

FLORISTIC AND VEGETATIONAL CHARACTERIZATION OF DEGRADED AREAS IN THE PROVINCE OF PISA: THE CASE OF A DISMISSED QUARRY AND THE NEIGHBORING TERRITORY (MUNICIPALITY OF VECCHIANO)

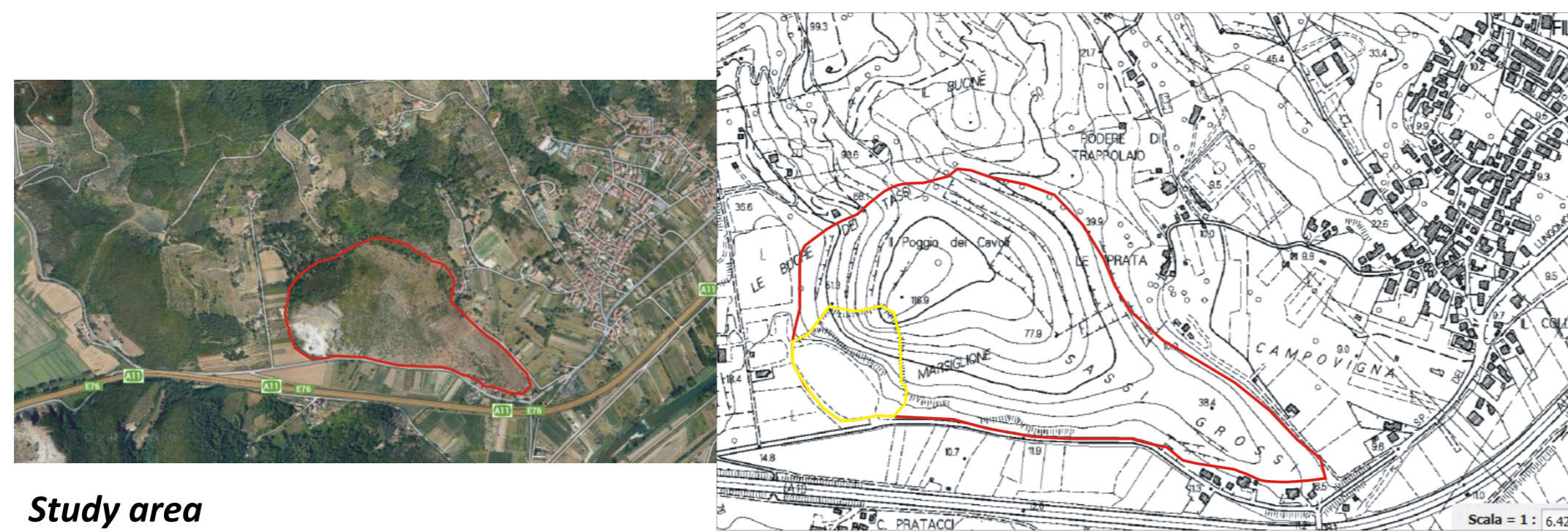
Tiziana Lombardi, Virginia Palestini, Andrea Bertacchi
 Department of Agricultural, Food and Agro-Environmental Sciences, Via del Borghetto 80, 56124 Pisa, Italy
 email tiziana.lombardi@unipi.it

The natural restoration of abandoned mining areas is one of the most complex environmental challenges due to the multiplicity of issues involved. In general, the spontaneous dynamics of renaturation in the quarry areas are very slow and altered because of limiting environmental conditions. So, recovery actions should promote ecological processes interrupted by mining and then the acceleration of the natural dynamics



Localization of study area

Presently, in the province of Pisa several abandoned quarries have not undergone the necessary environmental recovery and, for this reason, they are classified as "areas of geophysical degradation". These include the former quarry C.E.I. dismissed in 1992 and located on the Monti d'Oltr' Serchio in the municipality of Vecchiano (PI).



Study area

The study area, including the quarry (2.9 ha), the remaining sides of the Poggio dei Cavoli and the adjacent ridge of "Sassi Grossi", is characterized by limestone formations of the non metamorphic Tuscan Falda.

It is characterized by a rather hard carsum, with almost no soil and high pH in the quarry area, while it is rich in oxides and lacking humus in the outer portions. Inside the cave, however, the scarcity of vegetation cover and the strong albedo, due to the light-colored rock, cause a different microclimate, characterized by dryness and higher temperature.



Some morphological and pedological aspects of study area

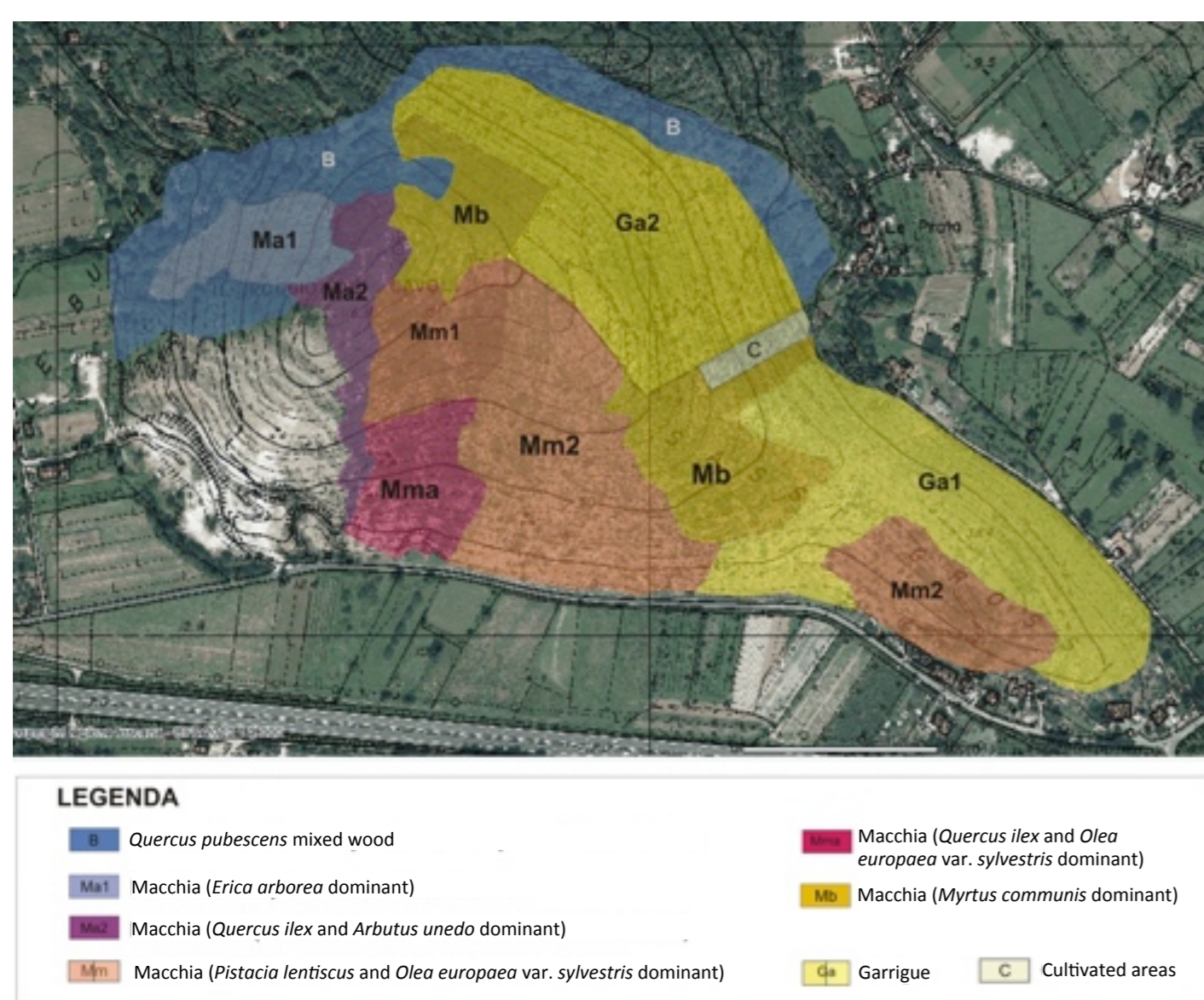
The flora consists of more than 200 vascular species, of which about 50 are restricted to the quarry and 85 to adjacent areas. Particularly important is the number of floristic emergences, including rare orchids and ferns which induced some scientists to propose the inclusion of the study area within the Regional Park of Migliarino-San Rossore-Massaciuccoli. This makes the site interesting from an environmental perspective and therefore, worthy of further valorisation and protection

Specie	LR 56/2000		RE.NA.TO.
	Allegato A	Allegato C	
<i>Anacamptis pyramidalis</i>	X		
<i>Asplenium petrarchae</i> subsp. <i>petrarchae</i>			X
<i>Campanula medium</i>	X	X	
<i>Cheilanthes acrostica</i>	X		X
<i>Globularia punctata</i>	X		
<i>Laurus nobilis</i>	X		
<i>Narcissus tazetta</i>	X		
<i>Ophioglossum lusitanicum</i>	X		
<i>Orchis papilionacea</i> subsp. <i>papilionacea</i>	X		
<i>Ornithogalum comosum</i>	X		
<i>Ruscus aculeatus</i>			
<i>Serapias cordigera</i>	X		
<i>Serapias neglecta</i>	X		

In the study area it was also found several alien species whose presence and spread could be a factor to consider carefully and to be monitored in projects aiming at renaturation of the site

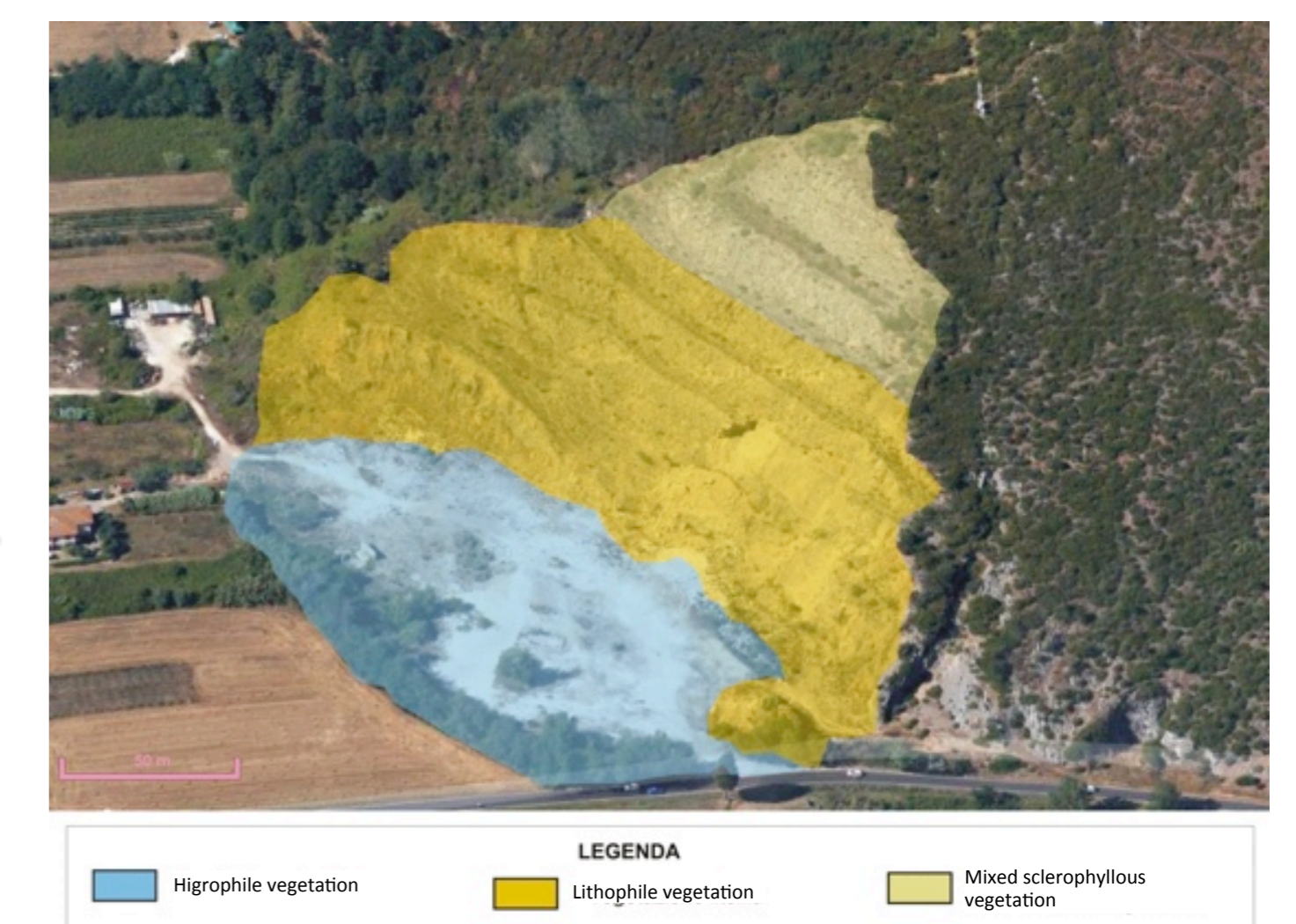
Specie	Origine	Categoria
<i>Ailanthus altissima</i>	Cina	Cs
<i>Arundo donax</i>	Asia centrale e meridionale	Cs
<i>Buddleja davidii</i>	Cina	Cs
<i>Cortaderia selloana</i>	America meridionale	Cs
<i>Crepis sancta</i>	Europa meridionale orientale e Asia occidentale	An
<i>Cupressus sempervirens</i>	Regione egea	Cs
<i>Phytolacca americana</i>	America settentrionale	Cs
<i>Robinia pseudoacacia</i>	America settentrionale	Cs
<i>Veronica persica</i>	Asia sud-occidentale	An

The analysis of aerial photographs and surveys conducted in the field has allowed the identification of the main types of vegetation.



In the territory outside the extraction site, the Mediterranean Macchia (high, medium and low) with evergreen sclerophyllous (*Quercion ilicis*) in catenal contact with the Garrigue (*Rosmarinetalia officinalis* and *Thero-Brachypodietalia*), and the mixed forest with dominant oak and transitional pruneto (referable to the alliance *Quercion pubescentis - petraeae* Br. Bl. 1931), can be found.

The quarry area is, instead, dominated by a pioneer vegetation that is hygrophile on the plain of the quarry, and lithophile on the front. This latter, at least in part, has species in common with the surrounding garrigues. This is interpreted as the initial stage of the series of vegetation that should lead to the reconstitution of the original forest cover, represented by the actual vegetation of the adjacent areas. The widespread presence of species such as *Rubus ulmifolius*, *Clematis vitalba* and *Dittrichia viscosa* (L.) Greuter, and of invasive exotic species, such as *Cortaderia selloana*, *Robinia pseudoacacia*, *Buddleja davidii* and *Ailanthus altissima*, reveal that, without proper action, it is difficult to imagine a fast recovery of the vegetation consistent with the area around the quarry.



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The analysis conducted floristic-vegetation in the study allowed to determine the current state of the vegetation and the various evolutionary stages of succession that are in place and that will manifest in the future. The spontaneous recolonization of the quarry by Pioneer plant species can be interpreted as the initial stage of the series, which in theory should lead to the reconstitution of the original forest cover, represented by the potential vegetation, above all, real, urban neighborhoods. Despite the intense human impact immediately, primarily for the mining and then for farming and grazing of the past still practiced, the site is characterized by a high number of plant species, varies widely floristry and the spread of protected species of Community interest and regional or undoubted natural value, including wild orchids. This richness, shows for the area outside the site of the quarry, a good degree of naturalness, which is certainly to be valued and protected and that, in future, it may also involve the degraded site. In the absence of an action for the environment, in the quarry, the exotic species shall prevail. Moreover, given the soil conditions and microclimate extremely difficult and limiting, the vegetation will reach ecological balance only in many years and with a plant composition significantly altered compared to natural conditions. No doubt the intervention the environmental recovery is a very expensive which would weigh on the shoulders of the government and, therefore, of the community. If it had been done in the past, together with the cultivation of the quarry and to appropriate criteria, it would have impacts and costs far less. However, to secure the area and initiate a process of renaturation today, despite everything, that could give multiple benefits: should, in fact, to heal a deep wound in the landscape, would eliminate a situation of high social and environmental hazard, return a land to the community, it would create jobs and would generate a new semi-natural habitats of high conservation value, at a time when the land use, reduction of habitats and biodiversity are among the most important and urgent environmental issues to solve.