

River bed changing in the lower Potenza Valley (mid-Adriatic Italy). A geo-archaeological approach to historical documents

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with 11 figures

Summary. This paper presents the results of an integrated survey project aiming to achieve the diachronic reconstruction of changes in river beds during historical times in the Potenza Valley, in mid-Adriatic Italy. Here intensive surveys are being carried out by a team from Ghent University (dir. F. VERMEULEN), especially in and around the Roman colony of *Potentia*, at the mouth of the river. They are aimed at studying occupation history and the relationship man-landscape in this valley between the Apennines and the Adriatic Sea. Interdisciplinary approaches include low altitude aerial photography, systematic archaeological field walking, artefact studies, re-study of excavated evidence, detailed geomorphologic field mapping, geophysical surveys and fine topographic mapping. Thanks especially to active oblique and vertical aerial photography, geomorphologic fieldwork and corings it is now possible to reconstruct a complete frame of the important changes that have affected the river bed during the last two millennia. The archaeological evidence concurs explicitly with the environmental data to understand and determine the general timing of this evolution, allowing us to measure the interaction between mankind and environment through time.

Newly found archive documents can now contribute to shed light on the exact chronology of the river bed shifts, giving details on the events of the last centuries, when human interference was much more consistent. These documents belong to the wide family of pre-geodetic maps (such as the so called “cabrei”) and the first cadastres (19th century). The georeferenciation of these cadastre maps (including those from the well-known 19th century “Catasto Gregoriano”) in the GIS of the Potenza Valley Survey-project offers now the possibility to date several palaeo-channels detected among the aerial imagery and with the help of intensive and integrated geomorphologic survey.

Introduction

Following the example of Nereo Alfieri, the scholar who perfectly formulated and actuated the methodology of “geo-archaeology“, in the Forties of last century, we will present here a case-study of integrated research from Central-Adriatic Italy (Fig. 1), where a team from Ghent University (directed by FRANK VERMEULEN), is carrying out, since 2000, a survey Project in the Potenza Valley (PVS). ALFIERI, a humanist and an historian specialised in ancient topography, worked in many cases with geologists: together they were able to reconstruct the developments and changes through time of very “unstable areas” (like the delta of the river Po), integrating archaeological, geomorphological and historical research. “Geoarchaeological studies” of NEREO ALFIERI and his collaborators still represent the starting point for every kind of historical landscape research in the Marche region (ORTOLANI & ALFIERI 1947; ALFIERI et al. 1965–1966).

The PVS Project aims at studying occupation history and the relationship man-landscape in the Potenza valley, especially during later prehistory, Roman times and the middle Ages (VERMEULEN 2002, 2005). The methodological framework of the PVS Project proposes that an

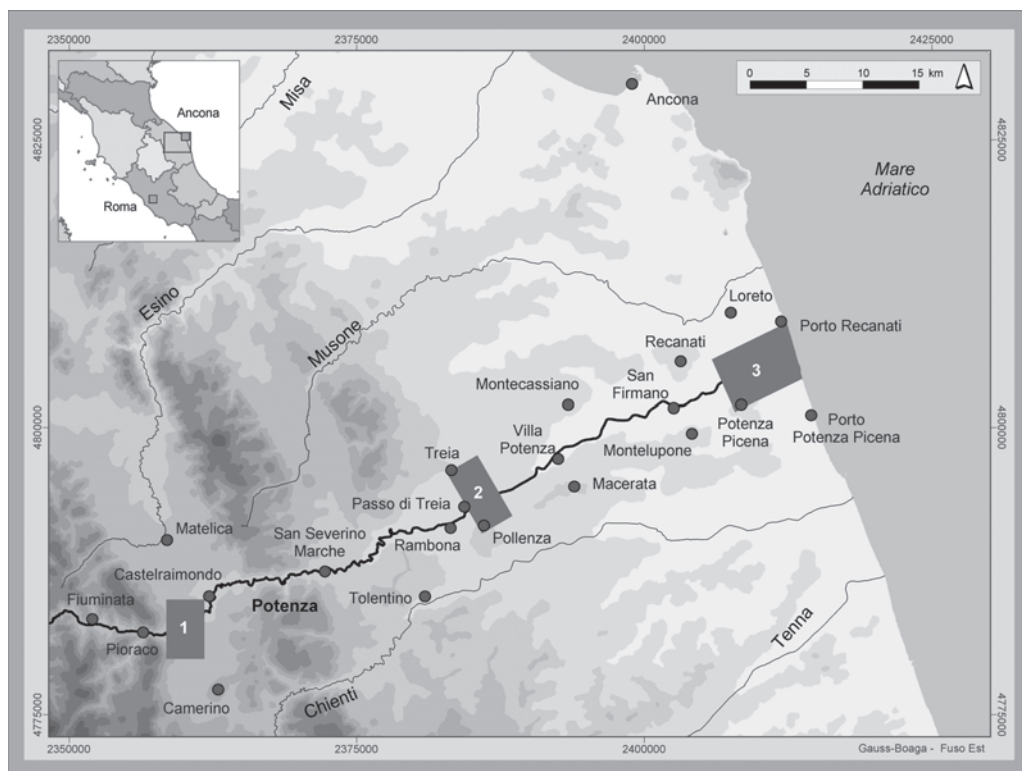


Fig. 1. The PVS Project. The rectangles (1–3) indicate areas of intensive survey.

integrated archaeological, geomorphologic and historical survey-approach is one of the best ways to achieve diachronic reconstructions of changes in river beds during historical times, without having to fall back on large scale and expensive excavation work. Interdisciplinary approaches include low altitude aerial photography, systematic archaeological field walking, artefact studies, re-study of excavated evidence, detailed geomorphologic field mapping, geophysical surveys and fine topographic mapping (VERMEULEN 2002, GOETHALS et al. 2003, 2005, 2006). Thanks especially to active oblique and vertical aerial photography, geomorphologic fieldwork and corings it is now possible to understand the most important changes that have affected the river bed during the last two millennia. The archaeological evidence concurs explicitly with the environmental data to understand and determine the general timing of this evolution, allowing us to measure the interaction between mankind and environment through time.

Archaeology and geomorphology of the lower Potenza River plain

The River Potenza – in the Marche region – rises in the central Apennines and discharges into the Adriatic Sea. Its 80 km long and about 10 km wide meandering fluvial basin develops parallel with the neighbouring streams. The present course of the Potenza is situated in the extreme north

of its coastal plain, touching the base of the hills that compose the northern interfluvium of the valley. This characteristic location of the present day stream bed can be considered an anomaly in the regional context: in fact, all rivers (but the Musone) in the Marche region show a tendency to displace southwards, with a well developed terrace sequence on their left banks and a stunted terrace sequence at their right banks (GOETHALS et al. in preparation).

To exemplify how the diachronic reconstructions of changes in the river bed during historical times has been achieved, making use of a geo-archaeological approach, we will focus our attention on the lower valley and the area around the coastal Roman town of *Potentia* (modern Porto Recanati) at the mouth of the river.

The geomorphological map of the area has been elaborated recently by MORGAN DE DAPPER and TANJA GOETHALS (Fig. 2), using several traditional instruments of research, such as the study of modern maps of the area and the use of the existing literature, which is not particularly rich for the Holocene and historical periods. Consequently, a more detailed study was executed as part of the PVS-project, combining data collected with aerial photograph interpretation, a full-scale augering campaign, qualitative electrical resistivity measurements, topographic survey, radiocarbon and OSL dating, mollusc analysis, and field survey campaigns (GOETHALS et al. 2006). At the same time, six extensive archaeological survey campaigns have been carried out in several areas along the Potenza valley, where an integrated approach has included: low altitude active aerial photography, systematic archaeological field walking (so-called line walking), artefact studies, re-study of excavated evidence, geophysical surveys and fine topographic mapping (VERMEULEN et al. 2003; GOETHALS et al. 2003, 2005, 2006).

In this coastal area of the valley, the archaeological evidence is very rich (Fig. 3), in particular for the Roman period (3rd century B.C. – 5th century A.D.). It mainly consists of: the well delimited surface of the Roman colony of *Potentia*, founded in 184 B.C., part of its network of road systems and suburban necropoleis, the system of Roman land division in the alluvial plain reconstructed by ALFIERI (1968) and some 30 settlements (Roman villas, smaller farms, amphora production sites), part of which are known by past excavations while most others were newly detected by field survey. Most interesting among these archaeological sites are the remains of a Roman bridge, which are now incorporated in an 18th century farm house (the so called Casa dell'Arco, situated southwest of *Potentia* and 1.5 km south of the actual river bed¹), and therefore, clearly witness that some watercourses have been subject to substantial changes (Fig. 4). At the northern edge of this area, represented by the end of the interfluvium between the rivers Potenza and Musone, the PVS team situated the protohistoric site of Montarice, a hillsite which was already occupied in the Middle Bronze Age (around 1500 B.C.) but had spectacularly developed in the context of the Iron Age Piceni culture (circa 900–300 B.C.), when it was most probably a kind of small *oppidum*. On the southern limit of the river valley, on another isolated hilltop, lays the medieval town of Potenza Picena. This landmark, formerly known as Montesanto, was probably founded by the early Medieval inhabitants of *Potentia* (during the 7th century A.D. ?), in the course of that very spread historical process of the relocation of peasant communities to steep, defensible hills.

¹ This bridge is supposed to have been part of the ancient road connecting *Urbs Salvia* (Urbisaglia) and *Pausulae* (San Claudio di Corridonia) to *Potentia*.

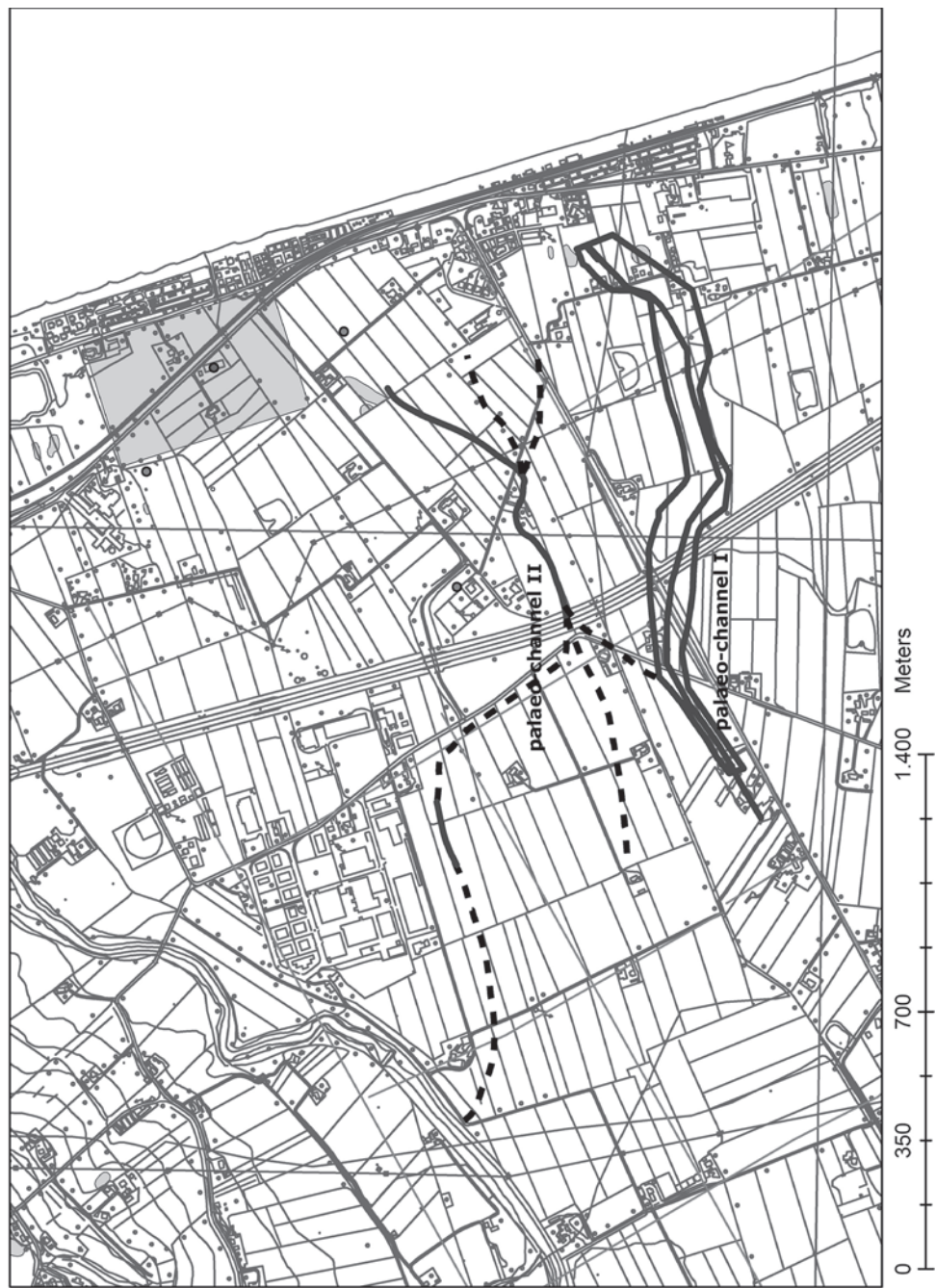


Fig. 2. Topographical map of the lower Potenza Valley with indication of palaeo-channels I and II and the Roman archeological evidence.

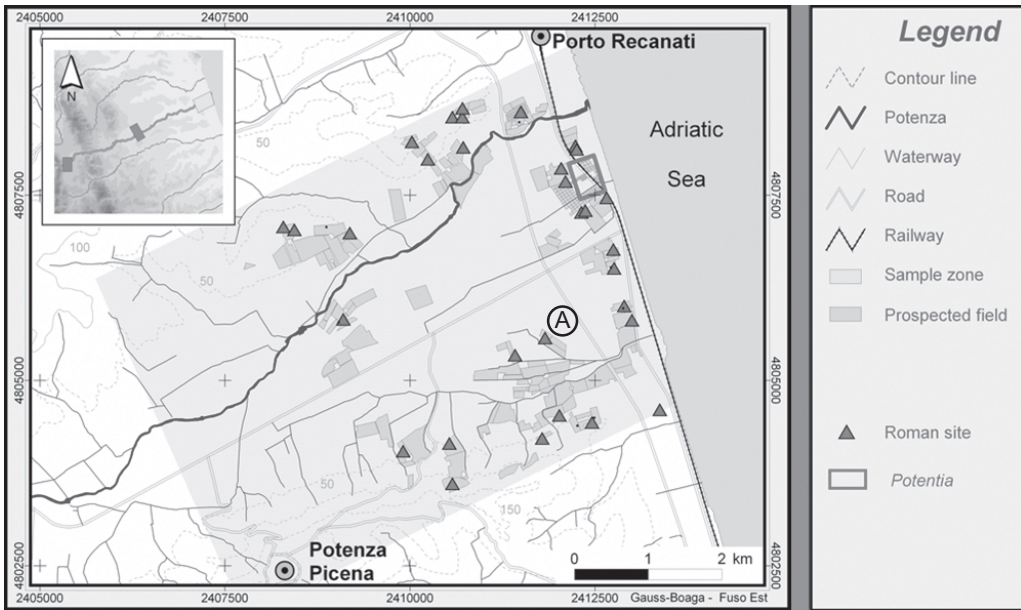


Fig. 3. Archaeological map of the area of the Roman town of *Potentia*, at the mouth of the River Potenza. With the letter A is indicated the position of the Roman bridge at Casa dell'Arco (cfr. Fig. 4).

The Potenza valley shares with most of the other valleys of the central Adriatic the characteristic that coastal plains have suffered a lot of transformations: almost all rivers here changed their course over time. This change of course was probably not gradual, but rather instantaneous, by avulsion. Flooding events interfered with branching and diversion of the River Potenza in its coastal plain: during peak flows, a barrier could be overcome and a new river course was created. The new location, in theory, will generally be the lowest path on the floodplain which is not obstructed.

The reconstruction of the palaeoenvironmental conditions and of their evolution in the coastal plain have been presented elsewhere (GOETHALS et al. 2003, 2005, 2006). What is interesting to summarize here is that, when the process of Romanisation started (3rd century B.C.), the coastline was rectilinear, with sandy-gravelly beach ridges directly in line with the cliffs, and with coastal lagoons and swamps lying behind these same beach ridges (ORTOLANI & ALFIERI 1979). Thus during Roman dominance, the transported fine river sediments were trapped at the river mouth by the beach ridges and settled in the lagoons. Deposition predominates here on a regional and long-term scale. As a consequence river terraces are mostly buried under the nearly flat coastal plain. Some remains of older marine terraces may be present. In the case of the Potenza, the coastal plain near the mouth is about 3 km wide, while the distance between the interfluvies is only about 7 km wide. Near the coast old beach ridges, parallel to the coast, are buried beneath clayey flood-sediments. In between these old beach ridges and the present ones, the homogenous loamy clay to clayey loam sediments point to the earlier presence of a coastal lagoon.

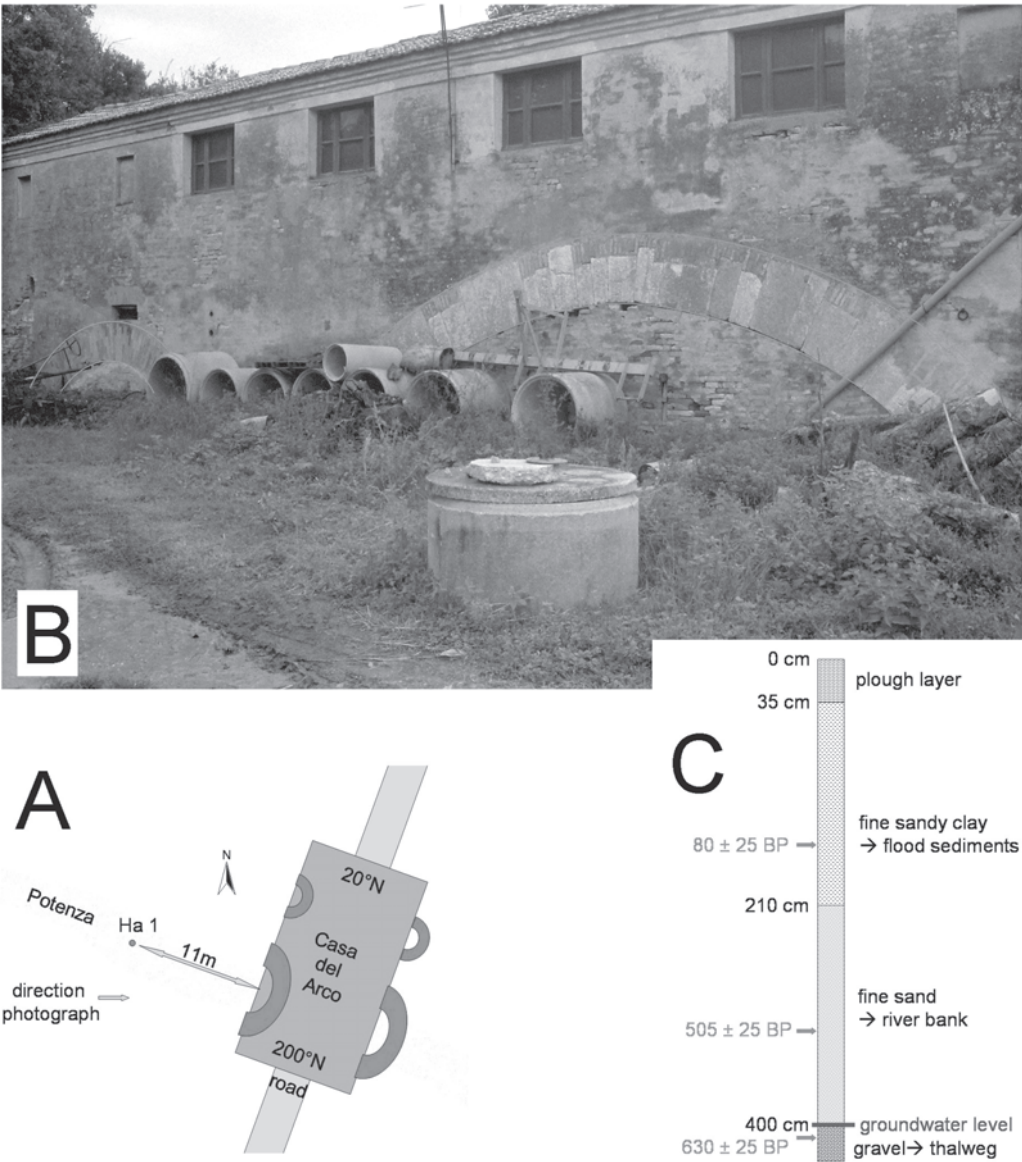


Fig. 4. The Roman bridge of the road connecting *Urbis Salvia* and *Pausulae* with *Potentia*, incorporated in the 18th century rural building so called “Casa dell’Arco”, clearly indicating the position of the river bed in Roman times.

The research hypotheses of the PVS team stated that the Potenza during the centuries predating the Roman conquest would have been roughly in the same position as nowadays. Later the main river bed would then have been displaced to the south to flow under the Roman bridge, and would only recently have been diverted again, possibly with the purpose of reclaiming coastal land.

The protohistoric (Late Iron Age) hypothesis was based upon the presence of the fluvial terrace, one of the few terraces in situ, and on the morphology of the SE-slope of the Montarice plateau: the gradient of this slope is 33° , which is about the maximum gradient that can be established by natural causes in loose sediments. This feature led to think that this slope had probably been the undercut bank on the outside of a Potenza meander bend which existed here for some time before the Roman period. This would have provided the protohistoric site with extra protection and water supply. This hypothesis had been recently rejected as a result of additional corings by the PVS team in the valley floor.

The hypothesis of the Roman river bed leans basically on the presence of the Roman bridge at Casa dell' Arco. An augering done beneath this bridge indeed revealed a fluvial type profile (see Fig 2: palaeochannel II). It was first hypothesized that the Potenza River flowed here exclusively during the Roman period. However, radiocarbon dating on some charcoal fragments retrieved in the base gravel of the river, indicated that this course was still active until 630 ± 25 BP (KIA-19509), therefore the channel was abandoned only in the late medieval period, probably somewhere after 1400 A.D. Another argument is the position of the two now buried beach ridges investigated by augerings: they have an opening more southwards than the present river mouth. That these beach ridges already existed during Roman times is demonstrated by the fact that the Roman town of *Potentia* is built on top of the northern beach ridge, and that a Roman amphora furnace was built on the southern beach ridge (the base material for this ceramical production was most probably laguna clay). These beach ridges have also been subject to floods during Roman times and later, as a distinct clay layer was deposited on top of them.

On the detailed oblique low-altitude aerial photographs taken at regular intervals by the PVS team since 2000 several traces assignable to the presence of palaeo-channels can be detected in the coastal plain. Among them, specially interesting is a winding pale trace of about 100 m wide and 3.5 km long, clearly visible in the very centre of the coastal plain (Fig. 5), where the trace exhibits a typical anastomosing pattern². It is most likely that palaeochannel II was installed somewhere after palaeochannel I.

The contribution of historical documents

Newly found archive documents can now contribute to shed light on the exact chronology of the historical river bed shifts, giving details on the events of the last centuries, when human interference was much more consistent. In fact, already in the late Middle Ages and early Renaissance,

² This paleochannel (named as "I": see Fig. 2) has been investigated at by corings at transect α , a type-section: GOETHAL et al. in preparation.



Fig. 5. Aerial view of the costal plain of the River Potenza (photo F. VERMEULEN).

large tracts of land in various coastal plains in Marche were reclaimed (CENCINI & VARANI 1991; NANNI & VIVALDA 1987). Recent historical research (MORONI 1993) has deepened our knowledge of the important interventions that were undertaken also in the Potenza Valley, and the information collected by BULI & ORTOLANI in 1947 (pp. 95–147), about a letter by pope Gregory the IX (1170 – †1241) addressed to the inhabitants of Porto Recanati, ordering them to arrange a confluence between the Potenza, Musone and Aspio rivers, can now be framed in a much more detailed diachronic picture. A new intervention was undertaken in 1369, to avoid the marshland development of the area around the mouth, and the river Potenza was deviated north of the *Castrum Maris*, the new settlement on the coast founded by the inhabitants of Recanati (MORONI 1983: 77). This first new setting was still ineffective: even combined with the following intervention (1397) to channel the river Musone, north of the Potenza, into the bed of the stream Aspio (MORONI 1983: 75), wide marshland areas were still recorded by archive sources, mostly in the area between the fortification of the harbour and the former mouth. The project for the construction of a harbor at the confluence of the two rivers was abandoned in 1474 after long periods of inactivity. What happened during the last centuries can be followed more in details in several “cartographic” documents: the oldest (18th c.) belonging to the family of “*cabrei*”, the most recent (19th c.) to be defined more properly as cadastre documents. *Cabrei* are descriptive documents related to the registration of land property of big institutions, where – exceptionally – the text is completed

with some sketched maps of the enumerated parcels. Such is the case of the so called Catasto Gonfaloni – Beni, compiled in Recanati in 1761 and of the “Catastro” Federici of Montesanto (Potenza Picena) of 1765 (Fig. 6). These sketched maps were designed with some rudimentary instruments, and do not normally follow a geodetic basis. For this reason, their georeferenciation in a GIS requires special procedures. The insertion of historical cartography into a GIS has at present lost the characteristics of an experimental procedure, but still many aspects of the methodology have to be deepened and some more recent advancements have still to be disseminated (CORSI & VERMEULEN 2007). In fact, given the above mentioned characteristics, it was necessary to start the georeferenciation process in the GIS of the PVS Project from the cadastres of 19th century, in this case the well-known “Catasto Gregoriano”. This procured us with a base of reference points, which can be much more easily individuated, allowing an overlay of the oldest cadastral sketches on this new layer. These new digital maps can then contribute decisively to eliminate elements which can be mistaken for parts of the traditional landscape: in this area, for instance, we can see that some existing coastal lagoons are artificial and did not occur almost two centuries ago.



Fig. 6. Catasto Federici di Montesanto (Potenza Picena) 1765. Detail of the “Casa dell’Arco”.

Given the impossibility of field survey nearest to the coastline, as the area around the present day river mouth has been completely built over by the development of the modern centre of Porto Recanati, the georeferentiation of this kind of documents allowed to dissipate the uncertainty about the reconstruction of the artificial bed of the river Potenza, connecting the last part (more or less, 500 m from the mouth) of the most northern and most recent branch to the mouth of the River Musone. This abandoned bed appears, in fact, in the cadastral maps of the 18th and 19th centuries with the name of “Fiumarelle” (meaning “the small rivers”) as a dried up, long parcel (Fig. 7)³. It has been possible to georeference this sketch introducing the “intermediate”

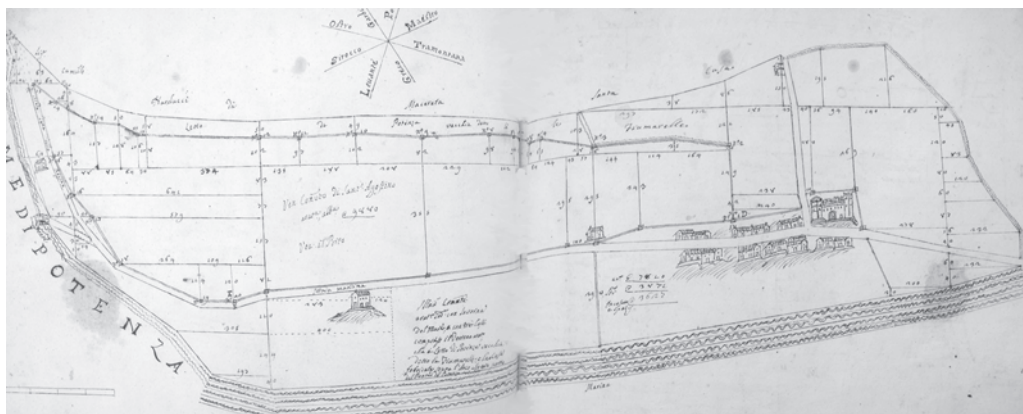


Fig. 7. The artificial channel dug W of Castrum Maris (Porto Recanati) in 1369 as it appears in the Catasto Gonfalonni – Beni (1761). The abandoned artificial bed of the river Potenza appears in the higher sector of the map with the caption “Letto di Potenza Vecchia detto Le Fiumarelle” (“bed of the Old Potenza, known as the Little Rivers”).

passage of the Gregoriano Cadastre on the modern cartography, and therefore to obtain the exact shape of this abandoned river bed even under the modern buildings of Porto Recanati (Fig. 8). Still, field work corroborated the reconstruction presented above. The artificiality of the last part of the river course can be easily detected, given the abruptness in the change of the morphology, starting from the distance of about 3 km from the coast: from a broad bed with abundant gravel bars in the west to a narrow, deeply cut channel-like bed to the east. Moreover, at this location, the channel starts to break through an alluvial fan of the Fosso Grande, a left bank tributary of the Potenza River. This alluvial fan surface is topographically 2 m higher than the alluvial plain

³ The existence of this bed is proved also by an epigraphic document preserved on a bridge in Porto Recanati which states “*Arcus hic est pars pontis Potentiae veteris dictae le Fiumarelle*” (= “this arch is a part of the bridge over the old Potenza, the so-called Fiumarelle”): ORTOLANI & ALFIERI 1947. The new setting was so unsatisfactory that in 1573 the river Potenza was driven back into its old bed (MORONI 1993: 33).



Fig. 8. Transposition of the trace of the artificial bed of the river Potenza as indicated in the Cadastre by Gonfalonì – Beni (1761) thorough the modern centre of Porto Recanati (Macerata, Italy) on the modern cartography of Regione Marche (original scale 1:10.000), processed in the PVS GIS.

surface just to the west. A second argument is presented at hand augering 35, executed just south and still within the embankments of the present day Potenza. In the stratigraphy, a sharp boundary is present at 170 cm depth. Below was found a clayey layer of about 20 cm thick with abundant ceramic fragments, radiocarbon dated at 1860 ± 25 BP or with 95 % certainty within the interval 80–230 CE. Above, loamy sand sediments with some gravel inclusions occurred. Consequently, it can be deduced that this location was settled during the Early Roman Empire (1st–3rd centuries A.D.), and that only afterwards the river broke through. The coarseness of the sediments just above the caesura indicates that the first floods of the river must have been rather energetic, as if engendered by a sudden breakthrough.



Fig. 9. Transposition of the bed of the river Potenza as it settled after the flood of 1827 according to the map ASR, Collezione Disegni e Piante, I, cart. 68, f. 462, on the modern cartography of Regione Marche (original scale 1:10000).

We will again focus the attention on the different shifts of the river Potenza bed recorded in a document from the Archivio di Stato di Roma⁴, specifically elaborated to describe an important river flood in 1827, that gave way to the opening of a new river-course. The transposition of this very long document does not perfectly overlay on the modern topography, but still a good result can be presented (Fig. 9). In the GIS, we can therefore draw a brand new layer with the more or less exact contour of this 1827 paleochannel, as we know that a few years later a consortium of proprietors agreed to pay the works to drive the river back to its original bed. This new map is especially interesting, as this river bed did not leave too many traces on aerial photography, probably because it was not long active. Therefore, as is clear from the detail of the overlay on the vertical aerial photography of RAF strip 3, of 10/11/1943, n. 4049, this element would have been missed without the historical documents (Fig. 10).

⁴ ASR Collezione Disegni e Piante (inv. 109), Coll. I, cart. 68, f. 462: “Topografia di quella parte del fiume Potenza limitato alla Destra dei territori di Montelupone e Monte Santo...”. The long title of the sheet can be translated as follows: “Topography of that part of river Potenza on the right bank (territories of Montelupone and Monte Santo), where you can see the shape of the deviation of the same river in the direction of Monte Santo plain (October, November, December 1827). This deviation started 5 miles from the coastline, and the new river mouth is now 2 miles south of the former...”.



Fig. 10. Detail of the transposition of the trace of the river bed established during the flood of 1827 on the vertical aerial-photo RAF strip 3, of 10/11/1943, n. 4049, where it is clear that the new course of the river did not leave many traces because of its short existence.

Conclusion

The case study concerning the protohistoric, Roman and post-Roman development of the river course in the mid-Adriatic Potenza plain is in the first place an example of integrating historical research within a typical geoarchaeological approach. In the past, several authors have proposed different ancient courses of the River Potenza. The most widespread of these theories, by Alfieri, is roughly based on the morphology of a fossil delta at the coast just south of the Roman town site of *Potentia*, and on some historical sources. Recent intensive archaeological field research and geomorphological mapping and analysis has now much refined this reconstruction of the ancient and medieval situation. The exact location where the paleo-Potenza branched off could be reconstructed by geomorphologic reasoning: the bed of the present Potenza changes drastically in aspect at 3.5 km from the coast, from a broad river bed with ample gravel bars, to a deep cutting downstream. The Potenza thus did not move exclusively northwards, as Alfieri stated, but corresponded to a natural chaotic river diverting both northwards and southwards, until man fixed its actual bed. The Roman situation of a Potenza flowing immediately south of *Potentia*, debouching about 200 m inland of the present coastline, lasts until the 14th century. At that time gradually a late medieval course develops until man decided to reroute the Potenza to its present course, probably to cultivate the newly available land. To understand these more recent developments a finer GIS-based analysis of historical documents and maps was necessary. As a result of this research we

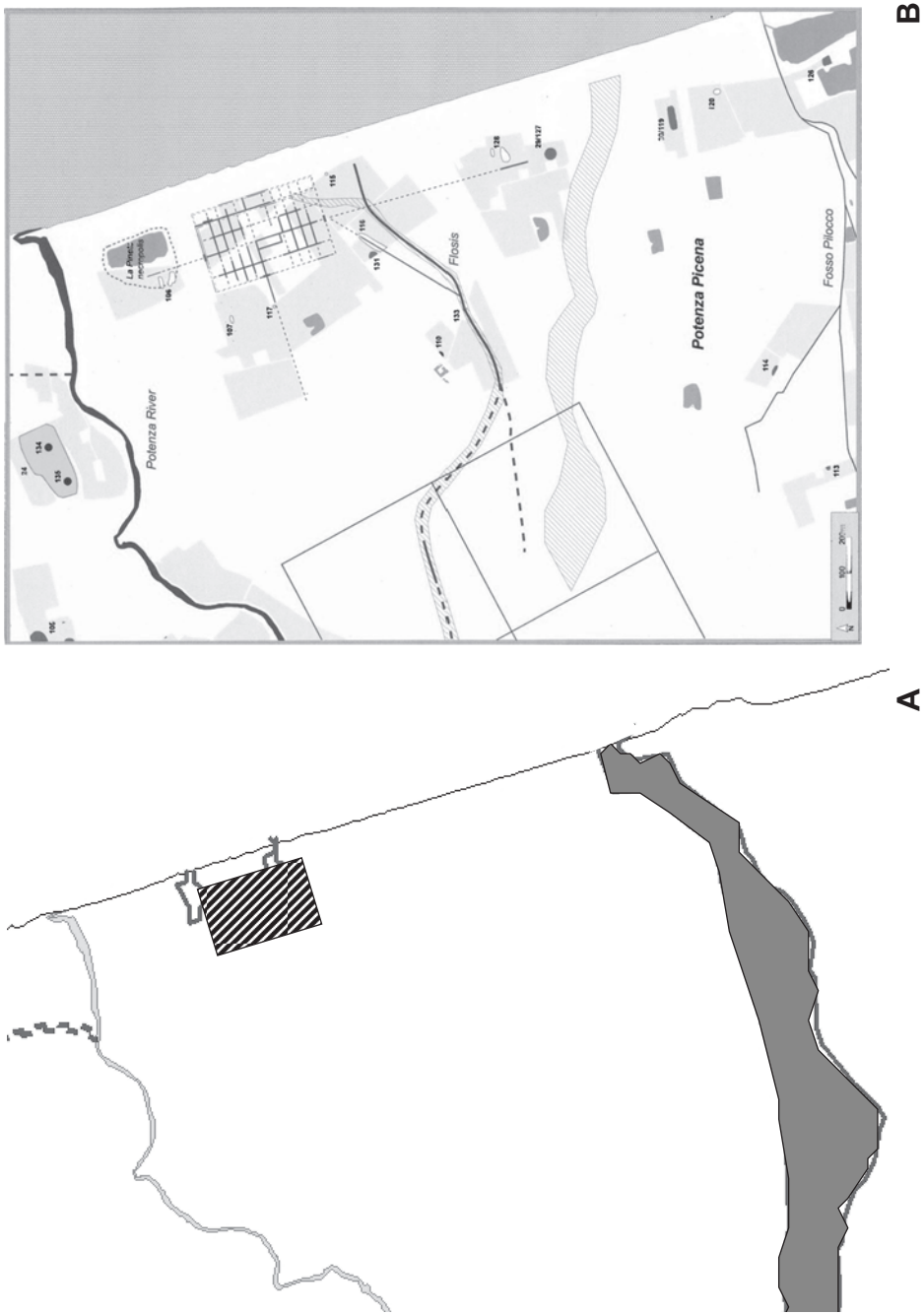


Fig. 11. A: Reconstruction of the palaeo-channel based on historical maps of 19th c. vs B: Reconstruction of palaeo-channels based on geomorphological survey.

can stress how the georeferenciation of these cadastre maps in the GIS offers now the possibility to date several palaeo-channels detected among the aerial imagery and with the help of intensive and integrated geomorphologic survey, or even detect different ones. The comparison between the two simplified maps of palaeochannels (Fig. 11) is exactly a proof of how these very different approaches to reconstruction of palaeo-environments can be integrated.

References

- ALFIERI, N., FORLANI, E. & GRIMALDI, F. (1965–1966): Ricerche paleo-geografiche e topografico-storiche sul territorio di Loreto. – *Studia Picena* **XXIII-XXIV**: 11–35.
- BULI, M. & ORTOLANI, M. (1947): Le spiagge marchigiane. – *CNR, Com. Naz. Geogr. Bologna* **148**.
- CENCINI, C. & VARANI, L. (1991): Per una storia ambientale delle pianure costiere medio-Adriatiche. – *Geogr Fisica e Dinamica Quatern* **14**: 33–44.
- CORSI, C. & VERMEULEN, F. (2007): Digital vs. historical cartography for studying archaeological sites: a case study from Corsica. – *Proc. 11th Workshop «Archäologie und Computer. Kulturelles Erbe und Neue Technologien»*, (Wien, 18.–20. Oktober 2006): 1–19; *Stadtarchäologie Wien*.
- GOETHALS, T., DE DAPPER, M. & DE Vlieghe, B.-M. (2003): The Holocene evolution of the coastal plain in the Potenza river basin and some geo-archaeological aspects of this study area. – *BABesch* **7**: 71–106.
- GOETHALS, T., DE DAPPER, M. & VERMEULEN, F. (2005): Geomorphology and geoarchaeology of three sites in the Potenza Valley Survey project (the Marches, Italy): Potentia, Montarice and Ricina. – *Rev. Geomorf.* **7**: 33–49.
- GOETHALS, T., DE DAPPER, M., VERMEULEN, F., VAN DAMME, D. & WALRAEVENS, K. (2006): Application de méthodes de prospection à l'étude géo-archéologique de la plaine côtière du fleuve Potenza (Les Marches, Italie). – *Belgeo* **3**: 339–361.
- GOETHALS, T., DE DAPPER, M. & VERMEULEN, F. (in preparation): Geo-archaeological methodology in the Potenza river basin (the Marches, Italy) – a case study: the coastal plain and surroundings.
- MORONI, M. (1983): Le campagne lauretane dal XII al XV secolo. – BALDETTI, E., GRIMALDI, F., MORONI, M., COMPAGNUCCI, M. & NATALI, A.: Le basse valli del Musone e del Potenza nel Medioevo: 59–82; *Arch. Storico Santa Casa di Loreto*.
- MORONI, M. (1993): Il territorio di Recanati e Loreto prima e dopo Sisto V. – In: POLICHETTI, M.L. (ed.): *Il progetto di Sisto V. Territorio, città, monumenti nelle Marche*: 31–47; *Istit. Poligraf. e Zecca dello Stato*.
- NANNI, T. & VIVALDA, P. (1987): Influenza della tettonica trasversale sulla morfogenesi delle pianure alluvionali marchigiane. – *Geograf. Fisica e Dinamica Quatern* **10**: 180–192.
- ORTOLANI, M. & ALFIERI, N. (1947): Deviazioni di fiumi piceni in età storica. – *Riv. Geograf. Italiana* **XLIV**: 1–16.
- ORTOLANI, M. & ALFIERI, N. (1979): Sena Gallica. – In: ANSELMi, S. (ed.): *Una città adriatica, forme insediamento urbane, economia e società nella storia di Senigallia*: 21–29; *Cassa di Risparmio di Jesi*.
- VERMEULEN, F. (2002): The Potenza Valley Survey (Marche). – In: ATTEMA, P., BURGERS, G.-J., VAN JOOLEN, E., VAN LEUSEN, M. & MATER, B. (eds.): *New Developments in Italian Landscape Archaeology. Theory and Methodology of Field Survey, Land Evaluation and Landscape Perception, Pottery Production and Distribution*. – *Proc. Three-Day Conf. Univ. of Groningen, April 13–15, 2000, BAR Int. Ser.* **1091**: 104–106.
- VERMEULEN, F. (2005): Espace, sol et urbanisation romaine dans une vallée des Marches (Italie). – In: BERGER, J.-F., BERTONCELLO, F., BRAEMER, F., DAVTIAN, G. & GAZENBEEK, M. (eds.): *Temps et espaces de l'homme en société, analyses et modèles spatiaux en archéologie*. – *Editions APDCA*: 353–364.

VERMEULEN, F., DE DAPPER, M., BOULLART, C., DE VliegHER, B.-M. & GOETHALS, T. (2003): Geo-Archaeological Approaches in the Valley of the Potenza (Marches, Central Italy). – In: FOUACHE, E. (ed.): *The Mediterranean World Environment and History. – Sympos. Proc.. Environ. Dynam. and Hist. in Mediterranean areas.* Paris, Univ. Paris-Sorbonne, 24–26 avril 2002: 381–396, Elsevier.

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