

1 Introduction

Several territorial contexts of Mediterranean Europe have considerably transformed over the last decades. Widespread land-use transformations depended not only on urbanization, industrialization and agricultural mechanization but also on depopulation, economic marginalization and land abandonment of rural areas, at times accompanied by local processes of soil erosion and degradation processes, which are emerging environmental issues and include unpredictable events, e.g. wildfires.

All these changes have directly affected local agricultural and forest contexts. An integrated framework, involving quantitative analysis, evidenced the complexity in land-use transformations, proposing detailed solutions for sustainable land management concerning social cohesion, environmental sustainability and local competitiveness.

The work during the PhD period explored several Mediterranean contexts, e.g. Barcelona and Valencia in Spain, Rome and Viterbo in Italy and Athens in Greece.

2 Collaboration and multidisciplinary approach

The PhD activity focused on the analysis of different contexts of Mediterranean Europe. The choice to work on these contexts is since they are very similar and comparable contexts, but with peculiar characteristics linked to their history, culture, society and economy. The research activity benefited from the collaboration of several universities and research institutions, e.g. CREA, which co-financed the research project.

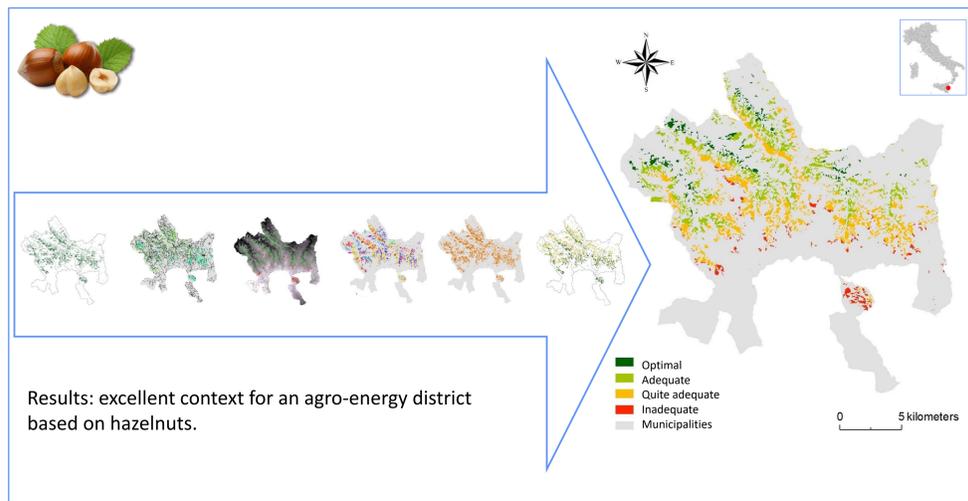
The strong multidisciplinary was also guaranteed through the collaboration with numerous researchers of different universities and research centers in Italy and around the world, proposing original approaches to provide innovative tools managing and proposing sustainable development scenarios in rural contexts and publishing the works in international journals.

3 GIS technologies

Using GIS technologies made it possible to recognize which realities can offer new development opportunities in rural and peri-urban landscape. For instance, strengthening the activities related to agricultural mechanization and proposing strategies and optimizing mechanization systems through geo-spatial technologies. New technologies also helped to identify where the major critical issues concern recent job accidents in the primary sector in Italy. The study exposed that the number of injuries reduced over time, likely influenced by a thorough supply of educational courses dealing with safety at work and which kind of agricultural machines was used.

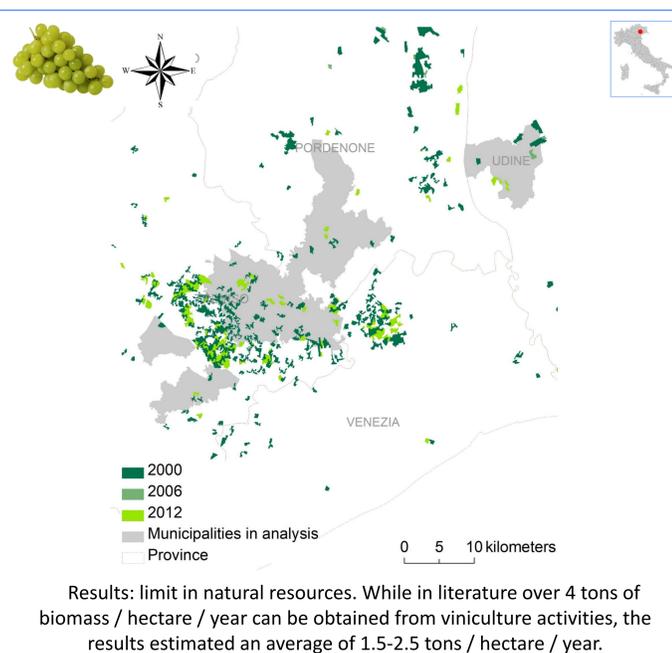
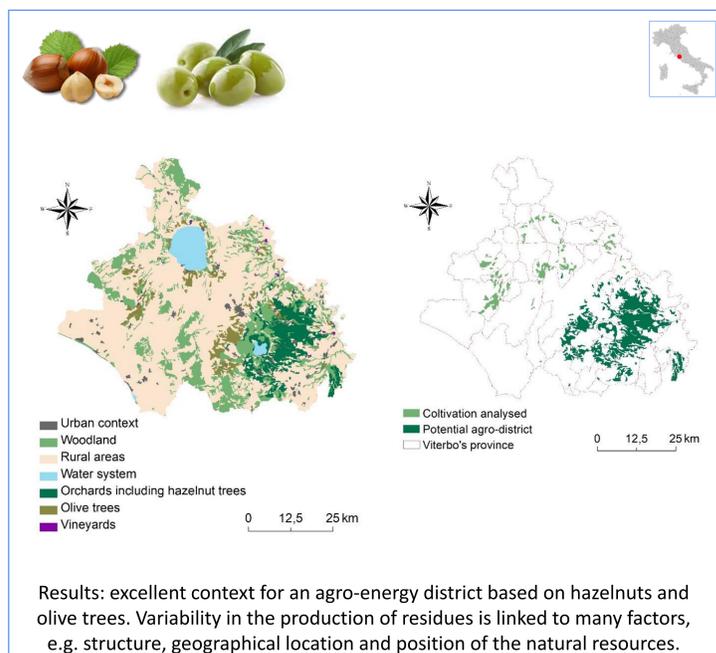
4 Agro-energy districts

The most relevant strength point of the thesis is the interdisciplinarity with which agricultural mechanization has been encountered during the research. The study of local realities (districts) in Italy and in Europe (e.g. Spain and Greece) were analyzed to offer development scenarios to improve the three components of sustainability (social, economic and environmental aspects). In addition to them, the research has found a fourth component: energy.



Establishing agro-energetic districts represents a real chance for local realities, which are rich of natural and agricultural resources, with the determination of strengthening their socio-economic structures with more technological innovation and environmental quality, reducing potential waste. Through the agro-energy districts, a territorial study was carried out in which also agricultural mechanization was linked with other disciplines. Proposing strategies and optimizing mechanization systems through geo-spatial technologies, the work suggests a potential reality based on the circular economy with the purpose of re-using agricultural residues for energy purposes. In this way, scenarios of circular economy and enhancement of local contexts are made possible and discussed highlighting their points of opportunity and threats.

GIS processing let to recognize the most appropriate areas for the cultivation (and collection) of hazelnuts, since this kind of agriculture is not recommended on the steep slopes and can cause invasive environmental processes e.g. soil erosion. The analysis focused also in e.g. topography, morphology, land-use changes and slopes, which are useful to then reflect on which agrarian and mechanization systems apply to avoid possible accidents at work, especially during hazelnut harvesting. A prototype of agricultural machine was suggested to harvest hazelnuts in these contexts guarantying a constant job safety for the operators.



5 Final Remark(s)

Due to the multidisciplinary nature of this thesis, agricultural mechanization was encountered with different disciplines. Rural realities were investigated reflecting on their sustainability development and revealing potential scenarios with distinctive opportunities and threats. The strong multidisciplinary was guaranteed through the collaboration with numerous researchers around the world, offering innovative results and publishing the works in international journals.