



**Politecnico
di Torino**

Honors Thesis

Master of Science in Sustainable Architecture

Abstract

“AN ÒGNI GIR DÈ STRA”

**Analysis of the system of fortifications and military routes in the area
of the Gardetta Pass (CN).**

**Comparative study between historical cartographic sources and innovative
technologies of 3D metric survey in GIS environment.**

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Mountains make up 35% of Italy's surface area and, whether Alps or Apennines, they have always had the dual reputation of frontier/limit and pass/connection, two sides of the same coin.

Unlike the common imagination that relegates it - and limits it - to an isolated place, mostly remembered for the great ski slopes, it is enough to rewind the tape of the history of the mountain valleys to read in it a projection of their future.

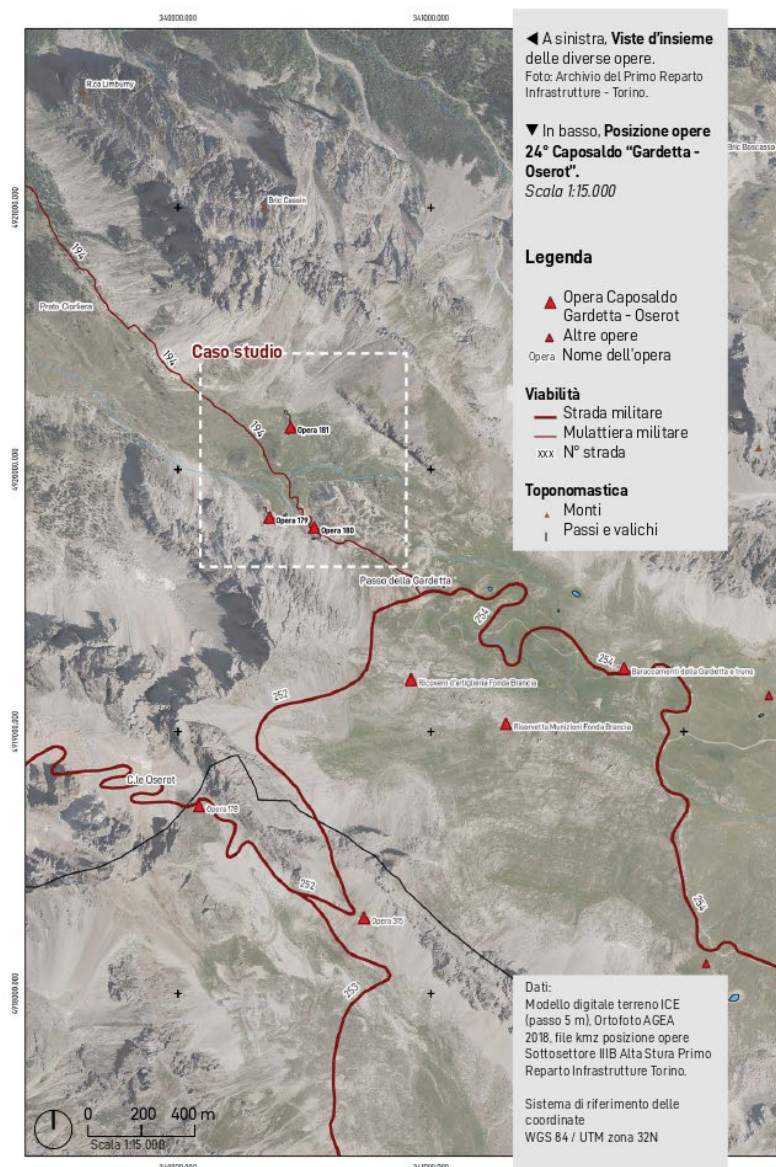
*"Everything here was a garden [...] here around our hamlets, up to the rock, were cultivated fields. In the good season it was a continuous coming and going of people along the mule tracks"*¹. It was a living mountain, made up of men and communities and an incessant wandering along paths, trails, mule tracks that populated the valley. They were responsible for connecting the villages and adjacent valleys, connecting them with neighbouring states, providing trade routes but also, and above all, useful routes for smuggling. Last but not least, the fundamental contribution of the valleys during the two wars and, more generally, that of the roads in providing a quick and effective connection between the fortified posts built here.



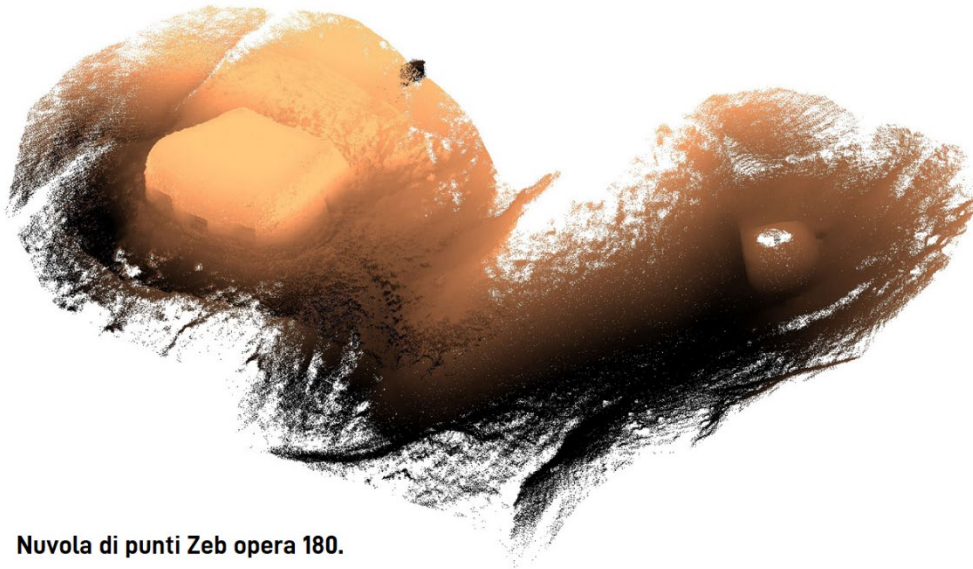
The aim of this thesis is, therefore, to investigate, through the methodologies proper of geomatics, this capillar network of paths and fortified systems and, in particular, the case constituted by the Gardetta Plateau in the Upper Maira Valley, which, through the pass of the same name, overlooks the Unerzio Valley, theatre of the War of Austrian Succession in 1744 and outpost during the two World Wars. The valley, which experienced centuries of isolation in the past, is famous for its unspoilt landscape, the result of this 'dark' period, which is now proving to be a strong point in a revitalisation project, with a focus on sustainability.

¹ Revelli N., 1977, *Il mondo dei vinti – Testimonianza di vita contadina*, Einaudi.

The survey, aimed at enhancing the places, will make use of the most innovative technologies of photogrammetry with UAV (Unmanned Aerial Vehicle) and laser scanning through mobile mapping systems, integrated and supported by GIS tools useful in comparing the metric products obtained and for their subsequent analysis. The topics covered will be twofold. On one hand, the trail network of the Upper Valley and its genesis from the ancient mule tracks, researching and recognising its transformations over the centuries and, specifically, during the Second World War, which saw its conversion into military roads. On the other hand, the three cave structures of the Gardetta, belonging to the great defence system of the Western Alpine Wall, which were carefully surveyed, documented and analysed, also exploiting the potential offered by the GIS environment, in an attempt to bring these artefacts back to life, at least metaphorically and in digital space.



This thesis work, moreover, through the invaluable contribution of Geomatics, subtends to a broader objective of documenting the architectural and landscape heritage of the Upper Maira Valley and, in particular, the Gardetta Plateau area.



Nuvola di punti Zeb opera 180.

The ultimate aim of this documentary apparatus, in addition to preserving the memory of this land, is to draw attention to territories rich in potential and steeped in history and traditions that, through their rediscovery, can provide examples and teachings to the new generations, who are increasingly interested in the themes of sustainability and recovery. Fortunately, this trend reversal has also been seen in recent years in the greater attention paid to these places by public opinion and the public administration, through the publication of ad hoc calls, such as the PNRR's 'Bando Borghi' to which the Turin Polytechnic² and the Laboratorio di Geomatica per i Beni Culturali (Geomatics Laboratory for Cultural Heritage) contributed, in the candidature of the municipality of Elva, also in Alta Valle Maira.

² Pagina Web Polito News. Disponibile su
<[https://www.dad.polito.it/news/\(idnews\)/18376](https://www.dad.polito.it/news/(idnews)/18376)>

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