Introduction to the Project
The Zanzibar Archipelago is home to a rich urban heritage reflecting its history as a fulcrum for settlement and trade over nearly two millennia. Previous archaeological research has recovered a broad picture of development from humble coastal sites to elegant stonetowns of coral and lime and has mapped these sites’ growing connections to global networks of trade. Urban Ecology and Transitions of the Zanzibar Archipelago (UETZAP) is working to expand that important work by exploring local systems of resource management and exploitation - of mangrove, fish, shells, coral, crops and animals – that made this urbanism possible.

A key feature of this project is attention to context, as we think about how artefacts, food and manufacturing debris, architectural spaces, natural products, imported goods from near and far, were used and lived with; in other words how urban life was experienced and practiced. A further aim is to explore those urban practices for their impact on the natural environment, and thereby to provide informed comment on the sustainability of particular urban forms and activities.

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Background to Research
The Zanzibar archipelago is well-known for its archaeological heritage. Although evidence for occupation at cave sites on both Unguja and Pemba dates back many thousands of years (Chami, 2001, 2009; Sinclair et al., 2006), it is from the 7th century AD that a record of consistent settlement can be traced. It is these communities that developed the Zanzibar Archipelago as an important gateway between the Indian Ocean world and continental Africa. Early sites, characterised by Tana Tradition ceramics, are found along the coast of both Zanzibar and Pemba. From their earliest occupation, these sites were already engaged in long distance maritime trade, with imported ceramics from the Gulf and India, glass, and glass beads, they were significant manufacturing centres of iron, as well as shell beads, and
had a mixed diet, that involved some hunting, consumption of fish on a substantial scale, and the keeping of some chicken, and a diet based on pearl millet and sorghum (Juma, 2004; Crowther et al., 2016; Walshaw, 2010). The architecture was entirely made of daub, timber and - by inference - thatched roofs. Many of these sites were substantial even at this early date covering around 4 ha - and can be best described as large villages with population estimate of around 1600 (Juma, 2004). From the eleventh century onwards, the entire East African coast experienced a shift in forms of settlement, with 'stonetowns' developing at key locations: often the sites of earlier settlements. These towns contained architecture of coral and lime, including mosques and palaces, and assumed a key role in overseas trade (Wynne-Jones and LaViolette, 2018; Wright, 1993).

Archaeology in Zanzibar has sketched the broad picture of this history of urban development, with a particular focus on chronology and links with overseas partners. The site of Unguja Ukuu has been the subject of detailed archaeological excavations (Juma,
2004; Horton and Clark, 1985; Crowther et al., 2016). Elsewhere in the archipelago, sites of the same period have been in relation to broader landscapes of village settlement (Fleisher, 2003, 2010). On Unguja there has been no comparable survey so it is difficult to explore how sites like Unguja Ukuu related to a broader landscape of settlement. In addition, we still have only a partial understanding of the full layout of the site itself, of how it related to maritime and terrestrial resources, and of how the excavated portions fitted within the overall site layout.

In recent years Wynne-Jones, Sulas and Fitton have conducted a series of small-scale investigations at the site. These have involved a geophysical survey conducted in 2013 aimed at recovering activity areas and exploring the urban layout (Fitton and Wynne-Jones, 2017); supplemented by further geophysical survey and text excavations to explore the

*Figure 2: The area of the site, showing modern features*
maritime activity areas of the site (Fitton, 2017); and a pilot season of the current research project exploring the early settlement history of the town (Sulas and Wynne-Jones 2018; Sulas et al. 2019). In sum, these studies gave a better sense of the areas of domestic occupation and craft activity at the site, have identified a possible early mosque at Unguja Ukuu, and confirmed the existence and location of substantial buried deposits (Figure 3; Fitton and Wynne-Jones, 2017). These therefore provide an essential background to the current excavations which targeted domestic architecture and various settlement spaces across the site in order to investigate urban transitions in the archipelago, urban ecology, and settlement resource use and environmental exploitation.

Figure 3: Probable area of domestic occupation based on previous research
Aims of 2019 Fieldwork

Following a successful pilot season of excavation in 2017 (Wynne-Jones and Sulas, 2018) the intention for this second season was to expand our programme of excavations and paleoenvironmental survey at the site of Unguja Ukuu, Zanzibar, to explore how people inhabited and exploited the locale as the earliest example of Zanzibar's unique urban tradition. Particular aims were to explore:

• Domestic settings, building on successful excavation of an earthen house in 2017, to think about how people lived and worked within the spaces of the town;

• Landscape survey using GPS and drone photogrammetry to recover information on how the site related to the local topographic landscape, vegetation, and environmental resources;

• Off-site landscape characterisation survey, using test pitting and sediment analyses to explore changing landscapes relating to the occupation of the site;

• Recovery of data relating to diet and subsistence, so as to understand relationship to a resource landscape.

Methodology

The research strategy develops and tests a high-definition approach to urban archaeology by employing established and innovative methods from the humanities and geosciences. These include survey techniques intended to complement and compare to existing legacy data sources; excavation strategies to investigate specific project aims; sampling techniques to enable detailed laboratory analyses of palaeoenvironmental and faunal remains; and innovative recording practices to support ongoing analysis by both the project team and other researchers in the future.

Fieldwork aims:

1. Shovel Test Pit survey to identify possible areas of archaeological deposits, daub architecture, and middens for excavation, based on analysis of legacy excavation data;

2. Six excavation units across areas containing wattle and daub architecture and middens, aiming to excavate at least two complete structures and associated activity areas, and one midden;

3. Sampling during excavations for laboratory analysis of building materials, soil and sediment properties, archaeological stratigraphies, and environmental and dietary data (botanicals, fauna);

4. Small scale off-site survey with sampling for environmental baseline data;

5. Local site survey using GPS and a quadcopter to build a digital elevation model of the site using photogrammetric modelling, and to explore the potential for non-destructive near-surface remote-sensing survey using multispectral imagery;
6. Collection of modern and archaeological faunal materials for reference and analysis, and observation of butchery practices.

Survey and excavation took place under a Research Permit from the Revolutionary Government of Zanzibar during September and October 2019. The season was cut short by several days because of the onset of the *kaskazi* rains which caused daily flooding of the trenches, threatening newly exposed archaeological contexts and preventing further excavation. We therefore decided to close the excavations early in order to protect the integrity of the buried remains of the site. Large undyed palm mats were cut and laid down at the bottom of the dried trenches to help protect exposed archaeological remains, and the trenches were then backfilled with excavated spoil and processed undiagnostic ceramics, recorded, and closed.

Field Team

The team consisted of PI Dr Stephanie Wynne-Jones (University of York), Co-PIs Dr Federica Sulas (Urbnet and University of Cambridge) and Dr Michelle Alexander (University of York), and PDRAs Dr Tom Fitton and Dr Mik Lisowski (University of York). Excavations were led on site by Dr Stephanie Wynne-Jones and Dr Tom Fitton; geoarchaeological sampling and off-site survey was led by Dr Federica Sulas; and zooarchaeological analysis was led by Dr Michelle Alexander and supported by Dr Mik Lisowski. The fieldwork was supported by the Director of the Antiquities Department on Zanzibar, Abdallah K. Ali, and local excavators. We were grateful for excavation assistance and supervision from Dr Ema Bauzytė (then at UrbNet, Aarhus University); PhD students Henriette Rødland (Uppsala University) and David Kay (University of Cambridge); and Imogen Coulson (British Museum). We were joined for field training by Sinyati Robinson, Louwna Mosses, Said Said, Isihaka Jumanne, Bettina Mapunda (University of Dar es Salaam), Philipp Rethwisch and Jacob Marvin (University of Newcastle).

Fieldwork Results

For the 2019 season, we aimed to build on the success of our 2017 pilot excavation (which concentrated on a single trench through a wattle and daub occupation) by conducting a STP survey to explore possible daub architecture in an understudied region of the settlement; excavating six excavation units over a four week period, complemented by sampling of archaeological sediments and buried soils for environmental information; a local landscape survey to gather comparative environmental data from the surrounding context of the settlement; and by collecting faunal materials from modern and archaeological contexts for laboratory analysis.

Shovel Test Pit Survey

One of the intentions of the project is to investigate the changing archaeological use of environmental materials and resources in different activity and occupation areas across the urban landscape. We therefore targeted two broad areas of the site for Shovel Test Pit survey based on a distribution map of trace archaeological remains collated from our own prior surveys and previous published excavations.
Shovel test pits were excavated at staggered intervals across a 20m grid to create a diagonal pattern across the ground moving away from the beach. The positions of STPs were determined with a Trimble dGPS, although several areas and spots were deemed unsuitable for excavation on the basis of significant ground disturbance (including buried tanks and cisterns), obstacles to excavation (including vegetation and structures), and health and safety (due to surface debris and rubbish). STPs were excavated to a width of c. 30 cm and a depth of c. 75cm by hand-shovel and trowel. Any material removed was sieved through a 2mm mesh and the stratigraphic sequence recorded in detail. Where concentrations of artefacts were identified, additional STPs were then excavated 2m away on cardinal compass points in order to explore whether the artefacts might be part of a wider spread of material or structural remains (Figure 4). STPs were labelled alpha-numerically with the prefix ‘STP’ and sequenced numbers for the initial survey points (n), and letters to denote the initial and subsequent sequence of radial STPs (alpha). This meant, for example, that the first test pit was labelled STP01a, and related pits excavated to investigate archaeological materials recorded in STP01a were subsequently labelled STP01b, STP01c, STP01d, and STP01e accordingly. Changes in soil and excavated materials in these STPs were recorded as ‘layers’ numbered in order of exposure, from surface to the bottom of exposure (Layer 1, Layer 2 etc).
The STPs were positioned over areas identified as potential domestic neighbourhoods (based on the presence of daub) and possible areas of intensive occupation and craft production (based on magnetometry survey; Fitton and Wynne-Jones 2017). Magnetometry had indicated the existence of significant activity to the south of the site in the area of the modern parade ground, a fact confirmed by test pitting in 2017 (Wynne-Jones and Sulas 2017). A further possible area, not previously explored, was identified through Juma’s (2004) auger survey results, which we utilised to create a distribution map in our project GIS database of the spread and clustering of materials originally recorded as inclusions in the cores (Figure 5). Based on our analysis of both of these results, we decided to conduct a limited shovel test pit (STP) survey to investigate potential areas of daub architecture and occupation in the open ground and treeline north of the beach, and probable middens and activity under the parade ground of the KamKam, which stands on the narrow bridge of the peninsula between the beach and the mangrove creek (Figure 6).

**STPs on southern side of the site**

Ten STPs were excavated across the open area of the ‘parade ground’ to the south of the site. These were located so as to create a transect crossing the site between the beach to the west and the mangrove creek to the east (map). The STPs confirmed the richness of the deposits in this area, with dense midden deposits encountered almost immediately beneath the surface. It is clear that a significant overburden of sediment has been removed during the clearance of the parade ground, but it was hoped that the deposits beneath would remain intact. This proved to be correct and despite surface mixing there were layers of intact midden deposit beneath. Nevertheless, the uncertainty over how much had been lost above these layers meant that this was not a suitable location for larger excavations.

**STPs to the north of the site**

In the area to the north of the site we excavated a total of 24 STPs (12 primary test pits, 3 of which necessitated secondary radial STPs) and demonstrated the existence of a significant area of earthen architecture that had not previously been explored. All STPs recovered
evidence for occupation deposits and many also contained daub suggesting the former existence of housing here. The upper layers of these STPs contained materials relating to the 17th/18th century, which must relate to the occupation of the ‘Arab house’ of that period which stands nearby on the beach (Horton & Clark 1985). Beneath these later artefacts many STPs revealed evidence for daub. This therefore seemed a promising location for excavation, even though it was unclear whether the housing would relate to the early occupation of the site or the later 18th-century activity. After excavation, it was clear that the houses were early and the 18th-century artefacts were scattered across the area at a later date. Analysis of the remains from both areas of test pits, and comparison of the visible stratigraphy to other sources and the wider region of the site is ongoing.

Geoarchaeological work

Soil analyses of archaeological sediments

Analyses of archaeological sediments aim at characterising the physico-chemical properties and microstratigraphy of cultural deposits and features. A special focus of these analyses concerns the recovery and identification of past environmental records and activity markers preserved at a microscopic scale in soils and sediments. As demonstrated by previous work in the region and at Unguja Ukuu itself, high-resolution characterisation of archaeological sediments and buried soils is possible using bulk soil analytical methods, multi-element trace chemistry (ICPMS), and soil micromorphology.

We adopted a flexible and multi-scalar sampling strategy tailored to two main types of deposits: excavation trenches and landscape units.

Landscape survey

The survey covered an area of about 1.2 km² encompassing the known archaeological area and reaching the Makime Peninsula to the south, the coastal plain to the east, and the settled rising land to the north. Field work involved recording and sampling of soil sequences and landscape features in exposed sections where these were available and via small test pits (c. 40 cm in diameter). Soil sequences were recorded and sampled across three main topographic units: 1) the coastal strip at about 30-40 m from the current shoreline to the east and south of the
main site, including the areas of Bandarini, the Fish Market, and the Makime peninsula; 2) the inland, gently sloping area of the modern Unguja Ukuu village, including the localities of Bandarini, KamKam, and Bondeni; 3) the raising upland with forest patches, including the localities of Bankok, Kiweni, and Maweni (Figure 2, Figure 7). Key topsoils and buried deposits were sampled for subsequent laboratory analyses: 46 samples for bulk soil analysis; 5 soil micromorphological blocks. Mapping of landscape resources and processing areas was performed using a hand-held, Trimble GPS device and basic descriptions and are the subject of ongoing analysis.

Collection and Sampling

Archaeological artefacts were collected from the excavation trenches by hand at the point of exposure; by dry sieving at the trench edge; and by wet sieving and flotation on site. The largest and most visible finds were collected by hand and immediately bagged and labelled. Small finds of particular relevance and/or importance, including metals, glass, beads, imported glazed ceramics, and large faunal remains lying flat on excavated archaeological surfaces were recorded with site coordinates on excavation plans. Excavated spoil sediment from all trenches was dry-sieved on removal from the trench through a 2mm mesh to enable the recovery of archaeological finds and most mammal bones (Payne 1972) missed at the point of excavation. A sieve that size is, however, too coarse to allow collection of the majority of remains of small fish. For this reason, every fifth or, in larger contexts, every tenth bucket of sediment was wet sieved on a 2mm mesh hand sieve. In this procedure, the sieve with dry sediment was submerged below its upper rim in still water and shaken until the sediment was washed away. The entirety of washed content of wet sieves was dried in mosquito net parcels, packed and exported to BioArCh facilities at the University of York, where it is being sorted to collect bones, shell, pottery, and other finds. Additionally, one bucket (or two in larger contexts) of sediment from each context were picked for full flotation for palaeobotanical remains. In this procedure, the sediment was dissolved in clean water tank and stirred to loosen the light floating fraction which was passed through the 0.5 mm
mesh sieve, dried in cotton bags and exported to York. The remaining heavy fraction was wet sieved in a procedure describe above, dried and exported to York.

During this season of excavations at Unguja Ukuu we collected and exported 44 kg of wet samples, 9.5 kg of heavy fraction flotation samples, and 2 kg of light fraction flotation samples.

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**Zooarchaeology**

**Faunal Reference Collection**

Comprehensive zooarchaeological analysis requires a substantial reference collection of fauna local to the site. Hence, one of the aims of UETZAP fieldwork was to expand the University of York reference collection of Swahili coast mammal and fish with locally acquired skeletal remains of modern animals.

For this purpose, 14 locally sourced fish of different species were bought at the Bandarini fish market on the shoreline of Unguja Ukuu. We collected ethnographic and ecological information from the fishermen; including the local names of the fish, their fishing areas, their commercial value for the local people, their culinary use and kitchen processing techniques. Each fish was photographed, measured according to Wheeler and Jones (2009) and weighed. Specimens were prepared by boiling in water with enzyme detergent followed by defleshing. Dried and washed bones were collected and exported to York for further processing. Additionally to fish, one specimen of locally hunted suni antelope (*Neotragus moschatus*) was acquired. The animal was hunted for food and its meat was kept by the hunters. The specimen was photographed, measured and weighted, then butchered with care to minimise to damage to bones. The skeleton was left for two weeks in a cage hung in mangroves for insects to clean it, then packed and exported to York for further processing.
with hydrogen peroxide. All specimens were added to University of York animal bone reference collection stored at BioArCh facilities.

**Ethnographic study on modern butchery in Zanzibar**

Zooarchaeology has proven to be a useful tool in investigating ethnicity and religion in the past, and an important part of this is the study of butchery practices supported by ethnographic analogies (Crabtree 1990, Nilssen 2000, Albarella 2011, Arnold and Lyons 2016, Seetah 2019). During this fieldwork we started an ethnographic reconnaissance of local professional and household butchery in both Unguja Ukuu and Stone Town. The investigation was carried out with the help of a local assistant who performed as a guide, contact and interpreter.

Observation of professional butchery was conducted in Stone Town's Darajani market. The procedure of butchery of an adult cow was photographed and video recorded for future reference. Butchered appendicular bones were collected for cleaning and further analysis in York. Additionally, a larger number of butchered cattle metapodials and phalanges was collected to investigate patterns of butchery of the feet. In Unguja Ukuu, we witnessed and documented an event of non-professional butchery of a young goat. The procedure was also photographed and video recorded. All bones were collected for on-site cleaning and export for further analysis at the University of York. Unfortunately, a small part of one of the skeletons was lost during the cleaning process when a scavenger broke into the cage containing the defleshed remains, which had been secured in undergrowth near the site to facilitate a natural cleaning of bones by insects. The remaining parts of the skeleton, along with butchered cattle bones, were exported to York.

**Photogrammetry**

Traditional photogrammetry involves the creation of photomosaics of sites or features from a collection of deliberately overlapping photos with careful measurements taken of ground control points visible in multiple photographs to aid photo positioning. The commercial development of digital photogrammetry software has made it possible to create photomosaic textured 3D models from overlapping photo archives based on automatic point and pattern recognition algorithms. In the past few years this has rapidly become a favoured methodology for recording both sites and artefacts in archaeology, since it enables a speedy and accurate alternative to techniques such as laser-scanning, which are higher resolution, but consequently require larger file sizes and more powerful processing computers to analyse effectively.

For the purposes of our project we are experimenting with using photogrammetry for analysis and morphological measurement of faunal remains and fragile artefacts; as complementary data for our field-records and excavation plans; and to build a digital elevation model of the area round the site using aerial photographs captured from a quadcopter. These models serve to complement paper records by enabling us, for example, to compare movable and accurately scaled 3D models to schematic excavation plans and sections drawn on site, allowing us to 'revisit' the sequence and consider with ease the relative positions of contexts, surfaces, and artefacts as they appeared in the trench.
Overlapping digital photographs were captured using a combination of a GoPro action camera mounted on a handheld brace; Nikon and Canon DSLRs; and a DJI Mavic Pro quadcopter for vertical aerial shots of trenches and oblique landscapes. These photographs were then collated and processed to build photogrammetry point clouds and subsequent models and images in Agisoft Metashape (formerly known as Photoscan). The results of these are currently being analysed and used to build digital elevation models for analysis in the project GIS.

Excavations

Six trenches were opened and excavated during the 2019 field season (Figure 11). Trench numbers were assigned to follow on from our pilot season in 2017, and contexts were labelled to reflect the trench number, followed by a three digit numeric. The first trench opened during the 2019 field season was therefore labelled UZ3, and the first context within the trench was #3001.

Figure 11: Location of UETZAP 2019 trenches
Trench UZ3

The location of Trench UZ3 in light woodland and coconut trees north of the Antiquities building was chosen to investigate the dense deposits of coral rag and daub identified in STP 30 and 31 thought to represent the buried remains of an archaeological structure. The excavation revealed the mounded structural remains and floor surfaces of a burned and collapsed daub-and-timber building, with later deposits indicating a separate reuse of the site in the late medieval or early modern period (Figure 12).

The trench was sited to intersect with two STPs with structural remains, and measured 6 x 3m running east-west. The ground was cleared of shrubs and foliage, and below the topsoil (#3001) and a thin deposit of light, possibly windblown sandy soil (#3002) was an apparently disturbed subsoil (#3003) containing artefacts from a range of periods, with the greatest accumulation of these artefacts at the bottom of this context. With the trench narrowed to 6 x 2m due to time and labour constraints, the removal of this mixed context revealed a dense deposit of degraded burned daub fragments (#3004) between 2-12cm in size. The daub was mounded in the eastern part of the trench, and extended into the northern, eastern, and southern sections, and was abutted in the western part of the trench by a yellowish sandy clay (#3005).

The daub deposit appears to represent the remains of a wattle-and-daub structure which burned to the ground while in use, and collapsed on top of an accumulation of artefacts, a floor surface, and the edge of an external coral platform below. Several small pits appear to have been cut into this daub deposit after the collapse, and small finds in the fill of these, such as a glass bottle in #3012 lying intact against the cut #3013, suggest reuse of the site or continued activity in the immediate area after the collapse of the structure.

Figure 12: Plans of excavated contexts in UZ3
Removal of this daub mound exposed two probable limits of the house, suggesting that the trench cut through the north-west corner of a timber and daub structure. The north-east wall of the house was identifiable by a dense line of large pieces of daub, and several examples of fragments of burnt daub standing in place around the in-situ charcoal remains of upright timber poles (Figure 13). Several of these were samples for later radiocarbon dating. No wall was identifiable for the north west limit of the house, but cleaning and excavation demonstrated a distinct limit to the tumble and spread of daub which more or less correlated with the division between internal floor contexts below (#3017) and the external coral surface (#3006).

The internal floor of the structure was a packed earth surface, but the eastern part of the excavated floor was either originally composed of a denser material than the west, or was exposed to greater temperatures during the fire which burned the structure, and appears to have been baked hard to a depth of around 7cm below the floor surface by the heat. This baked surface was photographed and sampled for later geochemical and microstratigraphic analysis to determine the type of activity taking place in the area, and whether the floor was composed of a single deposit, or the result of multiple floors accumulating over time. Scattered across the surface of the floor were various pots and pot sherds, some partially burned by the fire, and with many clustered apparently still in situ where they broke when the structure collapsed on top of them. Several burnt timbers and poles were found as intact sticks of charcoal preserved amongst this floor detritus. The floor and the accumulated remains of occupation activity and destruction were sealed within a thin context of dark soil (#3016) which may have accumulated between the daub as windblown and washed in silts after the burning and collapse of the structure. A similar dark soil was found outside the north-eastern wall of the structure (#3008).

The external coral surface was composed of what appears to be a single layer of coral rag deliberately embedded in a clay matrix, which may have been deliberately laid over an earlier packed-earth floor. An archaeological pit (#3010) was cut through this clay surface, and the fill contained a single sherd of a local ware at the base of the pit, some small fish bones and micro-charcoal, which might indicate that the surface and pit were used for cooking. A second smaller pit extending into the western section of the trench may represent a shallow posthole.
Unfortunately the early onset of the rains caused repeated flooding of the trench and prevented further excavation through the floors of this structure, and so the trench was closed before damage could be caused to the contexts. Reed mats were cut and laid to protect the exposed and unexcavated archaeological contexts, and the trench was then backfilled with the original spoil and processed undiagnostic ceramics.

**Trench UZ4**

Trench UZ4 was opened next to the site museum to investigate potential midden deposits noted in an STP, and whether these might relate to a deep midden previously identified above the beach of Unguja Ukuu by Juma (2004) and the Sealinks Project (2014; Crowther et al. 2016). Excavation of UZ4 to a depth of 1m revealed only a sparse midden materials in loose sand contexts (Figure 15), suggesting that area of the middens was smaller than hypothesised. It is possible that the middens of the site did not extend along the full length of the beach between the occupation area and the shoreline, but were deliberately concentrated in particular areas of the site.

**Trench UZ5**

Trench 5 was located at the top of the beach close to the exterior wall of the Menai Bay Beach Bungalows to investigate the environmental content of midden deposits previously identified by Juma (2004) and investigated in a test pit around 20m to the north west by the Sealinks Project (2014). The trench was laid out on an east-west alignment and measured 2 x 1m. This trench cut through various midden deposits with faunal remains and revealed a pair of shallow, non-Islamic grave cuts in the lower levels of the midden.

The topsoil (#5001) and subsoils (#5002, #5003) of this trench were loose silty sands and contained mixed finds from various periods, which was anticipated given the proximity to both the modern midden filling the remains of the Sealinks trench and to the current hotel, fishing area, and nearby bar.

Contexts #5004 and #5005 in sequence below were more compact, and both contained quantities of mixed faunal material and individual teeth. The edge of a deposit of mixed shell and small bones (#5006) around 8cm thick was also exposed in the north-eastern corner of the trench. Context #5007 beneath #5005 was again sandy, but contained fewer finds.

Beneath this we exposed the tops of a pair of parallel, shallow grave cuts filled with the same light sand (#5008) and sealed by a thick layer of darker sand (#5009) containing...
quantities of ceramics which may have been deliberately deposited on top of the pits. These cuts were aligned almost north-south. The fact that they were cut in or subsequently buried beneath the expansion of the middens in this area is a subject of future interest for the project.

**Figure 16: Stratigraphy of UZ5**

**Trench UZ6**

UZ5 was opened in an attempt to investigate a daub structure on the eastern side of the site, and was therefore sited around 10m north of Trench UZ2, excavated as part of our pilot season in 2017, which exposed the remains of another early daub structure. Trench 6 appears to have cut into the edges of two daub-and-coral structures in the trenches north-and south-western corners, and exposed an external activity area between the two structures.

The trench was opened with the permission of the Southern Headquarters of the SMZ, the Makao Makuu ya Kamandi ya Kusini (KM-KM, known locally as the 'KamKam'), measured 3 x 4m, and was orientated on a similar axis to UZ4, running north-east to south-west. This trench stood 5m upslope from the current road cutting, and partially cut the remains of an earlier trackway which was abandoned in the early 2000s after the expansion of the KamKam. The trench lay between a line of trees shading the new road cut to the east, and overgrown mounds of disturbed material on the edge of the KamKam. As a consequence of the tree cover, there were a great number of coarse roots and fine rootlets which may have caused stratigraphic disturbance beyond the topsoil (#6001) and subsoil (#6002).
Removal of the heavily mixed topsoil (#6001) and subsoil (#6002), as well as several contexts which appear to have been stained by underlying remains (#6003; #6004; #6005; #6006), we began to note the tops of archaeological levels with large quantities of archaeological materials lying flat on possible relict surfaces. These appeared to contain more coral, pottery (local and imported) and daub lying horizontally amongst redder clays, and it is possible these contexts (#6003; #6004; #6005; #6006) may represent archaeological surfaces. A 50cm grid was therefore established to enable environmental sampling of the contexts.

Below this horizon excavation revealed a similar surface with significant mottling and colour variation, within which a mottled reddish-brown context (#6007) and two particularly dark-brown to black contexts (#6010 and #6011) may represent activity areas (Figure 17). A linear coral rag feature bounding a slightly raised area in the south west corner of the trench (#6004) and a cluster of cobbles in the north-west corner (#6012) associated with a dense scatter of larger potsherds lying flat and running from the north west corner into the centre of the trench were noted, distinct from the slightly depressed or lower level surface recorded in the centre and east of the trench. In the south-western feature (#6004) large pieces of coral (roughly between 20cm² and 10cm²) extended 50cm in a straight line from the southern section and then turned and ran straight into the western wall. We hypothesise that this arrangement represents the corner of a coral structure. The small enclosed space inside this corner of corals contained pottery lying flat across another surface (#6008), and we

Figure 17: Plan of UZ6 showing excavated contexts
hypothesise that this may represent the interior floor of a house. Bulk environmental sampling across our 50cm grid was again conducted at this level, on the presumption that the contexts now exposed were earlier surfaces, with potential interior floors.

As with Trench 3, the early onset of the rains caused repeated flooding of the trench and prevented further excavation, and the trench was closed before damage could be caused to the contexts. Reed mats were cut and laid to protect the exposed and unexcavated archaeological contexts, and the trench was then backfilled with the original spoil and processed undiagnostic ceramics.

**Trench UZ7**

Trench 7 was located on the eastern side of the site, just above the beach of the mangrove, in order to investigate a large shell midden running along the shoreline and back up the slope into the treeline. The trench measured 3 x 1m on opening, but was reduced to half its length due to time constraints. The trench revealed an early surface and possible structure close to the contemporary shoreline, followed by what appear to be at least two distinct phases of midden and shell midden deposits across the area (Figure 18).

![Plan and section of UZ7](image)

**Figure 18: Plan and section of UZ7**

The topsoil of this trench (#7001) represents the surface shell midden and consists solely of shells, mostly of a large *conus* type. Below this surface midden we encountered a dark context (#7002) with a significant amount of charcoal, followed by two contexts with very few finds which we hypothesise may represent a phase of inactivity at this part of the site. Below this apparent absence of activity however we encountered lower archaeological contexts which appear to represent cultural middens (#7005 - #7008), and include significant quantities of pottery sherds as well as some beads, metals, and bones.
Below #7008 we came down onto a much more compact (although still mottled) orange surface which we interpreted as a probable activity or floor surface, and which we hypothesise was either indoors or partially covered. A small, circular area of darker soil along the western section wall may represent the base of a posthole or small pit (#7009). Two further surfaces were identified beneath this floor level consisting of a softer, mottled brown layer with some compact areas at the eastern end of the trench (#7012), and a further compact bright orange activity floor/surface in the western end (#7011). This compact floor contained a partially embedded probable grinding stone in the north-western corner.

When context #7012 was removed, another orange floor surface became visible, either relating to #7011 or indicating a third floor surface underneath both #7011 and #7012. Beneath this floor we encountered soft sands becoming gradually lighter which may represent the foundations beneath the structure. Once again however, the early onset of the rains forced us to close this trench and prevented further investigation in this season. Micromorphology samples were taken from the section, including the floor surfaces.

Although the trench was small and it was difficult to understand the use of the floor surfaces, this area very close to the shoreline was clearly actively used, perhaps in relation to fishing and trade activities taking place on the shore.

**Trench UZ8**

Trench 8 was located in the bank of a road cutting on the eastern side of the site, around 10m south and downslope of the estimated position of Juma’s (2004) ‘Unit M’ trench into a possible 9th century mosque. Trench 8 was sited in order to investigate possible midden deposits and sherd scatters which we had previously observed eroding out of the side of the road cut and embedded in the surface of the road. The trench measured 5 x 1m, running south-west to north-east cutting along and a metre into the side of the modern road. The excavation revealed a complex sequence of midden fills and possible structural remains (Figure 19), although it was not clear whether these remains represent a building or perhaps the retaining wall of a platform on this slope, similar to the foundations excavated by Juma (2004: 83). The position of trench UZ8 necessitated clearing a 5m length of the eroding bank of the road cutting, cutting back 1m into the section of the bank, and then excavating downwards towards the road cut. The topsoil (#8001) and immediate subsoils (#8003 and #8004, stained by underlying contexts) have been disturbed by the cutting of the road, and are now slumping down the face of the cutting and complicating the sequence. Once these were removed, further excavation revealed what appears to be a sequence of midden fills, structural levelling, and a later abandonment.

Beneath this slump we encountered what appeared to be a degraded daub deposit (#8002), perhaps representing the remains of a structural platform, sealing a sequence of deep and dense midden fills below. This daub context appeared level above the midden fills at the northern end of the trench, but sloped sharply down in a bank in the middle of the trench. South of this, and partially overlying the slope, were fills containing a quantity of loose coral rag cobbles which may represent the rubble of what appears to be the foundation of a linear coral feature cutting through the trench below. We interpreted this sequence as a first phase of midden deposits, followed by a second phase of levelling and the cutting of a foundation.
trench for a coral rag structure of unknown proportions or shape. Given the proximity of the coral feature to the daub bank which seals the midden, we hypothesise that the coral could represent part of a retaining wall similar to those identified by Juma in the same area, which appear to be part of the levelling of the slope to support the later mosque. The third phase of this trench then includes the destruction or collapse of structural features, which would account for the coral scatter throughout the upper deposits of the trench.

Due to time constraints, the final part of the excavation of this trench was limited to a 1 x 1m sondage into the sealed midden fills to investigate their depth, contents, and the process of deposition and accumulation. This sondage revealed a series of thick, gently sloping midden fills containing large quantities of both terrestrial and marine faunal material, small lenses of shell middens, and ceramics. The middens appear to continue vertically below the level of the modern road cut, suggesting the presence of further archaeological strata to be investigated in the future. Due to the early onset of the rains however, which washed sediments down the road cut across the sections and threatened erosion of the section, the trench was closed before significant damage could be caused to the contexts or the integrity of the road cutting. Reed mats were laid to protect the exposed and unexcavated archaeological contexts, weighted with processed undiagnostic ceramics to support the bank, and the trench was then backfilled with the original spoil.

Discussion

Analysis of the results of excavations in 2019 are still ongoing. At this stage, we can draw out a series of outcomes and directions that will shape interpretation:

The combination of STPs and test excavations have given a greater recognition of the extent of the site (Figure 20). In particular, a large area to the north of the site (behind the ‘Arab house’) can now be recognised as a zone of early settlement contemporary with the site further south;

Excavations have revealed at least two well-preserved earthen houses, with artefact debris intact and recorded in context. This will allow for greater understandings of the nature of domestic life.
The deep midden sequence and possible levelling of areas close to the eastern mosque suggests more extensive occupation in this area than may previously have been recognised.

Ongoing work

Integrating digital and excavation data

One of the ongoing aims of the project is to develop a useful methodology for integrating and synthesising new and legacy datasets for archaeological analysis and interpretation. The variety of archaeological projects focused on the investigation of Unguja Ukuu over the past 35 years offers a wealth of both published interpretation and supplementary data which may be useful even beyond their original purposes. In preparing for the 2019 season of fieldwork at Unguja Ukuu for example, we digitised and drew on the supplementary data of Professor

Figure 20: Updated map of possible excavation areas
Abdurahman Juma’s auger survey of the site (2004) conducted in 1996, in order to develop a distribution map of archaeological inclusions identified in the original core samples. This new distribution map, based on data which had not previously been analysed for this purpose, provided the basis for our targeting of particular areas of the site for further investigation. The results of both our northern STP survey and excavation trenches has demonstrated the value of utilising legacy data for new analytical purposes, and we continue to explore the possibilities of other published and available datasets, especially spatial and remote imaging sources, in our ongoing analysis of the landscape and urban ecology of the site. This work by Dr Tom Fitton is continuing at the University of York under the supervision of Dr Stephanie Wynne-Jones and Dr Federica Sulas (Cambridge University).

Artefact analysis

Undiagnostic artefacts were processed during fieldwork. Daub was weighed, sampled and returned to trenches before backfilling. Undiagnostic ceramics were weighed and counted by context and were also reburied. Iron slag was weighed and recorded by context and imported ceramics were identified and recorded. Both slag and imports were stored at the Antiquities building on-site for future reference. All diagnostic ceramics were exported to the UK and Denmark for analysis under export license from the Revolutionary Government of Zanzibar.

Ceramics are being analysed to create a site typology, using the system devised for recording Early Tana Tradition ceramics by Fleisher and Wynne-Jones (2011). This work is happening in York under the supervision of Dr Stephanie Wynne-Jones. The full database of results will later be made available online.

Glass beads are being identified in the UK by Dr Federica Sulas. A sample will be analysed at the Material laboratory at Urbnet, Aarhus University, under the supervision of Dr Gry Barfod.

Special finds such as metal objects are currently in York for recording and photography.

Sediment sampling

Sediment samples were shipped to Aarhus for characterisation using ICP-AES multi-element analysis. In addition, micromorphological samples are at the University of Cambridge awaiting microscopic analysis. Together this dataset covers both internal domestic and external landscape features and will inform on anthropogenic changes to the sediments.

Faunal analysis (terrestrial and marine)

All bones from this season of excavation were shipped to the University of York for laboratory identification and analysis. This collection comprises 44 kg of exported wet samples, 9.5 kg of heavy fraction flotation samples, and 2 kg of light fraction flotation samples, which are currently being stored under UK DEFRA mandated conditions at the BioArCh facilities of the University of York. Animal bones constitute a large portion of this material. The zooarchaeological analysis conducted by Mik Lisowski includes taxonomical and anatomical identification, and recording of natural and human taphonomic marks,
pathologies, and biometrical data. Preliminary results show that approximately 80% of the assemblage comprises of fish remains and mammals are rare.

Selected terrestrial animal and fish bones will be sampled for stable isotope analysis ($\delta^{13}C$ and $\delta^{15}N$ from collagen and $\delta^{13}C$ and $\delta^{18}O$ from tooth enamel carbonates) to inform on diet and animal husbandry practices. Single compound isotope analysis of amino acids are planned to shed further light on husbandry and feeding ecology in terrestrial and marine ecosystems.

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All samples were exported under license from Zanzibar, and imported to the UK for chemical and physical analysis under DEFRA license, and stored under DEFRA-mandated conditions at the BioArCh facility of the University of York.

Bibliography


