

Integrating historical cartography, written accounts and satellite images for the reconstruction of past landscapes: the case of Madayi (Kerala, India)

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ABSTRACT

The coastline of southern India has historically been a central node within an important commercial network that brought the West (and the Mediterranean) into contact with the Far East. After the fall of the Roman Empire, other commercial actors came into play and Arab and Jewish merchants began to travel the 'Western' routes, as attested by written sources at least starting from the 9th century AD.

In this context, archaeological surveys conducted in Madayipara (Kannur District, Kerala) have unearthed evidence of a complex network of settlements in the delta of the Kuppam River in Taliparamba which has almost disappeared today. The natural landscape has also changed over time, as the coastline slowly advanced and rivers changed their courses as well as their function. Traces of this hub or entrepôt can be found in the rich body of historical sources and cartography of the region, which suggests the presence of lively ports often associated with Jewish and Muslim communities, as well as in later maps drawn by European explorers. The historical sources, together with satellite imagery and results from archaeological surveys, can help us reconstruct a complex settlement pattern, fully embedded within the trade networks of the medieval Indian Ocean.

KEYWORDS: Historical cartography, remote sensing, Indian Ocean, remote sensing, Malabar.

Madayi is a small coastal area on the Malabar Coast (Kerala, India), which has been the target of investigations carried out by the Italian Archaeological Mission in India.² Research into the port of Madayi proved to be promising as the ceramic evidence, although scarce and originating exclusively from unsystematic surface reconnaissance, is representative of numerous types of Eastern and Western productions, distributed over a wide geographical and chronological spectrum (D. Hill, La Salvia, and Moderato 2020).

Although archaeological data are improving our knowledge about the site, we still do not know enough about its landscape and role in the historical trade networks. A multi-proxy approach is needed to place the finds in their historical and geographical framework. For this reason, different sources (material, written, cartographic and topographical) related to this site have been analysed. In this paper we will focus mainly on the overlapping literary and cartographical sources. Historical maps have long been used in archaeological research to analyse elements of the ancient landscape such as settlement patterns, communication and trade networks and even the perception of the landscape in Antiquity (Chouquer et al. 1987; Basso 2007; Cambi 2011; Gillings, Hacigüzeller, and Lock 2018). Regressive analysis can fill in the gaps due to contemporary transformations of historical landscapes; lately, the development

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of new technologies such as machine deep learning are changing the cartographic approach from qualitative to quantitative (Petrie et al. 2018; Chiang et al. 2020; Garcia-Molsosa et al. 2021).

Geographically, the Malabar Coast is located within in the sea trade routes between East and West. It is affected by the monsoons and is characterised by a recurring complex of wind and other meteorological phenomena which are significant not only because they have dictated the rate of sea travel but also the agriculture in South-East Asia (Cardini and Vanoli 2017, 13-31; Prange 2008; 2018).

The Indian Ocean is currently the focus of a great deal of attention in terms of historical and archaeological research. Numerous studies are highlighting the key role played by the Ocean/Sea in the development of millenary routes of mobility and trade from East to West. Modern scholars have gradually abandoned Eurocentric models, often focused only on Roman trade networks in the frontier areas, combining local high-resolution research with global perspectives (Heng 2019; Seland 2014; Schottenhammer 2019b, 2019c). New themes, such as Arabian trade, and new broader chronological perspectives are helping to reshape the connections between the nodes of this extraordinary network. Within this framework, the medieval period has not been yet fully investigated, in spite of a large number of literary and archaeological sources.

The study of international trade and cultural interaction during the early medieval period is only just beginning and the prevailing historiographical view continues to be that, during the middle of the first millennium, international trade ceased or declined to such an extent that it was no longer an important factor in enabling wider socio-economic developments in the area. As already mentioned, however, archaeology has begun to question the basic assumptions of these assertions. This is also due, among other things, to the fact that various textual sources, as we shall see below, indicate that Arab-Persian traders were already trading with India from at least the 7th and 8th centuries. However, this indication from written sources has not yet received the archaeological 'attention' necessary to verify its

historiographical reliability. In fact, as far as archaeology is concerned, since Carswell's studies on the Indian coast in 1976 there have been a number of surveys and reconnaissances which, in investigating trade in the Indian Ocean and in line with the general state of archaeological research in the region, have tended to focus on earlier periods (with a fixation on Indo-Roman trade and the identification of sites in India with places mentioned in classical Greek and Roman literature). In contrast, the early medieval period has so far been 'grossly' ignored (Hawkes 2014b, 2014a, 2019). The role of Rome and the Mediterranean in the Indian Ocean trade system, known from numerous written sources (Casson 1989, 1990; De Romanis 1997), on the basis of which it has always been overestimated, should, however, be repositioned within a broader (economic-commercial) horizon and, as mentioned, less centred on the Mediterranean; In fact, as Fitzpatrick well points out, taking up an 'old' intuition by Rostovtzeff, Rome was 'only' part of a mercantile trend with very ancient roots (dating back at least to the 4th millennium) and an oriental matrix that revolved around the Arabian peninsula, southern Persia, India and Ceylon (Sri Lanka). Moreover, its economy never had the capacity to stand out as a leading and/or prevailing force (not even from a military point of view) within this commercial circuit (Fitzpatrick 2011, 27-54). First for Rome, and later for Byzantium, starting at least from the 3rd century, the problem of competing with the Sassanid Empire and the consequent drastic change in trading nodes became central, progressively accentuating the importance of the Persian Gulf and Arabian peninsula to the detriment of the Red Sea (more included within Rome's political sphere of action: Fiaccadori 1992; Malekandathil 2007, 2010; Howard 2012; Cunliffe 2015). According to this perspective, the role played by the Eastern Christian Churches as a vehicle for their respective economic-commercial policies (Roman-Byzantine and Sassanid) is not secondary; rather, they seem to form part of a framework that is, by now, well defined by different spheres of influence (Fiaccadori 1992, 65-66; Tomber 2007; Howard 2012, 142-45; Seland 2012).

The Malabar coast is therefore a fundamental crossroads of inter-oceanic trade, not only because it is an intermediate station between the ‘western’ coasts and China (and/or the Far East in general) but also because of its products, the most important of which was black pepper (whose trade is reported by Roman sources from the 1st-2nd century AD). Closely connected to the movement of goods is the movement of people and ideas. Merchants moved along the routes linking the Mediterranean and the world of the Indian Ocean, sometimes only for short distances but later, especially from Late Antiquity, over long distances, supported by groups of investors and wealthy shipowners (Mohamed and Mohammad 1999; Ilias 2007).

Therefore, given its location along the Malabar coast, a very favourable position, the area existing today around the settlement of Madayi must have had a mercantile post and formed part of this intense system of commercial relations.

The site of Madayi is located near the present-day settlement of Pazhayangadi on the northern bank of the Kuppam River, north of the city of Kannur, the main administrative centre of the district in Kerala (India) that bears the same name. The Malabar coastline stretches from NW to SE in the south-western part of the Indian peninsula, alternating between headlands and bays generally situated near the delta of

rivers. These are descended from the Western Ghats, the mountains that mark the transition from the coastal region to the hinterland. The coast is characterised by relief and plains; the hillsides are, for the most part, occupied by terraces for cultivation while the extensive low wetlands are still dominated by forests or vast lagoons. The population is mainly concentrated along the coast. The current coastline is essentially due to and/or is the result of sea-level fluctuations and fluvial-marine processes and the formation of sediment of recent geological origin.

The geomorphological evolution of the coast has, historically, played an important role in the dynamics of settlement in the area. Coastal morphologies are made up of coastal ridges and sand dunes, crossed by rivers, estuaries and plains of alluvial deposits and bordered by high laterite outcrops towards the east. The evolution and stabilisation of the coastal area seem to have taken place between the middle and late Holocene, as evidenced by numerous megalithic burials found between the coastal areas and inland sand ridges (Gurukkal and Varier 1999; Shajan *et al.* 2004).

Since then, a long process of sedimentation produced by watercourses seems to have shifted the coastline considerably towards the west. Some data on the history of these geomorphological processes can be deduced from research carried out at the Pattanam site on the estuary of the Peryar River. In this area, the geomorphological sequences seem to indicate a marine transgression dating from 8,000 to 6,000 BC and a regression dating from 5,000 to 3,000 BC. The presence of a large palaeo-delta to the south of the current course of the Peryar indicates that the course of the river moved from the NW to the SE.

The paleo-delta itself is bordered to the south by the Paravur canal, which appears to be a palaeo-channel of its ancient course, the abundance of sandy ridges and delta sediment therefore suggesting that the course of the Peryar originally passed further south than the site of Pattanam (Shajan *et al.* 2004, 316). Such developments could have taken place in the Madayi area which, moreover, appears to be particularly suitable for human settlement. It is located at about 170-180 m above sea level, at the junction of four rivers (Taliparamba,

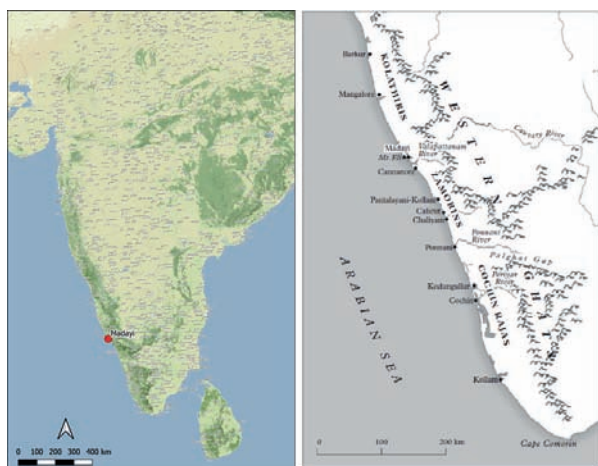


FIGURE 1. Left: Madayi's location. Right: Malabar's principal ports of trade in the 15th century (by the author based on Prange 2018).

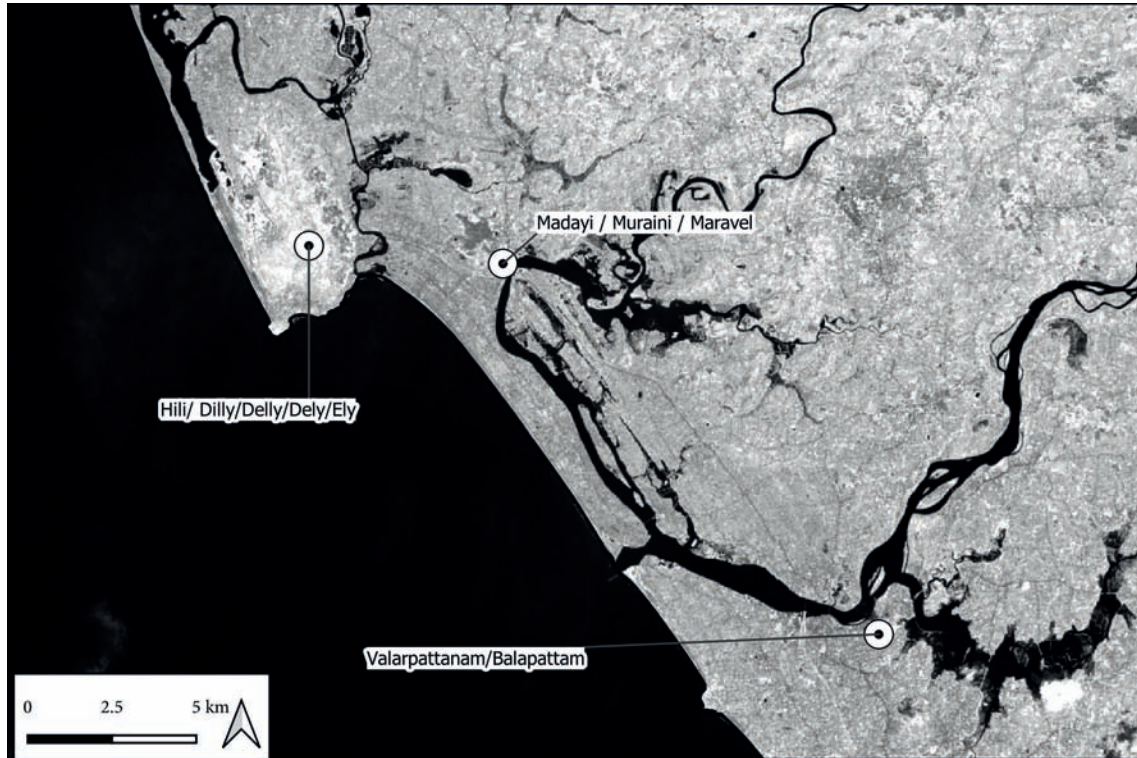


FIGURE 2. Landsat infrared of Madayi's region with historical place names.

Valapattanam, Kuppam and Perumba) and, therefore, sheltered from river flooding. It is also sheltered from oceanic winds by Mount Ezhimala.

As a preliminary step in reconstructing the historical landscape, we studied the river delta via remote sensing. From a series of satellite images (Landsat 8 B3,4,6), we can see that marine regression has formed a series of progressive sandy ridges that go from east to west and, at the same time, mark the deformation of the watercourses as they move from the laterite layers to the alluvial sands of the coastal plains (La Salvia and Moderato 2020). Several palaeo-river valleys also seem to be recognisable, the second of which, the one immediately south of the fortress, follows the contemporary road that runs along the current course of the river, passing a short distance from the present-day Madayi Mosque.

It should also be remembered that the frequent geomorphological changes along the Kerala coastline have resulted in most of the historical sites being located some distance from

the contemporary ones from which they take their name. For instance, the historical site of Pattanam/Muziris is located on the southern side of the bay while the modern town of Kodungallur is on the opposite side (Shajan et al. 2004).

The western area of the plateau, where the laterite slopes are less steep, is known as the 'Jewish Tank'. This toponym is probably related to the presence of a large rectangular cistern, cut directly into the laterite for 50×2 metres and with a maximum visible depth of at least 3.5 m; a long ramp, carved directly into the rock, is located on one of the shorter sides. Smaller circular cisterns are present throughout the surrounding area, as are the remains of walls and channels. Such a situation seems to indicate a deep and prolonged process of anthropising the landscape.

A fortified structure, known as the Madayi Fort, is in the southern part of this plateau. The fortification is trapezoidal and about 100×90 metres wide, with four square towers at the corners and a 'pincer' gate on its northern side.

All the bricks of the masonry seem to have been obtained and quarried directly from the laterite rock. The exact date of construction is still unknown but it is thought that it may be related to the reign of Kolathiris and that it was finally abandoned in 1887 (Logan 1887, 8-10).

The strategic position of the fort is evident to this day and should therefore have been even more pronounced in the past when, as mentioned, the river flowed directly into the sea instead of bending sharply to the south as it does today. At the foot of this hill is the mosque, where an epigraph on wood is still preserved, traditionally dated 1124 although there is still some debate regarding its age, given the fact that the year of the Hegira is not precisely readable (Sewell 1882, 242; Logan 1887, 424; Narayanan 2018, 344).

The aforementioned paleo-river, which passes close to the fort and the mosque, suggests the presence of a river port in the surrounding area. Traces of this past mercantile activity can be found in the rich body of historical and cartographic sources for the region, which also suggest the presence of bustling ports often associated with the presence of foreign, Jewish and Muslim trading communities.

From the list of ports compiled by Cosmas Indicopleustes for India and Malabar, one gets the impression of a region that was fully integrated into the trade networks that crossed the Indian Ocean already from Late Antiquity, although the Greco-Roman sources show, in general, a greater knowledge of the northern Indian regions. In the 11th book of Cosmas, however, eleven ports on the Indian coast are mentioned and some of these belong to the Malé/Malabar region (Banaji 2015).

Later, in the 9th century, a place called Babattan is mentioned by the Muslim geographer Ibn Khordadbeh and identified by Nainar as Baliapatam, which could be, in turn, the very Pudopatana mentioned by Cosmas (Nainar 1942, 25-26, 29; Ahmad 1989, 22): The place in question is, in fact, located on the Malabar coast, one day's journey from Schinjli and Bullin and five miles from Cannanore (modern Kannur). It is therefore one of the intermediate ports between the Persian Gulf and Ceylon, along the route that eventually led to China. This trade network was therefore active during the medieval

period. A local source, the epic poem *Mushika Vamsa*, mentions that the foundation of two sites, Muraini (Mathy) and Valabhappattana (Valarpattanam/Baliapattam) must be attributed to King Vallabha II, around the end of the 12th century AD (Kunhali 1975, 329-30).

In his study of medieval Muslim trade networks, Lambourn (2008) states that the Malabar coast had direct connections to Aden through a series of individual small ports rather than through larger regional hubs. The list of *qadis* and *khabs* mentioned follows the route from the Indian west coast to the east coast of Coromandel. The Malabar ports are therefore listed from north to south and three of these are particularly significant for our research. The first is Hili, identified with Mount Eli, which is the highest orographic point of the coast in this area and therefore fundamental for orientation in ancient navigation. In fact, it is mentioned by Al-Dimashi and Abul Fidā (Ras Hili) in the early 14th century and later by Ibn Battuta who reports, for the same site, the presence of a famous Friday mosque, a *madrassa* and a canteen. According to Lambourn (2008, 28), the site corresponds to the modern village of Madayi. Bud provides fewer details although its toponym may be a truncated derivation from Buddfattan, mentioned again by Al-Dimashqi and Ibn Battuta as being under the control of the ruler of Jurfatan. It could also be located in an area between Mount Eli and Cannanore and, therefore, perhaps identifiable with Babattan/Baliapattanam/Pudupattanam in earlier sources (Nainar 1942, 39-40).

We may also assume that many different 'Poudopatanas' were active and present along the Malabar coast at different times. However, if we consider the geographical position of this toponym in later cartography, as we will describe shortly, the term seems to fit better with the Maday area. The intensification of trade linked to the Malabar coast is, in fact, also well attested in later medieval and modern sources. As early as the 15th century, Tomé Pires lists 29 inhabited seaports. Among these we can still find Hyeri, Baliapatam/Balea Patanam, Puthupattanam/Pudopatana and Madayid/Marlarjanj mentioned. Cortesão (Cortesão 1944, 75) identifies Hyeri as a place

that existed south of Mount Dely (Mount Ely), whereas Baliapatanam is associated with a small town on the southern river of the same name, located between the same mountain and Cannanore (modern Kannur). Moreover, for the first time the toponym of Madayi is explicitly recorded in this source. Furthermore, the *Livro de Duarte Barbosa*, dating from the early Portuguese colonial period, reports the presence of a Jewish community at the foot of Mount D'Ely, in a place called Maravel. The book's editor, Dames, explains that Maravel/Maranel is most probably identifiable with Madayi.

Currently there are no longer any Jewish residents in the area. However, traces of an ancient presence is probably still reflected in a historical place name known as the 'Jewish Pond-Madaypara' on Maday Hill (Barbosa and Stanley 2010, 79-80).

Logan (1887, 235-37) also reports the presence of two fortified settlements along the Taliparamba and Valarpattanam rivers as well as trading centres (the so-called Palangadi, probably located in the

vicinity of the Madayi Mosque) and sites with strong Islamic connotations.

From a cartographic point of view, one of the first accounts is the place name Elly in the Catalan Atlas (1375), in Fra Mauro's Mappamondo, where we can find Chavo De Eli (Eli's Cape) together with the name of a settlement called Bassia/Balli. Fra Mauro's map is based on travel accounts earlier than 1453 (and for this region, mainly on Marco Polo's data), so we could state that Eli/Hili cape was still a reference point for western and eastern geographers in the 12-13th century. Mount Deli is also present in Gherard Mercator's *Asia Orientalis* (1607). The term Balepatan/Baliapatan is also mentioned in Nicolas Fer's *Les Indes Orientales* (1721), in Guillame de L'Isle's Map (1723), and refers to a place midway between Mount Dely and Cananore, while Jefferys' map (1768) shows Baliapatan together with a 'Bazaar' near a river course, located south of Mount Ely.

Consequently, the sources tend to report associated toponyms referring to Mount Ely and those related to and/or derived from the toponyms



FIGURE 3. Top left: Catala Atlas detail with the toponym Elly. Top right: Fra Mauro's Mappamondo and toponym Chavo de Eli. Bottom left: Mercator's Map with Mount Deli toponym. Bottom right: Jefferys's East Indies with Mount Dilly/Baliepatanam toponym.

Babattan/Baliapattanam/Pudupattanam, known from older sources.

Some preliminary conclusions can, however, be drawn based on this body of cartographic and topographical data. First, it is quite evident that the fact this part of the Malabar coast was continuously mentioned in late antique and medieval geographical sources is an indication of the persistence of commercial activities, at least since the early Middle Ages (if not earlier, considering that Cosmas' list may not have counted all the ports operating in the area).

The almost constant references in late medieval and early modern cartographic and geographical sources to Mount Ely/D'Ely, the only relief on an otherwise flat coastline, as a strategic point for navigation supports the idea of continuous traffic plying intense oceanic trade. These trade relations were characterised by a strong Arab-Muslim presence that left marks such as the early construction of the Madayi Mosque which was built, at the latest (if we are to trust Logan's interpretation) at least as early as the first few decades of the 12th

century (and therefore, in any case, prior to Ibn Battuta's writings).

We may suppose that the plurality of names related to the area surrounding the present settlement of Madayi derives from the fact that we are dealing with a scattered settlement, at least for the medieval-modern period. This same settlement may therefore have consisted of two separate harbours set on either bank of the two rivers, namely Balepatanam and Hili/Madayi.

The continuous presence of the toponym Hili/Elly/Eli and associated with a distinctive element of the landscape such as the promontory indicates a certain attention to this specific point on the coast, from which, according to Barbosa, the ships of the Moors and Gentiles got their supplies and then departed (Yule 1866, 2:451-53). Finally, as already mentioned, according to Ganesh (Ganesh 2009, 179-80) the term or rather the suffix -pattanam probably indicates the presence of commercial centres that operated as trading hubs all along the coast.

The sherds collected on the Madayi plateau also seem to confirm what has emerged from an



FIGURE 4. Madayi's site with the main locations: Jewish Pond, Madayi Fort and the Madayi Mosque (produced by the author).

analysis of the written sources and the preliminary analysis of the historical landscape of the area, highlighting a long period of occupation of the site, at least from Late Antiquity and throughout the Middle Ages.

Despite the absence of stratigraphic excavation and intensive reconnaissance tests of the entire Maday Hill area, it is possible to draw some conclusions based on the available data. The area around the so-called Cistern of the Jews yielded most of the TGP/TAG fragments together with numerous pieces of common ware (D. Hill, Speakman, and Glascock 2004; D. Hill 2006). The assemblages from the fort and mosque areas may have to be considered together, as many of the sherds recovered near the Islamic place of worship may have slid downwards because of the hillside eroding, ending up in secondary positions. However, most of the finds pertaining to the Mosque are of Chinese fine pottery (Longquan/Yue celadon) and other more common classes such as fragments tempered with limestone degreasers and torpedo amphorae. From a chronological point of view, therefore, the oldest fragments are those from the mosque (4th-8th) and this is not surprising given its possible privileged position as a landing place, directly connected to the Kuppam paleo-river. A second phase can be detected around the 9th century with the occupation of the area around the Cistern of the Jews, with a strong concentration of TGP/TAG. In this same phase the area of the mosque also became receptive to eastern trade routes (D. Hill, La Salvia, and Moderato 2020; La Salvia and Moderato 2020).

The whole group of fragments from the three areas, however, highlights the long occupation of the Madayi district and indicates the presence of probable river trade linked to the sea, active at least since Late Antiquity, with a first peak of activity around the 9th-10th century AD, well before the construction of the hill fort.

Considering the data available, Madayi is likely to form part of what Prange (2018, 28) calls *entrepôts* or trading ports; places specifically focusing on facilitating commercial exchanges with different cultures and institutions, characterised by the presence of access to water (anchorage, harbours), commercial infrastructures and facilities.

Further research into historical cartography and aerial and satellite images, associated with the possible coring of the coastal sediments, will be able to provide a more complete picture of the geomorphological and historical transformations undergone by the landscape in this area.

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