

Mapping the First World War Forgotten Material Heritage: A Multi-proxy and GIS-based Proposal for the Trentino Alps

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Abstract

The material remains of the First World War field-battles are gradually disappearing, especially in marginal mountain areas, due to negligence and changes in land coverage. The paper presents the first stage of an ongoing project, devoted to identifying the forgotten material features of war landscapes on the Trentino Alps, using a wide range of historical sources, such as cartography, aerial and ground photos, textual descriptions and field surveys. The case study chosen to test the methodology is a small area of the municipality of Trambileno, in the south of the Province of Trento. Different data from different sources are integrated in a GIS platform, in order to safeguard the memory and the location of cultural heritage, as well as to support future enhancement plans.

Keywords: Historical geography, First World War, multi-proxy approach, war trenches.

1. Objective

This paper presents the first step of an ongoing project carried on by the Centro Geografico di Studio e Documentazione (GeCo) of the University of Trento, that aims to identify, locate and analyse the landscape material features related to the First World War¹. It focuses especially on fortifications, intended as material cultural heritage that risks to disappear, and which must be preserved as a physical memory of one of the most terrible moments in human history. The identification of these sites has a double objective. The first is the reconstruction of the *proelium*, the battle fields, by identifying the position of trenches, bunkers, walkways, etc., for a better understanding of the war dynamics and the daily life of the soldiers at front. The second purpose is the creation of a database of the existing artefacts and material heritage related to the war, as well as of those that are at risk of obliteration or have already disap-

peared, to support future educational and dissemination initiatives and to remind future generations of the horrors of the war. In order to develop and assess the methodology, the area of Malga Cheserle - Corno Battisti, in the Municipality of Trambileno (south of the Province of Trento) has been chosen as case study (Fig. 1). The paper presents the method and some preliminary outputs.

2. Background

The centenary of the First World War has been the occasion to promote a series of cultural initiatives to recover the historical memory of the conflict, and has provided an opportunity for the historical, social, geographical and archaeological sciences to deal with such a watershed moment for the history of humanity and of science and technology (Fox, 2018). As pointed out by Imre Demhardt, the First World War was a “ter-

rible mother of invention” (Demhardt, 2018): the needs given by the conflict have led to significant technical advances, both in the war praxis and in related sciences. In the field of geography, the last five years have seen numerous publications –both at Italian and European level– concerning various aspects of the Great War (Liebenberg, Demhardt, Vervust, 2016; Demhardt, 2018; Chirico, Conti, 2018; Masetti, 2018), which can be aggregated into four main research lines: 1) the study of the role of geographers and geographic societies in the conflict, in the public debate, in intelligence operations, in the development of maps and aerial photos, or as mere soldiers in military operations; 2) the study of the impact of war on geographic and cartographic practices, caused by technical advances and by the demand for information and data from the Army; 3) the critical review of geo-historical sources produced during the conflict, such as cartography, aerial or terrain photos, reports, writings and memorials, and their potential for studying both war events and war spaces and landscapes; 4) the identification of battlefields and the assessment of their change over time.

After the awareness of the WWI space as research theme of the 1990s, and the subsequent definition of scientific problems, the study of the landscapes of the Great War has gradually acquired legitimacy and the recognition of historical, archaeological and geographical disciplines (Francis, 2014; Medri, 2018). In this context, attempts to identify the material cultural heritage of the First World War and rediscover the landscapes of war have multiplied in recent decades; a whole new field of research, named “First World War Archaeology”, is being developed, based on field surveys and stratigraphic analysis of the trenches (Saunders, 2002; Desfossés, Jacques, Prilaux, 2007). The development of tourism linked to celebrations, the spread of remembrance museums and the necessity of preservation and enhancement of this heritage now also impose on geographers the development of methods to reconstruct the effects of the passage of the Great War and of millions of soldiers on Alpine spaces. These spaces are configured as material custodians and places for preserving the collective memory of the tragedy (Jansen-Verbeke, George, 2005; Piva, Agostini, 2018). Except for some carefully restored and highly valued sites, many material traces of the conflict in the Alps are gradually disappearing. Some experience has been developed, such as, the small-scale WEB-GIS on the “Great War Places” elaborated by the Italian CNR (<http://luoghi.grandeguerra.ia.cnr.it/>, cfr.; Plini, Villari, Cailotto, 2018). To reconstruct these traces, the researcher can benefit from a wide number of archival, iconographic and field sources; historical geography, as a *carrefour* science, can carve out a fundamental role in the documentation and characterization of the heritage of almost obliterated landscapes (Woodward, 2014).

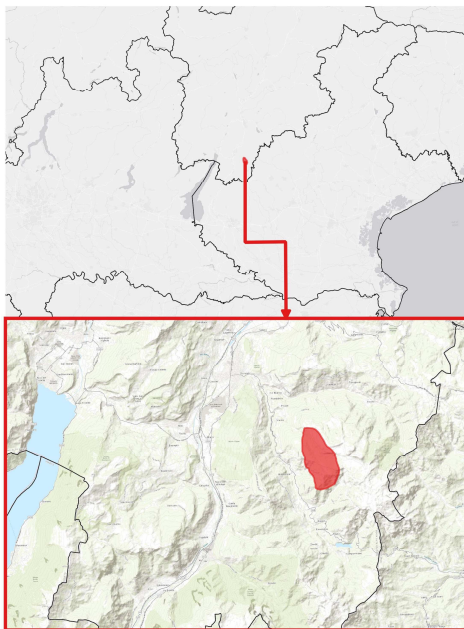


Fig. 1. Localisation of the case study.

3. The case study

The selected case study is located in the Leno Valleys, in the territory of the municipalities of Trambileno, Terragnolo and Vallarsa (with an extension of approximately 168 km²), placed between the city of Rovereto and the Pasubio massif (Fig. 1). These valleys are mostly inaccessible and characterized by steep slopes, as well as

by large flat areas or areas with a slight slope. The latter are concentrated in the upper part of the valleys. The altitude varies between 300 and 1800 m (Gorfer, 1977).

This area has been chosen for various reasons. First, the research outputs can be used to enrich the network of tourist itineraries on the Great War heritage in Vallagarina, which is already widely developed (Museo Storico Italiano della Guerra, 2018). Secondly, this area, although strategically quite marginal during the conflict, is very well known since it was the place of the capture of Cesare Battisti, the socialist-irredentist from Trentino, who was put to death by the Austrian Empire, and later assumed as iconic figure of the martyr of the Italian nation²; every July, local authorities and national institutions organize a ceremony and an excursion to this place to commemorate the figure of Battisti. Thirdly, it was the scene of strong clashes during the Great War, but has been substantially marginal in the course of the other wars fought between the Hapsburg Empire, the French army and the Kingdom of Italy in the eighteenth century; for this reason, most of the fortifications are related only to the Great War, unlike many areas of the rest of Trentino (Bortot, 2005; Dai Prà, Allegri, 2018).

Until the end of the First World War, Trentino was part of the Habsburg Empire. In Vallagarina, at the beginning of the 1900s, a defensive system was built, based on five large fortresses, several bunkers, walkways and defensive systems. Between the autumn of 1914 and the spring of 1915, the Austro-Hungarian army strengthened its defences by building the *Tiroler Widerstandlinie* (Tyrolean resistance line), a system of trenches and military positions that extended from *Passo del Tonale* through the Leno Valleys to the Marmolada. In the first months of the war the Austrian troops withdrew and the Italian troops occupied without difficulty large territories till Rovereto and the Leno Valleys. There, both armies focused on the construction of roads and paths, trenches, positions for machine guns and artillery, barracks, deposits and cableways. In May 1916 the Austro-Hungarian army launched a major offensive (known as *Strafexpedition*) and reoccupied almost the en-

tire Pasubio area. During the operations, three Trentino volunteers in the Italian army – Damiano Chiesa, Cesare Battisti and Fabio Filzi – were captured by the Austrians, and executed.

About 100 000 Italian and Austro-Hungarian soldiers have lived on the Pasubio for more than three years. On the front line, thousands of soldiers have died in combat, or from wounds, killed by the cold and by avalanches. The high losses imposed the construction of numerous military hospitals and cemeteries. The Corno di Vallarsa, now Corno Battisti, was one of the most contested peaks. The Italians conquered it in 1915, lost it in the spring of 1916 and regained it in the summer of 1918 with spectacular action (Lichem, 1997). Today, the tunnels carved into the rock have been made accessible by the work of the Grotte Group “E. Roner”. Further restoration interventions promoted by the “Pasubio100anni” association have been planned.

4. Sources and methods

To map the landscape of the First World War, the widest range of possible sources has been used, so as to develop a multi-proxy approach “model” of investigation; these sources include historical maps, text documents, current aerial photos, historical aerial or ground photos, and field surveys (Gheyle, *et al.*, 2014). The data collected from each source will be integrated and compared with the others, in order to assess and to criticize the information potential of each type of source. Clearly, a research model based on such a wide range of data needs to be large-scale, and to focus on a limited case study, in contrast to other models of research that use a small scale and focus on large areas (Master, Stichelbaut, 2009; Stichelbaut, 2006).

Most of the mapping projects of material remains and fortifications of WWI are based on the analysis of aerial photographs taken by military air force during the war. Aerial photography has been one of the main advances in intelligence of the Great War. Zenithal or oblique aerial photos, taken during reconnaissance expeditions, were interpreted in the rear areas and used

to continuously update tactical and strategic maps, both for spying on enemy positions and for detecting and monitoring one's own forces (Chasseaud, 2018).

The use of aerial photos through GIS software processing is effective in the identification and mapping of trench systems, as well as bunkers, roads and barracks (Stichelbaut, 2005, 2006). Anyway, despite their great potential, these sources present some problems; because of the technical limitations of these years, most pictures are oblique, and it is quite difficult to geo-reference and precisely overlap them with current maps.

A new solution for this problem is the recently developed Monoplotting Tool software created by the WSL research group. This software works with DTM and allows to geo-reference the picture, to vectorize some of its elements and to import them into a GIS software (Bozzini, Conedera, Krebs, 2012)³.

During the war, numerous photos were taken in the front line, from the trenches or from high places, to obtain information on the characteristics of no man's land, on the trenches and on the weak and strong points of the deployment. Many of them are large panoramic photographs; this type of documents was used both to allow immediate recognition of the territory on the part of front-line commands, and to provide appropriate cognitive tools to the commands in the rear to help them understand the situation on the battlefield.

This software opens new perspectives for the use of photos taken from the ground; until now, they have been used qualitatively, as a memory of the daily life in the trench or of fortification architecture; using the Monoplotting Tool, it is possible to quantitatively process the landscape photos, to identify trenches or bunkers, and to geolocate them in a GIS platform. Picture n° 2 shows a photo without date, shot during the conflict, that represents Monte Corno Battisti. The trenches and paths between Italian and Austro-Hungarian lines are quite visible. Fortification elements have been vectorized and integrated in the geodatabase in Qgis. Despite

the great potential, one limitation is that the photo only shows a small part of the area of interest.



Fig. 2. *Monte Corno Battisti visto dallo Spiz*, no date (Photographic Historical Archive, Museo Storico Italiano della Guerra di Rovereto, f. 125).

Moreover, the aerial photographs and surveys made by officials were used to elaborate tactical maps, or maps that were updated daily with manuscript information regarding troops, artillery, the location of fortifications and trenches, marked with conventional symbology. Picture n° 3 shows a tactical map of the Austro-Hungarian Army, the *Spezialkarte* 1:75 000, "Rovereto und Riva" sheet, that reproduced the trench situation in Trentino on the 5th of May 1918. Manuscript information has been added to the basis of the *Spezialkarte*: the Austro-Hungarian line (blue ink), the Italian line (red ink) and special infrastructures behind the Italian front, such as roads and cableways (black ink). Maps like this can be georeferenced and vectored in order to collect all the metadata inscribed on them in a geodatabase.

Compared with aerial photos, maps provide different information: first, they represent the battlefield on a particular date, and the integration of a number of them can allow to reconstruct day-by-day events on the front. Secondly, symbols are more easily understandable than aerial

photos, especially for hidden positions, or for recognizing different types of artefacts (*i.e.*, military road, road, path, etc.). On the other hand, maps, as selected reproduction of real spaces, have some inherent limitation: often cartographies recorded only some of the elements, and contain unavoidable imprecision of location. Sometimes, this imprecision in trench patterns was intentional, as commanders didn't want to share too much information with the enemy in the case maps would be stolen.

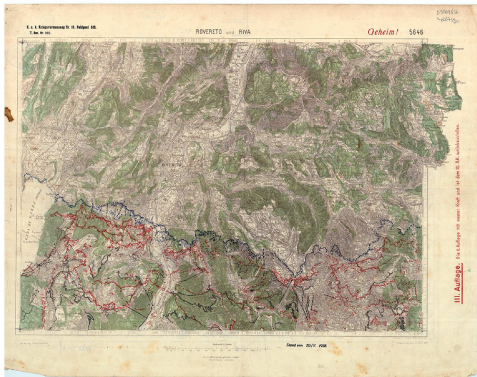


Fig. 3. Austro-Hungarian “tactical map” with trenches position (S.V.1918); the base is the *Spezialkarte*, 1:75000, sheet “Rovereto und Riva”.

A different type of sources to be used are textual descriptions. Useful documents can be reports written by battle officials or by the intelligence service, soldier's memories or correspondence. For the case study, *inter alia* we have the last letters that Cesare Battisti, wrote to his wife during the fights for Monte Trappola, Monte Corno and Quota 1801. Battisti was a volunteer and a politician, but also a geographer; his letters contain many geographic descriptions.

“Cara Ernesta, Ricevo la tua del 29. Mi vien recapitata sulla cime Est di Monte Corno, una montagnaccia infame, tutta franante, che contendiamo da giorni agli austriaci [...] La contesa è accanita. Noi vinciamo, ma con quanti sacrifici, con quali sforzi! Si vive aggrappati ai monti, senza tende, spesso senza cibo, sempre senz'acqua” (Letter from Cesare Battisti to Ernesta Battisti, 4th of July 1916; in Pieri, 1965, p. 79).



Fig. 4. Some trenches and fortification remains surveyed in the area of Monte Corno, completely covered by neo-formation of *Pinus mugo*.

“Credevo d'aver avuto nell'anno decorso, sul Tonale, sul Bado, una visione ampia della guerra. Ma mi accordo d'essermi illuso. Quello era sport, diletantismo. Quella cui assisto oggi è guerra e non tanto per l'azione a cui partecipo, quanto per le tracce dell'invasione feroce, e della fuga precipitosa, e del rinato spirito di vendetta nel nemico, che cerca e non trova la linea della sua resistenza” (Letter from Cesare Battisti to Ernesta Battisti, 7th July 1916; in Pieri, 1965, p. 82).

On the 4th of July, Battisti was close to Monte Corno, “horrible and infamous mountains”, where he was settled, “clinging to the slopes, without tents, food and water”. Two days later, he wrote about “the savage invasion” and the “revenge spirit of the enemy”. While it is quite difficult to geo-reference this kind of sources, especially the mail written by first line soldiers can be useful to transmit emotions and percep-

tions of the war (and of the war landscape) by people who lived it daily.

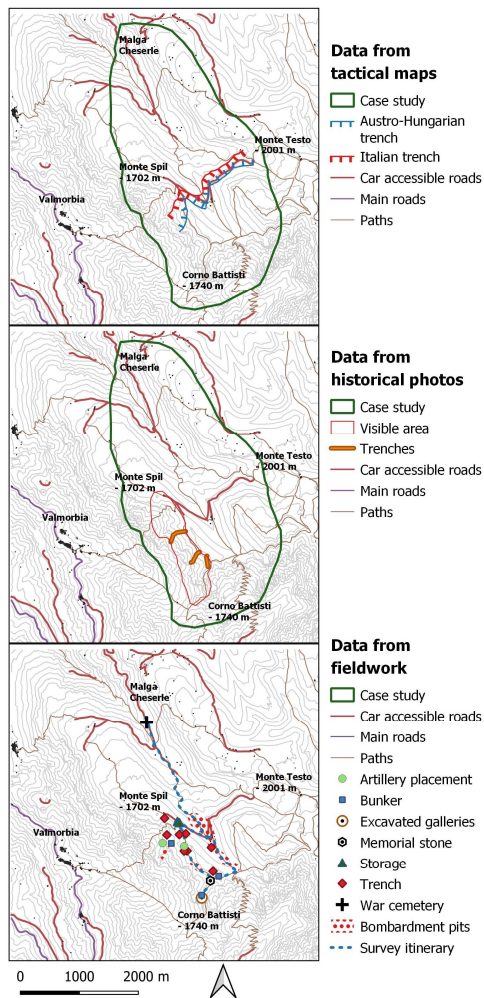


Fig. 5. Localisation of WWI remains in the studied areas as result of different source (map; photo) analysis and field surveys.

Data collected from historical sources can be compared with autoptic observation, through

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field surveys made with a GPS tool (Gheyle, *et al.*, 2014). The area has been surveyed two times: the first time, tracks of past defence systems and trenches, as well as other landscape features related to the passage of the front, have been identified; in the second survey, the localization of past artefacts has been controlled on the field. As a result of field work, and of the analysis of current orthophotos, it has been possible to verify that the whole area that in historical photos appears to be grassland is actually completely covered by recent formation of *Pinus mugo*. During the surveys, some elements such as trenches, walkways, holes in the ground for artillery placement, excavated galleries for hosting troops and pits in the ground made by bombardments have been localized. Many of them, however, are difficult to identify, due to new trees, shrub and ground coverage (Fig. 4).

Figure n° 5 shows some of the first results of the digitization process and of the geodatabase that has been developed. A division has been made according to the different sources that were used, such as historical maps, historical photos and field surveys. During the next phases, the database will be developed with new sources; different databases will be integrated, and different data will be compared.

Note

¹ The paper is the output of a team work. Anyway, E. Dai Prà is the main author of paragraphs 1 and 2, N. Gabellieri of paragraphs 3 and 4.

² Cesare Battisti was a key player in the political and civil debate of both Italian Kingdom and Hapsburg Empire from 1898 to 1915 (Pieri, 1965; Gatterer, 1975), as well as a brilliant researcher in the geographic field (Dai Prà, 2018). About the post-war debate and his mythologizing from a nationalist perspective, see Tiezzi, 2007.

³ In <https://www.wsl.ch/en/projects/monoplotting.html> (10-7-2019).

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