

Geomorphology and Archaeology: an integrated heritage along the Roman *Via Flaminia* in the mid Metauro River valley (Central Italy)

Geomorfologia e Archeologia: un patrimonio integrato lungo la Via Flaminia nella media Valle del Metauro (Italia centrale)

LUNI M. (*), MEI O. (**), NESCI O. (***)⁽¹⁾,
SAVELLI D. (***) , TROIANI F. (***)

ABSTRACT – The sector of the mid Metauro River valley (northern Marchean Apennines) run across by the Roman *Via Flaminia* owns a remarkable geomorphologic, naturalistic and historical heritage. Indeed, major Roman vestiges well integrated with landforms do occur in such places, originating a significant blend of geomorphologic and archaeological components. The presence throughout the study area of such remarkable cultural components distributed all along the “historical” *Via Flaminia* is suitable to promote an integrated approach to landscape exploitation. This paper has two primary objectives: to enhance the scientific and cultural knowledge of the “integrated” landscape of the mid Metauro River valley and to apply an integrated approach for a suitable exploitation of the geomorphic and archaeological heritage for a sustainable and responsible tourism. In this concern, a geo-archaeotouristic itinerary along the Roman *Via Flaminia* is proposed and the three most remarkable sites of geomorphologic and archaeological interest pertaining to considered sector of the “historical” road are taken into account and described.

KEY WORDS: Geomorphosites, Geoarchaeology, *Via Flaminia*, Metauro River valley, Central Italy.

RIASSUNTO – La media valle del Metauro (Appennino nord Marchigiano) attraversata dalla *Via Flaminia* possiede uno straordinario patrimonio geomorfologico, naturalistico e storico. Qui, le maggiori vestigia romane, ben integrate con il paesaggio, originano una significativa miscela di componenti geomorfologiche e archeologiche. La presenza in tutta l'area di studio di componenti culturali così straordinarie distribuite lungo la storica *Via Flaminia* ben si presta per promuovere un approccio integrato per la valorizzazione del paesaggio. Questo lavoro ha due obiettivi principali: contribuire alla conoscenza scientifica e culturale del paesaggio integrato della media valle

del Metauro e applicare un approccio integrato per una appropriata valorizzazione del patrimonio geomorfologico e archeologico al fine di sviluppare un turismo sostenibile e responsabile. In questo senso, viene proposto un itinerario geo-archeotouristico lungo la *Via Flaminia* e i tre siti di interesse geomorfologico e archeologico più presenti nel settore considerato della via storica vengono presi in considerazione e descritti.

PAROLE CHIAVE: Geomorfositi, Geoarcheologia, *Via Flaminia*, Valle del Metauro, Italia centrale.

1. – INTRODUCTION

The landforms of the mid Metauro River basin are impressive as well as crucial to unravelling the Plio-Quaternary evolution of this sector of the Apennines (e.g. DI BUCCI *et alii*, 2003 and references therein; MAYER *et alii*, 2003 and references therein). In this area the geomorphologic constituents flawlessly integrate into a wider naturalistic and historical-cultural context (VARIOUS AUTHOR, 2003). Indeed, major Roman vestiges do occur widespread (e.g. LUNI, 2003), often originating a significant blend of landforms and archaeological elements (DILIGENTI *et alii*, 2005). The over 500 m-deep Furlo Gorge is certainly the most famous site in the area, being well known for both its geologic-geomorphologic substance and beauty as well as for Roman works, such as tunnels chiselled out of rock and the imposing walls of the *Via Flaminia* road (DILIGENTI *et alii*, 2005; LUNI, 1993).

(*) Istituto di Archeologia e Storia dell'Arte Antica “Sandro Stucchi”, Università di Urbino “Carlo Bo”, Via del Balestriere 2, 61029 Urbino PU, Italy

(**) Parco Archeologico di Forum Sempronii

(***) Istituto di Geologia, Università di Urbino “Carlo Bo”, Campus Scientifico, Loc. Crocicchia, 61029 Urbino PU, Italy

(1) Corresponding author e-mail: olivia.nesci@uniurb.it

Hence, taking into account these peculiarities of the landscape, the Furlo Gorge area has been proposed (DILIGENTI *et alii*, 2005) as a Geomorphosite (*sensu* PANIZZA, 2001). Few kilometres downstream, the remains of the Roman *Forum Sempronii* town are placed (GORI & LUNI, 1993) close to the *Metauro* River, on a meander which was abandoned by stream-flow only in post-Roman times (SAVELLI *et alii*, 2004). Between the Furlo Gorge and the Roman *Forum Sempronii*, along the *Via Flaminia* road, the San Lazzaro Gorge site is found, an area of the *Metauro* River valley characterised by significant geologic, geomorphologic and historical-cultural components (GORI, 1993; PERGOLINI, 1990). Recently a geologic itinerary has been suggested in this site (SAVELLI & TRAMONTANA, 2001) in the framework of the paths proposed for the Umbria-Marchean Apennines by the Italian Geological Society.

Since the *Via Flaminia* constitutes an “historical” road connecting all these places (LUNI, 1989), an itinerary is being proposed along this route, which could allow students and tourists to benefit from an integrated approach to the remarkable geomorphologic, historical and archaeological heritage of this area. Moreover, the general aim of this work is to propose a geotouristic pathway in a sector of the Apennines chain that could be one of the first examples of sustainable use of the integrated landscape of the *Marche* region.

This work has been performed within the framework of a national research project which was supported by the Italian Ministry of Instruction, University and Research (COFIN 2004, Scientific Coordinator prof. M. PANIZZA) and focused on the suitable exploitation of the geomorphic heritage for a sustainable and responsible tourism.

2. – GEOLOGICAL AND GEOMORPHOLOGICAL SETTING

The study area lies in the northern *Marche* Apennines, a northeast-verging fold-and-thrust belt (BOCCALETTI *et alii*, 1971) made up of a stratigraphic succession evolving upward from carbonatic to terrigenous terms (COCCIONI *et alii*, 1994). The chain emerged definitely during the late Pliocene–lowermost Pleistocene (MAYER *et alii*, 2003) and a drainage network developed where the main streams followed an approximately sub-parallel pattern, mainly SW–NE oriented, and essentially perpendicular to the structural grain (MAZZANTI & TREVISAN, 1978). In the study area, the main carbonatic anticlines are prominent ridges (fig. 1) in the modern topography and the

major streams cross-cut them in deep and narrow gorges (e.g. the Furlo Gorge, the most important and suggestive one) as they flow into the Adriatic Sea (fig. 1). The Marchean ridge is the most relevant morphostructure of the study area. Significantly (MAYER *et alii*, 2003), the *Pietralata* and *Paganuccio* Mts. (Marchean Ridge) match to an axial culmination of the structure. More to the east, minor ridges - up to a few hundred of meters - can be found (e.g. the calcareous and marly-calcareous *Monti della Cesana* minor Ridge (fig. 1). Close to the coast, the mountain chain area merges in a hilly piedmont and coastal zone, where slightly deformed Plio-Quaternary terrains predominate.

The landscape is influenced by the inherited Pleistocene landforms referable to periglacial morphogenesis, characterized by slope and fluvial depositional processes. Alluvial deposits are arranged in at least four different levels of terraces (FANUCCI *et alii*, 1996) formed as response to aggradation and erosion phases of rivers, associated to Quaternary climatic oscillations and regional uplift (NESCI & SAVELLI, 1986; BISI & DRAMIS, 1991).

3. – ARCHAEOLOGICAL OUTLINE

Besides its environmental and geologic-geomorphologic features, the target area is distinguished by remarkable historical-archaeological elements. In the first instance, it is run across by a primary Roman arterial road formerly joining Rome and Rimini, the *Flaminia* consular road, opened by consul C. Flaminius around 220 BC. In ancient times, the *Flaminia* was the major road link between the Roman world and northern Italy and, later on, with Mideastern Europe. It is marked by the constant presence of Roman age infrastructure such as bridges, sluice gates, viaducts, rock cuts, tunnels, pavements, milestones and inscriptions. Moreover, a lot of Roman settlements rose in close proximity to the consular road which could guarantee easy communications and economic development. The *municipium* of *Forum Sempronii*, by today's *Fossombrone*, stands out among them on account of its being favourably located in the middle of the *Metauro* valley, close to the river; here visitors can admire one of the most important archaeological parks in the region. The best known and visually impressive site is undoubtedly the Furlo Gorge, where geologic-geomorphologic components perfectly complement historical-archaeological ones. Here the *Flaminia* road wedges into a narrow canyon, thus proving the Romans' extraordinary skill in exploiting and

capitalising on natural elements. The road is provided with retaining walls, rock cuts and artificial tunnels to allow crossing even where difficult.

4. – THE ROMAN *VIA FLAMINIA* ITINERARY BETWEEN *FORUM SEMPRONII* SITE AND THE FURLO GORGE

An integrated geo-archaeotouristic itinerary along the “historical” *Via Flaminia* road is here proposed. It covers an interval of about 15 km along the S.S. n° 3 road, a secondary way of communication with a low frequency of traffic. This road is parallel to the S.S. n° 3 *bis* motorway which nowadays constitutes the main connection way in this sector of northern *Marche* region. The proposed itinerary matches approximately the ancient Roman *Via Flaminia* road. Actually, travelling along this road is just like to travel along the ancient Roman one. The proposed itinerary (fig. 2), from the *Forum Sempronii* site to the *San Lazzaro* one, runs entirely in the Metauro River valley. From the *Calmazzo* village up to the upstream end of the Furlo Gorge, the itinerary leaves the *Metauro* River

valley-floor entering the *Candigliano* River valley - the major tributary of the *Metauro* River- and here crosses the *Furlo Gorge*.

The three most remarkable sites of geomorphologic and archaeological interest pertaining to considered sector of the Roman *Via Flaminia* road are taken into account (fig. 2) and described. Hence, the geologic, palaeontologic and geomorphologic characteristics of the Furlo Gorge, the geomorphologic relevance of the San Lazzaro Gorge and, finally, the archaeological and historical components of the *Forum Sempronii* area will be considered. The presence of several and remarkable cultural components well distributed throughout the area and along the “historical” *Via Flaminia* road is suitable for promoting an integrated approach in landscape exploitation for this sector of the *Marche* Apennines.

4.1. – THE ROMAN *FORUM SEMPRONII* SITE

The Roman town of *Forum Sempronii* is set upon a wide upper Pleistocene terrace, on the left flank of Metauro River valley, about 20 m above the present valley-floor (SAVELLI *et alii*, 2004) (fig. 3). A

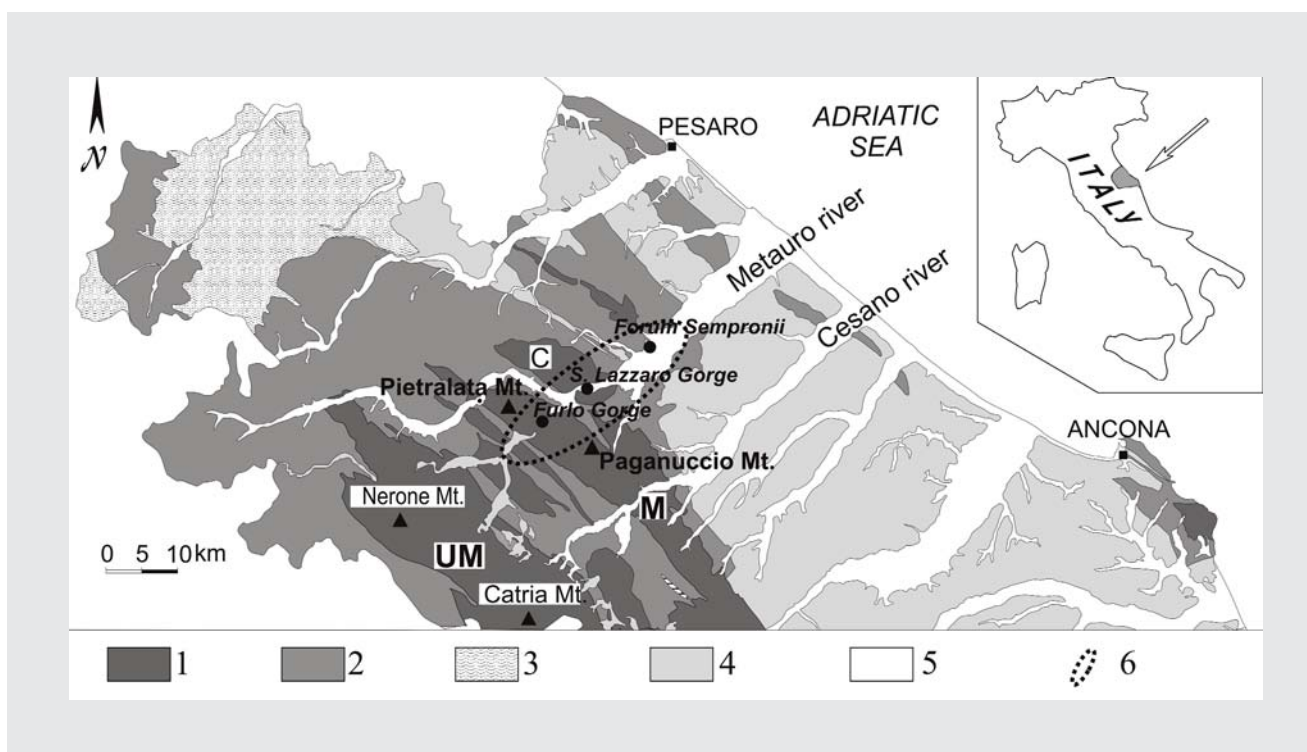


Fig. 1 – Geological sketch of the northern *Marche* Apennines and location of the study area (after: CAPACCIONI *et alii*, 2004, redrawn). 1) Meso-Cenozoic calcareous and marly-calcareous units of the carbonatic ridge; 2) Cenozoic marly-calcareous, evaporitic and siliciclastic units; 3) *Val Marecchia* allochthonous units; 4) Plio-Pleistocene terrigenous units; 5) middle Pleistocene-Holocene fluvial and coastal deposits; 6) study area; UM) Umbro-Marchean Ridge; M) Marchean Ridge; C) *Monti della Cesana* minor Ridge.

– Schema geologico del settore settentrionale dell'Appennino Marchigiano e ubicazione dell'area di studio (da: CAPACCIONI *et alii*, 2004, ridisegnato). 1) Unità Meso-Cenozoiche calcaree e marnoso-calcaree della dorsale carbonatica; 2) Unità Cenozoiche marnoso-calcaree, evaporitiche e silicoclastiche; 3) Unità alloctone della *Val Marecchia*; 4) Unità terrigene Plio-Pleistoceniche; 5) depositi fluviali e costieri del Pleistocene medio - Olocene; 6) area di studio; UM) dorsale Umbro-Marchigiana; M) dorsale Marchigiana; C) dorsale minore di *Monti della Cesana*.

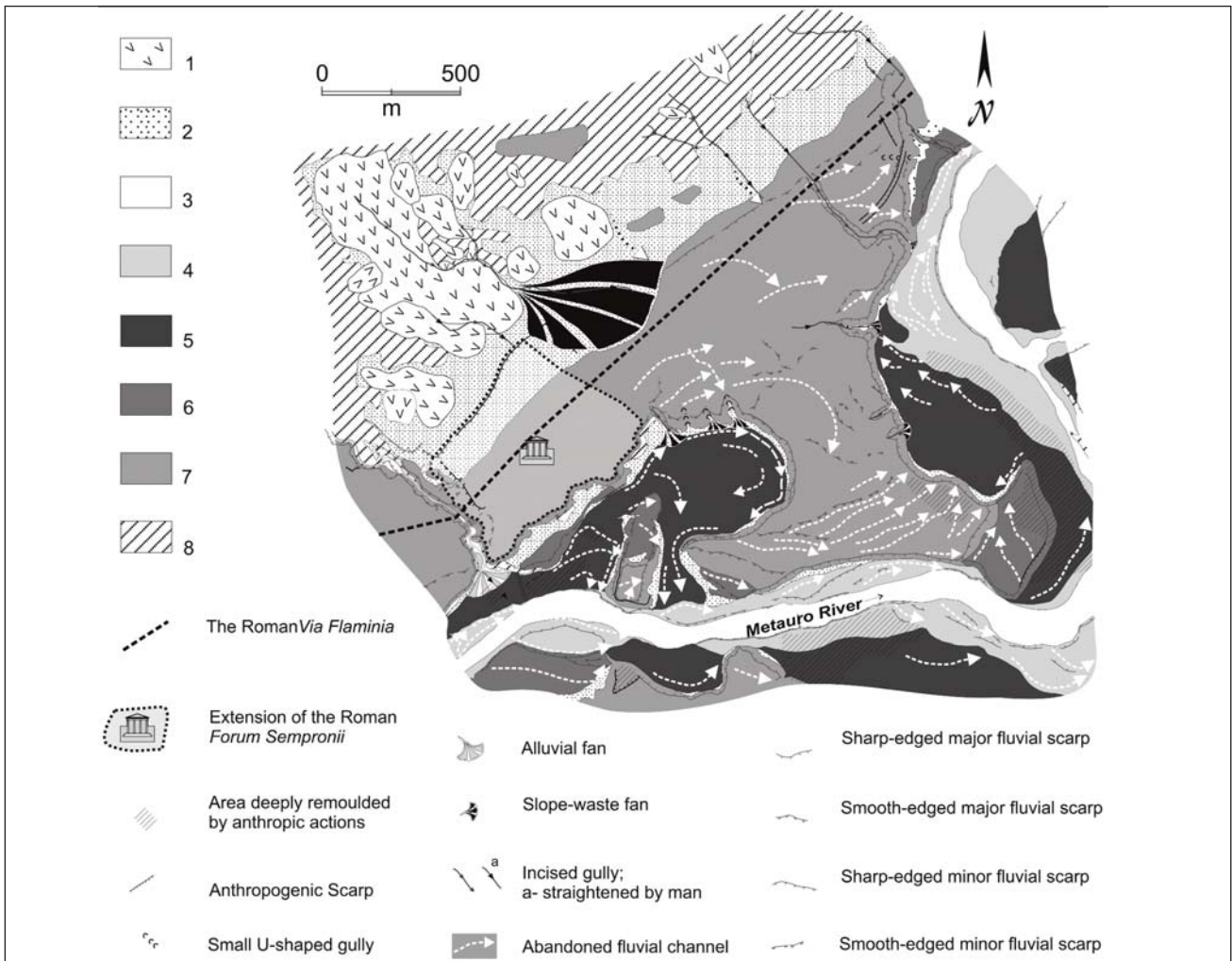
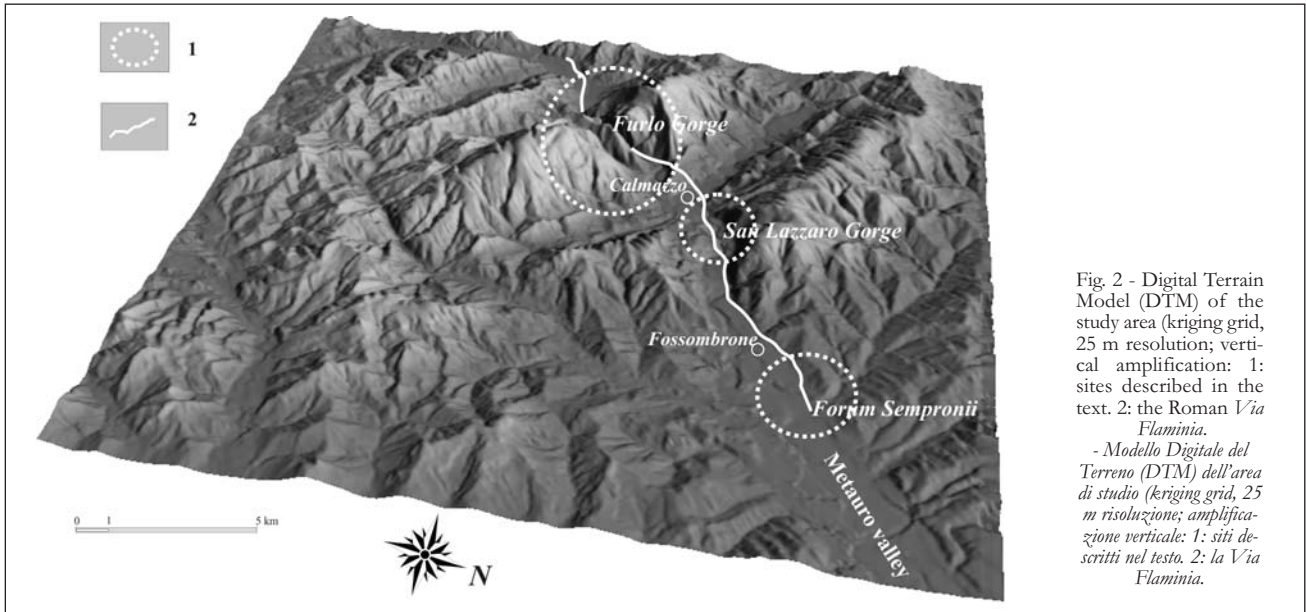


Fig. 3 – Geomorphological sketch of the Forum Sempronii area (after: SAVELLI et alii, 2004). 1: Landslide body; 2: Slope-waste deposits; 3: Active alluvial deposits; 4: partially re-incised alluvium post-dating the 50ies; 5: Terrace alluvium post-dating the 4th-5th century AD; 6: Terrace alluvium (Holocene); 7: Terrace alluvium (middle-upper Pleistocene); 8: Bedrock.

– Schema geomorfologico dell'area di Forum Sempronii (da: SAVELLI et alii, 2004). 1: Corpo di frana; 2: Detrito di versante; 3: Depositi alluvionali attivi; 4: Depositi alluvionali in parte re-incisi posteriori agli anni 50; 5: Terrazzo alluvionale posteriore al 4^o-5^o secolo AD; 6: Terrazzo alluvionale (Olocene); 7: Terrazzo alluvionale (Pleistocene medio-sup.); 8: Substrato.

broad relict meander of the Metauro River is certainly one of the most important landform of the modern landscape immediately close to the archaeological site (fig. 4). The abandoned meander cuts the upper Pleistocene terrace-alluvium and is bounded to the north by the terrace scarp where the southern wall of the Roman town was built (fig. 3). The scarp enclosing the abandoned meander separates the upper Pleistocene terrace-alluvium from the Holocene one. This scarp is well-preserved and shows a sharp upper edge and scarce colluvium/debris accumulation at the toe. Furthermore, the abandoned Metauro River channel is still well recognisable along almost all the scarp toe. The excellent preservation of such landforms hints at quite a recent cut-off of the meander neck and abandonment of the previous course. On the basis of several considerations (e.g. Roman bricks and tiles in alluvial deposits at the mouth of the meander, historical maps dating to 16th-18th century) it can be assumed that in Roman times the Metauro River flowed through the present day abandoned meander, at the toe of the southern walls of the town.

Forum Sempronii was founded, in a site populated in pre-Roman times, between 132 and 126 BC,

probably by *Caius Sempronius Gracchus*, whose presence in that area is documented by an inscription (CIL, I², 719), recovered in the 18th century on the hill of *Monte Giove*, not far from Fano. The so-called “*cippo graccano*” mentions the activity of the triumviral committee appointed to enforce the *lex Sempronia* of 133 BC, aimed at reorganising the *ager publicus* by parcelling out and allotting the agricultural land. *Forum Sempronii*, which turned into a *municipium* during the 1st century BC, has been ascribed to the *Politia* tribe and mentioned by Strabo (Suda V, 2, 10), Plinius (HN, III, 113) and Tolomeus (III, 1, 46), as well as in the *Itineraria*. Marked by a flourishing Christian community since the late 4th-early 5th century AD and known as bishopric (VERNARECCI, 1903: 97-116), the city was heavily damaged during the greek-gothic war of 535-553 AD. After that, most of the inhabitants, for defensive reasons, moved to a nearby hill, thus originating the centre which evolved during medieval and renaissance times under the name of *Fossombrone*. The former city was almost completely abandoned, but the new settlement kept its name, despite some alterations due to the passing of time and language changes (LUNI, 2001, 16).

The site of the ancient *municipium* had been lo-



Fig. 4 - The abandoned meander of *Metauro* River.
– Il meandro abbandonato del fiume *Metauro*.

cated, since the 15th century, on the vast plain where the modern village of *S. Martino del Piano*, about 2 km east of Fossombrone, after the recurrent discovery of artefacts during the ploughing-season (VERNARECCI, 1903: 30-34; MERCANDO 1983: 83-84; GORI & LUNI, 1983: 91-96). Besides affecting town layout, the *Flaminia* road, built around 220 BC, played a major role in the city's economic development, mainly in the first two centuries of the empire.

At least three sides of the Roman town walls took advantage of geomorphologic elements. Indeed, they were against the foothill to the north; to the west they ran along the edge of a steep scarp on the left of *Fosso della Conserva* (a small left-tributary stream of the Metauro River), and they rose southwards on the edge of the Pleistocene terrace. Relations with modern geomorphological features are more problematic in the eastern side of the town: nevertheless, recently, SAVELLI *et alii* (2004) have found some correlation of Roman town and the course of an ancient, no longer recognisable gully. Large cemeteries were found both to the west, over the *Fosso della Conserva*, and to the east of the settlement, thus allowing us to mark the

boundary of the ancient urban area. The existence of some Roman tombs was reported in the easternmost sector of the scarp which borders the city south-east. Probable sections of defensive walls and the rests of two quadrangular towers in *opus quadratum*, incorporated in the foundations of two farmhouse (GORI & LUNI, 1983: 92, 103), are currently visible on the southern side, while a wall section and a circular tower in *opus tumultuarium* (dated to the half of the 6th century AD and connected with the Greek-gothic war) were discovered on the very eastern side. Here, in 1806, some structures were found probably pertaining to a gate, in the same place where, on 3rd October 1603, an inscription mentioning the *Porta Gallica* was recovered (CIL, XI, 6136; VERNARECCI, 1903: 34-35; GORI & LUNI, 1983: 103). As a consequence, the settlement was extended for about 30 hectares, having a squared road network, with parallel and perpendicular streets crossing each other at right angles (fig. 5). The members of the Urbino University Archaeological Institute, in collaboration with the regional board of the Ministry of Cultural Heritage, have systematically studied the city since 1974, through surveys and soundings, locating and



Fig. 5 – Roman paved streets of *Forum Sempronii*.
– *Strade lastricate Romane di Forum Sempronii*.

digging out two baths, a urban stretch of the *Flaminia* consular road, as well as the stretches of other streets, thus allowing us to recognise at least one rectangular *insula*, measuring 2 by 3 *actus* (ca. 70x105 m.; LUNI, 2001: 11-16; LUNI, 2003).

4.2. – THE SAN LAZZARO GORGE AREA

This area is located in the neighbourhood of the village of *Calmazzo* (fig. 2), where the Metauro valley crosses and deeply cuts the *Monti della Cesana* minor Ridge (fig. 1). Here, the valley shows a strong flanks asymmetry. The left valley flank is steep and completely lacking in terraces older than upper Pleistocene (fig. 6); these latter on the contrary are preserved on the right valley side. In addition, the left valley flank shows significant gravitational instability stressed by extensive erosional processes, deep landslides, marked slope-waste production and formation of alluvial fans (fig. 6). The gravitational instability of this valley side is also underlined by the 1934 landslide, which produced 11 victims and is remembered by a commemorative inscription. The different characteristics of the two valley sides suggest a major tectonic control in the valley profile evolution (SAVELLI *et alii*, 2002). The

most significant geomorphologic feature of this area is a gorge, up to 30 meters deep, carved by the Metauro River out of the Cretaceous limestones of the *Maiolica* Fm (fig. 6). Well preserved giants potholes (fig. 7) are the most relevant landforms of the gorge. Six major potholes, both active and fossil, can be easily watched from the so-called *Ponte di Diocleziano* on the left gorge side; nevertheless, several minor potholes are present all along the gorge.

San Lazzaro is sometimes reported as bearing a Roman bridge, the so-called *Ponte di Diocleziano*. However, such bridge is not Roman, but younger in age, i.e. not older than Medieval times (LUNI, 2003, and references therein). Worth mentioning is the discovery of Roman burials at *Ponte Rotto*, *Calmazzo* (some 10 km west of *Forum Sempronii*), and, further to the west are the remains of an important Imperial age burial ground belonging to the local *gens Cissonia* (fig. 8). Indeed, a fairly important settlement, maybe a *vicus*, likely to be situated by *Calmazzo*, where the *Flaminia* branched off into a *diverticulum* connecting the consular road with middle-upper Metauro valley *municipia* (GORI, 1993). In the past, several archaeological finds – remains, pottery and various building materials – were recovered in close proximity to such key

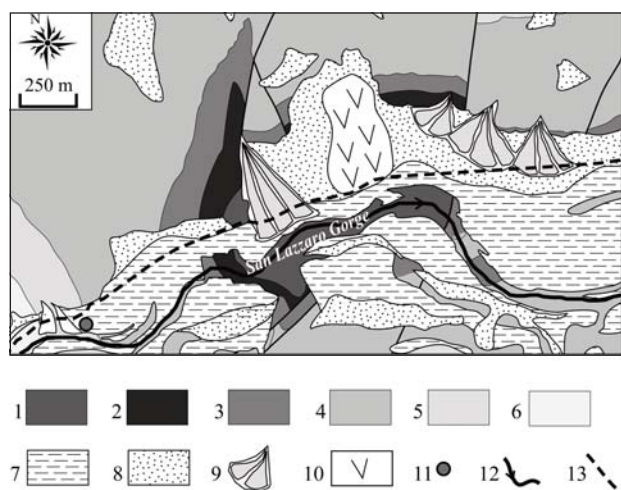


Fig. 6 – Geological sketch of the San Lazzaro Gorge site. (after: SAVELLI & TRAMONTANA, 2001, redrawn). 1: *Maiolica* Fm. (upper Jurassic-middle Cretaceous); 2: *marne a Fucoidi* Fm. (middle Cretaceous); 3: *Scaglia Bianca* Fm. (middle Cretaceous–upper Cretaceous); 4: *Scaglia Rossa* Fm. (upper Cretaceous–middle Eocene); 5: *Scaglia Variegata* Fm. (middle Eocene–lower Oligocene); 6: *Scaglia Cinerea* Fm. (lower Miocene); 7: terrace alluvium (middle Pleistocene–Holocene); 8: slope-waste deposits (upper Pleistocene–Holocene); 9: alluvial fan (Holocene); 10: the 1934 *San Lazzaro* landslide; 11: roman burials; 12: *Metauro* river; 13: the Roman *via Flaminia*.
 – *Schema geologico dell'area delle Gole di San Lazzaro* (da: SAVELLI & TRAMONTANA, 2001, ridisegnato). 1: formazione della *Maiolica* (Giurassico sup.-Cretacico medio); 2: formazione delle *Marne a Fucoidi* (Cretacico medio); 3: formazione della *Scaglia Bianca* (Cretacico medio–Cretacico sup.); 4: formazione della *Scaglia Rossa* (Cretacico sup.-Eocene medio); 5: formazione della *Scaglia Variegata* (Eocene medio - Oligocene inf.); 6: formazione della *Scaglia Cinerea* (Miocene inf.); 7: terrazzi alluvionali (Pleistocene medio-Olocene); 8: detrito di versante (Pleistocene sup.-Olocene); 9: conoide alluvionale (Olocene); 10: la frana del 1934 di *San Lazzaro*; 11: tombe romane; 12: fiume *Metauro*; 13: la *via Flaminia*.



Fig. 7 – The potholes of the San Lazzaro Gorge.
 – *Marmite dei giganti delle Gole di San Lazzaro*.



Fig. 8 – Gens Cissonia's burial ground, Calmazzo village.
– Recinto sepolcrale della Gens Cissonia, Calmazzo.

crossroads and some burial areas have been detected. Chief among the latter is *gens Cissonia* burial ground, the excavation of which was performed, since 1989, by the university of Urbino in alliance with the regional board of the Ministry

of Cultural Heritage. The area, approx 135 square metres, is bordered by a stone kerb originally bearing ashlar limestone slabs positioned at regular intervals. Inside the burial ground were two sepulchral altars, respectively dedicated to *C. Cisso Festus* and *C. Cisso Zosymus* and his wife *Cissonia Festa*. Noteworthy among the tools found inside the tombs is a gold necklace, as well as balsam and ointment vases, lamps and pottery. The funeral monument can be dated at early imperial age.

4.3. – THE FURLO GORGE

The *Furlo Gorge* site is well known for a striking canyon deeply cut by the *Candigliano River*, the major tributary of the *Metauro River*, transversally crossing the anticline mountains of *Pietralata-Paganuccio* Mts. (named *Monti del Furlo* according to a local designation). The gorge cuts the Jurassic-Paleogene calcareous and marly-calcareous formations of the *Umbria-Marchean Succession*. This area is one of the best example of such puzzling

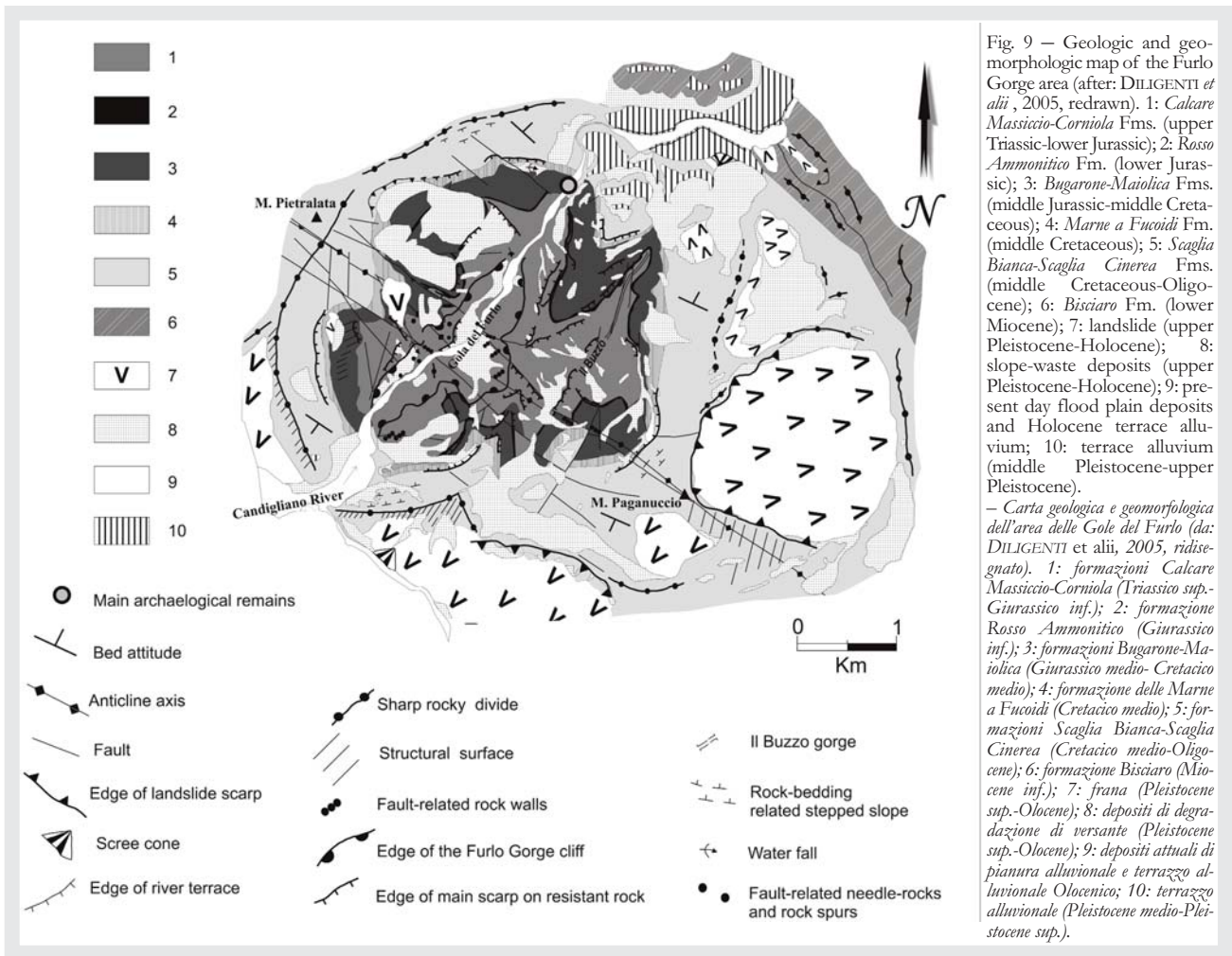


Fig. 9 – Geologic and geomorphologic map of the Furlo Gorge area (after: DILIGENTI *et alii*, 2005, redrawn). 1: *Calcare Massiccio-Corniola* Fms. (upper Triassic-lower Jurassic); 2: *Rosso Ammonitico* Fm. (lower Jurassic); 3: *Bugarone-Maiolica* Fms. (middle Jurassic-middle Cretaceous); 4: *Marne a Fucoidi* Fm. (middle Cretaceous); 5: *Scaglia Bianca-Scaglia Cinerea* Fms. (middle Cretaceous-Oligocene); 6: *Bisciaro* Fm. (lower Miocene); 7: landslide (upper Pleistocene-Holocene); 8: slope-waste deposits (upper Pleistocene-Holocene); 9: present day flood plain deposits and Holocene terrace alluvium; 10: terrace alluvium (middle Pleistocene-upper Pleistocene).
– *Carta geologica e geomorfologica dell'area delle Gole del Furlo* (da: DILIGENTI *et alii*, 2005, ridisegnato). 1: formazioni *Calcare Massiccio-Corniola* (Triassico sup.-Giurassico inf.); 2: formazione *Rosso Ammonitico* (Giurassico inf.); 3: formazioni *Bugarone-Maiolica* (Giurassico medio-Cretacico medio); 4: formazione delle *Marne a Fucoidi* (Cretacico medio); 5: formazioni *Scaglia Bianca-Scaglia Cinerea* (Cretacico medio-Oligocene); 6: formazione *Bisciaro* (Miocene inf.); 7: frana (Pleistocene sup.-Olocene); 8: depositi di degradazione di versante (Pleistocene sup.-Olocene); 9: depositi attuali di pianura alluvionale e terrazzo alluvionale Olocenico; 10: terrazzo alluvionale (Pleistocene medio-Pleistocene sup.).

landforms typical of central and northern Apennines and shows the main geomorphologic peculiarity of the area. Recently, taken into account its attractive and scenic beauty and scientific/educational relevance (BARTOLINI & PECCERILLO, 2002) the *Monti del Furlo* area has been proposed (DILIGENTI *et alii*, 2005) as a Geomorphosite (*sensu* PANIZZA, 2001). Moreover, several fossiliferous sites as well as the outcropping of the regional-markers *Bonarelli* level and K/T stratigraphic bound, contribute to enhance the environmental significance of the integrated landscape of the Furlo Gorge site. Finally, recently the area was included in the Riserva Naturale Statale Gioia del Furlo.

The approximately NW-SE striking *Pietralata-Paganuccio* anticline is characterized by a slightly asymmetric box fold without any clear evidence of emergent thrust in its forelimb (CAPACCIONI *et alii*, 2005). The anticline rapidly plunge-down both towards the NW and the SE where forms a wide depressed area crossed by the *Cesano* River (fig. 1). The axial culmination of this structure matches with the Furlo Gorge. In particular, the Furlo Gorge is entrenched in the lower Jurassic *Calcarea Massiccio* Fm., an over 500 m thick formation which mainly consists of massive dolomitic limestones (CECCA *et alii*, 1999). This formation, the oldest outcropping in the area, is overlain by an approximately 600-700 m thick sedimentary sequence, mainly characterized by calcareous, marly-calcareous and marly terrains, extending in age from lower Jurassic to lower Miocene (fig. 9).

Nevertheless the sub-vertical walls, hanging



Fig. 10 – The Furlo Gorge.
– *Le Gole del Furlo*.

over 500 m high on present valley-floor (fig. 10), represent the main scientific and scenic attraction of the site, from a geomorphologic standpoint the area is also characterized by several minor, yet noticeable, landforms and landform assemblages. Actually, *Il Buzzo* minor gorge, approximately parallel to the main Furlo Gorge (fig. 9) and well-preserved flatirons immediately over the gorges, certainly represent some of the main landforms. Moreover, karst, fault-related and fluvial landforms (DILIGENTI *et alii*, 2005) can also be observed widespread in the area (fig. 9).

The Furlo Gorge, frequented since prehistory, represented the natural access from the coast to pastures and Apennine passes. Such key function was then heightened in Roman times with the opening of the *Via Flaminia* around 220 BC and the imposing works performed in order to make the gorge traversable. The significant remains both of the consular road and its associated structures make the Furlo Gorge an important and renowned archaeological site. Rock cuts and imposing walls were made (fig. 11), on the rock spur to the left flank of the Can-



Fig. 11 – Roman walls in the downstream sector of the Furlo Gorge.
– *Costruzioni Romane nel settore a valle delle Gole del Furlo*.

digliano River, to get and sustain the road (the amount of removed rock is reckoned at 1500 m³). Later on two tunnels were opened: a smaller one, the dating of which is uncertain (1st century BC – first half of the 1st century AD), and Vespasiano one, dated to 76 AD. This latter is one of the most significant examples of tunnelling in Roman times. The long-lived, primary function of the gorge as natural barrier played a prominent part in the Greek-Gothic war (535-553 AD) and, reputedly, in Longobardic times (6th-8th century AD; LUNI, 1989, 2003).

Acknowledgements

This paper was funded by MIUR to O. NESCI (cofinanced project "Geomorphological heritage as a resource for a sustainable tourism", 2004).

REFERENCES

- BISCI C. & DRAMIS F. (1991) – *La Geomorfologia delle Marche*. In: VARIOUS AUTHORS (Eds.): *L'Ambiente fisico delle Marche*. Regione Marche – Giunta Regionale, Assessorato Urbanistica e Ambiente, 81-113, S.EL.CA., Firenze.
- BOCCALETTI M., ELTER P. & GUAZZONE G. (1971) – *Plate tectonic models for the development of the western Alps, and northern Apennines*. *Nature, Phys. Sci.*, **234**, 108-110.
- CAPACCIONI B., NESCI O., SACCHI E.M., SAVELLI D. & TROIANI F. (2005) – *Caratterizzazione idrochimica di un acquifero superficiale: il caso della circolazione idrica nei corpi di frana nella dorsale carbonatica di M. Pietralata – M. Paganocio (Appennino Marchigiano)*. *Il Quaternario*, **17** (2/2), 585-595.
- CECCA F., CONTE G., CRESTA S., D'ANDREA M., GRAZIANO R., MOLINARI V., PANTALONI M., PICHEZZI R.M., ROSSI M., CATENACCI V., CACOPARDO M., CENSI NERI P., PANNUTI V., BORGIA M.G., ERBA, MENICCHETTI M. & RAFFI I. (1999) – *Risultati preliminari del rilevamento nel settore sud-occidentale del foglio n. 280 Fossombrone della Carta Geologica d'Italia a scala 1:50.000*. *Boll. Serv. Geol. d'It.*, **115**.
- COCCIONI R., MORETTI E., NESCI O., SAVELLI D., TRAMONTANA M., VENERI F. & WEZEL F.C., con contributo di CECCA F., CRESTA S. & PASSERI L. (1994) – *Assetto stratigrafico e strutturale della successione Umbro-Marchigiana-Romagnola*. *Guide Geologiche Regionali*, **7**, 103-118.
- DEIANA G. & PIALI G. (1994) – *Le province strutturali dell'Appennino Umbro-Marchigiano*. *Memorie della Società Geologica Italiana*, **48**, 473-484.
- DI BUCCI D., MAZZOLI S., NESCI O., SAVELLI D., TRAMONTANA M., DE DONATIS M. & BORRACCINI, F. (2003) – *Active deformation in the frontal part of the Northern Apennines: insights from the lower Metauro River basin area (northern Marche, Italy) and adjacent Adriatic off-shore*. *Journal of Geodynamics*, **36**, 213-238.
- DILIGENTI A., NESCI O. & SAVELLI D. (2005) – *Geomorphosites in the landscape of Monti del Furlo (northern Marche Apennines)*. *Il Quaternario*, **18** (1), 203-211.
- FANUCCI F., MORETTI E., NESCI O., SAVELLI D. & VENERI F. (1996) – *Tipologia dei terrazzi vallivi ed evoluzione del rilievo nel versante adriatico dell'Appennino centro-settentrionale*. *Il Quaternario*, **9**, 255-258.
- GORI G. (1993) – *Il vicus di Calmazzo*. In: LUNI M. (Ed.): *La media vallata del Metauro nell'antichità*. Quattroventi, Urbino, 85-87.
- GORI G. & LUNI M. (1983) – *Note di archeologia e topografia fossomproniese*. *Picus*, **3**, 87-113.
- LUNI M. (1989) – *Nuovi documenti sulla Flaminia dall'Appennino alla costa adriatica*: Urbino, Quattroventi, Urbino, pp. 70.
- LUNI M. (1993) – *La Flaminia nelle gole del Furlo e del Burano*. *Arti grafiche Editoriali Srl.*, Urbino, pp. 67.
- LUNI M. (2001) – *Statue di bronzo a Forum Sempronii e in città del versante medio adriatico*. Quattroventi, Urbino, 56 pp.
- LUNI M. (2003) – *Archeologia nelle Marche*. Nardini, Firenze, pp. 438.
- MAYER L., MENICCHETTI M., NESCI O. & SAVELLI D. (2003) – *Morphotectonic approach to the drainage analysis in the North Marche region, Central Italy*. *Quaternary International*, **101-102**, 156-167.
- MAZZANTI R. & TREVISAN L. (1978) – *Evoluzione della rete idrografica dell'Appennino centro-settentrionale*. *Geografia Fisica e Dinamica Quaternaria*, **1**, 55-62.
- MERCANDO L. (1983) – *Documenti d'archivio per Forum Sempronii*. *Bollettino D'Arte*, **19**, 83-110.
- NESCI O. & SAVELLI D. (1986) – *Cicli continentali tardo-quaternari lungo i tratti vallivi mediani delle Marche Settentrionali*. *Geografia Fisica e Dinamica Quaternaria*, **9**, 192-211.
- PANIZZA M. (2001) – *Geomorphosites: concepts, methods and examples of geomorphological survey*. *Chinese Sci. Bull.*, **46**, 4-6.
- PANIZZA M. & PIACENTE S. (2003) – *Geomorfologia culturale*. Pitagora Ed., Bologna, pp. 350.
- PERGOLINI C. (1990) – *Le marmitte dei giganti a Fossombrone. Nascita ed evoluzione del canyon di S. Lazzaro*. Tipografia V. Sartini, Urbino: pp. 19.
- SAVELLI D., DE DONATIS M., MAZZOLI S., NESCI O., TRAMONTANA M. & VENERI F. (2002) – *Evidence for quaternary faulting in the Metauro River Basin (Northern Marche Apennines)*. *Boll.Soc.Geol.It.*, Special Issue **1**, 931-937.
- SAVELLI D., LUNI M. & MEI O. (2004) – *La città di Forum Sempronii e i suoi rapporti con il paesaggio attuale: una discussione basata su evidenze geologico-geomorfologiche e archeologiche*. *Il Quaternario*, **17** (2/1), 185-194.
- SAVELLI D. & TRAMONTANA M. (2001) – *I Monti della Cesana e La Gola del Furlo*. In: Società Geologica Italiana (Ed.): *Appennino Umbro-Marchigiano*, **2**. *Guide Geologiche Regionali*. BE-MA (Ed.), 103-118.
- VARIOUS AUTHORS (2003) – *La valle del Metauro - Banca dati sugli aspetti naturali e antropici del bacino del Metauro*. Ed. Comune di Fano e Associazione Naturalistica Argonauta, Fano (PU).
- VERNARECCI A. (1903) – *Fossombrone dai tempi antichissimi ai nostri giorni*, **1**, pp. 560, Soc. Tipografica G. Staurengi & C., Fossombrone.