Green infrastructure and landscape multifunctionality:
enhancing ecological connectivity and complexity in peri-urban agricultural systems

Dr. Simone Valeri* and Prof. Giulia Capotorti - **simone.valeri@uniroma1.it*
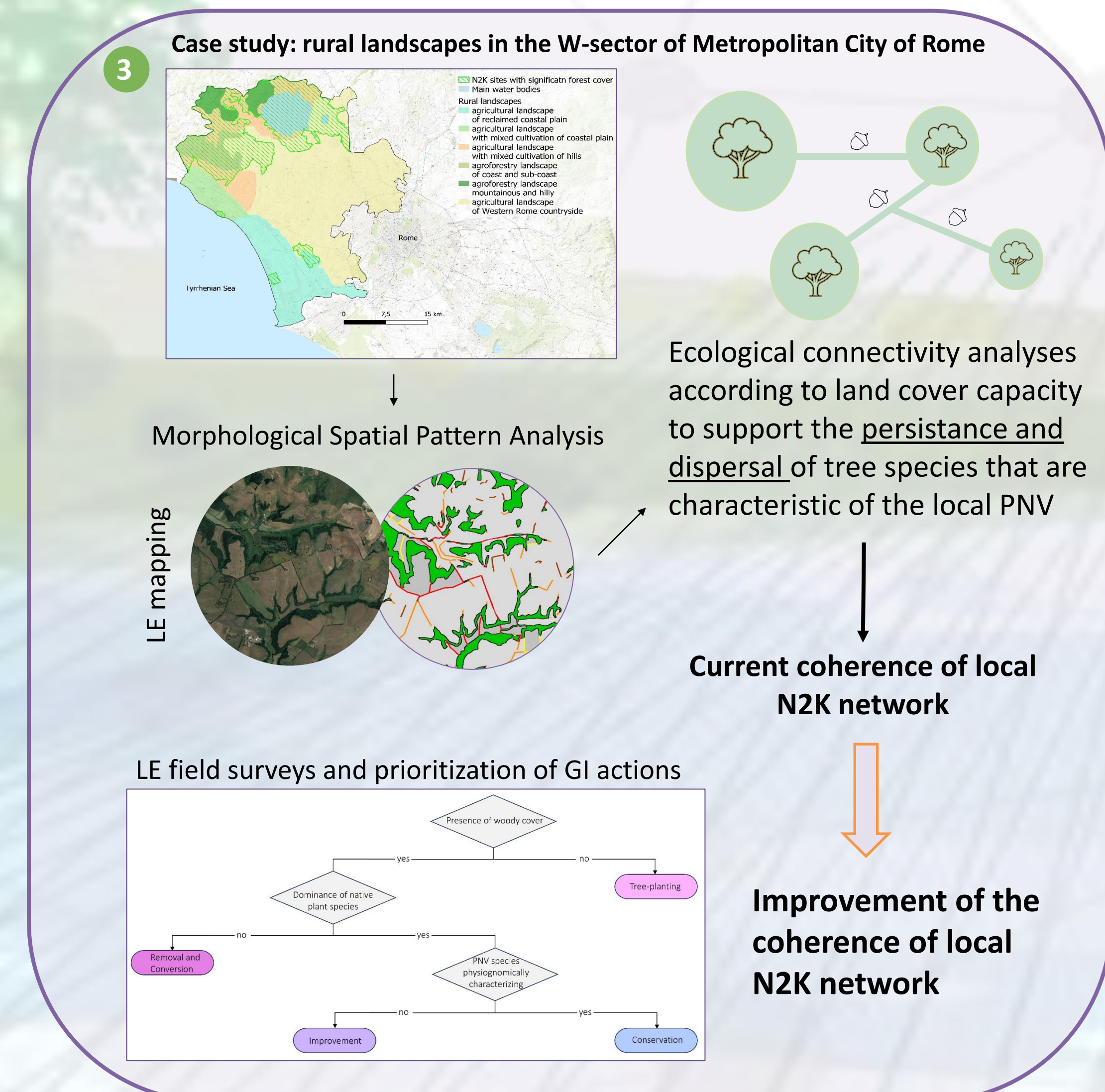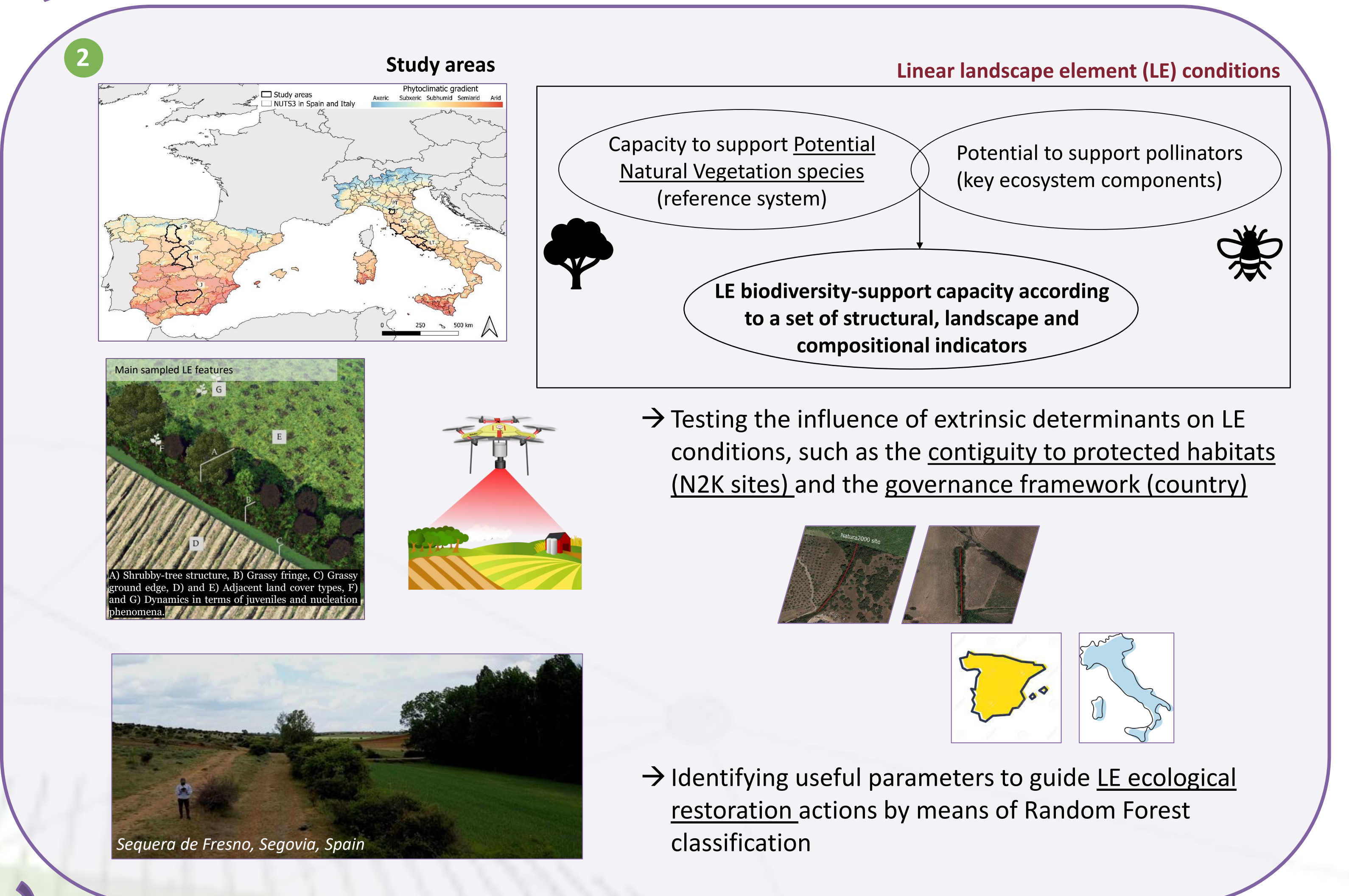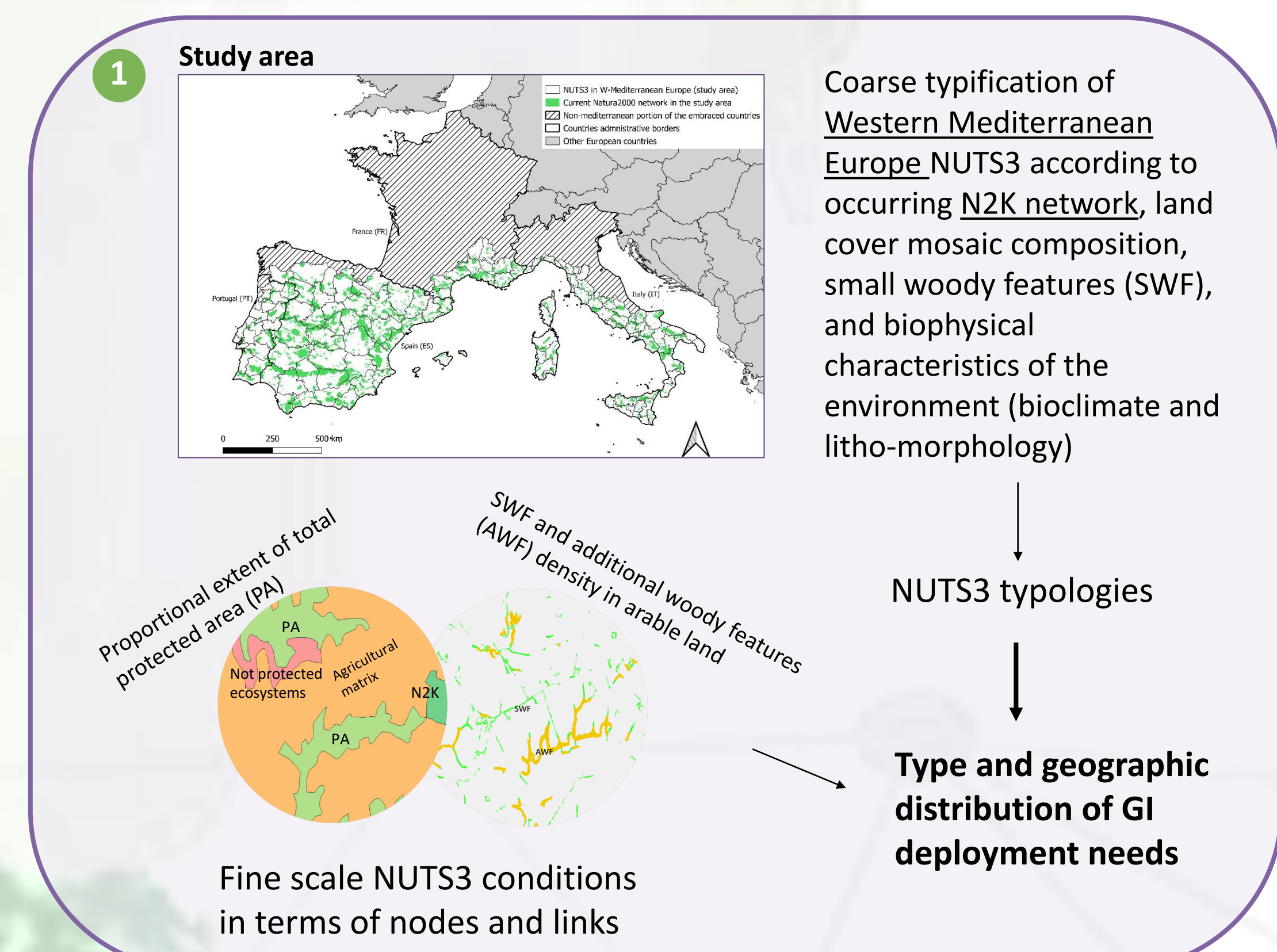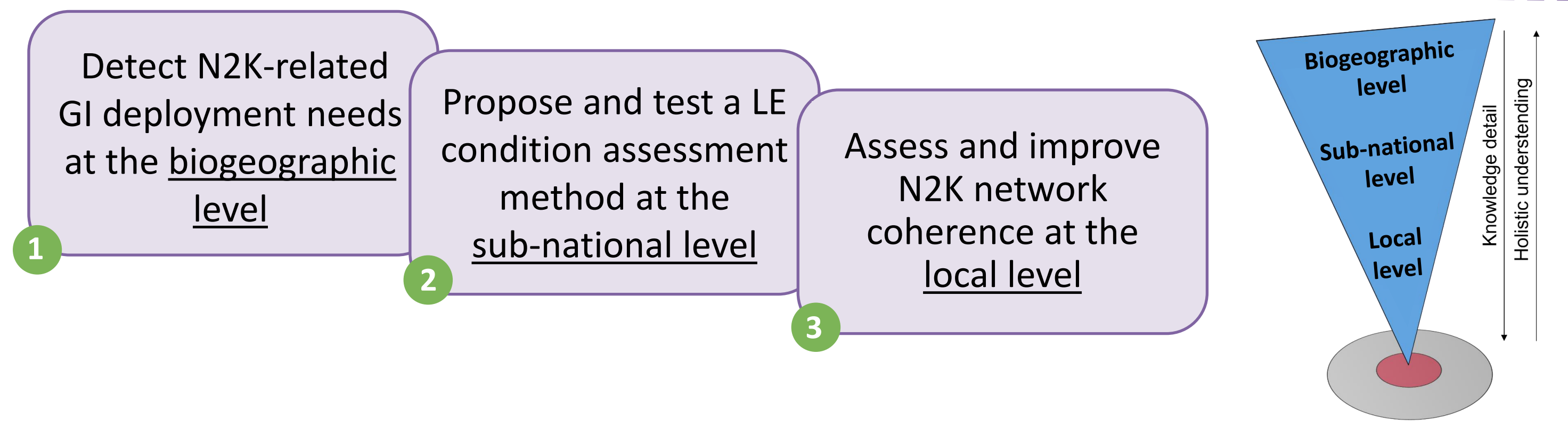
Scientific and policy framework

- Around 20% of the EU Natura2000 (N2K) sites dominated by woodland and forests are poorly connected due to fragmentation by urban areas and agricultural land
- Green Infrastructure (GI) has the potential to simultaneously protect and ecologically reconnect natural ecosystems across agricultural matrices
- A well-planned network of natural and semi-natural elements with high biodiversity could aid filling the gaps between and within N2K sites
- Linear landscape elements (LE) play a key role in assisting species dispersal and making agroecosystems resilient
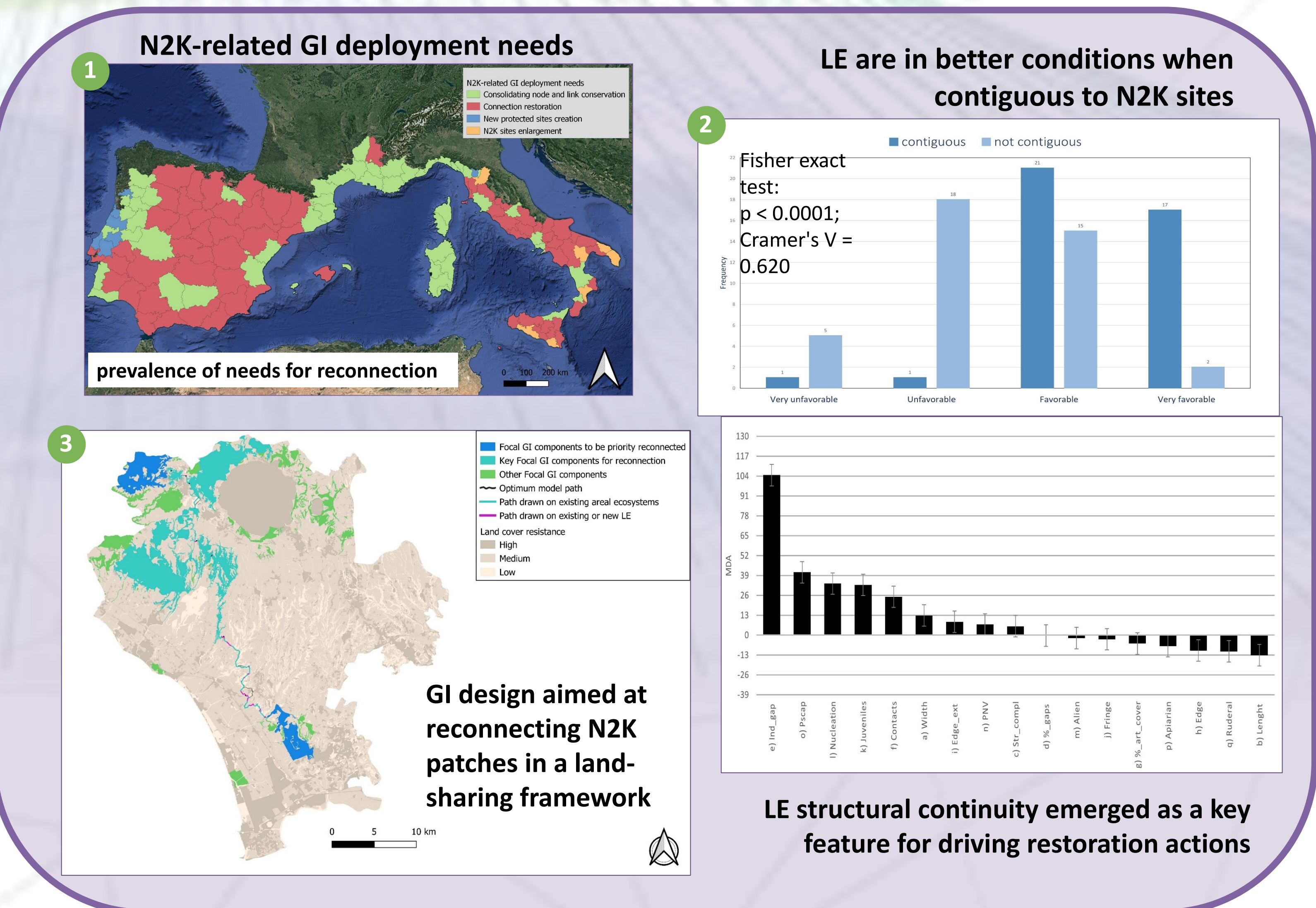

Main aim

To develop a GI planning model for the protection and restoration of agricultural systems and associated biological diversity in peri-urban agricultural landscapes. Such a model should aid agroecosystems resistance and resilience and would contribute to the completion of current N2K network

Multistep and hierarchical process

1. Detect N2K-related GI deployment needs at the biogeographic level
2. Propose and test a LE condition assessment method at the sub-national level
3. Assess and improve N2K network coherence at the local level

Biogeographic level / Sub-national level / Local level

1. Study area

Coarse typification of Western Mediterranean Europe NUTS3 according to occurring N2K network, land cover mosaic composition, small woody features (SWF), and biophysical characteristics of the environment (bioclimate and litho-morphology)

→ NUTS3 typologies

→ **Type and geographic distribution of GI deployment needs**

Proportional extent of total protected area (PA)

SWF and additional woody features (AWF) density in arable land

Fine scale NUTS3 conditions in terms of nodes and links

2. Study areas

Linear landscape element (LE) conditions

Capacity to support Potential Natural Vegetation species (reference system)

Potential to support pollinators (key ecosystem components)

LE biodiversity-support capacity according to a set of structural, landscape and compositional indicators

→ Testing the influence of extrinsic determinants on LE conditions, such as the contiguity to protected habitats (N2K sites) and the governance framework (country)

→ Identifying useful parameters to guide LE ecological restoration actions by means of Random Forest classification

Sequera de Fresno, Segovia, Spain

3. Case study: rural landscapes in the W-sector of Metropolitan City of Rome

Morphological Spatial Pattern Analysis

LE mapping

Ecological connectivity analyses according to land cover capacity to support the persistance and dispersal of tree species that are characteristic of the local PNV

Current coherence of local N2K network

LE field surveys and prioritization of GI actions

Improvement of the coherence of local N2K network

Main results

1. N2K-related GI deployment needs

prevalence of needs for reconnection

2. LE are in better conditions when contiguous to N2K sites

Fisher exact test: p < 0.0001; Cramer's V = 0.620

3. GI design aimed at reconnecting N2K patches in a land-sharing framework

LE structural continuity emerged as a key feature for driving restoration actions

Essential references and first publication

Zomeni, M; et al. High nature value farmlands: challenges in identification and interpretation using Cyprus as a case study. Nature Conservation, 31: 53–70 (2018);
Chatzimentora, A; Apostolopoulou, E; Mazaris, D. A. A review of green infrastructure research in Europe: Challenges and opportunities. Landscape and Urban Planning, 198, 103775, 2020.

DBA Dipartimento di Eccellenza MUR 2023-2027

FACOLTÀ DI SCIENZE MATEMATICHE FISICHE E NATURALI

SAPIENZA Università di Roma