

SURVEY AND ANALYSIS OF THE ARCHITECTURAL HERITAGE AT JUMBA LA MTWANA AND MNARANI, PRECOLONIAL SWAHILI TOWNS IN KENYA

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ABSTRACT: In 2021, a survey of two sites, known as Jumba la Mtwana and Mnarani in Kenya took place, which date between the 14th and 16th centuries CE. The sites represent some of the Swahili towns on the East African coast that were in the precolonial period taking part in trade along the coastline, to inland Africa and as far as the Middle East, India, and China. Today, the sites feature standing remains of various architectural features constructed of coral rag, a local type of limestone.

This paper reports on a high-definition survey, which for the first time documented the entirety of the standing remains, spatial layout, and a configuration of these predominantly Islamic towns. The survey was conducted using a combination of 3D scanning technologies and photography, aimed at achieving two goals – documenting the state of preservation of the architectural remains and, perhaps more importantly, answering research questions in Swahili archaeology pertaining to the organisation of the urban constructed space. The preliminary results show that data from the conducted survey bring new information on the life-cycles of mosque architecture or on the construction of exterior urban space, contributing to the discussion on the existence and organisation of streets.

KEYWORDS: 3D scanning – mapping – spatial organisation – Swahili towns – streets – East African coast

Introduction

The East African coast is dotted with the remains of settlements of various sizes that began forming here in the late 1st millennium CE. Some of these settlements may certainly be classified as urban, featuring monumental architecture, public spaces and buildings and serving as political and economic centres in their local regions. With evidence from sites like Shanga in northern Kenya, it is known that Islam spread to the region in the 8th century CE, with stone mosques built as early as the 10th century

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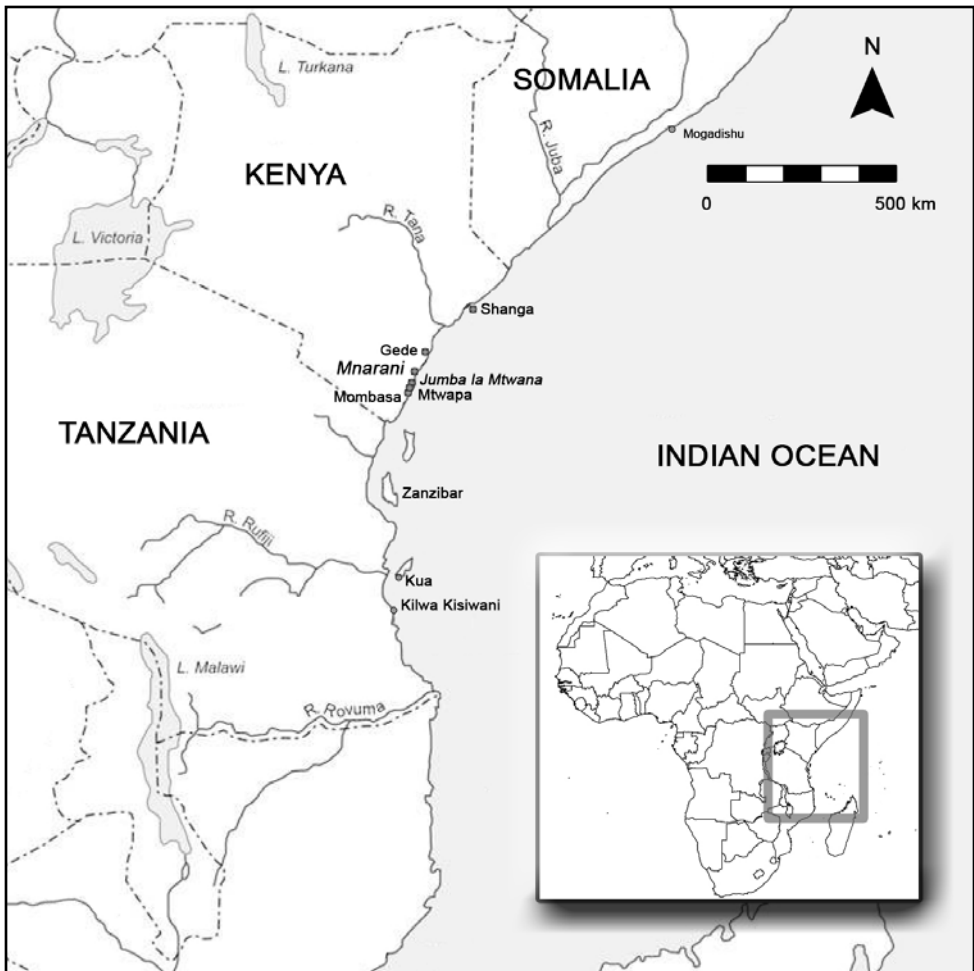


Fig. 1. A map of the coast of East Africa showing the location of the sites referred to in the text, and the two sites surveyed in 2021 – Jumba la Mtwana and Mnarani.

CE.² This chronology suggests that the urban population gradually converted to Islam along the coast³ in what is today Somalia, Kenya, Tanzania, northern Mozambique, and the associated islands and archipelagos [Fig. 1]. The coastal towns were economically focused on trade and contributed significantly to the course of global histories of the relevant historical period by participating in exchange networks of the broader Indian Ocean world.⁴ The ruins, now largely overgrown by dense coastal vegetation or hidden in the mangroves, have a romantic air about them and have been frequently visited and in some cases depicted by travellers to the coast from Europe since the colonial era.⁵

2 Horton 1996, p. 395.

3 Horton and Middleton 2000.

4 Beaujard 2012.

5 Freeman-Grenville 1962.

They were considered to represent remains of Arab towns; such a view was supported by early researchers employed by the colonial administration, who started excavations after the World War II.⁶ This misconception, proven decidedly wrong by the past three decades of research,⁷ sometimes still continues to be held by the present-day local population.

This paper reports on a survey of two of these precolonial coastal sites, Jumba la Mtwana and Mnarani. The survey was part of an ongoing research project *Urban morphological transformation in precolonial to colonial urban traditions* running from 2020 to 2022 (GAČR 20-02725Y), which has focused on comparisons of precolonial and colonial urban morphologies in several regions. Its objectives centre on analyses of the altering distribution of public buildings and spaces that may be indicative of changes in the social use and perception of urban space. The sites of Jumba la Mtwana and Mnarani, both in present-day Kenya [Fig. 1], were selected as suitable case studies of precolonial sites in East Africa. Their detailed survey with a 3D scanner and study of the data were financed by the Czech Science Foundation (GAČR) project granted to the author at the University of West Bohemia. The data collection was contracted to the Zamani team of surveyors from the University of Cape Town.

For both sites there is a lack of up-to-date plans, which would include all above-ground visible remains of walls and they have significant potential to contribute to the understanding of spatial relations on Swahili precolonial sites. In addition, both sites are located close to later towns, such as Mombasa and Kilifi, which experienced colonial and post-colonial past and their local urban histories could hence be compared.

The goals of the presented project and field survey are, in the first instance, relevant for documenting the state of preservation of the standing remains. The first serious archaeological research and excavations, undertaken in the 1950s, focused on exposing the monumental architecture on the largest of the coastal sites and mostly did not include detailed surface planning, which would have encompassed the total visible extent of the deserted settlements. Since then, the sites were re-planned to some extent every twenty to thirty years but none of them has been surveyed in the 21st century with the latest available technology. Furthermore, the project focused on producing data, which could be used as case studies to answer research questions about the spatial organisation of precolonial Swahili towns.

In terms of the built environment, the precolonial towns, dated to the period between the 11th and 16th centuries CE, featured wattle-and-daub buildings, which do not preserve above ground and the so-called coral rag 'stone' architecture. Although disregarded by early research, thanks to the excavation projects of the recent decades and application of micro-scale methodologies, research has significantly advanced on the wattle-and-daub buildings putting this type of architecture on the layout plans of the towns.⁸ However, the non-monumental stone remains, such as isolated and partially-preserved walls, rubble or features like wells, are on many sites still virtually missing from the records and as a result have not been interpreted. This is because early research focused on monumental buildings like mosques and palaces, and even their layouts are known today only from imprecise plans produced with relatively outdated

6 Such as James Kirkman, e.g. in Kirkman 1964.

7 For an overview see an edited volume by Wynne-Jones and LaViolette 2018.

8 Sulas et al. 2017.

technologies. This presented study aimed to record all identifiable stone remains as the only architectural features preserved above ground and accessible without excavation, thus complementing the existing record on the stone-built environment.

The building material specific to the East African coast, coral rag, is in fact a marine resource of organic origin and can be considered a type of limestone. It deserves attention for its specific properties. On the East African coast, it is a very common geological deposit underlying archaeological layers on Swahili sites. One type of this building material is *porites* coral, which can be carved like wood when freshly cut from the sea because it hardens as it dries. This property of the material was frequently made use of to make finer architectural features like niches, recessed archways, or inscriptions that are all widely seen on the coastal sites. It represents an important part of the architectural environment on the East African coast, however its specific characteristics can hardly be captured on layout plans. Therefore, recording elevations of buildings on Swahili sites facilitates appreciating and analysing the structures in their spatial complexity, especially when incorporating a combination of photographic views and 3D models.

Specific spatial organisation and use, as well as locally-adapted traditions of Islamic practices, have been of interest to archaeologists and ethnographers alike.⁹ Research on the precolonial social roles of the built environment and its characteristics which distinguish it from neighbouring non-Islamic settlements just a few kilometres inland as well as that in other Islamic regions, focused on, for example, the connotations of the architectural depth and positioning of individual rooms within houses, on construction technologies, or the role of mosques and tombs as the most prominent non-residential buildings in the urban environment.¹⁰

The present survey, whose initial results are presented here, builds on the studies of the Swahili built environment, and as part of the current project, also links to the past research of the author, where it focused on the remains of precolonial residential architecture on the Swahili coast, particularly at Gede, Kenya, and in some later towns of the colonial period such as Mombasa, Bagamoyo, and Mozambique Island¹¹. It is the first archaeological project on precolonial sub-Saharan Africa that is funded by the Czech Science Foundation and carried out at the University of West Bohemia. The growing interest in Africanist research in the Czech Republic and indeed in central Europe is still predominantly focused on postcolonial histories on the continent. With a focus on precolonial past and on perspectives of historical archaeology, the present project hence broadens, amongst other things, the scope and relevance of the Czech contribution to Africanist research.

Previous research

There is no written evidence on either Jumba la Mtwana or Mnarani, nevertheless both sites were frequently recorded on Portuguese maps from the 16th century onwards.¹²

9 Horton and Middleton 2000; Ichumbaki and Pollard 2021.

10 Baumanova 2018; Donley-Reid 1990; Garlake 1966; Gensheimer 2012; Horton et al. 2017; Wynne-Jones 2013.

11 Particularly Baumanova 2020; Baumanova and Smejda 2018.

12 Barbosa 1866; Kirkman 1959; Kirkman 1966; Pearson 1998.

Archaeological data hence represent the main data resource on their pasts. The sites began to be studied after World War II with the main focus on monumental structures, especially mosques.¹³

Jumba la Mtwana is the larger of the two sites. It is located close to the modern small town of Mtwapa and approximately 15 km north of Mombasa. Based on pottery chronology, the site was occupied for a relatively short timespan of a few generations, approximately falling between 1350–1450.¹⁴ Based on architectural sequence and the amount of rebuilding, both an earlier research conducted by Garlake¹⁵ in the 1960s and later by Wilson¹⁶ in the 1980s concluded that the site might have been occupied well into the 16th century. It is also possible that earlier ceramics were not identified in the 1970s excavations. For comparison, the nearby site of Jumba la Mtwapa also recently yielded much earlier dates spanning from the 11th century CE.¹⁷

Jumba la Mtwana has an interesting layout with some of the structures, including the Great Mosque, located on the beach itself [Fig. 2] below a steep but short cliff. Most of the settlement is located on higher ground on this cliff. The communication between the beach area and the rest of the settlement is mostly possible on foot across a short and steep grassy slope, with only a smaller part of the cliff running directly parallel with the mosque on the beach, where it cannot be climbed. The site continues on a flat terrain on top of this cliff with three more mosques, multiple stone houses and the remains of town walls. Only a (central) part of the site is accessible today, which is encroached on all sides by modern development [Fig. 3] – to the south-west a road separating the site from some new large estates, houses, gardens, and a public beach. To the north-west separated by another dirt road to the modern town of Mtwapa, fields and small modern houses. To the north-east by bushes and other dense vegetation beyond which there are small fields. To the south-east is the beach, where the site is encroached by the modern ‘Monsoons’ restaurant run mostly for tourists, which certainly disturbed some of the waterfront archaeological structures on the site, especially the so-called Beach Houses. The site is now a National Monument, and as such it is open to the public and its delimited extent is protected and kept clear of vegetation.

The site is located a few kilometres away from Mtwapa creek closer to which lay the earlier town of Jumba la Mtwapa, now mostly overgrown, which has been the subject of research in the recent decade.¹⁸ Some of the structures of Jumba la Mtwana were described by Garlake, who was the first to study the local architecture in detail, especially one of the smaller, domed mosques¹⁹ located beyond the extent of a now cared for part of the site. Garlake’s research is invaluable because it provides at least some idea of this building which has deteriorated now and of it, virtually nothing preserves above ground.

At Jumba la Mtwana, the first excavations were conducted by James Kirkman in 1972, who also focused on the mosques, especially on what he called the Great Mosque

13 Robertshaw 1987.

14 Kirkman 1974.

15 Garlake 1966, p. 62.

16 Wilson 1980, pp. 76–77.

17 Kusimba et al. 2018.

18 Kusimba et al. 2018.

19 Garlake 1966, p. 40, Fig. 37, 38.



Fig. 2. An aerial photo of the waterfront area of Jumba la Mtwana taken from a drone. It captures the Great Mosque by the Sea and a couple of tombs and houses. In the distance, the modern town of Mtwana is just visible.

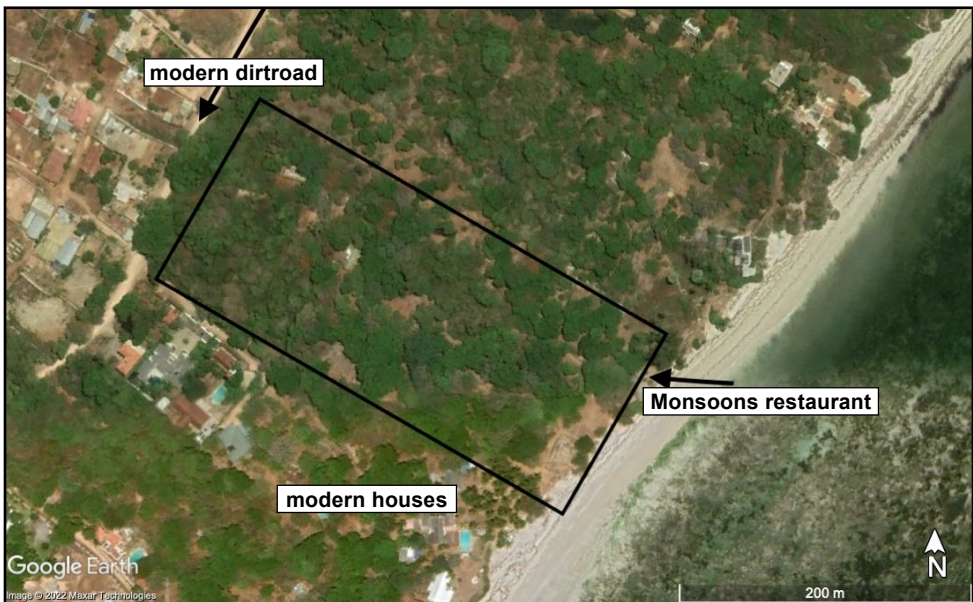


Fig. 3. A Google Earth image of the site of Jumba la Mtwana, showing its immediate vicinity. The black rectangle shows the limits of the National monument, with the actual site almost certainly extending beyond its limits on all sides.

by the Sea.²⁰ Kirkman gave such names to some of the architectural remains that formed coherent structures, and these continue to be in use and were adhered to also during the 2021 survey. Subsequently, the site was hand-drawn in 1978 by Mr Wright whose plan is held in Fort Jesus Museum in Mombasa and formed the basis of subsequent spatial research to date.²¹ Preservation of the standing remains was reassessed by Thomas Wilson who was then working as a coastal archaeologist. He still noted several interesting features which have since then disappeared including the possible existence of agricultural plots in the now overgrown western part of the site as well as tombs with some simple superstructures located by the Great Mosque just below the cliff to the north.²² Hamo Sasoon then provided an updated plan of the site and a guidebook of the ruins still available for use by visitors to the site.²³ The site then became a National Monument protected by Kenyan Law in 1982.²⁴

The second site studied in this report in Mnarani, a further 40 km north from Jumba la Mtwana and 60 km from Mombasa in the Kilifi district. This is the smaller of the two sites located close to the waterfront, which in this case is a lagoon formed by the mouth of the Kilifi Creek. Like Jumba, Mnarani is located on higher ground overlooking the lagoon from south to north. The beauty of its landscape setting suffers from the nearby presence of a Chinese loading port now open adjacent to the site [Fig. 4].

Based on the dating of the structures, finds, and inscriptions on some tombs, the site was probably occupied between the late 14th to 16th century CE,²⁵ and hence both Jumba la Mtwana and Mnarani could have been contemporary. No houses preserve above ground but there are two mosques with the truly monumental architecture of the Great Mosque, and a group of twelve tombs most of which have monumental superstructures [Pl. 1]. A short distance away, there is the Small Mosque with an adjacent structure. The terrain between the mosques is overgrown with dense vegetation and crossed only by several footpaths. Upon observation, it is evident that there were many more stone structures, whose fragmentary and low walls can be seen in the overgrowth. There was also a gate in what could have been a town wall, and foundations of a third mosque.²⁶

The site was studied and excavated in detail by James Kirkman²⁷ as one of the first sites where he worked. Peter Garlake in the 1960s, who was particularly interested in mosque architecture, produced detailed elevation plans.²⁸ The site is now a National Monument open to the public. The town was certainly much larger in the past than the extent of the preserved site today. To the west and south, the site is now encroached by modern estates and houses which have been fenced off over the last five years and therefore this area, where the site surely continued, is no longer accessible. A couple of low walls, which do not appear modern, are visible in the fenced-off private land surrounding the protected site.

20 Kirkman 1974.

21 Wilson 1980, p. 54.

22 Wilson 1980.

23 Sasoon 1980.

24 National Museums of Kenya – Where Heritage Lives on, *undated*.

25 Kirkman 1959; Garlake 1966, p. 64.

26 Kirkman 1959.

27 Kirkman 1959.

28 Garlake 1966, Fig. 19.



Fig. 4. A Google Earth image showing the location of the site of Mnarani highlighted by the black rectangle.

Hence, the data on the spatial organisation and layout of both Jumba la Mtwana and Mnarani have to date consisted mostly of hand-drawn plans, plans of elevations, and limited total station survey. Past research inherently focused on monumentality represented by the largest and unique buildings, either intentionally in the case of early research such as James Kirkman's, or predetermined by the limitations and capacity of later surveys, which focused on the more complete larger buildings. The possibility to interpret the standing walls as part of individual buildings also affected the recording, which did not include all isolated remains of rubble or low walls. The survey conducted in 2021 hence aimed to record the complete available data on all the above-ground remains, including low remnants of walls, which would provide a solid basis for subsequent enhanced interpretations of spatial relations.

Methodology of the 2021 survey

The survey, originally planned for 2020 and postponed to 2021 due to the restrictions imposed in relation to COVID-19, was conducted in cooperation with the surveyors of the Zamani Project team of the Division of Geomatics, University of Cape Town, under the permit from the National Museums of Kenya. All three institutions now own the rights to the data. Thanks to past activities of the Zamani Project team, the surveyors had extensive experience with similar planning conducted at other Swahili sites such as Gede, Kenya or Kilwa, Kua, and Zanzibar, Tanzania.²⁹

The 2021 survey aimed to conduct a detailed layout and elevation planning with the latest technology, which would result in high-resolution 3D scans, models of elevations,

²⁹ Zamani Project, 2020.

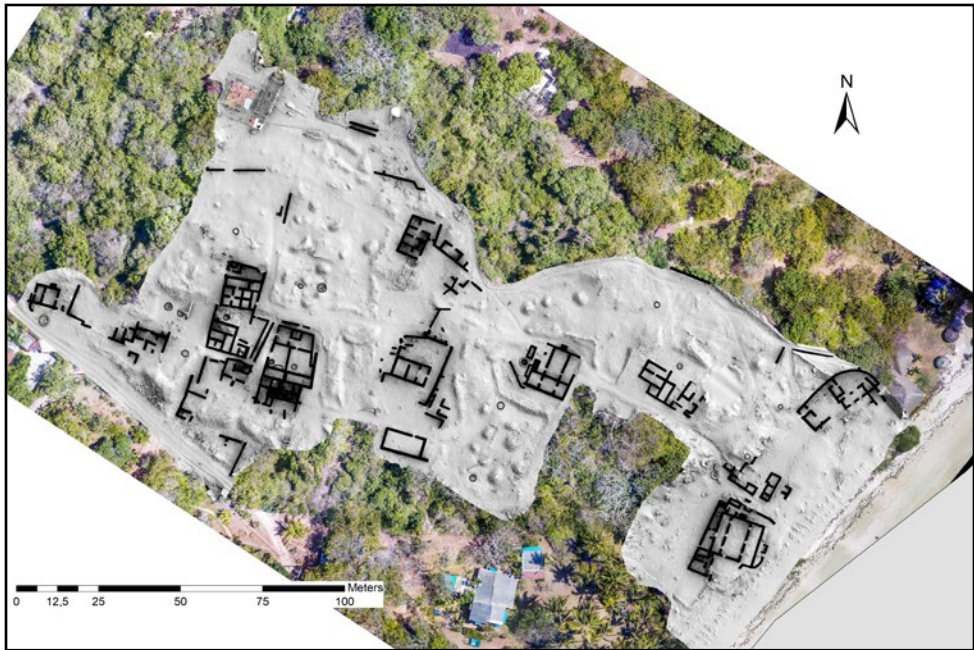


Fig. 5. A layout plan of Jumba la Mtwana including a shaded relief of the Digital Elevation Model extrapolated from the survey data, situating the preserved remains of standing structures in the local terrain. (Data source: Monika Baumanova, the Zamani team).



Fig. 6. A layout plan of Jumba la Mtwana produced on the basis of the 2021 survey. The red circles show the architectural remains not recorded on earlier plans. The buildings discussed in the text are labelled with names established during the 1970s excavations. (Data source: Monika Baumanova, the Zamani team).

and precise georeferenced ground plans. In terms of elevations, of particular relevance were architectural features with intricate inscriptions as well as decorations and remains of ceilings and windows, the preservation of which is rather unique on the coast. As for the ground layouts of stone remains, the sites have never been documented in such detail, including free-standing remains of low walls, rubble, or wells, which are all highly relevant for the planned further inquiry into the spatial relationships in the past towns.

A high-quality 3D scanner Z+F IMAGER 5010X was used for the goal, with a data acquisition rate of 1.016 million pixels per second and a completely encapsulated rotating mirror. This model has a vertical field of view of 320° and horizontal field of view of 360°. The scanner was used to get a complete 3D model of the site, including the outside and the inside of each standing structure. The complete coverage of the preserved and accessible extent on the larger of the two sites, Jumba la Mtwana, also facilitated the mapping of the terrain [Fig. 5]. This was not possible at Mnarani because of dense overgrowth encroaching on the site.

Some aspects of the survey were complicated by vegetation cover, which on Swahili sites usually consists of mangroves by the waterfront, bushes, and multiple kinds of tropical trees including palm trees disturbing or growing in the architectural remains. The survey was only possible because both Jumba la Mtwana and Mnarani are continually managed by staff from the National Museums of Kenya and open to the public, hence vegetation overgrowth is controlled within the protected extent of the sites and the waterfront is kept free of mangroves. The sites could hence be photographed in full to allow the representation of the models in colour and to document the real outlook of the sites. Aerial photos of the sites were taken with a drone, but the relevance of these photos was predetermined by the density of the tree canopies. It was especially the layout of some of the structures by the ocean at Jumba la Mtwana that could be captured quite well from the air [Fig. 2].

As a result, detailed plans of the sites were produced. In case of Jumba la Mtwana, the new layout plan produced in 2021 shows how the previous planning conducted between the 1970s and 2000s has now been complemented with 3D scanning. In particular, the site plan gained new details of solitary standing walls and pilasters, especially to south of the site [Fig. 6]. The new layout plan of Mnarani revealed the respective positioning of the two preserved building clusters [Fig. 7] – the Great Mosque and the associated group of tombs as one and the Small Mosque and the abutting structure as the other, which were previously planned by Kirkman as isolated buildings.³⁰

The increased detail in recording also showed how the structures were distributed in the terrain and respective to the waterfront. The resulting 3D models, which are being prepared by the Zamani team to make a virtual tour, can be zoomed in and out with a greater level of depth compared to photographs. On the basis of altering the perspective of the viewer, 3D scanning allows various kinds of studies to be undertaken in the future, such as the planned analyses of the sensory experience of the site. Without physical presence at the site, various aspects of the environment may be assessed using qualitative and quantitative analyses presenting a useful laboratory for repeatable experiments in the architectural environment.

30 Kirkman 1959.

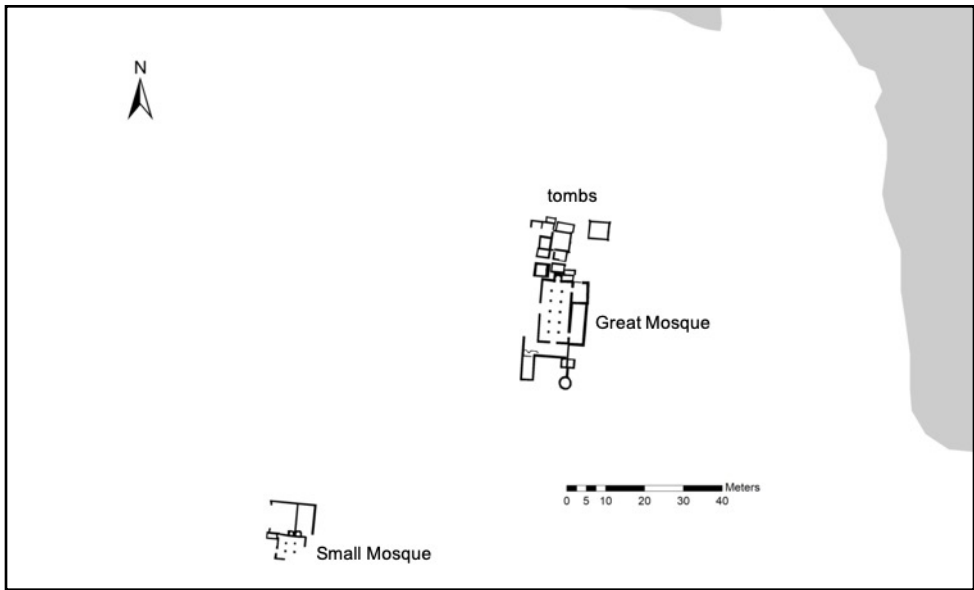


Fig. 7. A layout plan of Mnarani produced on the basis of the 2021 survey. Two buildings are labelled with names established during early research. (Data source: Monika Baumanova, the Zamani team).

Discussion of specific architectural features

Although it was not the primary goal of the present research, the survey revealed interesting features pointing to the frequent rebuilding and alterations undertaken on the structures. This is especially interesting because the ground layout of the buildings need not have been changed while the positioning of doorways and windows did, thus introducing features, which may have significantly altered the manner of movement and the experience of a building. This is apparent for example in the case of the Great Mosque by the Sea whose preserved layout shows that its southern doorway was built, then blocked, and then rebuilt just next to it and then blocked again [Pl. 2]. This chronology was confirmed by Kirkman during his excavation of the mosque.³¹ Considering that the site was occupied for less than a hundred years, and hence used only by a few generations, the repeated alterations of the stone buildings are rather interesting. Based on the survey data, these will be studied in detail in the process of the analysis.

In terms of religious architecture, analysis of the survey data may also contribute to the understanding of the layout of various features associated with the mosques. The Central Mosque, for example, has a window in one of the side bays, whose preservation is rather a rarity on Swahili sites. Such features recorded on the 3D model will be used for modelling access of light to the mosque [Pl. 3], as it has been done in European and Asian urban case studies.³² Another example of features worthy of further study are small structures sometimes found next to one of the minor mosques. At both

³¹ Kirkman 1974.

³² Shepperson 2017.

Jumba la Mtwana and Mnarani, these structures were found adjacent to the so-called Small mosque. These were usually discussed as houses.³³ However, they might have also served a public function such as *madradas*, i.e. Islamic schools. The role of these structures needs to be assessed with comparative spatial analyses.

The present survey also facilitated the documentation of the elevations of tomb superstructures. Both sites discussed here feature tombs with inscriptions and at Mnarani there are multiple such tombs. Their decorated tombstones were still reported in the 1920s³⁴ but have since mostly disappeared. The tomb at Jumba la Mtwana, positioned just to the east of the mihrab of the Great Mosque, features an inscription of the Koran *sure* III 185 [Pl. 4] which speaks about the elusiveness of the earthly life.³⁵ The inscription is carved in an oblong plaque. The tombs at Mnarani feature multiple carved features, including tombs with an inscribed plaque, carved bosses, and multiple niches. Recording the current state of preservation of these tombs in 3D and within their spatial setting is important for both heritage management and research. For this purpose, copies of the 3D models have been made available to the National Museums of Kenya.

The exterior space has been an important theme in Swahili archaeology in recent years.³⁶ Although it has been argued that open spaces at Swahili sites along the coast served congregation, ceremonial, or commemoration purposes, streets as linear features channelling movement in a defined two-way direction have mostly been disregarded or their existence undiscussed for lack of evidence. Nevertheless, Jumba la Mtwana shows evidence of preserved portions of a street network in some parts of the site [Pl. 5] and is currently being studied in follow-up research of the author.

Last but not least an interesting feature is the positioning of wells at Jumba la Mtwana. The spatial distribution of wells has not been previously recorded while it has been argued that the site was chosen for occupation because of the abundance of fresh water. In this context, the relatively high number of wells next to every building stands out and it is one of the questions now analysed, considering comparisons with other Swahili sites.

Conclusion

This paper presented the initial results of a survey on Swahili sites of Jumba la Mtwana and Mnarani in Kenya. As such, it highlights the benefits of collecting high-resolution data on the layout and elevations of architectural remains at sites on the East African coast. Such data are a useful reference point for heritage management and research, capturing the state of preservation and conservation of the monuments at any given point in time, which can be used for review in the future. The presented survey significantly complemented existing plans for the two sites, recording previously unmapped walls, features like wells, and evidence of rebuilding or alteration of some structures, which may all be used for detailed analysis of spatial configurations of the stone buildings in these towns and their transformations. The resulting 3D models also have a potential as virtual reality, which can be used with various software, for presenting the site from new perspectives at the local museum or to (remote) visitors.

33 Kirkman 1974; Wilson 1980.

34 Kirkman 1959, p. 99.

35 Wilson 1980, p. 59.

36 Fleisher 2013.

Follow-up surveys undertaken in the future should focus on other precolonial sites, which could bring complementary data for comparison. Of particular interest would be the sites in close vicinity of the surveyed deserted towns – in the case of Jumba la Mtwana, it is Jumba la Mtwapa, and in the case of Mnarani especially Kilifi and Kitoka³⁷ that might have formed a larger nucleated township with Mnarani in the past.

In terms of research, African architectural heritage has been gaining attention as a valuable resource in global considerations of urbanism.³⁸ Likewise, for advances in broader research themes involving the role of urban street networks and transformation of urban space over time, it is imperative that detailed plans of a variety of African sites are produced and updated. The results of surface mapping and surveying can be complemented with data on wattle-and-daub architecture and practices taking place in the houses obtained from research involving excavations.

As for the continuation of the presented survey and research, the author is planning to undertake spatial analyses that will mainly focus on considering regularities in the layout and configuration of various architectural features and building types on these sites. Currently, the data are being incorporated in comparative analyses with precolonial Islamic towns in other regions, as part of the running research project. In the course of preparation for the following years, there are several studies planned specifically on the distribution of streets and wells, and on the sensory characteristics of the documented built environment.

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37 Wilson 1980, pp. 84–87.

38 Breen 2007; Brunn et al. 2020.

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Pl. 1. Some of the tombs with superstructures at Mnarani.
(Photo: Monika Baumanova).



Pl. 2. A 3D model of the Great Mosque by the sea at Jumba la Mtwana, showing the wall with evidence of repeatedly changed position of its southern door. In the last occupation phase, all past doorways were blocked. (Data source: Monika Baumanova, the Zamani team).



Pl. 3. A 3D model of the Central Mosque at Jumba la Mtwana with a preserved window. (Data source: Monika Baumanova, the Zamani team).



Pl. 4. A 3D model of a tomb with an inscription plaque at Jumba la Mtwana.
(Data source: Monika Baumanova, the Zamani team).



Pl. 5. A street by the House of Many Doors at Jumba la Mtwana. (Photo: Monika Baumanova).