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MAPPING THE ARCHAEOLOGICAL LANDSCAPES OF SAN BASILIO (ARIANO NEL POLESINE, ROVIGO)

1. Introduction

A renewed interest in the site of San Basilio and its archaeological heritage has recently led to the resumption of research in that sector of the Polesine (province of Rovigo; Fig. 1), which was traversed, in Roman times, by at least two important roads, namely the via *Annia* and the via *Popillia*. This effort is supported by a fruitful collaboration among the Universities of Padova and Ca' Foscari of Venice, the Superintendency for the provinces of Verona, Rovigo, and Vicenza, and the Veneto Regional Directorate of Museums, with financial support from the Fondazione Cariparo and the Municipality of Ariano nel Polesine. In this context, pre-Roman and Roman excavations have been reopened, and systematic territorial investigations have been planned to reconstruct the ancient anthropic landscape. To that aim, FOSS (free and open source) software and mobile mapping tools have been employed for managing both legacy and new data in a GIS environment.

J.T.

2. Legacy data to define the layout of the Roman settlement of San Basilio

In order to deepen our knowledge on the extension and layout of the ancient settlement, legacy data regarding the geolocation of sporadic finds, structures and buildings, tombs and necropolises pertaining to the Roman age was analysed and digitised within a QGIS project. To this aim, in the framework of a bachelor's degree Thesis in Archaeology (supervised by prof. Caterina Previato), both published (De Bellis, De Bellis 1978; Turolla 1986; Capuis *et al.* 1988; AA.VV. 2013) and unpublished documentation were examined. Among the latter sources, kept in the archives of the Superintendency of Padova, the information contained in the correspondence exchanged between the Superintendency and those who had variously been involved in the discoveries turned out to be particularly interesting. Oral testimonies of those who were present at the time of some of those discoveries were heard as well.

The most significant information of each find, and especially its geographical localisation, was collected and summarised in Excel tables that, once imported into QGIS, allowed to obtain a digital archaeological map of the area of San Basilio (Fig. 2). The distribution of finds has also made it possible

Fig. 1 – The lower Polesine and the localisation (red dot) of San Basilio (basemap: Google Earth).

to identify two distinct sectors (Fig. 3): the area with lower concentration is marked in orange and has an extension of approximately 2800 ha; the area with higher concentration, on the other hand, is highlighted in green and has an extension of approximately 220 ha. On the basis of this evidence, it is possible to recognise the main core of the Roman settlement in the green area; however, the entire settlement must have extended for a few more kilometres to the N, E and W, while to the S it probably stopped where the Po di Goro flows today. With regard to the relationship between the settlement and the coastline, an archaeological find from the Roman period located approximately 3,6 km NE of the Church of San Basilio would lead one to hypothesise that the coastline, which in Roman times probably followed the course of the coastline of the pre-Roman period (Iadicicco, Vicenzutto, Paltineri 2022), was shifted about 1,5 km to the E.

The overall geolocalised findings allowed to hypothesise a topographical layout of the settlement and identify several areas with buildings for private use (coloured in purple in Fig. 4) and a single central area with buildings for public use (in turquoise in Fig. 4). Indeed, in the three areas highlighted in purple (to the N, E and W of San Basilio's Church), traces attributable to private buildings were identified, such as mosaic floors, fragments and mosaic *tesserae*, sometimes also associated with walls or other structural elements. In the central area highlighted in turquoise, several buildings were identified, such as the *horreum*, the only structure that was certainly public in character,

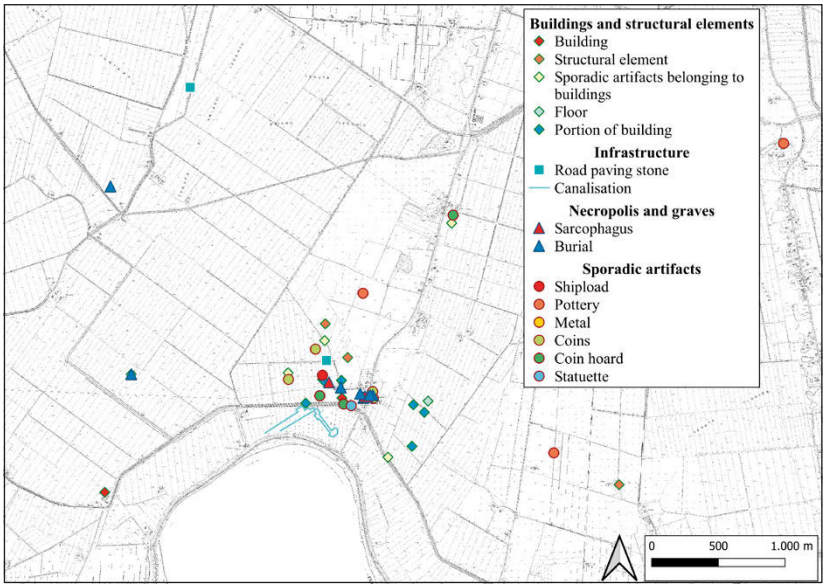

Fig. 2 – Archaeological map of the area of San Basilio (QGIS elaboration E. Consolo).

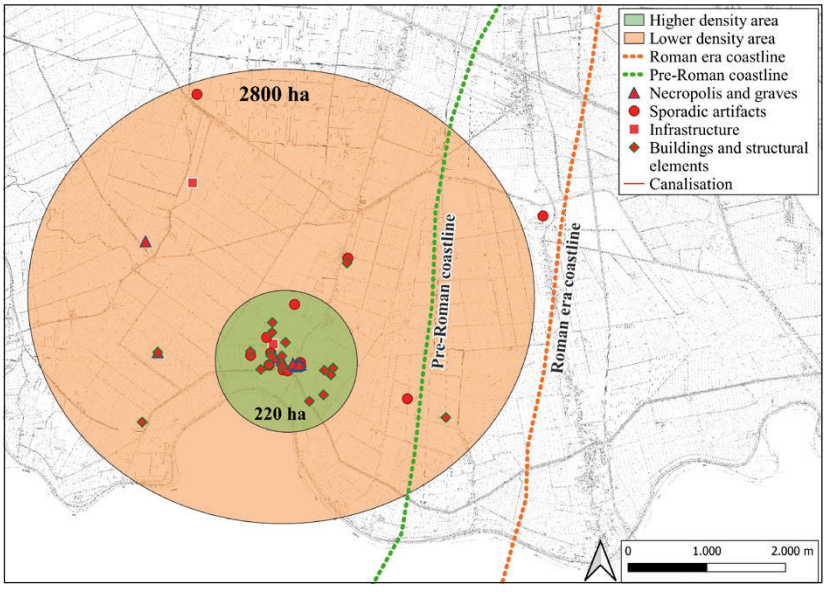

Fig. 3 – Map with areas of lower and higher concentration of archaeological finds discovered in San Basilio (QGIS elaboration E. Consolo).

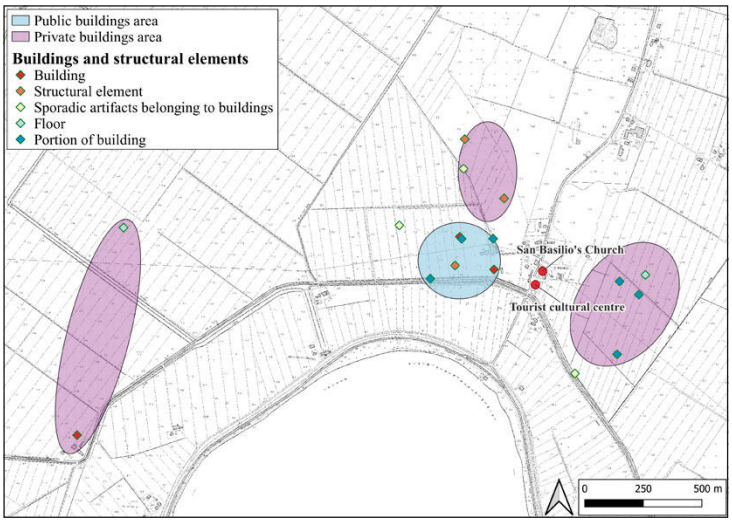

Fig. 4 – Areas of concentration of public (turquoise) and private (purple) buildings in San Basilio (QGIS elaboration E. Consolo).

and the so-called 'Roman villa', which should be more reasonably interpreted as a multifunctional *villa* with probably a thermal sector for public use. Thick walls have also been recognised that can perhaps be related to a functional infrastructure for the unloading of goods that were stored in the *horreum*. Furthermore, the presence of a sacred building has been hypothesised on the basis of the discovery of artefacts of a religious character and an inscribed pediment.

E.C.

3. Legacy data for a topographic analysis of San Basilio's territory

During the Roman era, San Basilio was a significant road junction for the entire high Adriatic coastal area. This importance is evidenced by its mention in the Peutinger Map under the name *mansio Hadriani*. By studying and cataloguing discoveries over the years and processing this data using GIS software, we can better understand the road layout. The area was influenced by the road systems of via *Annia* and via *Popillia*. Via *Annia*, constructed in 153 BC according to recent studies, was a communication route which directly linked Rome with Aquileia, connecting cities such as Ravenna, Padova, and Altino along the Adriatic coast. Via *Popillia*, established in 132 BC, extended from Rimini to Altino, following a more coastal route where it partly overlapped with via *Annia* (Uggeri 2012). San Basilio's location

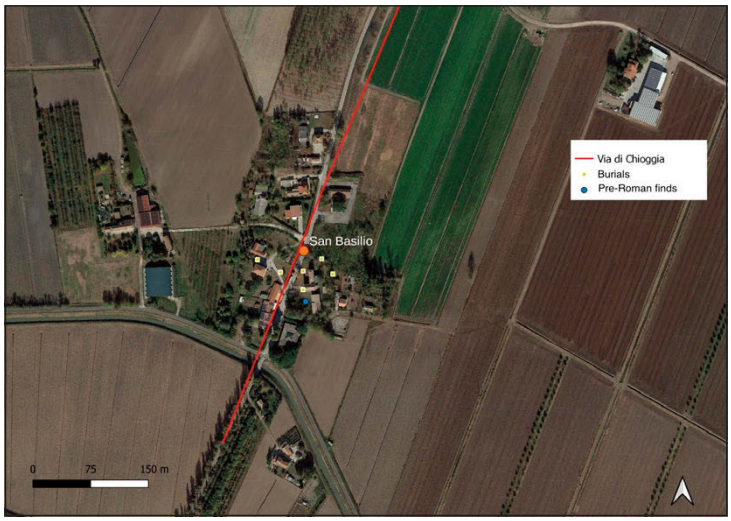

Fig. 5 – The layout of the road leading towards Chioggia (QGIS elaboration G. Moro).

along these routes made it a crucial hub. Coming from the S, the system of via *Annia-Popillia* turned NW from San Basilio towards Adria. In the mid-1st century AD, an additional connection to Altino was created, running along the fossil dunes present along the back coastline.

The exact route of the road through the area of San Basilio remains largely unknown. However, georeferencing catalogued finds which can be related to a major Roman communication route can provide valuable insights. These finds include remnants of road tracks, tombs, and funerary steles. The precise location of these archaeological records reveals that the highest concentration of burials is on top of the fossil dune where the modern town of San Basilio is situated. These discoveries span from the 2nd century BC to the 3rd century AD. This area is also traversed by a road leading towards Chioggia (Frassine 2010). Further N, in the areas of Corte Cavanella and Sant'Anna (Chioggia), sections of the road have been uncovered over time. The association of these finds strongly suggests the presence of a Roman road stretching from San Basilio to Chioggia along the ancient coastal fossil dune cordon (Fig. 5).

The route of the via *Annia-Popillia*, which extended from San Basilio to Adria, has left only sparse traces, making its identification challenging. A probable route has been hypothesized through the interpretation of aerial photos and the georeferencing of minor discoveries, such as burials and road traces. The route entered San Basilio from the S and then branched off NW towards Adria. Analysis of aerial photos suggests a straight road in

Fig. 6 – Traces of a plausible route in the locality of Tombe, near San Basilio (basemap: Google Earth).

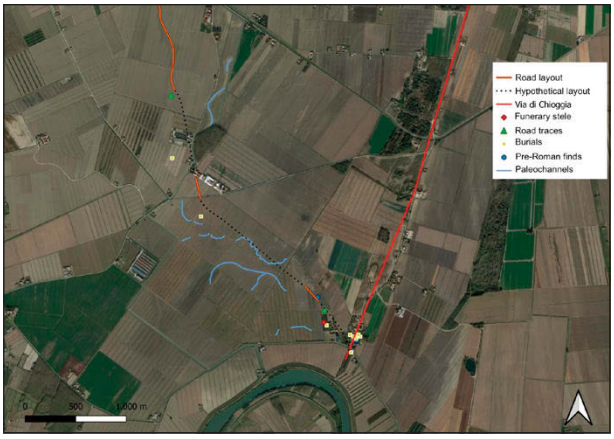

Fig. 7 – Overall map of the evidence analysed in the territory of San Basilio (QGIS elaboration G. Moro).

this direction, corroborated by the discovery of a funerary stele and a burial in the Forcello estate. The road continued towards the locality of Tombe, where it turned N, at an area that has also yielded burials and remains of a road. Further N, aerial photos reveal a distinct trace consistent with a road (Peretto, Bedetti 2013). It proceeded to the locality of Mantovane, where additional evidence is visible in aerial photos. Continuing N, the road appears

to veer NW again, but beyond this point, its hypothetical route can no longer be reconstructed (Fig. 6).

The area where the ancient town of San Basilio stood during Roman times had significantly different environmental characteristics compared to today, which played a crucial role in its settlement (Peretto 1986). One of the primary challenges for large infrastructures like roads was crossing unstable, water-rich areas and ensuring proper drainage. A specific Roman road construction technique involved elevating the road surface above the surrounding countryside by building an embankment (*agger*). This method provided stability to the infrastructure. Often, the embankment was flanked by one or two channels to aid in water drainage. The traces identified from aerial photos in the San Basilio area can be consistent with this type of structure.

An intriguing detail is that these traces show an average width of about 20 m, which is unusual for a typical ancient roadway, but aligns with the dimensions of an 'agger road'. Given the presence of significant water and numerous river courses, as evidenced by the identification of paleochannels visible from aerial photos, it is plausible that Roman builders employed this construction method for the via *Annia-Popillia* in the section passing through San Basilio (Fig. 7).

G.M.

4. Gathering new data through proximal sensing and archaeological survey

The most recent step of the research involved the application of remote sensing techniques via drones. Initially, the analyses were carried out with a Parrot Anafi Thermal, equipped with a thermal sensor which can identify heat differences due, in our case, to the presence of underground archaeological structures. Afterwards, a multispectral drone (DJI Mavic M3M) was employed, capable of seeing the 'invisible' and analysing crop growth, which is strongly influenced by the presence or absence of archaeological elements (Fig. 8). The applications used to define the flight plans of the two drones (Pix4Dcapture and DJI Pilot 2) allowed for the repetition of the same surveys at different times of the year, thus enabling a more precise assessment of the consistency of the identified traces, better determination of their nature, and refinement of the investigations, with the advantage to more accurately calibrate in which vegetative phase of the crops the 'archaeological' response was more or less clear and evident. Finally, the image processing was conducted using the photogrammetric software Pix4Dmapper and Agisoft Metashape, which allowed for the acquisition of a large data set of orthomosaics for the entire area of San Basilio, georeferenced with centimetric precision, thanks to the use of the RTK (Real Time Kinematic) system, which collects data from

Fig. 8 – DJI Mavic M3M Red Edge (RE) image of alfalfa fields, with evident traces of a Roman building (photo J. Turchetto).

both satellites and the base station to correct the image position in real time during the drone flight.

Using the various orthomosaics obtained, a ground survey phase was initiated in the fall of 2022, involving around twenty students from the Ancient Topography course of the bachelor's degree in Archaeology at the University of Padova. The most innovative aspect of this step of the field research was the application of the QField software (https://qfield.org/) for mobile mapping, which allowed for participatory mapping, collecting, and cataloguing of archaeological artifacts.

Once the base project was created using the desktop version of QGIS, it was uploaded through the QFieldSync plugin to QFieldCloud (https://qfield.cloud/), a platform that enables not only to manage the entire project and share it with various field operators, but also to synchronise and merge all collected data into a single database. Each operator (or group of operators) then installed the updated version of QField on their devices (tablet or smartphone) and downloaded a copy of the entire project from the Cloud. This allowed them to easily conduct their field survey activities, mapping the location of artifacts using GPS, taking geotagged photographs, and entering preliminary data into the attribute table associated with each point/artifact. This phase of fieldwork has been carried out seamlessly even offline: points mapped via QField could be recorded locally and later uploaded to QFieldCloud, and finally integrated into the desktop version of the project.

The advantages of using this mobile mapping software were numerous: the ability to conduct surveys over large areas in relatively short times, real-time data updates, and improved collaboration and synchronisation among field operators. Additionally, the integrated management of data and outputs obtained from Remote Sensing analysis and the survey in a single GIS platform allowed for the verification and sometimes correction of the locations generated with QField. Although in most cases the GPS positioning was adequate for our archaeological-topographic purposes, small geolocation errors were resolved through detailed comparison with low-altitude drone images, which distinctly identified the archaeological artifacts subsequently collected by the students.

The multi- and inter-disciplinary approach characterising the new research in San Basilio, including magnetometric analysis in collaboration with experts from Gent University, is generating substantial data. This is ushering in a new and promising era of discoveries and of renewed interest in the archaeological heritage and historical landscape of that nearly forgotten corner of Polesine.

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ABSTRACT

Between the end of the Seventies and the beginning of the Eighties of the Twentieth century, following the discovery of numerous occasional findings, the village of San Basilio (Ariano nel Polesine, Rovigo, Italy) had been the object of a series of archaeological campaigns, which made it possible to identify a pre-Roman settlement and a Roman *villa/mansio* linked to the passage of the via *Annia*/via *Popillia*. In the past few years, the research has been resumed in that area, carrying out both archaeological and topographical activities, aimed at reconstructing the organisation of the ancient landscape. The aim of this contribution is twofold: on the one hand, the planned research activities are presented and, on the other, the opportunity can arise to discuss about the potentialities of digital approaches in mapping the archaeological landscapes of San Basilio.