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Navigating on the past, as a bird flight, in the territorial scale of historical topographic maps. WMS on the “Corografie delle Province del Regno Lombardo-Veneto”, for accessing cadastral map catalogue

Keywords: GeoTIFF; GeoDB; Geoportal, Historical Topographic Map; Georeferencing; Cartographic Heritage.

Summary:

The research presented here has developed within the project “Atl@s of historical cadastral and topographic maps of Lombardy (2009-2011)” funded by ‘Fondazione Cariplo’, involving ‘Politecnico di Milano - BEST Dept.’ (project leader), ‘Archivio di Stato di Milano’, ‘Agenzia del Territorio’, ‘Centro Studi PIM’, ‘Regione Lombardia’, ‘Comune di Gorgonzola’ (partners). The first release of the geo-portal (www.atlantestoricolombardia.it), has been presented to the public on 19th January 2010 after a year’s work. Conceived in the form of a modern Atl@s, it has been designed with a double level access to the historical cadastral series available by ASMi (‘Catasto Teresiano’, ‘Lombardo Veneto’, ‘Cessato Catasto’), together with samples of ‘Impianto in conservazione’ by AdT (Italian Cadastral Administration): besides a catalogue approach level based on classical research keys (the application, Divenire©, has been inherited by ASMi from the Archive of Venice), an open geographic level has been implemented by the research group of Politecnico, with ongoing functionalities, based on a territorial regional basis, obtained experimenting and georeferencing small scale topographic maps, principally here focused on the historical chorographic maps.

The methodologies, the reliability and feasibility of the georeferenced output, and the overall potentiality to use them as a gate to access the local scale represented by the spread diffusion of the cadastral series, are the topics discussed. Due to the high number of historical cadastral sheets, the generation of a systematic GeoDB on the local cadastral series - with a rigorous georeferencing method, already documented within the research – shall be faced by government policies and by algorithm automation, to become sustainable in the next years, in terms of time and costs. Thus, in the mean time, few functionalities are being tested to allow an agile user access, based on a geographic approach to the non georeferenced sheets, straightening the immediate content of the geographic language to a large public demand, respect to the simple key queries, through Web Mapping Services (WMS) developed on the small scale map: ASMi is going to share - over this project through the portal - more than 28.000 sheet units, that can find a challenge in the geographic fruition. Flying the territory of the past with the small scale synthesis, its political assets and physical elements, such as the hydrographic network, can offer interesting thematic cultural opportunities to knowledge dissemination of ‘our territory’ and its preservation.

Introduction

The paper intends to evaluate the contribution of small scale historical topographic maps, in the increasing knowledge and consciousness of landscape, facilitating web access to cartographic heritage represented by the cadastral map series (paragraph 2). Different georeferencing systems, with respect to the one developed for large scale cadastral maps¹, have been used and compared

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¹ (Brumana et al. 2009).

on the following historical topographic series conserved by ASMi, showing how each map, created with its own instruments, purposes and representation methods, requires a cognitive and procedural effort to apply georeferencing techniques, that need to be evaluated in the aim of qualitative, measurable and satisfying results (par. 3). The map series considered here, are the 'Corografie delle Province del Regno Lombardo-Veneto' (from 1836, in scale 1:115,000), the 'Carta del Territorio del Milanese e Mantovano' (1788-1796, in scale 1:86,400), the 'Carta del Regno Lombardo Veneto' (ITM 1933, in scale 1:86,400).

In particular the case of the provincial chorographic maps is discussed here, since they represent the ideal element of connection between the cadastral maps (Lombardo Veneto) of the Municipalities at the local large scale (1:2,000) - the first cadastre surveyed within a geodetic reference - and the topographic ones. These maps are without coordinates, perhaps considered unnecessary for geographic purposes such as providing the Cadastral Officers with an overall representation, useful for checking the different territorial divisions, intended to focus and to immediately manifest the political and administrative articulation of the region, through the provincial, municipal and taxable borders. In addition, hydrography and orography were represented with their essential elements, in a synthesis, perhaps through a 'raw' generalization process from cadastral map units, on which the research intends to deepen beginning from the valuation of the results and reasoning on some elements evidenced in the course of it, considering metrical and accuracy aspects.

Once the GeoDB on the georeferenced maps was generated, an open geographic platform has been implemented (par. 4), compliant to OGC, as an instrument for publishing them in a geoportal built up on the actual and historical topographic maps through WMS: a powerful instrument of documenting the transformations of the territorial administration boundaries, recording the history of the transformation and aggregation of areas up to the actual political asset, with a strong impact on the identity roots and cultural reconstruction (par. 5). The result is a bird flight on the territory of the Lombardy region, with the possibility to navigate with continuity along the municipalities and the provinces in the asset of 19th century, useful for a geographic query access to the cadastral maps in case they are not yet georeferenced (this functionality will be exploited and experimented with, during the second year of the project activities). Critical aspects and opportunities of the research are summarized in paragraph 6.

The 'consciousness of the landscape': the role of historic topographic georeferenced maps in creating culture

The project financed is devoted to contributing to the rising of "consciousness of the landscape", as a source of welfare, culture, historical memory and identity, to be transmitted to the future. With this aim, the comprehension of the characteristics of the territory in which we live, both from its natural and anthropogenic point of view, together with the recovery of historical values stratified (human and material culture, landscape, historical use of the land over the centuries, all the traces of the man's work), can become a key element for a sustainable land project and territorial government, compliant with legislative frame (i.e. 'Codice Beni Culturali, the Italian CH codex, Piano di Governo del Territorio, the Government Regional-local Plan), towards a 'participated' cooperation by the citizen themselves. Consequently, the main aim is to create and divulge the culture of the historical territory of Lombardy, through the analysis of historical maps, preserved in public and private archives, promoting a simple navigation on the territory viewed with the lens of the past.

The aim of the project is to enable historical cartography - from descriptive documents of the territory, now in almost exclusive use of the experts - to become a concrete instrument for an increasing land knowledge, for culture divulgation and identity, in order to be used by technicians, operators, scholars and citizens, as well as Public Administrations. It means improving agile access, overcoming 'exclusive catalogographic access' in favour of geographic items.

In the geographic portal, setup in the form of Atl@nte web (Fig. 1), the historical Lombard cadastres ('Catasto Teresiano', 'Lombardo Veneto', 'Cessato Catasto', 'Impianto in conservazione') have been made available, representing an inestimable source of historical information and cartographic details, through two territorial access levels: the regional-provincial level, and the local one.

The portal uses the open tools of interactive navigation of the georeferenced historical maps over the actual maps, as an instrument of immediate perception of movement, in a virtual space. The georeferencing of the topographic maps, geographically placed on the territory of today (by using current topographic database, technical maps, orthophotos), intends to offer a privileged vehicle to access the heritage of historical cadastral maps (Fig. 2), in addition to the application developed by Divenire© based on a set of search keys (such as place's name or alpha-numeric lists).



Figure 1. Home page of Atl@s (www.atlantestoricolombardia.it).



Figure 2. The access level to the maps: the descriptive catalogographic level (in the middle of the webpage), the geographical access based on GeoDB built up on the historical maps at regional-provincial scale and at urban scale (on the left), and the thematic itineraries (on the right).

The phase of map publishing on the Atl@nte web site (www.atlantestoricolombardia.it), at different scales of representation, was preceded by the following different phases: the methodological project, the georeferencing of every single map on different layers with respect to the chosen grid mapping system, (Gauss-Boaga – datum Roma40 – for local cadastral maps, and UTM - datum WGS ETRF89 - for regional-territorial maps; Mugnier, 2005 gives an overview on the Italian geodetic and mapping frameworks) according to the standards used by regional and town administration geo-portals to publish current maps and GeoDB, and by the conversion of files in order to upload them on a geoserver.

The objective is to show the unique and complex case of the georeferencing of Chorographic maps (in scale 1:115,000), in parallel with the problems of the georeferencing of small-scale Topographic maps (in scale 1:86,400), produced by ‘Astronomi di Brera’ in Milano between the end of the 18th and the early 19th century.

The “Corografie delle Province del Regno Lombardo-Veneto”: problems and method for their georeferencing

Discussed in this paragraph is the complex georeferencing task of the chorographic map sheets obtained so far (the provinces of Milano, Bergamo, Brescia, Lodi, Cremona, Pavia and Sondrio), carried out using as stakeholders the current map in scale 1:100,000, the web published layers of the regional geodatabase (CT50), identifying the few resistant elements on the territory (boundaries and significant physical features), keeping in mind the tolerance of the maps.

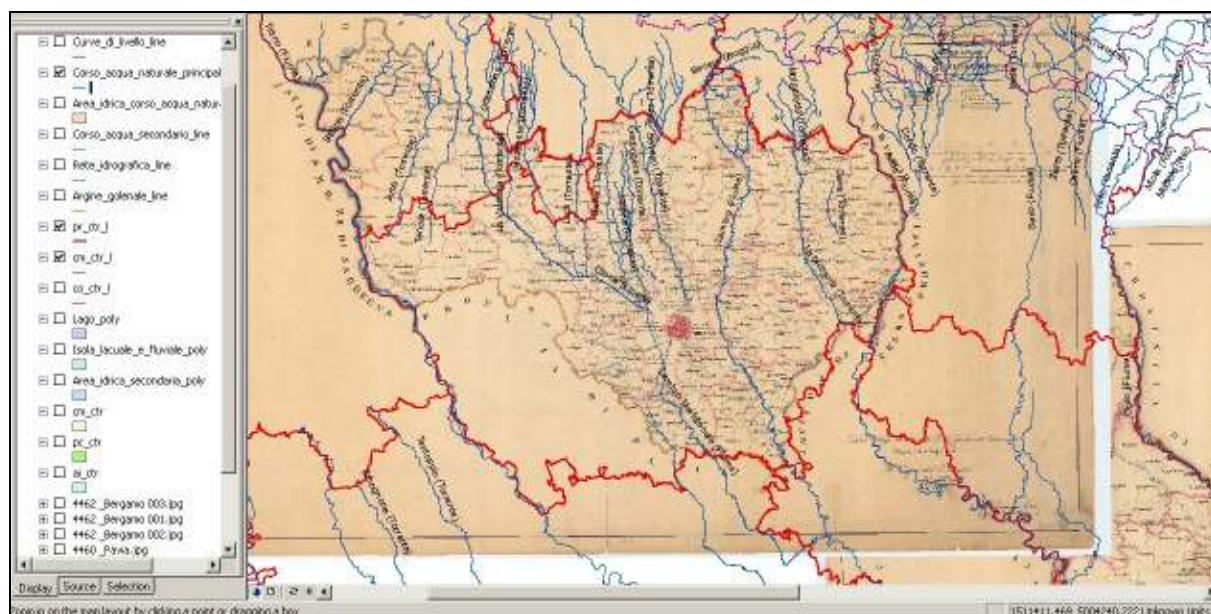


Figure 3. The georeferencing process and the vector features used as stakeholder to locate persisting control points.

The result obtained is interesting from both a qualitative and quantitative point of view, and it has opened the horizon to new possible investigations. On one side, a general excellent result in terms of quality and fruition of the georeferenced maps by researchers, architects, local administrations and citizens has been achieved; but, on the other side, in terms of precision, an important distortion of individual sheets has been registered, with high anisotropic effects, valuable for comparing the ancient georeferenced boundaries with respect to the actual ISTAT boundaries (the political boundaries of each Municipality).

It is very difficult to estimate and evaluate the analytical reliability, due to the non homogeneous distribution of the error in the georeferencing process, which would require further investigation: in the condition of locating some persisting features between the old and actual boundaries, and considering only the resistant profile, or portion of them, for some profiles the result is a perfect correspondence of the entire ancient municipality boundary with respect to the actual one. Instead, for others, even along these well fitted adjacent traits of boundary, there are evident errors along the other portions, thus the local border results shifted along partial traits of the whole closed polylines, or totally shifted without a 'role' with respect to the adjacent one (Fig. 4).

In order to evaluate the errors and their distribution (Table 1), we consider the tolerance as a term of comparison. The error range is not always included within a 'virtual' value of tolerance (t), assumed, for the ancient map, with respect to the actual tolerance value adopted for a 'similar' map in scale 1:100,000 (where $t \sim 50m$): the tolerance has to be considered as the 95% confidence range of correctly finding the point positions at the end of georeferencing. The meaning of tolerance depends - in modern cartography - on the technical specifications adopted in order to achieve the accuracy for a specific map scale generation made by all the methodological and operative phases of the production process (from the network to the plotting). Obviously those aren't the specifications of the ancient maps, consequently we are forced to apply this concept to them (from the value of current tolerance of similar map scale to the corresponding historical ones). However, this assumption is expected to help indicate interesting aspects.

In addition to possible factors related to the scanning of the maps, to the deformation over time, and to the individuation of the persisting ground features, it is plausible to attribute these errors to the technique of the chorographic maps' generation.

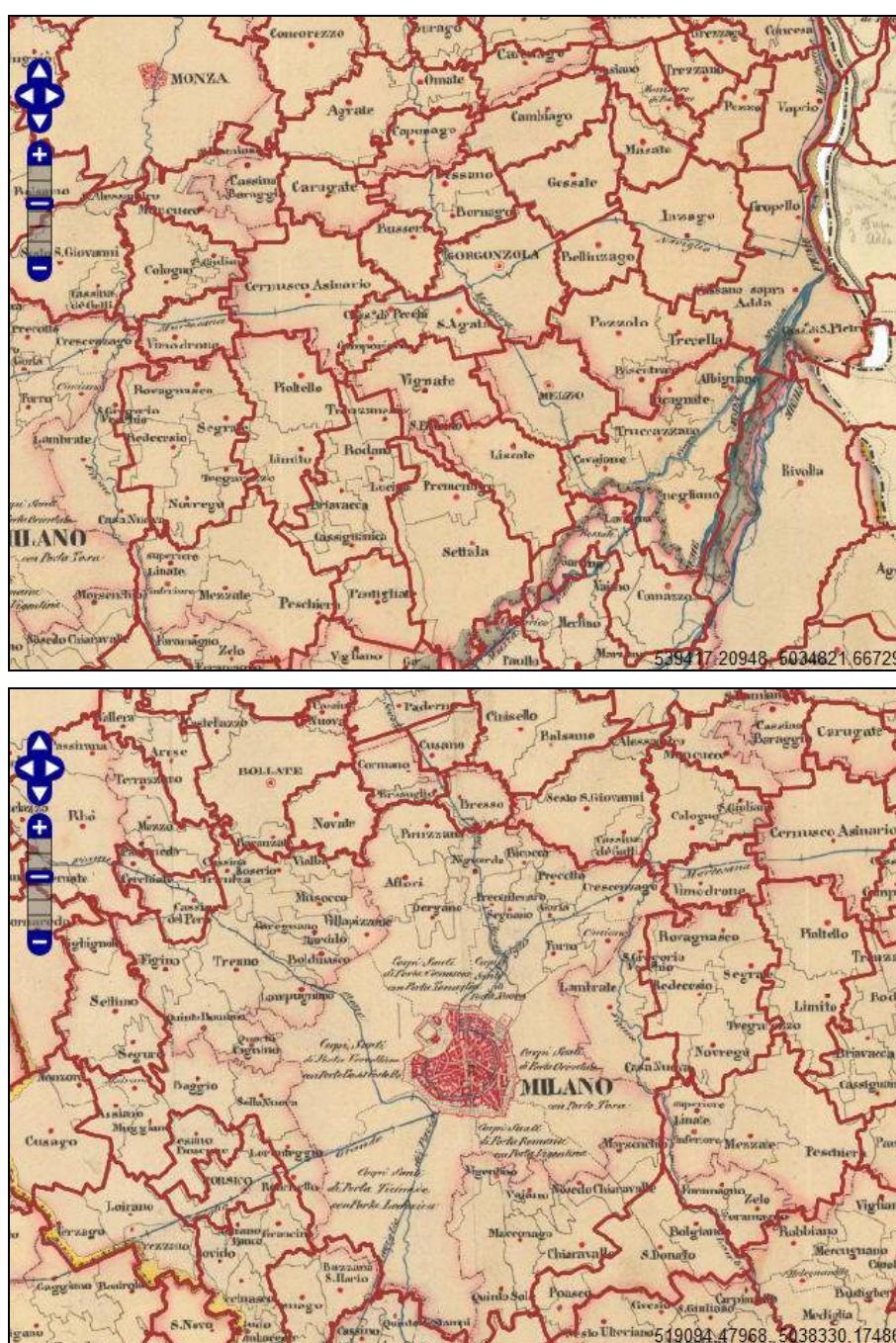


Figure 4. The result of the georeferenced chorographic map (Provincia di Milano) with respect to the current boundaries (in red). Different correspondences between historical and current municipality boundaries allow to read the progressive transformation and aggregation of the political assets. Anisotropic effects can be read along the corresponding persisting traits.

They are generated by the overlapping of the single municipal boundaries, deduced directly from the Lombardo Veneto (LV) cadastral maps in scale 1:2000 (coeval to the Chorographic), but probably not through a rigorous generalization process. In fact, on one hand, we have to consider the good result obtained and the reliability of the georeferencing process carried out on the LV large scale cadastral sampled areas (in Fig. 5, the case of Gorgonzola Municipality, 1:2000), which is approximately contained in the corresponding tolerance value (~1.5-2m) derived from the high accuracy of the maps themselves, achieved thanks to the geodetic approach, used for the

generation process, and to the high precision of the local detailed geometry: consequently, the reduction of the boundary to a small scale would be more reliable, with respect the one obtained on them.

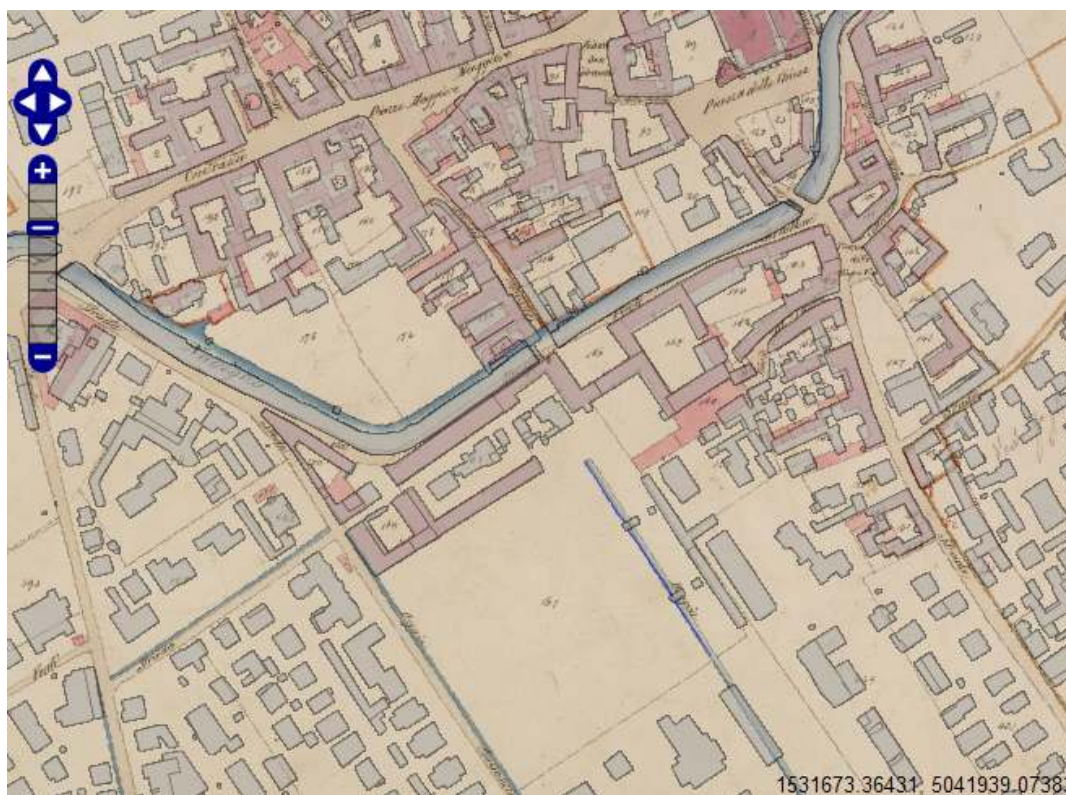


Figure 5. One of the cadastral map sheets georeferenced to the current technical maps, belonging to the Lombardo Veneto series (1:2000) of the Municipality of Gorgonzola, and the results obtained.



Figure 6. The overlap of the border extracted from the chorographic map and coeval border extract from the LV cadastral mosaic of the 16 georeferenced sheets of the municipality of Gorgonzola.

It is therefore evident that it is not possible to justify a systematic mechanism in the generation of errors, due to uneven results and error distribution within every single map along the municipal boundaries enclosed on the map itself: perhaps they are the consequence of deriving different synthesis maps made in different context of operators or other. A test on the geometric accuracy, is on course on one of the test areas (Gorgonzola), to derive the boundary obtained from the collage of the georeferenced cadastral local map sheets, and compare it with the provincial map municipalities boundary extracted by the chorographic map by overlapping the two ancient boundaries (Fig. 6).

Georeferencing this typology of maps has required a series of methodological considerations in order to assess preventively the real possibility to obtain compatible results with the scale of representation of the maps, and in order to identify a possible control method during the process.

The greater difficulty in georeferencing was related to the quality and the quantity of information represented, such to represent a real problem in the identification of persisting features. It was evident that it wouldn't have been possible to use the centre of the inhabited places, whose position was simply indicative, or the rivers and lakes, for which it is impossible to individuate with certainty correspondent ground control point, since the ancient river beds could have varied in position over the centuries and since the level of synthesis doesn't allow to identify resistant element due to the different representation. The only elements that were represented in a rather precise way, being this the scope of the map, were the provincial and municipal boundaries, even within the limits of accuracy due to the method of tracking their shapes. In fact, it is plausible to suppose that the chorographic maps, lacking in coordinates reference, were the result of a merging of individual municipal boundaries, derived by several large-scale cadastral maps, prepared for the only purpose of providing a support in tracing the individual of cadastral sheets, in scale 1:2000.

The need to adapt to this kind of maps a method already tested in other research, such as the georeferencing of historical cadastral maps, induced the inevitable choice to privilege the final aim (to obtain a continuous and navigable map, georeferenced on current boundaries, still keeping alive the function for which the map was designed and realized), in disadvantage of a lower geometrical accuracy of the final result. Nevertheless, a series of tests on georeferencing individual maps and their union, by using border points, have been made in order to evaluate the acceptability of the result, but also to identify any systematic error or rules to predict their punctual showing (Brumana et al, 2009).

The ground points - used as control points for the georeferencing process - have been carefully chosen after a comparison between the current and the 19th century maps, all belonging to the border line and homogeneously distributed, as much as possible, in each map sheet (Fig. 7).

The thematic vector layers of the Regional Technical Map, at scale 1:50,000 (CT50), were chosen as current cartography, and used as reference for the identification of homologous points, principally boundaries (Fig. 7). This data are referenced to both grid systems adopted in Italy, i.e. Gauss-Boaga (datum Roma40) and UTM (datum ETRF89).

The first test sheet georeferenced concerned the province of Milan; here an affine transformation implemented in ArcGIS[®] environment was applied. The ground points have been set in a systematic way, isotropically on the map, by progressively increasing the number of points and checking the value of the residual medium values.

A progressive increase, even though not constant and regular, of the value of the error, was observed when increasing the points on the map, independently of their distribution.

This operation, that apparently worsens the accuracy of the result, was however functional to the aim of the research. It was therefore wrong, from the point of view of the historical information contained in the document, to avoid the points that were manifestly different from the tolerance value of the map.

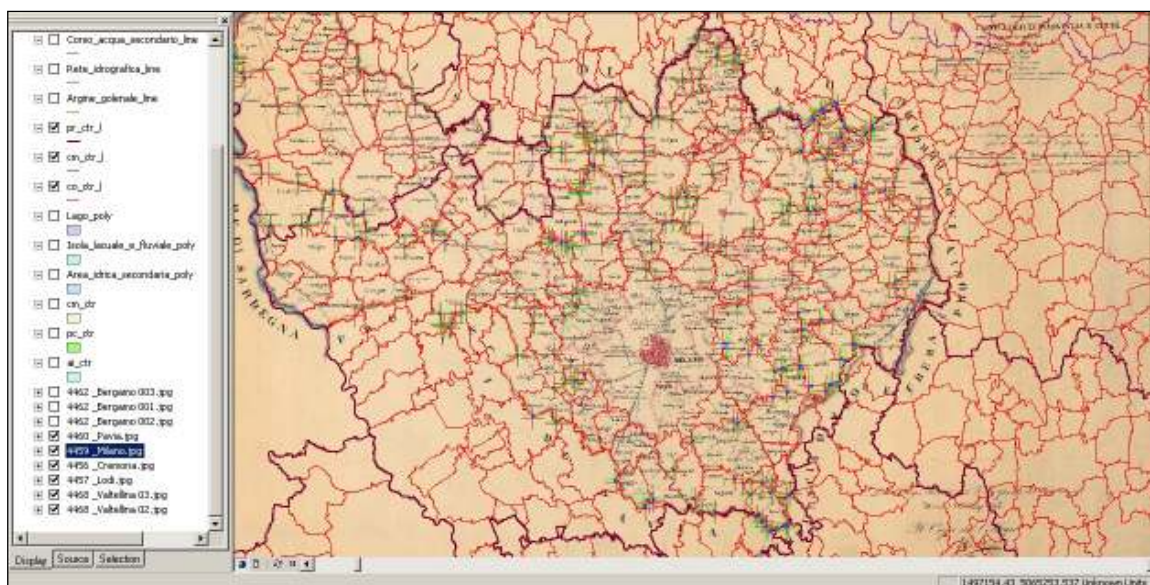


Figure 7. The distribution of the ground points used as control points for the georeferencing process and the actual .shp file remotely downloaded from the geoportal of Region Lombardy.

Sheet	# ground control points	Residuals		
		Total RMSE	Minimum error	Maximum error
Bergamo 1	73	218 m	49 m	410 m
Bergamo 2	120	506 m	80 m	1244 m
Valtellina 3	17	211 m	78 m	449 m
Valtellina 2	57	315 m	55 m	734 m
Milano	203	178 m	27 m	304 m
Cremona	151	300 m	34 m	622 m

Sheet	# ground control points	Residuals		
		Total RMSE		
Milano	6	22 m	2 m	34 m
Milano	9	35 m	14 m	56 m
Milano	30	169 m	57 m	255 m
Milano	35	196 m	48 m	367 m
Milano	52	307 m	33 m	546 m
Milano	203	178 m	27 m	297 m
Milano	232	210 m	41 m	440 m

Table 1. The errors obtained on the Ground Control Points for the chorographic georeferenced sheets.

Therefore, the need to find a compromise led to continuous improvements in the applied method, even though this meant to privilege the semantic and geographic content of the map, instead of the geometric one (Fig. 8).

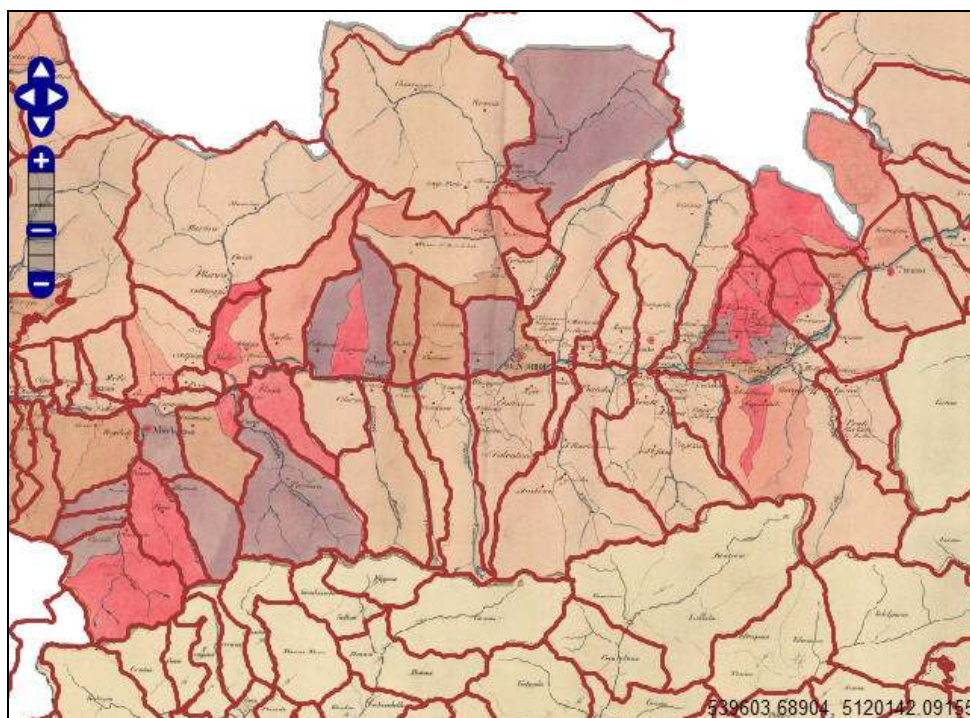


Figure 8. The Valtellina Chorographic map with the interesting municipalities distribution along the river Adda.

A similar careful methodological design was studied in order to georeference other two important historical cartographic layers of Lombardy (Fig. 9, Fig. 10): the “Carta del Territorio del Milanese e Mantovano” (1788-1796, in scale 1:86,400), and the “Carta del Regno Lombardo Veneto” (ITM 1933, in scale 1:86,400). They were essential to integrate the information represented in Provincial Chorographies with orography, roads, shape and precious ‘toponima’ of urban and rural centres, system of cultivation, etc.



Figure 9. The portal access to the georeferenced topographical map series.



Figure 10. The two georeferenced layers superimposed on each other with respect to the current map layers: a sheet of the “Carta del Territorio del Milanese e Mantovano” (1788-1796, in scale 1:86,400), and two sheets of the same area of the “Carta del Regno Lombardo Veneto” (ITM 1933, in scale 1:86,400).

The Geoportal: towards a geographical and territorial access to historical cadastral maps, from regional georeferenced maps

GIS technologies have evolved, towards an increasingly distributed model based on independently provided specialized, interoperable GIS Web Services. It is possible to dynamically assem-

ble applications from multiple GIS Web services for use in a variety of client applications. During the last years, Open Geospatial Consortium (OGC) has successfully executed efforts for GIS interoperability. The OGC Web Services (OWS) initiative has undergone multiple phases – including the Web Map Service (WMS), Web Feature Service (WFS), Web Coverage Service (WCS), and OGC Web Service Architecture (Lieberman, ed., 2003), which support application developers in integrating a variety of online geo-processing and location services.

As a result, end-users can take advantage from the Web-GIS that is WMS compliant to publish and access geospatial information from many sources and systems. By supporting the WMS Server, any WMS client is able to view information published by any WMS compliant server. WMS layers are added to maps published by the WMS compliant server and a map layer may be a combination of one or more WMS layers. This makes it possible to take advantage of the wealth of information publicly available through WMS service.

Access to geospatial data from the consumers point of view, is a part of a process of what goes from discovery to evaluation, to access and finally to exploitation. Discovery (find, locate) involves the use of services such as metadata catalogues to find data of particular interest over a specific geographic region. Evaluation involves detailed reports, sample data and visualisation to help the consumer determine whether the data is of interest. Access involves the order, packaging and delivery, offline or online, of the data (coordinate and attributes according to the form of the data) specified. Finally exploitation (use, employ) is what the consumer does with the data for their own purpose.

In order to assure access to historical maps the Geoportal has been developed using Geoserver, which is an open source OGC standard compliant. In this way we can assure interoperability through different systems.

The historical maps once georeferenced, are tiled and then exposed through Geoserver such as WMS service (Fig. 11, Fig. 12). In this way it is possible both to consult the map into the Geoportal and to access the map using a desktop GIS solution through the map services exposed by the geoserver.

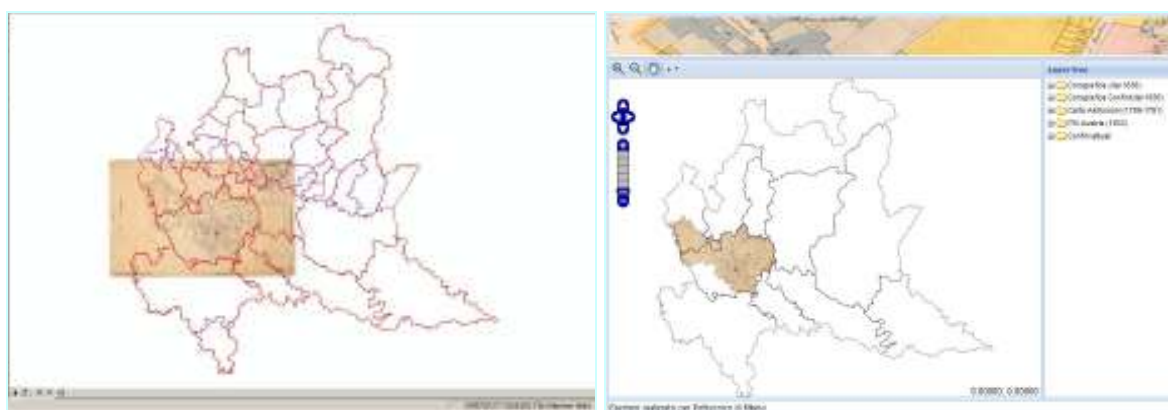


Figure 11. The single sheet data management within the geoportal and the same sheet without the margin map, allowing continuous navigation within the mosaic obtained from all the georeferenced chorographic sheets.

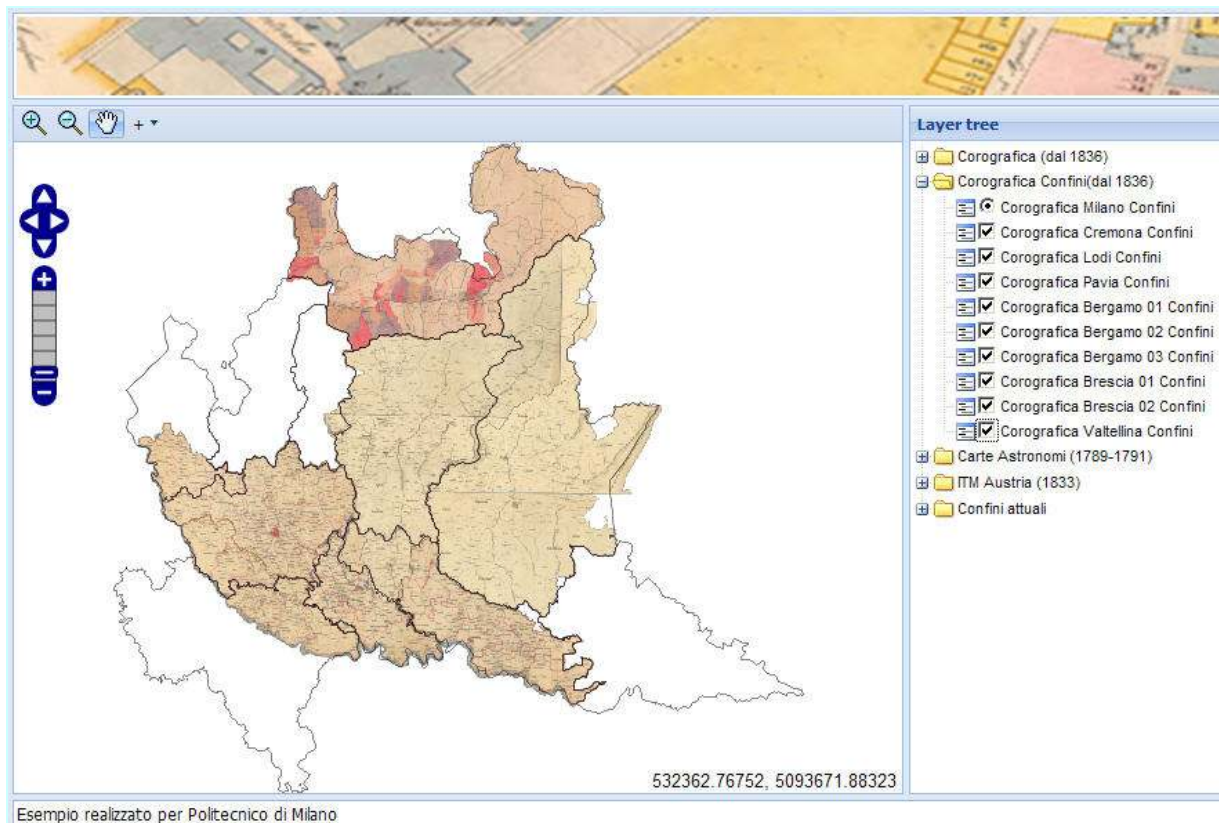
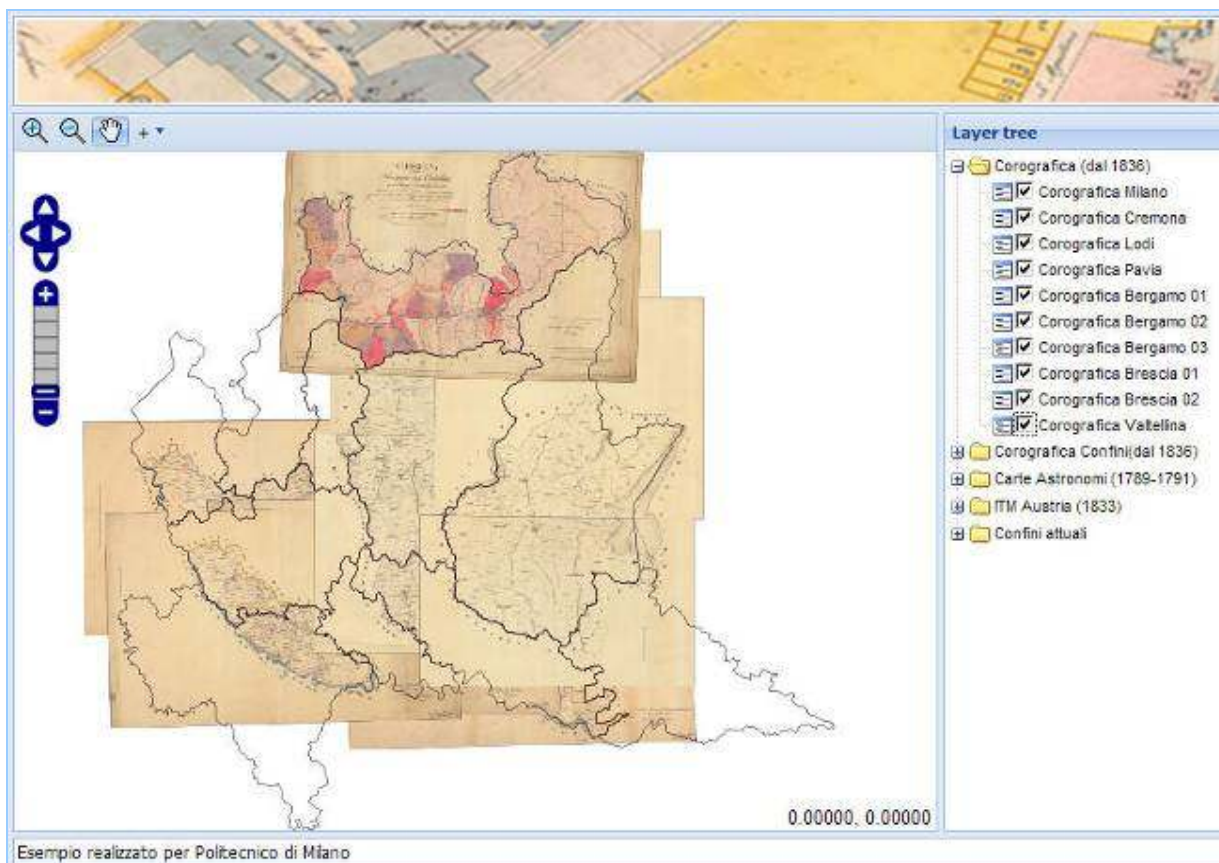


Figure 12. The map sheets data management within the geoportal and the mosaic obtained from all the georeferenced chorographic sheets.

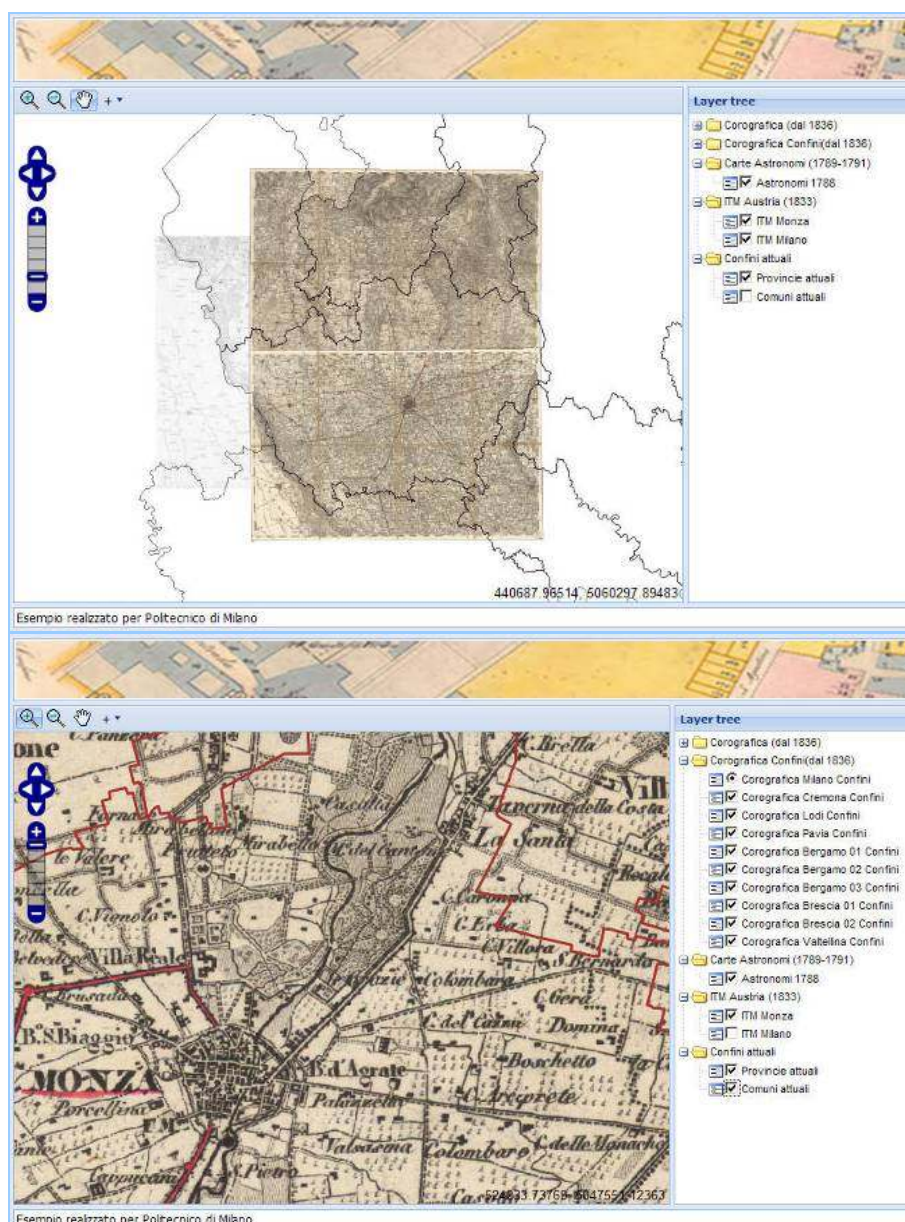


Figure 13. Detail of the geoportal navigation at different scales.


Landscape and water: an example of thematic trail, predisposed in the Portal starting from the maps at territorial scale

With the aim of valorising the Cartographic Heritage shared in the Portal and suggesting some possible use and design that can be made with this precious material (Fig. 14), the building of some cultural axes on the theme of "Water" has begun, in the Atl@nte, in parallel with the construction of a Geodatabase of historical maps.

The choice of this axis is related to a peculiar characteristic of this region: among the EU regions Lombardy is one of the most characterised by an early and long lasting construction of an articulated hydraulic infrastructure. Its presence has influenced the economy of the irrigated plains and determined new or faster commercial routes. The territories of Lombard municipalities are still characterised by both the presence of rivers and lakes, creeks and other natural elements of the

hydrographic network, and the presence of canals, ditches and fountains, referable to the artificial networks of irrigation and reclamation.

For centuries the water paths, the rights of their use in agriculture and the demarcation of borders have been the causes for an enormous production of maps, now preserved in various archives but often inaccessible and slightly known, except to the technicians. Therefore, the aim of this research is to show how the theme of the water can be used as a key to comprehend the dynamics of the transformation of the landscape and can become an advantaged point of observation of the countries, with their peculiarities.



Percorsi tematici

Mostrare un paesaggio che cambia in modo insospettabile e ricostruire alcuni volti sconosciuti del territorio, la continuità dei fiumi nel passato, delle acque, dei confini territoriali così come si sono trasformati fino ad arrivare a quelli attuali, che sono traccia tangibile di una storia di convivenza, di aggregazioni di comunità, e delle loro economie. La diversificazione delle aree scelte come campione mette a tema paesaggi diversi, con diverse problematiche idrologiche, e quindi con documentazioni archivistiche diverse per collocazione, tipologia, problematiche di elaborazione e presentazione

Percorsi Tematici
I percorsi tematici sono volutamente fondati sull'uso sistematico della georeferenziazione applicata selettivamente ad un insieme circoscritto di mappe catastali di località ritenute esemplificative. La georeferenziazione consente di navigare sui fogli orientati e assemblati delle mappe catastali senza soluzione di continuità e offre l'opportunità di cogliere l'immagine dei territori rilevati e delineati dai geometri censuari in un unico colpo d'occhio, che evidenzia la

ACQUE & TERRITORI	Martesana ■ 1	Lambro ■ 2	Navigli ■ 3	Adda Lario ■ 4	Reti ■ 5
● A Agricolture	Gorgonzola, Area EXPO	Parco Villa Reale di Monza	Naviglio Grande (Mi prov)		
● S Insediamenti storici	Gorgonzola		Milano e aree campione S. Marco	Trezzo d'Adda	Pieve di Cantù
● V Ville Verde Parchi Giardini	Ville lungo la Martesana	Villa Reale di Monza	Naviglio Grande (Mi prov)		
● C Confini alvei fluviali		Confini demanio idrico e paleosolvi		Adda (Chiavenna, Ticino)	
● T Archee Tracce	Tracce			Area Comerio	
● M Paesaggio Montano Pademontano Collinare		Laghi di "Pusiano Oggierno Annone"		Adda (Chiavenna)	

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L'Atl@nte dei Catasti Storici e delle Carte Topografiche della Lombardia

Immagini
Navigazione dal lago di Como, attraverso l'Adda e il naviglio della Martesana, lungo un percorso impervio e ambizioso, costruito ad arte per oltrepassare anche corsi d'acqua quali il Lambro e il Seveso, e confluire nella cerchia dei Navigli urbani nei pressi del Tombone di San Marco a Milano.

Giovanni Paolo Bionati, ASM, Naviglio di Martesana, planis. tra Vercelli, 1827 (ASM)

Giovanni Paolo Bionati, il tratto dell'Adda tra Paderno e Porto, 1817 (ASM)




Figure 14. Access page of thematic axis (above); Navigable non-georeferenced map of river Adda (below).

Among the investigated thematic axes during the first year of activity (which will continue in the second year), the most developed has been the path of Martesana canal, an ancient way of connection between the Milano canals network and Adda river, intersecting classical themes of analysing the area, such as villas, parks and gardens, agricultural landscape and historical cultivations (Fig. 14).

Starting from the inner circle of Milano city canals (different cartographic layers georeferenced: “Catasto Teresiano - Porte”, 1715, in scale 1:2,000, 6 sheets; “Pianta degli Astronomi di Milano” in scale 1:1,000), single original sheet; “Pianta degli Astronomi di Milano”, 1806 – in scale 1:1,000, 39 sheets (Fig. 15); “Catasto Lombardo Veneto e Cessato Catasto”, “Porta Nuova” area (Fig. 15), in scale 1:2,000, the reconstruction of the Martesana image at the time of “Catasto Lombardo Veneto” (1835 - 1865) has been completed by georeferencing all the maps that included this Canal (originally designed by Leonardo da Vinci).

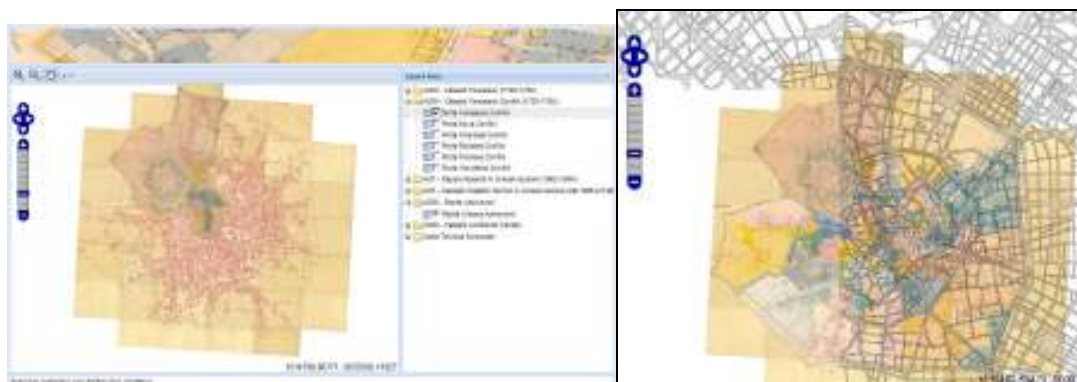


Figure 15. Left: Overlaying of georeferenced ‘Catasto Teresiano’ (city of Milan - 6 sheets) and of Astronomi di Brera map (39 sheets); Right: Maps overlaid with CTC in scale 1:1000.

Through the identification of still persisting homologous points (building corners, land parcels, irrigation canals, etc.), and using border points of different sheets, it was possible to setup a continuous and navigable map of the whole canal, between Adda river and the circle of Milan Canals, next to the “Tombone of San Marco”. The aim of this research is to allow a virtual tour useful both for an historical and cultural analysis of the area, and for the protection and planning of the landscape.



Figure 16. Access page of thematic axis Martesana canal, detail.

Homepage Progetto Acque e territori Ricerca geografica Catalogo Catasti Carrello acquisti Precedente

L'Atl@nte dei Catasti Storici e delle Carte Topografiche della Lombardia

Comune di Gorgonzola. Mappa del catasto austro-italiano. 1865-1887.

La mappa del catasto austro-italiano (Lombardo Veneto) rilevata nel 1865 raffigura il territorio del comune su 17 fogli associati al foglio modello che riporta l'intestazione dell'elaborato.

SCALA: 1/xxxx NUMERO FOGLI: xxx FORMATO: JPG 300 dpi CODICE ELENCO: xxxxxx.jpg

Etichetta 1

La mappa del catasto austro-italiano rilevata nel 1865 raffigura il territorio del comune su 17 fogli associati al foglio modello che riporta l'intestazione dell'elaborato. Il territorio del comune è delimitato nei propri confini con i comuni censuari di Bornago, Gessate, Bellinzago, Pozzolo, Melzo, Sant'Agata e Bussero. Il nucleo insediativo del borgo raffigurato sul foglio 9 è lambito dal naviglio di Martesana, che attraversa in direzione est-ovest l'intero territorio del comune. Il torrente Molgora ne delimita parte del confine orientale. Il modello grafico per l'unione dei fogli segnala la presenza delle "cassine" e degli insediamenti minori presenti nell'intero territorio del comune. La mappa raffigura in dettaglio la rete dei canali di irrigazione e delle strade regie, comunali e consorziali presenti sul territorio comunale indicandone la toponomastica. Le rettifiche ai confini delle particelle inserite nella mappa nel periodo successiva all'attivazione del catasto seguita nel 1888 sono riportate sul foglio 18.

ACCEDI AREA GEOREFERENZIATA

La navigazione completa del portale sarà disponibile entro il 31 gennaio 2010

ISTAT Agenzia di Territorio IRI Regione Lombardia fondazione cariplo

Figure 17. Access page of georeferenced sheets ('Catasto Teresiano', 'Lombardo Veneto', 'Cessato catasto') of Gorgonzola commune (province of Milan) sited along Martesana canal.

Conclusions

The decision of publishing historical metrics maps in the Atl@nte was taken with the aim of providing a synthetic and continuous vision of the territory, at different historical levels, in order to allow different users to make immediate comparisons between the shapes and the characteristics of the landscape of yesterday and today.

In order to achieve this goal, a phase of georeferencing old maps on current ones was necessary, at different scales of representation, allowing a virtual navigation throughout the region. Georeferencing historical maps did not naturally mean to alter the qualitative and quantitative contents of the maps, in order to fit them on current cartography, but it meant to make a series of scientifically rigorous operations of processing of the maps, by using algorithms, control parameters and methodological standards, shared by the international scientific community. Therefore, this technique allows for correlating an historical map, within its geographic reference system, by "overlying" it onto the current ones.

It should further be noted that georeferencing the individual maps does not, in any way, invalidate the future possibility of extracting the original map at any time, regardless of the different map layers which were overlaid.

The choice of using the Provincial Chorographic Maps as a means of geographic access to the single municipal cadastral maps, was also dictated by a functional need: to allow a future connection between the databases of current ISTAT boundaries and the 19th century ones (within this research project, ASMi is making this complex exercise), in order to allow an easy access to all the information associated to every municipality, whose borders have now changed, geographically and administratively (municipalities combinations, subdivisions, etc.).

The subsequent extraction of the shape file of the actual borders and those of mid19th century, will also allow realising a geographical access tool to individual cadastral maps, in scale 1:2,000.

It is therefore evident that the local offset of the shapes of the georeferenced boundaries are almost irrelevant for their readability over the centuries, while the analysis of the problem and the origin of the error obtained is important and still open, in order to achieve a gradual improvement of techniques and tools for georeferencing the historical maps.

References

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