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The Grosseto plain (Tuscany, Italy) in historical maps (18th - 20th centuries): Georeferencing of historic landscape

Keywords: Coastal plain of Grosseto (Italy); drainage; historical maps; 18th-20th centuries; georeferencing.

Summary: The coastal plain of Grosseto (Tuscany, Italy) was largely occupied by marshes and uncultivated land up to the middle of the eighteenth century. The presence of the large landed estates and malaria meant that it was almost unpopulated, with the exception of the small city of Grosseto, a few military towers along the coast and several farms devoted to cereal-growing and sheep-farming.

In the 1760s the drainage operations were begun by the government of the Grand Duchy of Tuscany, which also approved other operations of a territorial (above all roads) and economic nature, up to the unification of Italy (1859-1861). State commitment then waned considerably up to the time of the Fascist government (1922-1943) which energetically resumed works for the transformation of the territory. Finally, through the complete reclamation carried out under the Fascist regime, combined with the agrarian reform of 1950, the Grosseto plain acquired the distinctive features that now characterise it, with a dense fabric of farms laid out along the regular network of roads and canals, and the tourist resorts dotted all along the coast from Castiglione della Pescaia to the Obrone river.

The georeferencing of a pondered selection of the administrative cartography of State production, of almost geometric and strictly geometric quality, which was built up starting from around the middle of the 18th century (authors: Ximenes 1758-1759, Manetti 1828-1849, Giorgini 1863 and the Istituto Geografico Militare 1883, 1927-1929, 1939-1943 and 1953), enables us to identify, date and index the most significant historic landscape categories of the Grosseto plain, both inland and costal: those prior to the mid 18th century and those created during this phase as a result of the processes of drainage, agricultural colonisation and territorial transformation. These include: human settlements (agricultural, residential, productive – industrial and commercial – and military), roads, bridges, canals and hydraulic artefacts (pump houses, water pumps, dams for the collection of river water), forestry plantations (pinewoods, rows of trees and copses acting as windbreaks) and those of an agricultural nature, always with the related toponymics.

A brief historical overview

From Late Antiquity until the mid-18th century, the Grosseto coastal plain was occupied largely by marshland (used for fishing and salt production from the mid-16th century on), woods, and uncultivated land (used for the most part for free-range grazing and breeding connected, in large part, to transhumance from the Apennine mountains). The presence of state franchises, large estates (*latifundia*) owned by families and city agencies and malaria had almost completely depopulated the area with the exception of the small city of Grosseto and the castle and port of Castiglione della Pescaia (centers founded in the Middle Ages), a few coastal military watch

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towers, and the main site of several farms devoted to large-scale grain production and grazing. In the 1760s and continuing until the unification of Italy (1859-1860), the waters were drained by the government of the Grand Duchy of Tuscany, which approved other territorial and economic innovations: administration reform eliminating several feudal holdings; the devolution of governing powers to communities and to the new province of Grosseto; the construction of railroads and public buildings; economic liberalization; distribution of lands to wealthy or fairly wealthy farm owners to encourage modernization of the agricultural system.

The centralizing efforts of the new Kingdom of Italy slowed almost to a standstill between the 19th and 20th centuries. The hydrographic conditions of the plain then began to worsen, even though at the beginning of the 20th century, new quinine based treatment had eradicated or at least rendered malaria less fatal and effectively terminated the long historical period of summer migration of the population of Grosseto and the plain to the hill and mountain areas ("estatatura") As at the time of the House of Lorena, the fascist government (1922-1923) reactivated in grand style the public works that transformed the territory. With the comprehensive drainage of the waters (1922-1943) and the agrarian reform of 1950, the Grosseto plain took on the characteristics that are well known: the drainage of the swamps, of which there remain today a few unique remains protected as natural habitats near Castiglione della Pescaia (Diaccia Botrona) and around the delta of the Ombrone River (Trappola and Alberese dunes); the development of Grosseto and minor villages along the principal roads; the construction of a dense network of small and medium-sized farms located along the regular layout of roads and canals; the development of tourist centres (Marina di Grosseto and Principina a Mare) on the coast between Castiglione della Pescaia, the Ombrone River, Alberese, and the mountains of the Uccellina, site of the Regional Park of the Maremma since 1975.

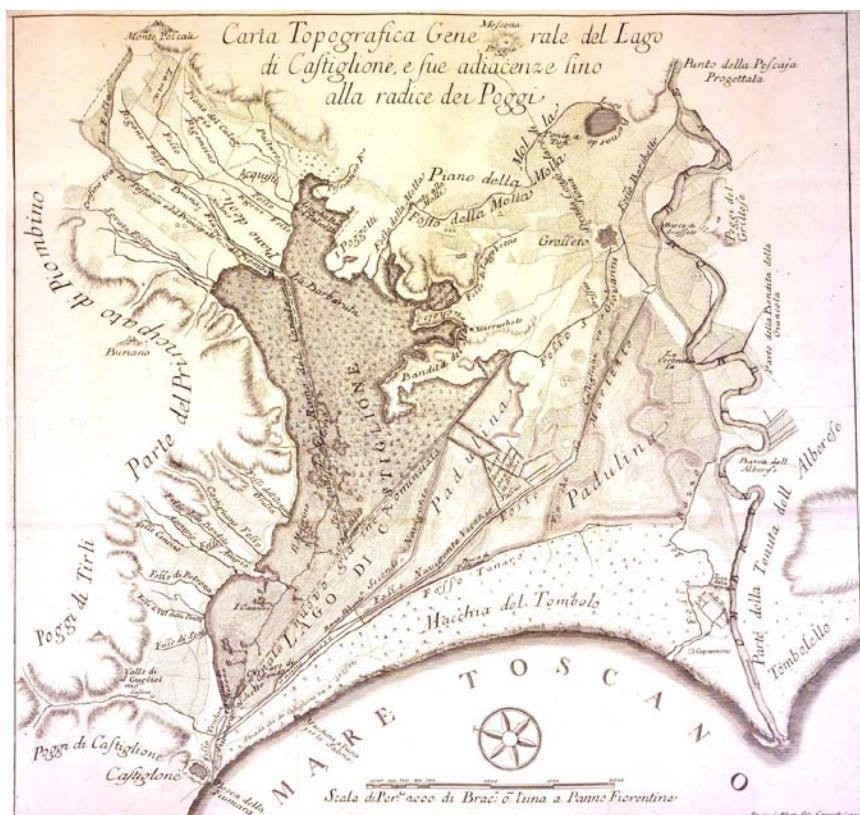
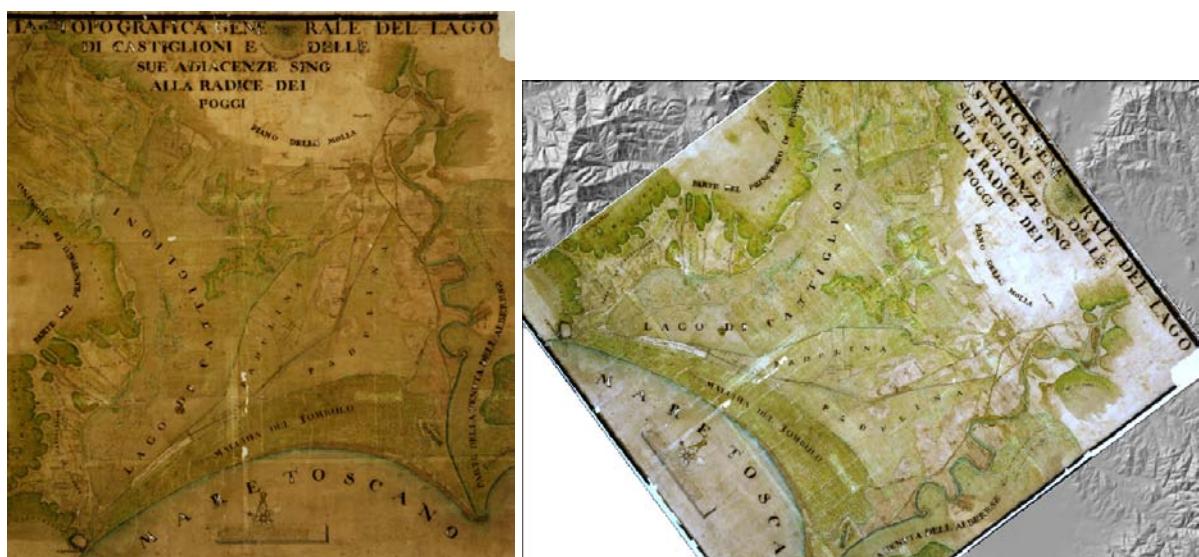


Figure 1. The Grosseto coastal plain in 1758-1759 (Archivio di Stato di Firenze, *Manoscritti*, 785, 24).

Method and Sources

The georeferencing of a selection of state-produced administrative maps - of almost geometric quality - made from approximately the mid-18th century on, allow us to date and catalogue the most important historical landscape categories of the Grosseto plain.

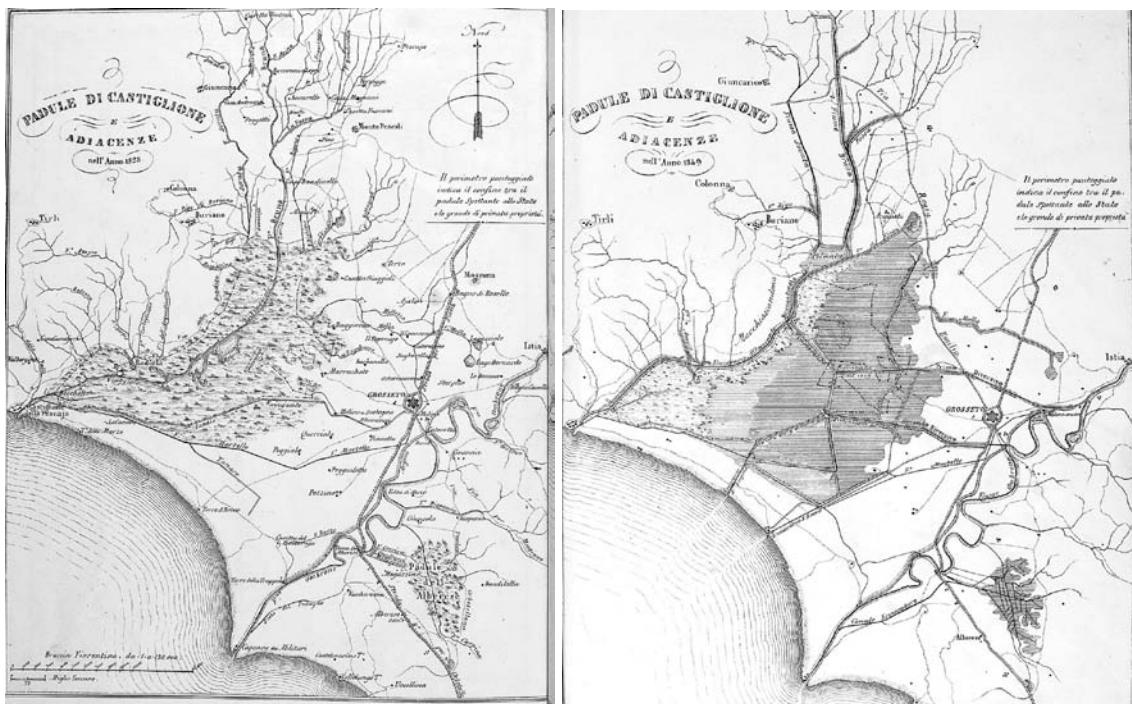
The first map under consideration is Leonardo Ximenes' manuscript of 1758-1759 entitled *Carta topografica generale del Lago di Castiglioni e sue adiacenze sino alla radice dei Poggi* (Archivio di Stato di Firenze/ASF, *Miscellanea di Piane*, 56). This is the first result of a precise topographical survey of the Grosseto plain aimed at producing an organic plan of the hydraulic system.



Figures 2-3. Leonardo Ximenes's map, 1758-1759.

This is followed by printed maps by Alessandro Manetti in 1828 and 1849 (Manetti 1849: Tables IV, V), entitled *Padule di Castiglione e adiacenze nell'anno 1828* and *Padule di Castiglione e adiacenze nell'anno 1849*; then Gaetano Giorgini's map of 1863 (Giorgini 1863), entitled *Padule di Castiglioni della Pescaja 1863*. And, finally, some versions of the *Carta d'Italia* of the Military Geographical Institute (Istituto Geografico Militare/IGM) from 1883, 1927-1929, 1939-1943 and 1953.

The landscape categories that emerge from the maps are the results of swamp drainage, agrarian resettlement, and the transformation of the territory by central and local political authority, and economic and social forces; that is, human interventions (agricultural, residential, productive, industrial, commercial, and military), infrastructure (roads, bridge, railroads), canals and waterworks (drainage pumps, dikes), in addition to the most important forest plantations (pine groves, rows of trees, and windbreaker woods) and agricultural plantations, all with corresponding toponymy.



Figures 4-5. Alessandro Manetti's maps, 1828 and 1849.

The choice of maps was based on scale, reliability, quality, and thoroughness of information and dating, giving precedence to those maps which refer to significant phases in the process of transformation of the territory over a long period. We used a retrospective method, beginning with more recent maps and moving to more ancient ones in order to make it easier to recognize corresponding points established in time to georeference. It was possible to have access to the maps in the Tuscan land registry between 1822 and 1824 and already georeferenced during a previous research project (De Silva 2010; Azzari, De Siva and Pizzoli 2002). These maps — thanks to their scale (1:5000 for rural areas and 1:1250 for urban areas), geometric precision and rich detail — provided an excellent foundation, together with current maps, for the recognition of corresponding points used for georeferencing of other cartographic documents. The *Sistema Nazionale Italiano, fuso Ovest* (Gauss-Boaga projection, Roma Monte Mario 1940), consistent with the official cartography of the Region of Tuscany, was chosen as the reference system. The resulting vectorization (acquisition) and analysis of some thematic information by GIS has made it possible to follow the transformation of the territory in time and to construct maps that synthesize data synchronically and diachronically.

Cartography and territorialization processes. The plain in 1758-1759 on the eve of the reforms and interventions of Grand Duke Pietro Leopoldo di Lorena (1765-1790)

The *Carta topografica generale del Lago di Castiglioni [...] of 1758-1759* is the result of precise measurement and observation by a group of engineers coordinated by Leonardo Ximenes, mathematician of the Grand Duchy, and his assistant Engineer Agostino Fortini, to work up a plan of overall reclamation and socio-economic development of the extensive, malarial swamp of Castiglione della Pescaia, until then one of the main centers of fish production in Tuscany (Barsanti, Bonelli Conenna and Rombai 2001).

The map has a scale of approximately 1:64.000 and constitutes, in fact, one of the first thorough

topographies of a Tuscan sub-region. The map gives a detailed rendering of the entire Grosseto plain and Castiglione della Pescaia, highlighting well the contrast between lake and marsh areas (with the landscape typically used for grazing and large-scale farming, given the widespread pasture land and areas planted extensively with semi-native gymnosperms), the coastal sand dunes (slightly higher, with the pine groves) and the surrounding hills (covered with Mediterranean maquis). Particular attention was given to thoroughfares and the sparse human settlements, for the most part temporary. Apart from the ancient walled centers of Castiglione and Grosseto, only a few huts and military coastal control structures appear, as well as the Grand Duchy salt-works, i.e., the medieval salt beds of Trappola and those under construction at Pratacci delle Marze near Castiglione.

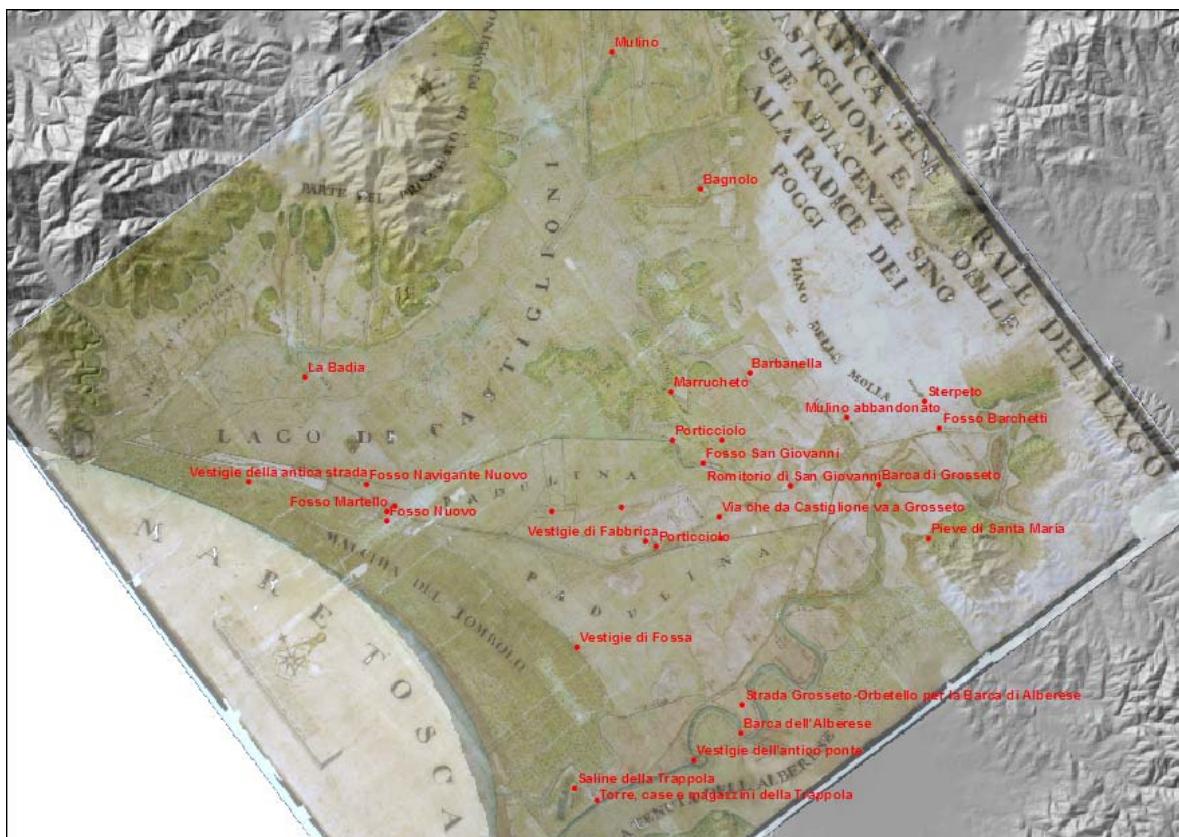


Figure 6. Georeferencing of Leonardo Ximenes's map.

Among the hydraulic works, several important, historic structures are evident: *Fosso Martello* (or *Navigante Vecchio*), *Fosso Barchetti*, *Fosso Nuovo*, *Navigante Nuovo*, *Fosso di San Giovanni*, *Porticciolo di San Giovanni*, *Argine d'Ombrone* on the right bank, *Barca di Alberese* and *Barca di Grosseto* on the Ombrone River.

The main routes of communication were: *Via delle Paduline* from Castiglione to Grosseto, Road that went from Castiglione to Grosseto passing by the *Porticciolo* (*small port*) *del Querciolo*, Road from Porticciolo to Grosseto and Road from Grosseto to Orbetello.

Among the few permanent agricultural settlements, the map indicates: the ancient Grancia di Santa Maria, property of the large Sienese hospital of Santa Maria della Scala, Marrucheto, Barbanella, Bagnolo (Poggetti di Montepescali) and Sterpeto. Other settlements are: religious sites (Pieve di Santa Maria della Grancia and Romitorio di San Giovanni), industrial sites (the Trappola salt beds, Mulino degli Acquisti on the Bruna River, the fishing centre on the Lake of

Castiglione, i.e. La Badia or Badiola Vecchia), commercial sites (Osteria di Sterpeto on the Via Senese) and military sites (the Trappola Tower with the nearby and more ancient Tower of the Salt Beds which at the time had already been decommissioned and refitted as a salt warehouse). It is worth noting that Ximenes' map documents some of the archaeological sites dating back to the ancient and medieval periods: the "Place where the ancient salt beds of Querciolo seem to have been" active until the 14th century and the opening of those closer to the sea at Trappola, the "Vestige dell'antica strada Aurelia" in the Tombolo (Sand dunes), the "Vestige dell'Antico ponte del Diavolo" (of the Devil) on the Ombrone River, the "Vestige di fossa" in the marshland, the "Vestige di fabbrica" at the small port of Querciolo on the Fosso Martello or Navigante Vecchio and the "Mulino abbandonato" on the Fosso Barchetti.

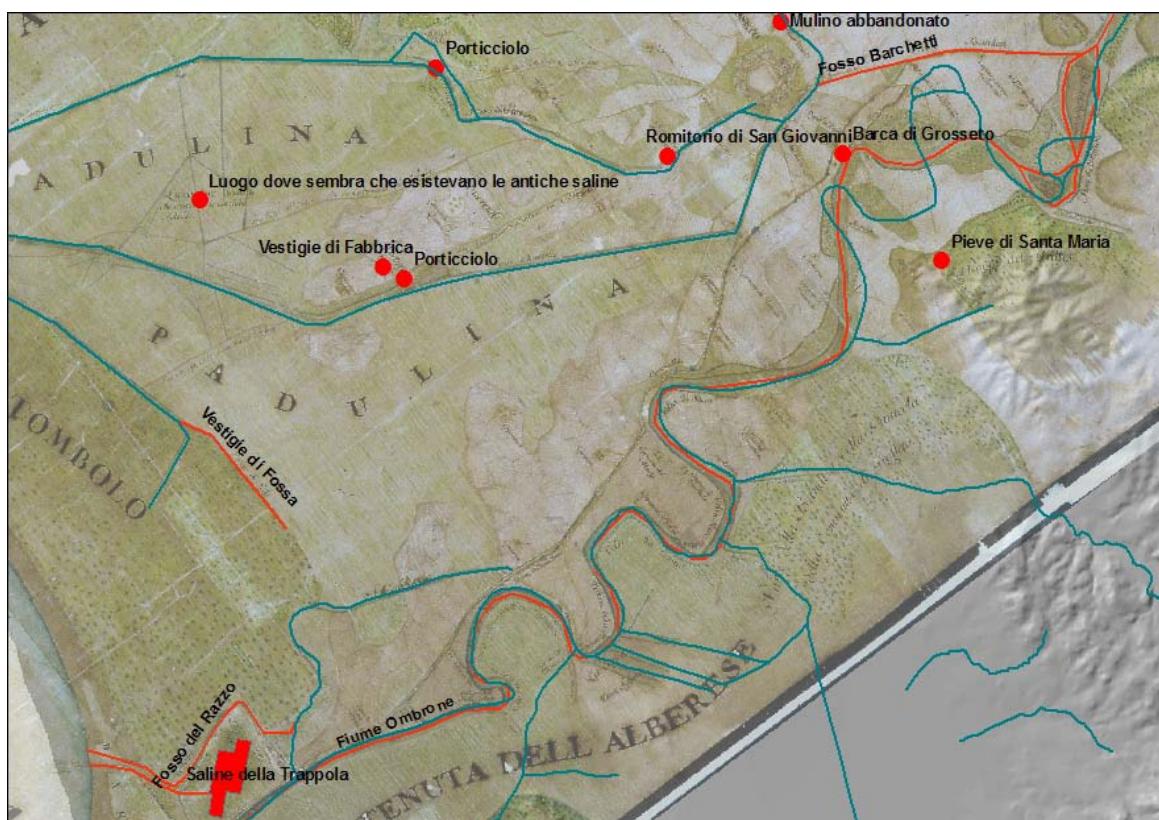


Figure 7. Georeferencing of Leonardo Ximenes's map.

Cartography and territorialization processes. The plain in 1828 and 1849 at the beginning and during the great "comprehensive drainage" carried out by the Grand Duke Leopold II of Lorena (1824-1859)

The public works carried out by the State from 1760 to 1790 were impressive:

Hydraulic drainage of the marsh area (by excavating canals supplied with flood gates); improvements in the urban and sanitary conditions of Grosseto and Castiglione della Pescaia (with interventions on hospitals, aqueducts, and sewers); modernization of agriculture and other economic activities; distribution of public lands and church properties to several farmers from the Apennine region; liberalization of artisanal, industrial, and commercial activities.

Such interventions did not, however, achieve the desired results, due to changes, political and military events of the revolutionary and Napoleonic period, and the economic and demographic

crises of the Restoration period. We must wait for the great "comprehensive drainage" program approved by the Grand Duke Leopold II of Lorraine in 1828 for the arrival of important changes to the Grosseto plain.

The two maps *Padule di Castiglione e adiacenze nell'anno 1828* and *Padule di Castiglione e adiacenze nell'anno 1849* have a scale of 1:120.000 and are part of the map collection published in hundreds of copies from 1828 to the early 1860s by the Imperial and Royal Laboratory of Cartography. This agency was founded by Leopold II with the engineers of Waterworks and Roads to produce maps in various scales for projects and government public works using and updating the maps of the geometric cadastre of land parcels from the years 1817 to 1826.

The first map (1828) shows the plain before the beginning of the drainage. A dotted line indicates the boundary between the state-owned marshland and the surrounding privately owned marshland. The representation also shows the Alberese marsh and the two small lakes to the northeast of Grosseto (Lagacciolo and Lago Bernardo).

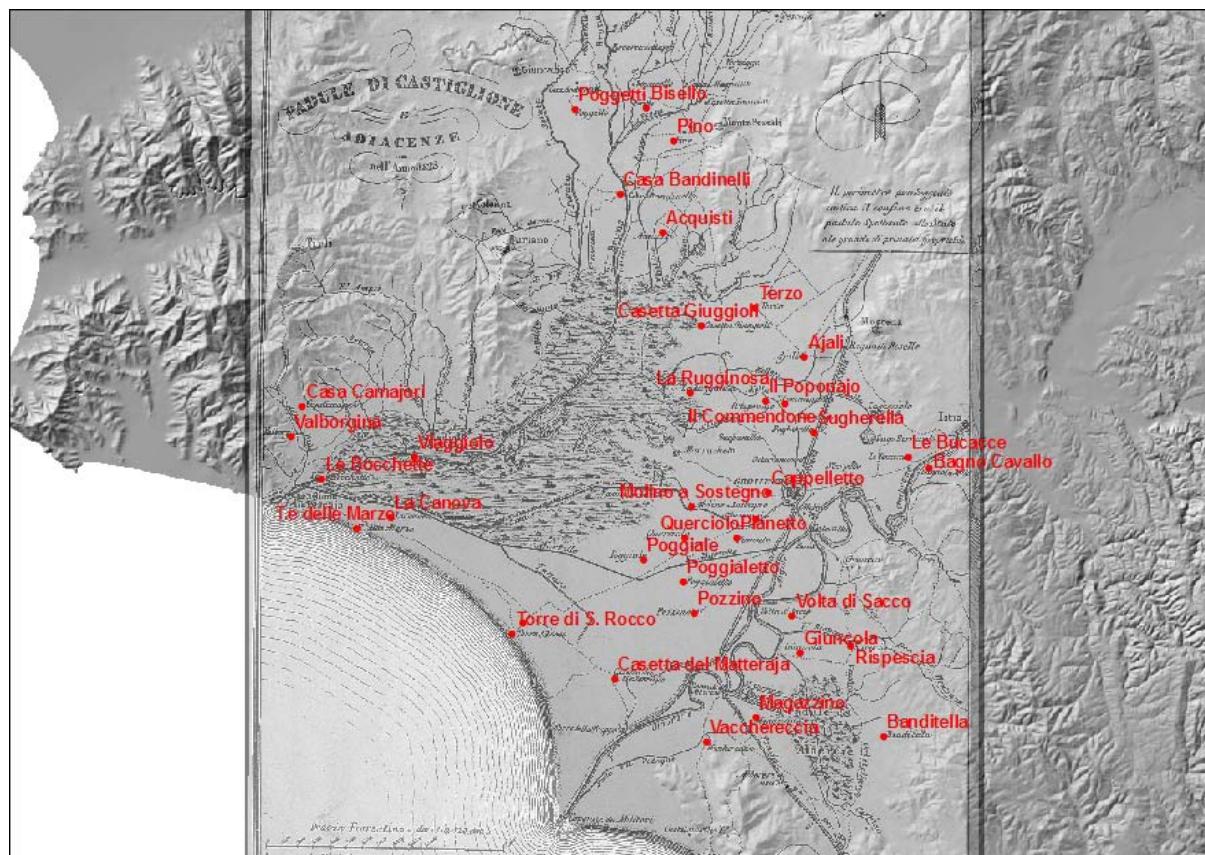


Figure 8. Georeferencing of Alessandro Manetti's map, 1828.

Several hydraulic works built by Leonardo Ximenes appear on the plain, such as: le Bocchette (Construction of the flood gates - Fabbrica della cateratte - Casa Ximenes, 1759-1769), the Canale Viaggiolo on the Bruna River at Castiglione, 1769-1782 and the Canale Navigante from Castiglione almost to Grosseto with the supporting Mill built between 1759 and 1769.

Visible also are:

The new *Strada del Tombolo* between San Rocco and Castiglione-Grosseto; several rural settlements that were district offices for large estates created with the 1765 privatization of lands belonging to Opera del Duomo di Grosseto: Casa Camaiori, Valborgina, La Canova, Poggialeto,

Poggialetto, Pozzino, Cappelletto, Pianetto, Casa del Matteraia, Sugherella, Il Poponaio, Il Commendone, Casetta La Rugginosa, Casetta Giuggioli, Barbanella, Terzo, Acquisti, Casa Bandinelli, Ajali, Le Bucacce, Bagno Cavallo, Querciolo, Pino, Bisello, Poggetti, Volta di Sacco, Giuncola, Rispescia, Banditella, Magazzino, Vacchereccia and Alberese with its palace-farm and the nearby Inn on the old via Aurelia; the late-18th century (1780s) coastal fortifications: Le Marze, San Rocco and the blockhouse of Bocca d'Ombrone of the same period with the huts for the soldiers. The Le Marze building had been built earlier for use in the marshes of the same name in the 1760s and thirty years later transformed into a blockhouse after salt production was suspended.

The 1849 map shows:

The new Via Emilia/Aurelia built *ex novo* compared with the ancient inland Giuncarico-Grosseto stretch of road and modernized in the later stretch called the Strada Regia Orbetellana; the marsh which, twenty years after the beginning of the drainage project designed by the hydraulic engineer, Vittorio Fossombroni, and overseen by the architect, Alessandro Manetti, was in large part filled in thanks to the construction of "barriers" fed by the floodwaters of the two diversion channels of the Ombrone River (extended within the wetlands in 1846). The first of these channels was excavated downstream of Istia and the second downstream of Grosseto and were equipped with specially-designed junction features or "prese d'acqua". In addition, the map highlights other works, such as: the channelling of the Sovata Canal and the Bruna River into one course in the Macchiascandona area and toward Castiglione. The clarified waters of the *colmata* (a kind of landfill reclamation, using the silt deposited by a watercourse to raise the level of a swampy area) could then flow into the sea through the two new emissaries of San Leopoldo and San Rocco, while the only emissaries in the wetland area continued to be the mouth of the Bilogio River at Castiglione.

The Alberese marshland also appears intersected by a dense network of canals that were intended to carry off stagnant water in the Drying Canal open toward the lower course of the Ombrone River.

New agricultural settlements are very few and as yet unnamed; the New Mill (Mulino Nuovo) on the Ombrone River appears at San Martino. It is important to note that the map does not show the fortification of Bocca d'Ombrone (reduced to a ruin around 1840), which today is submerged a few hundred meters from the beach. In fact, the erosion of the Ombrone delta was almost immediate when a large part of the flood deposits were removed from the river to be used to fill in the marshland.

A map dating from the period soon after the Grand Duchy passed to the Kingdom of Italy (1860), i.e. the representation of the *Padule di Castiglioni della Pescara 1863* by Giorgini (Giorgini 1863), shows the changes introduced in the last decade of the government of the Grand Duchy of Lorraine and the few corrective steps adopted by the interim Tuscan government of the dictator Bettino Ricasoli (1859-1860). The latter, on firing Manetti, entrusted the construction management to the scientist Giorgini, who continued work into the first years of the new unified nation.

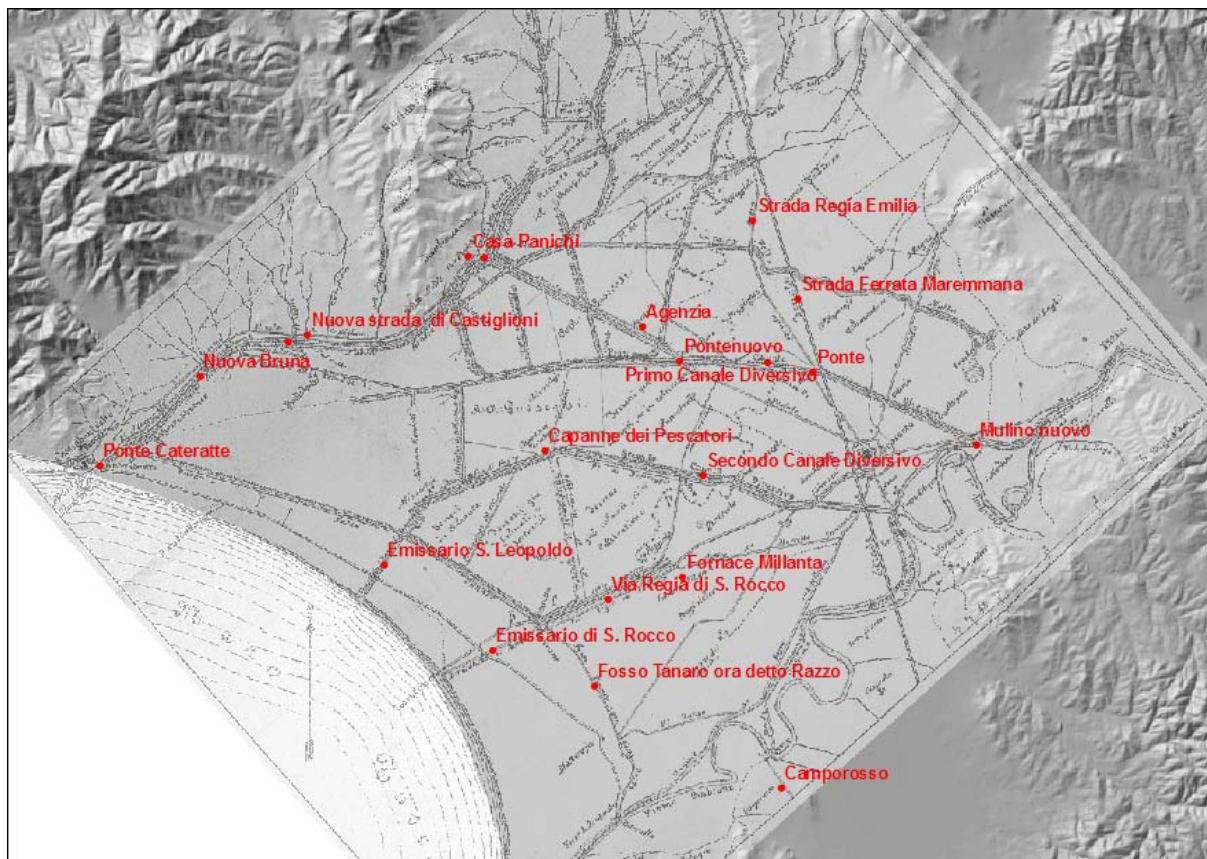


Figure 9. Georeferencing of Gaetano Giorgini's map, 1863.

New hydraulic works appear in the map, such as:

The “Catchment” buildings of the Ombrone River at Poggio Cavallo and San Martino, the Nuovo Fosso Tanaro, called Razzo (continuing to the east beyond the Tombolo di Grosseto (Sand Dunes) and emptying into the Ombrone at La Trappola) and some new canals connecting the two diversion channels and the three emissaries in the wetland.

Additions to the infrastructure are of particular importance, for instance:

The *Strada di Castiglioni* passing through the Marsh; the *Via Regia di San Rocco*, also known as the *San Rocco-Grosseto* Road (built from 1830-1860); the *Ponte Cateratte* (called the Giorgini Bridge by the scientist who constructed it) over the *Emissario di Castiglione*; the *Ponte Nuovo* over the *Primo Diversivo*, near the *Deposito Quadrupedi dello Stato*; the *Ponte della Via Aurelia* over the *Primo Diversivo*; the *Ponte di Macchiascandona* (known as the Cataracts) over the two *Bruna-Allacciante* water courses; the *Ponte di Badia* (known as the Cataracts) also over the *Bruna-Allacciante* courses; the *Ponte della Strada Castiglione-Grosseto* over the *Emissario San Leopoldo*; the *Ponte della Castiglione-Grosseto* (known as The Cataracts) over the *Emissario San Rocco*; the *Ponte sul Primo Canale Diversivo* near the *Osteria della Strada Regia Grosseto-Siena*; the *Ponte sul Primo Canale Diversivo* of the *Strada Grosseto-Istia*; finally, the major construction of the Maremmana or Tyhennian Railroad to Grosseto in 1862-1863 with extension to Orbetello-Civitavecchia.

Compared with the numerous improvements to infrastructure, there are relatively few agricultural settlements (Casa Panichi, Camporosso, the military Office of the Quadruped Depot at Rugginosa (Agenzia del Deposito Quadrupedi militare alla Rugginosa), all built from 1859-1863, with a few other settlements not indicated by name) and non-agricultural settlements (Millanta Kiln and

Fishermen's Huts), underscoring the environmental and sanitary challenges that continued to characterize the Grosseto plain.

Cartography and territorialization processes. The plain in the period of disengagement on the part of the unified State according to the first version of the Map of Italy (1883)

The expectations that property interests and the society of the Maremma area held for the new unified State proved to be short-lived: the 1860-1863 drainage project did not show any progress for approximately twenty years. Tight budgets and the liberal ideas of the Historical Right, which saw in the drainage project a simple economic enterprise benefitting private interests, did not produce any specific legislation. On the contrary, in 1870, the largely inefficient Technical Association of Drainage Projects (*Circolo Tecnico delle Bonifiche*) of Grosseto was dismantled and the management of the hydrographic network passed from the Ministry of Agriculture to the Ministry of Public Works and the provincial offices of the new Corps of Civil Engineers (*Genio Civile*). State neglect of the existing works caused a considerable advance in swampland and malaria in the areas already completely or partially filled in and reclaimed. Lack of maintenance caused the gradual burial of the diversion channels (the Second was, in fact, abandoned all together), with a resulting reduction in volume, damage to the camp-shedding on the Ombrone and the banking of the canals and the expandable barriers caused by river-flooding. In addition, almost everywhere, compacting of the terrain was registered at up to two-thirds of the new stratum created by filling, significantly increasing the volume of the floodwaters necessary for the elevation. In the 1870s it was estimated that approximately half (5,000 hectares) of the ancient marsh of Castiglione remained to be filled in largely because the canals were buried. Only in the years 1876-1879 were some hydraulic projects taken up again: work was done on the First Diversion Channel on the Ombrone River (excavation and discharge into the marshland at Poggioforte) and damming on the river which fed the canal.



Figure 10. *Carta d'Italia (Map of Italy)*, IGM, 1883 (detail).

The first version of the *Map of Italy (Carta d'Italia)* of the (Military Geographical Institute -

Istituto Geografico Militare/IGM) (Sheets 127, 128 and 135 quadrants on scale 1:50.000) dated 1883 documents the completion of work on the only remaining Diversion Channel, extended toward Castiglione. In addition, it documents the static nature of the settlement, including urban settlement, given that the inhabited area of Grosseto continued to stay within the city walls, despite the fact that the station, which remained essentially isolated, had been present for twenty years. Furthermore, the role of the main city communication junction had been reinforced from 1867-1870 with the construction of the inland Grosseto-Siena railroad to Asciano-Montepescali. The new agricultural sites are still rather limited in number: various houses between Castiglione and the hills (Casa Pozzignoni, Rombaja, Acquagiusta), on the open plain especially around Grosseto (San Lorenzo, Barbanella Nuova, Santa Elisabetta, Ricasoli, and in particular the new state agricultural town of the Horse Breeding Depot) and between Tombolo (Sand Dunes) and marsh (Casetta Pescatori, Consumi, two Casa Squartapaglia and various Huts). At any rate, it is worth noting the increase in cultivated land vs. fallow land and the appearance of the first examples of croplands planted with trees (grains with vines) in areas around Grosseto and more precisely at Commendone and Sugherella.

Cartography and territorialization processes. The plain in the period of renewal of the swamp drainage project on the part of the Liberal State and the fascist “comprehensive swamp drainage project” in the second and third versions of the Map of Italy (1927-1929 and 1939-1943)

1927-1929

The first national law on marsh reclamation (No. 869 of June 25, 1882) entrusted the implementation to local consortia of public agencies and private owners, with public funding equal to a maximum of 75% of the amount of work. In the Maremma area, this law remained unimplemented for a long time. Between 1892 and 1897, the only significant reclamation work took place privately on the Alberese (Grosseto) estate, where Ferdinando of Lorena reclaimed - only temporarily, despite the investment of one million lira - more than 300 acres of marsh land by means of canals, while between the nineteenth and twentieth centuries, the Corps of Civil Engineers began digging the old drains of the Ombrone River again and building the 9 km Main Dryer Canal completed in 1914 (Barsanti 2002: 393-395).

Thanks to Law no. 774, dated July 31, 1911, there was a certain degree of agricultural reclamation by various large and mid-sized private companies, with loans granted for water systems and land development, the initiation of subdivision of traditional estates by application of the sharecropping system, and with the introduction of crop rotation based on grains and forage. As of June 30, 1915, the Parliamentary Commission report reveals the situation to be still incomplete: of 11,748 hectares in the hydraulic vicinity of Grosseto, only 5,925 had been reclaimed, while 5,823 were under drainage. With World War I the reclamation projects were interrupted and continued to languish even after the war. Even Law no. 1177, dated August 20, 1921, which established the Independent Reclamation Agencies authorized to implement the hydraulic, land, and forestry operations, did not manage to renew the drainage program.

With decree no. 3256, dated December 30, 1923, and decree no. 753, May 18, 1924 (the Serpieri Law on the transformation of lands of public interest,) the Fascist State reinforced the reclamation of marshes and wetlands. This was now transformed from a hydraulic project into a radical reorganization of the territorial districts involved. A few years later the so-called Mussolini Law

(No. 3134, date December 24, 1928) was approved, which, in addition, created the reclamation districts and the independent consortia that, together with the Opera Nazionale Combattenti (National Veterans' Association), were able to resume the reclamation work with far greater consistency and technical and financial commitment than in the past. In terms of reclamation technique, they resorted to the traditional *colmate* and canals and the innovative use of powerful drainage machines.

In addition to the the fascist comprehensive drainage project, positive results were recognized in the area of productive soil reclamation, in the populating - by parcelled sharecropping - of the districts affected by the migration of settlers (coming mainly from Romagna and Veneto, as occurred in Alberese) into areas with improved health conditions and infrastructure, and equipped with electricity, water, and social services. In 1929 the Via Aurelia south of Grosseto was also improved with the construction of the new section in the direction of Rispescia (east of the ancient Alberese Road) and the great Mussolini Bridge over the Ombrone River. Between the two wars, the construction of new agency-owned houses multiplied just about everywhere which, with the direction and interiors oriented toward the management of the estate, housed permanent employees and casual laborers (Acquisti, Poggio Cavallo, Grancia, Poggione Commendone, Trappola, Badiola, Il Deposito, Poggetti Nuovi, etc.).

As agriculture continued to improve from the plague of malaria and swamps, Grosseto developed like wildfire as did tourism at Castiglione della Pescaia and at the new Grosseto marina under construction at the San Rocco fort.

After the construction of a row of cottages on the public beach in the early 1920s, from 1926 on this area saw the beginning of the development of villas and beach colonies built in a grid-pattern of roads with two avenues parallel to the coast with cross-streets intersecting them. A bathhouse allowed the wealthy of Grosseto, in particular, to enjoy sunbathing and swimming (Fonnesu, Guarducci and Rombai 2003).



Figures 11-12. *Carta d'Italia (Map of Italy)*, IGM, 1929 and 1943 (details of Alberese).

1939-1943

In the second half of the 1920s and throughout the following decade the Grosseto plain experienced intense changes to its landscape and territory. In 1927, there was feverish activity in the warp-land on 1,200 hectares and then 3,000 hectares of wetlands; in Alberese the main Canal Manifold (Canale Collettore) was opened, along with approximately 30 km of other canals, and work was continuing on the embankment of the Ombrone River. In 1924 the Ombrone River Diversion (Diversivo d'Ombrone) was extended into the middle of the march and the river dam of Poggio Cavallo was built with the great hydrant building of the Tura Bridge (Ponte Tura) equipped with seven metal floodgates powered by electric motors.



Figures 13-14. *Carta d'Italia (Map of Italy)*, IGM, 1929 and 1943 (details of Marina di Grosseto beach).

On the Grosseto plain to the right of the Ombrone River, the Ombrone consortium founded in 1928 with authority over an area of 31,000 hectares (6,000 of which were wetlands) built through 1940 a number of canals connecting for floodwater draining into the Bruna and Ombrone Rivers (Marrucheto, Poggialberi, Macchiascandona, and Porto a Colle for a total of 88 km), reorganized the lower course of the Bruna River as far as the mouth of Castiglione and the courses of the streams and the Ampio, Valle, Squartapaglia and other minor canals. Afterwards, the following were built: the monumental floodgate bridge of Castiglione and various other large bridges on the Bruna and Ombrone Rivers (Macchiascandona, Ponti di Badia, etc.); about 50 km of country roads (Pollino, San Giovanni, Laghi, Sbirro, Buriano, Sovata, Vaccareccia, Poggialberi, Pineta and Conice), and finally the Fiora aqueduct was extended from Grosseto into the countryside for more than 50 km.

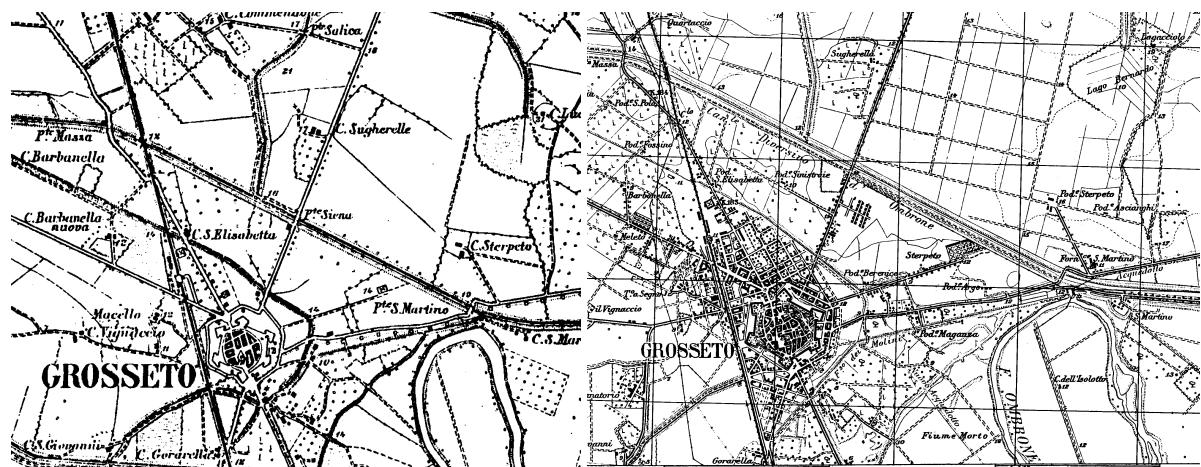


Figure 15-16. *Carta d'Italia* (Map of Italy), IGM, 1883 and 1943 (details of Grosseto city).

At Alberese from 1926 to about 1940, the *Opera Nazionale Combattenti* (National Veterans Association) completed the work begun by the Civil Corps of Engineers (the main Drying Canal - *Canale Essiccatore Principale* – the Pescina Statua canal, the left bank of the Ombrone) and built 30 km of new roads (Rispescia, Val Giardino, Ponte Neri, Sorbino, Spergolaia, Mulinaccio, Dogana Vecchia, Pianacce e Cerretale,) 15 km of new collecting and connecting canals (the main one at Scoglietto, with the others from Perazzeta, Lasco, Lavandone, Acquadoro, Migliarino Barbiceto and Carpine) and the 18 km Grancia-Alberese aqueduct. The works which transformed the estate land that led to the formation of the new rural town of Alberese were significant - the doubling of cultivated terrain in place of uncultivated, macchia wetlands and major development of vines and olive tree cultivation as part of the process of sharecropping subdivision. This involved the transfer of dozens of farming families from the Veneto: the number of farms increased from 20 in 1926 to 103 in 1939.

Between the second half of the 1920s and the outbreak of World War II - which disrupted the work in progress operations in the most important districts (Scarlino, Grosseto-Castiglione and Burano) - the current hydrographic grid of the Maremma plains, like the road grid, had more or less already been created (Consorzio Bonifica Grossetana 1997; Ponticelli 1998; Opera Nazionale Combattenti 1955; Guerrini 1983; Barsanti 2002: 402-405).

Cartography and territorialization processes. The plain in the later post-war period with the transformation of the Agrarian Reform of 1950, according to the updates to the third version of the Map of Italy (1953)

In the late post-war period, the hydraulic projects aimed at the repair of damage caused by the conflict: lack of maintenance, but especially the destruction of important constructions during the German retreat in 1944. These were years of intense agrarian conflict, during which the governments of the new Republican Italy seized the occasion to prepare social legislation, such as the timid sharecropping reform of 1947 ("Lodo De Gasperi" of 1946, converted into law on May 27, 1947) and, in particular, Short Act n. 841, dated October 21, 1950 of the Agrarian Reform. As the Map of Italy (Carta d'Italia) of 1953 in scale 1:100.000 documents, as a result of that law – due to the work of the agency – the Maremma Authority (l'Ente Maremma) created in Grosseto specifically for this - in just a few years several hundred farm houses, the farmworkers' village of Rispescia and the rural villages of Casotto Pescatori and Il Cristo, with technical assistance and

commercial suppliers of tools, fertilizers, seeds, and livestock (agricultural consortia), along with shops, churches, and schools.

The plain was now criss-crossed by a dense network of drainage canals, roads, power lines, aqueducts, and wells powered by the characteristic windmills and other structures for irrigation (with bypasses from the rivers) and dotted with a variety of crops with grapes, olives and fruit trees and rows of trees as windbreaks. The Maremma Authority also saw to the construction of the large wine cooperative in Marina di Grosseto.

Cartography and Coastal Geodynamics

The cartographic documents used - thanks to their geometric characteristics - have also allowed us to measure accurately the geodynamics of the coastline between Castiglione della Pescaia and the Uccellina Mountains and, particularly, the delta of the Ombrone.

Up through the 18th century and on until roughly 1830, we notice a progradation of the coast, accompanied by a rotation of the mouth to the southwest with the expansion of the delta of the river. Since then a reverse phenomenon has begun - and is still on-going - that has caused the mouth to retreat by about 1,200-1,300 meters since 1830, and then expand to the beaches on each side. At least initially, the erosion must be placed in relation to beginning of the *colmata* of Castiglione Lake in 1828, resulting in a reduction of the sedimentary deposits in the Ombrone coastal territory.



Figure 17. Measuring of Coastal Geodynamics (Guarducci, Kukanovic, Piccardi and Rombai 2011).

More generally, the delta area of Bocca d'Ombrone shows the more obviously positive and negative changes - thanks also to the extreme inland position of the two towers: the 15th-16th

century Torre della Trappola and the 13th century Torre or the Torretta delle Saline, the latter already abandoned in the second half of the 18th century, and ruined, as indicated in the cadastral map of 1823, and today reduced to a few ruins of masonry (Guarducci, Kukanovic, Piccardi and Rombai 2011).

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