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Communities and landscape(s) of North-eastern Apulia during the 2nd millennium BC

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Introduction

Northern Apulia is composed of a highly diversified palimpsest of landscapes, from the dynamic ecosystems of the coastal and wet areas to the uplands and rough mountain valleys. These diverse ecozones have yielded dozens of archaeological sites dating to the 2nd millennium BC: some can be characterised by but a small amount of finds, generally pottery fragments, indicating short and/or sporadic occupation of a location, others are extraordinary structures with a large number of archaeological finds (for example, at Torre Mileto or Coppa Nevigata), witnessing long-lasting occupation of the same physical place. Diverse communities interacted with one another and across various environments, producing multi-layered political relationships and human-environment interactions.

This study discusses possible scenarios of human-landscape(s) interaction and political relationships between different communities throughout the 2nd millennium BC in North-eastern Apulia, by visualising and analysing a dataset composed of archaeological sites known from available literature (e.g. works of A. Gravina) and web sources (e.g. Cartapulia¹). The case studies take into account sites that highly differ in their data quality, since the analysis considers both contexts investigated by archaeological excavations and those known from surveys (the larger part). Yet, this work, by exploiting potentialities of data visualisation and computing of GIS

¹ <http://cartapulia.it/>

systems, attempts their integration into an overarching discussion, embracing data uncertainty within a contextual analytical perspective. The focus of exploration is on the timespan of the 18th to the 12th centuries BC: the goal being to analyse the lived-in landscape(s) and assess the impact of the emergence and growth of fortified centres in the cultural landscape formation.

Geographical and paleoenvironmental setting

The area under scrutiny (fig.1) encompasses the North-eastern part of the Apulia region (WGS84 – UTM33N; unit – in metres; range from limits at NW *Long.* 542055,38, *Lat.* 4648995,50 to the SE *Long.* 600277,19, *Lat.* 4587426,00). It is characterised by the presence of four environmental components: the Adriatic Sea, the coastal wet areas, the flat northern part of the Tavoliere plain (the second largest plain of the Italian peninsula) and the mountainous backdrop of the Gargano promontory, that merge into each other. They contribute to make this geographical area one of the most naturally diversified regions of the Central Mediterranean. Furthermore, since the Neolithic period, the particular shape of the Gargano promontory, projecting into the Adriatic Sea, as well as the presence of small islands (e.g. Tremiti and Pelagosa), has served as a bridge for contacts between South-eastern Italian and Western Balkan societies (Forenbaher *et alii* 2018; Gori *et alii* 2018; Arena 2020).

Recent research has shed new light on the paleoenvironmental conditions throughout the Mid-Late Holocene, including changes in coastlines and wetlands (SUSINI *et alii* 2022; CALDARA, SIMONE 2012; BOENZI *et alii* 2006; LUCCHI *et alii* 2006), as well as changes in climate and vegetation cover (CAROLI, CALDARA 2007; DI RITA, MAGRI 2012; FIORENTINO *et alii* 2013; SUSINI *et alii* 2022). Notably, fresh paleoenvironmental data are available from a recent paper (SUSINI *et alii* 2022) focused on changes seen in coastal lagoons located along the south-western shore of the Manfredonia gulf, historically known by the names of Lago Salso and Lago Salpi. Here, this paper takes into consideration the extension of the northern part of the lagoon (Lago Salso) and the surrounding marsh areas as reconstructed by Susini *et al.* for the Early-Middle Meghalayan (i.e. 4.2ka - 2.4Ka B.P.), which partially modifies the previous hypothesis by Caldara and Simone (CALDARA, SIMONE 2012) and better combines with the available archaeological evidence. Northern bodies of water though, Lago di Lesina and Lago di Varano, have been mapped using present shorelines, since they are expected to be broadly comparable to those in Late Prehistory (PENNETTA 2007). But throughout the second millennium BC, another body of water – the now-extinct *Battaglia* Lake – influenced the eastern side of the Gargano promontory (fig.14 PENNETTA 2007). It has also been incorporated into the map (fig.1) at its hypothesised extent and position at around 5180±40 BP (fig. 14b PENNETTA 2007).

During the 2nd mill. BC, lowlands were mainly characterised by an open land-

scape, with a native vegetation composed of herbaceous plants and shrubs, a condition resulting from both the impact of human activities and the previous dry event (4.2. Ka event) (DI RITA, MAGRI 2019) that occasioned the decrease of the arboreal *taxa*. In contrast, deciduous trees continued to characterise the Gargano promontory, probably serving as a source of wood supply for local people.

A brief statement of the position of the present archaeological research and data

Northern Apulia provides a remarkably diversified range of archaeological contexts dating to the Late Prehistory, from settlement to ritual and funerary contexts, as well as megalithic structures (i.e. dolmens). This dataset is highly informative for exploring construction and development of cultural landscapes during the 2nd millennium BC.

Archaeological investigations at some of the most significant sites were under way during the first half of the 1900s. For example, the excavation at the fortified settlement of Coppa Nevigata, carried out in connection to reclamation activities of the Salso lagoon (MOSSO 1909; CAZZELLA, MOSCOLONI 2012), Grotta Scaloria (CIAMPALINI *et alii* 2011; ELSTER *et alii* 2016) and the investigation at Grotta Manaccora (RELLINI *et alii* 1930). However, archaeological research significantly increased from the 1950s, owing to systematic studies conducted by diverse academic research groups, the Superintendency, and even with contributions from local organisations (notably the *Archeoclub* groups). Moreover, the rescue archaeology policy, adopted by the authority in charge of this area, currently the SABAP - *Soprintendenza Archeologia, Belle arti e Paesaggio per le province di Barletta-Andria-Trani e Foggia*, enables us to preserve and record the cultural heritage, expanding the archaeological knowledge about this region. Noteworthy is the activity of local *Archeoclub* groups (e.g. the works of Armando Gravina), which allows us to recognize an important number of archaeological sites (GRAVINA 1999; 1982). Thus, published conference proceedings about the annual meeting organised by the *Archeoclub* of San Severo² represent a precious dataset about the archaeological (Bronze Age in this study) evidence of the *Daunia* region. Moreover, in recent years, a doctoral project led by Andrea Monaco investigated a wide area of the southern Gargano promontory, providing further data on human occupation of the highlands during the Late Prehistory (MONACO 2016).

From the coasts to the inlands/uplands, these research activities investigated the diverse ecozones, revealing the coexistence of differentiated settlement patterns throughout the 2nd millennium BC. Notably, this region witnessed the phenomenon of the emergence of long-lasting fortified settlements characterising the Bronze

² <http://www.archeologiadigitale.it/>

Age of the Central Mediterranean, seen too in Southern Italy as well as the regions of the Adriatic coast opposite (CAZZELLA, RECCHIA 2013; HÄNSEL *et alii* 2015; ARENA *et alii* 2018; CAZZELLA, RECCHIA 2018). But these centres represented only part of a wider multifaceted palimpsest of settlement patterns. As previously mentioned, surface pottery collections as well as evidence from investigated archaeological deposits (especially as part of rescue investigations) witness the continuation of small and dispersed open hamlets, in addition to potential temporary/work sites related to primary resources procurement (e.g. salt). It remains uncertain and open to debate to what degree the landscape was politically structured and what kind of relationships existed between communities characterised by different social organisations. Finding an answer is quite difficult, since the majority of these contexts are identified from surveys, thus their chronology remains quite uncertain within the broader 2nd millennium BC. However a range of potential scenarios can be traced: their elucidation is the main purpose of this paper.

This palimpsest of evidence is enriched by contexts characterised by a high symbolic meaning, such as Grotta Manaccora (RECCHIA 1999; TUNZI *et alii* 2018) or the cave system of Scaloria/Occhiopinto (ELSTER *et alii* 2016). Here, even though they are not included in the study area (they are located farther south), it is important to bear in mind the presence of cult/funerary hypogenous structures of Trinitapoli and San Ferdinando (TUNZI-SISTO 1998; PERONI *et alii* 2003; TUNZI *et alii* 2017), which are part of the wider phenomenon of the *hypogeism* characterising ritual sphere of the Bronze Age communities of South-eastern Italy.

Another noteworthy feature within the landscape is the presence of megalithic buildings (dolmens), but they lack systematic investigation; for this reason, they were not considered in this work.

Mapping and analysing sites distribution: materials and methods

Data entry process and map visualisation have been carried out by Qgis (*version 3.2x.x*) adopting the *WGS 84 / UTM zone 33N - EPSG:32633*. Analytical processes have been performed by the use of Qgis and R. DEM used in the data visualisation and analysis is the EU-DEM V1.1 with 25 m resolution (European Space Agency and Sinergise 2021). Sites have been gathered from Cartapulia and available literature (e.g. publications of *Atti della Daunia*).

The map shows the site distribution of the entire analysed dataset. It displays 32 contexts referring to different types of evidence (tab.1), from the coast to the inner low and uplands areas (fig.1). The large part of the dataset is composed of archaeological contexts known through surveys (tab.1), thus their chronology is generally poorly characterised. Accordingly, they have been considered as “open sites” of indeterminable function. Conversely, a small part has been investigated through ar-

chaeological excavation, particularly fortified settlements located along the coast, the open settlement of Masseria Cupola Beccarini, the site of Castelpagano³ and the karstic system Scaloria-Occhiopinto. The site of Monte Granata (site n. 27), located along the south-western margin of the Gargano promontory and dominating the lower plan, deserves a particular mention. According to various studies (TUNZI SISTO 1995; GRAVINA 1999), this is considered to be a fortified settlement, since Bronze Age pottery (particularly Apennine pottery, of the 15th – 14th centuries BC) was discovered in an area characterised by the presence of a complex pattern of dry-stone walls, also visible from satellite images and aerial photography (GRAVINA 1999 fig.17-18; ROSSI 2011). This is interpreted as the remains of a Bronze Age fortification. However, in this paper the site has been typified as “suspected fortified settlement”, since archaeological excavation investigated only a small area, characterised by the presence of an elliptical dry-stone barrow placed along the western side (ROSSI 2011). Thus the actual development of the entire system of dry-stone walls during the Bronze Age remains quite uncertain.

As stated in the previous paragraph, a few contexts in natural caves have been included in the dataset under scrutiny (tab.1) in order to explore the lived-in landscape from a more complete point of view, over as wide a range of places of human-environment interaction as possible. However, they should be viewed as but a small sample of the much larger number of natural caves existing in this area, most of which have not been systematically investigated and published.

The analysis presented in this work is based on two main lines of investigation, observing: 1) the settlement pattern transformation over a diachronic perspective and 2) interactions between communities and places in the landscape through GIS analyses, enabling us to explore space in a perceptive approach, namely how people could interact with places and landscapes in which they were situated.

The first aspect is analysed by the use of distributional maps referring to the three main chronological phases, starting from the early 18th century BC to the late 12th century BC, in this scheme:

- Protoapennine phase: 18th – 16th c. BC;
- Apennine phase 15th – 14th c. BC;
- Subapennine phase 13th – 12th c. BC.

The chrono-cultural sequence used for this region is based on well-excavated con-

³ As regards the site of Castelpagano (LISCIARELLI, SUADONI 2009), part of the archaeological deposit pertaining to the Bronze Age was investigated during the archaeological investigation carried out in the area interested by the presence of the Middle Ages ‘castle’. As a result, it is quite difficult to completely define the function of the site, although the presence of a stable community in a prominent position over the landscape during the mid-2nd millennium BC could be suggested by the significant quantity of pottery fragments.

n	Site name	x coord.	y coord.	Investigation	Site type	Bronze Age (generic)	18th-16th c. BC	15th-14th c. BC	13th-12th c. BC
1	Punta Manaccora	586513,026	4644474,687	Archaeological excavation	Fortified settlement				
2	Grotta Manaccora	586555,111	4644359,407	Archaeological excavation	Natural cave				
3	Loc. Macchia a Mare	581124,246	4643628,678	Surface collection	Open site				
4	La Bufalara	586752,823	4643462,791	Surface collection	Open site				
5	Grotta dell'Acqua	589929,887	4642979,984	Surface collection	Natural cave				
6	Loc. Finitia	583309,67	4642901,46	Surface collection	Open site				
7	Grotta di Mauro	578959,196	4643082,267	Surface collection	Natural cave				
8	Grotta del Crovatico	591161,777	4642431,886	Surface collection	Natural cave				
9	Punta la Molinella	594819,941	4640634,427	excavation	Fortified settlement				
10	Loc. Santa Lucia	572137,599	4641372,386	Surface collection	Open site				
11	Torre Mileto	551505,33	4641920,242	excavation	Fortified settlement				
12	Torre Calarossa	553326,635	4641778,214	Surface collection	Open site				
13	Foce Capolale	555012,235	4641166,693	Surface collection	Open site				
14	Loc. Monte d'Elio	553046,85	4639759,928	Surface collection	Open site				
15	Masseria Pasquarelli	568961,753	4637497,801	Surface collection	Natural cave				
16	Loc. Macchito	572826,989	4634151,174	Surface collection	Open site				
17	Loc. Grotta del canale mortale	567041,142	4631056,221	Surface collection	Natural cave				
18	Castelpagano	544085,133	4622837,797	Archaeological excavation	Open site				
19	Loc. Monte Castello	545969,478	4622621,133	Surface collection	Open site				
20	Postiglione	543185,923	4618383,405	Surface collection	Open site				
21	Località Gravina	552958,575	4616302,429	Surface collection	Open site				
22	Località Casale								
22	Crisetti	554601,394	4615512,545	Surface collection	Open site				
23	Chiancata Civita	554059,192	4614640,404	Surface collection	Open site				
24	Località Il Castello	560603,186	4613647,91	Surface collection	Open site				
25	Loc. Chiancata Avatra	565644,347	4613749,966	Surface collection	Open site				
26	Coppa Masselli	567554,89	4614016,203	Surface collection	Open site				
27	Loc. I Lamioni	553736,298	4612239,737	Surface collection	Open site				
28	Scaloria-Occhiopinto	575536,097	4610194,398	Archaeological excavation	Natural cave				
29	Monte Granata	553851,247	4608559,541	Surface collection	Suspected fortified				
30	Coppa Navigata	569540,521	4601051,826	excavation	Fortified settlement				
31	Masseria Cupola	569724,46	4596539,986	Archaeological excavation	Open settlement				
32	Sanse Postie	576220,052	4588854,455	Surface collection	Open site				

Table 1 – Site table reporting spatial coordinates, type of investigation, site type and referred chronological data.

texts, particularly on the cultural sequence and radiocarbon data from Coppa Nevigata (CALDERONI *et alii* 2012). The second aim is achieved by the combination and visualisation on maps of two types of analyses: Topographic Position Index (TPI – fig. 2) (NAKOAIZ, KNITTER 2016) and Visibility Index – total viewshed – incoming views (fig.2) performed on Qgis by the plugin Visibility Index setting a *radius* of 5 km (ČUČKOVIĆ, SMITH 2016). The TPI calculates relative terrain positions by comparing the value of each cell in a raster DEM to the mean value of cells within a pre-defined buffer zone. Positive numbers represent ridge/hill-like positions (i.e. dominant/naturally defended places), whereas negative values represent valley/depressed places. The TPI analysis was carried out in the manner described in the publication by O. Nakoinz and D. Knitter (2016, p.112), setting $w = 25$ (which has proven to be the most effective discriminant value). The second analysis provides a model of the visibility structure of landscape, particularly, how a place is visible from its surroundings, overturning the common use of the GIS viewshed analysis concerned mostly to investigate the possibility of control of a surrounding from a specific point. In the framework of archaeological issues explored in this paper, by this analytical method we can answer the question of how much a site could be a point of reference within landscape.

Results and discussion

In the maps (fig.3) are synthesised the distributional settings during three main phases of the 2nd mill. BC. As mentioned above, a large part of the dataset under scrutiny is only generically attributable to the 2nd mill. BC. A small white square, for an open site, or a light grey ‘semi-circle’, for natural caves, appear on the maps; they have been included in each of the three chronological sceneries examined.

The map (fig.3A) refers to the earliest analysed period, when fortified settlements emerged along coastal areas (CAZZELLA, RECCHIA 2018), but exploiting different topographical conditions. In particular, Punta Manaccora (n.1) and Torre Mileto (n.11) arose on small promontories extending into the sea, naturally protected by the water on three sides, and artificially fortified along the side that connected the promontory to the mainland (TUNZI *et alii* 2010; SCARANO 2012). Coppa Nevigata (CAZZELLA, RECCHIA 2012), on the other hand, arose on the shore of a coastal lagoon that was open to the sea, ensuring access to maritime trade while also providing an element of protection and secure mooring by being protected from sea currents and winds. The lagoon also represented a valuable source of livelihoods, both foods and other types of primary resources (e.g. reeds as building material) (MINNITI 2012; RECCHIA *et alii* 2021). Returning to Punta Manaccora, the surrounding area sees the presence of different contexts in natural caves, generally characterised by non-diagnostic pottery fragments, except for one of the most important cult/funerary sites for the region and, gen-

erally, southern Italy. This is the nearby natural cave of Manaccora (RECCHIA 1999), whose use encompasses the entire 2nd millennium BC and also successive prehistoric and historical periods. Its significance is in the information it provides regarding social changes, in terms of internal differentiation within groups, as well as connectivity, notably with the western Balkans (TUNZI *et alii* 2018; ARENA 2020).

In a wider perspective, the archaeological data underline a crucial role of coastal communities, particularly fortified centres, in maritime connections with Aegean and Western Balkans (IACONO *et alii* 2021), a topic that goes beyond the aims of this paper and for which I refer the interested reader to the wide available literature (e.g. works of A. Cazzella, G. Recchia, E. Borgna, M. Gori, F. Iacono, A. Arena). The general absence of cult/ritual contexts close to fortified settlements, beyond the case mentioned above, appears more to do with a research bias rather than to any actual and specific behaviour. In fact, in the landscape south of the Gargano promontory, the use of caves was frequent: both the natural ones (like Scaloria and Occhiopinto – exploited from the Neolithic period until the first centuries of the Bronze Age) and/or artificial caves (like Trinitapoli and San Ferdinando, south of the study area). The latter are both harder to identify and, above all, more vulnerable to natural or anthropogenic destruction events.

Fortified settlements represented stable and long-lived reference points within the landscape, as witnessed by their persistence until the Late Bronze Age phases (fig.3B-C), with the emergence of further centres during the central centuries of the 2nd mill. BC (fig.3B). Notably, Punta la Molinella (n.9) arose along the N-E shore of the Gargano promontory (CAZZELLA, MOSCOLONI 1988). Here though a further aspect must be considered. The presence of the body of water known in historical periods as *Lago di Battaglia* (fig.1) likely occupied a large area on the S-W side of the promontory of Punta La Molinella, which – at least partially – isolated the settlement from the mainland (see fig. 14 in PENNETTA 2017), naturally defending it on almost all its sides.

Monte Granata (fig. 3B) could be part of the dynamic of fortified settlement emergence in internal areas, as appreciable – though outside the analysed area – examples exist in further contexts located to the south (e.g. Madonna di Ripalta, Castello Pignatelli, Masseria Chiancudda) (TUNZI SISTO *et alii* 2002; BURGERS, RECCHIA 2009; RADINA *et alii* 2017) and even by recent data from the Molise region (CAZZELLA *et alii* 2020). The part of such contexts in community interconnectivity deserves an in-depth analysis, and should be the topic of future research. However, to speculate a little: they may have served as intermediate points along the long-distance network connecting the coast to the inland during the 2nd millennium BC (CAZZELLA *et alii* 2007); equally, they may have played a role in the acquisition and distribution of natural resources (e.g., woodlands, wild game) and/or other livelihoods at a micro-regional level.

In the plot (fig.4) are combined the two indices of TPI (y axis) and Total Viewshed analysis (x axis). Fortified settlements, including Monte Granata (suspected for-

tified), are mostly located in places highly visible from surroundings (high visibility index values), despite not being particularly dominant (low TPI values), implying – probably – that such communities satisfied the need to be visible and to serve as a point of reference within the landscape, rather than controlling surrounding areas.

As regards other evidence, most of the archaeological data derive from surveys (characterised by a square-symbol on the map), thus it remains quite difficult to actually and functionally characterise them. Nonetheless, including such evidence enables one to appreciate the exploitation of diverse ecozones during the 2nd mill. BC. Along the northern coast of the Gargano promontory, diverse sites (known through surveys) have been recorded, located at a short distance from the current shoreline. Three of them, all dating back to the broad Bronze Age, are located within a 5-kilometer radius from Punta Manaccora, while another cluster can be seen near Torre Mileto. One of these latter is located on the top of Monte d'Elio, about 2.5 km from the fortified centre of Torre Mileto, while the other two are positioned along the shore and date to the mid-second millennium BC (Apennine phase) (GRAVINA 1982). Finally (at Macchito), some pottery fragments dating back to the Protoapennine period have been found on the northern downward slope of the Gargano (p.92 in MAZZEI, TUNZI SISTO 2006), but the low quantity of pottery sherds allows us to categorise this as a temporary site⁴.

On the southern edge of the Gargano promontory a significant volume of evidence is present, to a large part not referable to a specific phase of the Bronze Age. Castelpagano⁵ and Loc. Crisetti, on the other hand, revealed pottery dating to the mid and late 2nd millennium BC, while Castello appears to be associated with a later timeframe (from the 13th c. to the end of the 2nd mill. BC). From the plot (fig.4) it is appreciable that some of these contexts were located in hill-like positions, thus such communities were established in key locations, naturally defended and able to ensure a certain degree of protection. Meeting the need for protection through the exploitation of key locations was also probably related to their demography (small groups of less than 100 people) and economic strength, which did not allow them to bear the cost of the construction of defensive constructions (lack of *surplus* and manpower). They could be interpreted as seasonal settlements or evidence left by the use of regularly (few years?) shifting settlement position. A similar dynamic has been proposed for the Murge upland (RECCHIA, RUGGINI 2009).

Along the shore of the Salso lagoon, south of the fortified centre of Coppa Nevigata, is Masseria Cupola Beccarini (NAVA 1984), dating to the Protoapennine

⁴ Taking into account the presence of a wide range of prehistoric artefacts (from the Palaeolithic period to the Late Prehistory) and the topographical position the archaeological palimpsest could be the result of erosional processes.

⁵ The site 19, known as Monte Castello, can be related to Castelpagano, in spite of being recorded as a different site in *Cartapulia*.

period (18th – 16th c. BC), and Sette Poste (15th – 14th c. BC). These are communities involved in the exploitation of the wet environment and its resources. However, two aspects deserve note here. Firstly, Sette Poste falls in a marshland area, based on a recent palaeoenvironmental reconstruction (SUSINI *et alii* 2022), thus it could be connected to the exploitation of the wet environment for short time periods, for example a seasonal/temporary functional site for fishing or salt production; it could equally be a stable settlement during a dry phase. Here, one should remember that the lagoon underwent level fluctuations, as well as a process of progressive retreat during the 2nd millennium BC, until its separation into two distinct bodies of water (the Salso and Salpi lakes) during the mid-1st millennium BC (CALDARA, SIMONE 2012; SUSINI *et alii* 2022). Second, the life-span of Masseria Cupola Beccarini, which is the nearest and indeed the only site within a radius of more than 10 km to the long-lived fortified settlement of Coppa Nevigata, being separated from it by a branch of marsh, is restricted to the Protoapennine period. This data could imply that the fortified centre of Coppa Nevigata had a significant impact on shaping the settlement pattern of the area south of the Gargano promontory, limiting the possibility of development for other neighbour communities, both for the necessity of securing an economic space of subsistence for itself (CAZZELLA *et alii* 2021) and – possibly – for security reasons.

Final remarks

Northern Apulia holds a multifaceted palimpsest of landscapes, from mountainous to flat areas and wet coastal zones. This study explores how such diverse landscapes were inhabited and exploited by different societies during the 2nd millennium BC, employing approaches designed to nullify as much as possible existing research bias, which latter affects the quality of available archaeological data and partially limits an in-depth comprehension.

One of the most significant investigated aspects regards the coexistence of at least two settlement patterns: one embodied by the emergence and development of long-life fortified centres along the coasts (exploiting promontories stretched toward the sea or a lagoon's internal shores) and the other represented by short-lived hamlets in the inland. Nevertheless, it is probable that fortified centres of some sort also arose in the interior. However, the manner of interconnectivity between these two settlement patterns differs within the study area. Observing the territory surrounding the fortified centres of Punta Manaccora and Torre Mileto, diverse sites, generically referable to the Bronze Age, have been recognised. Their nature is not clear, since they are known through surveys. However, hypothesising that they correspond to short-life open settlements, then their vital space was not in conflict with that pertaining to the fortified centre. They may even have been integrated in some way. At the

same time, it is important to consider that the landform of this particular area, with its reliefs and asperities, may have helped to define social space across the landscape.

On the other hand, in the southern part of the area under scrutiny, namely the flat territory around the settlement of Coppa Nevigata, no evidence is currently known of settlement beyond that of Cupola Beccarini, which was separated from it by a marshy zone and with whom it shared only the earliest moments of its existence. The community of the fortified centre could have discouraged/hindered the formation of other villages, especially given that the need for diverse natural resources (e.g. wood) likely led them to forage all the way to the foothills of the Gargano (CAZZELLA *et alii* 2021).

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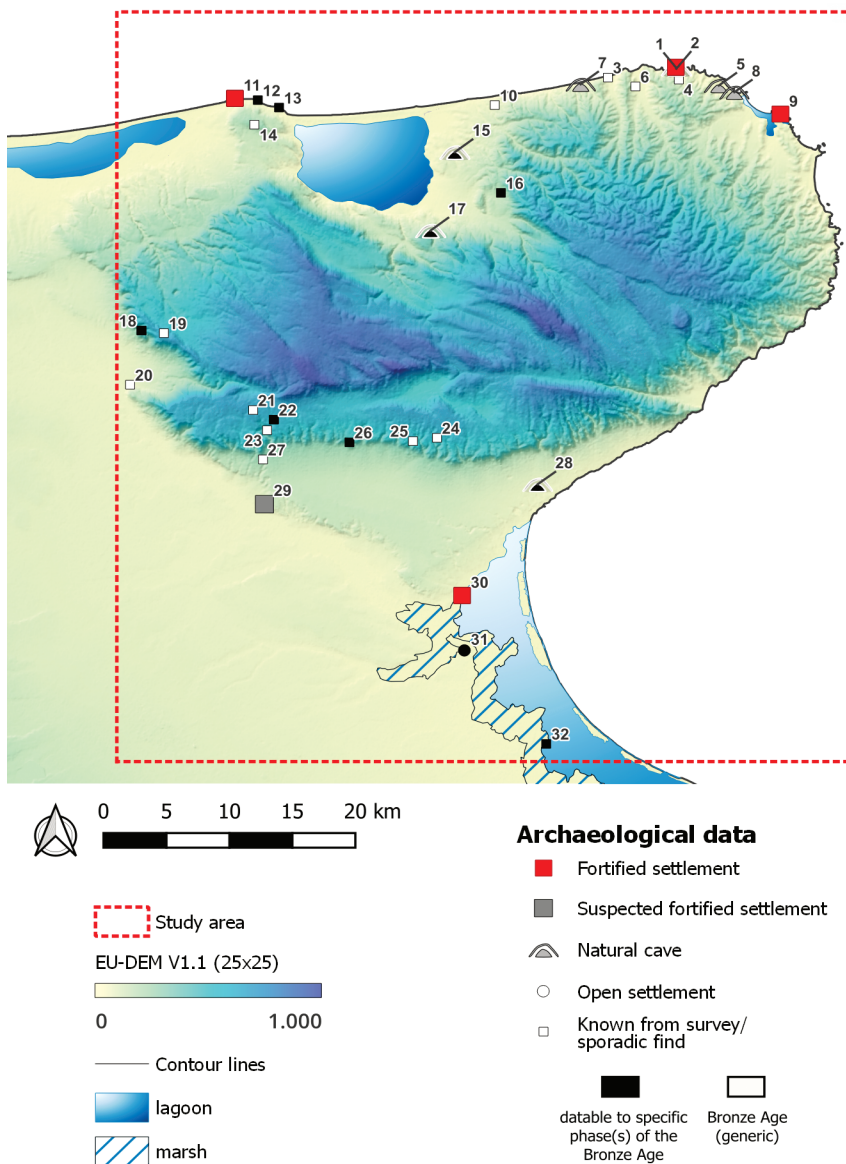


Fig. 1 – Cumulative site distribution in the study area with the reconstruction of the ancient coastal wet areas. Archaeological sites beyond fortified or suspected fortified settlements have been distinguished as to their date within the Bronze Age (black symbol) and not-datable within the Bronze Age (white symbol). 1) Punta Manaccora; 2) Grotta Manaccora; 3) Loc. Macchia a Mare; 4) La Bufalara; 5) Grotta dell'Acqua; 6) Loc. Finizia; 7) Grotta di Mauro; 8) Grotta del Crovatico 9) Punta la Molinella; 10) Loc. Santa Lucia; 11) Torre Mileto; 12) Torre Calarossa; 13) Foce Capoiale; 14) Loc. Monte d'Elio; 15) Masseria Pasquarelli; 16) Loc. Macchito; 17) Loc. Grotta del canale mortale) 18) Castelpagano; 19) Loc. Monte Castello; 20) Loc. Brancia Postiglione; 21) Località Gravina; 22) Località Casale Crisetti; 23) Chiancata Civita; 24) Località Il Castello; 25) Loc. Chiancata Avatra; 26) Coppa Masselli; 27) Loc. I Lamioni; 28) Scaloria-Occhiopinto; 29) Monte Granata; 30) Coppa Nevigata; 31) Masseria Cupola Beccarini; 32) Sette Poste.

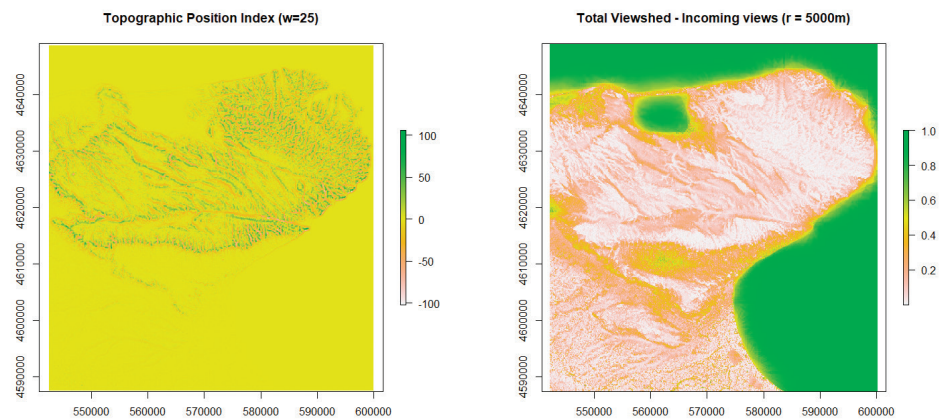


Fig. 2 – Raster data resulting from TPI analysis (on the left) and Total viewshed (on the right).

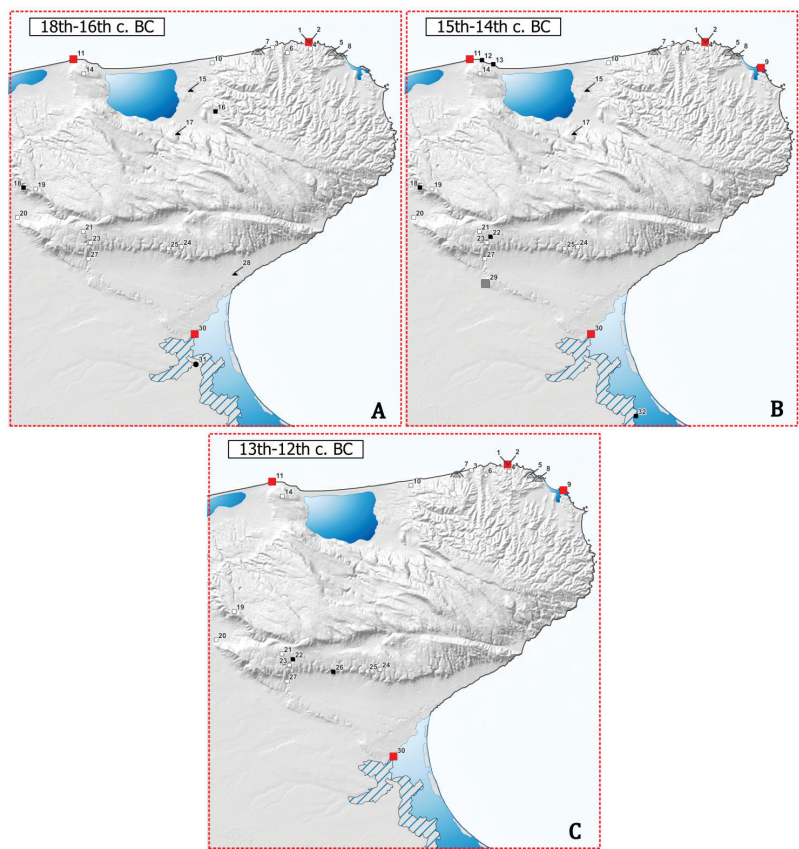


Fig. 3 – Site distribution in the three main chronological phases analysed in this work.

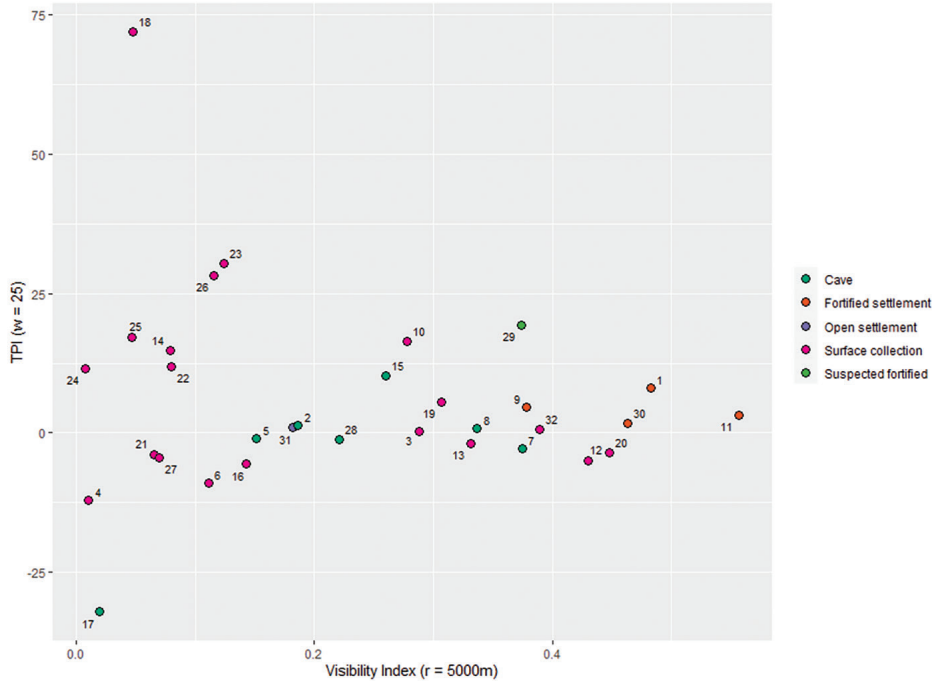


Fig.4 – Plot based on the two variables used for topographic characterisation of sites over landscape: TPI (on the y axis) and Visibility Index (on the x axis).

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