

GIS information databases: Routing and tour generation

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Abstract

The main objective of activity 4.2 is the data population of the Progressive Web Application with routing and tour itinerary generation.

A specific GIS platform has been created for managing and implementing the historical, archaeological and topographical data related to the northern Adriatic shores and their cultural landscapes. An in-depth study dedicated to the distribution of amber materials in the area between Polesine and the Croatian peri-coastal belt during the Bronze Age was carried out. The goal is outlined in a GIS platform and in a related database a detailed profile of the distribution of raw materials, semi-finished and finished amber artefacts in the area under examination and observe the dynamics of material circulation and the possible exchange routes used in the period under analysis.

Geographical Information System of ancient roman routes

As part of the activities WP4.2.1 GIS Information Database, a bibliographic analysis related to the archaeological and topographical contexts relevant to Regio X Venetia et Histria has been conducted which represent the main focus of the project and the territory in which the pilot areas identified by the Rovigo and ESUVenice task forces are located.

For the data-set management, a GIS platform (with the open source software QGIS) was set up, in which, in addition to archaeo-topographical vector data (point for settlements/points of interest archaeological; linear for roads), WMS (Web Map Service) layers related to orthophotos regional from the years 1984-1989, satellite images (BingMaps, GoogleEarth, Landsat), historical cartography (especially georeferenced maps of the Kriegskarte 1799-1805), cadastral cartography (available online for the provinces of Padua and Rovigo - <http://archiviodistato.provincia.padova.it/>), modern cartography (mainly sections of the CTR available in the Veneto Region geoportal also in shapefile format) and geological and geomorphological maps of Veneto (also available in the geoportal of the Veneto Region, as well as in the national geoportal) were implemented.

Data management using GIS made it possible to create a digital cartography thematized, consisting mainly of two layers: a point layer, with which the distribution of ancient mapped the distribution of ancient settlements, and a linear one, which records, instead, the routes and roadways of Regio X.

The final shapefile will be imported within the Trip Planner Web Application, which allow the management of tourist products and social route tracking. The GIS database and The App, in fact, through the thematic overlay, will make it possible to visualize not only the different areas of interest, archaeological sites or museums, but also the communication routes (ancient and modern) that connect them and the modes of travel by which these can be covered (on foot, by bicycle, on horseback, by boat), so that each tourist can plan their trip according to their interests and preferences.

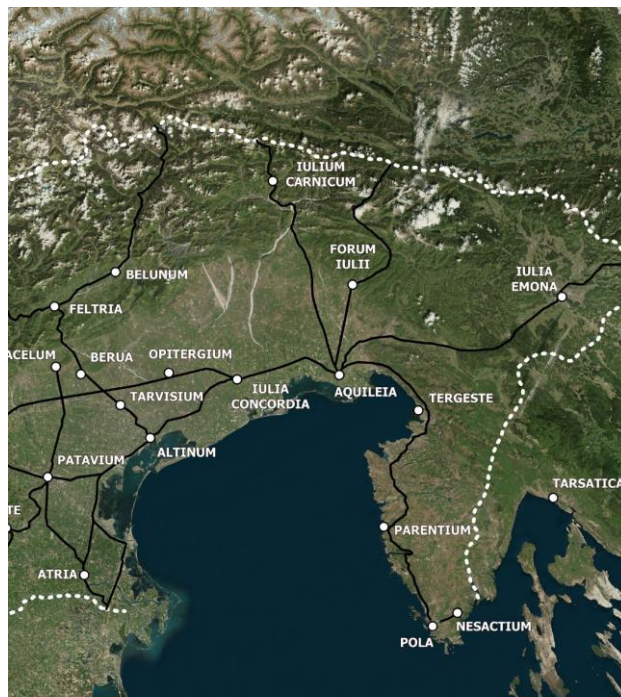
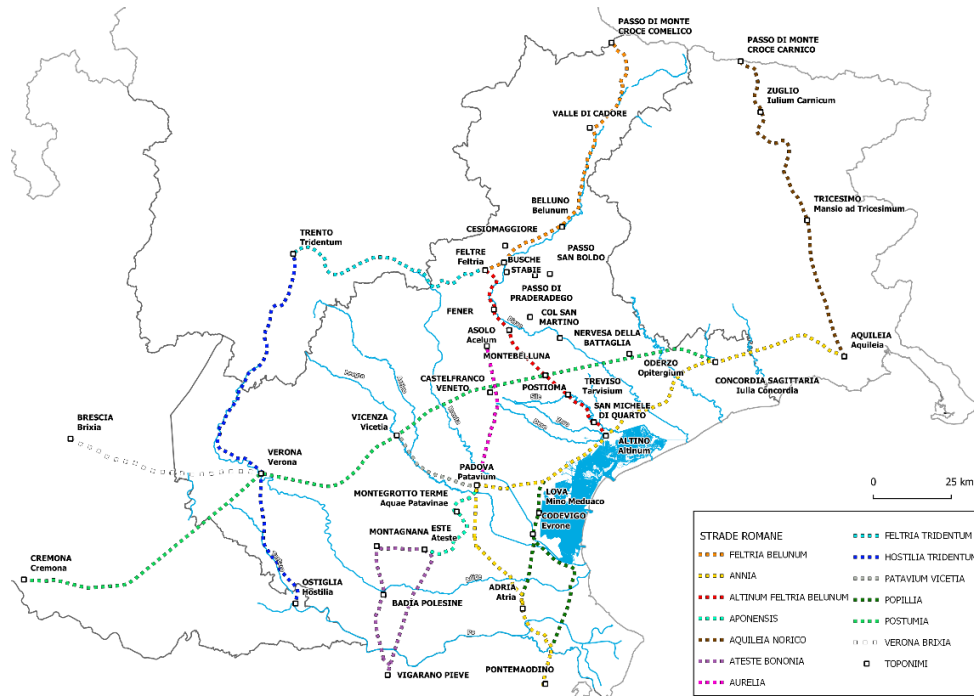


Figure 1: two examples of GIS-derived map of the ancient itineraries and routes of the decima region. The dotted lines (shapefile) were traced by analysing historical cartography, orthorectified aerial photographs and satellite imageries, and by taking into consideration the distribution of archaeological findings.

Amber database

An in-depth study was dedicated to the distribution of amber materials in the area between Polesine and the Croatian peri-coastal belt during the Bronze Age. The aim of this GIS database was outlined a detailed profile of the distribution of raw materials, semi-finished and finished amber artefacts in the area under examination, making it possible to carefully observe the dynamics of material circulation and the possible exchange routes (ancient amber routes) used in the period under analysis.

During the Early Bronze Age, amber was mainly concentrated in lake Garda pile-dwelling sites – above all in the settlements of Ledro (TN) and Peschiera (VR) – underlining the importance of these settlements, located in a key area for trade and commerce between the north of the Alps and the Adriatic area. During the Middle Bronze Age, amber artefacts in the terramaricolous-palafitticolous area of the north Po Valley were always concentrated in settlement areas, as evidenced by the site of Fondo Paviani (VR), but it is also present in the grave goods of the main necropolis in the Veronese area (Olmo di Nogara, Franzine Nuove, Castello del Tartaro, etc.).

As for the final phases of the Bronze Age, some peculiar productions are recorded throughout the area under examination through the diffusion of the vagus defined in literature as “Tirinto” and “Allumiere”. Particularly numerous are the attestations of both semi-finished and finished products in the Polesine area, specifically in the sites of Frattesina di Fratta Polesine (RO) and Campestrin di Grignano Polesine (RO); it is in the latter site that amber was worked for the first time on site, arrived here via the Adige valley.

Throughout the Bronze Age the absence of amber materials in the Friuli Venezia Giulia region is underlined. On the other hand, amber from the Croatian sites of Monte Orcino (Vrčín), Kompolje and, above all, from the castelliere of Moncodogno are particularly consistent; from the latter site come evidence from both the residential area and the necropolis. The chronology of Croatian sites is generally placed between the Middle Bronze and the Recent Bronze Ages, except for a few sites that, as we will see later, last even into the Iron Age.

The observation of the collected data made it possible to visualise, thanks to *GIS* restitution, the main concentrations and possible diffusion routes of the materials under examination. During the first phases of the Bronze Age, an “amber route” was certainly active, running along the Brennero Pass and down through the Adige Valley to the pile-dwelling sites on Lake Garda. In the Recent Bronze Age and especially in the Final Bronze Age, the Polesine pole was active and absolutely central, from which materials were redirected to the Adriatic coast, crossing it and reaching the Croatian shores. It is also possible that the Croatian area was supplied with amber from a second, internal route, which can be defined as “continental”, following the course of the Rhine.

During the phases of analysis of the Bronze Age occurrences, the need arose spontaneously to observe the phenomenon of the diffusion and circulation of amber also in a later chronological period, i.e. the Iron

Age, in order to allow this work to take the form of a global analysis of the phenomenon throughout the whole of Upper Adriatic protohistory.

In this regard, a second stage of work was dedicated to the research, carried out on a broader scale, to define an exhaustive picture of the materials present in the area for the Iron Age as well. The different approach of the research is due to various factors, but specifically it must be stressed that for the Italic area, amber is found almost exclusively in necropolis contexts. The practice of incineration represents the exclusive ritual in these phases, contributing to the “invisibility” of amber in these contexts: amber, in fact, as a fossil resin, has a melting temperature of between 190° and 230°, a temperature certainly already reached in the initial phases of combustion of the body laid on the pyre.

The few artefacts found in the main cemeteries of the pre-Roman Veneto relate to the rare inhumation burials or to grave goods placed in the tomb during the funeral ceremonies. On the other hand, the materials coming from the settlement areas are almost non-existent, except for some scraps of work from the residential site of Borgo Canevedo in Este (PD): here, during the very first phases of the Iron Age, amber manufacture is testified.



For the Croatian area, on the other hand, the quantity of amber material is very substantial, always and above all in necropolis contexts, also thanks to the biritualism that characterises the cultural facies of the area; a recent publication (Catalogue of the “Iapodes” Exhibition, 2007) together with the publication by Palavestra (1993), has therefore made it possible to better analyse the presence of amber in the Croatian area for the Iron Age.

At this point we continued with the creation of the GIS relating to the amber diffused in the Iron Age (for Italy the quantities of the individual attestations were not included as they are often unrecoverable) and, above all, the inclusion in the GIS of new features useful for consulting this tool for the average user.

The first step of the research involved systematic studies of all the Bronze and Iron Age amber material attestations in order to create a complete and updated database of finished or semi-finished artefacts. This operation was carried out through the creation of an interactive FileMaker Pro database with 217 records.

The systematization of the bibliographical data allowed 194 bibliographical records to be processed, specifically 171 scientific articles (including both articles exclusively dedicated to amber materials and publications on the contexts of dwellings and/or necropolises) and 23 specific monographs/catalogues of dedicated exhibitions.

The individual occurrences of amber artefacts or semi-finished products from the entire Bronze Age amount to over 400 units.

Nome sito Narde II	Regione Veneto	Provincia Rovigo
Tipologia sito <input type="checkbox"/> Abitato <input checked="" type="checkbox"/> Necropoli <input type="checkbox"/> Ripostiglio		
Contesto [Tb 75 (settore I)]		
Datazione: "Bronzo Finale 3" (Porta 2010);		
Rappresentazione grafica 	Rappresentazione fotografica 	
Scala: 1:2	Scala: Assente.	
Descrizione: - "Perla in ambra: tipo Allumiere, di forma cilindrica molto allungata" (Porta 2010); - "Il corredo è costituito da una collana di perle in ambra tipo Allumiere, da una perla d'ambra di forma a "dariatto", altre perle in ambra forma globulare." (Salzani 2013).		
Dimensioni (centimetri) <input checked="" type="checkbox"/> Sì <input type="checkbox"/> No Altezza ND Diametro 1,4 Larghezza ND Lunghezza 4,6 Diametro Foro ND		
Analisi archeometriche <input checked="" type="checkbox"/> Sì <input type="checkbox"/> Origine Batca <input type="checkbox"/> Non Det. <input type="checkbox"/> Altro Note Sigla: NF 75 - AL 1. Analisi DRIFT: succinato		
Collocazione Museo dei Grandi Fiumi, Rovigo. Num. inventario I.G. 316387		
Bibliografia Porta 2010 - Tav. 13, B3, scala 1:2. Angelini 2010 - Tab. 1, Fig. 1,2,3. Salzani 2013 - Fig. 1.5.1, fotografia senza scala.		
Note Generali ND		
Coordinate E [32 T 707667.80m	Coordinate N [32 T 4989554.52m	

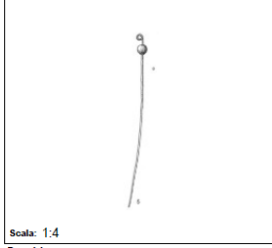

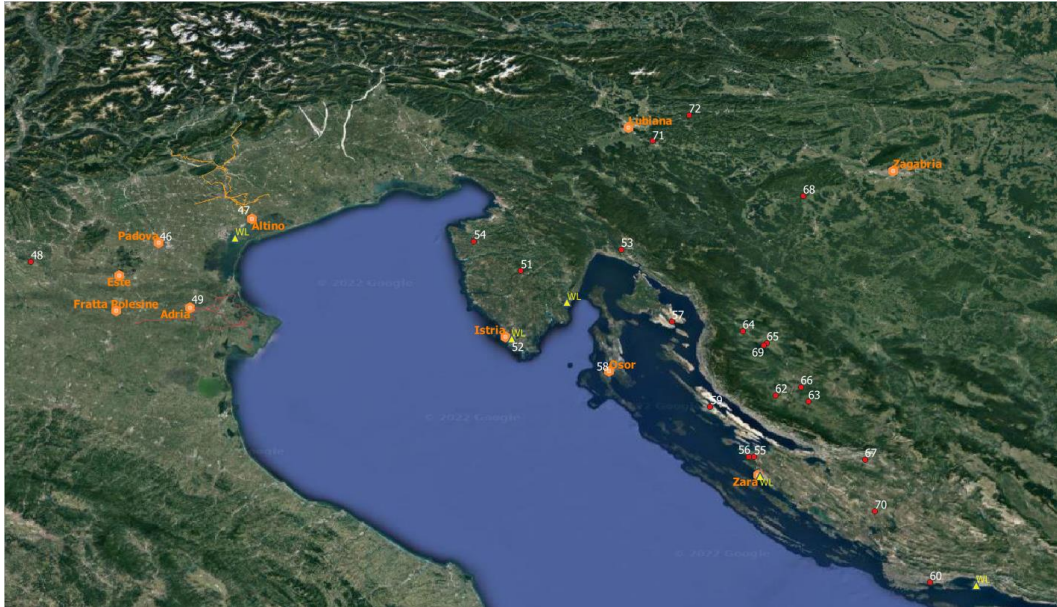
Nome sito Palafitta della Maraschina	Regione Lombardia - Veneto	Provincia Brescia - Verona
Tipologia sito <input checked="" type="checkbox"/> Abitato <input type="checkbox"/> Necropoli <input type="checkbox"/> Ripostiglio		
Contesto ND		
Datazione: "Nel complesso i materiali [provenienti dalla palafitta della Maraschina] sono inquadrabili"		
Rappresentazione grafica 	Rappresentazione fotografica 	
Scala: 1:4	Scala: ND.	
Descrizione: - "Tra i numerosi spilloni si annoverano esemplari con testa a rotolo, capocchia ellissoidale forata trasversalmente, con capocchia globulare biconica perforata obliquamente, oppure con testa ad anello. Da segnalare due pregevoli spilloni con testa a traforo ed uno con capocchia in ambra" (Ruggiero 2001); - "Spillone con perla d'ambra di forma globulare infilata subito sotto la capocchia a rotolo" (De Marinis 2006); - "Spillone con infilato un vago globulare d'ambra" (De Marinis 2007).		
Dimensioni (centimetri) <input type="checkbox"/> Sì <input checked="" type="checkbox"/> No Altezza ND Diametro ND Larghezza ND Lunghezza ND Diametro Foro ND		
Analisi archeometriche <input type="checkbox"/> Sì <input type="checkbox"/> Origine Batca <input type="checkbox"/> Non Det. <input type="checkbox"/> Altro Note ND Analisi DRIFT:		
Collocazione Desenzano del Garda, Museo Civico Archeologico "G." Num. inventario ND		
Bibliografia Ruggiero 2001 - Fig. 8, fotografia senza scala. De Marinis 2006 - Tav. V, n.5, scala 1:2. De Marinis 2007 - Fig. 5, scala 1:2, spillone con vago a sinistra.		
Note Generali ND		
Coordinate E [32 T 628589.41m	Coordinate N [32 T 5034920.34m	

Figure 2: example of two records of the amber database realized with file maker. It contains all the information about the findings (name, origin, graphic and photographic documentation, description, dimension, archaeometric analysis, placement and bibliography). The total amount of the records is 217.

The observation of the collected data allows the visualization of the main concentrations and possible diffusion routes of the materials under examination through GIS layers. The dataset considered in the GIS amber database were:

- current hydrographic network, both Italian and Croatian;
- cycle routes of Rovigo, Venice, Verona, Vicenza, Padua and Treviso and of the whole Friuli Venezia Giulia;
- main Archaeological Museums - National and Civic - where amber finds are preserved;
- attestations of amber materials of Bronze Age;
- attestations of amber material of Iron Age;
- example of image record in the amber material layers.

The map will be accessed from any browsers by any users and will be used to show and communicate the results with new cartographic views.



*Figure 3: GIS-derived map of amber findings.
 Orange dots indicate the Archaeological Museums; the yellow ones are amber materials of Bronze Age; the yellow ones the port docking of the hydrographic network; the orange roads are the cycle routes of Venice.*

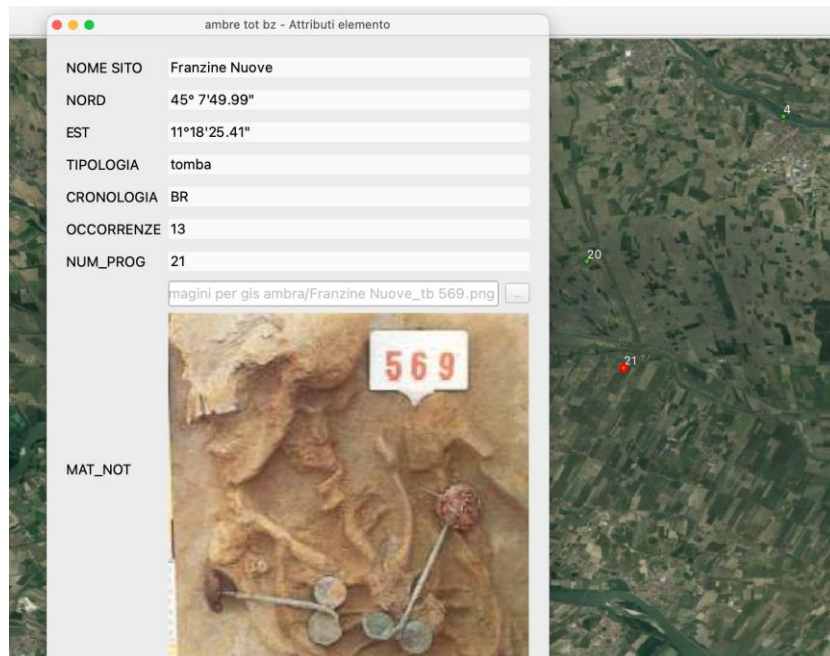


Figure 4: example of a database card with descriptive information on a point on map.