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*Archaeology of the built environment and
urban space on the East African coast
(11th – 19th century CE)*

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Introduction

The East African coast is a region with rich cultural heritage, and archaeological research in this part of the world is immensely important because of its potential to bring insights into globally relevant themes such as urbanisation, social dynamics and power negotiations in context with Islam, inner mechanics of trade networks, and effects of modern colonialism. All of these themes have played a key part in the coastal histories throughout the last millennium, and understanding most of them is not possible without analyses of archaeological data and the coastal material culture. The *longue durée* perspectives associated with the insights of archaeology are unique in their scope, as history and ethnography offer substantial data only for the last few centuries, while in turn these disciplines continuously provide new impulses and questions for archaeology. It is becoming increasingly recognised that archaeology is highly relevant in an interdisciplinary effort to understand the causalities of long-term urban development or human-environmental interaction (e.g. Fisher and Creekmore 2014; Christophersen 2015), and the research presented here has aimed to contribute to these debates on the East African coast, as well as to some broader themes in the study of African and global pasts.

The region, also known as the Swahili coast, extends for approximately 3,000 km from what is today southern Somalia, across Kenya and Tanzania to northern Mozambique and Madagascar, and includes numerous small islands along the coastline (Fig.1). The coast began to be studied archaeologically relatively early on after the World War II. This quickly revealed that the narrow strip of land with a distinct character of natural environment supported an equally specific culture. The architectural remains that often preserve as standing structures, especially the monumental remains of



Fig.1 Relief map of Africa showing the region of the Swahili coast.

stone buildings, attracted the attention of early researchers and motivated the first surveys and excavation campaigns. The study of the built environment therefore represented a key focal point from early on in the research of the region. However, the almost exclusive focus

on excavation and documenting the monumental buildings that long characterised Swahili archaeology, frequently without local contextual data and along with an accent on imported ceramics and material culture, resulted in interpretations held until late in the 20th century, that numerous Swahili cultural phenomena including architecture were imported from the Middle East. However, more recent research explored broader avenues of theoretical concepts and brought new data, recognising the African origin and cosmopolitan nature of the Swahili society throughout history (for an overview see e.g. Wynne-Jones and LaViolette 2018). Still, the Swahili built environment has not been exhaustively studied and lacks large-scale analytical reviews, even with regards to the structures of stone that represent only part of the past constructed landscape of the towns. This may also be because Sub-Saharan Africa has long served as a popular source of ethnographic parallels for archaeology, which resulted in a perception of its societies as unchanging, perhaps reminiscent either of European prehistory or the Islamic Middle Ages (for a critique see e.g. Lane 2015; Garlake 2002). In the recent decades, the ever-broadening range of theoretical perspectives and analytical approaches influencing archaeology for example in Europe, have found their way to the research on Swahili pasts.

The author's contribution to archaeology on the Swahili coast has addressed the above-mentioned gaps in research, especially in terms of collecting more data and providing analytical reinterpretations. It hinges on examining the stone-built architecture and urban space, highlighting and studying its locally specific features and social connotations as well as the roles the built environment played in socio-spatial dynamics, and aspects of dwelling, power, or identity. It carries relevance for reviewing various models of urbanism and housing applied in the archaeology of Africa and the Islamic world. The achievements of the author's research on the Swahili built environment presented here centre on advances made in generating new primary data in survey and documenting of the preserved built environment on the Swahili coast, introducing and adapting new approaches to the study of space and built environment into Swahili archaeology, establishing classification of standing remains of precolonial stone houses and palace-complexes as well as introducing the theme of sensory archaeology to the interpretation of Swahili architecture and spatial analyses. In addition, the presented research links precolonial Swahili archaeology with the study of heritage dated to the colonial period, that has long stood aside the range of disciplinary enquiry.

1 The archaeology of buildings on Swahili coast and the current state of research

The East African coastal landscape is relatively varied and distinct from the savanna that begins to characterise the region just several kilometres inland. There are tropical coastal forests with a different representation and distribution of vegetation species, patches of dry grassland, as well as marshland and floodplains. On the shoreline, lagoons are very common, and sandy beaches alternate with mangrove forests (Fig.2). Sandy beaches and mud flats turn into shallows with seagrasses and coral patches on the seabed that several hundreds of metres from the shoreline rise up as a coral reef, beyond which the seafloor descends sharply (Richmond 2011). The presence of coral is extremely important for life on the coast, as it affects the character of marine life and the potentially available resources, has an impact on navigation when approaching the shoreline, and represents a building material used widely along the coast. Fossilised coral was used in the form of building blocks for centuries, while *Porites* coral was cut fresh from the ocean and used for more delicate building features (Pollard 2018).



Fig.2 A view of the coastal landscape, north of Mombasa, Kenya. (Photo by the author).

The roots of a culture that became known as Swahili and that are tied closely with the coast were gradually pushed back as research progressed and more data became available. The currently recognised timeframe begins in the late 6th or early 7th century CE, if the date of first settlements is to be followed (Horton *et al.* 2022; Kusimba 1999) and coincides with the

appearance of the Triangular Incised Ware, a category of ceramics typically associated with the precolonial Swahili along the coast. Dating and definition of Swahili culture in archaeological literature largely depend on the importance ascribed to two determinants – association with coastal lifestyle in terms of subsistence and economics (Fleisher *et al.* 2015) and a characteristic built environment with rectangular buildings located most often directly on the waterfront (Gensheimer 2018). The first constructed stone buildings on Swahili sites are mosques that link the Swahili to Islam, and likely post-dated an earlier mud-and-thatch building tradition. At some sites, like Kilwa Kisiwani, Tanzania, stone mosques began to be constructed at the end of the 10th century CE (Horton *et al.* 2022), although Islam as such most likely appeared on the coast several centuries earlier. By the 11th century, stone buildings were represented all along the coast.

Geographically, the East African coast is characterised by numerous small islands and archipelagos that are spread out close to the coastline. The waterfront with its beaches and lagoons offers frequent opportunities for anchorage. This factor, combined with the monsoons that are typical for the local climate, supported the development of trade networks first along the coast and then reaching all the way to India and China at the peak of long-distance trade during the 2nd millennium CE (Pradines 2019). Maritime trade with East Africa might have much deeper roots in the past, encompassing ancient Egypt and Rome, as attested in the written records. The most important of historical sources are *Periplus of the Erythraean Sea*, is dated to the 1st or 2nd century CE, that mentions the legendary town of Rhapta, whose location has never been firmly ascertained but may have been as far south as southern Tanzania, and Ptolemy's *Geography* that speaks of the coast as of Azania (Freeman-Grenville 1962). Written records give navigational instructions and refer to the role of East Africa in trade along the rim of the Indian Ocean. The writings of the traveller Ibn Battuta from the 14th century and the recorded Chinese voyages of the 15th century gave navigational instructions and listed a variety of trade goods. This initially underlined the accent on overseas trade in most archaeological research, while local production and trade with inland Africa became only recently seriously studied and recognised (Wynne-Jones 2016; Walz 2017). Beyond providing the economic impetus for growth, trade likely also played an important role in construction activities, because building was associated with individual and group status, an atmosphere of mercantile competition, and, by extension, establishing and actively managing social networks.

The era of growth and far-reaching contacts is recognised to fall between the 13th and 15th centuries, during which the importance of Islam, trade and the ocean-oriented lifestyle intertwined. In this period, the towns that probably functioned as city-states (Sinclair and Håkansson 2000) were internationally known and became major trading powers in the Indian Ocean world. The built environment increasingly incorporated stone-built features. Stone mosques were associated with often rather monumental stone tombs. Gradually, stone houses of various sizes became more common in the urban environment as well as a variety of other stone-built features such as town walls and wells (Fig.3).



Fig.3 A view of the coastal town of Jumba la Mtwana, Kenya, showing the doorways of the house block with lamp niches. (Photo by the author).

The preserved building tradition, especially the architectural features and monumentality of mosques, was reminiscent of the Middle East, and as it has been stated above, in early research this was used to support the claim that Swahili architectural knowledge and achievements were imported from Arabia. There are however, multiple aspects that distinguish the Swahili built environment from other Islamic regions. One is the innovative use of local building material that the Swahili stone architecture employs, known as coral rag, which is a type of limestone of organic origin. This material facilitates the use of

some unique architectural features. In particular, the carving of the *porites*, one of the varieties of coral, which is possible when the material is still wet from the sea, is reminiscent of wood-carving and is associated with some decorative features typical for the region. It was used in elaborate decoration of doorways and tombs, but also contributed to creating unique conditions for sensory perception, such as shaping the visual and aural landscape, which also distinguishes the Swahili society in the Islamic world of the last millennium.

The structuring of houses is another aspect of the built environment unique to the coast, as this is not directly reminiscent of other predominantly Islamic regions. Stone houses from this period preserve in various sizes with 3-10 rooms and open-air courtyards. From the study of the larger sites it is apparent that the houses were built in various spatial settings, as solitary-standing or in blocks. There were also structures known as 'palaces', that represent complexes of approximately 30-50 rooms. The relevance of spatial structure for the organisation of social relations and power negotiations, including a classification of houses and palace-complexes, has been one of the key aspects of the author's research presented here. Yet another important perspective on the Swahili built environment offers the study of tombs. One type of stone tombs, known as pillar tombs, is unparalleled in their appearance with other regions that were in contact with the coast in the precolonial period, and the significance of their social role may be assumed on the basis of their popularity in the region and placement at socially important locations in and outside the towns.

In order to enhance our understanding of the unique aspects of the Swahili built environment in the Islamic world of the 13th-15th centuries, the author's research presented here has employed comparative analyses, methodologies like space syntax and network analysis, and concepts of sensory archaeology to study in depth some of the constructed features that helped to define the precolonial Swahili. Some of these approaches, especially space syntax and sensory archaeology were introduced by the author to the Swahili coast, where they incorporated analyses of the sensory properties of coral stone as a building material, movement and the connotations of layout of the built environment for perception and potential social role of various urban spaces.

The arrival of the Europeans in the late 15th century demarcated a period of decline for many settlements. In the late 17th century, Swahili rulers allied with the Omanis against the increasing military-backed efforts of the Portuguese to control the coastal settlements. This demarcated an era of Omani colonialism in some towns on coast, while others like

Pangani and Bagamoyo witnessed power shared between Omani and European colonists (Ichumbaki and Pollard 2021). The formal establishment of German and British colonies of the 19th and 20th centuries signified some new urban development, targeting especially the waterfront as part of the European colonial focus on development of transportation networks and on towns with deeper ports (Demissie 2012). This had reverberating effects on the structure of Swahili towns, on building material, layout and character of individual houses and urban quarters.

However, research has been rather artificially divided in terms of its temporal focus between the precolonial period, the ultimate subject domain of archaeology, and the colonial period, which has been focused on by historians, architectural historians and ethnographers. With regards to the local pasts as reflected in the built environment, this break in research has an unfortunate impact on making use of relevant archaeological research for providing important insights on urban development. The research of the author addressed the issue, aiming to broaden the range of architectural and historical studies (Meier 2016; Demissie 2012; Kamalkhan 2010) by discussing the continuity and changes associated with the precolonial to colonial transformation, abandonment of settlements and establishment of new towns, or the effects of colonial development on the distribution of public spaces in existing towns (Baumanova 2022b). This feeds into the need to incorporate the heritage of colonialism into archaeological research and analyse the long-term urban trajectories (Rhodes 2014).

In terms of archaeological heritage management there are limited opportunities for excavation on many of the sites of past towns. Archaeological deposits had frequently been excavated in the period of early research in context with the largest sites and their stone buildings. Furthermore, many of the architectural remains are endangered, and even with conservation they are exposed to the elements and subject to gradual deterioration. In this context, non-destructive approaches that facilitate the enhanced documentation and study of stone buildings become all the more important. The author has specialised in non-destructive survey, addressing some of the acute problems facing this arena of research in Swahili archaeology. Currently, only a small proportion of sites have been studied in high-resolution, employing methods like 3D scanning. Some more sites, but still a relatively small proportion of precolonial Swahili sites have been planned, but the study of the preserved built environment has long relied on two-dimensional plans. On sites that were planned with a total

station or on hand-drawn plans, isolated walls or very deteriorated remains were often omitted from survey, and the majority of sites with some preserved remains still lack archaeological survey. In her research, the author generated new high-resolution data on some of the Swahili sites and conducted analytical and comparative studies of standing buildings employing data from numerous sites from along the coast. The author has aimed to establish a classification as well as highlight underlying patterns in the Swahili built environment that may have played a significant part in past social life of the towns. The following text will discuss the contribution of individual published papers in relevant international archaeological journals, and it is divided thematically addressing the themes highlighted in the author's research.

2 Survey and collection of new primary data

The early history of archaeological data collection is associated with several names. James Kirkman was the first archaeologist who intensively worked on the excavation of some of the largest and most monumental Swahili sites, especially in Kenya, like Gede, Ungwana or Mnarani (Kirkman 1954; Kirkman 1957), for which he produced some of the first layout plans and documented the preserved mosques and tombs. Even in his later works he remained convinced that Swahili architecture was a product of implanted Arab culture that arrived to the coast from the Middle East and largely defined the greatest achievements of the local material culture (Kirkman 1964; Kirkman 1975) - a claim that was widely disproved by later studies and with enhanced chronologies. In the early decades, research on Swahili architecture was greatly advanced by the work of Peter Garlake, who originally worked with Kirkman, but following his own line of enquiry and focusing on the architecture of stone mosques, he pioneered the thought that Swahili culture is indigenous to Africa (Garlake 1966). Garlake established the first comparative collection of mosque layouts and elevations, on the basis of which he was able to define some characteristic differences between the architectural features on the northern and southern part of the coast. One of the most important Swahili sites is Kilwa Kisiwani in Tanzania, which was first extensively studied by Neville Chittick (Chittick 1974). The site has played an important role in establishing the chronology on Swahili settlements, which updates continue to carry relevance for the entire coast (Horton *et al.* 2022).

An important milestone in research on Swahili housing and urbanism was represented by opening up the debate on the built environment as a complex spatial entanglement, that included buildings as well as (open) spaces. This theme was pioneered in a large-scale study of the site of Shanga, Kenya (Horton 1994; 1996), and more recently elaborated in analyses of open spaces and the housing context at Songo Mnara, Tanzania (Fleisher 2013; Fleisher and Wynne-Jones 2012). High-resolution recording and foot surveys encompassing multiple sites and their vicinities, such as at Mtwapa and Gede (Kusimba *et al.* 2018; Pradines 2010), further highlight the importance of understanding the construction of both the buildings and open spaces.

The listed selection of some of the most influential research that was conducted on the Swahili coast further suggests that while stone buildings were the major focus of early research, later studies mostly aimed to add context by addressing the urban practices that might have been associated with the interior and exterior of the buildings. Urban archaeology gained new data from research that employed innovative technologies such as geoarchaeology and soil analyses at Songo Mnara (Sulas *et al.* 2017). In the process, individual sites, mostly those where large-scale projects were conducted, were planned with modern technologies, especially 3D scanning. These sites are still too few, especially for conducting comparative analyses. As these represented one of the key parts of the most recent research project of the author, financed by the *Czech Science Foundation*, the author conducted a study in collaboration with the University of Cape Town, South Africa, and the National Museums of Kenya, which represented the first archaeological project on the Swahili coast financed and led from the Czech Republic.

With the goal to complement the existing published collection of high-resolution data on Swahili precolonial architecture, the author focused on mapping combined with field foot survey of the built environment on several sites, with the potential for subsequent spatial analyses, as well as the classification and analytical description of the standing remains. The survey results at Jumba la Mtwana and Mnarani, both in Kenya, which occupation is dated approximately to the 14th-16th centuries CE was published in the paper *Survey and analysis of the architectural heritage at Jumba la Mtwana and Mnarani* (Baumanova 2022a), in the *Annals of the Naprstek museum*. The paper presented the results of the 3D scanning, aerial photography and photogrammetry survey of standing architecture, which for the first time encompassed all visible remains of standing structures including heavily damaged walls and

isolated remains of rubble as well as the present-day terrain relief on the site of the past town. The data shows how important such survey is in context with heritage, which is today frequently protected by national law and/or UNESCO. The new level of detail and spatial analysis of the remains facilitated an enhanced understanding of the number and layout of the houses on the site, and the potential underlying logic in the distribution of buildings and the town wall. The high-resolution of data facilitate modelling the urban landscape, monitoring the current state of preservation of some the more delicate carved features and inscriptions, with an added value of increased accessibility for the public. The data were shared with the National Museums of Kenya and the current plans include production of videos for the local Youth Heritage Hub.

The data from Jumba la Mtwana also served as a case study in another paper of the author that discussed water management and potential roles of water on the site. The study on *The element of water in the built environment on the precolonial Kenya coast* published in *Land* (Baumanova 2023) aimed to resolve the question how the inhabitants of Jumba la Mtwana sourced freshwater for the town, and where/in what context the element of water was encountered in the built environment. In particular, it focused on explaining the exceptionally high number of wells per hectare compare to other known precolonial sites, and concluded that it cannot be explained by a practical need only. Even for wells that were located in the exterior, publicly accessible spaces, drawing water from them might have been limited by social rules, and access to them associated with specific activities, seasonality or household(s). Water management was also studied by archaeologists on sites like Gede and Songo Mnara (Wynne-Jones and Fleisher 2014), and the author's research on the basis of data from Jumba la Mtwana therefore complements the existing knowledge with another case study on how water supply and presence of water were managed in the relatively arid environment on the precolonial coast. The study also considered water in terms of sensory perception and the role water containers. Building on other studies in archaeology (Petek-Sargeant and Lane 2022), the presented paper of the author on urban of water in the context of precolonial built environment makes archaeology on the coast further relevant for informing present day development. Cooperation with local institutions planned by the author on future activities should further lead to creating larger comparative datasets and their assessment for the coming years.

3 Spatial and comparative analyses

The developmental trajectory and indigenous origin of the Swahili built environment, including aspects of continuity and change in its characteristics, is well-apparent in the building material used, which attests how the early mud-and-thatch origins of the local tradition were later complemented with the use of coral stone, while neither material went out of use in the precolonial or any later period. The unique character of Swahili architecture is also detectable in the spatial structuring and complexity of the building layout. On the basis of configurational analyses that study the mutual positioning of rooms, orientation of buildings and distribution of various spaces, it may be derived that Swahili built environment is unique both in the context of East Africa as well as in the Islamic world.

An important step in the early study of architecture was its description and definition, to which Peter Garlake contributed perhaps the most (Garlake 1966). Although the description of architectural features later accompanied most surveys and excavations conducted on the coast (e.g. Horton 1996; Pradines and Blanchard 2015), the first attempt at classification can also be attributed to Garlake (Garlake 1966; 2002), who highlighted some patterns in the design of buildings and in their orientation. Data collection facilitated further classification and comparative analyses for the precolonial period, and this was greatly aided by the surveys of Thomas Wilson, who, for example, first assessed the data on the accuracy of mosque orientation to Mecca, or the character, size and distribution of tombs on northern Kenya coast (Wilson 1979). In terms of the size of settlements, an initial quantitative comparative analysis was published in the 1980s and argued that settlements may be classified based on their size and the represented buildings (Wilson 1982). Since then, more recent studies have usually focused on the context of a single site providing data on the chronology and use of individual buildings (Horton *et al.* 2017).

The early interpretations of the use of individual house rooms/spaces, which were based on isolated finds, may now be reviewed thanks to convincing evidence on specific situated practices (Wynne-Jones 2016). Alongside this stream of enquiry, spatial and comparative analyses of the configurational aspect of the built environment, considering intra- and inter-site variations and similarities become of key importance for understanding how social space was constructed, and how preferences changed over time. The research of the author presented in this section was focused on the latter goal, employing the approaches to the built environment pioneered in European contexts and in the Americas, aiming to

provide an enhanced understanding of the role of constructed space in negotiating social relations (Morton *et al.* 2012; Smith 2011; Steadman 2015). For this goal, the author reviewed and analysed a range of data on stone houses, palace-complexes and pillar tombs.

3.1 Houses and palace-complexes

The Swahili house has for decades been an object of interest for archaeologists and ethnographers alike. Building on the fact that the layout and some remains of precolonial houses preserve to the present, the two disciplines have sought mutual reflections and potential parallels. The most influential studies, published in context with the growing influence of structuralist and post-processual approaches in archaeology, were the studies of Linda Donley-Reid, who strived to interpret underlying social meanings in the layout of preserved precolonial Swahili houses on the basis of studying the houses in the living historical town of Lamu, north Kenya (Donley-Reid 1990; 1987; Donley 1982). In her research, Donley-Reid argued that the layout of the house is based on the principle of gradually increasing privacy associated with the organisation of the house rooms in the town of Lamu, which were arranged lineally one behind the other from the entrance to the back of the house. This concept was later subjected to criticism, for its heavy reliance on ethnographic parallels from the (post)colonial era, and for their direct application on archaeological data (Fleisher 2015).

The author examined the layout of precolonial houses on Swahili sites in two papers, aiming to contribute to the debate on the underlying social meaning of Swahili residential buildings of the precolonial era with an analysis based on spatial data. Both papers of the author build on space syntax and network analysis, which were therefore used for the first time in archaeology of the East African coast. Space syntax originated in the field of architecture in the 1980s (Hillier and Hanson 1984), but since then has been widely applied in archaeology from the Americas across Europe, West Africa to Asia and in contexts ranging from prehistory to the modern era (for a review see Fladd 2017; Smith 2011). Network analysis found its way to archaeology in late 2000s (e.g. Knappett 2011). While building on some principles similar to space syntax, its main advantages are the focus on links connecting individual nodes (e.g. rooms) in a given spatial system and the capacity to quantify the relative strength of these communication links.

The paper published in *Azania: Archaeological Research in Africa* examined the *Structural dynamics of spatial complexity at the 'Palace of Gede'*, focusing on a palace-complex

that developed in three stages over approximately 150 years on the precolonial site of Gede in Kenya (Baumanova and Smejda 2017). It reflected on the configuration of rooms, how this predetermined possible movement around the palace-complex and on how this potentially correlates with the use of rooms determined on the basis of finds recovered during the early excavations of the building conducted in the 1950s. The paper interconnected the analysis conducted on spatial configuration with an assessment of inter-visibility between spaces within the structure based on the alignment of doorways, which has also been highlighted as potentially important in ethnoarchaeological research by Donley-Reid (Donley-Reid 1987; 1990; Donley 1982). The results of the paper assessed the capacity of various parts of the palace-complex for privacy and foreshadowed the potential importance of small stone houses with 3-5 rooms for the construction of grand houses and palace-complexes, which still respect the same principles of layout, as well as courtyard and doorways positioning.

This was further confirmed in the second presented paper, *Space as Material Culture: Residential Stone Buildings on the Precolonial Swahili Coast in a Comparative Perspective* (Baumanova and Smejda 2018), which also established the first classification of stone houses and palace-complexes on the basis of their size, with respect to the number of rooms, entrances and open-air courtyards. For this purpose, an enhanced visualisation of spatial data and space syntax graphic representations was presented in the paper. The analyses also assessed the capacity of the houses for fulfilling roles associated with trade. Thanks to the character of trade, Swahili precolonial towns were likely rather cosmopolitan places. The northeast monsoon that brought merchants to the East African between November to March, predetermined that they resided on the coast until the southeast monsoon between May to October allowed voyages back to Middle East and Asia. Written evidence confirms that merchants were accommodated in Swahili houses during their stay on the coast, and that the Swahili used this strategy to secure access to trade deals (Alpers 2014: 40). The importance of the houses for trade seems to be further suggested by the fact that no markets have been identified archaeologically in context with the precolonial towns. The analysis presented identified spaces within the houses where the visiting merchants could have been accommodated, arguing that these were proportionately better defined in larger houses, where they could have represented special housing units.

3.2 Stone tombs

A very specific feature of precolonial Swahili towns are pillar tombs, that from early on helped to distinguish the Swahili urban environment from other Islamic contexts (e.g. Kirkman 1964). Pillar tombs are a type of stone tombs with 3 - 8 m tall pillars and they were built particularly in the period of the 13th to 16th centuries. Pillar tombs likely had social relevance, as they were placed next to mosques and on cemeteries outside the towns, but also centrally among residential structures, next to houses and on the publicly accessible urban spaces, as well as privately on the interior courtyards of the larger stone houses. The paper on *Pillar tombs* (Baumanova 2018) published in the *Archaeologies* journal classified the details on approximately 50 Swahili sites with stone tombs, including dating for the relevant sites and information on the number and description of recorded pillar tombs. It was the first archaeological paper dedicated to reviewing the fragmented state of knowledge on the theme and its goal was to establish whether the pillar tombs were concentrated in any section of the coast and how their appearance varied from site to site. While in this respect no pattern was identified in the data, the distribution of pillar tombs along the 3,000 km of the coast and their placement in the urban space suggest that they might have played a role for establishing a shared Swahili identity among the coastal city states. The highly visible pillars and the decorative features used on them linked the tombs with houses, in particular the decoration used on doorways, and suggest their potential use to claim space and ancestry in a given town. The author's interpretation and review of collected data from a range of sites provided a basis for further studies of tomb placement, such as at Kua, in Tanzania (Christie 2019).

3.3 Precolonial to colonial transformation – archaeology of urban social sustainability

The precolonial urbanism that had developed on the East African coast for 6 centuries at least, was heavily impacted by the era of modern colonialism, as it is apparent from the abandonment of settlements, their transformation and establishment of new ones. Archaeology, with its material culture-oriented perspectives and long-term scope, is ideally positioned for the assessment of the effects of both Omani and European colonialism on the Swahili coast. The study of change in the organisation and configuration of urban space provides clues on how the potential for social use of the towns and the capacity to serve a range of communal purposes was transformed. It is well-attested by numerous archaeological, historical and anthropological publications that deal with urbanism, that the

character of a street network, distribution of public buildings and open spaces carry these social connotations (e.g. Low 2016; Hansen 2000; Sinclair *et al.* 2010). On the basis of these principles, for example, Islamic towns are generally defined as featuring narrow winding streets, relatively few open spaces and by an accent on spatially manifested privacy (Abu-Lughod 1987; Satō 1997; Milwright 2010).

The inner organisation of towns in terms of urban quarters is another important concept. In the Islamic world, residence in individual quarters might be associated with group membership based on ancestry, ethnicity, or occupation. Especially in West Africa, this theme is linked with dual urbanism, where archaeological data confirm that some towns developed from two cores, and the two parts of the town may be divided along religious or occupational lines (Holl 2006; Insoll 2003). An important role of urban quarters was also suggested for the Swahili site of Shanga in Kenya, where it was argued that the individual quarters represent lineages that used different gates and access routes to shared public spaces (Horton 1994). In this regard, the research of the author was oriented to defining the character and organisation of the street network, distribution of open spaces and the spatial organisation of urban quarters. As the precolonial spatial organisation was subscribed to for generations, it may be presumed that it carried important social meaning. In this vein, the presented papers of the author consider layout as linked with social sustainability, looking in turn at towns and residential buildings. The author studied the long-term dynamics on a selection of towns, which were occupied from the precolonial era and affected by colonial development.

The paper in the *Journal of Archaeological Science: Reports* (Baumanova 2020b) addressed *Urban kinaesthetic heritage* as passed on for many generations, discussing the idea that the built environment, as a type material culture contributes to setting up the intangible heritage of urban lifestyle. The paper focuses on two case studies from the Swahili coast, the historic centre of Mombasa, Kenya, and Mozambique Island, as both towns were established before the colonial era but experienced a strong colonial involvement. The analyses of the street network and public spaces concentrate on the distribution of mosques, on the streets that interconnect individual quarters, whose location was established ethnographically and historically, while considering colonial development. The results show that the features used by the public promote certain movement patterns within the town and may have served as mnemonics on the established use of space. The findings of the paper were also applied by

the author in a larger monograph on urban public space, where three regions with colonial history, Morocco, Iberia, and the East African coast, were compared (Baumanova 2022b).

It is well attested in Africa and in the Islamic context more generally that historical cores of living towns, when built of permanent materials, offer a snapshot of how the street network developed. For example, in north Africa and the Near and Middle East, the towns that were established under the Romans, such as Damascus and Aleppo, frequently preserved part of their rectangular street grid even after centuries under Islamic rule (Valerian 2013; Milwright 2010). Patterns in the street network that developed independently in multiple towns, may be characterised as potentially important and, as multiple generations subscribe to them, socially sustainable. The research of the author contributed to this line of research with a comparative study of living historical towns in West Africa in the paper on *Precolonial origins of urban spaces* (Baumanova et al. 2019) in the *Journal of Urban History*. The paper that since its publications has attracted attention of archaeologists, historians and urbanists alike, focused on the towns on the edge of the Sahara, that in key aspects offer a useful parallel to the East African coast. In their development, they were contemporary with the Swahili towns, for most of their history they were also predominantly Islamic, with an economy primarily based on trade. Their location on the edge of the vast Saharan desert 'sea' may also be interpreted as coastal. The data for the paper were sourced from digitalised historical and modern maps and accessed thanks to a collaboration with the University of Cape Town. Space syntax represented an important part of the methodology developed by the author for the paper, which aimed to assess the long-term dynamics of the urban layout. The historical street networks of the towns of Timbuktu and Old Djenné in present-day Mali were analysed, working with ArcGIS software. The length of individual streets was determined on the basis of absence/presence of turns greater than 45 degrees in individual quarters of the town, together with an analysis of the integration of mosques and markets. The relative length of streets was visualised on digital maps and projected on Google Earth images. Apart from disentangling the role of public spaces in the street network, the paper introduced the term of urban plurality, building on the concept of dual towns discussed above.

4 Sensory archaeology

Through analyses of movement in constructed space, the research of the author has also progressed in the field of sensory archaeology. The approaches known collectively as sensory

archaeology become gradually more prominent in the 1990s, especially in Classical archaeology and in the European context, and continue to be developed further (Platts 2019). The field is relatively broad today, including quantitative analyses as well as experiments and employing principles of phenomenology (for an overview see Skeates and Day 2019). Sensory archaeology deals with themes like the audibility of conversations and its effect on social space and relative privacy, the visibility of landmarks, or olfactory connotations of various activities. The social relevance of these factors for understanding the built environments was foreshadowed by arguments presented already in the 1970s (e.g. Rapoport 1976).

While ethnography-based parallels and analyses have been popular in African contexts, analyses of sensory perception still have not been much explored in African archaeology, despite the fact that sensory perception is to a large extent universal over time for a defined group of people, such as able-bodied adults. Taking advantage of the fact that the permanent nature of coral stone as a building material likely implied certain character of sensory environment for multiple generations, the author introduced sensory archaeology in several studies, that aimed to analytically examine the built environment on precolonial sites.

The majority of methods that may be applied for sensory analysis of urban environments is limited to perception through one sense only. For example, analyses frequently conducted in ArcGIS and QGIS software are limited to (inter)visibility of various spaces or buildings, based on their height and elevation of the terrain. In the paper on *Sensory synaesthesia* published in *African Archaeological Review* (Baumanova 2020a), the author promoted analysis of multiple types of sensory perception in one study, to achieve an inclusive understanding of past space. This paper focused on vision and movement (as part of haptic perception) and proposed novel approaches that modify space syntax graphs, as a methodology primarily designed for movement analysis, to assess visual and movement paths simultaneously on a single graph. The approaches were then used to compare the West and East African Islamic towns dated to the precolonial era, to consider spaces potentially associated with congregation, and main movement arteries in the towns of Mombasa, Djenne and Timbuktu.

Sound and aural perception was incorporated in the paper on *Precolonial soundscapes* published in *Time and Mind: Journal of Archaeology, Consciousness and Culture* (Baumanova 2021). Using methodologies from acoustics and present-day architecture, the author tested a hypothesis how the distribution of mosques in the precolonial towns of Jumba la Mtwana,

Kenya and Kua, Tanzania, correlates with audibility of the calls to prayer, that was most likely realised from the roofs of the mosques that had no minarets in the precolonial period. Inside the houses, the analysis focused on the elongated shape of rooms known from along the Swahili coast and predetermined by the length of mangrove poles used for roofing, and its impact on audibility and comprehensiveness of conversations taking place inside the houses. Working with the established acoustic properties of porous coral stone blocks, the results show that the properties of the room shape, unfavourable to conversation, were significantly mitigated by the hanging of carpets on walls, for which practice there is abundant archaeological evidence.

5 Implications for future research

Although all the opened themes have brought important results, they have not been exhausted. Especially, more primary data collection is needed as a basis for studies encompassing a larger sample of high-resolution data, as well as comparative analyses reflecting on other regions of Africa and the Islamic world. Sensory archaeology in the context of the Swahili coast has been important for analyses of the changing spatial characteristics of Swahili towns bridging the precolonial and colonial period. It will continue to play a part in the author's research, adding an element of experimental research.

It has been the primary goal of the author's studies presented here to contribute to the archaeology of the standing remains of the Swahili built environment, generating new primary data from survey and compiling an enhanced classification of features and building-types. Precisely for the reason, that early archaeological research on the coast was linked with monumental architecture and its interpretations were conforming to the rationalisation of colonial policies (Reid and Lane 2004), current archaeology should not leave the theme of Swahili stone buildings aside. Rather, reviews of early data in the light of new findings, their continued scrutiny with a range of methods, and complementation with comparative perspectives is crucial for further development of archaeology of the East African coast.

6 Broader relevance of African archaeology

In the broader field of archaeology, sub-Saharan Africa entered the general debate very late and in many respects it was the last region to become seriously archaeologically studied. The first comprehensive publication on the archaeology of sub-Saharan Africa introduced in its

very name some of the key themes represented by 'food, metals and towns' (Shaw *et al.* 1993). Only in the 2000s, more review publications began to be published (Stahl 2005; Garlake 2002; Connah 2001) followed by the most inclusive volume to date (Mitchell and Lane 2013). To date there is only one volume dedicated to the review and advancement of the theoretical aspects of the discipline (Wynne-Jones and Fleisher 2015), with an important early predecessor that reviewed the wider implications of research in the region of East Africa (Robertshaw 1987). In a review of the *Oxford handbook of African Archaeology* for the *European Journal of Archaeology*, the author engaged in presenting the relevance of African archaeology, and specifically that of the East African coast, for research conducted from and in Europe. African archaeology offers parallels and reflections in some key theoretical themes (Baumanova 2015). These include practice-oriented approaches that allow us to step aside and critically review the culture-history perspectives, which have characterised much of research conducted from or in Central Europe. Another theme that deserves to be highlighted is the study of various representations of identity abundantly contained in African material culture, highlighting the complexity of the theme and the need to contextually interpret its ethnic, religious or locally-specific facets. The third important arena of study is represented by the principles of social power dynamics, of which space is an important component. In sub-Saharan Africa, power is frequently based on different foundations than in Europe and became enhanced through the African experience with various types of colonialism, that was invariably represented by power negotiations in a changing social context. All of these themes make Africa highly relevant for archaeology generally, as a study of the human past, and link archaeology as a discipline with the multi-faceted nature of human experience, studied by anthropologists and ethnographers.

Archaeological research of sub-Saharan Africa long remained in the shadow cast by African ethnography in particular, and this is no different in the Czech Republic, where Africanist research has a relatively rich history still represented today for example by the Naprstek Museum. Along with participation in early research, Czechs were economically and politically involved in the discourse of dominance exercised by the major European colonial powers, which is also exemplified in South America (Křížová 2021: 39). The development in the field was cut short by the emigration of specialists like Ladislav Holý and Magdalena Hauner during the communist era. African archaeology hence never fully realised its potential in the Czech Republic, despite its relevance for offering a valuable reflection on material

culture and on some key theoretical debates in archaeology. Developing the field of African archaeology now can further open up the scope of archaeology conducted from the Czech Republic and enrich its potential to contribute to the international research on globally relevant themes.

References:

- Abu-Lughod, J. L. 1987. The Islamic city: Historic myth, Islamic essence and contemporary relevance. *International Journal of Middle East Studies* 19, 155-177.
- Alpers, E. A. 2014. *The Indian Ocean in world history*. Oxford: Oxford University Press.
- Baumanova, M. 2015. Review of: Peter Mitchell and Paul Lane, eds. The Oxford Handbook of African Archaeology. *European Journal of Archaeology* 18/1, 147-150.
- Baumanova, M. 2018. Pillar Tombs and the city: creating a sense of shared identity in Swahili urban space. *Archaeologies - Journal of the World Archaeological Congress* 14/3, 377-411.
- Baumanova, M. 2020a. Sensory Synaesthesia: Combined Analyses Based on Space Syntax in African Urban Contexts. *African Archaeological Review* 37/1, 125-141.
- Baumanova, M. 2020b. Urban kinaesthetic heritage and the production of social sustainability. *Journal of Archaeological Science: Reports* 32, article no. 102445.
- Baumanova, M. 2021. Precolonial soundscapes of Swahili coastal towns in East Africa. *Time and Mind: Journal of Archaeology, Consciousness and Culture* 14/4, 501-516.
- Baumanova, M. 2022a. Survey and analysis of the architectural heritage at Jumba la Mtwana and Mnarani, precolonial Swahili towns in Kenya. *Annals of the Naprstek Museum in Prague* 43/1, 107-124.
- Baumanova, M. 2022b. *Urban public space in colonial transformations*. Springer Nature.
- Baumanova, M. 2023. The element of water in the built environment on the precolonial Kenya coast. *Land* 12/1, art. no.157.
- Baumanova, M. and Smejda, L. 2017. Structural dynamics of spatial complexity at the 'Palace of Gede', Kenya. *Azania: Archaeological Research in Africa* 52/1, 71-99.
- Baumanova, M. and Smejda, L. 2018. Space as material culture: residential stone buildings on the precolonial Swahili coast in a comparative perspective. *South African Archaeological Bulletin* 73/208, 82-92.

- Baumanova, M., Smejda, L. and R  ther, H. 2019. Pre-Colonial Origins of Urban Spaces in the West African Sahel: Street Networks, Trade, and Spatial Plurality. *Journal of Urban History* 45/3, 500-519.
- Chittick, H. N. 1974. *Kilwa: an Islamic trading city on the East African coast*. Nairobi: British Institute in Eastern Africa.
- Christie, A. 2019. Structures and Settlement Organization at Kua Ruins, Juani (Mafia Archipelago, Tanzania). *African Archaeological Review* 36/2, 249-269.
- Christophersen, A. 2015. Performing towns. Steps towards an understanding of medieval urban communities as social practice. *Archaeological Dialogues* 22, 109-132.
- Connah, G. 2001. *African civilizations: an archaeological perspective*. Cambridge: Cambridge University Press.
- Demissie, F. (ed.) 2012. *Colonial architecture and urbanism in Africa: intertwined and contested histories*. Farnham: Ashgate.
- Donley, L. 1982. House power: Swahili space and symbolic markers. In: Hodder, I. (ed.) *Symbolic and structural archaeology*. Cambridge: Cambridge University Press, 63-73.
- Donley-Reid, L. 1987. Life in the Swahili town house reveals the symbolic meaning of spaces and artefact assemblages. *African Archaeological Review* 5, 181-192.
- Donley-Reid, L. 1990. A structuring structure: the Swahili house. In: Kent, S. (ed.) *Domestic Architecture and the Use of Space*. Cambridge: Cambridge University Press, 114-126.
- Fisher, K. D. and Creekmore, A. 2014. *Making ancient cities: space and place in early urban societies*. New York, NY: Cambridge University Press.
- Fladd, S. G. 2017. Social syntax: An approach to spatial modification through the reworking of space syntax for archaeological applications. *Journal of Anthropological Archaeology* 47, 127-138.
- Fleisher, J. 2013. Performance, monumentality and the 'built exterior' on the eastern African Swahili coast. *Azania: Archaeological Research in Africa* 48/2, 263-281.
- Fleisher, J. 2015. Situating the Swahili house. In: Wynne-Jones, S. and Fleisher, J. B. (eds.) *Theory in Africa, Africa in theory: locating meaning in archaeology*. New York, NY: Routledge, 72-88.
- Fleisher, J., Lane, P., Laviolette, A., Horton, M., Pollard, E., Morales, E. Q., Vernet, T., Christie, A. and Wynne-Jones, S. 2015. When Did the Swahili Become Maritime? *American Anthropologist* 117/1, 100-115.

- Fleisher, J. and Wynne-Jones, S. 2012. Finding Meaning in Ancient Swahili Spatial Practices. *African Archaeological Review* 29/2, 171-207.
- Freeman-Grenville, G. S. P. 1962. *The East African coast; select documents from the first to the earlier nineteenth century*. Oxford: Clarendon Press.
- Garlake, P. S. 1966. *The early Islamic architecture of the East African coast*. Nairobi: Published for the Institute by the Oxford University Press.
- Garlake, P. S. 2002. *Early Art and Architecture of Africa*. Oxford: Oxford University Press.
- Gensheimer, T. R. 2018. Swahili houses. In: Wynne-Jones, S. and LaViolette, A. J. (eds.) *The Swahili world*. London: Routledge, 500-512.
- Hansen, M. H. 2000. *A comparative study of thirty city-state cultures: an investigation*. Copenhagen: Kongelige Danske Videnskabernes Selskab.
- Hillier, B. and Hanson, J. 1984. *The social logic of space*. Cambridge: Cambridge University Press.
- Holl, A. F. C. 2006. *West African early towns: archaeology of households in urban landscapes*. Ann Arbor, MI: Museum of Anthropology, University of Michigan.
- Horton, M. 1994. Swahili architecture, space and social structure. In: Parker Pearson, M. and Richards, C. (eds.) *Architecture and order: approaches to social space*. London: Routledge, 147-169.
- Horton, M. 1996. *Shanga: the archaeology of a Muslim trading community on the coast of East Africa*. London: British Institute in Eastern Africa.
- Horton, M., Fleisher, J. and Wynne-Jones, S. 2017. The Mosques of Songo Mnara in their Urban Landscape. *Journal of Islamic Archaeology* 4/2, 163-188.
- Horton, M., Olsen, J., Fleisher, J. and Wynne-Jones, S. 2022. The Chronology of Kilwa Kisiwani, AD 800–1500. *African Archaeological Review* 39, 143-166.
- Ichumbaki, E. B. and Pollard, E. 2021. The Swahili Civilization in Eastern Africa. *Oxford Research Encyclopaedia of Anthropology*. Oxford: Oxford University Press.
- Insoll, T. 2003. *The archaeology of Islam in sub-Saharan Africa*. Cambridge: Cambridge University Press.
- Kamalkhan, K. 2010. *The Swahili Architecture Of Lamu, Kenya: Oral Tradition And Space*: LAP Lambert.
- Kirkman, J. S. 1954. *The Arab city of Gedi; excavations at the great mosque, architecture and finds*. London: Oxford University Press.

- Kirkman, J. S. 1957. Historical archaeology in Kenya 1948-56. *Antiquaries Journal* 37, 16-29.
- Kirkman, J. S. 1964. *Men and monuments on the East African coast*. London: Lutterworth.
- Kirkman, J. S. 1975. Some conclusions from archaeological excavations on the coast of Kenya 1948-1966. In: Chittick, H. N. and Rotberg, R. I. (eds.) *East Africa and the Orient: cultural syntheses in pre-colonial times*. London: Holmes and Heier, 226-247.
- Knappett, C. 2011. *An archaeology of interaction: network perspectives on material culture and society*. Oxford: Oxford University Press.
- Křížová, M. 2021. Skulls from Tiwanaku: a forgotten part of Nestler's collection in the Hrdlička Museum of Man in Prague. *Annals of the Naprstek Museum in Prague* 42/1, 29-48.
- Kusimba, C. M. 1999. *The rise and fall of Swahili states*. Walnut Creek: AltaMira Press.
- Kusimba, C. M., Williams, S., R., Monge, J. M., Mohamed, M. M., Oka, R., Oteyo, G., Kusimba, S. B. and Dussubieux, L. 2018. Mtwapa. In: Wynne-Jones, S. and LaViolette, A. J. (eds.) *The Swahili world*. London: Routledge, 226-230.
- Lane, P. J. 2015. Iron Age imaginaries and barbarian encounters: British prehistory's African past. In: Wynne-Jones, S. and Fleisher, J. B. (eds.) *Theory in Africa, Africa in theory: locating meaning in archaeology*. New York, NY: Routledge, 175-200.
- Low, S. M. 2016. *Spatializing culture: the ethnography of space and place*. New York, NY: Routledge.
- Meier, P. 2016. *Swahili port cities: the architecture of elsewhere*. Bloomington, Indianapolis: Indiana University Press.
- Milwright, M. 2010. *An introduction to Islamic archaeology*. Edinburgh: Edinburgh University Press.
- Mitchell, P. and Lane, P. 2013. *The Oxford handbook of African archaeology*. Oxford: Oxford University Press.
- Morton, S. G., Peuramaki-Brown, M. M., Dawson, P. C. and Seibert, J. D. 2012. Civic and Household Community Relationships at Teotihuacan, Mexico: a Space Syntax Approach. *Cambridge Archaeological Journal* 22/03, 387-400.
- Petek-Sargeant, N. and Lane, P. J. 2022. Weather Landscapes and Archaeology: Material weathering practices and tangible climates. *Archaeology, society and environment*, 2/1, 1-24.
- Platts, H. 2019. *Multisensory living in ancient Rome: power and space in Roman houses*. London: Bloomsbury.

- Pollard, E. 2018. Ocean fringe resources and archaeology of the medieval Swahili. In: Wynne-Jones, S. and Laviolette, A. J. (eds.) *The Swahili world*. London: Routledge, 36-50.
- Pradines, S. 2010. *Gedi: une cité portuaire swahilie: Islam médiéval en Afrique orientale*, Cairo: Institute Francais d'Archéologie Orientale.
- Pradines, S. 2019. Islamic Archaeology in the Comoros: The Swahili and the Rock Crystal Trade with the Abbasid and Fatimid Caliphates. *Journal of Islamic Archaeology* 6/1, 109-135.
- Pradines, S. and Blanchard, P. 2015. Songo Mnara. Etude architecturale d'une ville swahilie médiévale. *Taarifa* 5, 9-33.
- Rapoport, A. 1976. *The Mutual interaction of people and their built environment: a cross-cultural perspective*. The Hague: Mouton.
- Reid, A. M. and Lane, P. J. 2004. African historical archaeologies: an introductory consideration of scope and potential. In: Reid, A. and Lane, P. (eds.) *African Historical Archaeologies*. 1-32.
- Rhodes, D. T. 2014. *Building Colonialism: Archaeology and Urban Space in East Africa*. London: Bloomsbury Academic.
- Richmond, M. (ed.) 2011. *A field guide to the seashores of eastern Africa and the western Indian Ocean islands*. Stockholm: SIDA, WIOMSA.
- Robertshaw, P. 1987. *The development of archaeology in East Africa*. Nairobi: Dept. of History, University of Nairobi.
- Satō, T. 1997. *Islamic urbanism in human history: political power and social networks*. New York: Columbia University Press.
- Shaw, T., Sinclair, P., Andah, B. and Okpoko, A. 1993. *The Archaeology of Africa: food, metals, and towns*. London: Routledge.
- Sinclair, P. and Håkansson, T. 2000. The Swahili city-state culture. In: Hansen, M. H. (ed.) *A comparative study of thirty city-state cultures: an investigation*. Copenhagen: The Royal Danish Academy of Sciences and Letters, 463-482.
- Sinclair, P., Nordquist, G., Herschend, F. and Isendahl, C. 2010. *The urban mind. Cultural and environmental dynamics*. Uppsala: Uppsala University.
- Skeates, R. and Day, J. (eds.) 2019. *The Routledge Handbook of Sensory Archaeology*. New York: Routledge.
- Smith, M. E. 2011. Empirical urban theory for archaeologists. *Journal of Archaeological Method and Theory* 18, 167-192.

- Stahl, A. B. 2005. *African archaeology: a critical introduction*, Malden, MA: Blackwell Pub.
- Steadman, S. R. 2015. *Archaeology of domestic architecture and the human use of space*. Walnut Creek, California: Left Coast Press.
- Sulas, F., Fleisher, J. and Wynne-Jones, S. 2017. Geoarchaeology of urban space in tropical island environments: Songo Mnara, Tanzania. *Journal of Archaeological Science* 77, 52-63.
- Valerian, D. 2013. Middle East: 7th-15th centuries. In: Clark, P. (ed.) *The Oxford handbook of cities in world history*. Oxford: Oxford University Press, 258-274.
- Walz, J. 2017. Inland connectivity in ancient Tanzania. *Islamic Africa* 8, 217-227.
- Wilson, T. H. 1979. Swahili funerary architecture of the North Kenya coast. In: De Vere Allen, J. and Wilson, T. H. (eds.) *Swahili houses and tombs of the coast of Kenya*. London: AARP, 33-46.
- Wilson, T. H. 1982. Spatial analysis and settlement patterns on the East African coast. *Paideuma* 28, 201-219.
- Wynne-Jones, S. 2016. *A material culture: consumption and materiality on the coast of precolonial East Africa*. Oxford: Oxford University Press.
- Wynne-Jones, S. and Fleisher, J. 2014. Water Management in a Maritime Culture: The Swahili Coast of East Africa. In: Tvedt, T. and Oestigaard, T. (eds.) *A History of Water*. IB Tauris, 240-258.
- Wynne-Jones, S. and Fleisher, J. B. 2015. *Theory in Africa, Africa in theory: locating meaning in archaeology*. New York: Routledge.
- Wynne-Jones, S. and LaViolette, A. J. (eds.) 2018. *The Swahili world*. London: Routledge.

Journal article

Baumanova, M. 2022.

Survey and analysis of the architectural heritage at Jumba la Mtwana and Mnarani, precolonial Swahili towns in Kenya.

Annals of the Naprstek Museum in Prague 43/1, 107-124.

Journal article

Baumanova, M. 2023.

The element of water in the built environment on the precolonial Kenya coast.

Land 12/1, art. no.157.

Journal article

Baumanova, M. and Smejda, L. 2017.

Structural dynamics of spatial complexity at the 'Palace of Gede', Kenya.

Azania: Archaeological Research in Africa 52/1, 71-99.

(Monika Baumanova was responsible for 85% of the paper, developing the study, designing its methodology and writing up the text. Ladislav Smejda was responsible for Figure 7 and work with Cytoscape software).

Journal article

Baumanova, M. and Smejda, L. 2018.

Space as material culture: residential stone buildings on the precolonial Swahili coast in a comparative perspective.

South African Archaeological Bulletin 73/208, 82-92.

(Monika Baumanova was responsible for 90% of the paper designing the approach of the study and writing up the text. Ladislav Smejda was responsible for Figures 3-4 and designing their graphical appearance of the study).

Journal article

Baumanova, M. 2018.

Pillar Tombs and the city: creating a sense of shared identity in Swahili urban space.

Archaeologies-Journal of the World Archaeological Congress 14/3, 377-411.

Journal article

Baumanova, M. 2020.

Urban kinaesthetic heritage and the production of social sustainability.

Journal of Archaeological Science: Reports 32, article no. 102445.

Journal article

Baumanova, M., Smejda, L. and Rüter, H. 2019.

Pre-colonial origins of urban spaces in the West African Sahel: street networks, trade, and spatial plurality.

Journal of Urban History 45/3, 500-519.

(Monika Baumanova was responsible for 85% of the paper designing the methodology of the study and writing up the text. Ladislav Smejda was responsible for testing some tools in ArcGIS and figures 4-5. Heinz Rüter was responsible for providing the background data from digitalised historical and present-day maps).

Journal article

Baumanova, M. 2020.

Sensory synaesthesia: combined analyses based on space syntax in African urban contexts.

African Archaeological Review 37/1, 125-141.

Journal article

Baumanova, M. 2021.

Precolonial soundscapes of Swahili coastal towns in East Africa.

Time and Mind: Journal of Archaeology, Consciousness and Culture 14/4, 501-516.