

Riparia,
un patrimoine culturel

La gestion intégrée des bords de l'eau

Proceedings of the Sudbury Workshop, April 12–14, 2012 /
Actes de l'atelier Savoirs et pratiques de gestion intégrée des
bords de l'eau – *Riparia*, Sudbury, 12–14 avril 2012

Sous la direction de

Ella Hermon
Anne Watelet

Préface de
Henri Décamps

BAR International Series 2587
2014



Published by

Archaeopress
Publishers of British Archaeological Reports
Gordon House
276 Banbury Road
Oxford OX2 7ED
England
bar@archaeopress.com
www.archaeopress.com

BAR S2587

Riparia, un patrimoine culturel: La gestion intégrée des bords de l'eau. Proceedings of the Sudbury Workshop, April 12–14, 2012 / Actes de l'atelier Savoirs et pratiques de gestion intégrée des bords de l'eau – Riparia, Sudbury, 12–14 avril 2012

© Archaeopress and the individual authors 2014

ISBN 978 1 4073 1215 6

Cover illustration: Port antique de Milet, en Turquie. Photographie de Anne Watelet

Printed in England by Information Press, Oxford

All BAR titles are available from:

Hadrian Books Ltd
122 Banbury Road
Oxford
OX2 7BP
England
www.hadrianbooks.co.uk

The current BAR catalogue with details of all titles in print, prices and means of payment is available free from Hadrian Books or may be downloaded from www.archaeopress.com

**RIPARIA ENVIRONMENTS IN *HISPANIA ULTERIOR BAETICA*:
THE CASE OF THE LAGOON OF LA JANDA AND THE ESTUARY OF THE BARBATE RIVER**

María del Mar CASTRO GARCÍA
Université Laval, Canada

*Seminario Agustín de Horozco
Universidad de Cádiz, España*

Ángel David BASTOS ZARANDIETA

Seminario Agustín de Horozco, España

José Antonio BOCANEGRA BARBA

*Medio Ambiente, Ayuntamiento de Puerto Real
Seminario Agustín de Horozco, España*

Abstract

This communication aims at applying the concept of *riparia* to a precise geographical framework within the Roman Empire. The Roman province of *Hispania Ulterior-Baetica* shows intense land use, some of which is on wetland, more specifically on paludal and estuarial environments. The interaction between society and environment on marshlands will be studied based on data from archaeology, literature and environmental studies, using the case study of the lagoon of La Janda and the estuary of the Barbate River. Located in the south of the province of *Baetica* (currently Andalusia, Spain), it reveals a strong relationship with the Strait of Gibraltar. The integrated management of the lagoon will be analyzed using an economic, communal and cultural point of view.

Résumé

On présente ici l'application du concept de *riparia* dans l'Empire romain, d'après une approche régionale, à un écosystème riparien situé à l'extrémité sud de la Péninsule ibérique, la région d'influence du Déroit de Gibraltar et qui appartenait à la province romaine de l'Hispanie Ulérieure Bétique. Cette configuration spatiale est articulée autour des bords de l'eau à l'époque du Haut Empire, au I^{er} siècle ap. J.-C. Il s'avère être une ville du type *oppidum* avec une grande valeur stratégique et un port maritime-fluvial de communication. On constate une occupation romaine sur les bords de l'eau dans des milieux humides divers, étangs, rives et littoral, liée à la gestion intégrée des ressources naturelles, surtout l'exploitation des ressources maritimes et fluviale, principalement la pêche, les usines de salaison de poisson et l'exploitation du sel marin. Aussi on peut vérifier une occupation des terres intérieures, c'est-à-dire l'occupation agricole du territoire. Il s'agit d'un écosystème à risque qui a subi diverses modifications et altérations dès l'époque ancienne jusqu'à aujourd'hui. Il est passé d'un milieu d'étang et d'estuaire maritime à une région marécageuse à l'embouchure de la rivière Barbate à cause de l'assèchement par l'action de l'homme au début du XIX^{ème} siècle. Cet article se propose ainsi d'apporter une étude d'approche à la réalité de l'environnement naturel et paysagé du moment pour comprendre sa configuration à l'époque romaine, en finissant avec l'analyse de l'occupation romaine du territoire, en tenant en compte de ses antécédents et du contexte régional, ainsi que de la gestion de cet espace intégré.

Keywords: *Hispania Ulterior-Baetica*, Barbate river, Janda Lagoon, estuary, Roman settlement, early Roman imperial period.

Mots-clés : *Hispania Ulterior-Baetica*, rivière Barbate, Étang de la Janda, estuaire, peuplement romain, Haut Empire.

*

* *

At the southern end of the Iberian Peninsula, north-east of the town of Barbate, is located a depression into which flow the Barbate and Almodóvar Rivers, along with other tributaries. This depression of tectonic origin reaches about 35 km² in extension (Luque *et al.*, 2001). More than a century and a half ago this depression was the Laguna de La Janda (Lagoon of La Janda), and was gradually dried up. The natural drainage of this depression is provided by the Barbate River, north-east of the town of Vejer de la Frontera, forming a gorge to save the hill of Sierra Graná. After crossing this short and narrow valley, the marshes of the Barbate River are located, before the estuary, which flows for about 10 km before draining into the Atlantic Ocean (fig. 1). Since the mid-XIXth century, this Laguna has fragmented into

different lagoons: Espartinas, Jandilla, del Hierro, del Águila, Rehuelga, del Torero, Tapatánilla, Granada and the last vestige of the Laguna de la Janda, el Charco de los Ánsares, before its artificial drying (Luque *et al.*, 1999; Castro and Recio, 2007).

In this article we will look at the area shaped by the Barbate River: To the north, the depression of La Janda, its lake ecosystem, and the rivers and streams; in the middle, the estuary and its silting in marsh ecosystem. And next to it, to the south, the sea, into which it flows. The shores in these areas, some along freshwater bodies (rivers and streams, and lagoons), and others on the edges of the sea (marsh, coastal edge and the Atlantic Ocean), have formed an area known, built and perceived by

human communities in Roman times (in application of the *riparian* concept).¹ In the south of the province of *Hispania Ulterior-Baetica*, the landscape configuration around the edges of water was established in the Early Imperial period (Ist century AD); this space was set by one strategic high settlement and one river-sea communication port. We document an occupation of river-sea shores, based on exploitation-oriented towards resource management (mainly by fishing, fish preservation by salt, and the exploitation of sea salt), combined with the land occupation of the interior space, albeit with shores of the lagoon very little exploited.

I. Riparia Spaces at the Southern End of the Iberian Peninsula

The Barbate River basin extends to an area of 1329 km². We have a unique space where, from north to south, is the Barbate River and tributaries, the Laguna de la Janda, the marsh of the Barbate River and the Atlantic Ocean. In the southern area of this basin are located two Roman settlements: *Besippone* (*Baessipo*) and *Besaro*. Northwards lies *Lascuta* and the basin even reaches the *colonia* of *Asido Caesarina*. Towards the south-east, and external to this river basin, lies *Belone Claudia* (*Baelo Claudia*). *Belone Claudia* and *Besippone* would be connected by a named path in the Antonine Itinerary.

I.1. Evolution of the Environments of the Depression of La Janda

In the land that occupies this area contact materials pre- and post-orogenic. This geodiversity will be accompanied by the biodiversity that it occupies. During the Middle and Upper Pleistocene, the depression of La Janda was an endorheic basin where the flowing courses of the Barbate, Almodóvar and Celemin rivers, and other streams, met. There was no connection to the sea because it was prevented by the Lomas del Pericón (now at 27 m above sea level). During the last Glacial period when the sea descended to an altitude of 120 m below the current level, the creation of a river basin occurred (Luque *et al.*, 1999), and the connection of the Barbate river with the sea was made possible through the tectonic Groove of Vejer-Barbate, dodging Sierra Graná through a river gorge (fig. 1). The lagoon led to the sea, and the environmental conditions changed from endorheic to exorheic. From 15000 BP to 6500 BP, the sea level rose to its current state, and the depression of La Janda became an internal bay. Fluvio-marine sedimentation, coinciding with the deposition of of progradational phase H2 of coastal spits², broke into 4200 BP, continued until 3820 BP, and led to the silting of the depression and the narrowing of the aforementioned gorge.

In the survey carried out in the Charco de los Ánsares (Luque *et al.*, 1999), practiced at a current height of +3.5 m, reached 5.4 m in depth. The authors detected a shell of a common cockle (*Cerastoderma*), of the deepest witness, yielding an age of 3820 BP. On the layer 10 cm from the bottom of the drilling is the only sequence that contains microfauna in the brackish waters of shallow estuaries, though the area was not directly connected to the open sea. They point to the change of fluvio-marine conditions, at the base of the drilling, to alluvial-lagoon environments on the top of this deposit. This top was due either to the remobilization of marine sands because of floods, or by the generation of eolian sand deposits.³ The following strata alternate between a temporary water runoff and a more stable ponding, followed by a perennial pond, and then another period of temporary ponding. The layer that follows could correspond to a stable lagoon to a large and stable lagoon of considerable depth. The surface layer (0.9 m stratum) corresponds to current dried and altered agricultural land. Given that the top of the deposits of the background layer is contemporary to the formation of H2 dune system from the IVth century BC, the depression of La Janda would have an alluvial lagoon environment at the beginning of the Roman era. The authors of the survey subsequently proposed different stages for this scenario, from temporary ponding to perennial lakes.

I.2. Evolution of the Estuary of the Barbate River

At the south-eastern end of the Gulf of Cadiz there are two subsidiary distensive troughs with N-S orientations: Barbate and Algeciras Bay. They are connected to the two largest, most prominent, tectonic lineations caused by the convergence of Africa and Eurasia: the NE-SW dextral and the NW-SE sinistral strike-slip faults. The intersection of both systems created a central crustal block in the Strait zone, and the Atlantic and Mediterranean lateral blocks (Zazo *et al.*, 2008). It is believed that the marsh of the Barbate River formed subsequently to the Laguna de la Janda, and most of the sedimentary input from the marsh comes from this river (Luque *et al.*, 1999). In the south-east area of the estuary, sandy deposits from the Holocene set abrasion platforms and cliffs carved by the sea in the materials belonging to the Almarchal Unit and the sandstones of the Aljibe. In the north-west area of the estuary appears the organogenic (calcareous) relief where Vejer de la Frontera is located. The structural collapse of the Groove of the Barbate River has yet to stop, but the contributions of the river have been sufficient to offset the decline, carrying out the filling of this estuary (Fernández-Palacios, Fernández-Palacios and Gil, 1988).

Similarly to what happened with the estuary of the Guadalquivir River (Rodríguez-Vidalb, 2008), in the estuary of the Barbate River we can assume a domain of

¹ Concept applied to the analysis of the Roman Empire in HERMON E., 2010 p. 6. See the definition of Integrated Management in the Roman Empire, HERMON, E., 2004.

² Four intermediate progradational phases (H1 to H4) that correspond to spit-bar units: H1 (6500–4500 yr. BP), H2(4200–2700 yr BP), H3(2400–1100 yr BP) and H4 (1000 yr BP to present–day).

³ They may have been contemporary to the formation of the first Upper Holocene dune system and, in the Andalusia Atlantic coast, would have happened until 2410 BP.

the sedimentary filling, with marsh and beach-coastal dune facies, interrupted by events of high energy, that eroded the previous coastal morphology and collected sediments in the marsh. Sedimentary interruptions of the littoral barrier are due to tsunamis affecting the Gulf of Cadiz. In the south-west Iberian margin, in Roman times, at least three tsunamis occurred, one in 218-209 BC (Rodríguez-Vidal *et al.*, 2011) and the others in 60 BC and 382 AD (Ruiz *et al.*, 2008). These high-energy events could have profoundly altered coastal spits that separated the marshes of the Barbate River from the sea.

1.3. The Sea

Dune fields underwater, in depths ranging from 15 to 30 m are located on the coast, between the towns of Conil and Barbate, associated with a shallow physiographic feature known as the Barbate High, a marine boundary formed by a submarine scarp. The physiographic profile of the continental margin is a continental shelf 30-40 km wide, with the shelf-break at 120 m, except for south of Cape Trafalgar, with 15 km shelf wide and the shelf-break located at 100 m depth (Lobo *et al.*, 2000). The circulatory pattern of water masses in the Gulf of Cadiz has two counter-flows: The Atlantic inflow is moving southeastwards over the continental shelf, and the Mediterranean outflow water is moving northwestwards over the continental slope. A clockwise sediment transport pattern is established, where three large dune fields are located on the Barbate High, and the bedforms that have been identified seem to be from the Late Pleistocene-Holocene. The circulatory pattern and the water depth (dunes are not found when water depth exceeds 30 m) favoured a rich ecosystem, with a historic fishing zone. Tuna (*Thunnus thynnus*) migrates near the coast, and it is captured into "almadrabas"⁴.

1.4. High Energy Events

The present paper has taken into account the geodiversity, that influences the shaping of the landscape, hydrology, vegetation, or morphology, necessary for settling evolving ecosystems, altered by erosive processes, natural dynamics and human action. The use of the Geographic Information System (GIS) provides a hypothetical representation of these spaces (Fig. 1), in response to the landscape reality of Roman times. However, at least two types of high-energy events have been able to lead to both the abandonment of coastal settlements and the loss of its vestiges: tsunamis and earthquakes.

1.4.1 Tsunamis

On the south-west coast of the Iberian Peninsula at least 16 historical tsunamis have been recognized, between 218 BC and 1848 AD. In each of them, one to five waves (variable heights, 2 to 8 meters) flooded the coastal zone

between Lisbon and the Gibraltar Strait (Ruiz *et al.*, 2008). Several washover fans, corresponding to the tsunami of 1755, have been detected in the spit in Valdelagrana (El Puerto de Santa María, in the Bay of Cádiz), which even caused the rupture of this spit due to the aforementioned energy event (Dabrio, Goy and Zazo, 1998). At the Cape of Trafalgar, located 10 km to the west of the town of Barbate, there are traces of ashlar (Cape Trafalgar I, site YN102), fish-salting vats (Cape Trafalgar II, site YN103), traces of settlement and fish salteries (Cape Trafalgar, site YN109). On the platform of abrasion, at the foot of this place, are located about 80 large boulders moved by the tsunami of 1755 (Whelan and Kelletat, 2005). All these boulders exceed 10 tons, and some 90 tons; the high-energy event is able to move heavy rocks and, therefore, dismantle artificial structures, such as a potential coastal path. To the south of the coastal town of Conil de la Frontera, 9 km northwest of Cape Trafalgar, and between the Salado and Conilete streams, have been identified two fan spills from the tsunami of 1755, when waves reached heights of 8-8.5 m above high tide level (Luque, 2004). The authors indicate that the coast of Conil was extensively amended by the action of this tsunami, when waves exceeding 8 m high advanced more than 2.5 km upstream of these two streams. The geomorphology of the estuary and marshes of the Barbate River should be studied in detail, because it would shed light on the filling of the estuary and the evolution of the spit where one could devise an alleged "Coastal Path" on the berm. We could point out that the route may have been dismantled by some of these high energy events, if we look for signs of tsunamis.

1.4.2 Earthquakes

The Sierra de la Plata coastline borders two capes: Gracia and Plata. Both are locally raised areas, like the Punta del Camarinal (Fig. 1). The opposite happens in the Ensenada (cove, creek) of Bolonia (where *Baelo Claudia* is located), and the El Cañuelo beach, which are locally subsided areas. A likely underwater seismic event (NE-SW orientation), south-west of Baelo Claudia, was the cause of two episodes of destruction for this ancient Roman city in 40-60 AD and 350-395 AD. The latter led to the eventual abandonment of the city (Silva *et al.*, 2005). In its hay day, different harbour structures were built on the ancient dune system, when there was a different roman paleo-shoreline.

A potentially seismic fault segment (north side) and a presently aseismic fault segment (south side) converge on the Cabo of Gracia. On the north side, moreover, are remains of paleoseismic evidence. The possible "Coastal path" encircle this cape; on the south side is still a passable ramp, although very eroded, while the possible stretch of road on the north side was perhaps collapsed along with the large blocks which appear below, with coastline that borders the cape.

⁴ Traditional *tuna trap*, a netting fence anchored near the coast to catch tuna, an age-old technique for catching Atlantic Bluefin tuna.

II. Management of the Territory in Roman Times

We will analyze the concept of riparia in the area of the mouth of the Barbate River during Roman times, based on a settlement (oppidum type) established on top of a hill, and a port centre, all this taking into account their pre-Roman and Phoenician-Punic backgrounds.

II.1. Sources for the Study of Riparia

Ancient literary sources provide descriptions of the province of *Hispania Ulterior-Baetica*. The geographer *Pomponius Mela* (2. 85), in his description of the *Baetica* coast, cites the area of *Fretum Gaditano* (Strait of Gibraltar) naming *Baesippo*, located it after the *municipium* of *Bello*, and before the *Promunturium Iunonis*,⁵ at the end of the Strait of the Mediterranean Sea. *Pliny the Elder* (*N. H.* III, 7) in his description of the *Baeticae* coasts cites the portus *Baesippo* in the area of the Strait of Gibraltar; later returns to designate the toponym *Baesippo* (*Pl. N. H.* III, 15) in the enumeration of the population entities of the *Conventus Gaditanus*, as part of the city *Besaro* (pre-Roman name) which, following the phonetic rules, would evolve into the toponym of Vejer (Muñoz, 1996, p. 20). For *Ptolemy* (II, 4, 14), *Baisippo* is situated between the cities of *Ursone* and *Fornacis* giving a turdetanian ethno-cultural affiliation; this secondment and its location between cities located in the Sevillian countryside suggest that the author is talking about another city.⁶ *Avienus* (*Or. Mar.* 420) in his description of the coasts, mentions in the area of Gibraltar the mouth of the river *Besilus*, which has been identified as the Barbate River (Schulten, 1963, p. 46). This interpretation can relate it with another one made about the toponym "Barbate", a town that takes its name from the river, documented as *Barbat* in Arab sources (Terés, 1986, p. 77). The Latin name *Fluvius Barbatus* might be the designation of this river (Simonet, 1983, 19), which seems to come from the name of a species of river catfish or *barbus* (*Cicero, Par.5, 2, 38* and *Att. 2, 1, 7*), perhaps the mud red mullet (*Mullus barbatus*), which could indicate the fishing of this species in the area since pre-Roman times (Pascual, 2007, p. 516-517).

Itinerary sources provide us with information on the articulation of the terrestrial routes of communication, confirming the location of the city in the Atlantic area of the Strait of Gibraltar and providing specific distances between cities. The *Antonine Itinerary* (408.1) mentions a *mansio Besippone*, located between *Baelo* and *Mergablum*; and *Ravennatis Anonymi Cosmographia* (306,1) quotes *Bepsipon* between *Belone* and *Merifabion*.

The presence of archaeological materials of different nature bears witness to an intensive occupation and a Roman articulation of this territory (*CIL* II, 1924; Sáez, 1979-1980; Bernabé, 2010), supplemented by the results of different archaeological prospecting that have been made in the area (Ferrer *et al.*, 2002, p. 61-72). Many historical cartographic series are preserved, showing the area of the Campo de Gibraltar and the Strait as a geostrategic area throughout history, and are useful to observe the geographical changes, the toponymic evolution and the articulation of space.⁷

II.2. Pre-Roman Background

The estuary of the Barbate River and the La Laguna de la Janda present a use of space and its resources from prehistoric times (Ramos *et al.*, 2002). This occupation intensifies with the Phoenician colonization of the western end (beginning in the VIIIth century BC, or even before), leaving the coast of the Strait of Gibraltar under the political and economic influence of the Phoenician-Punic colony of *Gadir*, guiding center of this process. From this moment this area plays a geostrategic role of communications between the south of *Iberia* and North Africa,⁸ specializing in the production and commerce of salted fish products.

The territory is organized – from the pre-Roman period – around *oppida*, which are bastuli-punic cultural attachments, located in the Libyo-Phoenician area of Eastern influence.⁹ Located at the beginning of the estuary of the Barbate River, which coincides with the current population of Vejer,¹⁰ we find an *oppidum* with evidence of occupation from the VIIIth century BC. It's a high settlement which serves as to control the watercourse, its mouth, the coast, the Laguna de la Janda and its adjacent territory. It is consistent with the pattern of settlement in the area: occupation of hill locations with natural defence possibilities. Similar *oppida* are the site of Cerro Patria, *Asido* (modern city of Medina Sidonia) or Silla del Papa (Bologna). Studies seem to have an impact on the detection of an intense phenomenon of occupation of the rural territory of the basin of the Barbate River between the IInd and Ist centuries BC, and a process of exploitation of new land which is unprecedented (Ferrer, 2007, p. 301), and which we can identify with the entrance of this area under Roman influence.

⁷ For example, the Juan Lobo's topographic plans of 1821.

⁸ This geopolitical configuration in Phoenician-Punic times has been termed "Circle of the Strait", designating the existence of an area with specific interests between both shores and defined cultural identities (TARRADELL, 1960).

⁹ This influence is characterized by the Phoenician-Punic and the indigenous population miscegenation.

¹⁰ FERRER *et al.*, 2002, p. 61-72, identifies this *oppidum* with the toponym of *Baesippo*. We disagree with the identification of the toponym, according to later arguments.

⁵ It would be the Cape of Trafalgar, with remains of Roman fish salteries and an important point of reference for navigation, in this case dedicated to Juno.

⁶ Possible link with *Basilippo* or other cities that share the same root, of indigenous origin. BENDALA and CORZO, 1992, p. 98.

II.3. Configuration in Roman Times

In the political and military context of the 2nd Punic War (at the end of the IIIrd century BC), the estuary of the Barbate River, the adjacent territory and their communities, enter the political, economic, social and cultural area of Rome. One of the facts that testify to this early inclusion is the foundation of *Carteia*, the first Latin colony of extra-italic area (Livy, 43, 2, 3), in 171 BC, because of its strategic value. Rome takes advantage of existing economic structures,¹¹ specialized in exploitation and commercialization of fish products, characterized by the persistence of the political and economic influence of *Gadir/Gades*. This process becomes more intense from the active involvement of the pre-Roman indigenous communities in the civil conflicts from the end of the Republic, resulting in the promotion and integration of these communities in the political-administrative Roman structures at the end of the Ist century BC.¹²

The human organization of the estuary of the Barbate River (the territorial articulation of this riparia space) was established during the transition from the Ist century BC to the Ist century AD. It is in the Early Imperial period that the highest level of occupation of this space is reached; this occupation was organized around an *oppidum*, following the pattern of pre-Roman settlement in the area,¹³ and it is possible to identify it with *Besaro*, *stipendiaria* city of the *Conventus Gaditanus*.¹⁴ The *oppidum* located in the present-day town of Vejer de la Frontera occupies a hill of 201 m in height, and is situated at a distance of 8 km from the coast. Located inland and at the foot of the ancient estuary of the river *Besilus*, it controlled its communication with the Laguna de la Janda (Fig. 2). In its lower part is located the natural passage of the river (the gorge in Sierra Graná), place of passage known as the “Barca de Vejer” (*The Boat of Vejer*), a traditional crossing point of the river. “La Barca” was a river-sea port, because we record the navigability of the river until this point during the last half of the XIXth century.¹⁵ The *oppidum* presents a continuous occupation from orientalisering (VIIIth

century BC) to Early Imperial (Ist and IInd centuries AD) periods,¹⁶ with visual control of the routes of communication and the surrounding rural area, and its exploitation of *uillae*. It would be a junction with the interior, allowing the access to the Atlantic Ocean of the Roman colony of *Asido Casaerina*.

The other main point of organization of this territory would be the *portus Baessippo*, which tends to be identified with the current population of Barbate, on the Western side of the mouth of the river (Tovar, 1974-1976, p. 65). It presents a Roman occupation from the Ist century BC until the IVth century AD.¹⁷ It is a settlement of port character with characteristics of maritime anchorage, situated in an advantageous location in the estuary and protected from the sea by a sandy bar. In its surroundings are fish salteries and exploitation of *uillae*. It is a communication port in the area with North Africa,¹⁸ intended for the transport of people and goods (mainly fish products, salt and agricultural production of the interior).

We do not have sources to clarify the legal status of *Besaro* and *Baessippo* within the Roman administrative system. Only Pliny (*N. H.* III, 15) informs us that there are *stipendiariae* cities in the Ist century AD, without determining if there is a subsequent promotion to *municipium*, as other nearby communities.¹⁹ We cannot determine what type of relationship existed between these communities which, due to their proximity, should possess some sort of link, even leaving open the possibility of being the same entity. At least we can be sure of their membership of the *conventus gaditanus*.

Some authors have chosen to differentiate between the *oppidum* of *Baessippo* and the *portus* (Roldán, 1975, p. 223). In this contribution we opted for the possible identification of Barbate with the *portus Baessippo*, and the Vejer *oppidum* as *Besaro*.²⁰ On the other hand, in the Laguna de la Janda and its shores an intense occupation in Roman times is not detected; nor any nucleus of settlement of importance in this lagoon environment.

III. Construction of the Riparian Space and Its Uses

The time-frame is restricted to the Early Imperial period, because it was the time of highest density of occupation.

¹¹ Some authors have called it the survival of the “Circle of the Strait”, CHAVES, GARCÍA and FERRER, 1998, p. 1307-1320.

¹² Raised the hypothesis of place – in the estuary of the Barbate River – the anchorage where the fleet of Sertorius was safe, in his politico-military conflict with supporters of Sulla (81-80 BC), while the army penetrated into the interior with support troops CHAVES, GARCÍA and FERRER, 2000, 1479-1477.

¹³ A similar case would be the bastuli-punic *oppidum*, possibly called *Bailo*, located in the Silla del Papa (Sierra de la Plata, to the east of Barbate); after the Roman conquest in the time of Augustus, the *oppidum* moved to the coast as a city with the name of *Baelo*, promoting it as a *municipium* in times of Claudio. MORET *et al.*, 2010, p. 441-464.

¹⁴ Pl. *N. H.* III, 7. Other researchers have opted for calling the *oppidum* located in Vejer as *oppidum Baessippo*, placing the *portus Baessippo* in Barbate, and characterizing it by the condition of small settlement dedicated to the exploitation of the river and the sea resources; FERRER, 2007, p. 286. Others have chosen to differentiate between two entities, the *oppidum* of *Baessippo* and the *portus Baessippo*; ROLDÁN, 1975, p. 223.

¹⁵ MADDOZ, 1849, advises of the existence of a mill in “La Barca de Vejer” and coastal vessels access to that point.

¹⁶ Archaeological excavation of in the center of the town of Vejer de la Frontera (Cádiz), which provided a stratigraphic sequence of continuous occupation from the VIIIth century BC to the present day; MOLINA, 1993, p. 94-103. Other archaeological finds in MUÑOZ, 1996, p. 15-47.

¹⁷ Detection in the town of Barbate of a late Roman necropolis; BERNABÉ, 1989. Other archaeological finds in SÁEZ, 1979-1980, BERNABÉ, 2010; and epigraphic finds in *CIL* II, 1924 and *CIL* II, 1925.

¹⁸ The discovery of ancient coins shows the existence of relations with the North African cities in CHAVES, GARCÍA and FERRER, 1998, p. 1319.

¹⁹ As in the case of the *municipium Baelo Claudia* (current Bolonia).

²⁰ However, the possibility of its identification with *Baessippo*, is pending more sources.

The spatial framework (built around the edges of water) relates to the availability and exploitation of natural resources.

III.1. Exploitation of Potencial Wildlife Resources

Today this area is rich in biodiversity, being composed of several riparian ecosystems: rivers and streams, a lagoon, an estuary, marshes and the sea. The nearby location of Belone Claudia and the Parque Natural de los Alcornocales (Natural Park of Cork Oak Forests) would serve to assume that the same, if not greater biodiversity, would take place in Roman times²¹. With regard to timber as an economic interest (firewood for wood-fired ovens and potteries, wood for construction and tools, etc.), wild olive trees abounded (*Oleo europaea* subsp. *sylvestris*), evergreen oak trees (*Quercus rotundifolia*), cork oaks (*Quercus suber*) and on the coastal front, junipers. The Laguna de la Janda would be a health hazard, the focus of malaria (endemic in the area until the beginning of the XXth century; perhaps this is why the Roman occupation would be low), although it could be used for fishing (European eels, *Anguilla*), and serve as hunting ground for greylag geese, *Anser anser*; dabbling ducks (wild duck or mallard, *Anas platyrhynchos*; gadwall, *A. strepera*; pintail or northern pintail, *A. acuta*; Eurasian wigeon, *A. penelope*; northern shoveller, *A. clypeata*); shelducks (common shelduck, *Tadorna tadorna*; and ruddy shelduck, *Casarca ferruginea*); red-crested pochard (*Netta rufina*); and diving ducks (tufted duck, *Aythya fuligula*; common pochard, *A. ferina*; and ferruginous duck, *A. nyroca*). Woodland and scrub areas would be source of hunting resources: boars (wild boar, *Sus scrofa*) and deer (red deer, *Cervus elaphus*; European roe deer, *Capreolus capreolus*; fallow deer, *Dama dama*), although the presence of the wild goat (*Capra hircus*) wouldn't be surprising in the rocky massifs.

The coast, forced passage of Atlantic bluefin tuna (*Thunnus thynnus*) and its predator, the killer whale (*Orcinus orca*), would be an important source of fishery resources: school shark or snapper shark (*Galeorhinus galeus*), thornback ray (*Raja clavata*), Mediterranean flyingfish (*Cheilopogon heterurus*), European pilchard (*Sardina pilchardus*), European anchovy (*Engraulis encrasicolus*), John Dory, St Pierre or Peter's Fish (*Zeus faber*), European seabass (*Dicentrarchus labrax*), spotted seabass (*Dicentrarchus punctatus*), dusky grouper (*Epinephelus marginatus*), golden grouper (*Epinephelus alexandrinus*), Atlantic wreckfish (*Polyprion americanus*), comber (*Serranus cabrilla*), bluefish (*Pomatomus saltatrix*), Atlantic horse mackerel (*Trachurus trachurus*), leerfish or garrick (*Lichia amia*), pompano (*Trachinotus ovatus*), greater amberjack (*Seriola dumerili*), Atlantic pomfret (*Brama brama*), rubberlip grunt (*Plectorhinchus mediterraneus*), bastard grunt (*Pomadasyus incisus*), meagre or shade-fish

(*Argyrosomus regius*), brown meagre (*Sciaena umbra*), ombline or shi drum (*Umbrina cirrosa*), Canary dentex (*Dentex canariensis*), common dentex (*Dentex dentex*), pink dentex (*Dentex gibbosus*), large-eye dentex (*Dentex macrophthalmus*), zebra seabream (*Diplodus cervinus*), axillary seabream (*Pagellus acarne*), red seabream (*Pagellus bogaraveo*), common pandora (*Pagellus erythrinus*), redbanded seabream (*Pagrus auriga*), red porgy (*Pagrus pagrus*), salema porgy (*Sarpa salpa*), gilthead seabream (*Sparus aurata*), black seabream (*Spondyliosoma cantharus*), fish watcher (*Spicara smaris*), striped red mullet (*Mullus surmuletus*), red mullet (*Mullus barbatus*), flathead mullet (*Mugil cephalus*), Atlantic mackerel (*Scomber scombrus*), Atlantic bonito (*Sarda sarda*), bullet tuna (*Auxis rochei*), little tunny (*Euthynnus alletteratus*), albacore (*Thunnus alalunga*), bigeye tuna (*Thunnus obesus*), Atlantic sailfish (*Istiophorus albicans*), Atlantic white marlin (*Tetrapturus albidus*), blackbelly rosefish (*Helicolenus dactylopterus*), tub gurnard (*Trigla lucerna*), grey triggerfish (*Balistes carolinensis*), among others. Without forgetting the purple dye murex (*Murex brandaris*), and cephalopods (common cuttlefish, *Sepia officinalis*; and common octopus, (*Octopus vulgaris*) (Pérez-Martín and Rodríguez-Valle, 2001).

The estuary of the Barbate River and the coastline would be characterized by the abundance of these species, fishing and exploitation, which should represent the main economic activity, as in the cities of their coastal environment: *Baelo*, *Carteia* o *Mellaria*. Alleged structures located on the coast, identified as potential "corrales de pesca"²², could be its unique vestiges (Moreno and Abad, 1971). On the shore of the sea there have been localized deposits, or signs of occupation, with remains of Roman building materials and amphoric fragments.²³ The main indication of fishing activity already is in the *cetariae* environment, factories of salted fish sauces. The field of *Baessipo* would be embedded in the economic structures of the so-called "Circle of the Strait", characterized by the production of sauces and salted-fish, and their subsequent export and marketing (Chaves, 1997; Lagóstena and Cañizar, 2001). Although no large concentration of these structures has been located, they are present in the town of Barbate, next to the river or on the coast.²⁴ With regard to the production and processing of these canned products, the left (eastern) bank of the estuary of the Barbate River presents inter-

²¹ In fact, even more distant in time, during the settlement of Gibraltar and its environment by *Homo nerdenthalensis*, that biodiversity was spectacular (RODRÍGUEZ-VIDAL *et al.*, 2013).

²² "Corral de pesca" (or corrales de pesca, when plural) is a fishing weir trap, an obstruction placed in tidal waters, which is designed to hinder the passage of fish. Traditionally the corrales de pesca are built by forming walls with biogenic sedimentary rocks of fossiliferous conglomerates, in the zone subject to the ebb and flow of ordinary tides, and used since immemorial times to trap fish.

²³ Archaeological beach sites, "Botero", "Cortijo de Noriega" or "Cortijo del Novillero"; BERNABÉ, 2010, p. 157-167. Difficult to detect due to its location on the littoral.

²⁴ In the "Playa del Carmen" of Barbate factories of salted fish products, next to the supposed location of the castle of Santiago have been located: SÁEZ, 1978-1980, LAGÓSTENA, 2001, p. 323. In the town centre: BUENO and BLANCO, 2007, p. 341. In the Cape of Trafalgar: BERNABÉ, 2010, p. 50-61.

tidal areas with environmental conditions optimal for the establishment of salt marshes or *salinae maritimae* (clay soils related to the mouth of the River, high tidal gradients, prevailing winds, rain regime and average insolation; Lagóstena and Cañizar, 2010, p. 69). The production of sea salt is necessary and complementary to fishing-preserving industries located in their vicinity, mainly the factories in the city of *Belo* (*Belone Claudia*), because environmental conditions around this city are not suitable for the construction of salt farms.

The Roman settlement located on the banks of the estuary of the Barbate River was present since the end of the Republic, registered through surface exploration (Bernabé, A. 1989, p. 19-21; Ferrer *et al.*, 2002). The general pattern of these riparian settlements is presenting room structures located in soft hills at the foot of the marsh, being able to relate to exploitation *uillae*. We highlight the site of La Carrasca,²⁵ located on a small hill (25 m above the sea level) and about 200 meters away from the marsh. The site has good communication with the rest of the towns of the territory, through river-sea and land routes (the hypothetical route from the coastal path would be in the vicinity) and presents a good visual control of the area. Detected in surface materials are basically building materials, remains of wall structures, ceramic fragments of campaniense type, thin-walled vessels, African red slip ware (ARS), and storage vessels (*amphorae* and *dolias*). Most of the materials are dated between the Ist century BC and the Ist century AD (Early Imperial period), although the continuous settlement extended until the IVth century AD. Other nearby settlements that have these characteristics are the Cerro of Bujar (El Bujar II, site YN202) and the Cerro del Molinillo (Bernabé, 2010, p. 43-48).

III.2. Exploitation of Agricultural, Livestock and Forest Resources; Potential Vegetation

The current environment of the depression of La Janda and the marshes of the Barbate River are attached to the Ocean-rain seasonal bioclimate, with thermomediterranean thermal-type (Costa-Pérez, 2004, vol. I). With regard to the vegetation in this area, there is a convergence of two biogeographic provinces: the Bética province (represented by the Sevillian sector, and the Jerez district) and the Gaditano-Onubo-Algarviense province (represented by two sectors: the Algíbico²⁶ and the Gaditano-Onubense). It comprises the area southwest of the mountain ranges of the Campo de Gibraltar (Algíbico sector, flysch of the Campo de Gibraltar), typical of sandstones and siliceous sands. It is characterized by cork oak shadow forest (classified as TbQs²⁷) close to the headwaters of the rivers Almodóvar,

Barbate and Celemin further east, configure the current Natural Park of los Alcornocales (cork oak forest), (Costa-Pérez, 2004, vol. II). In this sector there is a contact between sedimentary and alluvial lands of the depression of the River Guadalquivir (*Hispalensis* sector), abounding the vertisols of the Jerez district that accompany the courses of those three rivers, with wild olive tree forest (TcOs) and, separately, cork oak forest (TbQs, just to the south of the depression of La Janda). Towards the coast, between the town of Barbate and the Cape of Trafalgar, is represented the Gaditano-Onubense sector, dominated by the sands and siliceous soils, reaching two unique ecosystems in the Gaditano-littoral district: the marshes (of the Barbate River) and the dunes (tombolo of Trafalgar and away to the south, the Anclón dune, along with *Belone Claudia*). Next to these lands are represented scarce cork oak forests (series OQs) on sands, usually evolved to stages of substitution and degradation; in addition to the bushes and shrubs on arid soils and sands (xerophytic and psammophytic Psa formations), and the hydrophilic EH20 microgeoseries.

accompanying (occasional) plants (Costa-Pérez, 2004, vol. II and IV). TbQs and OQs are cork oak forests, although the latter is psammophytic. TbQs is acronym of the series Teucro Querceto suberis, and is so named because of the species *Teucrium scorodonia* subsp. *baeticum* and *Quercus suber*. The OQs series (Oleo-Querceto suberis) is because of *Olea europaea* subsp. *sylvestris* and *Quercus suber*. When many species of TbQs and OQs are present but lack the cork oak (*Quercus suber*), resulting TcOs series (Tamo communis-Oleeto *sylvestris*, because of *Tamus communis* and *Olea europaea* subsp. *sylvestris*), a wild olive tree forest; it grows on "tierras de bujeo" (that literally means "land that moves"), soils of loam and clay which swell in winter and crack deeply in summer. Commonest species for TbQs, OQs and TcOs, that are potentially suitable for timber, charcoal, combustible for pottery kilns, or other known uses are *Pistacia lentiscus* and *Ruscus aculeatus*; with *Crataegus monogyna* subsp. *brevispina* as accompanying plant, besides the mentioned *Quercus suber* and *Olea europaea* subsp. *sylvestris*. Species present in OQs and TcOs series are *Chamaerops humilis*, *Quercus coccifera*, *Rhamnus alaternus* and *Rhamnus oleoides*. *Myrtus communis* and *Viburnum tinus* are present in TbQs and TcOs series. *Arbutus unedo* and *Erica arborea* are species present only in TbQs series. Not to mention *Rhododendron ponticum*, *Laurus nobilis*, *Frangula alnus*, *Quercus canariensis*, *Quercus faginea*, or *Populus alba*, associated with freshwater courses. The vegetation on sandy shores forms a geoseries edafoxerophilic littoral termomediterranean-iberoatlantic psammophilic, named Psa. Plant species in this geoseries colonize the soil from primary sand dunes until fixed and stabilized dunes, with the following species giving name to the various geoseries in that gradient: *Elymus farctus* subsp. *boreali-atlanticus* and *Euphorbia paralias* (fresh sands), *Ammophila arenaria* subsp. *australis* and *Lotus creticus*, *Juniperus oxycedrus* subsp. *macrocarpa* and *Rhamnus oleoides*, *Corema album* and *Rubia peregrina* subsp. *longifolia*, *Armeria pungens* and *Artemisia crithmifolia*, *Juniperus turbinata* and *Osyris quadripartita*, *Halimione halimifolium* and *Stauracanthus genistoides* (stabilized sands). The species in EH20 microseries, from less to more halophilic communities of plants, are *Spartina* sp., *Puccinellia embergeri*, *Sarcocornia perennis* (subsp. *perennis* and *alpini*), *Limonium* sp., *Halimione portucaloides*, *Cistanche phelypaea*, *Anthrocnemum macrostachyum*, *Inula crithmoides*, *Juncus* sp., *Limoniastrum monopetalum*, *Polygonum equisetiformis*, *Suaeda* sp., *Atriplex* sp., *Tamarix* sp., and *Nerium oleander* (COSTA-PÉREZ, 2004, vol. II and IV).

²⁵ *Carta Arqueológica de Barbate*; BERNABÉ, 2010, p. 79.

²⁶ The term "Algíbico" comes from the Pico del Aljibe (Cistern Peak, 1092 meters high), which presents Miocene sandstones as dominant rocks.

²⁷ The following "vegetation series" are cited in the text: TbQs, OQs, TcOs, Psa and EH20. Each series consists of characteristic (dominant) species of trees, shrubs, and herbaceous plants, and other

IV. Conclusion

The River Barbate has resulted in different aquatic ecosystems which are riparian environments. In the central and northern areas of its drainage basin, it is a river system and a lagoon. An estuary, now transformed into marshes at its mouth; and further on, the sea shore. In the period of Roman settlement, the estuary of the river Barbate was navigable; at least until the gorge next to the “Barca de Vejer”, at the foot of the *oppidum* which could be *Besaro*. Instead, the Laguna de la Janda – although it has been attainable in some vessels of sufficient draught – seems to be relegated to local transport. This view could be modified if a geomorphological investigation demonstrated that there have been tsunamis and earthquakes (during Roman times or later) as the cause for the following assumptions:

- The hasty closing of the gorge which connects the estuary lagoon, so the Roman transport through the navigation route could have used larger vessels and therefore pushed more into that territory.
- The disappearance of the road or its remains, if it existed next to the coast.
- The modification of the coastline, affecting most coastal settlements (as *Besippone* and *Mercablo*), such as was the case with *Baelo Claudia*.

These aspects would clarify landscape reality in Roman times. However, there has not yet been clarified the final location and identification of place names. And there is still very little progress in determining the type of management that the Romans made of natural resources (eg, salt farm spaces), or who carried out the exploitation of those resources, or how they did.

Control of the territory was achieved with ports (at least, in “La Barca de Vejer” and Barbate), and the sections of the Antonine, Itinerary, connecting, *Belone Claudia*, *Besippone* and *Mercablo*. Even today the last two allocations to Barbate and Conil, respectively, are discussed. This discussion would be resolved by defining the layout of the road by the coast or through the interior, in order to the following orographic accidents: the mountain ranges of la Plata and the Retin, the Estuary of the River Barbate, the Depression of la Janda, the Hillocks of Pericón, Hill of Cañar, Hill of Sierra Graná, La Muela and the mouths of the streams Candalar and Zarzuela (in Zahara de los Atunes), and streams of the Salado and Conilete (in Conil de la Frontera). It is necessary to deeply study the geomorphology of the estuary / marsh of the Barbate River, and the events that have shaped them, to define the correct road junction of this productive territory.

Between the lines of work, in relation to this riparian space, it still remains to define the legal status of these communities (*Baesippo*, *Besaro*), as well as the development of the process of immersion and its promotion in the structures of the Empire. This reaches its maximum level of organization in the riparian area in the Early Empire period, maintaining this use of space

until Late Empire period, and transferring that value of use to the successive historical eras.

Bibliography

- BENDALA, M., and CORZO, R., 1992. Etnografía de la Andalucía Occidental, *Complutum*, (2/3), 89-99.
- BERNABÉ, A., 1989. Memoria de las prospecciones arqueológicas superficiales realizadas en Barbate en el año 1987. *Anuario Arqueológico de Andalucía 1987* (II), 19-21.
- BERNABÉ, A., 2010. *Carta Arqueológica de Barbate*. Sevilla.
- BUENO, P., 2001. Las Actuaciones Arqueológicas realizadas en la Ermita de San Ambrosio. *Anuario Arqueológico de Andalucía 2000*, 127-137.
- BUENO, P. and BLANCO, F., 2007. Barbate y la fabricación de salsas y salazones de pescado durante la Antigüedad: La excavación arqueológica de urgencia realizada en la C/ Padre Castrillón nº 20 in LAGÓSTENA, L, BERNAL, D. and ARÉVALO, A. (eds.) *CETARIAE 2005. Salsas y Salazones de Pescado en Occidente durante la Antigüedad, Actas del Congreso Internacional (Cádiz, 7-9 noviembre de 2005)*, Oxford, 341-353.
- CASTRO, J. C. and RECIO, J. M., 2007. La Laguna de la Janda (Cádiz): 10 años después del inicio de los estudios básicos para su restauración ecológica. *Almoraima* 35, 175-184.
- CHAVES, F., 1997. Las acuñaciones latinas de la Hispania Ulterior in ALFARO, C. *et al.*, *Historia monetaria de Hispania Antigua*, Madrid, 233-317.
- CHAVES, F., GARCÍA, E. and FERRER, E. 1998. Datos relativos a la pervivencia del denominado “Circulo del Estrecho” en época republicana in KHANOUSSI, M., RUGGERI, P. and VISMARA, C. (eds.) *L’Africa Romana: atti del XII Convegno di Studi*, Sassari, 1307-1320.
- CHAVES, F., GARCÍA, E. and FERRER, E., 2000. Sertorio: de África a Hispania in KHANOUSSI, M., RUGGERI, P. and VISMARA, C. (eds.) *L’Africa Romana: atti del XIII Convegno di Studi*, Roma, 1463-1486.
- COSTA-PÉREZ, J.C. (dir.), 2004. *Modelos de restauración forestal. Datos botánicos aplicados a la Gestión del Medio Natural Andaluz*. Sevilla.
- DABRIO, C. J., GOY, J. L. and ZAZO, C., 1998. The record of the tsunami produced by the 1755 Lisbon earthquake in Valdelagrana spit (Gulf of Cádiz, southern Spain). *Geogaceta* 23, 31-34.
- FERNÁNDEZ-PALACIOS, A., FERNÁNDEZ-PALACIOS, J. and GIL, B. J., 1988. *Guía naturalística de la provincia de Cádiz: el litoral*. Cádiz.

- FERRER, E., 2007. El Territorio de la Ciudad Bástulo-Púnica de Baesippo. in LÓPEZ, J. L. (ed.), *Las Ciudades Fenicio-Púnicas en el Mediterráneo Occidental, Coloquio Internacional del Centro de Estudios Fenicios y Púnicos*, Almería, 281-314.
- FERRER, E. *et al.*, 2002. Informe de la Prospección Arqueológica superficial del TM de Vejer de la Frontera (Cádiz). *Anuario Arqueológico de Andalucía* 1999 (II), 61-72.
- HERMON, E., 2004. Avant-propos in CLAVEL-LÉVÊQUE, M and HERMON, E. (dir.), *Espaces intégrés et gestion des ressources naturelles dans l'Empire romain*, Besançon.
- HERMON, E., 2010. *Riparia* dans l'Empire romain : pour la définition d'un concept in HERMON, E. (dir.), *Riparia dans l'Empire romain pour la définition du concept*, British Archaeological Reports 2066, Oxford, 3-12.
- LAGÓSTENA, L., 2001. *La producción de salsas y conservas de pescado en la Hispania Romana (s. II a. C.-VI d. C.)* Barcelona.
- LAGÓSTENA, L. and CAÑIZAR, J. L., 2010. *Salinae maritimae* en *Baetica*: condiciones ambientales y consideración jurídica in HERMON, E. (dir.), *Riparia dans l'Empire romain pour la définition du concept*, British Archaeological Reports 2066, Oxford, 67-84.
- LOBO, F. J. *et al.*, 2000. Patterns of bottom current flow deduced from dune asymmetries over the Gulf of Cadiz shelf (southwest Spain). *Marine Geology* 164, p.91-117.
- LUQUE, L., 2004 El efecto del tsunami del año 1755 en el litoral de Conil de la Frontera (Cádiz) in BAQUEDANO, E. and RUBIO, S., (Coord) *Miscelanea en homenaje a Emiliano Aguirre I. Geología*, Madrid, 72-82.
- LUQUE, L. *et al.*, 1999. Evolución sedimentaria de la laguna de La Janda (Cádiz) durante el Holoceno. *Cuaternario y Geomorfología* 13, 43-50.
- MADOZ, P., 1849. *Diccionario Geográfico-Estadístico-Histórico de España y sus posesiones de Ultramar*. Imprenta del Diccionario geográfico-estadístico-histórico de Don Pascual Madoz, Madrid.
- MENA, J. E., 2008. Tierras de Labor in FERNÁNDEZ-PALACIOS, J. M. (dir.) *Rio Barbate*, Sevilla.
- MOLINA CARRIÓN, M^a I., 1993. Informe de la excavación de urgencia en la Iglesia de las Monjas Concepcionistas (Vejer de la Frontera, Cádiz). *Anuario Arqueológico de Andalucía* 1990 (III), 94-103.
- MORENO, A. and ABAD, L., 1971. Aportaciones al estudio de la pesca en la Antigüedad. *Habis* 2, 209-221.
- MORET, P. *et al.*, 2010. Silla del Papa (Tarifa, Cádiz): bilan de trois années de recherches. *Pallas* 32, (1), 205-228.
- MORILLO, A., 1975. *Vejer y su comarca. Aportaciones a la Historia de Cádiz*, Cádiz.
- MUÑOZ, A., 1996. *Vejer de la Frontera*, Cádiz.
- PASCUAL, J., 2007. Cetaria, Barbatus y otros nombres latinos referidos a las antiguas conservas de pescado in LAGÓSTENA, L., BERNAL, D. and ARÉVALO, A. (eds.), *Cetariae 2005. Salsas y Salazones de Pescado en Occidente durante la Antigüedad, Actas del Congreso Internacional, (Cádiz, 7-9 de noviembre 2005)*, Oxford.
- PÉREZ-MARTÍN, M. and RODRÍGUEZ-VALLE, F. (coord.), 2001. Especies de Interés Pesquero en el Litoral de Andalucía. Vol. 1 Vertebrados.
- PONS, J., 1977. Algunas consideraciones teóricas sobre el *sevirato* como indicador de dinamismo socio-económico, *Memorias de Historia Antigua*, I, 215-219.
- RAMOS, J. *et al.*, 2002. Informe de las campañas de prospecciones superficiales desarrollada en los términos de Barbate y Tarifa. Valoración en el proyecto de investigación: La ocupación prehistórica de la campiña litoral y banda atlántica de Cádiz. *Anuario Arqueológico de Andalucía* 1999 (II), 9-20.
- RODRÍGUEZ-VIDAL, J., 2008a. Correlación de unidades morfotectónicas cuaternarias en la costa del Mar de Alborán occidental y del Estrecho de Gibraltar in BENAVENTE, J. and GRACIA, F. J. (eds.) *Trabajos de Geomorfología en España, 2006-2008*, Cádiz, 63-66.
- RODRÍGUEZ-VIDAL, J., 2008b. Geomorfología de Andalucía in VERA, J. A. (coord.) *Proyecto Andalucía, Tomo XXVII, Geología III*, 15-78.
- RODRÍGUEZ-VIDAL, J. *et al.*, 2011. The recorded evidence of AD 1755 Atlantic tsunami on the Gibraltar coast. *Journal of Iberian Geology: an International Publication of Earth Sciences* 37(2), 177-193.
- RODRÍGUEZ-VIDAL, J. *et al.*, 2013. Undrowning a lost world-The Marine Isotope Stage 3 landscape of Gibraltar. *Geomorphology (in press)*.
- ROLDÁN, J. M., 1975. *Itineraria Hispana. Fuentes antiguas para el estudio de las vías romanas en la Península Ibérica*. Madrid.
- RUÍZ, F. *et al.*, 2008. The geological record of the oldest historical tsunamis in southwestern Spain. *Rivista Italiana di Paleontologia e Stratigrafia* 114, 147-156.
- SÁEZ, A., 1979-1980. Hallazgos arqueológicos en Barbate. *Boletín del Museo de Cádiz (Cádiz)* 2, 45-47.
- SHULTEN, A., 1963. *Geografía y etnografía antiguas de la Península Ibérica*. Madrid.
- SILLIÈRES, P., 1990. *Les voies de communication de l'Hispanie Méridionale*. París.

- SILLIÈRES, P., 1990. *Les voies de communication de l'Hispanie Méridionale*. Paris.
- SILVA, P. G. *et al.*, 2005. Archaeoseismic record at the ancient Roman City of Baelo Claudia (Cádiz, south Spain), *Tectonophysics* 408, 129-146.
- SIMONET, F. J., 1983. *Historia de los mozárabes de España*, t. I, Madrid.
- TARRADELL, M., 1960. *Marruecos púnico*. Tetuán.
- TERÉS, E., 1986. *Materiales para el estudio de la toponimia hispanoárabe: nomina fluvial* t. I, Madrid.
- TOVAR, A., 1974-1976. *Iberische landeskunde*. Baden-Baden.
- WHELAN, F. and KELLETAT, D., 2005. Boulder deposits on the Southern Spanish Atlantic Coast: Possible Evidence for the 1755 AD Lisbon Tsunami? *Science of Tsunami Hazards* 23, 25-38.
- ZAZO, C. *et al.*, 2008. The coastal archives of the last 15 ka in the Atlantic–Mediterranean Spanish linkage area: Sea level and climate changes. *Quaternary International* 181, 72-87.

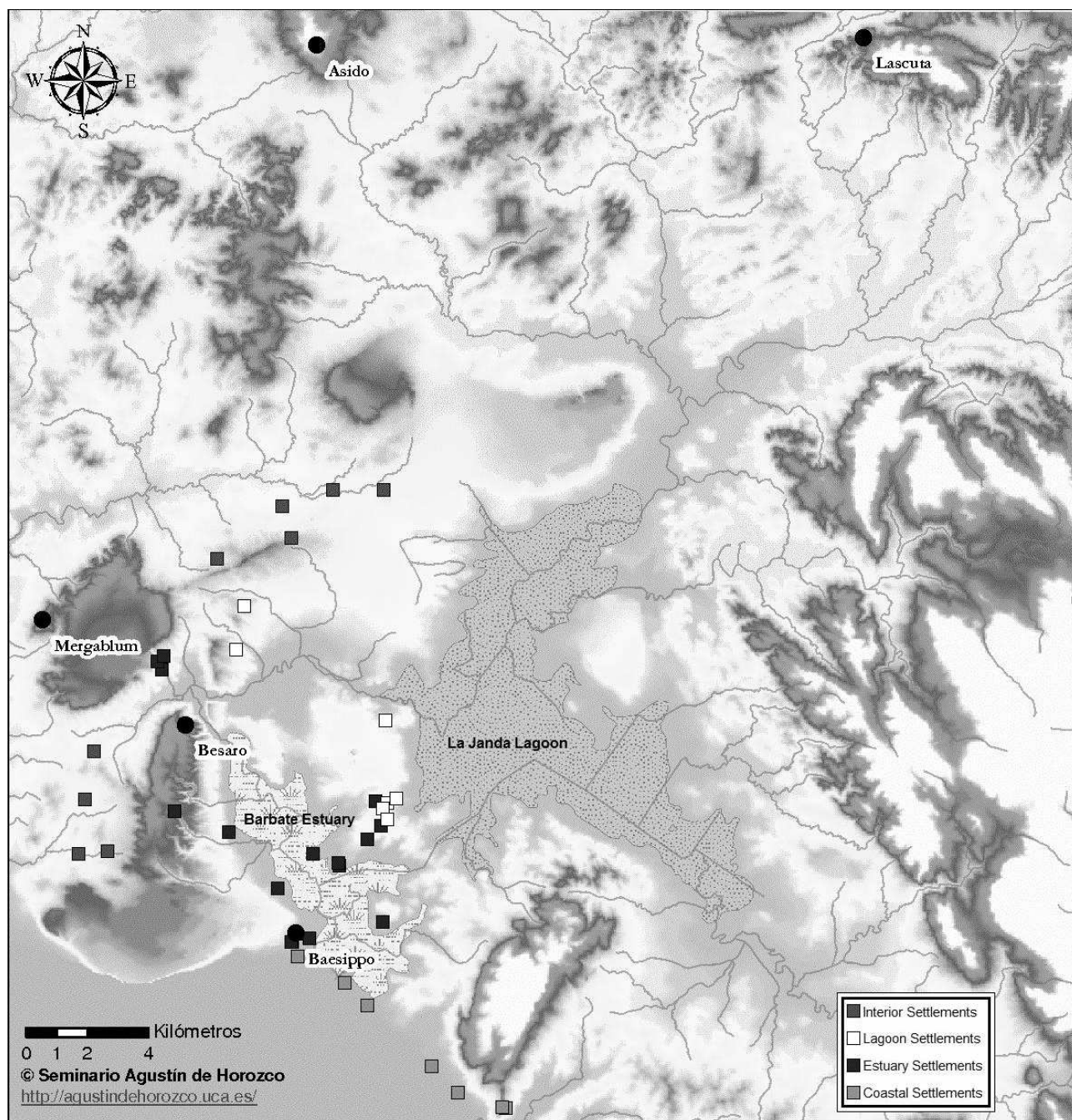


Figure 1. Distribution map of the Roman rural settlement, *riparia* and important centers of population.
Seminario Agustín de Horozco de Estudios Económicos de Historia Antigua y Medieval, Universidad de Cádiz.

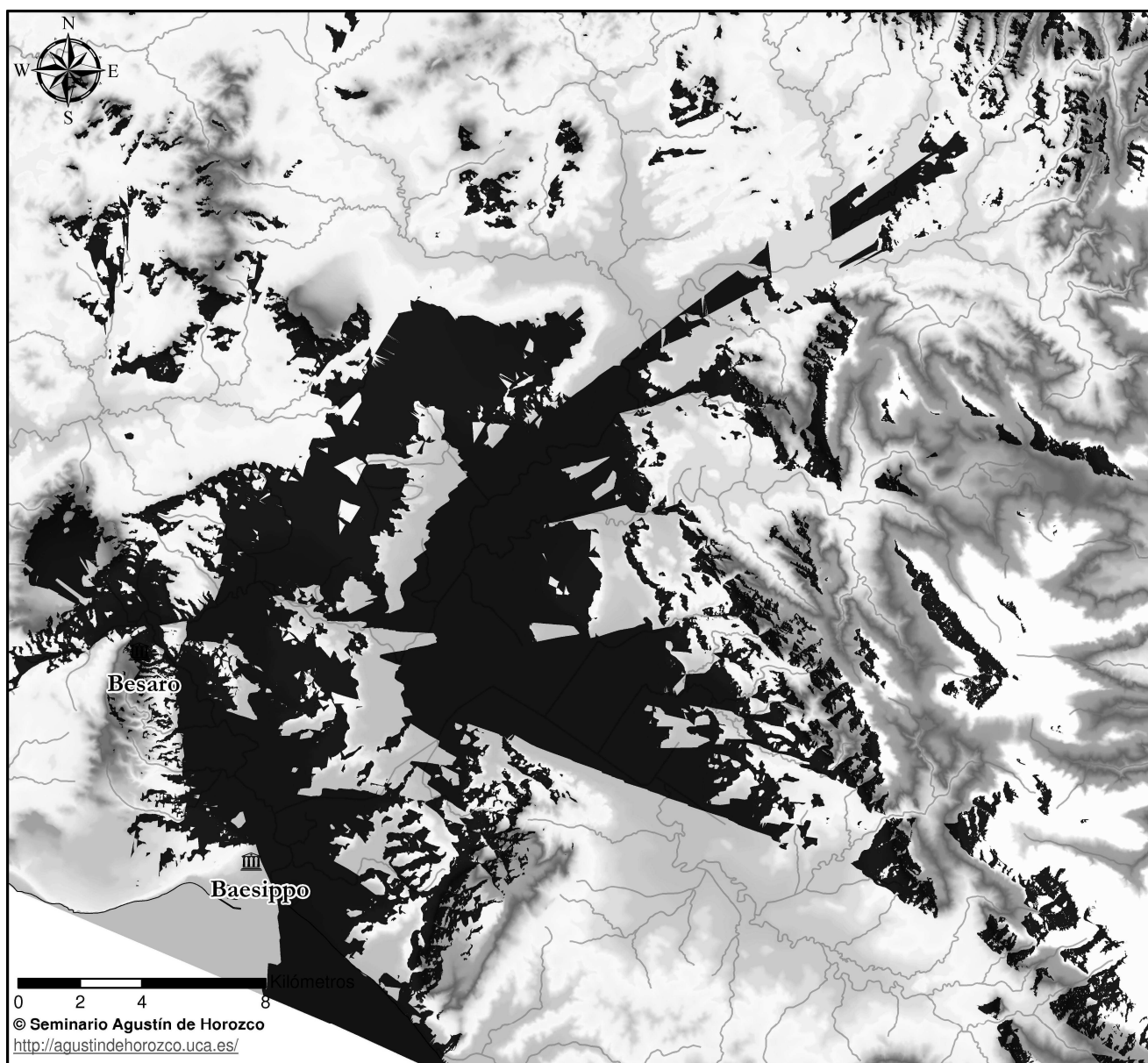


Figure 2. Analysis of visibility from the oppidum of Besaro.

Seminario Agustín de Horozco de Estudios Económicos de Historia Antigua y Medieval, Universidad de Cádiz.