UNIVERSITÀ DEGLI STUDI DI PALERMO

112° Congresso della Società Botanica Italiana onlus

European Commission

MEDITERRANEAN MOUNTAINOUS LANDSCAPES

Plant communities and landscape diversity in NW Sicily: The MEMOLA EU FP7 Project case study

Giuseppe Bazan[1,2], Giuseppe Baiamonte[2], Lorenzo Gianguzzi[3], Giuseppe Lo Papa[3], Mª Teresa Bonet García[4], Rocco Corselli[4], Rosario Schicchi[2,3], José Mª Martín Civantos[5]

[1]Department STEBICEF, University of Palermo, Italy; [2]CIRITA, University of Palermo; [3]Department SAAF, University of Palermo; [4]Arqueoandalusí - Arqueología y Patrimonio, Granada, Spain; [5]Department of Medieval History and Historiographical Techniques, University of Granada, Spain.

The UE FP7 research project MEMOLA (Mediterranean Mountainous Landscapes: an historical approach to cultural heritage based on traditional agrosystems) aims at investigating landscapes through a diachronic study of the relationship between human populations and natural resources. The project analyses from an interdisciplinary perspective the drivers and dynamics that have generated landscapes in four areas of the Mediterranean Region (Sierra Nevada, in Spain; Colli Euganei, in Northern Italy; Monti di Trapani, in Sicily (Fig. 1); Vjosa Valley in Albania), with a research group of ten partners (1). The main focus of the Project is the historical use of water, related to traditional and irrigation systems, which has played a key role in the creation and transformations of Mediterranean agricultural landscapes. The presence of traditional and historical irrigation systems was used as one of the criteria for traditional agricultural landscapes identification (Fig.2). These systems are strictly linked to the socio-economic structure and organization of the rural populations which have exploited them since medieval times (2).

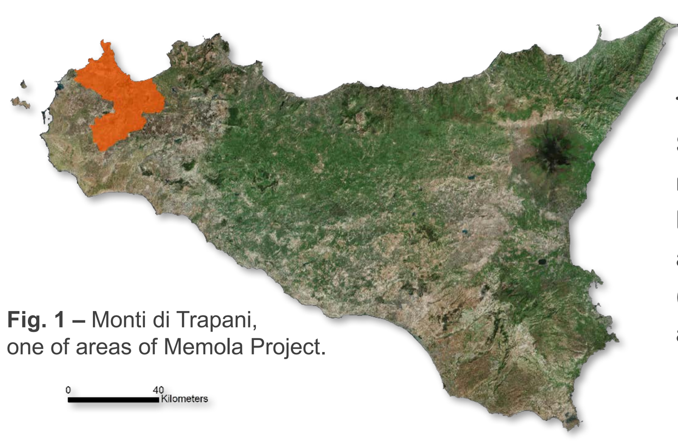


Fig. 1 – Monti di Trapani, one of areas of Memola Project.

The traditional agricultural landscapes of Calatafimi rural district (NW Sicily) are the outcome of the historical relationship between man and nature, resulting from complex interactions between biodiversity (at all levels, including species richness, ecosystem and biotope diversity) and cultural diversity, including material and immaterial aspects (architectural heritage, historical irrigation systems, local traditional agricultural practices, dialectal culture) (3).

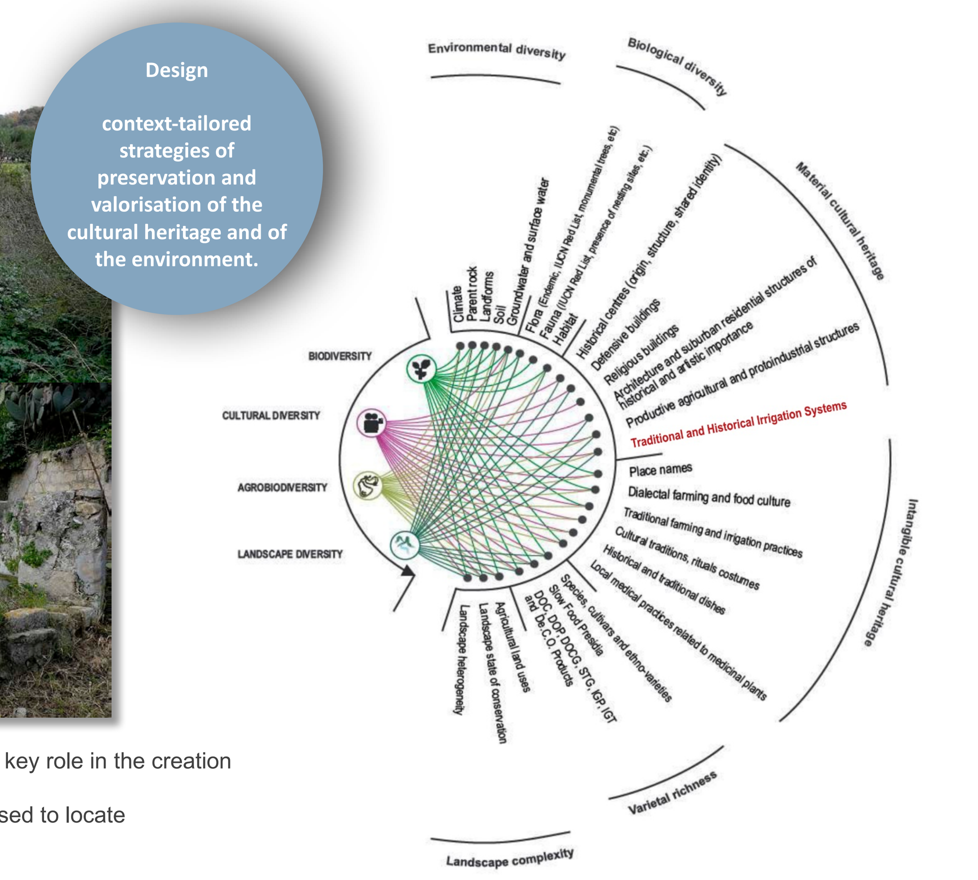


Fig. 2 – The historical use of water, related to traditional irrigation systems, has played a key role in the creation and transformations of Mediterranean agricultural landscapes. In the Project Memola, the presence of traditional and historical irrigation systems is one of the characteristics used to locate and identify traditional agricultural landscapes.

The methodological approach of Integrated Phytosociology is a powerful interpretation key to examine landscapes as an integrated whole (4).

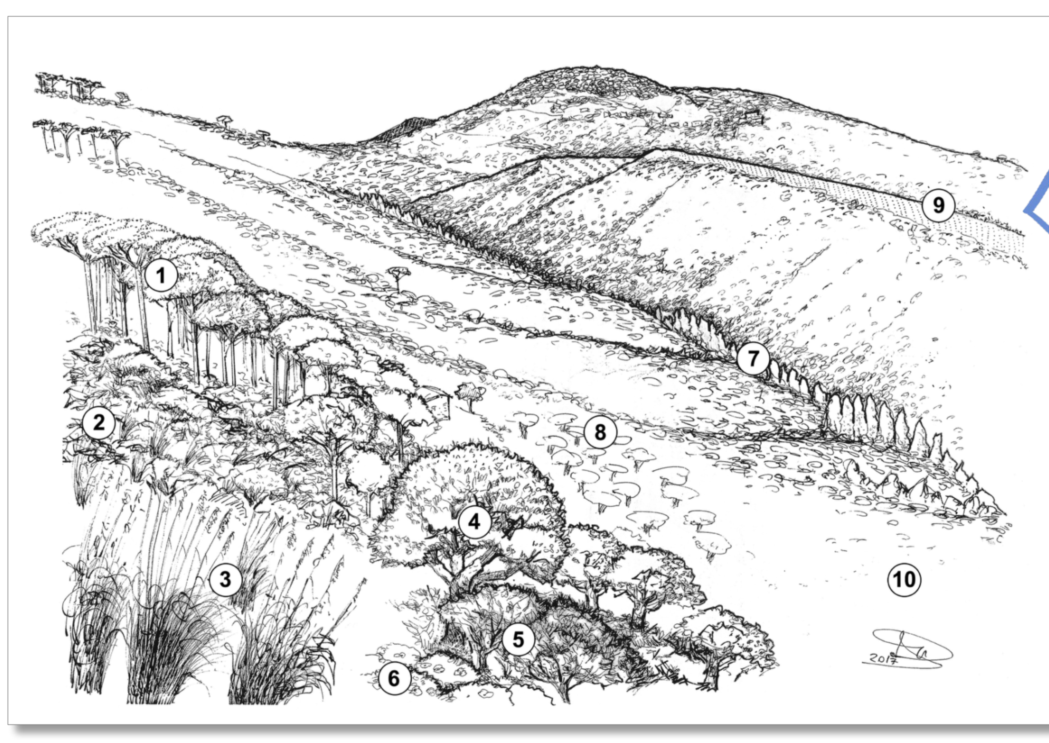


Fig. 4 – Schematic interpretation of vegetation spatial distribution on Bosco di Calatafimi NW slope: 1) *Pinus pinea* woodland (*Cisto cretici-Pinetum pineae*); 2 *Arbutus unedo* and *Erica arborea* maquis (*Erico-Arbutetum unedonis*); 3) *Ampelodesmos mauritanicus* grassland (*Helictotricho-Ampelodesmetum mauritanici*); 4) *Quercus suber* woodland (*Genisto-Quercetum suberis pistacietosum terebinthi*); 5) *Calicotome infesta* scrubland (*Pyro-Calicotometum infestae*); 6) *Cistus salvifolius* garrigue; 7) riparian vegetation with *Populus nigra* and *Salix alba* (*Salicetum albo-pedicellatae*); 8) Olive grove; 9) Vineyard; 10) Uncultivated.

Fig. 3 – In depth study area in the Calatafimi rural district. NW slope (top photo) and SW slope (bottom photo) around the Bosco di Calatafimi.

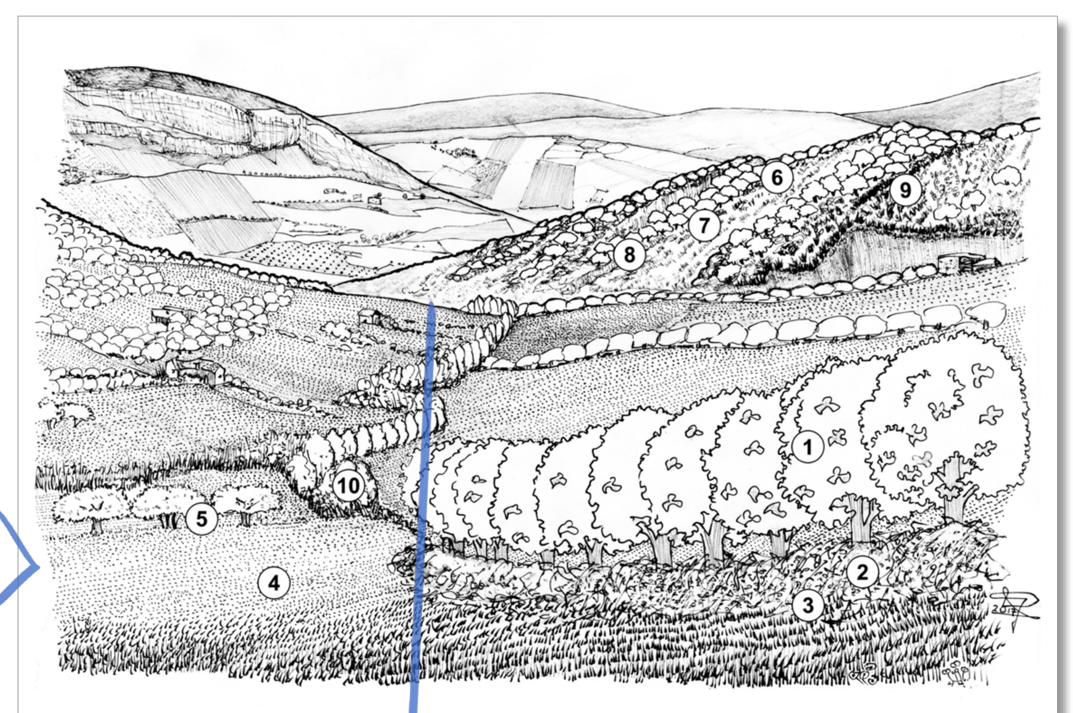


Fig. 5 – Schematic interpretation of vegetation spatial distribution on Bosco di Calatafimi SW slope: 1) *Quercus virgiliana* woodland (*Erico-Quercetum virgilianae*); 2) *Rubus ulmifolius* scrubland (*Roso - Rubetum ulmifolii*); 3) *Arundo collina* formation (*Euphorbio-Arundinetum collinae*); 4) arable land; 5) Olive grove; 6) oleaster maquis (*Oleo-Euphorbietum dendroidis*); 7) dwarf palm maquis (*Pistacio-Chamaeropetum humilis*); 8) *Hyparrhenia hirta* grassland (*Hyparrhenietum hirto-pubescentis*); 9) *Opuntia ficus-indica* and *Agave americana* abandoned cultivations; 10) riparian vegetation with *Populus nigra* and *Salix alba* (*Salicetum albo-pedicellatae*).

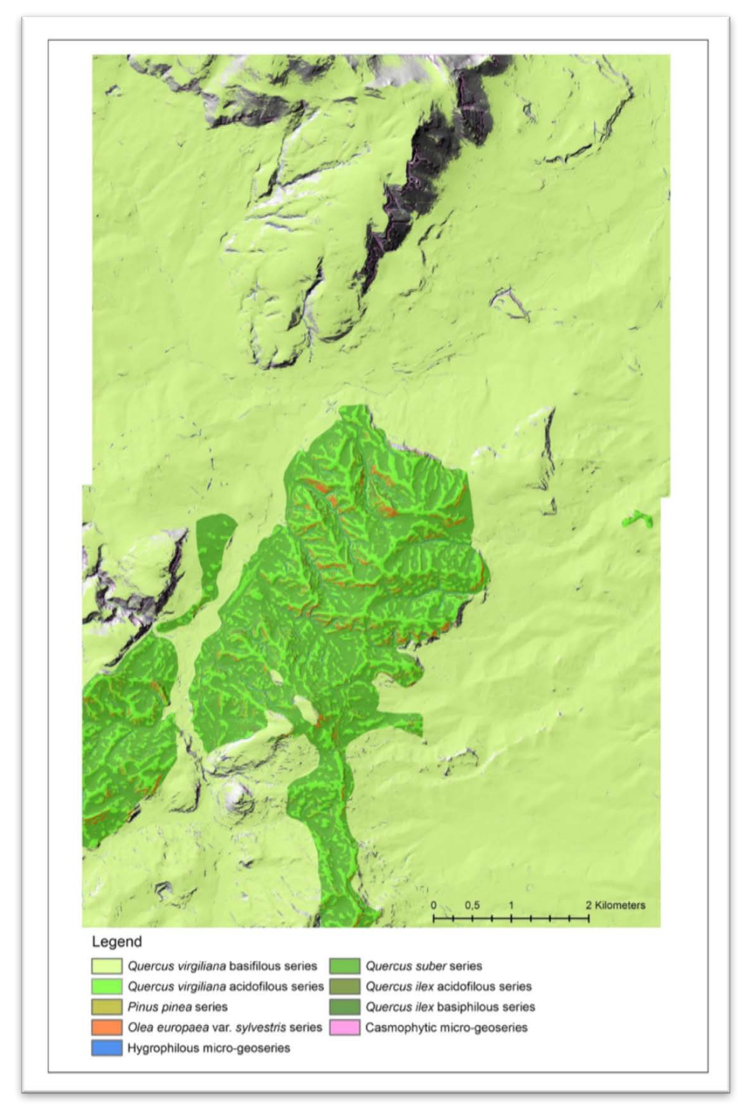


Fig. 11 – Land classification results, obtained through GIS analysis, is the Vegetation series map.

The syndynamic study of vegetation (series and geoseries) has been used to better understand human impact on land mosaic formative processes. Vegetation series are the result of the relationship between landscape natural heterogeneity and diversity produced by humans through historical land use. The existence of a direct causal link between vegetation series and anthropic factors represents a tool for new narratives of the trajectories of Mediterranean land mosaic. Vegetation series have been defined with the purpose of understanding the dynamic relationships between the diverse facets of land mosaic tiles.

Characterization of associations and vegetation series was carried out through field surveys (Figs. 3-5). Mapping of the series was performed through a land classification process, performed using GIS techniques, which allowed to identify the land-units for each series (Figg. 6-11).

Nine vegetation series were identified (Figs. 11-12). Agricultural land-uses associated with each vegetation series were then identified for relating traditional agricultural landscapes to ecological factors.

The study of cultural landscapes, of which traditional agricultural systems are the best expression, needs an holistic perspective. The contribution of vegetation science is a key element, considering the variety of factors that define a landscape.

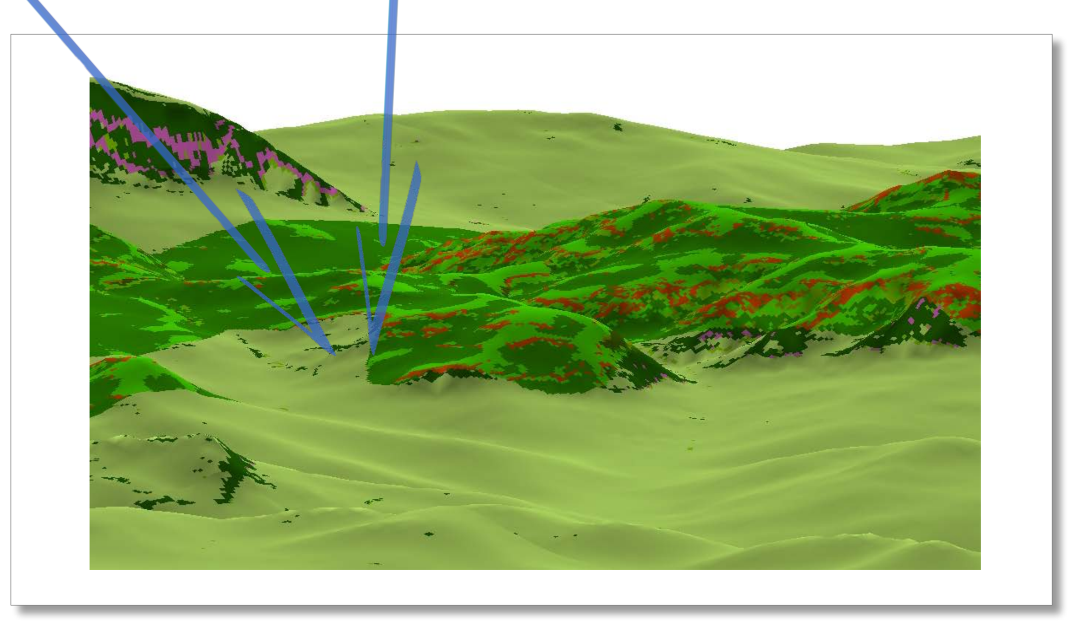


Fig. 12 – The result of GIS-based classification matched well with data gathered from vegetation series field surveys, as indicated by arrows. This approach to vegetation series specialization allowed us to map land units and to collect useful information to design landscape planning strategies.

References

1) J.M Martín Civantos., M.T. Bonet García (2015) PCA, 5, 347-356
2) J.M Martin Civantos (2012) APSAT 1 Teoria e metodi della ricerca sui paesaggi d'altura, Mantova, pp. 51-73
3) G. Bazan, G. Baiamonte, A. Cancellieri, R. Schicchi (2017) Atti della XIX Conferenza Nazionale SIU, Planum Publisher, Roma Milano, pp. 189-195
4) G. Bazan, L. Gianguzzi, G. Baiamonte, R. Corselli, R. Schicchi, J. M. Martín Civantos (2017) The 60th Iavs annual symposium, Palermo
5) A. Weiss, A. (2001). ESRI user conference, San Diego, CA.

Hierarchical-based land classification

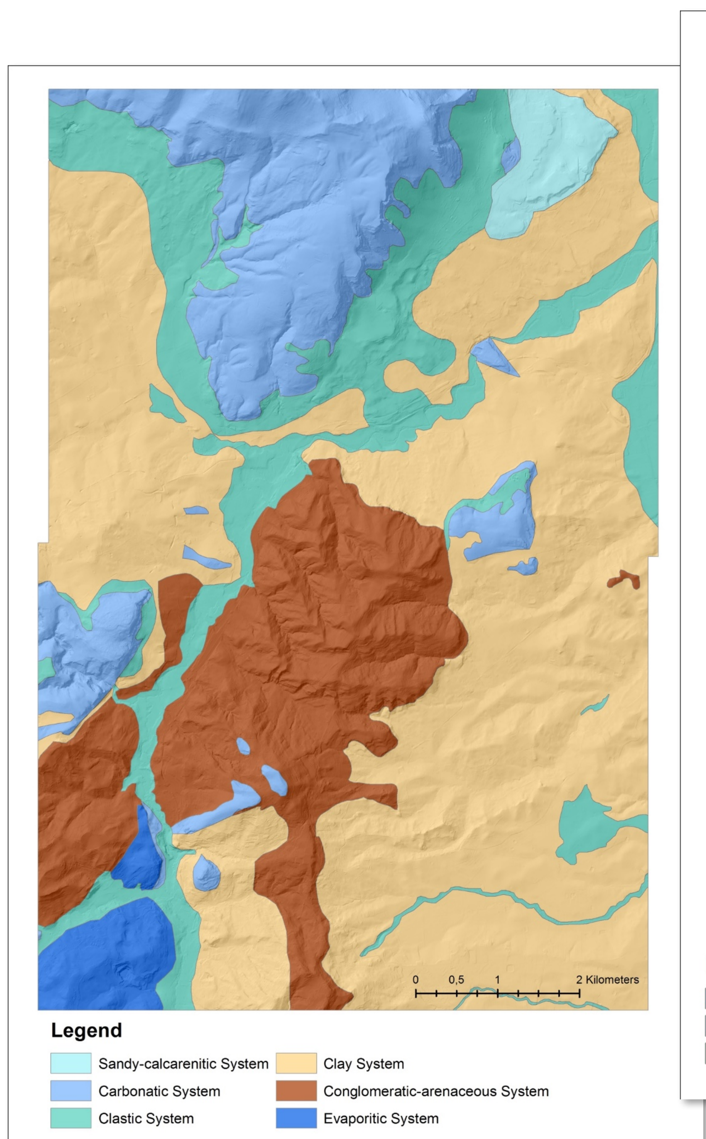


Fig. 6 – Land systems map was created using data from aggregated geological information.

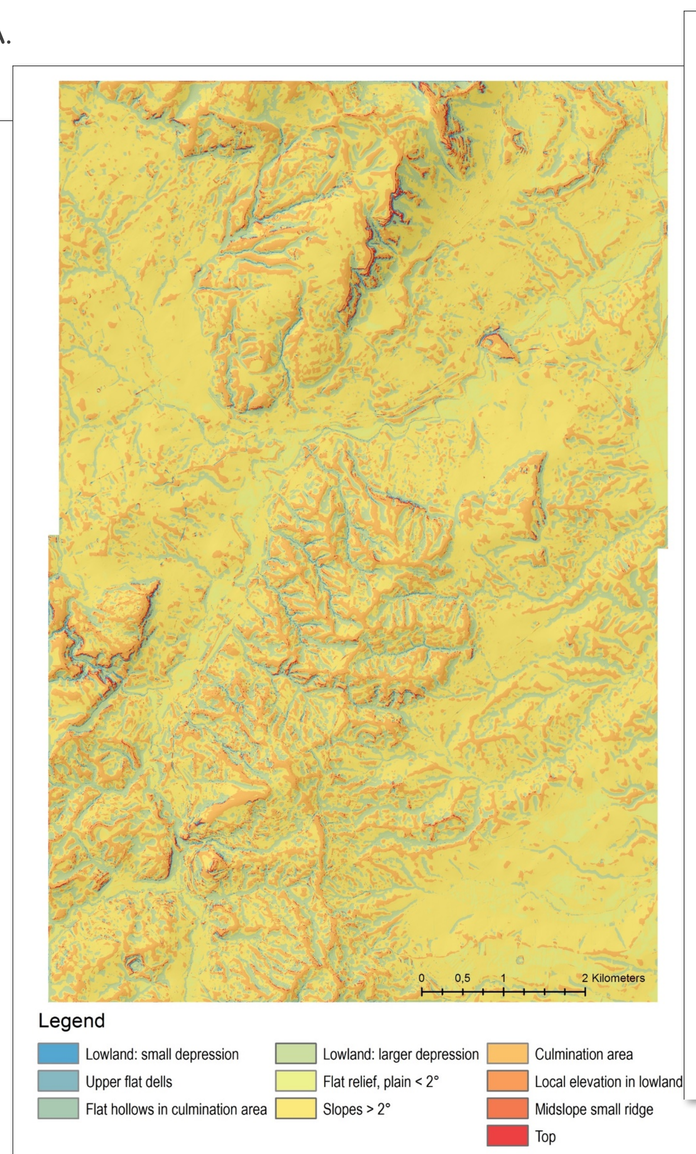


Fig. 7 – Landform types map was based on the Topographic Position Index (TPI) approach as proposed by Weiss (5).

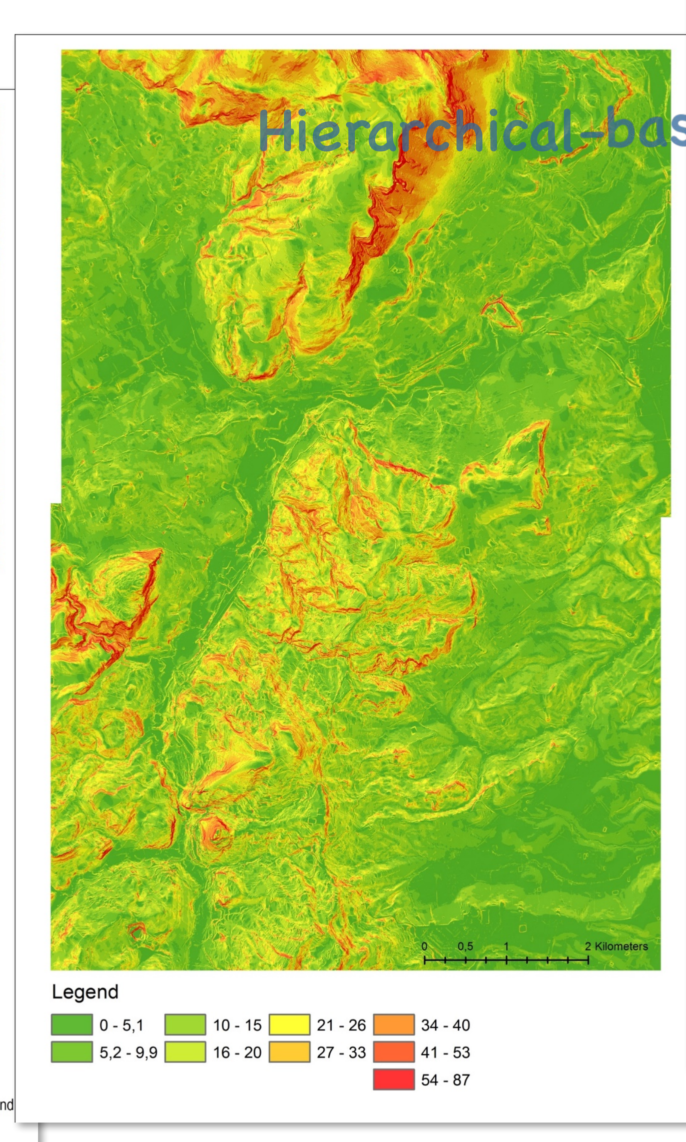


Fig. 8 – Slope map. Slope, above or below the 30 degrees threshold, determines the presence of one series instead of others.

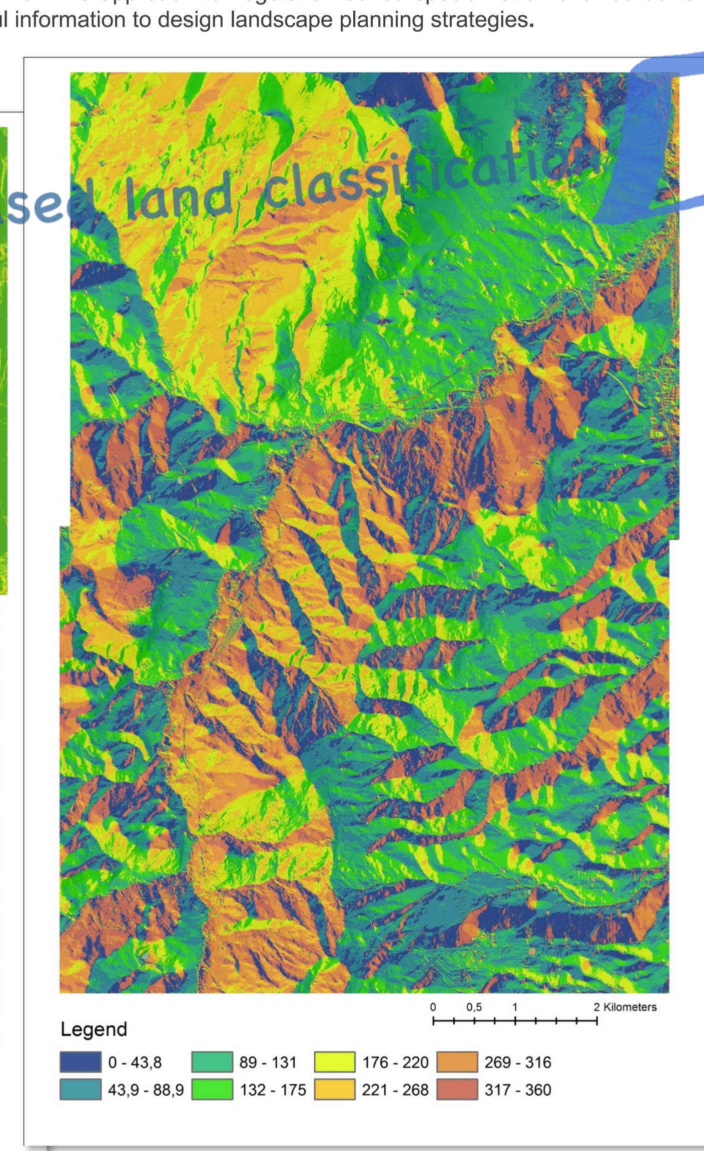
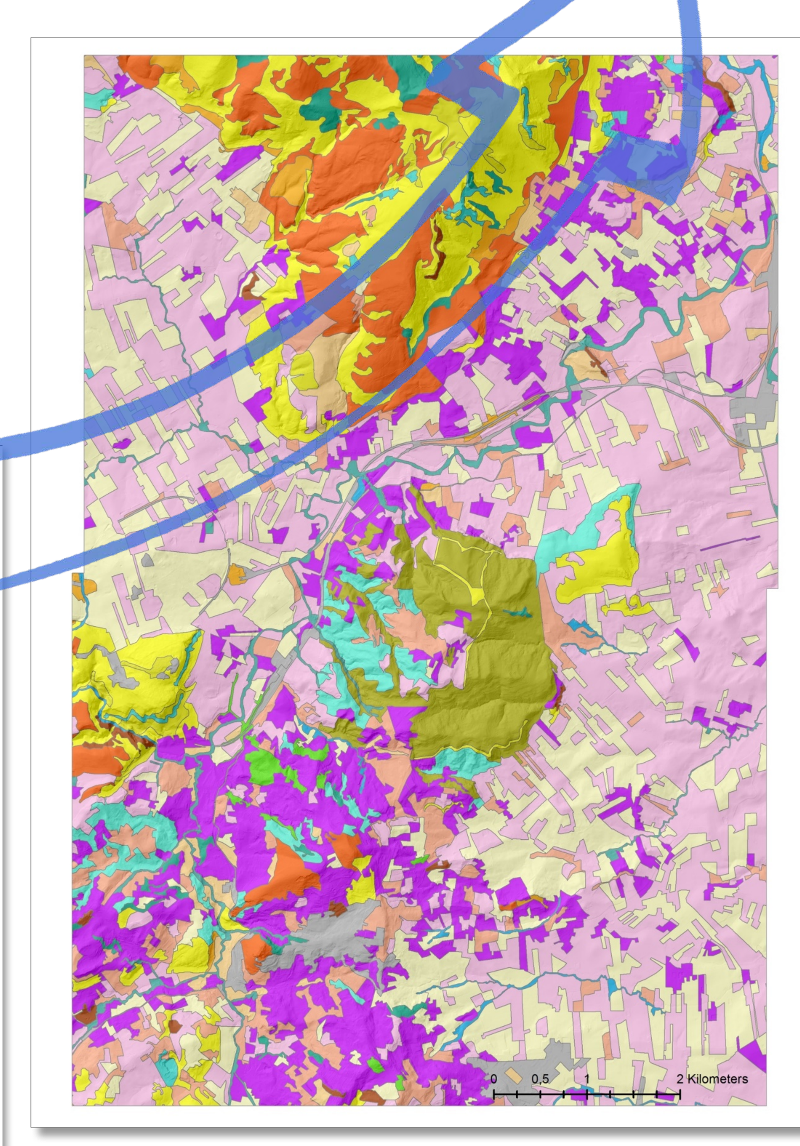


Fig. 9 – Aspect map. Overlapping the Land Systems map with other information layers created a dataset containing 40 combination of environmental factors.



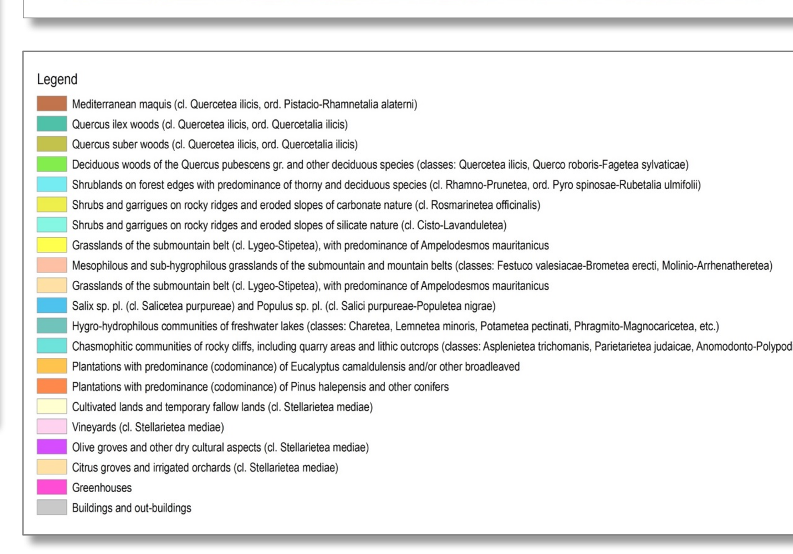


Fig. 10 – Vegetation map.

Acknowledgements

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 613265