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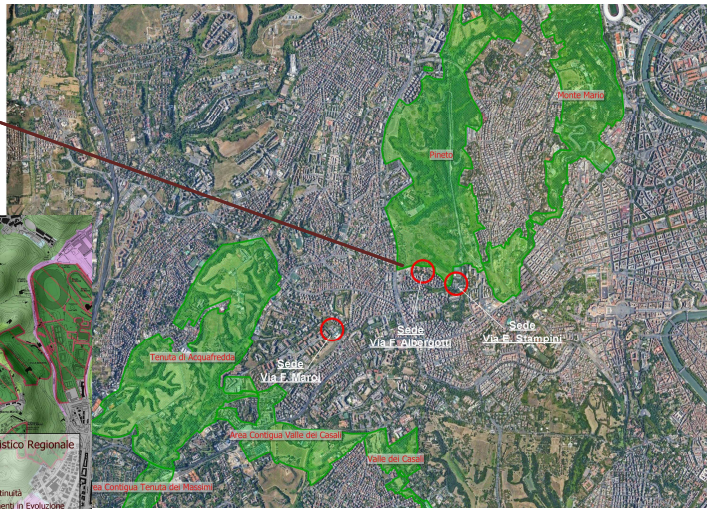
Lichens and Education: Integrating GIS Technology and Montessori Pedagogy for Urban Environmental Awareness

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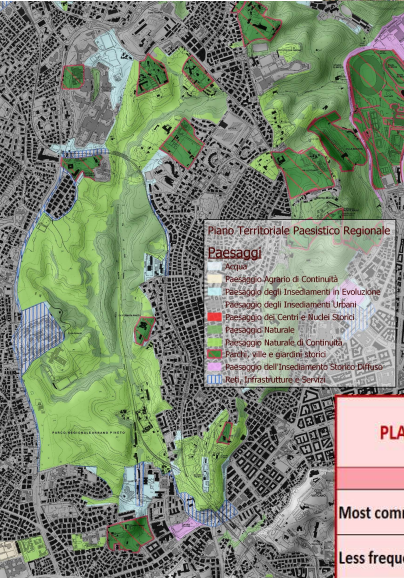
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L. A. Seneca High School Headquarters



Protected areas around the densely urbanised land bounded by Via Boccea, Via Battistini, Pineta Sacchetti, and the Cornelia ring road



METHOD

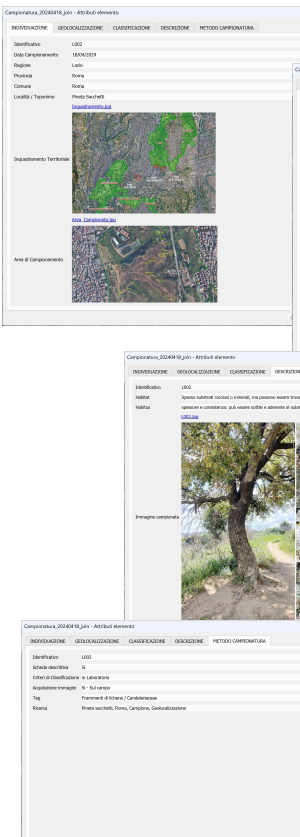
All specimens were geolocated and photographed in the field. The cataloguing was conducted in the laboratory, where the identifiers were assigned to link the specimens to the photographic images.

PLANT HERITAGE	650 species, including 190 trees 1/10 of the species present in Italy 1/5 of the species in the Lazio region
Most common tree species	Cork oak (<i>Quercus suber</i>), holm oak (<i>Quercus ilex</i>), and stone pine (<i>Pinus pinea</i>).
Less frequent tree species	Deciduous oaks, specifically downy oak (<i>Quercus pubescens</i>) and Hungarian oak (<i>Quercus frainetto</i>), alongside riparian species such as white poplar (<i>Populus alba</i>) and willow (<i>Salix</i> spp.).
Typical shrub species	Mediterranean maquis: rockrose (<i>Cistus</i> spp.), tree heath (<i>Erica arborea</i>), and strawberry tree (<i>Arbutus unedo</i>).
Widespread herbaceous species	Wild orchids.
Other rare or special plants	Goldsmid stonecrop (<i>Sedum acre</i>), Roll's sand crocus (<i>Romulea rollii</i>), branched bur-reed (<i>Sparganium erectum</i>), etc.

INTRODUCTION Lichens are sensitive bioindicators for environmental disturbances and air pollution [1]. This research investigates the synergy between digital tools and the Parco del Pineto naturalistic site in Rome [2], grounded in Maria Montessori's pedagogy and inclusive, student-centred outdoor education [3]. The study involved 43 third- and fourth-year students from High School L.A. Seneca in Rome. The methodology followed a multi-phase scientific approach: field observation, photographic documentation, and specimen collection. Students utilised P!@ntNet, an AI-based identification tool [4], alongside expert guidance to foster Citizen Science [5].

REFERENCES

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- [3] Montessori, M. *Come educare il potenziale umano*. Garzanti: Milano, 2007 (original work published 1947).
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- [5] Daskolia, M.; Pappa, M.; Joly, A.; Bonnet, P.; Arias, R.; Piera, J.; Soacha, K. Integrating Citizen Observatories into School Environmental Education for Sustainability: Design and Evaluation of a Case Study Engaging Students with P!@ntNet and OdoorCollect. In 15th Annual International Conference of Education, Research and Innovation (ICERI2022) Proceedings; Seville, Spain, Nov 7–9, 2022; pp 5451–5458. DOI: 10.21215/iceri.2022.1345



1) IDENTIFICATION - The sheet contains the geographic references of the sampling area

2) GEOLOCATION
The geographic coordinates of the sampled points highlighted on satellite imagery are identified.

3) CLASSIFICATION

Through a system of relationships, the data was imported into a GIS and navigable data sheets were produced, which can be consulted using open-source software.

RESULTS

The distribution of detected samples represented on a 3D map: the colours highlight the increase in the presence of specimens in areas with higher humidity and where the undergrowth is thicker.

CONCLUSION

Beyond scientific findings, the results indicate that students significantly strengthened their teamwork and rigorous scientific working methods. This project bridges the gap between scientific theory and environmental protection, providing a scalable model for urban heritage management and illustrating that technology is a vital ally in cultivating a deeper respect for our planet.

Geographic Information System Developed for the management of the cataloguing of the detected specimens

