

Persistence and Change in the Landscape between Aquileia and the Lagoon

Some observations

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Abstract. This paper constitutes a preliminary introduction to a project concerning the south-western area of Aquileia in antiquity. Through the collection and the study of historical and archaeological documents, historical maps, modern aerial photos and the fulfillment of geomorphological surveys, the evolution of the forms of settlement and land use will be investigated. Historical maps and modern orthophotos in particular can be extremely useful to identify some important elements and factors in order to reconstruct the persistences and changes in the natural and cultural landscape.

Keywords: Historical Geography, Cartography, Maps, Orthophotos.

The south-western territory of Aquileia, between the Natissa river, the Anfora canal and the lagoon fringe has some peculiar geomorphological characteristics that make it an interesting investigation subject in order to reconstruct the agrarian structure and the forms of territorial planning in ancient times and their transformations over the centuries. The territories considered are, in fact, largely below the present sea level and changes in elevation, which occurred over the time, do not seem to have significantly altered this situation¹.

It follows that the area has been subject to waterlogging phenomena that only planned and extended drainage interventions were able to hold back. Not surprisingly, therefore, the modern territorial plan shows, in its essential lines (Fig. 1), a substantial continuity with the most important interventions of territorial organization implemented in the modern era: the so-called "Theresian reclamation".

¹ Carta geologico-tecnica, 109013, Aquileia.

Promoted according to the will of Maria Theresia of Austria and started from 1763, the reclamation plan included a complex series of arrangements that should lead to drainage, land rearrange and cultivation of the Aquileia's territory. There is an extensive documentation regarding these interventions, deployed over the years on several occasions, both in archival and cartographic sources (Fig. 2)².



Fig. 1. View of the south-western territory of Aquileia, from Google Earth.

The continuity is even more evident from the analysis of aerial photographs taken by the Italian Air Force during the 50's of the last century³. In the area corresponding to the fourth lot of the Theresian reclamation and to the southernmost portion of the Panigai property - which was subject of a more recent reclamation plan - the roads, the main ditches and most of the boundaries and internal drainages are still fully and integrally preserved. The main changes occurred during the last decades, documented as well by comparison with aerial photos taken for the Regional Cartographic Service since the 80's⁴, concerned the orientation of the internal lots, with the rotation of drains and headlands, but they did not change the overall structure.

The impact of the Theresian reclamation is evident in some cartographic documents produced around 1763 to show the interventions set up by the “Commissari della Cesarea Regia Intendenza di Trieste”, Franz Anton von Raab and Maximillian Em-

² Donnini 1989, 31-49; Muzzioli 2005a, 282-314.

³ See, in particular, the aerial photos taken in May 26 1954 (reproduced by Muzzioli 2005b, 13, Fig. 1) and in November 20 1957 (reproduced by Muzzioli 2003, 63, Fig. 1).

⁴ In addition to the set of orthophotos dating to the years 1984 and 1990, are available on the website of the Regione Friuli Venezia Giulia the ortophotos taken in 1998, 2003, 2007 and 2011 (<http://irdat.regione.fvg.it/WebGIS/>). Through the Anteo project it is possible to consult some of the orthophotos taken in 2003 and 2007 (<http://webgisanteo.dimi.uniud.it/>).

manuel de Fremaut, in preparation for the operations to desiccate the swamps of the Aquileian district⁵. Drawn up to carry out specific works in the area, these are, for design and method of representation, the first modern maps on the Aquileian territory and offer an extremely clear picture of the situation at that time. They show the existence of a territory completely dominated by water and marshes, where large areas were used as a common land by local communities: Aquileia south of the Anfora canal and Cervignano to the north. The artificial drains and ditches present on these maps seem to have been made before the Theresian reclamation, in an unsuccessful attempt to take some areas to waters (Fig. 2). Some of these attempts, mostly concentrated in the southeast zone, can perhaps be ascribed to intervention partially made by privates, since they border and define individual properties (Stabile, Baron de Fin). The Fremaut and von Raab's map itself shows, in fact, next to the public intervention, also the operations carried out by privates, like Tullio.



Fig. 2. Particular of the Map produced by Franz Anton von Raab and Maximillian Emmanuel de Fremaut: Trieste State Archive, "Imperial Regia Direzione delle Fabbriche del Litorale" Piani Archive, b. 121.

The comparison with later illustrative maps of the reclamation, with maps of the so called "Napoleonic cadastre" and with the nineteenth-century maps showed that the reclamation system was conceived in its essential lines following some pre-existing axes. The main one is the Anfora canal, an ancient great hydraulic work built for the

⁵ Venice State Archive, "Provveditori Camera Confini", b. 333, d. 12. Map of Franz Anton von Raab and Maximillian Emmanuel de Fremaut: Trieste State Archive, "Imperial Regia Direzione delle Fabbriche del Litorale" Piani Archive, b. 121.

drainage of wetlands, for inland navigation and for water exchange, restored and used as the real generator axis for the network of streets and drains that were drawn approximately perpendicularly or parallel to it. Since the canal is a remain of the Roman centuriation⁶, perhaps correlated with the *decumanus maximus*, the Hapsburg reclamation recovered and perpetuated some lines of the ancient orientation, but diverging altogether for a lack of regularity and uniformity.

Among the elements departing perpendicularly from the Anfora, marking the eastern boundary for the extension of the third and fourth lot of the reclamation, stands the Terzo river, which was probably rectified and canalized during the eighteenth-century interventions. In fact, it appears drawn with an irregular course on the previous maps⁷. South of the Anfora an important reference point for the Theresian reorganization is constituted by the La Caua canal, which branched off perpendicularly to the Anfora then turned southwest and continued straight up to a rectilinear ditch that ran east-west and whose course was followed and extended by the Fosso colatore of the Hapsburgian reclamation. South of it, running parallel there was the Marasin ditch or stream. From these two ditches numerous rivers and channels started, among which stands out the Fossa noua, that marked, along with the Natissa river, the marshy area of Panigai, excluded from the reclamation.

Therefore it seems clear that the present landscape is the result of a specific modern intervention, which can be dated with accuracy. After that very few variations took place, that did not upset, for example, the general structure and the system axis orientation, but rather entailed phenomena of internal reorganization of land and fields. As rightly pointed out, this observation justifies the idea that the elements and traces detectable below the land surface of the land and identifiable through the aerial photography are prior to the Theresian reclamation and represent more ancient territorial organizations⁸.

Some tracks dated back probably to interventions put into action the Patriarchal period, regarding to which some sources point out the achievement of canalization works⁹. Of these, while the southern section of La Caua remains today partially functional, as well as the antecedent of the draw, the Marasin and the Fossa Noua, still present in the nineteenth century cartography, have been obliterated after most recent agrarian rearrangements. The Marasin seems detectable in only a weak trace on the 1954 and in the 90's orthophotos, perhaps because it was partly consistent with the draw orientation of the reclamation, to which the fields organization in Panigai area was adapted, with the consequent overlap of modern ditches, running parallel to the

⁶ About the antiquity of the Anfora canal, see Buora 2000, 33. The correlation and coincidence of the Anfora with the *decumanus maximus* has been supposed by Buora 2000 and Bottazzi 2000, 38-39. Otherwise Prenc 2002, 49-51, argues that the Anfora was built on an internal limits of the Roman centuriation.

⁷ This does not exclude that the river had already been settled in previous periods and phases. See Bertacchi 1990, 247-248, with dating to the XIII-XIV centuries, based on ancient reports concerning the realization of some channels in the territory of Aquileia. In fact, on the modern maps preceding the reclamation the Terzo river appears not yet rectified.

⁸ Muzzioli 2008, 61.

⁹ Bertacchi 1990, 247-248.

drain. In the 1954 aerial photographs it was still legible instead the course of Fossa Noua, which was by that time superimposed by the modern fields network.

The most important element in this area is the course of a paleochannel, comparable for dimensions with the Anfora, probably artificially canalized and rectified, where apparently some tortuous side streams flowed into. The paleochannel, clearly detectable even in the most recent orthophotos, thanks to the contrast between the dark band of the central bed and the brighter band of the lateral embankments, seems to stem from the ditch that follows the route of La Caua, just south of the Stradone della Bonifica. Hence, it ran straight the south-west for about 2 km, crossing the Fosso colatore, then it turn east with a large bend, and after continuing rectilinearly for about 700 m, it bent toward to the actual lagoon¹⁰.

The point where the trace begins to be detectable lies in correspondence of an elevated land stripe, probably a paleo-embankment, which runs parallel to the Stradone of drainage towards the actual Natissa, at the area called Le Bacchine. Into this relief is inserted a country road created during the eighteenth century reclamation works. It is therefore possible that the ancient watercourse followed originally the relief formation and constituted a continuation or a branch of the terminal system of *Natiso cum Turro*, probably rectified and used in function of its navigability.

At the present, it is impossible to determine in which period the paleochannel has been active. It can only be noted that it appears already completely obliterated in the maps from the half of the eighteen century, where, in Panigai's area, it was superimposed by the drainage system centred on Fossa Noua, some elements of which might constitute a form of restoration or survival of the ancient paleochannel. These considerations and the size of the possible human intervention, which requires considerable organization, lead at least to assume that the paleochannel has been regimented and canalized in Roman times. Therefore, it was probably part of the complex system of channels and rivers that characterized Aquileia and other upper Adriatic centres. These channels were used as communication routes, but played also a very important role in drainage and water exchange, thus favoring the healthiness of the place¹¹.

Some answers will probably come from the prosecution of the geomorphological prospections undertaken in collaboration with Stefano Marabini and Luca Gobbato, in cooperation with Arianna Traviglia, supervisor of the project "Beyond the city walls: the landscapes of Aquileia", in the framework of the agreement between the Macquarie University and the Department of History and Conservation of Cultural Heritage of the University of Udine.

In addition to these aspects in aerial photographs traces of a large regular grid planning, that affected the entire region, are clearly discernible (Fig. 3)¹². Such framework, as has been noted, it seems to refer to the Roman centuriation and, in particular, to the so-called "classical" Aquileian centuriation, which was characterized

¹⁰ Buora, Bottazzi 1999, 67-68, 74-75; Muzzioli 2003, 61-62. Some paleo-hydrological elements are reported on the Carta geologico-tecnica alla scala 1:5.000, Aquileia (109013), Muson (109054)

¹¹ Vitruvius, I, 4, 11; Strabo, V, 1, 5 C 212. With regards to the ancient hydrographic network of Aquileia, see Carre 2004.

¹² See Muzzioli 2003.

by square areas of 20 actus for side (710 m approx.), with cardines inclination of about 22° west¹³. The generator axis of the system, the *cardo maximus*, appears to coincide with the straight stretch of the road that coming from the northwest crosses Aquileia, to continue in the south-east direction, which was the reference axis of the urban system¹⁴. A less easy task is to detect the *decumanus maximus*, about which in recent studies different solutions has been proposed: coincidence with a stretch of the *via Annia*¹⁵; identification with the axis along which the Canale Anfora was built¹⁶; coincidence with the *decumanus* running south of the *forum* of Aquileia¹⁷.



Fig. 3. Particular of the 1957 aerial photo (from Muzzioli 2003, 63, Fig. 1).

Comparing the aerial photos taken in different years, in particular those of 1954, 1957 and 1990, it is possible to confirm the detection of parts of at least seven parallel elements corresponding to internal limits (*limites intercisivi*) of the Roman centuriation. As noted by Maria Pia Muzzioli, they are apparently made by paths or

¹³ Prenc 2002, 42-66; Prenc 2007, 97-98.

¹⁴ Bianchetti 2004, 119-122; Tiussi 2006, 349.

¹⁵ Muzzioli 2005b, 14-17.

¹⁶ Buora 2000, 36.

¹⁷ Prenc 2002, 49-51; Prenc 2012, 477; see also Bianchetti 2004, 121.

routes flanked by drains, that in the images appear darker¹⁸. In a couple of cases dual traces can be noticed: they seem to be ditches flanked by two banks or raised streets, or two paths placed side by side. The width of these elements varies between 9 and 12 m approx., reaching 30 m approx. in the case of dammed ditches. The distance between the axes is regular, ranging from about 90 m, for the closest limits, to 180, and then to about 360 m. Calculating the distance from the alleged *cardo maximus* and its extension approximately corresponding to the actual road from Aquileia to Belvedere, it is possible to identify, at least hypothetically, the western *cardines* III, IV and V, as well as a number of internal minor limits or apparently so. In fact it should be verified the function of the internal limits included between the III and IV *cardines*, that are in coincidence with the ditches or the doubles alignments previously mentioned.

For what concerns the orthogonal alignments to these, arranged in the sense of the *decumani*, it seems possible to identify certain elements apparently corresponding to paths or routes flanked by drains, whose overall width is around 10-11 m. Three of these can be detected in the Panigai area with a mutual distance computable in 180 m approx. A fourth northernmost axis, is located about 270 meters far from the nearest of the three, while a fifth one lies 270 m approx. from the latter. This last axis lies approximately 1700 meters far from the Anfora canal. Despite the coincidence in the general alignment, it's hard to detect a direct relationship and hierarchy between these axes and the Anfora canal, due to the presence of apparently different organizational forms.

¹⁸ Muzzioli 2003.



Fig. 4. Particular of the 1954 aerial photo, with evidence of the grid of centurial limits, ditches and drains west of the Natissa river (from Muzzioli 2005b, 13, Fig. 1).

In addition to the main evidences, in some sectors of the area examined through aerial photographs the presence of a surprising number of minor alignments can be detected. These show very peculiar features along with elements related to subdivisions or other forms of small size agrarian or perhaps settlement organization. These alignments are oriented depending on the centurial axes, from which they seem to be generated and with which are partly coherently integrated. They appear to be related to forms of subdivision conducted on an extremely small scale and consist of a series of close dark lines, mutually parallel, separated by a distance of 9-12 meters (Figs. 4-5).

They are, apparently, traces corresponding to ancient partition ditches lying within the lots, whose distribution was clearly functional to the distinctive forms of land use and water management. These alignments do not necessarily correspond to agricultural activities, but rather may respond to drainage needs of the area.

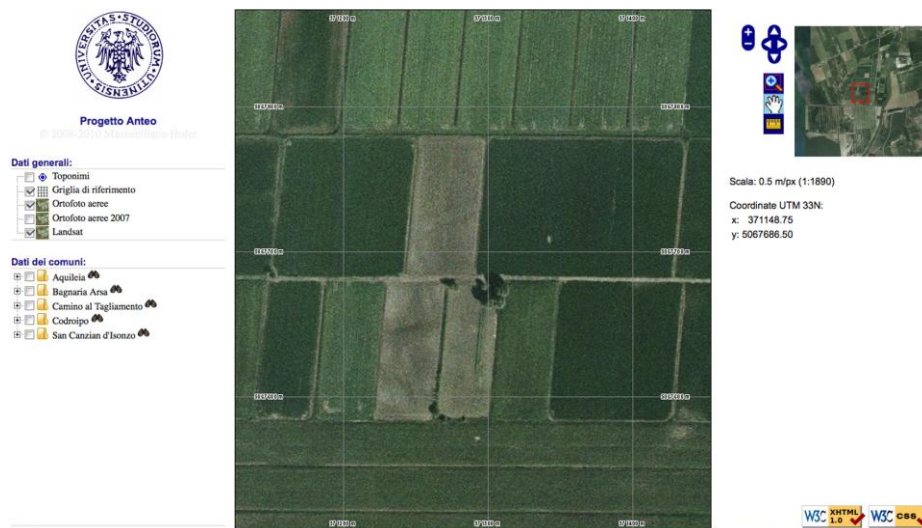


Fig. 5. Detail of the area showed on the middle of Fig. 4, with some evidences of the grid, from the Anteo project.

A system of fields parceled in such a way lies north of the Fosso colatore, within the area between the Natissa and the trench that preserves the course and functions of the oldest La Caua, with a second extension beyond the trench itself. The central system is constituted by dozen of traces occupying the area between the two northernmost limits *decumani* detected and one of the internal *cardines*, with them the traces are parallel arranged. They are approximately 9-10 m away from each other, for a total extension of approximately 420 m along the *decumani* axes. A smaller system, also oriented along the *cardines*, is located over the trench, as it has already been said, while a third sector, of medium size, is located north of the first, perhaps even in direct connection with it, although the middle traces are very faint. A fourth area, oriented along the *decumani* is detectable farther south, in Panigai areas according to the 1990 orthophotos.

These alignments are flanked by larger spaces of regular shape, delimited apparently by ditches, which seem to relate to a different specialization or productive function. Although these traces as a whole can be associated to centurial axes belonging to the Roman period, it cannot be excluded that their establishment could have taken place in later times, in the frame of a phenomenon of restoration and transformation of previous agrarian structure remains, of which numerous examples exist¹⁹. However, the distribution of the areas affected by this type of organization basically coincides or

¹⁹ See, for example, Franceschelli, Marabini 2007, about the medieval origin of the agrarian plan of Bagnacavallo, or Di Cocco 2011, about some portions of the Roman centuriation near Bologna, rearranged in modern times.

borders the few areas of this territory, which seem to have been place of settlement in ancient times²⁰.

According to the information provided by the archaeological documentation, in fact, the area between the Anfora canal and the Natissa appear to be subject of a scattered and sparse settlement, concentrated along the two water courses surrounding it. In particular, some settlements between the Panigai area and the Natissa river can be distinguished, that due to their proximity may be connected with the areas where this type of widespread intervention has been recognized. Apparently, although in Roman times the dry land stretched as far as the present day Grado lagoon²¹, the hydrograph of the southern Aquileian territory was complex and characterized by high level of instability. It can therefore be presumed that most of the land surface was destined to the same use indicated on the maps prior to the Theresian reclamation, that is to say as a community space used to supply pasture and fodder for the animals. For this reason the alignments of the small parallel ditches, when they are not to be assigned to a later time, might have responded to the need for a suitable drain of at least some portions of the land next to the few rural settlements.

In conclusion, the continuation of the studies of historical maps and aerial photographs of the area between the modern Natissa river, the Canale Anfora and the Lagoons of Grado and Marano can allow to better understand the dynamic of the land occupation structure from antiquity to the present days. Through this analysis it will be possible to highlight some key events corresponding to territorial planning interventions, both on large and small scale, changes in the organizational systems, alternation of different exploitation forms, transformations and alterations of some natural elements, such as water courses and coast line state.

Even at an early stage of the project, besides what appear to be forms connected to the main human interventions, known also from historical sources and archaeological evidence, this approach permits to distinguish the existence of a series of minor changes, small scale transformations and local planning. Their examination and their interpretation may provide useful information to reconstruct the forms of land use and exploitation, the modality of succession or overlapping of interventions and their organization, with considerable effects on the understanding of the economic and social spheres that produced those interventions.

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²⁰ On the Roman settlements of the area, see Maggi, Oriolo 1999, 111, 114-116; Bertacchi 1979, 276.

²¹ See De Grassi 1950; De Grassi 1952; Schmiedt 1979, 145-153; Schmiedt 1980; Baggio 2000.

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