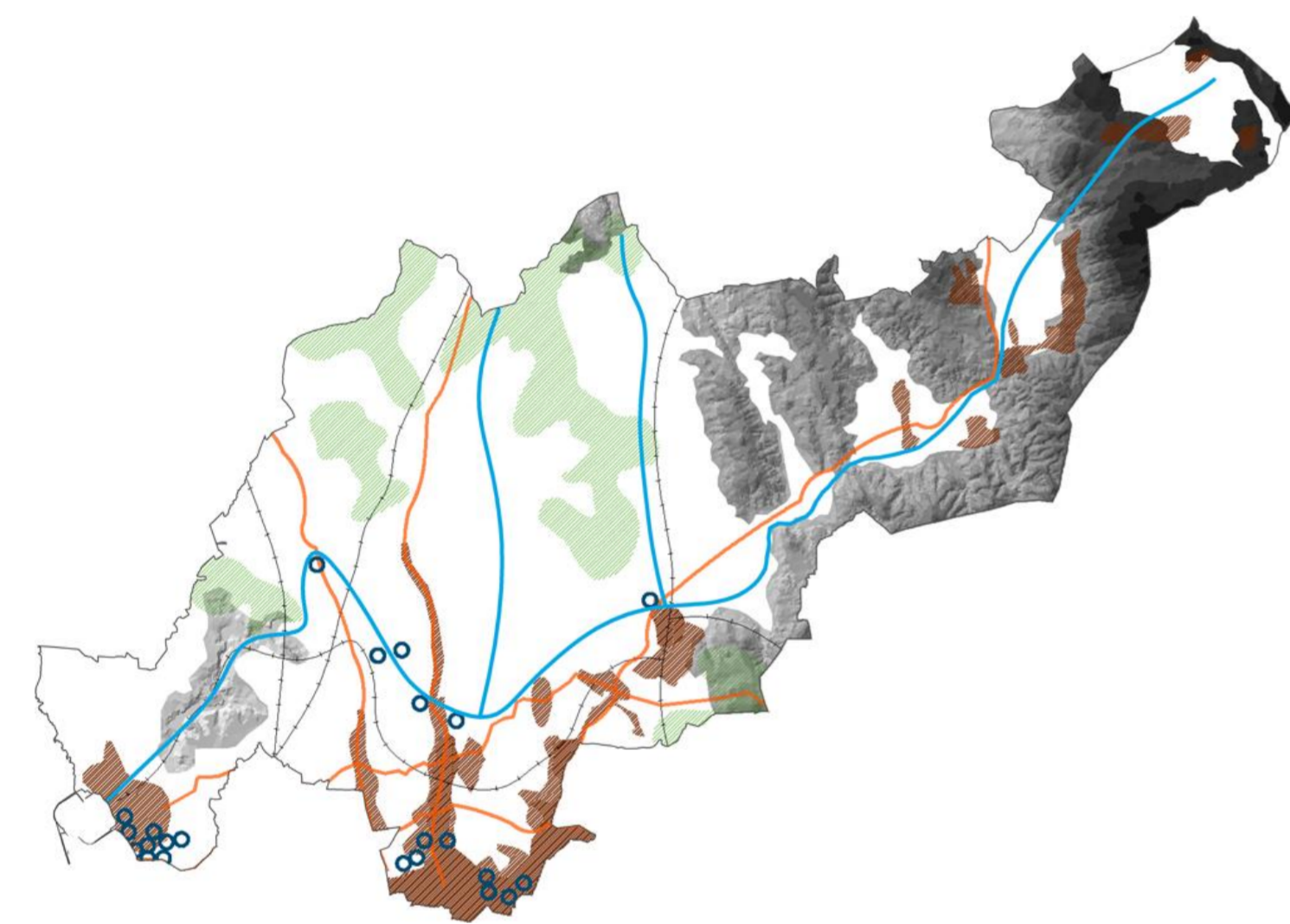
- emergence of new urban centers, reinforcement of development along the main regional roads and intensification of urban sprawl
- decrease of agricultural activity and abandonment of fertile crop lands
- conversion of agricultural land to eucalyptus plantations
- implantation of factories along the riversides
- pollution and degradation of rivers and riversides
- diminution of dependency on local natural resources

- intensification of urban development
- changes in industrial locations: from riversides to industrial parks
- the abandoned old factories remain in riversides
- river landscape degradation
- persistence of river pollution
- the urban growth ignores the desqualified rivers
- the urban growth neglects the river as a landscape resource

**1950's**  
105.321 inhab.

**1980's**  
209.806 inhab.

**2000's**  
276.276 inhab.

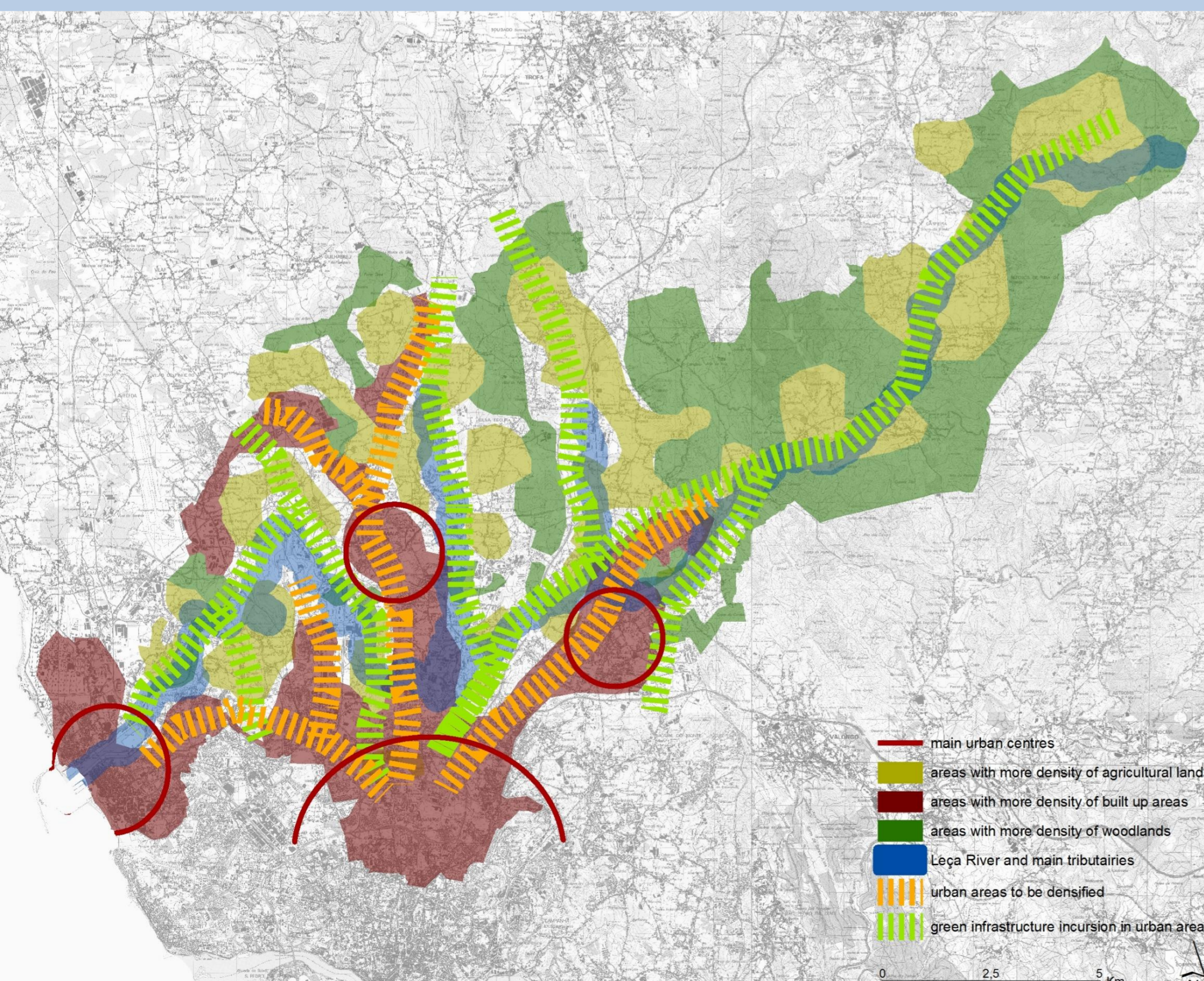


DEPENDENCE

DOMINATION

DEGRADATION

### THE FORTHCOMING STAGE: SEARCH OF SUSTAINABILITY? THE IMPORTANCE OF A GREEN INFRASTRUCTURE STRATEGY FOR THE LEÇA RIVER BASIN



- main urban centres
- areas with more density of agricultural land
- areas with more density of built up areas
- areas with more density of woodlands
- Leça River and main tributaries
- urban areas to be densified
- green infrastructure incursion in urban areas

#### Arguments

A green infrastructure strategy based on Leça river system promotes:

- 1. urban containment**  
the protected natural land along the river system can shape urban and growth
- 2. identity**  
river system restoration may improve sense of place and identity in metropolitan region
- 3. connectivity**  
river system restoration may *re-establish natural landscape connectivity*
- 4. multifunctionality**  
the coexistence of different categories of green areas: agricultural, woodland, public parks, ...
- 5. a continuum of rural-to-urban landscapes**  
natural continuum from the surrounding rural areas to the metropolitan region center