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4

The Impact of Rivers on Ancient Economies

Panel 2.2

Christof Berns
Sabine Huy (Eds.)

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Volume 4: The Impact of Rivers on Ancient Economies

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Edited by

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PREFACE

On behalf of the 'Associazione Internazionale di Archaeologia Classica (AIAC)' the 19th International Congress for Classical Archaeology took place in Cologne and Bonn from 22 to 26 May 2018. It was jointly organized by the two Archaeological Institutes of the Universities of Cologne and Bonn, and the primary theme of the congress was 'Archaeology and Economy in the Ancient World'. In fact, economic aspects permeate all areas of public and private life in ancient societies, whether in urban development, religion, art, housing, or in death.

Research on ancient economies has long played a significant role in ancient history. Increasingly in the last decades, awareness has grown in archaeology that the material culture of ancient societies offers excellent opportunities for studying the structure, performance, and dynamics of ancient economic systems and economic processes. Therefore, the main objective of this congress was to understand economy as a central element of classical societies and to analyze its interaction with ecological, political, social, religious, and cultural factors. The theme of the congress was addressed to all disciplines that deal with the Greco-Roman civilization and their neighbouring cultures from the Aegean Bronze Age to the end of Late Antiquity.

The participation of more than 1.200 scholars from more than 40 countries demonstrates the great response to the topic of the congress. Altogether, more than 900 papers in 128 panels were presented, as were more than 110 posters. The publication of the congress is in two stages: larger panels are initially presented as independent volumes, such as this publication. Finally, at the end of the editing process, all contributions will be published in a joint conference volume.

We would like to take this opportunity to thank all participants and helpers of the congress who made it such a great success. Its realization would not have been possible without the generous support of many institutions, whom we would like to thank once again: the Universities of Bonn and Cologne, the Archaeological Society of Cologne, the Archaeology Foundation of Cologne, the Gerda Henkel Foundation, the Fritz Thyssen Foundation, the Sal. Oppenheim Foundation, the German Research Foundation (DFG), the German Academic Exchange Service (DAAD), the Romano-Germanic Museum Cologne and the LVR-LandesMuseum Bonn. Finally, our thanks go to all colleagues and panel organizers who were involved in the editing and printing process.

Bonn/Cologne, in August 2019

Martin Bentz & Michael Heinzelmann

The Impact of Rivers on Ancient Economies – An Introduction

Christof Berns – Sabine Huy

The increased interest in the mutual constitution of socio-cultural and physical spaces has led to watercourses becoming more prominent as a formative factor of cultural systems.[1] Landscapes shaped by rivers provide characteristics and specific conditions, which have a great impact on the economic life of people living in fluvial contexts. On the one hand, rivers are interregional connecting arteries, for example by offering suitable ways of distributing cargos (rivers as connecting links). On the other hand, they also mark borders by separating the areas on either side of their banks and might obstruct the crossing at low or high water (rivers as barriers[2]). Both qualities make them elements of a 'geography of power' in empires such as the Roman.[3] On a regional level, the different conditions of a river – i.e. seasonal (flooding, low water, icing, etc.) and long-term effects (changing river courses, sedimentation etc.) but also altering possibilities of exploitation – force people to live in close relationship with the watercourse. Rivers are an important natural resource and provide specific chances for economic activities. The concentration on the distribution of commodities via rivers has long been of particular interest to archaeological research on rivers.[4] The silting up of rivers was a constant cause of concern in many cities.[5] There is therefore a constant interaction between the economic habits of a society and the river landscapes, which offer different possibilities for economic lifestyles. The river is appropriated by people, but at the same time it constitutes their experiences.

With seven contributions our panel aimed to describe rivers as dynamic factors of ancient communities and their economies. Especially geo-archaeological research has led to a better understanding of the complex effects of rivers on social communities. Significant geomorphic changes of river-landscapes have been proven at many sites.[6] H. Brückner demonstrated this in his lecture about the Maiandros river. Further case studies from both the Black Sea and the Mediterranean focused on various functions of rivers. The role of rivers as transport routes within long-distance trade links depends strongly on the economic habits of the societies living along the river, as discussed in S. Huy's article on the Don. Taking the same example as a starting point, B. Weissova explores the methodological challenges of reconstructing overland- and river-routes by GIS based analysis. The contributions of S. Paltineri, F. Wiel-Marin, M. Robino and P. Pasieka focus on the impact of rivers on economic development in Etruria from the Archaic to the Classical periods and in the Roman Empire. The long-term change of the settlement pattern due to the fluvial connection of the coast with the hinterland is illustrated in the paper by A. Sebastiani on the Ombrone valley. Using the Danube as an example, Ch. Rummel examined the risks and opportunities resulting from anthropo-

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genic changes in river landscapes. A. Dan's contribution concentrated on the discovery and exploitation of food from rivers.

These different approaches to the role of rivers as economic factors touch on questions of the development of settlement structures, infrastructural interventions such as the canalisation of river courses or the construction of harbours, but also on the use of resources and possibilities for connectivity. The panel's diverse contributions thus show a broad and complex panorama of the economic power that rivers can unfold in their region.

Presentations Given in Panel 2.2 (23 May 2018)

- Sabine Huy, The Economy of the Don River Communities. Driven by the River or by Land Routes?
- Helmut Brückner, Life Cycles of Islands and Harbours. The Case Study of the Maiandros River and the City of Miletos
- Silvia Paltineri – Mirella T. A. Robino – Federica Wiel-Marin, Flüsse als Wirtschaftsfaktor. Der Handel zwischen Etruskern, Griechen und Venetern im 6. und 5. Jh. v. Chr.
- Christoph Rummel, Taming Nature. Riverine Connectivity in the Middle Danube Region
- Paul Pasieka, Südetrurien und seine Flüsse. Beobachtungen zur wirtschaftlichen und infrastrukturellen Erschließung in der römischen Kaiserzeit
- Alessandro Sebastiani, The River Ombrone Valley: Connecting Economies during the Roman Period
- Anca Dan, Milesian Landscape Transfer: the Salted Fish, from Egypt to the Black Sea

Notes

[1] Tvedt 2005–2016.

[2] Marzolff 1994.

[3] Purcell 2012; cp. also Campbell 2012.

[4] cf., for example: Ljubičev et al. 2012, 162–163.

[5] Kirbihler 2018.

[6] cf., among others, Fushöller 1991 (Medjerda/Tunisia); Bintliff 1991 (Menderes and Dümrek/Troia); Müllenhoff 2005; Brückner et al. 2006 (Maiandros valley); Giaime et al. 2016 (Kuban-Bosphorus).

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The Economy of the Don Communities – Driven by the River or by Land Routes?

Sabine Huy

This paper deals with the connectivity of the communities that lived along the Don River system (western part of the modern Russian Federation) from the late 7th to the early 3rd century BC (fig. 1). Since Ionian Greeks founded a trading post at the mouth of the Don in the last quarter of the 7th century BC,[1] there has been a regular demand for pottery and metal objects produced in the Greek cities around the Aegean and Black Seas along the entire Don River system.[2] In previous studies I have concentrated on the Greek objects in order to analyse the cultural connections of the Aegean world with the Eurasian steppes.[3] By considering the people's social practices, it became evident that the Greek objects were used in completely different ways than known in the Greek world. Instead, they were fully incorporated, always in the same way, into the local structures of the inhabitants of the Don River system. In this context, the delta provided a border zone between the Aegean/Black Sea world and the steppe zones of Eurasia, in which objects were accepted but, cultural concepts of the Greeks were rejected. I concluded that the exchange of the Greek objects was performed within a self-organised system of the people living on the Don, and that these objects thus prove regular contacts between these Don communities. That now leads to the question, of how these communities organised their connections – were they driven by the rivers or by land routes?

By offering a much more suitable way for the distribution of cargoes than land routes, the function of rivers as transport routes is often taken for granted. Even if this hypothesis is true in many cases,[4] it depends strongly on both the dynamic ecosystem of the riverine landscapes as well as on the social and economic habits of the people involved. In the case of the Don in the period from the late 7th to the early 3rd century BC, some issues challenge the silent assumption of rivers as the most probable routes of communication. In the following, I will show this in detail and approach the topic in three steps: 1) a brief description of the natural environment of the Don River region in relation to the distribution of known archaeological sites. 2) a short overview of the general appearance of the settlements with a focus on finds providing information about the economic foundations of the Don River communities. 3) a comparison of the results so far with a GIS based least cost path analysis, calculated by B. Weissová.[5]

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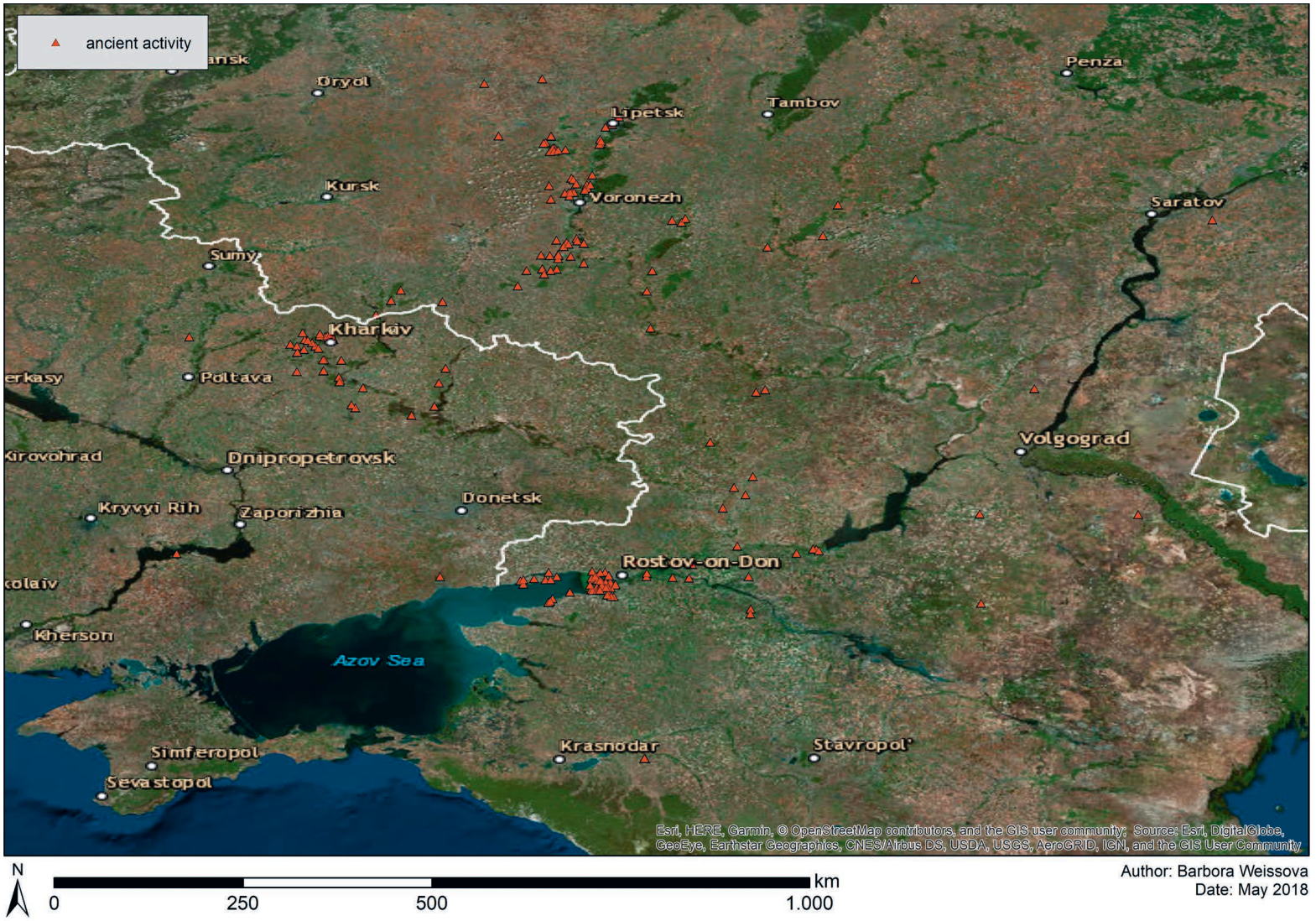

Fig. 1: Region of the Don River system.

1.

On the way from the sources south of Moscow to the Sea of Azov, the Don traverses vast forest massifs in the wooden steppe as well as the wide-open fields of the grass steppe. Steppe zones develop in places where the long-standing average of rainfall is insufficient to support forests. This causes a comparatively low quantity of water. The soils can be fertile, but they need to be irrigated. The grass steppe yields a diversity of herbaceous plants and grasses and is therefore well suited for keeping grazing animals. The forest steppe forms a transition zone between the grass steppes and the temperate forests. It includes grassland as well as forests or individual groups of trees. The climate in the Eurasian steppes is continental with hot summers, cold snowy winters and prevailing winds.

The entire course of the Don can be divided into three parts (fig. 2):[6] 1. the upper reaches from the source to the inflow of the tributary Voronezh 2. the middle course, where the Don descends to the east to the Tsimlyansky Reservoir and leads from the forest- to the grass steppe; and 3. the lower course, where the Don flows slightly to the west to the large delta into the Sea of Azov. The Don collects the waters of many tributaries. Among these, the Voronezh, the Khoper and the Seversky Donets form the largest ones.

The landscape within the forest steppe zone is characterised by rocky, densely wooded shorelines, which are up to 50m high on the western banks. The eastern banks of the Don provide treeless, shallow floodplains with predominantly sandy soils. In the grass steppe zone, the landscape varies from gently sloping elevations, which are up to 300 m high at the middle reaches to fertile meadows at the lower reaches of the Don. As in the northern sections, the banks can be differentiated in a hilly west side and a low, sandy east side. In spring, when the water level rises, the flatlands are flooded.

In this environment, population density developed during the course of the late 7th to the early 3rd century BC in different areas with varying intensity. Three main categories of sites can be distinguished: settlements, burial fields and separated burial mounds (*kurgans*) (fig. 2). The flat hilltops at the upper reaches of the Don and the Voronezh formed excellent places for settlements. The same is true for the watersheds between smaller tributaries, especially around the Tichaya Sosna, Potudan' and Devitsa at the middle reaches, where numerous burial fields and settlements were found (fig. 3a–b). The vast areas of the flatter eastern banks were almost uninhabited. Just a few sites were found scattered along small rivers. Also, the grass steppe zone, in which only isolated burials are found, was almost empty. Solely in the delta was a further dense cluster of sites established. These were lined up in serried rows directly at now dried up rivers.

Chronologically, two phases can be distinguished (fig. 2): From the 7th to the 6th century BC there were just a few spots in the whole territory. In the area of the lower Don, the lack of settlements, except for the Greek trading post at Taganrog, is striking, whereas kurgans were built in quite large numbers. In the forest steppe zone, on

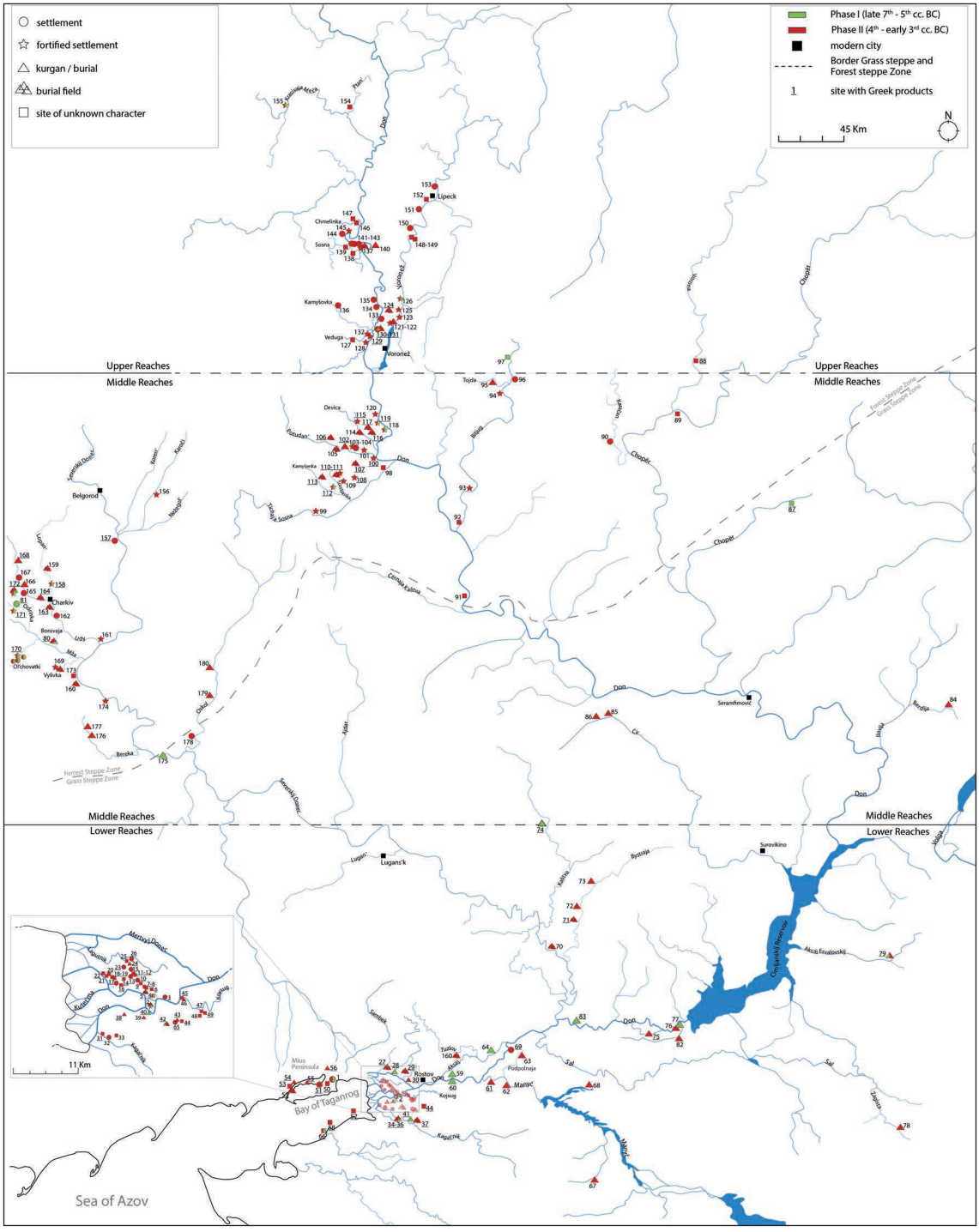

Fig. 2: Map of the Don River System with ancient sites.

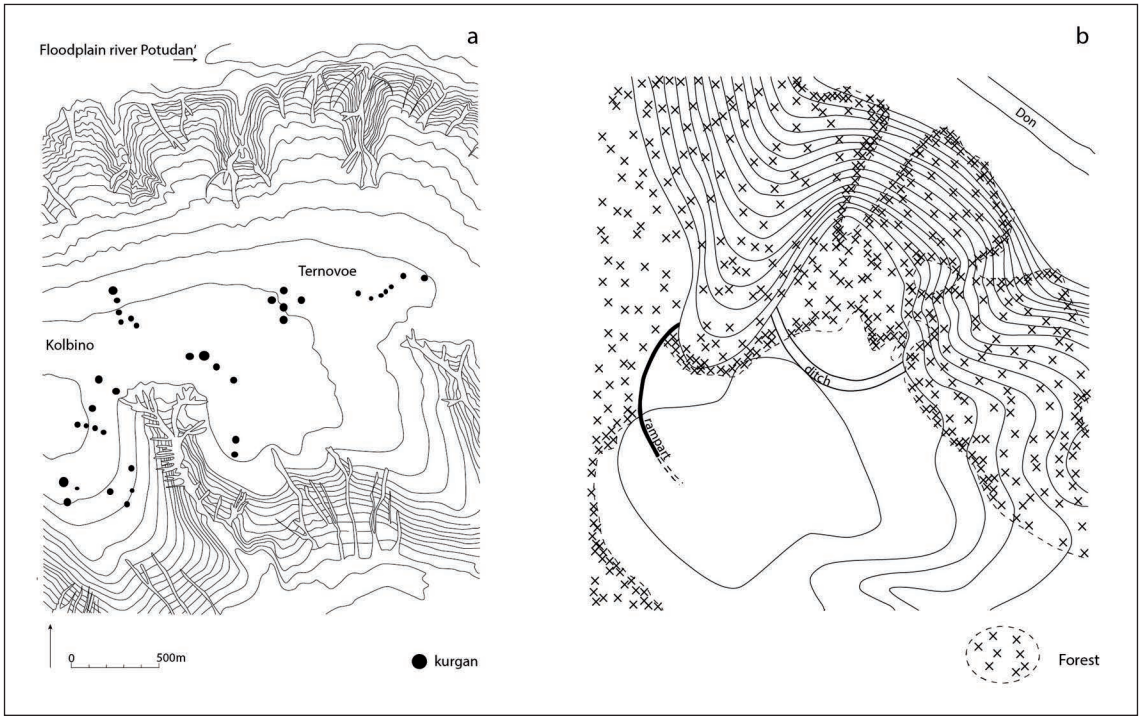

Fig. 3: a) Site map of the burial field Ternovoe-Kolbino (**107**) and b) of the settlement Titchikha (**118**).

the contrary, a few settlements are known, but contemporaneous burials appear very rarely. Within the 5th and especially within the 4th century BC the density of sites increased rapidly, and clusters developed in several areas. With regard to the vast empty territories in the grass steppe, the impact of the different conditions of grass and forest steppe for the choice of settlement sites becomes evident. However, the overview of the distribution of sites in relation to the topography shows that nearly all of the sites from the 7th to the early 3rd century BC are situated at riverbanks and clustered in areas of narrow watersheds. Thus, the vicinity to a watercourse was of crucial significance.

Extensive paleo-geographical investigations to reconstruct the ancient landscape of the whole Don River system have not been carried out yet. It is safe to assume that the watercourse and the hydrological regime of the entire Don River system have generally changed since antiquity. Nevertheless, some clues allow us to open the discussion on the complex interplay of settlement patterns and the landscapes of the Don River system: Major interventions to correct the course of the Don were only carried out in two areas: the construction of the Tsimlyansky Reservoir (1948–1953) and the artificial section of the riverbed within the city of Rostov-on-Don. There are still many old arms of rivers that divide and converge again, pointing to the natural and ancient riverbed in these place.[7] Furthermore, the paleo-botanical investigations of Kremenetsky showed that the vegetation cover in the Dnepr, Don and Volga basins became similar to today's

after 600 BC.[8] Historical descriptions and maps of settlements and fortresses from the 12th to the 17th century allow a diachronic comparison in some places, e.g. with regard to forest density.[9]

2.

In the following, I shall deal with the general appearance of the settlements and the preserved find spectra in order to shed light on the economic conditions of the people in the Don River system.

Broadly speaking, two different types of settlements can be observed. The first type consists of rather small, unfortified villages, composed of loosely arranged dugouts and storage-pits (fig. 4). They provide just weakly defined occupation layers of about 20 to 50 cm thickness with only a small number of finds.[10] The second type differs consid-

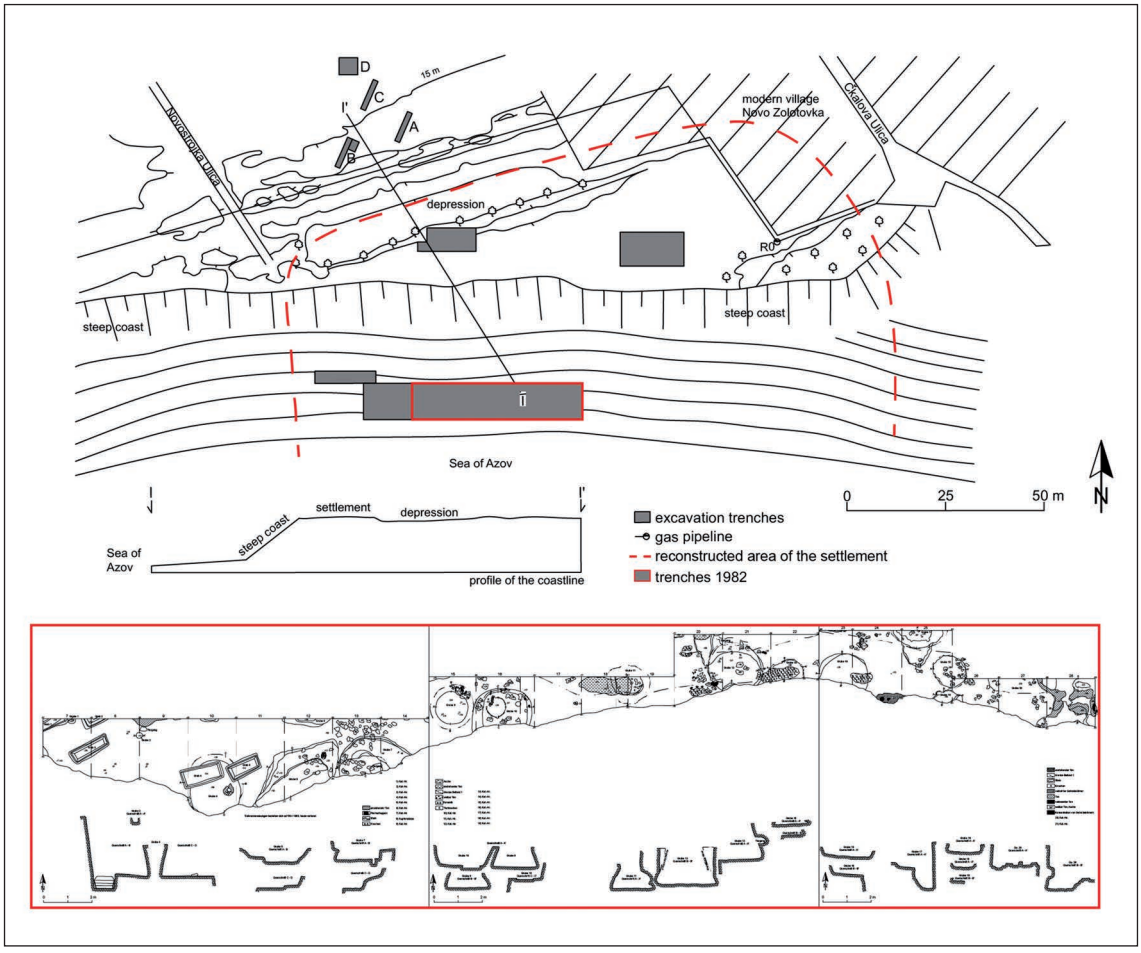

Fig. 4: Site map of the settlement Novo Zolotovka (**51**) with trenches nos. 7–14, 1982 in detail.

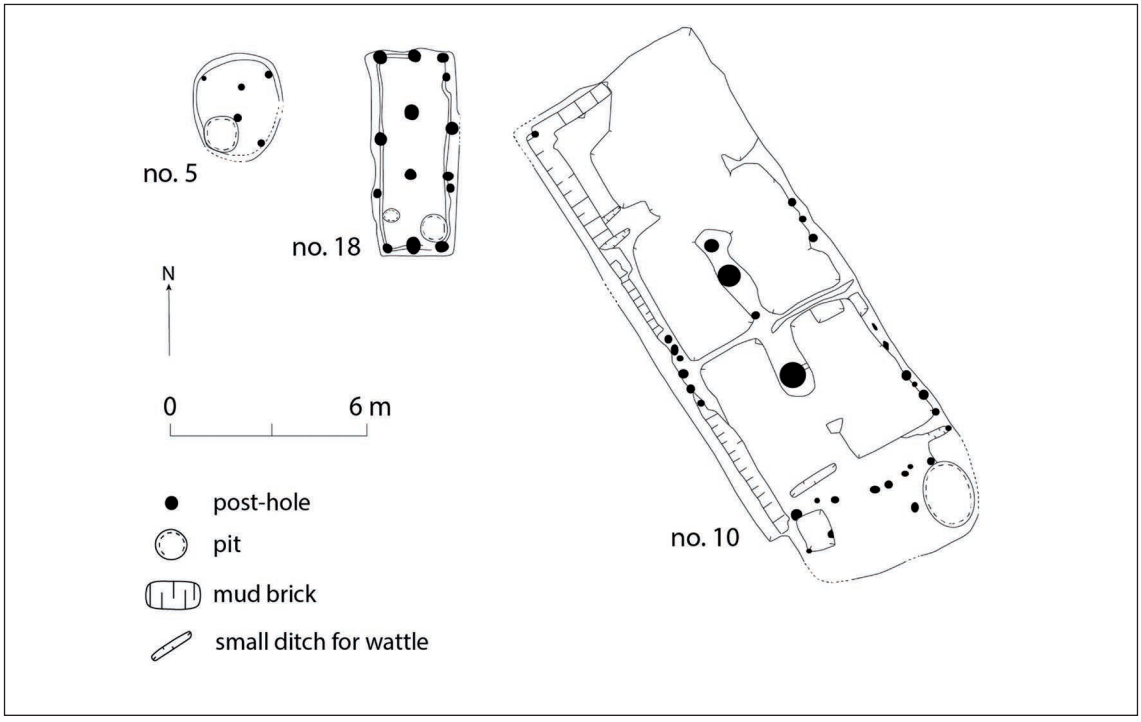

Fig. 5: Settlement Elizavetovka (**2**): layout of dugout no. 5 and of aboveground houses nos. 18 & 10.

erably. Above all to mention is the presence of defence systems, constructed of ditches and ramparts with wooden palisades. The housings consisted not only of dugouts but also of more durable aboveground houses with wattle and daub or wood (fig. 5). These vary in their dimension from one to six rooms. The fortified settlements encompassed from around 2 to 20 ha with occupation layers of up to 3 m.[11] Outstanding is the settlement of Elizavetovka (**2**) in the delta of the Don with an area of around 55 ha and a huge amount of finds, including more than 200,000 Greek transport amphorae.[12]

The two types of settlements are arranged in an interesting pattern. The larger, fortified settlements were regularly surrounded by some of the small villages and thus, can be regarded as centres of their local area.[13] In order to get closer to the economic base of the settlements, I will concentrate on objects associated with food production and have a look at the archaeozoological evidence. The small settlement Novo Zolotovka (**51**) near the estuary of the Don gives a representative picture (fig. 6a):[14] domestic mammals like sheep, cattle and horses were of major importance, whereas pigs played no part in the production of food. The published results from neighbouring Elizavetovka (**2**) are well comparable, only the cattle seem to be better represented[15] (fig. 6b). Available data on the middle reaches of the Don show a lower presence of sheep and goats and slightly higher proportions of pigs, but do not differ in the general trend (fig. 6c–d).[16] Although, due to the different analytical methods an exact comparison of the osteological ma-

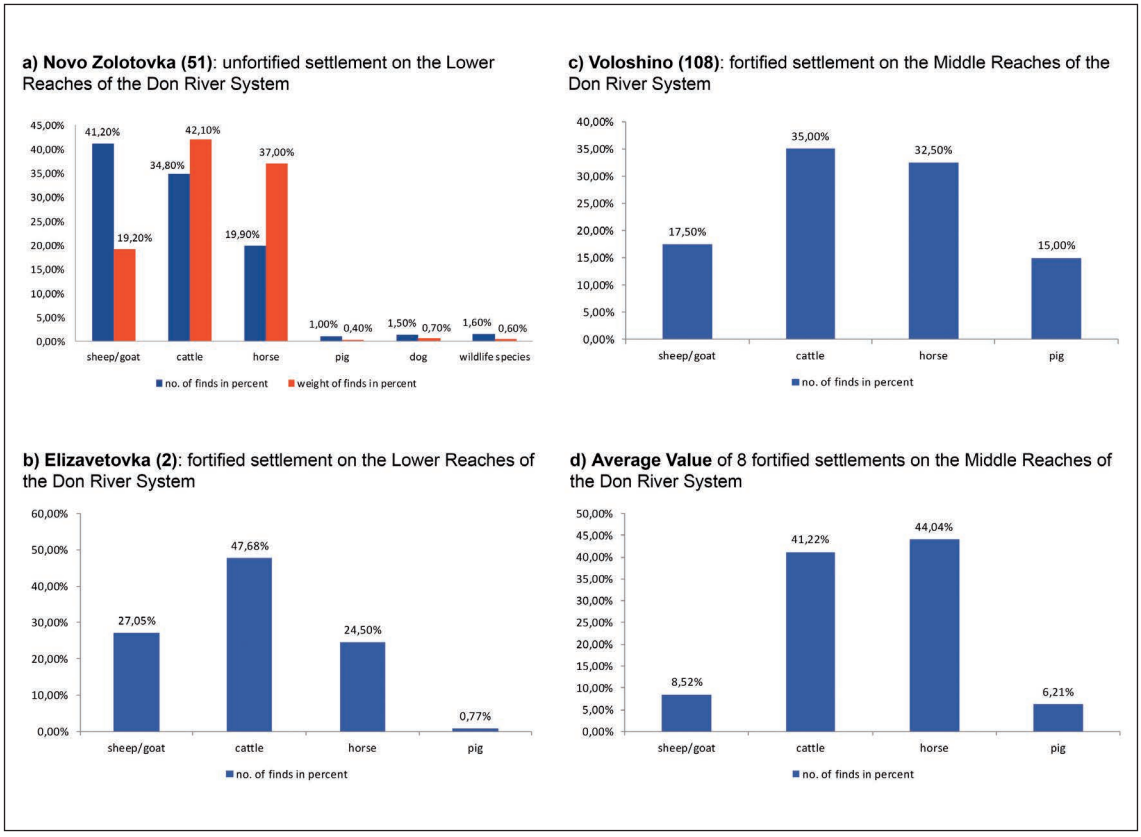

Fig. 6: Statistical overview of the osteological materials of various sites of the Don River system.

terials is impossible, the diagrams do give an indication of the economic situation in the settlements. The strong presence of cattle speaks for a certain role of agriculture. Sedentariness is also reflected in the existence of the large, fortified settlements with their huge number of finds and the fixed architecture. But, concrete evidence for agriculture is rare. Archaeobotanical remains and objects like ploughs, grinding stones and mortars that indicate grain procession were found only seldom.[17] Hence, agriculture was obviously very weakly defined and moreover, in the open steppes threatened by drought. With this in mind, the bones of horses and sheep can be interpreted as part of the herds of semi-nomads and also the low presence of pigs fits well into the picture. The value of sheep and horses scarcely needs any comment.[18] A distinct benefit in the environment of the Eurasian steppes consists in the fact, that they can get at fodder in pasture covered with snow up to 20cm deep. Semi-nomadism is characterised by extensive pastoralism and the periodic changing of pastures during the course of the year. However, agriculture forms a secondary and supplementary capacity.[19] In this context, the small settlements of the first type should be understood as seasonal bases, whereas the fortified settlements were used as permanent residences of another social group.[20]

It is interesting to stress again the complete lack of settlements at the lower Don in the 7th and 6th century BC, where only burial mounds have been erected (fig. 2, phase I). That points to a fully nomadic life-style in this phase, in which extensive mobile pastoralism formed the predominant economic activity. Judged by the increasing number of large stock, the emergence of fortified settlements accompanied by extended burial fields, in the course of the 5th to the 4th century BC, people transformed their economic basis from nomadism to a more sedentary way of life. Nevertheless, agriculture along the river banks has taken up so little of the wide-open steppes that it is very unlikely that there has been a common seasonal use of one ecological zone by agriculturalists and nomads.[21] Hence, these are two groups within one society, in which all members benefited of pastoral migrations. This result negates the value of the rivers as transport routes. Extensive shipping is inconsistent with the needs of pastoralism of the semi-nomads. Moreover, due to mobility and ownership of horses as transport animals, shipping was even not required. However, interseasonal changes of pasture are mainly determined by the availability of food and water[22] and it can thus be assumed that nomads have taken advantage of the river valleys.

3.

I will finally discuss the possible migration routes of the semi-nomads and the role of river courses in the whole system. The clustered location of settlements in different areas suggests that each cluster had its own pasture area, which was probably rather small and located in its surroundings. In the forest steppe, the territories east of the Don with flat meadows were well suited as grazing ground. On the other hand, the Greek objects found all along the Don account for regular contacts between the communities of the delta and those of the middle reaches. Hence, pastoral migrations should also have taken place from south to north within the boundaries of the grass steppe. Promising road-markers can be seen in the scattered kurgans in this territory (fig. 2). Some of these were even visited repeatedly, what is attested by several burial mounds at the same place. In Sladovsky (**71**) for example, seven kurgans with eight funerals were constructed within around 100 years.[23] Moreover, together with a few neighbouring burial mounds, the burial field of Sladovsky forms a kind of kurgan-avenue along the small river Bystraya Kalitva (**70–73**). The same can be observed in the area beyond the delta (**59–64. 69. 83. 75–77. 82**) as well as along the river Oksol in the modern district of Kharkiv (**175. 178–180**). That strongly indicates two possible itineraries from Elizavetovka as the main trading hub for the Greek objects to the middle reaches of the Don. In the first case, I suggest a route via the Don and the Bystraya Kalitva up to the forest steppes and in the second case via the Seversky Donets and the Oksol to the cluster around the Tikhaya Sosna (fig. 7). In order to reach the places further north from there, it seems likely that the route followed the main course of the Don. To test this hypothesis,

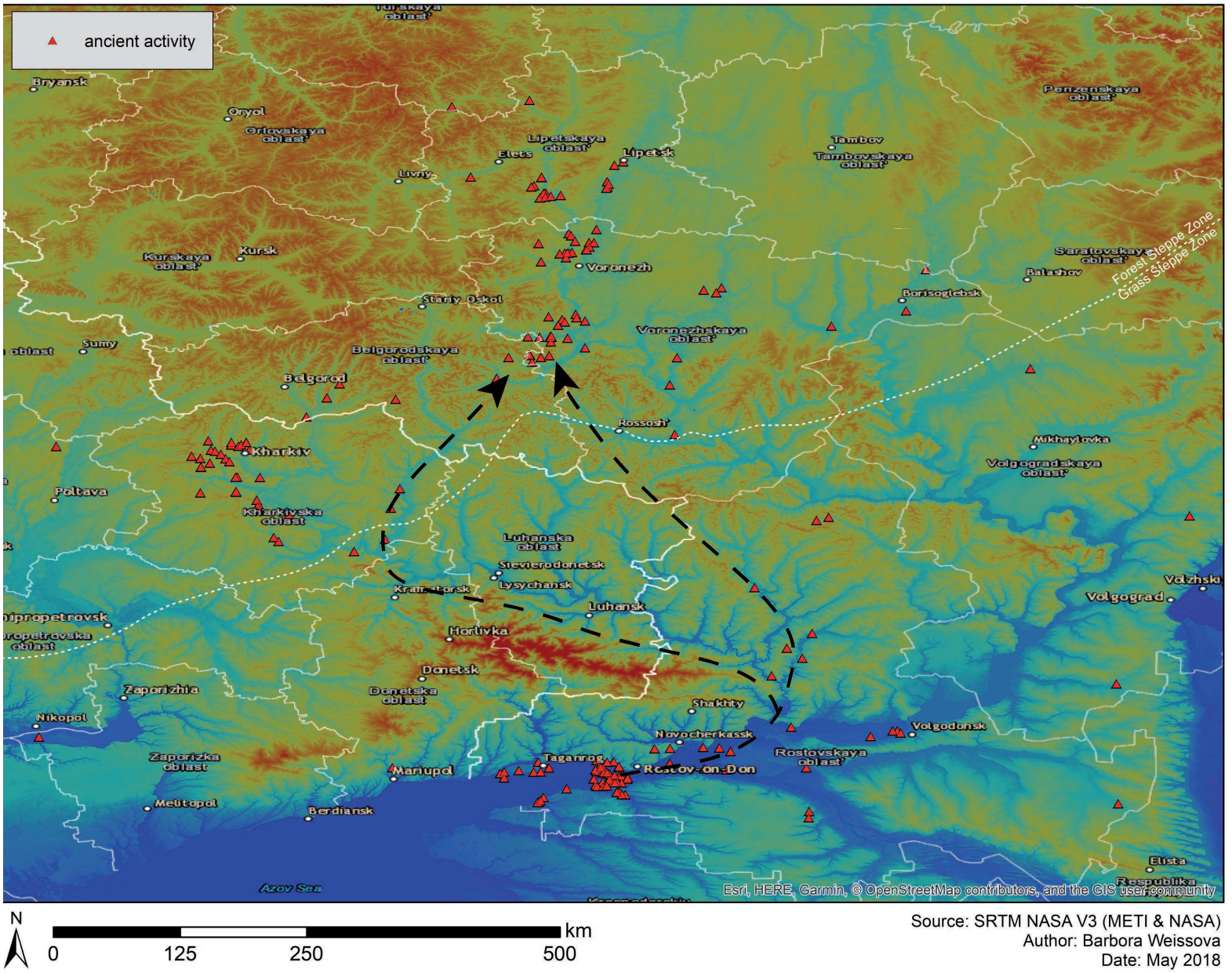

Fig. 7: Map of the Don River system with possible migration routes along kurgan avenues.

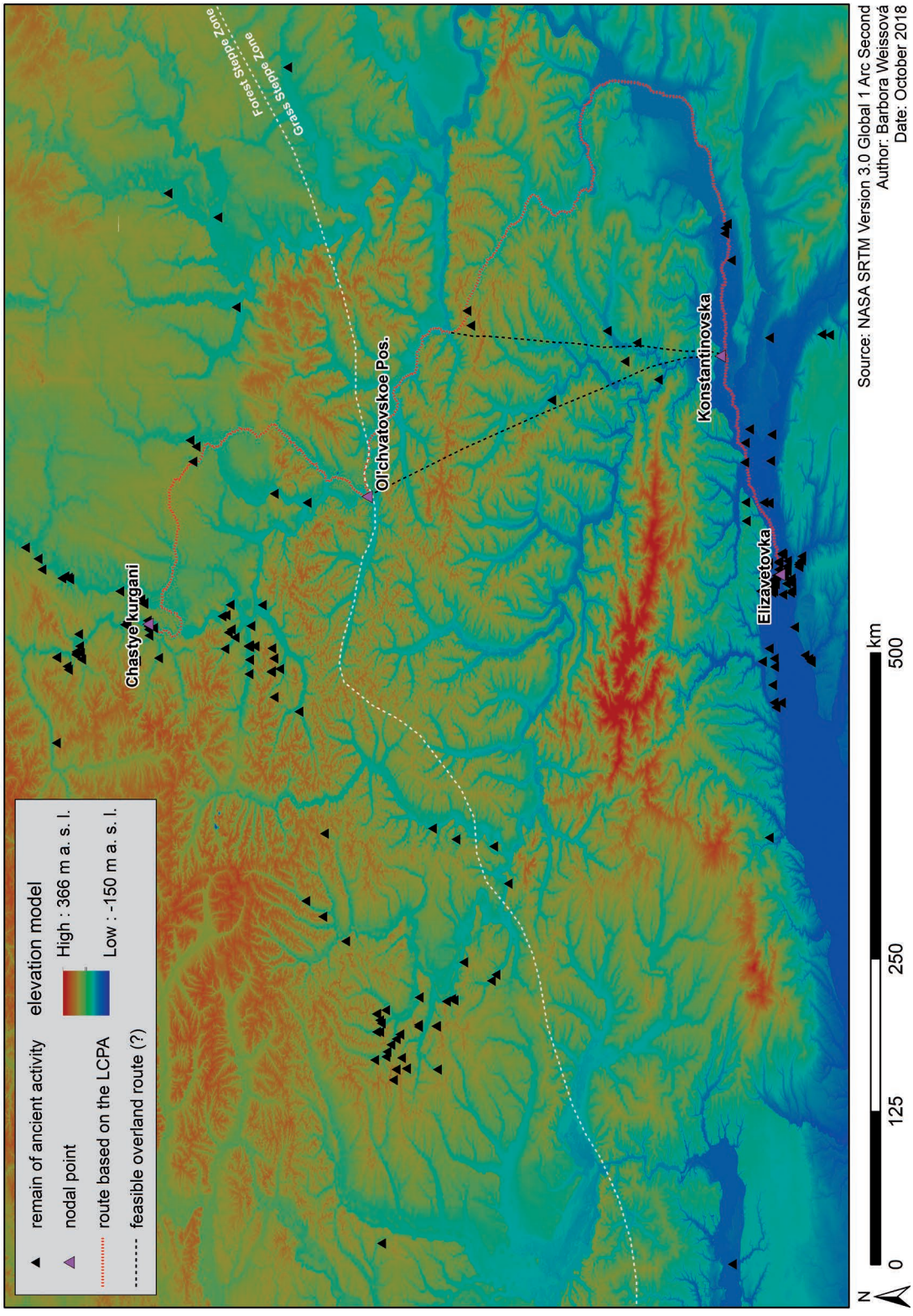

Fig. 8: Map of the Don River system with GIS based (LCPA) calculated routes.

I performed a comparative study with results of an anisotropic GIS based least cost path analysis (fig. 8). Surprisingly, the proposed routes were always avoided in favour of much longer but less gradient ways. The most feasible path from the delta to the densely populated areas on the middle reaches leads from the delta along the main river course to the Tsimlyansky Reservoir. Once it has passed the reservoir, the calculated route leaves the current riverbed and crosses the tributary Chyr. It meets the Don again just below the border to the forest steppe zone (**91**: Ol'khvatovskoe Pos.). However, the GIS calculates the ideal solution in terms of effort and expense and is dealing with totally rational acting agents. But people's decisions are motivated by a lot of reasons. Beyond an economic benefit of one route, further appealing factors should be seen for example in places for ritual practices. In this respect, we must not forget the kurgan-avenues. In general, the nomadic migratory routes, even the most firmly established ones, are not necessarily repeated every year.[24] Furthermore, since the elevations within the grass steppes do not overreach 360 meters above the sea level and for the most part vary only between 50 and 150 meters above the sea level, the river system certainly was not stable. This can be observed in the section north to the Tsimlyansky Reservoir with the strong eastwards leading loop of the Don and the shortcut in its course offered by the tributary Chyr. Accordingly, also the pastoral routes of the ancient semi-nomads had to change frequently in order to adjust to the current conditions.

Conclusion

It is of course no surprise that the different methodological approaches all emphasise the crucial significance of the watercourses for the ancient people. This is already indicated by the locations of all sites at riverbanks and further demonstrated by the GIS based calculated routes, which mainly run along the rivers. But, as came out of the analyses of the economic basis of the communities, that gave strong evidence for the nomadic to semi-nomadic life-style, the value of the rivers lay not in the function as transport routes. They were rather primarily utilised as water-suppliers for the herds of the nomads and the transport of products was most probably organised overland within the pastoral migrations. Therefore, the ecologic conditions of the grass and forest steppe zones with the extended river system of the Don had major impact on the ancient economies but not in the expected form.

Notes

[1] The settlement is situated at the site of the modern city Taganrog: Dally et al. 2009; Dally et al. 2012.

[2] In particular, transport amphorae were found in large numbers throughout the region, while tableware like cups, jugs and plates were less in demand. Precious metal objects such as bronze and silver vessels

were found almost exclusively in huge burial mounds in the forest steppe: Medvedev 1999, fig. 56–57; Huy 2019.

[3] Huy in print; Huy 2019.

[4] cf. Salač 2018, 42–43 with examples of travel speed on rivers downstream and upstream from Roman times and the Middle Ages.

[5] cf. the contribution of B. Weissová in this volume.

[6] In the following, numbers in bold type indicate the respective sites on the map fig. 2. The complete legend on this map with bibliographical information is published in Huy 2019, table 1.

[7] Minoransky 2004, 15–18; Schmid-Merkl 2016, 39–42.

[8] Kremenetsky 2003, 11. 15. 17; c.f. Medvedev 1999, 55–57; Gulyaev 2010, 12–19.

[9] Wagner 2003, 65–92.

[10] E.g. Novo Zolotovka (**51**): Dally et al. 2012, 190–200; Huy in print; Zamyatino 10 (**142**): Ivashov 2001; Shvedovka (**178**): Liberov 1962, 63. For a general overview of the middle and upper reaches cf. Liberov 1965, 8–10; Medvedev 1999, 59.

[11] E.g. Elizavetovka (**2**): Marchenko et al. 2000; Voloshino (108): Puzikova 1969, 41–81; Gulyaev 2010, 123–137; Pekshevo (**126**): Medvedev 1999, 79–89.

[12] Marchenko et al. 2000.

[13] E.g. Russkaya Trostyanka (**110**) was surrounded by 9 villages, not shown here; Semiluki (**129**) and Gubarevo (**132**) were surrounded by 14 villages, not shown here (Medvedev 1999, 57); Ksizovo (**137**) was surrounded by ca. 4 villages (Oblomsky – Razuvaev 2013, 183–184); Chervonosovskoe Gorodishche (**170**), in the Kharkiv region, was surrounded by ca. 13 villages, not shown here (Zadnikov et al. 2003).

[14] The animal bones were analysed by Prof. Dr. N. Benecke (DAI Berlin) and originate from excavations in Novo Zolotovka (**51**), which were carried out in 2008 as part of the German-Russian Taganrog project under the direction of Ortwin Dally (DAI Rom).

[15] Marchenko et al. 2000, 169–173.

[16] Tsalkin 1969, 129 Tab. 1; Gulyaev 2010, 125. 131.

[17] Marchenko et al. 2000, 173–175 tab. 43; Gulyaev 2010, 125. 131–132; Huy in print, cat.nos. O14–O18.

[18] cf. Khazanov 1994, 46–53 also pointing out the important role of oxen as transport animals and the polyfunctional purpose of small stock for the nomads of the Eurasian steppes in antiquity.

[19] Khazanov 1994, 19.

[20] Cf. Medvedev 1999, 62 and the discussion at Gulyaev 2010, 130–132.

[21] Khazanov 1994, 50.

[22] Important is also the size of herds, their species-composition and many other factors. For nomads of the Eurasian steppes from historical periods, distances of a thousand kilometres are known: Khazanov 1994, 38. 52. General information on factors influencing travel and travel speed: cf. Salač 2018 with further literature.

[23] Smirnov et al., 1976, 120–121; Smirnov – Maksimenko 1977, 142; Maksimenko 1980, 109.

[24] Khazanov 1994, 50.

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Fig. 1, 8: B. Weissová. – Fig. 2: S. Huy. – Fig. 3: S. Huy a) after Gulyaev 2010, 71 fig. 5; b) after Moskalenko – Pryakhin 1969, fig. 1. – Fig. 4: B. Ludwig, S. Huy after T. Panchenko and P. Larenok. – Fig. 5: S. Huy after Marchenko et al. 2000, 97, fig. 20. – Fig. 6: S. Huy a) after Benecke 2008; b) after Marchenko et al. 2000, 169–173; c) after Gulyaev 2010, 125; d) after Tsalkin 1969, 129 tab. 1. – Fig. 7: B. Weissová, S. Huy.

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A Computational Analysis of a Feasible Network of Routes in the Watershed of the Don River

Barbora Weissová

Abstract

The article presents a brief description of available datasets and resulting methodology applied when analysing feasible routes leading through the territory of the modern Southern Federal District of Russia. The examined time span falls between the late 7th and the early 3rd centuries BC, defined by the chronology of the archaeological datasets. The roads are calculated based on an anisotropic least cost path analysis, connecting find-spots which, albeit situated deep in the inland, revealed Greek imports. Rather than a separate study, the present outcome should be seen as a methodological supplement to a comprehensive work of S. Huy who collected the archaeological datasets and who also further interprets the results within their broader historical contexts (see contribution of S. Huy in this volume).

Introduction

The following study introduces results of a computational analysis of a feasible system of routes in the watershed of the middle and lower courses of the River Don (ancient *Tanais*[1]), flowing through the districts of Voronezh, Volgograd and Rostov. The outcomes supplement the study of S. Huy who suggested an existence of alternative overland routes to a traditional communication network using the river system.[2]

The studied area is located in the European part of the Russian Federation, in the modern Southern Federal District. The territory is of a challenging extent, covering more than 360,000 sq. km, and featuring a changing character of the landscape represented by a grass steppe in the south and a forest steppe in the north[3] (the border is outlined on the map fig. 1). Due to a lack of data concerning fluvial geomorphology of the River Don and its tributaries during the researched chronological frame, the analysis considers all the possible routes without excluding the riverbeds.

Geographic Characteristics (see Map fig. 1)

The analysed area is dominated by the River Don[4] and its numerous tributaries. The territory is delimited by watersheds of two other rives, by Dnieper in the west and by Volga in the east. The borders in the north and in the south follow the middle and lower parts of the course of the River Don, roughly delimited by the cities of Voronezh and

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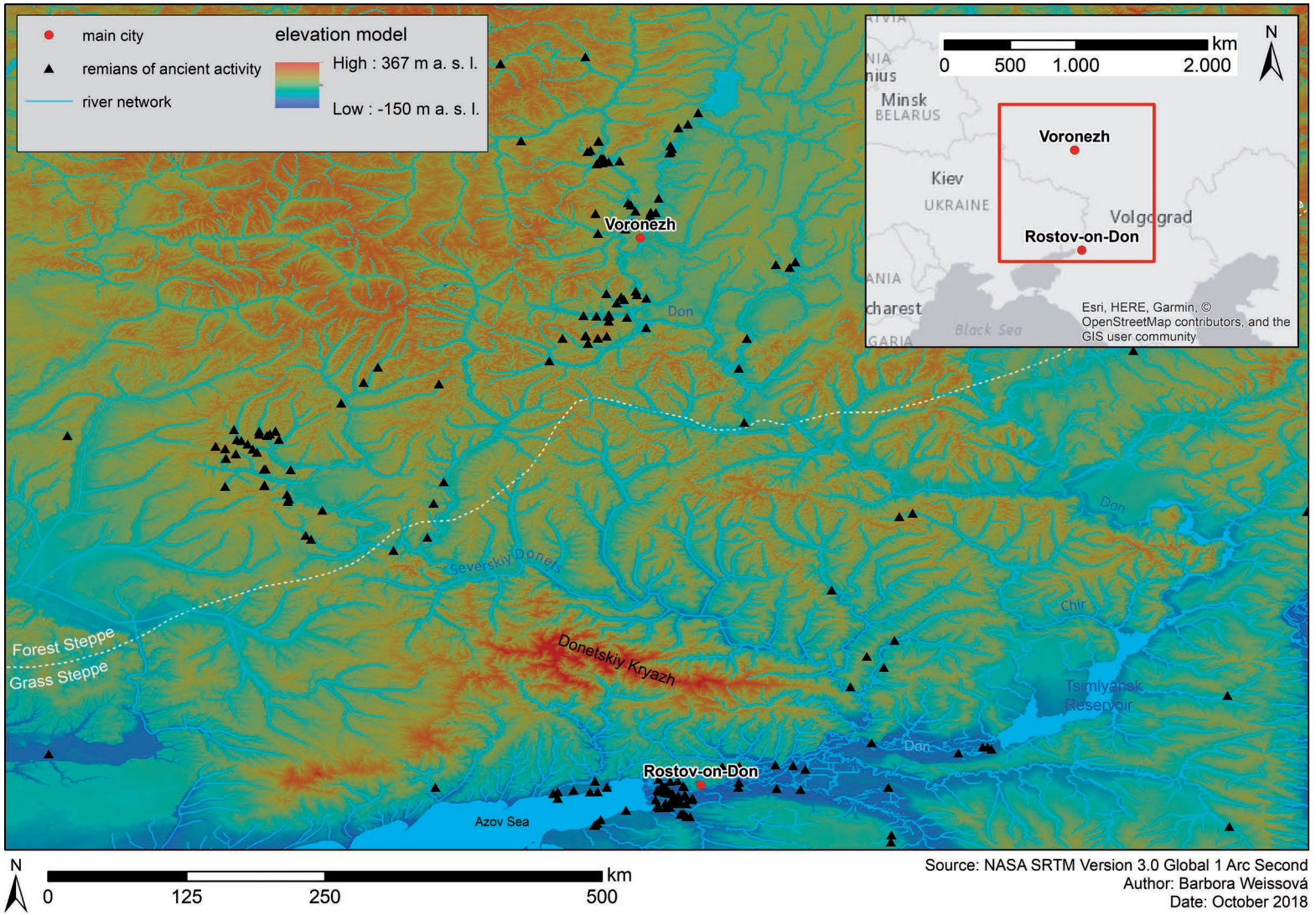

Fig. 1: An Overview Map of the Analysed Territory

Rostov-on-Don respectively. The analysed length of the river stretches over 1100 km and it is divided into a middle and lower course by the Tsimlyansky Reservoir. The middle course is characterised by a valley of about 6 km wide, numerous floodplains, small lakes and relict channels. The width of the river varies between 100 and 400 m. The right bank is of a steeper character, with chalk, limestones, and sandstones predominating. The landscape on the right bank is characterised by undulating plains cut into by jagged gorges, and on the left bank by the smoother, pond dotted topography of the Oka-Don Lowland. The first 300 km of the lower course are taken by the Tsimlyansky Reservoir, followed by 313 km of the river flow before it reaches the Taganrog Bay. The valley along the lower section of the Don is between 20 and 30 km wide, including a large floodplain and a braided river channel. The width of the river varies between 400 and 600 meters.

Although 70 per cent of the lower Don basin are now ploughed and used for agriculture, under natural conditions the analysed area would be covered by forest-steppe and steppe vegetation.[5] The regime of the Don is largely influenced by the Tsimlyansky Reservoir and numerous dams along its lower course, equalising its runoff during the year and increasing the evaporation. The loss of the water is largely intensified by the irrigation of the agriculture areas.[6]

The highest hill in the territory, Mogila Mechetnaya, reaches mere 367 m a.s.l. and it is situated within the Donetskiy Kryazh Highlands.

Sources of Data

The archaeological data used in the study come from numerous publications, mostly reports focused on one site solely, and brought together by S. Huy.[7] Character of the data allowed for only a broad definition of archaeological sites represented in the assemblage, including settlements, fortified settlements, burial mounds, burial fields and sites of an unknown character. The nodal points were chosen from the dataset as representatives encompassing distinctive amounts and/or quality of Greek imports detected, assuming regular contacts with Greeks.

The digital terrain model has been released by NASA[8] and it is the SRTM[9] Version 3.0 Global 1 arc second (henceforth the SRTMGL1). The SRTMGL1 is a void-filled product with a precision of about 30 meters,[10] allowing for calculating more than a satisfactory environment for the performed analyses. Vectorised inland waters and rivers[11] are products of the GIS-Lab,[12] only moderately adjusted in order to add some of the missing data. The outlines of the coastline[13] and the digitised open waters[14] follow the Barrington Atlas of the Greek and Roman World.[15]

Methodology

Given the extensive territory of about 360,000 sq. km and a relative insufficiency of the available datasets, I decided for applying a simple anisotropic least cost path analysis (henceforth the LCPA)[16] performed in GRASS GIS.[17] In other words, the cost-of-passage, a decisive factor for final outcomes, solely bases upon the slope of the land.[18] The slope is calculated using the SRTMGL1 and the necessary relative cost raster bases upon the equation *'tan (Slope) / tan (1)'*[19] applied to the smoothed slope.

The following and rather cumbersome step within the LCPA represent the road equations between the provided points of interest. Firstly, since the sites were digitised in Google Earth Pro and as such available only in a .kml (.kmz) format, it was necessary to convert and further transform them to shapefiles in order to enable their analysis.[20] An outcome of this work represents a spatial database created in ESRI ArcGIS.[21] The targeted points including Elizavetovka, Ol'chvatovskoe Pos., Cheperskiy, Konstantinovska, Krasnoyakova 2, Lyubotino, Russkaya Trostyanka, Mostishche and Chastye Kurgany, were one by one exported from the database as single point shapefiles and uploaded to GRASS GIS. In the following, it was necessary to calculate an accumulated cost raster and finally a drain between each pair of the nodal points.

In case of the real nodal points, interconnection of nearest neighbours brings sufficient results, covering all the possible routes. However, as the examined points are not real nodal points, but points of interest chosen based on the presence of the Greek imports, it was necessary to calculate all the possible routes. In other words, it was essential to connect each single point with all the other points, notwithstanding the distance or presence of points seemingly lying between the analysed ones. This approach proved to be legitimate since it revealed several feasible connections on top of the ones based on interconnecting the nearest neighbours exclusively.

One more issue represented the proximity of the Azov Sea when calculating routes leading from Elizavetovka to Lyubotino (from south to NW). Since the seas naturally feature the lowest level, the first route was calculated using the Sea of Azov on the first place, turning inland to take a relatively direct route to Lyubotino. Creation of a high cost raster for the Azov Sea appeared to be a prerequisite for a successful calculation of a route leading through the inland (both of the routes are depicted on the map fig. 2).

Results and Further Interpretations (see map fig. 2)

The routes calculated based on the LCPA revealed rather questionable results. The first obvious discrepancy is the length of the routes, since most of them are much longer than the beelines, in other words the shortest connections. To underline this observation with total figures, the lengths of the calculated roads are listed in the table fig. 3, accomplished with the lengths of the beelines and percentual expressions of the dif-

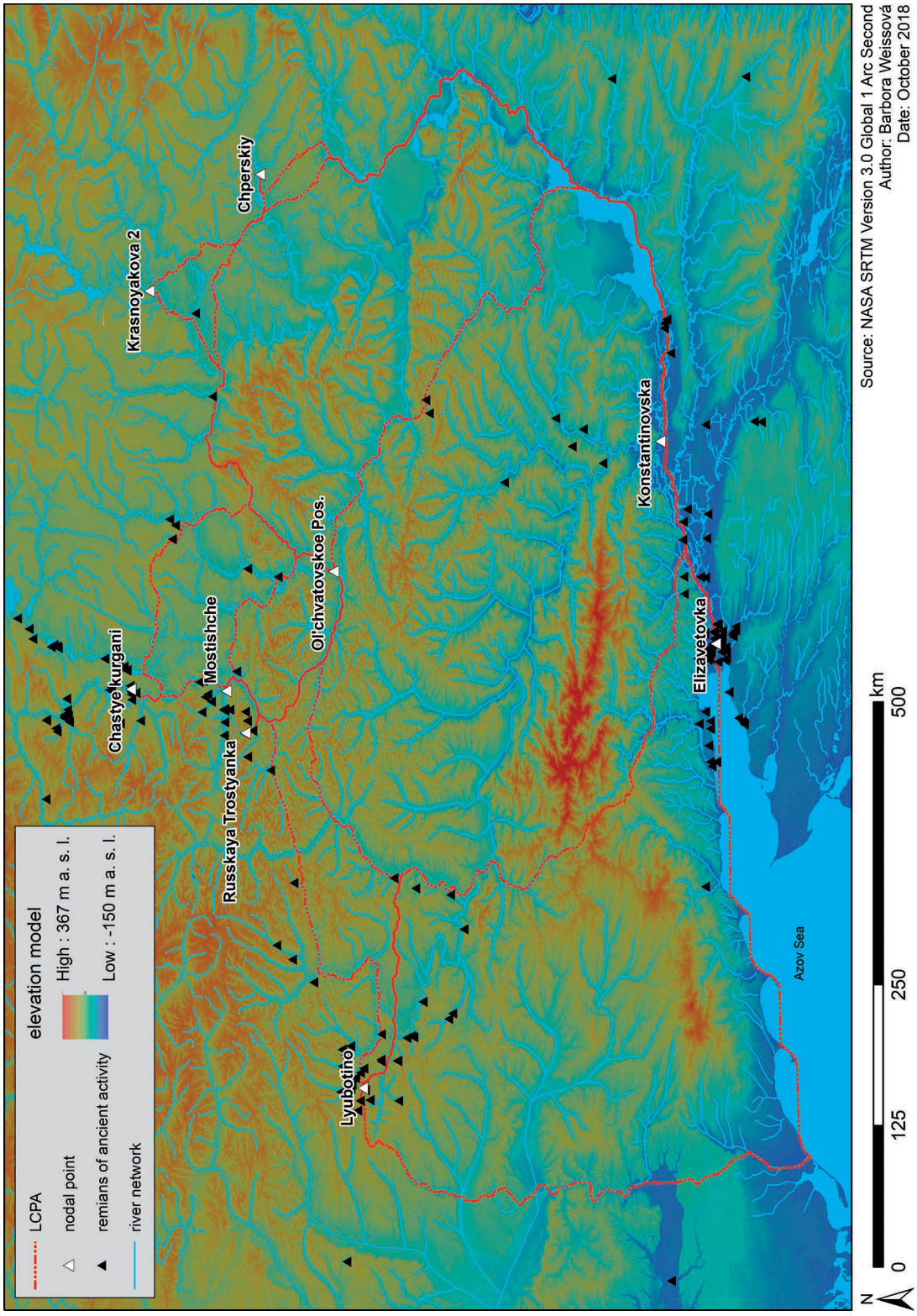

Fig. 2: Results of the Least Cost Path Analysis Interconnecting all the Points of Interest

Routes Between the Points of Interest		Distance (km)		Length of beeline (%)
From	To	LCPA	beeline	(LCPA represents 100%)
Elizavetovka	Krasnoyakova 2	960	544	57
Elizavetovka	Chperskiy	837	487	58
Elizavetovka	Lyubotino	909	408	45
Elizavetovka	Lyubotino	655	408	62
Elizavetovka	Ol'chvatovskoe Pos.	847	350	41
Ol'chvatovskoe Pos.	Chperskiy	399	233	58
Ol'chvatovskoe Pos.	Krasnoyakova 2	335	226	67
Ol'chvatovskoe Pos.	Mostishche	180	116	65
Ol'chvatovskoe Pos.	Chastye kurgani	365	191	52
Ol'chvatovskoe Pos.	Chastye kurgani	317	191	60
Ol'chvatovskoe Pos.	Russkaya Trostyanka	176	120	68
Ol'chvatovskoe Pos.	Lyubotino	445	295	66
Ol'chvatovskoe Pos.	Konstantinovska	683	299	44
Konstantinovska	Lyubotino	719	461	64
Russkaya Trostyanka	Lyubotino	380	226	59

Fig. 3: Computed Routes and their Lengths Compared with the Length of the Beeline

ferences between both of them (results of the LCPA represent 100 per cent to the length of the beelines). On average, the distances as the crow flies are one third shorter than the routes calculated by the LCPA. Considering that in absolute numbers the maximum difference reaches in one case not less than 497 km, it is highly probable the calculations based on the LCPA do not always respond to the most feasible routes in reality.

In all probability, the reason of this great disparity lies in the terrain model. Although the Donetskiy Kryazh Highlands situated in the southern part of the grass steppe reach mere 367 m a.s.l. in the maximum altitude, they still represent a considerable barrier for the LCPA, trying to avoid them at all costs and choosing the routes along the River Don.

This leads me to the second issue; the River Don was during the analysed timespan considerably mightier than today, and possibly running out of its confines and sub-

merging surrounding areas once in a while. Large rivers represented a crucial problem and they were always avoided regardless the dating and/or character of the road system.[22] It follows that the routes were either using the river itself or avoided it as well as its vicinity, since there is no safe road along such a mighty flow.

Regardless of the abovementioned issues, a brief spatial analysis of the distribution of the sites revealed an appealing observation. Some 33 (45) of the sites (excluding the points of interest) showed a linear clustering along the predicted routes when using buffers of 2 km (3 km). Spatial allocation of their vast majority is in the northern part of the territory. This fact largely supports the results achieved with the LCPA. Given all the aspects of the results, it seems that the inaccuracy of the LCPA is bordered to the southern part of the area.

In order to model a possible network within the erroneous southern part, one could take an advantage of the sustainability of the road systems, possibly featuring analogous routes for regional as well as supra-regional roads from the prehistory until today.[23] An examination of the modern road network, however, did not bring satisfactory results. The main road connecting Rostov-on-Don and Voronezh makes a bow to the east in order to avoid the state borders, a barrier which had not played any role during the analysed time span. Therefore, it is rather improbable the prehistoric and ancient routes followed the same course, as the direct north – south line is equally demanding but shorter.

Another possibility how to reconstruct the feasible route represent the remains of ancient activities, in this case the five (eventually seven when considering also the two in the NE) points dispersed between Konstantinovska and Ol'chvatskoe Pos. As all of the points represent burial mounds, some of them may have also served as road markers. Unfortunately, they do not feature any observable linear clustering, which would point to their function as the road markers.

Deficiency of the Analysed Dataset

During the analysis, several issues of the dataset appeared to be decisive, although not apparent at the first sight. The first one is the geographic precision of the record, which proved to be rather insufficient. For instance, within the seven burial mounds discussed above, the southernmost point represents not one but ca. 30 burial mounds from various periods. In such a case, any analysis of possible linear clustering is hindered.

The second issue is the enormously large scale, largely confusing when interpreting the data. For example, the two clusters appearing on the map in the northwest and north are scarcely distributed points in reality. In particular, the point cloud in the northwest features 30 sites dispersed within the territory covering more than 2400 sq. km.[24]

To achieve a more precise and reliable reconstruction of the routes, it is essential to streamline and enrich the current archaeological dataset. Shorter and more precisely

defined segments, especially in the territory of the Donetskiy Kryazh Highlands, have a great potential to reveal more feasible results.

Conclusion

Based on the careful evaluation of the results of the LCPA, I suggest seeing the entire territory and the numerous riverbeds as a matter of subsequent but relatively rapid, and possibly also seasonal change. This fact most likely largely influenced the routes of the communications. Since the elevations within the grass steppe do not overreach 367 m a.s.l. and for the most part vary between 50 and 150 m a.s.l., it is plausible the routes led directly towards the north, crossing the highlands and avoiding the longer and unstable route along the Don. As the territory is cut with a number of smaller rivers, it is expectable the road system was flexible to a given extent, adjusting to current conditions. This assumption would not be acceptable when speaking about an established road system, as, for instance, in case of the Roman paved roads, but since the analysis concerns nomadic movements, it is possible to speak about a relatively rapidly adjustable system of routes, depending on current weather conditions/season.

The presented analysis is the first attempt to shed light on the system of routes in the territory along the River Don and rather than representing final results, it should prompt a more intense discussion and research in the area. In particular, I do hope to inspire other studies in order to improve the mapping and spatial analyses of the distribution of the sites and their possible interconnections in the watershed of the River Don.

Notes

[1] For an overview of ancient authors mentioning Tanais, see Herrmann 1932, 2162–2166.

[2] For instance, see Grivenetsky et al. 2015, 245.

[3] Chibilyov 2008, 253.

[4] For more details about the River Don and its tributaries, see Vvedenskiy 1952, 88–90; Mart'nova – Aleksenko 2009, 31–32; French 1964, 577–578.

[5] Sidorchuk et al. 2011, 6.

[6] Nikanorov et al. 1994, 251; Blinnikov 2011, 16; Koronkevich 2008, 132. 134.

[7] Huy 2019.

[8] NASA stands for the National Aeronautics and Space Administration. For further information, see URL: <https://www.nasa.gov/> (25. 10. 2018).

[9] SRTM stands for the Shuttle Radar Topography Mission. For a detailed information, see URL: <https://www2.jpl.nasa.gov/srtm/> (25. 10. 2018).

[10] NASA SRTM 3.0 Global 1 arc second void-filled product combines elevation data from Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER), Global Digital Elevation Model 2 (GDEM2),

USGS Global Multi-resolution Terrain Elevation Data (GMTED) 2010, and USGS National Elevation Dataset (NED).

[11] Shapefiles in the forms of polygons and lines respectively.

[12] For a detailed information, see URL: <http://gis-lab.info/about.html> (20. 10. 2018).

[13] Ancient World Mapping Centre, "Coastline", URL: <http://awmc.unc.edu/wordpress/map-files/> (10. 10. 2018).

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[15] Talbert 2000. The digitisation is curated by the Ancient World Mapping Centre. For detailed reports about activities of the centre, see URL: <http://awmc.unc.edu/wordpress/awmc-annual-reports/> (25. 10. 2018).

[16] For more on the anisotropic least cost path analysis, see Wheatley – Gillings 2002, 151–154.

[17] GRASS Development Team, 2018. Geographic Resources Analysis Support System (GRASS) Software, Version 7.4.0. Open Source Geospatial Foundation. URL: <https://grass.osgeo.org> (25. 10. 2018).

[18] Bell – Lock 2000, 88.

[19] Bell – Lock 2000, 89.

[20] The outcomes of the database represented by several maps are published within the Doctoral thesis of S. Huy, forthcoming.

[21] The licence was provided by the Institute of Archaeological Studies at the Ruhr University Bochum.

[22] Compare French 1981. The reconstructed route of the Pilgrim's road between *Nicaea and Iuliopolis* crosses the mountainous plateau and avoids much easier but longer and often flooded route along the Sakarya River.

[23] Compare with 'Royal road', where the Roman road is explicitly described by Hdt. 5,52 as coinciding with the route of the 'Royal road'. Based on the linear clustering of prehistoric settlements, it even dates back to the 2nd mill BC (How – Wells 1957, 21–22). The territory around the Iznik Lake, NW Turkey, revealed even a more remarkable pattern, as the estimated deviation between the prehistoric routes and modern roads do not overreach 1 km (Weissová – Pavúk 2016, 11–21).

[24] In other words, the density of the sites (not even settlements!) in this area is one per 80 sq. km.

Image Credits

Fig. 1: Barbora Weissová. – Fig. 2: Barbora Weissová. – Fig. 3: Barbora Weissová.

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Life Cycles of Islands and Harbours. The Case Study of the Maiandros River and the City of Miletos

Helmut Brückner

During the past millennia, the formerly flourishing harbour city of Miletos and its environs have experienced major geographical and ecological changes, caused by the post-glacial sea-level rise, tectonic activities, the delta progradation of the Maiandros (Maeander, Büyük Menderes), and the continued human impact since late Chalcolithic times. Based on historical accounts, archaeological criteria, and geoarchaeological research, it is possible to reconstruct the spatio-temporal evolution of the landscape. Our major geoarchaeological tools are sediment cores, which are analysed and interpreted in a multi-proxy approach.[1]

Islands and harbours are key locations where these changes can be exemplified. The post-glacial and early Holocene transgression had created a deep marine embayment in the Büyük Menderes rift zone, which led to the "birth" of several islands, whereof Hybanda and Lade were the most famous ones. The later delta advance of the Maiandros caused their "death", i.e. their landlocking and final integration into the floodplain, which terminated their "life cycle" (fig. 1).[2]

At some places, the shifts in the shoreline can be demonstrated: in the area of the Temple of Athena, sea level had reached its highest stand during the early Bronze Age. A similar pattern is evident around the later Sanctuary of Apollo Delphinius, where cultural debris from the late Chalcolithic period is covered by shallow marine sediments.

The environmental changes with high erosion and correlate accumulation rates contributed to the rapid transformation of the Milesian archipelago with five islands to the Milesian Peninsula, which started during the 2nd millennium BC by the evolution of sand bars (tombolos) and was later supported by intentional infill (fig. 2).[3]

We know from Strabon (*Geographica* 14,1,6) that during his time Miletus had four harbours. The most prominent was the so-called Lion Harbour, a deep and narrow natural indentation between Kale Tepe and Humei Tepe (fig. 2). It shows the highest sedimentation rate in Roman Imperial times, which is evidence of high landscape consumption. With the loss of access to the open sea, at the latest around AD 1500, the life cycles of the Milesian harbours terminated. Today, Miletos is situated some 8 km inland.

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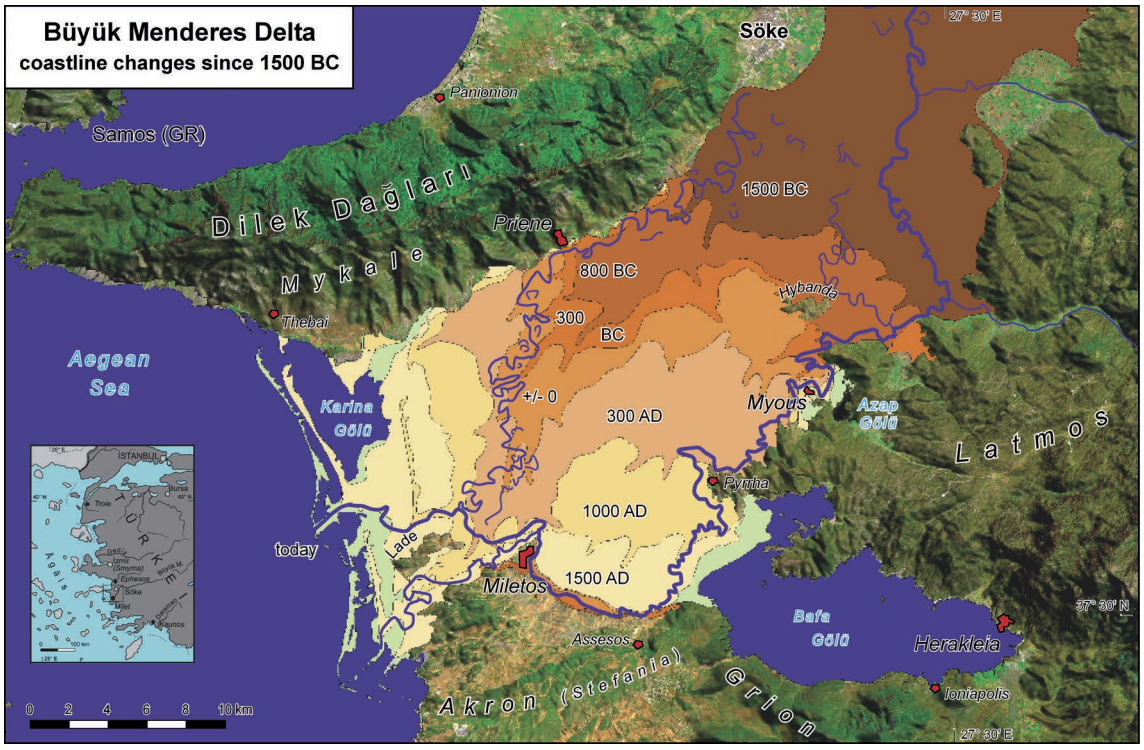

Fig. 1: Spatio-temporal evolution of the delta and floodplain of the Büyük Menderes (Maiandros, Maeander) since 1500 BC. Nowadays, the former marine gulf is nearly totally silted up, except for two remaining lakes in marginal positions, the most prominent one being the brackish Lake Bafa. The former islands of Hybanda and Lade were integrated into the floodplain, former harbour cities (Myous, Priene, Herakleia, Miletos) lost their access to the sea.

Fig. 2: (see page 35) Land-sea distribution in the area of Miletos for three time slices: during the maximum extent of the local marine transgression ca. 2500 BC with the Milesian archipelago (three of the former islands and the mainland are shown in yellow); during Archaic times; during Roman Imperial times. Sediments from denudation and wave action, as well as consolidation measures finally transformed the archipelago into the Milesian peninsula. Noted are also the most important buildings, the markets, the city grid and the harbours. Meanwhile, the whole area is silted up, and the present shoreline is situated at a distance of about 8 km to the west.

LEGEND

age of buildings

- modern
- Islamic
- Byzantine
- Roman Imperial time
- Classical-Hellenistic
- Archaic
- ambiguous age
- street-insulae-grid (Archaic-Classical)

distribution of land and water area

- land area at maximum transgression (around 2500 BC)
- water area at maximum transgression
- water area during Archaic time
- water area during Roman Imperial time
- coring site
- contour lines

map based on:

Bendt, W. (1968): Topographische Karte von Milet, M 1:2.000 (Milet II, 4); geophysical survey CAU Kiel, Dr. H. Stümpel; own topographical survey

Source: **Marc Müllenhoff, Alexander Herda & Helmut Brückner** (2008): Geoarchaeology in the City of Thales - Deciphering Palaeogeographic changes in the Agora Area of Miletus. Philippika, 1: 97-110; Wiesbaden.

cartography: Marc Müllenhoff, Alexander Herda

Notes

[1] Brückner 2019; Brückner et al. 2006; 2014; 2017; Herda et al. 2019.

[2] cf. Brückner et al. 2017.

[3] cf. Brückner et al. 2017.

Image Credits

Fig. 1: Brückner et al. 2014, Fig. 11. – Fig. 2: Brückner et al. 2014, Fig. 10.

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Flüsse als Wirtschaftsfaktor. Der Handel zwischen Etruskern, Griechen und Venetern im 6. und 5. Jahrhundert v. Chr.

Silvia Paltineri* – Mirella T. A. Robino – Federica Wiel-Marin*****

Unsere Reise beginnt in San Cassiano di Crespino[1] im Hinterland der Stadt Adria (Abb. 1). In der Antike verlief die Küstenlinie weiter landeinwärts als heute und Adria befand sich nicht weit im Inland am „Po di Adria", d. h. am nördlichsten Arm des weitläufigen Po-Deltas. Adria war ein Viel-Völker-Zentrum, das sich hauptsächlich aus Etruskern, Griechen und Venetern zusammensetzte.[2] Die Stadt bildete den End- und Ausgangspunkt vieler Seewege. Sie wurde ein Umschlagzentrum, in dem Produkte aus der griechischen Welt gelagert wurden, um sie dann auf den Wasserwegen ins Landesinnere zu verschiffen, vor allem nach Westen (Forcello di Bagnolo San Vito, südlich von Mantua am Mincio gelegen[3]) sowie nach Nord-Nordwesten (Este und von dort über die Etsch und die Alpen nach Norden[4]). Das Hinterland, das unter der Kontrolle von Adria stand, musste an die Stadt landwirtschaftliche Erzeugnisse und Vieh liefern. Ein solches Wirtschaftsmodell hat Maurizio Harari, der Ausgräber von San Cassiano, auch für Spina vorgeschlagen.[5] Demnach wurde das Land einerseits als Ackerfläche genutzt und wurde so – am Ende des 6. und während des 5. Jahrhunderts v. Chr. – Ausgangspunkt für die Gründung neuer Zentren. Andererseits waren diese nun für die Trockenlegung der Böden sowie auch für die Einrichtungen zur Kontrolle der Wasserwege verantwortlich. Letztere sind von Plinius überliefert als *„fossae per transversum"*, die man den Etruskern verdanke.[6]

Die Landschaft, das heutige Polesine, ist reich an Flüssen, die alle von Westen nach Osten, bzw. südlich der Euganeischen Hügel von Norden nach Süden fließen.[7] Die Gegend ist so flach, dass die Flüsse im Laufe der Jahrhunderte oftmals ihren Lauf verändert haben. Tatsächlich hat das minimale Gefälle, das gegen Null tendiert, den Transport des Gerölls ins Meer verhindert. Dadurch wurde der Wasserabfluss stark beeinträchtigt, so dass manchmal entlang der Uferlinie eine sogenannte *„rotta"* (ein Dammbruch) entstand und der Fluss sich ein neues Bett suchte. Dabei blieben die alten Uferböschungen aus Schutt zumeist erhalten. Da der Wasserstand wegen des fehlenden Gefälles weitgehend konstant blieb, waren die Flüsse leicht mit Booten zu befahren. Strabon (Georg. V,1,7) berichtet, wie man vom Meer aus Padua erreichen konnte: *„Man reist vom Meer zur Stadt auf einem Fluss, der von einem großen Hafen aus durch Sümpfe 250 Stadien weit verläuft* [etwa 45 km]. *Der Hafen heißt Medoaco und ebenso der Fluss"*. Dieser Fluss (heute: Brenta) ist jedoch schon seit langem nicht mehr schiffbar.

Im 6. und 5. Jahrhundert v. Chr. wurden die Siedlungen im Delta-Bereich auf den Ufer-Rücken des Flussnetzes angelegt. Sie wurden nach Möglichkeit in erhöhter Position oder auf Pfählen erbaut und von einer Vielzahl von Kanälen für den Abfluss der Gewässer durchzogen. Auf den Uferböschungen längs der Flussläufe lagen nahe bei den

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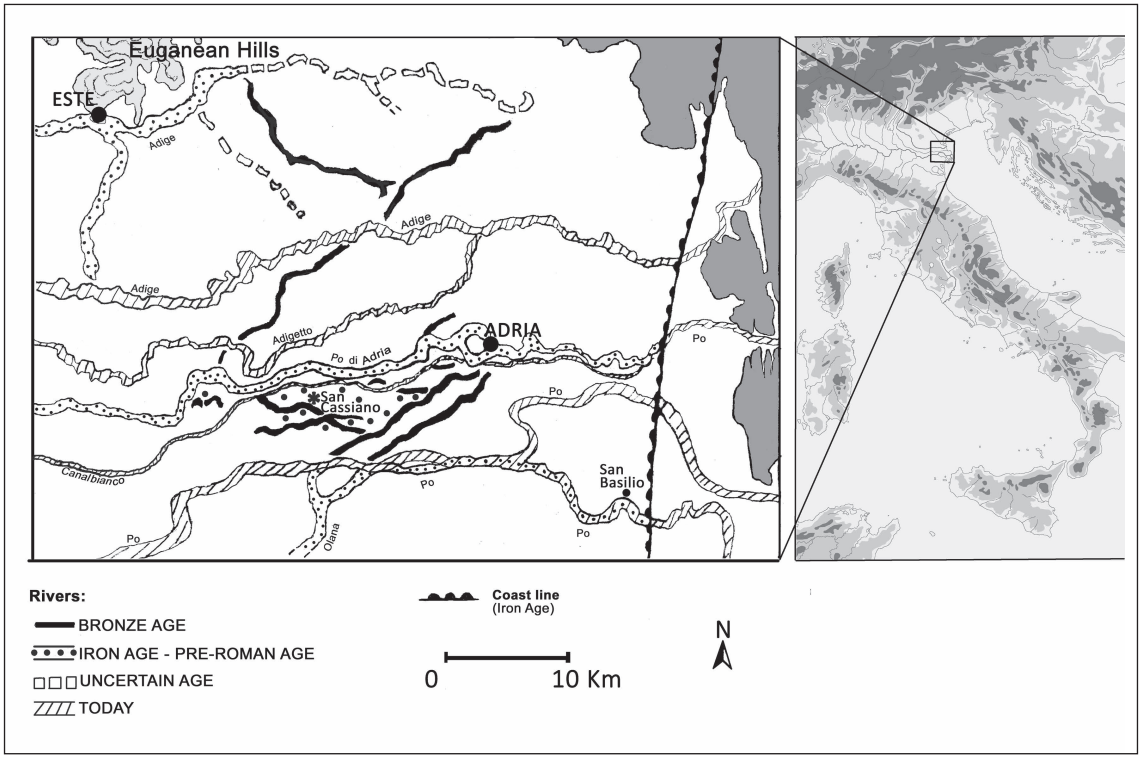

Abb. 1: Das Po-Delta mit den wichtigsten Orten, die im Text erwähnt werden.

Behausungen auch die Nekropolen. So lassen sich beispielsweise zahlreiche Fundstellen im Gebiet von Adria nachweisen.[8]

Auch das in der benachbarten venetischen Region gelegene Este/Atheste (Abb. 1), entfaltete sich am Ufer eines Flusses: der Etsch/Adige/Athesis, die der Stadt den Namen gab. Este liegt an den südlichen Hängen der Euganeischen Hügel. Die Etsch floss südlich am Fuß dieser Hügel vorbei und umspülte das Zentrum von Este, dem Hauptort des vorrömischen Veneto.[9] Südlich der Etsch auf halbem Weg zum heutigen Verlauf des Pos und entlang der Linie des heutigen Canalbiancos, flossen in der frühen Eisenzeit der „Po di Adria" oder, wie er in den antiken Quellen genannt wurde, der *potamos adrias* und der Tartaro. Der südliche Teil der Etsch, der Tartaro und der „Po di Adria" lagen an einigen Stellen sehr nahe beieinander oder vereinigten sich sogar, wie Plinius berichtet (N. H. III 119–121).

Wir müssen uns also für die vorrömische Zeit eine Landschaft vorstellen, die aus der Abfolge von Land, Sümpfen und Wasser bestand, mit Uferböschungen, die sich über das Netz der Flüsse erhoben.

Kehren wir zurück nach San Cassiano. Der Ort entstand gegen Ende des 6. Jahrhunderts v. Chr. und blieb bis zum Anfang des 4. Jahrhunderts besiedelt (Abb. 2). Wie die paläobotanischen Analysen zeigen,[10] die den Anbau von *panicum…* und den Verzehr von *sus…*, und somit Ackerbau und Tierhaltung belegen, hatte die Siedlung die Funk-

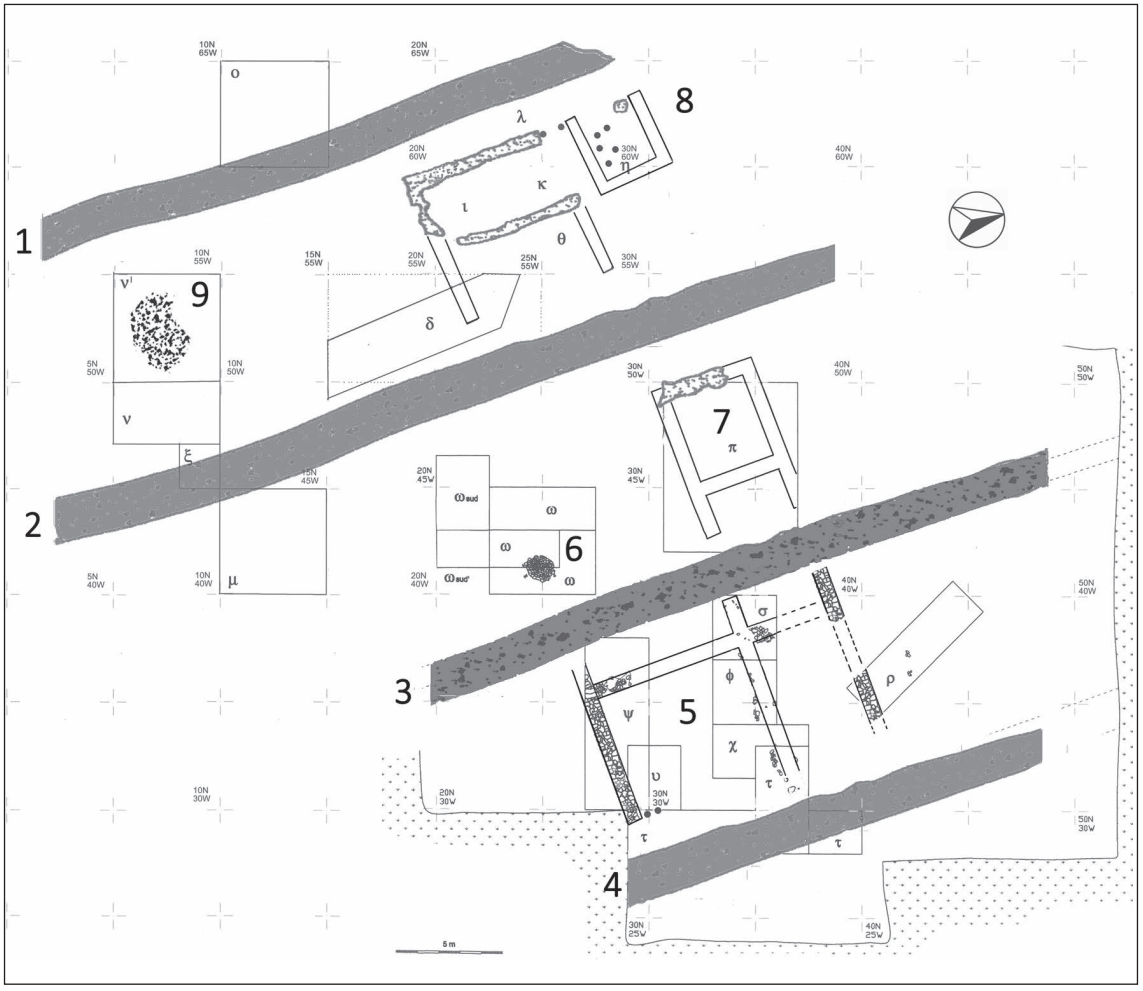

Abb. 2: San Cassiano di Crespino. Plan der Siedlung der 1. Phase. 1, 2, 3, 4: Kanäle; 5: *Edificio della cortina;* 6: Kreisförmige Basis; 7: Einraumgebäude; 8: *Casa del telaio;* 9: kleines Gebäude aus vergänglichem Material.

tion einer landwirtschaftlichen Produktionszelle. Die Siedlung bestand mit Sicherheit aus mindestens vier Gebäuden, von denen drei Sockelzonen aus Steinblöcken aufweisen (Abb. 3). Die Steinsockel der Gebäude sind in der Gegend von San Cassiano eine Besonderheit, was auf etruskischen Ursprung hinweist. Sonst wurde nur mit Holz und Erde gebaut.[11] Die Gebäude waren mit einem Ziegeldach (Flach- und Deckziegel) über einem hölzernen Dachstuhl gedeckt. Neben den Sockeln der drei Gebäude befand sich im Zentrum des Komplexes eine kreisförmige Basis (Abb. 4), die vermutlich als Grundlage und Ausgangspunkt für die Planung des Geländes diente: Gebäude und Kanäle folgen in ihrer orthogonalen Anlage dem Vorbild für Siedlungen, das aus der *Etruria Padana* bekannt ist (Marzabotto) und das schließlich bis zum Po gelangte, wie Forcello di Bagnolo San Vito beweist.[12]

Abb. 3: San Cassiano di Crespino. Steinsockel des *Edificio della cortina* aus euganeischem Trachyt.

Abb. 4: San Cassiano di Crespino. Kreisförmige Basis im Zentrum der Anlage aus euganeischem Trachyt.

Die Sockel waren aus Trachyt, der aus den Euganeischen Hügeln stammt, einem Gebiet vulkanischen Ursprungs, das nordwestlich von San Cassiano in einer Entfernung von 20 km Luftlinie liegt. Es muss in dieser Region mehrere Trachytbrüche gegeben haben, obwohl wir heute nur wenige kennen, die bereits in der Antike genutzt wurden (heute zählt man um die 70 Steinbrüche in der Region).[13] Zu den antiken Trachytbrüchen gehören die Rocca di Monselice, die sich am nördlichen Arm des antiken Laufs der Etsch befinden, sowie einige andere Brüche im nordöstlichen Teil der Hügel. Der Trachyt ist mit Sicherheit auf dem Wasserweg nach San Cassiano verschifft worden. Der Transport über Wasser war leichter, schneller und weniger ermüdend als über Land und bot sich in einem Gebiet, das so reich an Flüssen und Kanälen war wie das Po-Delta, geradezu an. Dass man Trachyt im Delta antrifft, zeigt die erstaunliche ökonomische Leistungsfähigkeit der etruskischen Gemeinschaft von San Cassiano. Es beweist außerdem die Existenz von Handelsbeziehungen zwischen den Venetern von Este und den Etruskern im Po-Delta, welche einer klaren wirtschaftlichen Logik folgten: Für die Epoche, mit der wir uns hier beschäftigen, ist nicht länger das Modell des *„gift trade"* maßgeblich, also der Austausch von Prestige-Gütern. Im Gegenteil handelt es sich nunmehr um ein viel komplexeres wirtschaftliches Modell mit einem großen Volumen des Warenverkehrs, der von lokalen Autoritäten geregelt wurde. Wir sind tatsächlich bereits in einer Phase, in welcher die Gesellschaft – jedenfalls in dieser Gegend – schon vollständig urbanisiert war, und in der die Stadt eine direkte Kontrolle über ihr Umland ausübte.

Elemente, die diesen Handelsaustausch zwischen den Etruskern des Deltas und den Venetern belegen, sind die griechischen Transportamphoren[14] und die attische Keramik, deren Fundplätze sich entlang der Altarme der Flüsse in dem Gebiet verteilen, das zwischen den Euganeischen Hügeln und der Stadt Adria liegt. Es handelt sich um Material unterschiedlicher Herkunft: aus Siedlungen (Adria, San Cassiano, Este usw.), aus Nekropolen (Adria, Le Balone, Este usw.) sowie Oberflächenfunde (aus der Gegend von Romanina, Manzoleria, Larda di Gavello).[15] Die Verteilung der hier untersuchten archäologischen Funde bestätigt, dass der Handelsverkehr das Netz der Wasserwege nutzte. Es waren also die Flüsse, die das Wirtschaftsmodell bestimmten, indem das Land für die Produktion und die Wasserläufe für den Handel genutzt wurden.

In San Cassiano ist die attische Keramik gut vertreten: Wir haben schwarzfigurige und schwarzgefirniste, aber auch rotfigurige Keramik. Es handelt sich vorwiegend um Trinkgefäße: meistens sind dies Kyliken (Abb. 7), aber auch Skyphoi (Abb. 8). Darüber hinaus gibt es fünf Lekyten (Abb. 5), zwei Lekaniden sowie einen Kelchkrater. Diese Gefäße decken einen weiten chronologischen Bogen von den letzten Jahren des 6. bis zum Ende des 5. Jahrhunderts v. Chr. ab. Unter all diesen Gefäßen sticht die Randscherbe eines rotfigurigen Kantharos[16] (Abb. 6) mit einer Reliefdekoration besonders heraus. Er bildet einen der frühesten attischen Funde aus der Siedlung und ist bis heute einzigartig.

San Cassiano liegt zwischen Adria und Este und besteht nur aus dem Siedlungsareal. In Este dagegen sind neben einem Wohnbereich auch die Nekropolen und die Heiligtümer identifiziert worden.[17] In Adria hingegen kennt man außer dem Wohnbereich

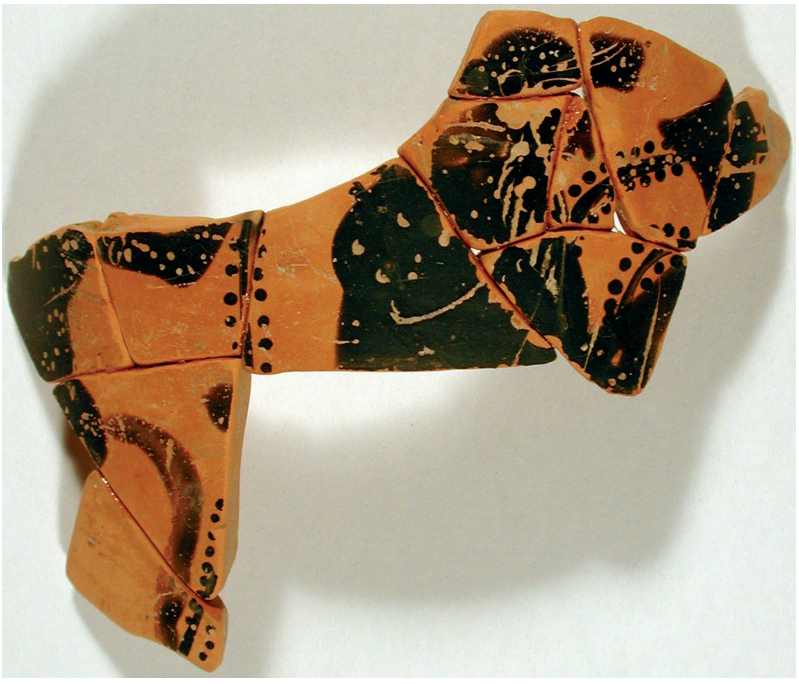

Abb. 5: San Cassiano di Crespino. Lekythos (Inv.-Nr. 360785), Class of Athens 581, um 500 v. Chr.

Abb. 6: San Cassiano di Crespino. Scherbe des Kantharos (Inv.-Nr. 360725), Castle Ashby Maler, um 500 v. Chr.

Abb. 7: San Cassiano di Crespino. Kylix (Inv.-Nr. 278726), Leafless Group, 500–475 v. Chr.

Abb. 8: San Cassiano di Crespino. Skyphos (Inv.-Nr. 360792), Anfang 2. Hälfte 5. Jahrhundert v. Chr.

nur wenige Gräber aus dem 6.–5. Jahrhundert v. Chr.,[18] während man über die Existenz eines Heiligtums nur Vermutungen anstellen kann.[19]

Betrachtet man die Keramik, die aus den Wohnbereichen von Este, San Cassiano und Adria stammt, lassen sich auffällige Analogien feststellen:

1. Trinkgefäße sind deutlich häufiger belegt als alle anderen Gefäßformen; doch die Übernahme ganzer Trinksets für griechisch-etruskische Symposien mit ausschließlich attischer Keramik fehlt bisher.
2. Unter den Formen der Trinkgefäße sind die Kylikes viel häufiger als die Skyphoi.
3. Die schwarzfigurigen Gefäße sind sehr beliebt, auch während des 5. Jahrhunderts v. Chr.

Die Präsenz von attischer Keramik konzentriert sich in besonderer Weise im Wohnareal, während sie in Nekropolen seltener ist. In Este haben wir ein Verhältnis von ca. 3:1 der Häufigkeit von attischer Keramik im Wohnbereich und in den Nekropolen, während in Adria bis zum heutigen Tag die Nekropolen des 6.–5. Jahrhunderts v. Chr. noch weitgehend unbekannt sind, wodurch ein Vergleich nicht möglich ist.[20]

Die Veneter, die die Trachytbrüche in den Euganeischen Hügeln kontrollierten, also für das Brechen und die erste Bearbeitung des Steinmaterials zuständig waren, standen also in Verbindung mit ihren Handelspartnern, den Etruskern im Delta, die ihrerseits auf der Suche nach einem festen und widerstandsfähigen Baumaterial waren.[21] Die Etrusker wiederum betrieben den Handel mit attischer Keramik in den Zentren des Po-Deltas und im benachbarten venetischen Gebiet. Eine Bestätigung dieser Tatsache ist auch das Vorkommen einfacher Keramik aus etrusco-padanischer Produktion.[22] Zwischen der Mitte des 5. und der Mitte des 4. Jahrhunderts v. Chr. konzentriert sich in Este die etrusco-padanische Keramik in den Nekropolen Capodaglio und Franchini.[23] In Este finden wir etrusco-padanische Keramik nur in Gräbern zusammen mit Gegenständen, meistens aus Metall, die von Norden über die Etsch ins Veneto gelangt waren.

Wir sehen also, dass die Etsch und die nördliche Fortsetzung, die Eisack, der Inn, die Salzach, nicht nur mediterrane Produkte (attische Keramik, Glas usw.) nach Zentral-Europa, sondern auch typisch zentral-europäische Objekte von Norden nach Süden gelangen ließen, vor allem Metallobjekte wie Fibeln, Gürtelhaken, Situlen, Messer besonderer Form, die sich deutlich von jenen aus der *Etruria Padana* unterscheiden.[24]

(S. P.); (M. R.); (F. W.-M.)

Anmerkungen

* Università degli Studi di Padova – Dipartimento dei Beni Culturali: archeologia, storia dell'arte, del cinema e della musica – 35139 Padova – silvia.paltineri@unipd.it

** Università degli Studi di Pavia – Dipartimento di Studi Umanistici – 27100 Pavia – mirellateresaaugusta.robino@unipv.it

*** Ruhr-Universität Bochum – Institut für Archäologische Wissenschaften – 44791 Bochum – federica.wielmarin@ruhr-uni-bochum.de

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[5] Harari 2004c, 41–49.
[6] Harari 1998, 683–690; Harari 1999, 627–628; Harari 2002; Harari 2004c, 38–39.
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[8] De Min – Peretto 1986; Peretto 1994; Peretto u. a. 2002; s. auch Anm.1 und 2.
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Abbildungsnachweis

Abb. 1: S. Paltineri. – Abb. 2: Paltineri u. a. 2018, 201. – Abb. 3: Paltineri – Robino 2016, Taf. XXIIc. – Abb. 4: Paltineri – Robino 2016, Taf. XXIIa. – Abb. 5–8: F. Wiel-Marin, mit Erlaubnis M. Harari.

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Taming Nature – Riverine Connectivity in the Middle Danube Region

Christoph Rummel

The Danube as an Economic Corridor

Today, the Danube serves as a key economic artery for the wider Region, if not all of Europe – mainly in terms goods transport and tourism. This vital role of Europe's longest river is reflected in the numerous EU initiatives that focus on the Danube or its catchment area, and is a development that can generally be traced back across the last centuries – to think only of the "Donaumonarchie" of Austro-Hungary or the "Donauschwaben" of the 18th century. This notion of the Danube as a major economic corridor is fixed in modern minds, and economic policy – particularly as, linked up with the Rhine by canals, it forms a water-based east west link between the North Sea and the Black Sea.

More or less the same link was created in the Roman period by the northern frontier of the Roman Empire, which largely followed the two great European rivers and, wherever it did not, at least consisted of a road running along, and possibly defining, the frontier (fig. 1).[1] In this, it is important to note that in earlier historical periods, far smaller rivers were considered navigable for transport vessels. This is particularly true for antiquity, and the stretch of land between the uppermost reaches of the Danube and the Rhine or Lake Constance that divided these two riverine systems would have been far less of an obstacle than the "missing link" that is bridged by artificial canals today. In Roman frontier studies, there are new trends that argue that the frontier zone would have acted as a key economic zone of the Roman Empire: the presence of large numbers of soldiers who were paid in hard currency, but who also needed to be housed and fed and had animals that needed to be cared for and equipment to maintain, would have provided an economic stimulus rivalled only by the great cities at the core of the Mediterranean world.[2] In this, the Danube and Rhine would have acted as economic corridors in antiquity as they do today. Added to this is the newly emerging observation that the road running along the frontier provided an important communication route through this frontier zone.[3]

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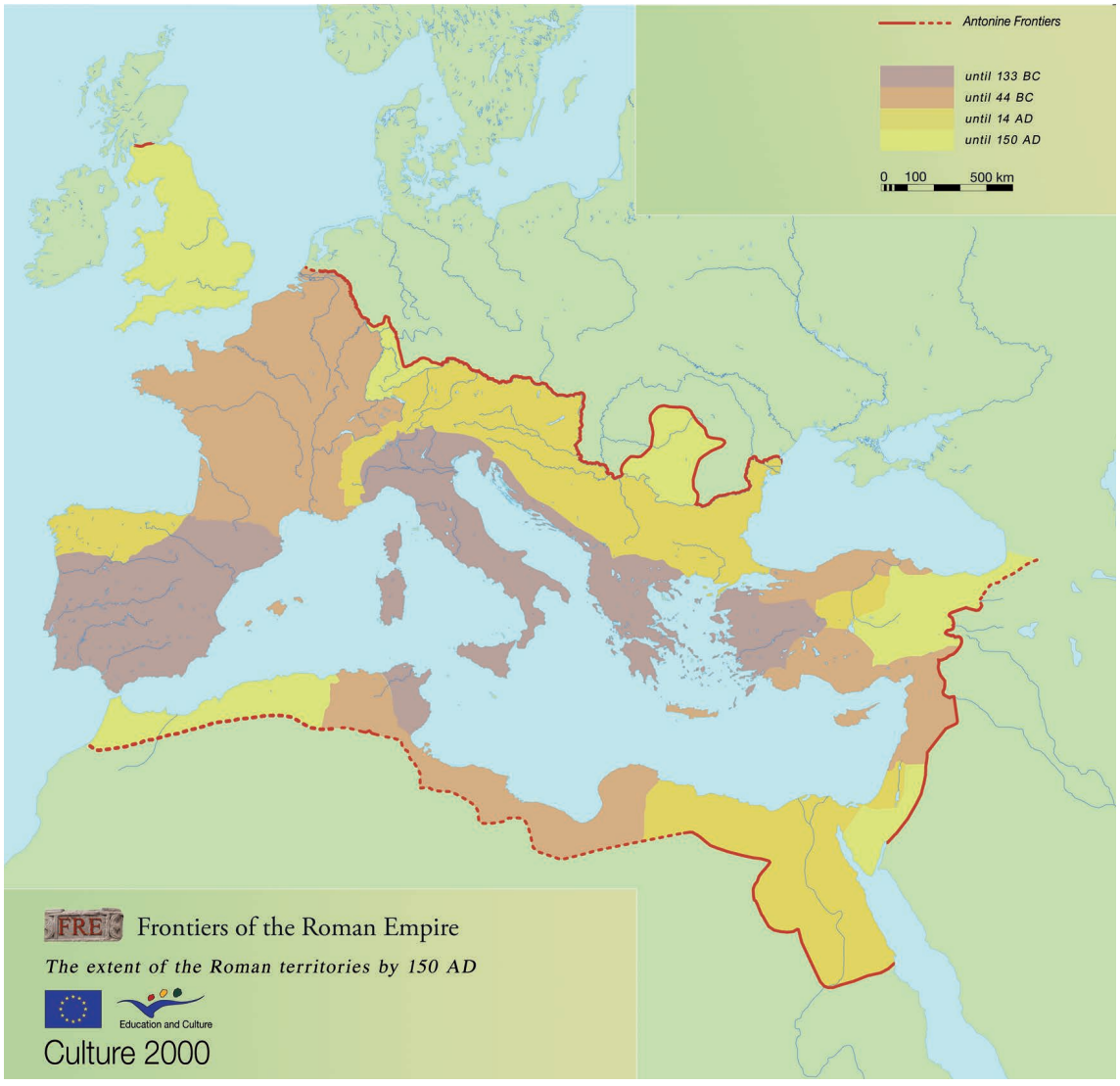

Fig. 1: The Roman Empire at its greatest extent in the 2nd century AD, showing how the northern frontier follows the courses of the Rhine and Danube rivers.

Evidence for Danube Connectivity in Antiquity

At first sight this is reflected in several aspects that we use to analyse the economic potential of rivers. To date, archaeological remains of 15 harbours have been identified along the Danube – of varying types and far too few to make any overall assessments in view of the 2780km of river (on average one Roman harbour to every 200km). But in view of the changing river course particularly in the lower reaches and severe erosion in the more central parts, this is actually quite a significant number of identified sites. They range from artificially constructed harbours, such as at Aquae/Prahovo in Serbia[4] to constructed riverside revetments and quays, such as at the legionary fortress of Novae/Švištov in Bulgaria[5] and simple wooden reinforcements of a riverbank as identified together with the Roman patrol boats at Oberstimm in Bavaria.[6] In addition to this archaeological evidence for naval activity on the Danube, literary sources and epigraphic data indicate further sites relevant to shipping. These include, amongst others, two sites in modern Bulgaria: Ratiaria, now Arčar, which was named the ratis, a type of ship that is identified on the Tunisian Althiburbus mosaic,[7] and Sexaginta Prista, now Ruse, its name referring to the Greek pristis, a type of military vessel.[8]

The economic role of the Danube is further underlined by individuals such as Aurelius Martialis, identified in a sarcophagus inscription found at Brigetio, modern Komarom on the border between Hungary and Slovakia, AE 2000, 1197/RIU 0595.[9] On this sarcophagus for his departed wife of 40 years, Martialis identifies himself as a 'nauclerus portus Pontis Aeni'. Pons Aeni is a town well known to those working in the German Provinces, modern Pfaffenhofen am Inn, located on the river Inn near Rosenheim just south of Munich.[10] This nauclerus or shipowner – who presumably shipped goods along the Danube, therefore evidently moved between the Bavarian, Austrian and Slovakian/Hungarian parts of the Danube, as well as tributaries such as the Inn, regularly enough for his wife to travel with him, as she was buried at Komarom rather than the home town of Pons Aeni.

On a less individual level, economic activity along the river becomes evident when looking at material culture, particularly in the form of ceramics distribution from production centres in southwestern Germany. This was shown clearly by the Transformation Project of the Römisch-Germanische Zentralmuseum at Mainz that mapped different finds distributions across Europe. In this, it is particularly evident for certain ceramics workshops, particularly those operating from the 2nd century AD onwards.[11] A key factor in this movement of material culture along the Roman frontier line will have been the Roman army, which possessed significant buying power as the soldiers were paid in hard currency and would have created an economic hot zone along the fringe of the Empire. The army itself, however, provides further evidence for the use of the Danube as a transport corridor, with Roman military units moved along the river between modern southern Germany and the middle Danube on a regular basis – particularly so in the context of the Dacian Wars of Domitian and Trajan.

The pre-Roman Middle Danube Region

It is interesting to note, however, that up to the early 2nd century AD, i.e. the Dacian Wars of Trajan, material culture and military unit movements appear to have been limited to the Upper and Middle Danube (i.e. the course between modern southern Germany and Serbia and Romania), and only rarely reach the lower reaches of the river, an observation particularly noteworthy when seen in the wider context of distributions of material culture in the Balkans before the arrival of the Romans.

Recent research has shown that most prehistoric cultures, from the late Neolithic Vinča culture or different Iron Age cultures[12] to the distribution of Thracian hoard finds,[13] to name only a few examples, can be divided into distinct eastern and western groups separated by the major mountain ranges of the Carpathians and their connecting foothills into the Stara Planina. These mountains generally appear to have served as a major divide that affected prehistoric communications, cultural exchange and movement, separating the Balkan peninsula into an eastern and a western part.

Where these mountains meet the Danube, the river enters the so-called "Iron Gates", one of the most dramatic landscapes of Europe (fig. 2). On either side of the river course, steep cliffs rise several hundred metres into the air, the river itself is channelled into three stretches of narrow gorges called "Klisura" or "Kazan", depending on linguistic preference, both basically meaning cauldron. In total, these narrows and shallows extend over a distance of nearly 140 km along the river course. At its narrowest point, the Danube, today regulated following the construction of two hydroelectric dams in the 20th century and with a water level c. 30 m higher than before this regulation, was originally reduced to a course 150 m wide and more than 50 m deep. This so called "Great Kazan" or cauldron originally formed a continuous run of rapids and shallows extending over a stretch of 20 km.[14] Until the late 19th century, the area was hardly navigable and at times, such as during winter floods or summer shallows, thoroughly impassable by boat. Regular navigation by larger vessels only became possible following major Austro-Hungarian regulation works that involved blasting navigable channels through parts of the difficult sections. Even following this work, larger vessels had to be towed upstream by train until the creation of two dams, with resulting rises in water levels and construction of two locks, in the 20th century.[15] It is apparent therefore, that river navigation in this stretch would have been difficult, verging on the impossible, in prehistory and antiquity.

The natural barrier posed by the southern Carpathians and northern foothills of the Balkan range, as indicated by material culture distributions, is furthermore reflected in the Roman occupation of the region. The general advance towards the Danube around AD 6 followed two entirely separate prongs, one from the west following the course of the Sava and moving up along the Drin and Morava valleys from what are now Greece and Albania, and an eastern advance heading up the Danube from the Black Sea and supported by a movement across the Haemus mountains.[16] The implication of this

Fig. 2: The narrowest point of the Iron Gate gorge near Golubinje in 2011, view from the southern bank towards the West.

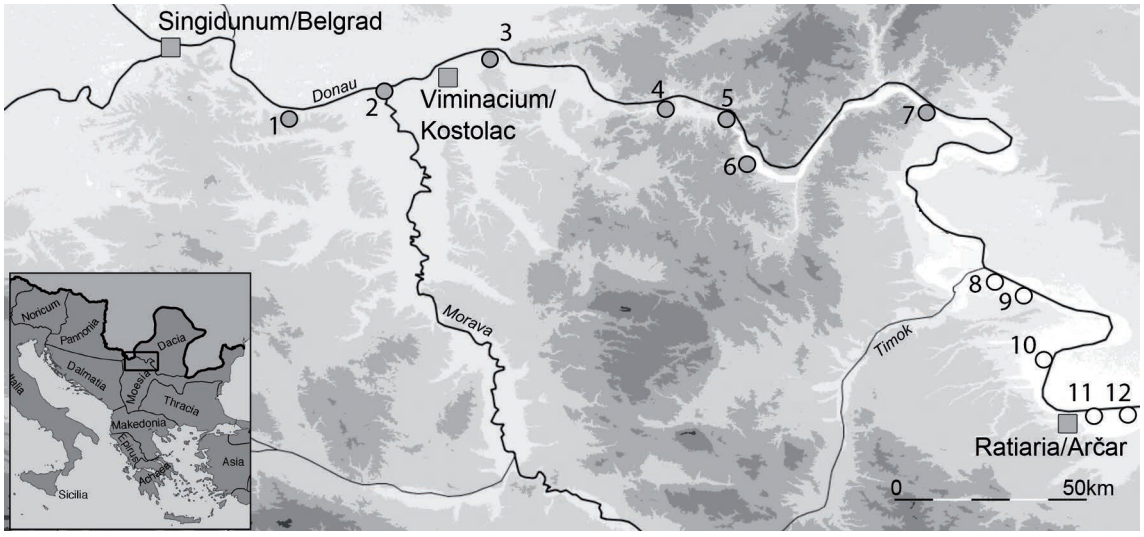

Fig. 3: Pre-Flavian Roman Military sites on the Middle Danube. Legionary Fortresses marked as rectangles, auxiliary forts circles. White: site not investigated archaeologically. 1 Aureus Mons/Seona, 2 Margum/Dubravica, 3 Lederata/Ram, 4 Novae/Česava, 5 Saldum/Gradac, 6 Smorna/Boljetin, 7 Diana/Karataš, 8 Dorticum/Vrav, 9 Novo Selo, 10 Vidin/Bononia, 11 Dobri Dol, 12 Remetodia/Oršolja.

two-pronged Roman occupation, which largely followed existing prehistoric routes, is that the pre-Roman Balkan peninsula consisted of two separate spheres, and that the Danube, at this time at least, did not unite and serve as one linking corridor in the way we see it today and is implied by the Roman material culture distributions referred to above.

This is also shown by an overview of Roman sites predating the Flavian period in the Middle Danube region and the area around the Iron Gates, which cluster around major river confluences where the Danube can be reached from the southern hinterland – such as the Sava at modern Singidunum/Belgrade, the Morava at Viminacium/Kostolac and the Lom at Ratiaria/Arčar (fig. 3). Relatively regularly spaced sites can be found along the Danube, but not in the Iron Gates region itself. Here, only four sites (4–7) have been identified for this period, despite large-scale survey and excavation programmes preceding the construction of the two hydroelectric dams – both at possible crossing points of the river.

Roman Infrastructure Projects to Create Danube Connectivity

Epigraphic and archaeological evidence shows that from Tiberius onwards, the Romans undertook a concerted effort to create a road link through the difficult sections of the Middle Danube, in order to create a continuous east-west link along the river. To this

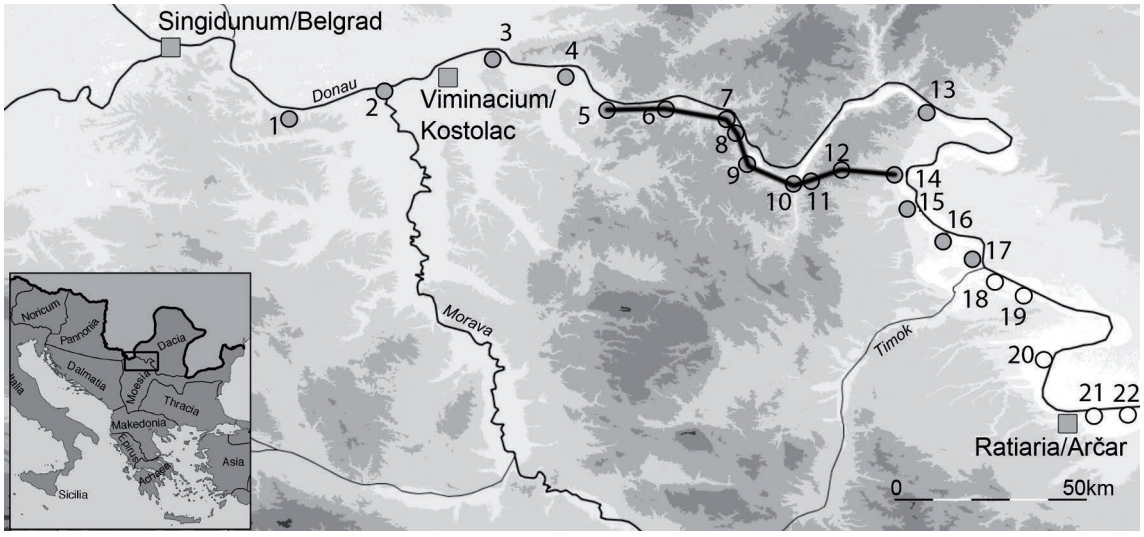

Fig. 4: Roman Military sites on the Middle Danube and the state of the Danube Road at the time of Domitian (post AD 92). Legionary Fortresses marked as rectangles, auxiliary forts circles. White: site not investigated archaeologically. 1 Aureus Mons/Seona, 2 Margum/Dubravica, 3 Lederata/Ram, 4 Pincum/Veliko Gradište, 5 Cuppae/Golubac, 6 Novae/Česava, 7 Saldum/Gradac, 8 Gospođin Vir, 9 Smorna/Boljetin, 10 Taliata/Donji Milanovac, 11 Gradač, 12 Gerulatis/Miroć, 13 Diana/Karataš, 14 Egeta/Brza Palanka, 15 Mihaijlovac, 16 Aquae/Prahovo, 17 Kurvingrad, 18 Dorticum/Vrav, 19 Novo Selo, 20 Vidin/Bononia, 21 Dobri Dol, 22 Remetodia/Oršolja.

end, an artificial road was cut into the rock-faces of the southern bank of the Iron Gates from the east towards the west from the late Julio-Claudian period onwards by the IV Scythica and V Macedonica legions.[17] A first road link through the area in question appears to have been completed by the VII Claudia Legion under Domitian,[18] though part of it ran overland, cutting across the northern foothills of the Stara Planina via the fort of Gerulatis/Miroć and avoiding the most difficult stretch of the Danube between Gradač and Egeta/Brza Palanka (fig. 4).

A continuous, largely artificially created roadway along the Danube itself was finally completed under Trajan in AD 101, as commemorated in the famous Tabula Traiana.[19] This Roman Danube Road was a unique engineering project that lasted for nearly a century. It remained in use until the water level of the Danube was raised as a result of the construction of the first hydroelectric dam, Đerdap I, and was studied in detail by Yugoslav scholars as part of the large-scale archaeological research programme that took place in the Iron Gates region in preparation for the dam project.[20] The road consisted of an artificial roadway up to 2 m wide that was cut into the rockfaces in several places and for long stretches.[21] In other parts it was either extended or replaced in its entirety by beams slotted into holes cut into the cliff-faces that would have supported a roadway of up to 4 m width, directly above the water.[22] Overall, the Danube Road is

a unique monument of Roman engineering. Traces of wear on the riverside of the cut sections of road have repeatedly been interpreted as wear by ropes, suggesting that the road was used to tow ships upstream – much like the modern equivalent in the form of a railway in the 20th century, as discussed above.

However, Trajan did not just complete the Danube road, he also, apparently, initiated the construction of canals to bypass some of the worst rapids in the river, as attested by Procopius.[23] Traces of such a Roman canal were identified near the fort of Diana/Karataš as part of Austro-Hungarian river regulation works in the 19th century, and the large-scale Yugoslav archaeological project carried out prior to dam construction in the Iron Gates unearthed an inscription related to this project, stating that Trajan "made navigation safe on the entire Danube by rerouting the river".[24] All of these infrastructure works appear, therefore, to have completed the east-west link through this difficult central stretch of the Danube – shipping and goods could now move from the Upper to the Lower Danube stretches with some reliability, and the transport and economic corridor we take for granted today was established for the first time.

It has been argued in the past that the late 1st century engineering works in the Iron Gates region, which also include two river harbours as well as the famous Trajanic Danube Bridge between Pontes and Drobeta, should be seen in the context of the general troop concentration in the region as part of the preparations for Trajan's Dacian Wars.[25] This appears true for the Danube bridge, but it is less likely that the general build-up of infrastructure in this region over the best part of a century, as shown by inscriptions, was related to these military campaigns alone. Such a large-scale and long-term project ought rather to be seen within the wider framework of the establishment of linear Roman frontiers at the time, and with a view towards creating a direct and reliable transport and communication route along the river in particular. Indeed, an economic rather than purely military basis for the engineering works that can be identified in the middle Danube region at this time has been suggested as early as the 1930s.[26]

As shown at the outset of this paper, the Danube served as a major economic link and corridor in the Roman Period as it does today. However, this seems only to have been the case from the 2nd century onwards. To fully provide the link between east and west that it came to be from then onwards, a century of concentrated infrastructure development on the part of the Romans was required. As such, this case study is not so much one of a natural river course defining economic patterns, as is usually found in archaeological investigations – although in an inverse way that could be said to be true for the prehistoric periods that show separate cultures to the east and west of this region, as indicated above. Instead, it is an example how human strategic planning on the part of the Roman Empire resulted in the modification and overcoming of a natural barrier that had defined cultural contacts for previous centuries if not millennia. It is the major infrastructure works in the Iron Gates outlined in this paper that ultimately made the development of a common material culture on the Upper and Lower Danube possible for the first time.

Notes

[1] See Breeze 2011, 167–171.

[2] Breeze – Jilek 2014, 8. 21 ff.

[3] See Rummel 2015, 148.

[4] Petrović 1991, 209.

[5] Sarnowski 1996, 197.

[6] Bockius 2002, 13 ff.

[7] For the mosaic, see Bardo Museum, Inv. Tun. 576. See also Bounegru – Zahariade 1996, 21.

[8] See Stanchev 1987, 87.

[9] AE 2000, 1197 = RIU 0595: D(IS) M(ANIBVS) / VALERI(A)E LVCILL(A)E Q(VONDAM) Q(?) / VAE VIXIT ANN(OS) XL / AVREL(IVS) MARTIA / LIS NAVCLER(US) PORTVS / [PON(TIS)] (A)ENI CONIVGI / CARISSIM(A)E F(ACIENDVM) C(VRAVIT).

[10] For a recent overview, including earlier literature, see Steidl 2011.

[11] <https://www2.rgzm.de/transformation/home/FramesDE.cfm> (17. 09. 2020). For particular evident distributions along the northern frontier of the Roman Empire, see the distribution maps for the ceramics from Heiligenberg, Schwabegg, Rheinzabern or Westerndorf. These are found under the heading "Entstehung der Produktion" in the subgroup "Töpfereien". Rheinzabern and Heiligenberg are located in Germania Superior, Schwabegg and Westerndorf in Raetia. Amongst them, the Westerndorf ceramics deserve particular attention, as the production site is located close to Pfaffenhofen am Inn – the hometown of the nauclerus Aurelius Martialis discussed above and presumed port of origin for all Westerndorf ceramics that travelled along the Danube by ship. The Westerndorf and Rheinzabern workshops, whose distributions range all the way to the lower Danube, were in operation only from the 2nd c. AD onwards.

[12] See Tasić 2005 for a summary of Iron Age cultures in the middle Danube region.

[13] For a distribution see v. Bülow 2015.

[14] Korać et al. 2014, 53–57.

[15] Veresić 2007, 42 ff.

[16] For a full discussion with further references, see Rummel 2015, 142 ff.

[17] For a detailed discussion of all early inscriptions to the road, see Gabričević 1972.

[18] An argument first presented by V. Kondić 1989, based on CIL III, 13813. See <http://danube-cooperation.com/danubius/2012/06/12/roman-limes-frontier-line-of-the-roman-empire-in-the-iron-gate-area/> (17. 09. 2020).

[19] For a full discussion of the Tabula Traiana inscription, CIL III, 1699/8267, see Petrović, 1968. For continued use of the Roman Danube road into the 20th c. see Korać et al. 2014, 84.

[20] Published in the Đerdapske Sveske/Cahiers de Portes de Fer Monograph Series.

[21] The artificially cut roadway has been documented for a 210 m stretch near Gospođin Vir, stretches near Lepenska Stena and Greben (lengths not given), 43 m near Pečka Bara, 620 m + 8 m near Hajdučka Vodenica. See Jordović 1996.

[22] Petrović 1986.

[23] Procop. De Aed. IV.6.8.

[24] AE 1973, 0474 = ILJug 0468: IMP(ERATOR) CAESAR DIVI NERVAE F(ILIVS) / NERVA TRAIANVS AVG(VSTS) GERM(ANICVS) / PONT(IFEX) MAX(IMUS) TRIB(VNICIA) POT(ESTATE) V P(ATER) P(ATRIAE) CO(N)S(VL) IIII / OB PERICVLUVM CATARACTARVM / DERIVATO FLVMINE TVTAM DA / NVVI NAVIGATIONEM FECIT. For a detailed discussion of this inscription, the references in Procopius to Trajanic canals in this region, and earlier archaeological traces see Šašel 1973, 80–81. For a summary, see Rummel 2015, 147.

[25] E.g. Gudea 2001, 25 including an overview of earlier literature.

[26] Swoboda 1939, 9. Following this argument, see also Petrović 1990, 884.

Image Credits

Fig. 1: Open source map supplied by the Frontiers of the Roman Empire Culture 2000 Project 2005–08. – Fig. 2: C. Rummel/RGK. – Fig. 3: C. Rummel/RGK, based on ASTER-GDEM Data (original data of ASTER GDEM is the property of METI and NASA) and an open source map base supplied by the Frontiers of the Roman Empire Culture 2000 Project 2005–08. – Fig. 4: C. Rummel/RGK, based on ASTER-GDEM Data (original data of ASTER GDEM is the property of METI and NASA) and an open source map base supplied by the Frontiers of the Roman Empire Culture 2000 Project 2005–08.

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Südetrurien und seine Flüsse. Beobachtungen zur wirtschaftlichen und infrastrukturellen Erschließung in der römischen Kaiserzeit

Paul P. Pasieka

Eine systematische und vergleichende Studie, die sich mit der ökonomischen Rolle und der Infrastruktur der Flüsse Südetruriens beschäftigt, ist bislang ein Desiderat.[1] Im Folgenden soll mithilfe archäologischer und epigraphischer Quellen nicht nur ein erstes Bild von der infrastrukturellen Durchdringung der Flüsse mit Häfen und Hafensiedlungen und ihrer Einbettung in größere Verkehrs- und Transportsysteme gezeichnet, sondern gleichermaßen auch das Spektrum der dort umgeschlagenen Güter gezeigt werden. Damit soll der Frage nach dem ökonomischen Potential, das speziell Flusslandschaften bereithalten konnten, nachgegangen werden. Beispielhaft werden hier Mignone, Marta, Fiora und Albegna sowie der Mittellauf des Tibers betrachtet (Abb. 1).

Entscheidend zur Beurteilung der ökonomischen Bedeutung von Flüssen ist die methodisch nicht einfach zu beantwortende Frage nach ihrer Schiffbarkeit.[2] Auffällig ist jedoch, dass in den Schriftquellen auch so kleine Flüsse als schiffbar erachtet wurden, die heute für ein derartiges Unterfangen völlig ungeeignet erscheinen,[3] was wohl der Konstruktion und dem geringen Tiefgang der entsprechenden Schiffstypen zuzuschreiben ist.[4] Es herrscht weitestgehende Einigkeit darüber, dass alle Beispielflüsse bis zu einem gewissen Punkt schiffbar gewesen sind.[5] Flussufer und -täler wurden häufig von Straßen begleitet,[6] die das Potential für Transport und Kommunikation erheblich erhöht haben, gerade auch bei den Flüssen, die nicht ganzjährig oder gar nicht schiffbar waren.

Flussmündungshäfen

Flussmündungshäfen bezeichnen solche Häfen, die an der Schnittstelle zwischen Fluss und Meer liegen.[7] Das *Itinerarium maritimum,* dessen Datierung zwischen dem 3. und dem 5./6. Jahrhundert schwankt,[8] nennt für jeden der kleinen Flüsse an der tyrrhenischen Küste einen Hafen.[9] Für den Fiora (Itin. Anton. Aug. 499, 4–6) und den Albegna (Itin. Anton. Aug. 500, 1–3) wird dort der Ausdruck *fluvius habet positio* verwendet; beim Marta ist die *positio Martanum* vermerkt (Itin. Anton. Aug. 499, 1), weshalb auch hier mit einem Hafen in unmittelbarer Nähe der Flussmündung zu rechnen ist. Im Mündungsgebiet des Mignone dürfte sich die *positio Rapinium* (Itin. Anton. Aug. 498, 6–7) befunden haben.

Die *positio Rapinium* konnte bislang mit keinen archäologischen Resten sicher in Verbindung gebracht werden. Südlich der Mündung des Mignone wurden in der Bucht

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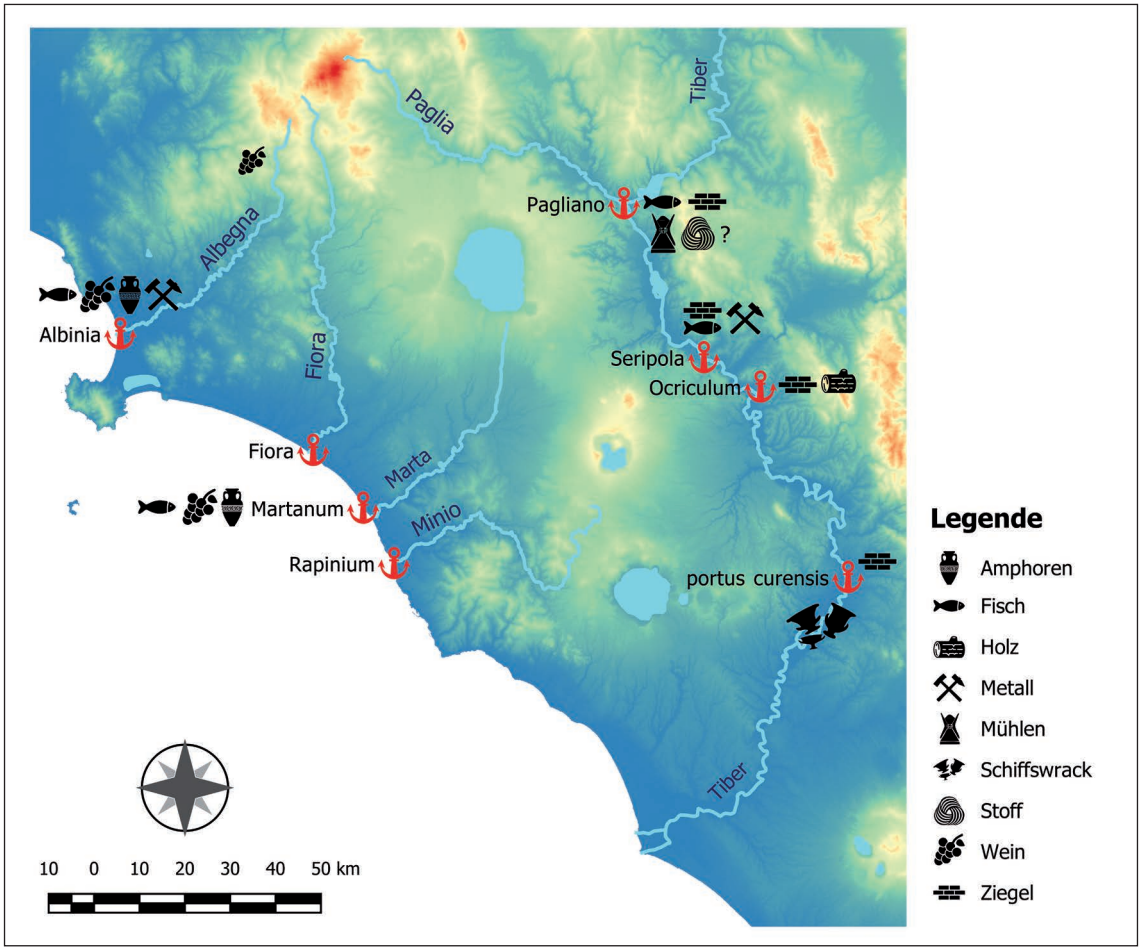

Abb. 1: Die südetrurischen Häfen und ihre wichtigsten Produkte.

von Sant'Agostino einige Schiffswracks gefunden.[10] Ca. 2,5 km weiter südlich bei La Frasca[11] wurden ein kleiner Hafen,[12] der auch in römischer Zeit noch in Benutzung gewesen sein könnte,[13] und eine Therme, die zwischen das 1. und das 5. Jahrhundert n. Chr. datiert,[14] identifiziert. Dass der Mignone einen wichtigen Wirtschaftsraum geboten hat, zeigt die Verteilung von Villen im Hinterland.[15]

Die *positio Martanum* wird mit einer im Luftbild gut zu erkennenden rechteckigen Anomalie von 700 × 430 m in Verbindung gebracht, die sich etwas mehr als einen Kilometer von der heutigen Mündung des Marta entfernt bei Pian di Spille befindet.[16] Archäologisch bekannt sind von der Anlage nur die Becken zur Fischzucht;[17] die Laufzeit wird in die frühe und mittlere Kaiserzeit gesetzt, obwohl weder frühere noch spätere Phasen auszuschließen sind.[18] Nur wenige Dutzend Meter weiter nördlich schließen sich weitere römische Befunde an, darunter ein System an Fischbecken sowie an der Mündung des fosso della Bandita di Pian di Spille Öfen zur Produktion von Amphoren des Typs Dressel 1.[19]

Während für die *positio* am Fiora bislang keine archäologischen Hinweise gefunden wurden, erstreckt sich das archäologische Areal von Albinia über ca. 25 ha auf beiden Flussufern.[20] An den Flussufern konnten Molen und Plätze zum Vertäuen von kleinen Schiffen nachgewiesen werden.[21] Die Siedlungsspuren datieren wenigstens vom Beginn des 2. Jahrhunderts v. Chr. bis in die Mitte des 4. Jahrhunderts n. Chr., evtl. sogar noch weiter.[22] Unsere Kenntnis über die Siedlungsstruktur ist begrenzt, sie wird jedoch auch eine *statio* an der Via Aurelia, die hier mit einer Brücke den Fluss querte, umfasst haben.[23] Gegraben sind v. a. die bekannten Töpferöfen.[24] In ihnen wurden von der Wende vom 2. zum 1. Jahrhundert v. Chr. bis zum Ende des 1. Jahrhunderts n. Chr. großmaßstäblich Amphoren[25] – graeco-italische, Dressel 1 A, B und C sowie Dressel 2–4 –, in kleinerem Umfang aber auch Ziegel[26] und Gebrauchskeramik[27] produziert. Während die Amphoren Dressel 1 A und B für Wein aus dem Tal des Albegna gedacht waren und sich ihre Fundstellen über weite Teile Galliens verteilen, dienten die Dressel 1 C wohl speziell zum Vertrieb von Fisch, u. a. Thunfisch.[28] Metallverarbeitung ist archäologisch durch die Grabbüste des Abaskanthos, eines *chalkeus,* aus dem späten 1. Jahrhundert v. Chr. belegt[29] (Abb. 2).

Abb. 2: Grabbüste des Abaskanthos.

Dieser tyrrhenische Küstenabschnitt ist mit einem dichten Netz an Häfen und Anlegestellen überzogen. Albinia markiert die Spitze der hier betrachteten Siedlungen. Ökonomisch gesehen dominieren Landwirtschafts- und Fischereiprodukte, letztere wohl vor Ort bzw. in der unmittelbaren Umgebung produziert, erstere zeigen sich vornehmlich in den Amphorenproduktionen[30] von Martanum und Albinia sowie an der Vielzahl an Villen entlang der Flussufer.

Flusshäfen am Tiber

Trotz einer schwierigen Befundlage am Tiber zeigt eine Gesamtschau verschiedener literarischer, historischer und archäologischer Quellen das Bild einer Vielzahl von Hafenanlagen, von denen einige zu privaten Villen oder fundi[31] und andere zu größeren Häfen einzelner Städte gehörten. Beispielhaft werden hier der *portus Curensis,* Ocriculum, Seripola und Pagliano vorgestellt (Abb. 1).

Der *portus Curensis* ist als einziger epigraphisch belegt.[32] Die paläographisch ins späte 3. bzw. 4. Jahrhundert n. Chr.[33] datierte Inschrift wurde 1953 in einer Villa am Zusammenfluss von Corese und Tiber in einem sekundären Kontext aufgefunden.[34] Sie besagt, dass der *vir clarissimus* Lucius Baebius Celsus[35] die Wiederherstellung einer Brücke am *portus Curensis* kuratierte.[36] Der Hafen wurde mit *figlinae,*[37] aber auch der landwirtschaftlichen Produktion der Sabina in Verbindung gebracht, die über den Corese und die an dieser Stelle das Tibertal verlassende Salaria erschlossen wurde.[38] 1975/76 wurde bei Baggerarbeiten im Tiber auf Höhe der Einmündung des Corese ein Wrack aus dem 3./4. Jahrhundert n. Chr. zerstört, das einfache Gebrauchskeramik und Ziegel geladen hatte.[39]

Ocriculum, das unmittelbar am Tiber lag, besaß ebenfalls einen Flusshafen, der an einem 1846 durch ein Hochwasser abgeschnittenen Tiberaltarm verortet wird.[40] Ein archäologischer Nachweis steht allerdings aus.[41] Bei Otricoli überquerte die Via Flaminia den Tiber und das vermeintliche Hafengelände war eventuell direkt an die Konsularsstraße angebunden.[42] Für die Annahme, dass der Hafen von Otricoli eine Schlüsselrolle beim Transport von Baumaterialien Richtung Rom einnahm,[43] spricht zum einen die Präsenz von *figlinae* in der Umgebung, die für Stadtrom und Ostia produzierten, und das aktive Engagement der Bewohner in diesem Geschäftszweig.[44] Zum anderen belegt der Fund eines mit einer Inschrift versehenen marmornen Gewichtes aus dem späten 4. Jahrhundert n. Chr., dass ebenfalls Holz, und zwar *lignum* (Feuerholz), hier produziert oder umgeschlagen wurde.[45]

Ebenfalls am Handel bzw. Transport mit Baumaterialien dürfte Seripola, der antike *vicus Castellum Amerinum,*[46] beteiligt gewesen sein,[47] das unmittelbar am linken Tiberufer zu beiden Seiten des fosso Seripola liegt, und zwar an der Stelle, an der die Via Amerina den Tiber quert.[48] Nur wenige hundert Meter weiter nördlich mündet der Rio Grande in den Tiber, über den sich ein weites Hinterland erschließen lässt.[49] Bei den

Grabungen in Seripola[50] wurden seit den 1960er Jahren zwei sich kreuzende Straßen (eine ist die Via Amerina[51]) und Teile der angrenzenden Bebauung aufgedeckt.[52] Im Südost-Areal wurden einige auf eine Straße orientierte *tabernae* aufgrund des Fundes vieler Gegenstände zur Metallverarbeitung als Werkstätten oder wenigstens als Verkaufsräume angesprochen.[53] Eine frühtrajanische Therme mit dazugehörigen Zisternen, die Ende 2. oder Anfang 3. Jahrhundert n. Chr. aufgegeben wurde, wurde zu Beginn des 3. Jahrhunderts teilweise in eine Bäckerei umfunktioniert.[54] Der Beginn der Siedlung ist im ausgehenden 2. Jahrhundert v. Chr. zu verorten,[55] das Ende nicht vor dem 7. Jahrhundert n. Chr.[56]

Einige Kleinfunde, wie Gewichte,[57] eine Schnellwaage,[58] oder Knochennadeln,[59] unterstreichen den kommerziellen Charakter der Siedlung. Ein 1962 im Areal Seripolas dekontextualisiert gefundenes Marmorrelief aus dem 2. Jahrhundert n. Chr., das wahrscheinlich zu einem Grabmonument gehört, zeigt ein für die römische Flussschifffahrt typisches Schiff (Abb. 3 und 4).[60]

Pagliano[61] liegt am Zusammenfluss von Tiber und Paglia, dem wichtigsten Tiberzubringer, der die Wassermenge so erhöht, dass mindestens ab dort Schifffahrt möglich

Abb. 3: Relief eines Flussschiffes aus Seripola/Castellum Amerinum.

Abb. 4: Relief eines Flussschiffes aus Seripola/Castellum Amerinum.

ist.[62] An diesem Punkt verlaufen wichtige Überlandstraßen Richtung Todi und Bolsena[63] und ca. 300 m nördlich des Fundplatzes befand sich eine römische Brücke über den Paglia.[64] Im Prinzip sind nur zum südlichen Bereich Paglianos dank neuer Untersuchungen in den 1990er und 2000er Jahren gesicherte Aussagen möglich.[65] Besonders fallen dort die beiden großen Pfeilerhallen und die darum gruppierten *tabernae* oder Magazinräume auf. Die älteste Bauphase wird in die früheste Kaiserzeit gesetzt. Die jüngste Münze stammt aus der gemeinsamen Regierungszeit von Theodosius und Arcadius, womit das Ende für den Beginn des 5. Jahrhunderts n. Chr. anzunehmen ist.[66]

Für die Deutung Paglianos als Hafen können v. a. die Funde herangezogen werden. Neben den 5000 Münzen und einer großen Menge an Keramik, Lampen und Ziegeln,[67] sind sicherlich die vielen Webgewichte,[68] Waagen[69] sowie Fischereiutensilien[70] erwähnenswert. Außergewöhnlich ist die hohe Anzahl an Mühlsteinen: 16 teilweise fragmentierte Exemplare, wohl vornehmlich Handmühlen,[71] wurden allein bei den Grabungen im 19. Jahrhundert notiert. Pagliano diente wahrscheinlich als Umschlagplatz für im Gebiet von Volsinii produzierte Mühlen.[72] Herkunftsanalysen an römischen Mühlen zeigten, dass es sich bei denen aus Volsinii um die beliebtesten und am weitesten verbreiteten im römischen Reich handelte.[73]

Es bleibt noch auf eine Weihung an Venus Victrix von einem Centurio der VI. Kohorte der Vigiles hinzuweisen.[74] Sollten wirklich Vigiles in Pagliano stationiert oder temporär mit Aufgaben betreut gewesen sein, könnte das auf eine Rolle des Hafens in der staatlich organisierten Versorgung Roms hindeuten, schließlich finden wir die Vigiles außerhalb Roms nur in wenigen Orten wie Ostia, Centumcellae, Puteoli und Karthago.[75]

Südetrurien und seine Flüsse

Zwar konnte bis auf Albinia in keinem der Fälle Hafenanlagen im engeren Sinne angetroffen werden, dennoch dürfen die hier vorgestellten Befunde aufgrund der literarischen, epigraphischen und archäologischen Indizien als Häfen bezeichnet werden. Das Spektrum der Güter, die mit den einzelnen Häfen in Verbindung gebracht werden konnten, ist sehr breit und unterscheidet sich teilweise deutlich in Quantität und Bedeutung. Dabei konnten sichere Nachweise für den Fischfang, für Amphorenproduktionen sowohl für Fisch als auch für Wein, für Metallverarbeitung, die Produktion, v. a. aber den Transport von Baukeramik, sowie den Transport von Holz und Mühlsteinen erbracht werden. Die Analyse der Besiedlungsstrukturen verschiedener Gebiete Südetruriens und der Sabina zeigen, dass Flusstäler ein bevorzugter Standort für ländliche Siedlungen waren.[76] Obwohl bisher der Fund von Flussschiffen in diesem Bereich aussteht, verdeutlicht doch das Relief aus Seripola, dass wenigstens für den Tiber nicht nur mit Flößen, sondern auch mit kleineren Flussschiffen und Kähnen zu rechnen ist.

Albinia und Seripola entstanden bereits im 2. Jahrhundert v. Chr., andere Anlagen wie Martanum oder Pagliano sind erst ab dem Übergang von später Republik zur Kai-

serzeit sicher nachweisbar. Jedoch scheinen alle Anlagen, trotz internen Wandels, bis wenigstens ins 5. Jahrhundert, manche sogar länger existiert und eine bedeutende ökonomische Funktion erfüllt zu haben. Ob die Häfen und ihre Infrastrukturen auf kaiserliche Initiative zurückzuführen sind oder es sich teilweise um lokale oder private Projekte handelte, lässt sich nicht entscheiden.[77]

Zeigten sich bei den einzelnen Fundstellen und vor allem zwischen Flussmündungs- und Flusshäfen doch einige Unterschiede, so ist nichtsdestotrotz zu konstatieren, dass gezielt Flüsse aufgesucht wurden, mit Vorliebe solche Punkte, von denen aus man verschiedene Flusssysteme erschließen konnte, und es oft zu einer Bildung von infrastrukturellen Knoten kam, an denen sich verschiedene Verkehrswege kreuzten, Güter produziert, weiterverarbeitet oder verhandelt wurden und die damit im ökonomischen Gefüge des römischen Zentralitaliens eine wesentliche Rolle einnahmen.

Anmerkungen

* Ich möchte mich an dieser Stelle herzlich bei den Organisator*innen des Panels 2.2 „The Impact of Rivers on Ancient Economies" Christof Berns und Sabine Huy für die freundliche Einladung, bei Mariachiara Franceschini für den steten Beistand und bei der Gerda Henkel Stiftung für die großzügige Unterstützung meines Promotionsprojektes bedanken.

[1] Wawrzinek 2014 verzeichnet in Südetrurien keinen einzigen Binnenhafen.

[2] Einerseits darf nicht von einer geomorphologischen Kontinuität für die Flüsse und ihre Täler ausgegangen werden: Wawrzinek 2014, 221 f. Andererseits liefern die Schriftquellen oft widersprüchliche Angaben zur Schiffbarkeit, vgl. Anm. 5.

[3] Vgl. Quilici 1986, 134.

[4] Wawrzinek 2014, 45 f.

[5] Vgl. Nardi 1993, 500 für den Mignone, Bianchi 2017, 14, der nur von einer Schiffbarkeit bis zum Pian di Voce spricht, und Michetti 2017, 396 für den Fiora. Calastri 2007, 24 veranschlagt eine Schiffbarkeit des Albegna bis Marsiliana. Für den Tiber geht Mocchegiani Carpano 1986, 153 von einer bis Perugia aus; Zifferero 2017, 1252 jedoch nur von einer bis Orvieto. In den Schriftquellen gibt es widersprüchliche Angaben v. a. für den Oberlauf: Dion. Hal. Ant. Rom. III, 44,1; Plin. NH, III, 9,53; Plin. Ep. 5, 4; s. zur Frage auch: Le Gall 1953, 55–59.

[6] Wie die Via Tiberina: Carbonara – Messineo 1994, 7–9. Vgl. für den Mignone bzw. das Umland von Civitavecchia Nardi Combescure 2002, 63, für den Marta Quilici Gigli 1970, 20; 142 Nr. 432; 147 Nr. 440; 147 Nr. 446 und für den agro Falisco Rajala 2015, 110 f.

[7] Vgl. Arnaud 2016.

[8] Uggeri 2004, 35; zur Überlieferungsgeschichte vgl. Löhberg 2006.

[9] Zur Terminologie: Uggeri 1968; zuletzt Michetti 2017, 393.

[10] Vgl. Sonno 2011b; Medaglia – Martino 2014. Zur Verortung im Bereich von Sant'Agostino s. Pelfer 2002, 47 f. und Medaglia – Martino 2014 mit älterer Literatur.

[11] Vgl. zur Verortung an dieser Stelle: Basoli – Foschi 1977, 19–24; Caruso 1991, 69.

[12] Vgl. Sonno – Anelli 2011. In dem unmittelbar davorliegenden Küstenabschnitt wurden wenigstens zwei Schiffswracks identifiziert, eines, das Werksteine aus Granit geladen hatte, und eines, das möglicherweise ein dolia-Schiff war: Vgl. Anelli 2011; Sonno – Anelli 2011, 46.
[13] Sicher aber schon vorher, worauf etruskische und griechische Funde ab dem 6. Jh. v. Chr. aus dem Hafenbereich deuten: Vgl. Sonno 2011a, 70.
[14] Vgl. Bassoli u. a. 2016.
[15] Vgl. Nardi 1993; Hemphill 2000.
[16] Vgl. De Rossi 1968, 140 Abb. 314. 315; Taf, II Nr. 176; Corsi 2000, 263 Abb. 23. 24.
[17] Zur Villa: De Rossi 1968, 141–143 Nr. 176; Higginbotham 1997, 88–90; Corsi 2000, 263–265 Nr. 146; Marzano 2007, 562 Nr. L264.
[18] Zur Datierung: Corsi 2000, 263 f. Lafon 2001, 97 deutet das Rechteck als castrum.
[19] Vgl. Incitti 1985; Corsi 2000, 266; Olcese 2009, 147 Anm. 19.
[20] Vgl. Calastri 2011.
[21] Vitali u. a. 2017, 255.
[22] Ciampoltrini 1997, 283–287; Calastri 2007, 20.
[23] s. Ciampoltrini 1997.
[24] s. Vitali 2007a.
[25] Vitali 2007b, 44 f. rekonstruiert für die Hochphase der Anlage max. 20 000 Amphoren pro Brennvorgang. Zum Formenspektrum vgl. Benquet – Mancino 2007.
[26] Spizzirri 2007; Vitali 2007c.
[27] Pallecchi 2009.
[28] Costantini 2007; Laubenheimer 2007.
[29] Ciampoltrini – Rendini 2001, 71 f.
[30] Zur strategischen Lage von Amphorenproduktionen an Straßen oder schiffbaren Flüssen vgl. die Auflistung bei Pallecchi 2010, 612.
[31] Sternini 2004, 64.
[32] AE 1958, 269. Inv.nr. MNR 126381. Die Marmorplatte, die Reggiani 1986, 210 einer Statuenbasis zuweist, misst 0,90 × 0,86 × 0,08 m.
[33] Romanelli 1956, 604.
[34] Quilici Gigli 1986, 81 f. Anm. 49.
[35] L. Baebius Celsus könnte zu einer lokalen Familie gehört haben, die noch ein weiteres Mal im epigraphischen Befund von Cures auftaucht (CIL XI, 4970). Vgl. Romanelli 1956, 602.
[36] Vgl. Romanelli 1956, 601 f. „[------] / pontem portus Curensis violen= / tia torrentis ablatum dextra / laevaque a solo exstructis / pilarum molibus usui / commeantium amplificato / commeantium amplificato / commeantium amplificato“.
[37] Eine Vermutung aufgrund des bisher nur in einem Exemplar vorliegenden Ziegelstempels Portus Cor(…): Zaccaria 2014, 19 Anm. 26. Dem entgegen Chioffi 2012, 326.
[38] Romanelli 1956, 605; Reggiani 1986, 211.
[39] Alvino 1986, 202.
[40] Zur Lokalisierung Pietrangeli 1978, 336–342.

[41] Es liegen nur allgemeine Berichte über römische Bebauung (Pietrangeli 1978, 47. 338 Anm. 113) oder Zisternen (Martinori 1929, 98 f. Anm. 2) in dem Gebiet vor. Beim Stadtsurvey der British School wurde das Hafenareal nicht miteinbezogen: Hay u. a. 2013, 72. 77.
[42] Millett 2013, 141. 143.
[43] Maiuro 2012, 309.
[44] Patterson 2009, 492 mit weiterer Literatur.
[45] AE 1994, 577; Caldelli 1994; Diosono 2009, 262–265.
[46] Zum Toponym s. Del Lungo 1999, 111. Zur Interpretation als vicus s. Nardi 1980, 117 f. Nr. 164.
[47] Johnson u. a. 2004, 94 f.
[48] Zur Lage s. Johnson u. a. 2004, 85.
[49] Vgl. Galli 1997, 34; Monacchi 1999, 384.
[50] Vgl. Begni Perina 1986; Caretta u. a. 1986; Galli 1997; Johnson u. a. 2004; Aureli u. a. 2006.
[51] Johnson u. a. 2004, 87.
[52] s. De Lucia Brolli – Suaria 2006, 136–138. Das Siedlungsareal dürfte aber deutlich größer gewesen sein: Johnson u. a. 2004, 87.
[53] s. Francocci 2006.
[54] De Lucia Brolli – Suaria 2006, 139–143. In dem Siedlungsareal fanden sich auch einige kleine Getreidemühlen, die aber wohl alle eher dem häuslichen Kontext zuzuordnen sind: Chilini 2006, 178 f.
[55] s. De Lucia Brolli 1991, 143.
[56] Obwohl Schriftquellen im Frühmittelalter hier noch einen Hafen (Del Lungo 1999, 111) bezeugten, möchten De Lucia Brolli – Suaria 2006, 144 wegen der sehr geringen Anzahl an Funden, die vom 5. bis zum 7. Jh. n. Chr. datiert werden, nicht von einer Siedlungskontinuität über das 5. Jh. n. Chr. ausgehen.
[57] s. Chilini 2006.
[58] s. Francocci 2006, 273.
[59] Sie deuten auf Fischerei hin: Del Lungo 2006, 301.
[60] s. Nardi 1980, 226 f. Nr. 33. Der hintere Teil der Platte wurde nach der Auffindung abgesägt und verfügte über eine ursprüngliche Tiefe von ca. 18–20 cm. Diese Information verdanke ich der freundlichen persönlichen Mitteilung von Stefano Del Lungo, Direktor des Museo Civico von Orte. Zur Schifffahrt auf dem Tiber vgl. Diosono 2009, 267–276; Zuddas 2014.
[61] Zur wechselvollen Forschungsgeschichte von Pagliano s. Bruschetti 2009, 326–330.
[62] Vgl. Quilici 1986.
[63] Morelli 1957, 28 f.; Bruschetti 2009, 340.
[64] Vgl. Bruschetti 2009, 323 Anm. 3.
[65] Bruschetti 2009.
[66] Bruschetti 2009, 328. 340. Die älteste gefundene Münze ist ein Silberdenar aus dem Jahr 32/31 v. Chr.: Bruschetti 2009, 335.
[67] Bruschetti 2009, 328.
[68] Bruschetti 2009, 337.
[69] Mancini 1890a, 7; Mancini 1890b, 73.
[70] Mancini 1891, 24.

[71] Die Mühlen sind nicht mehr auffindbar (Antonelli u. a. 2001, 183), doch die Größenangaben in den Berichten Mancinis deuten eher auf kleinere, handbetriebene Mühlen.
[72] Bspw. Antonelli u. a. 2001, 183; Santi u. a. 2003, 66 f.; Bruschetti 2009, 333; Antonelli – Lazzarini 2010, 2084. Zu den Produktionsgebieten vgl. Peacock 1986; Binaco 2007, 20–24.
[73] s. die Verbreitungskarte in Antonelli – Lazzarini 2010, 2085 Abb. 3a.
[74] CIL XI 7275.
[75] Vgl. Maiuro 2012, 321. Zu den Vigiles mit weiterer Literatur Granino Cecere – Ricci 2014, 133.
[76] Eine Auswertung der Daten aus dem South Etruria Survey zeigte, dass 96–98 % aller Siedlungsstellen 500 m oder weniger von einem Flusssystem und 71–82 % weniger als 1 km von schiffbaren Flüssen entfernt lagen: vgl. Goodchild 2009, 777.
[77] Allgemein zu dieser Frage: Arnaud 2014; Wawrzinek 2014, 204 f.; Arnaud 2015.

Abbildungsnachweise

Abb. 1: Karte: M. Franceschini. – Abb. 2: Mit freundlicher Genehmigung der Soprintendenza Archeologia, Belle Arti e Paesaggio per le Province di Siena, Grosseto, Arezzo und des Polo Museale della Toscana. – Abb. 3–4: Orte, MiBACT, SABAP-RM-MET, n° inv. 129798, Museo Civico.

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The Riverine Landscape of the Ombrone Valley in the Roman Period. Preliminary Data from Southern Tuscany

Alessandro Sebastiani

Introduction

The study of the classical settlement networks along riverine landscapes in central Italy started with the Tiber Valley Project, directed by John Ward-Perkins, in the immediate aftermath of World War II. The idea behind the project was simple: to record all the archaeological sites before they could be destroyed by the introduction of mechanized agricultural activities. The selected territory lay at the heart of the Roman civilization – from its origins until the collapse of the western Roman Empire, the Tiber river valley symbolized the wealth of Rome by providing direct access to both the Mediterranean and local markets, flowing through the city that was destined to become the capital of the *mare nostrum* region. The collected data from the project was impressive and still stands at the base of any further detailed analysis on the settlement networks of southern Etruria, the precise study of the recovered material culture, or the economic paradigms that the project originated.[1]

At the end of the 1970s, a new project was established, initiating a series of field surveys to comprehend another crucial and puzzling piece of the Etrurian landscape: the territory of the ancient colony at Cosa.[2] The Albegna River Valley Project commenced while the colony itself was under excavation, within which Frank Brown glimpsed the possibility of investigating the origins and successive developments of an early Roman colony. The timing was ideal as wider debates on the Romanization process, such as those concerning the city of Vulci and its related territory, had just begun. Thus, the Albegna River valley represented an invaluable opportunity to understand Roman expansion through the analysis of scattered (and, at the time, unknown) settlements. The role of the Albegna survey project and the excavations of the Republican villas at Settefinestre[3] and Le Colonne[4] in originating new narratives around the rise of the slave-based economy and its climax around the late Republican period[5] is well known. The survey data emphasized what field archaeology expressed: that between the end of the 2nd century BC and the beginning of the 1st century BC, the economy of the area exploited agrarian resources (mainly wine and olive oil) and distributed them across western Mediterranean markets through a network of villas (producing and processing agrarian goods), manufacturing districts (providing the necessary amphorae), and a peculiar web of suburban and riverine harbors (allowing for international supply).

With the Severan period, this organized network saw a dramatic decline. It is only with the late Roman period that a revival can be attested in agrarian productions, with a key role played by the revitalized villas in the territory.

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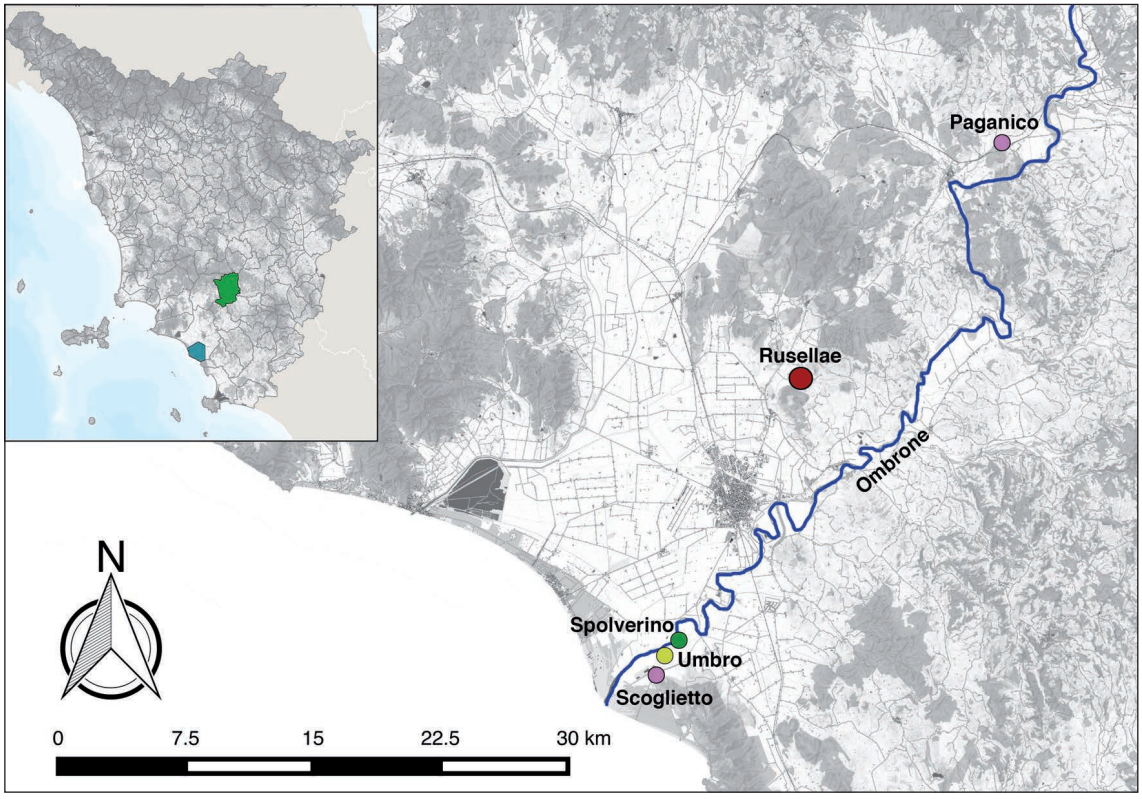

Fig. 1: Map of the area, with cited sites in the text.

Recent archaeological research in the area of Etruria aims to investigate this widely accepted scenario within the middle to lower valley of the Ombrone River (modern Province of Grosseto – Tuscany). This territory coincides with a large portion of the *ager Rusellanus,* set immediately north of the *ager Cosanus.* Unfortunately, a synthesis for the Roman period of this landscape has yet to be produced, although an abundance of results from programmed and rescue archaeological initiatives will soon be available to better define the settlement networks and their related economies. This paper aims to introduce recent archaeological data to explore new, possible narratives around the Roman economy, settlement patterns, and society of the *ager Rusellanus,* drawing from the results of two research projects currently active in the hinterland and the coastal areas.[6] Three sites were investigated along the Tyrrhenian coast (Alberese Project) while other information can be retrieved from ongoing excavations at Civitella Paganico (Impero Project) (fig. 1). Given the limited space for this contribution, the paper presents only a partial assessment of the available archaeological data for the region. When possible, to assist in reading the data, a division between the settlements on the coast and the hinterland is provided.

The Republican Period (3rd century BC – 1st century BC)

For the Republican period, data from two sanctuaries and a possible *positio* at the mouth of the Ombrone River can be used to describe the characterization of the post-Romanization landscape.

The Hinterland (Civitella Paganico)

The recovery of the excavations at the site of Podere Cannicci allowed for the discovery of several new structures connected with a nearby late Etruscan and Republican sanctuary.

At the end of the 1980s, the layout of a gas pipeline revealed the existence of an articulate network of Roman structures, initially interpreted as a *villa rustica.*[7] A number of anatomical votive offerings were recovered[8] as well, suggesting the presence of a sanctuary related to fertility cults that exploited the abundance of natural springs for its location (fig. 2). Main excavations were carried out within a large complex where *dolia* still *in situ* evidenced the agrarian character of the local economy. The recent excavations have, however, started to demonstrate that the economic scenario was more articulate, owing to the discovery of manufacturing infrastructures connected to metal

Fig. 2: One of the anatomical votive offerings from the 1980s excavations at Podere Cannicci.

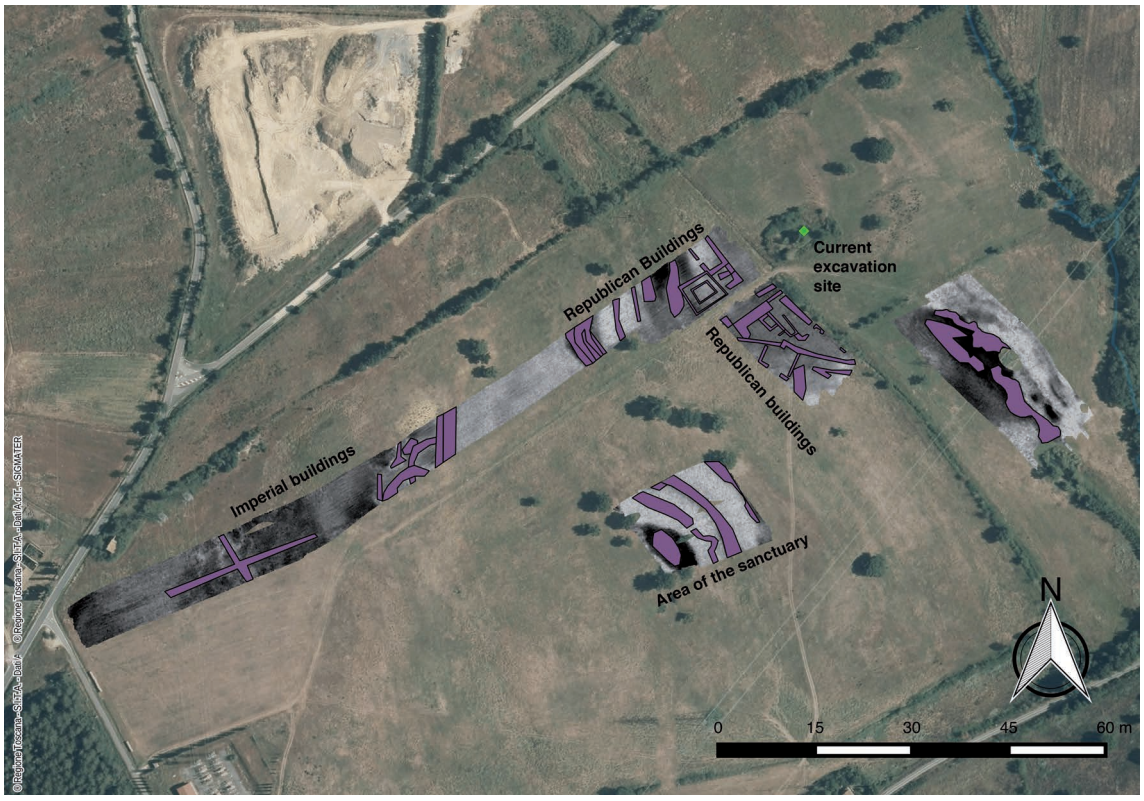

Fig. 3: Geophysics anomalies at Podere Cannicci showing Republican and Imperial buildings and the area of the sanctuary.

and pottery productions.[9] These latter focused on the *dolia,* bricks, cooking ware, and, especially, black gloss ware. Although the excavations of these facilities are still ongoing, one can expect the evidence to show that the typology of black gloss ware produced at Podere Cannicci was clearly inspired or directly initiated by seasonal workforces coming from the *ager Volterranis.*

Following a geophysics survey in 2018, it appears clearer that the Republican settlement is not limited to a single building. As shown in fig. 3, in fact, other structures are related to the main one currently under investigation. Finally, the two archaeological seasons in 2017 and 2018 have confirmed the final moments of the settlement: it was destroyed by a violent fire at the beginning of the 1st century BC in conjunction with the battles between Marius and Sulla.[10]

The Coast (Alberese)

Here, set at the outlet of the Ombrone River, a quadrangular building was constructed around the 3rd century BC (fig. 4). Archaeological excavations showed that the site was arranged around a central area with an *atrium* since its very beginning and that it continued to maintain the original plan until the Antonine period. The research has focused

Fig. 4: Overlay of the different structures found at the site of *Umbro* (Alberese) together with crop marks.

mainly on the Imperial phases of the site, and no further information is yet available for this phase;[11] however, the settlement can be recognized in the *Umbro flumen positio* in the Tabula Peuntingeriana.

Less than a mile away, a small temple was constructed during the 2nd century BC on top of the Scoglietto promontory (fig. 5a).[12] Surrounded by a *temenos* wall, the structure has been dated through the votive offerings recovered at its entrance.[13] Its location, facing the Tyrrhenian Sea, allowed for a full control over maritime and riverine routes.

Discussion

The data retrieved from the Republican sites points to a different approach that Rome had on this part of the territory soon after the conquest of *Rusellae* in 294 BC. The Etruscan temple at Podere Cannicci survived into the Republican phase, although we currently lack substantial evidence of its structures. The analysis of the votive offerings offers a continuity of the cults until, at least, the late 2nd – beginning of the 1st century BC. Interesting information comes from the foundation of a settlement around it, which dates to the 3rd century BC; apparently, these structures were built to sustain the economy of the sanctuary, and the new settlers had Volterra as their reference point. This is an intriguing aspect of the Romanization period in this part of Etruria, as *Rusellae* was expected to be the urban central place. Further investigations will define the economical

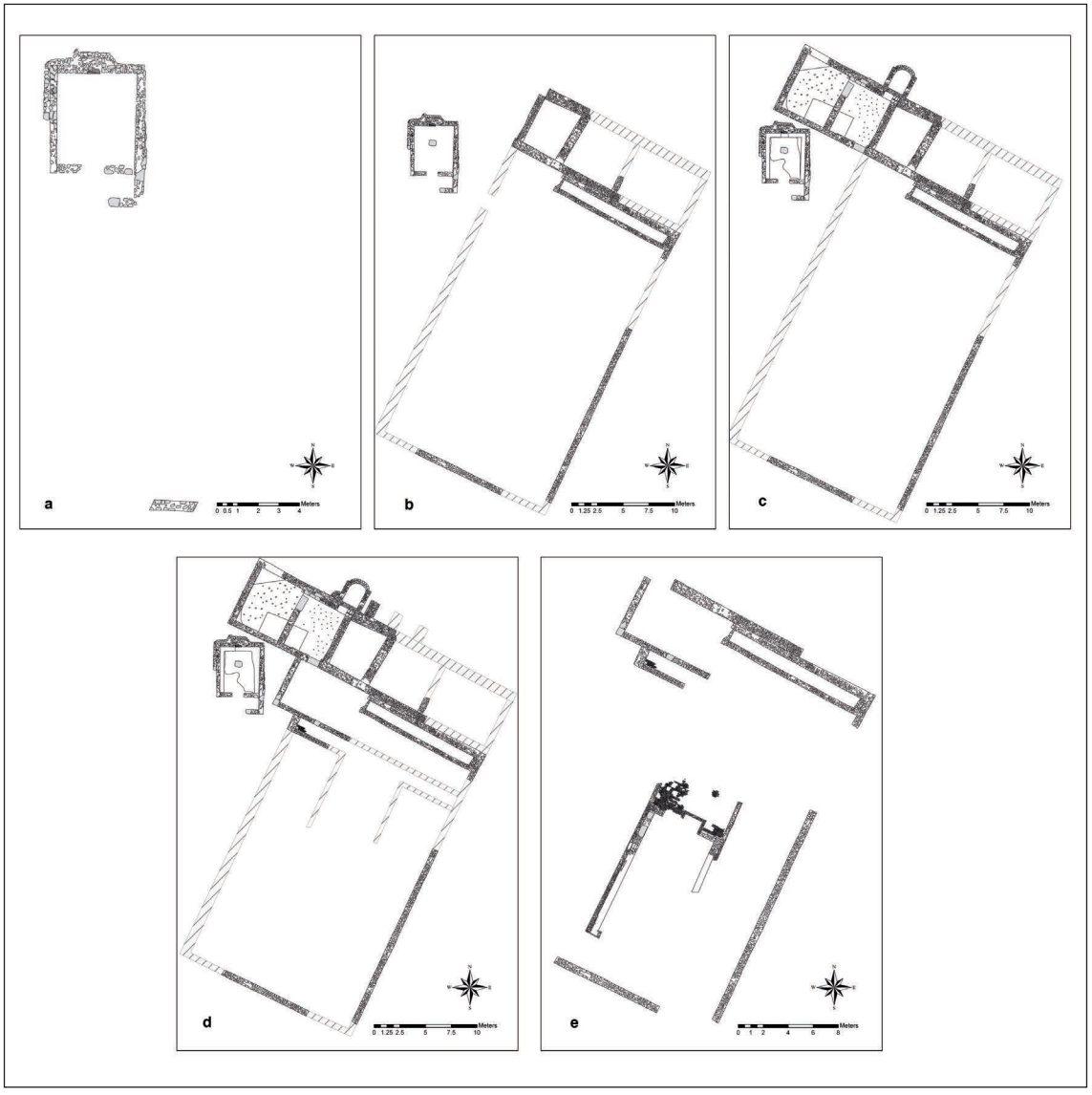

Fig. 5: Chronological plans of the sanctuary at Scoglietto (Alberese) a – Republican phase; b – Late 1st century BC; c – Late 1st century AD; d – Second half of the 2nd century AD; e – Severan period.

and productive relationships of the sanctuary area with the two urban centers, its connectivity through the road system and riverine facilities, as well as the chronological span of use.

On the coastal side, the period after the romanization shows the construction of a number of new settlements: the archaeological research uncovered the remains of a *positio,* the establishment, of which has to be sought in the generation of veterans and colonists who settled the area. A century after, the sanctuary area at Scoglietto was established to define the administrative boundaries with the southern *ager Cosanus* and to impose a visual landmark along the maritime trade routes – an action that the Severan period confirms.

The High Imperial Period (late 1st century BC – 2nd century AD)

The Hinterland (Civitella Paganico)

The excavations at Cannicci provide little data for the Imperial period. As the settlement was destroyed in the aftermath of the Civil War, no structures were reoccupied. The 2018 geophysics survey has, however, shown the existence of a large settled area on the western part (fig. 3), where field surveys carried out in the 1990s recovered Caesarian to late Antonine pottery;[14] it is possible that a new complex was built, possibly serving the main road system.

The Coast (Alberese)

The situation is rather different on the coast.

The sanctuary at Scoglietto underwent a significant refurbishment at the end of the 1st century BC[15] (fig. 5b): a new temple and enclosing *temenos* wall were erected, both sharing a NE-SW orientation. This cut off the previous, smaller temple, now reduced to a *thēsaurus.* The newly enclosed sacred area housed a capacious cistern and at least two rooms with earth-beaten floors. The sanctuary continued to grow under the reign of Domitian where rooms with *opus signinum* floors and frescoed walls were added; further, a small *nympheum* was added with a simple black and white tesserae mosaic (fig. 5c). By the reign of Commodus, the sanctuary reached its maximum expansion with the construction of a new room, paved with plain mortar, which was accessed by the main square facing the temple (fig. 5d).

Little structural changes can be seen at *Umbro,* although the analysis of the residual material culture of the late Republican and mid Imperial period clearly shows the lavishness of the site. Later spoliation and refurbishing activities of the late Roman period have severely damaged the preservation of any Imperial strata, preventing any more detailed examination of the site.

At the end of the 1st century AD, the manufacturing settlement at Spolverino (fig. 6) was built along the final flow of the Ombrone River.[16] Until the late Antonine period,

Fig. 6: Aerial view of the manufacturing settlement at Spolverino.

the site based its economy on twofold revenues: the surplus of agrarian goods (and subsequent processing and trade) and glass-working activities. The site presented a possible plan distributed around a central area, and rooms were accessible through arcades, possibly to better serve a cabotage port.[17]

Discussion

The settlement network experienced a phase of reorganization starting in the Augustan period. In the hinterland, where there is a scarcity of data at this stage of the research, the situation is less clear. The site at Cannicci underwent a shift towards the west with the construction of a new complex, the origins and functions of which future investigations will determine.

The coastal area provides more information. Although later activities marred the site, razing its structures and obscuring the evolution of the building, the lavish material culture at *Umbro* attests to growing wealth, while the sanctuary area continuously grew after a late 1st century BC reorganization of its spaces. The foundation of the manufacturing district at Spolverino represents an innovation in the landscape of Alberese:

its glass workshop and storage facility for agrarian surplus illuminates a dual economy that perpetuated until the late 2nd century AD, providing insights of different economical activities connected to maritime, riverine, and terrestrial trade routes.[18]

The Mid to Late Imperial Period (3rd – mid 5th century AD)

The Coast (Alberese)

Data for this period is available only from the coastal area. The Severan period marked a turning point in the Roman landscape at Alberese, as the three sites previously seen underwent radical changes that terminated in the mid 5th century AD.

The *Umbro positio* was abandoned during the mid 2nd century AD, and some of its rooms were converted into workshops during the 3rd century. The first atelier was located on the eastern side and was dedicated to metalworking. A sunken forge specialized in the production of rivets and fishhooks, largely found during the excavations (fig. 4). The *atrium* area was partially blocked by the construction of an oval furnace, surrounded by marble-shaped fragments of Egyptian blue, possibly its main products. As the 4th century started, the northern part of the *atrium* was blocked by a new rubble wall, which incorporated two pillars as foundations. This new room contained two hearths: one was a simple pit where cooking ware was still *in situ,* while the second accommodated a platform of reused bricks that has parallels with similar facilities at Settefinestre. Further north, a room was paved with an *opus spicatum* floor and housed a raised platform with possible spaces for a wine or olive press. Finally, on the northwest side, a simple mortar floor was laid out in a room that has returned a bronze stirrup during excavations. The rest of the complex has given no evidence of any sort of occupation, indicating that only a partial reuse of the structure occurred.

The productive site at Spolverino underwent a significant enlargement from the Severan period onwards.[19] Workshops dedicated to the recycling of metal were built, remolding the high Imperial structure. The arcades were partially blocked to allow for new arrangements of rooms (fig. 7), while a large manufacturing space was added in the south. This included at least two circular kilns and a large furnace. The large amount of glass junks recovered here pointed to a possible glass workshop; however, recently, new ideas have been proposed.[20] The hectic sequence of kilns and workshops that were built over at least two centuries saw a definitive termination around the mid 5th century, when most of the complex was abandoned. Small activities continued, with a possible limekiln built in Room VI, while around the end of the century later users of the space fashioned humble floors by leveling some of the rubble materials in Rooms VII and IX.

Finally, the sanctuary area at Scoglietto was heavily modified. Between the end of the 2nd and the beginning of the successive century, the rooms of the sanctuary were abandoned and never rebuilt[21] (fig. 5e). The rubble and any marble decorations were instead reused in the construction or refurbishment of the main temple that survived until

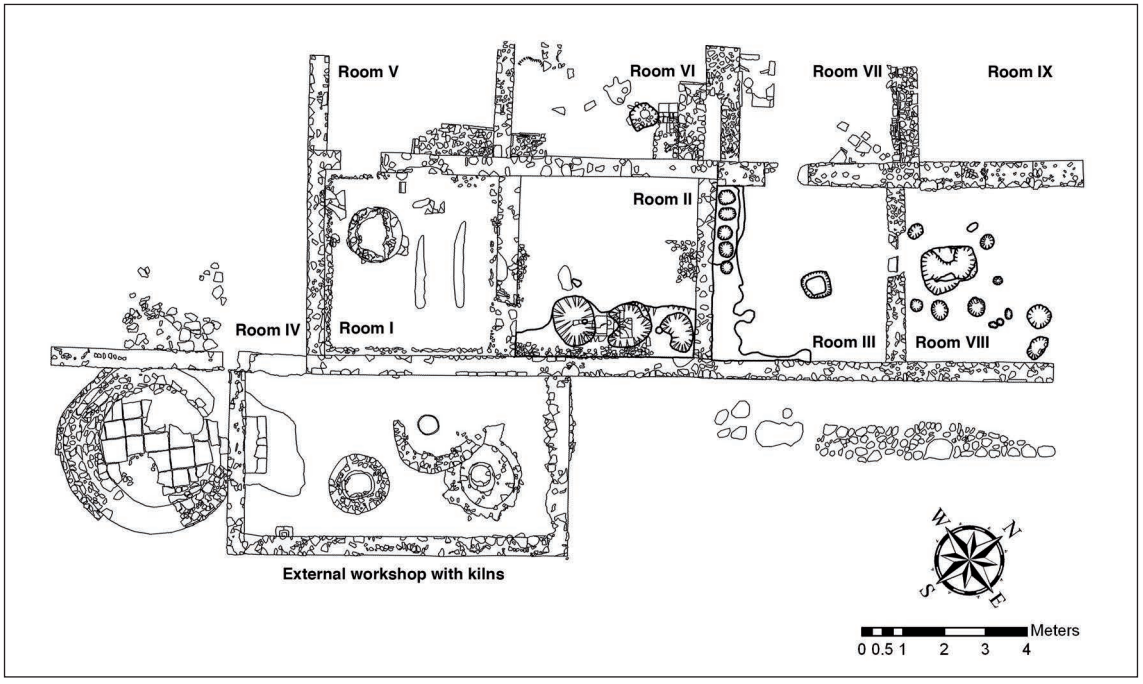

Fig. 7: Plan of the manufacturing settlement at Spolverino.

the mid 4th century; only the cistern of the former sanctuary and the latest room with the simple mortar floor continued to be in use in this phase. During the mid 4th century, the temple started a slow decline that culminated in a violent destruction at the end of the century. A small necropolis was made in the sacred area of the *temenos,* although only one burial survived *in situ.* The remains of seven other skeletons were found instead in the backfilling of the cistern, which occurred when the temple was systematically dismantled at the end of the century.[22] During this dramatic event, the votive offerings and the main cult statue were destroyed in the open square in front of the temple, and the building was demolished – as several blocks of masonry found all around its perimeter attest.[23] Rituals continued nonetheless. The recovery of an interesting assemblage of early 5th century AD African lamps suggests that local communities and traders along the Tyrrhenian routes perpetuated the cult of *Diana Umbronensis* for further decades before the settlement was forgotten.[24]

Discussion

The data for the mid to late Imperial period introduces several theories, mainly related to the economy of this part of Etruria. At the end of the 2nd century AD, the coastal territory began the construction of manufacturing facilities dedicated to the production of Egyptian blue (fig. 8), glass and metal recycling, and the production of bone objects. The decline of the agrarian supremacy of Italy would have facilitated a general reorganization of the economies, possibly alongside the introduction of new social agents

Fig. 8: Egyptian Blue pigments found at *Umbro.*

who emerged from the 3rd century AD.[25] The settlement at Spolverino played a key role in the restructuring of the landscape, emerging and continuously expanding until the mid 5th century. Its workshops are contemporaneous with those that inhabit the ruined *Umbro,* where a blacksmith forged rivets to fix ships sailing the Tyrrhenian coast along the cabotage routes and where the Egyptian blue could have fed the urban markets. The construction of what seems to be a two-story dwelling at *Umbro* in the 4th century AD appears to signal the permanent presence of one or two families involved with wine or olive oil production as well as secondary industries that continued from the previous century.

In this hectic economic panorama, the spatially diminished sacred area at Scoglietto still had a role to play. The refurbishment of the temple, in contrast with the abandonment of the rest of the sanctuary, emphasizes its function as a visual landmark to guarantee the necessary connectivity among those trading along the Tyrrhenian and those producing and collecting the goods in the workshops.

Late Roman Period (late 5th – mid 6th century AD)

The Coast (Alberese)

The coastal area alone provides data for this period.

The abandoned sacred area at Scoglietto was altered by the construction of a small, sunken hut during the first half of the 6th century. The humble dwelling was accompanied by a few small satellite infrastructures, most likely little fences to recover flocks. The recovery of the first Byzantine *nummus* of the entire *ager Rusellanus* dates to the end of this occupation phase around the mid 6th century. After this point, the ruins of the temple became overgrown and slowly disappeared in the memory of local communities. No other traces of permanent occupation of the promontory have been found, although a few fragments of Renaissance pottery suggest that some wayfarers passed by, possibly on their way to the late Medieval watchtower of Collelungo that is located less than three miles away.[26]

After a complete abandonment of the manufacturing district, a small necropolis was retrieved. This consisted of four burials deployed into 3 former rooms of the complex. The anthropological analysis did not produce any cause of death, although it emphasized the stress on the bones, a clear sign of heavy daily work.[27]

Finally, the site at *Umbro* was fully abandoned by the late 5th century AD. No signs of violent abandonment or collapse have been found during the excavations, while a thick deposit of sand, brought by a tide, was discovered between the rubble, suggesting that the ruined building underwent a slow decline.

Discussion

The late 5th century AD marked the moment when all the settlements analyzed in this paper were abandoned. The temple area at Scoglietto saw a temporary reoccupation, but only as the location for a hut built with perishable materials. Likewise, Spolverino was occupied by a small necropolis, but all the workshops had finished their activities around the mid 5th century. *Umbro,* where the late Imperial revival did not last more than a few decades, experienced an uncertain cessation. The changing economic and political panoramas, fueled by the fall of the western Empire, and the progressive decline of a globalized market concluded the experience of the manufacturing district at Spolverino as well as the agrarian and artisanal productions at *Umbro.* The gradual worsening of the environmental riverine conditions, with an increasing number of floods and the

impaired maintenance of the river banks, caused the slow, yet incessant silting of the settlement at Spolverino, while tides and coastal storms sealed the site at *Umbro.*

Final Remarks

The dataset presented in this paper does not aspire to delineate a definitive pattern along the riverine landscape of the Ombrone valley for the Roman period.

On the contrary, further research is needed to produce data for the hinterland area where a lack of Imperial and late Roman settlements undermines our general comprehension of this part of Etruria. At the same time, it is necessary to correlate and integrate datasets coming from other research projects that operate in this territory in order to produce a detailed, refined, and complete settlement and economic sequence that could compete with the results produced in other Roman riverine valleys of central Italy.

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Notes

[1] Patterson 2004; Di Giuseppe 2005; Patterson – Coarelli 2008.

[2] Carandini – Cambi 2002.

[3] Carandini 1985.

[4] Dyson 2002.

[5] Carandini 1988. For a much more recent review on the debates around the slave-based economy and the role that villas played in the establishment of this kind of economy, see Marzano 2007; Bowman – Wilson 2013 and related bibliography.

[6] Sebastiani 2017.

[7] For a detailed report, see Barbieri 2005.

[8] Detailed studies of the votive offerings: Fabbri 2005; Fabbri 2009.

[9] For a first interim report, see Sebastiani et al. 2018.

[10] The recovery of a hoard of silver *denarii,* found below a *dolium* smashed by the collapse of the roof, helps to tie the final chronology of the site (Adembri 2001).

[11] Sebastiani et al. 2016.
[12] Sebastiani et al. 2015.
[13] Vanni 2015.
[14] Barbieri 2005.
[15] Sebastiani – Chirico 2015.
[16] Sebastiani 2014.
[17] Sebastiani 2014, 5.
[18] Sebastiani 2016b.
[19] Sebastiani 2014.
[20] Sebastiani forthcoming; Sebastiani – Derrick 2016; Sebastiani – Derrick forthcoming.
[21] Chirico – Colombini 2015.
[22] Aniceti 2015.
[23] Sebastiani 2015a.
[24] Brando 2015; Brando – Sebastiani 2016.
[25] Sebastiani 2016a.
[26] Sebastiani 2015b.
[27] Sebastiani 2014.

Image Credits

Fig. 1: Alessandro Sebastiani. – Fig. 2: after Sebastiani et al 2018. – Fig. 3: Gianfranco Morelli. – Fig. 4: Photo by Paolo Nannini, elaboration Alessandro Sebastiani. – Fig. 5: after Sebastiani, Chirico, Colombini, Cygielman 2015. – Fig. 6: Photo Paolo Nannini. – Fig. 7: Alessandro Sebastiani. – Fig. 8: Alessandro Sebastiani.

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The increased interest in the mutual interdependence of socio-cultural and physical spaces has led to the fact that watercourses have gained in importance as a formative factor of societies. Landscapes shaped by rivers provide characteristics and specific conditions that have a major impact on the economic life of people living in riverine contexts. Rivers are significant natural resources and offer special opportunities for economic activities. They can act both as connecting arteries and as borderlines. The contributions of our panel describe rivers as dynamic factors of ancient communities and their economy. The articles presented in this volume focus on the interrelation between river landscapes and the economic habits of their inhabitants. The case studies cover a wide range of epochs and geographical areas and discuss phenomena such as geomorphic and anthropogenic changes in rivers, the role of rivers as transport and trade routes and their impact on settlement patterns.

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