

Coastal Geomorphological Change and Settlement Adaptation in Tanzania from the Sixth to Fifteenth Centuries AD

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Introduction

Research, in coastal Tanzania, was conducted: in the Kilwa area from July to November 2004 as part of a maritime landscape survey of the East African coast (Figure 1) (Pollard, 2007). This paper directly considers the availability and suitability of the coastal fringe for settlement over the last two millennia, particularly in response to evidence of sea level change and consequent processes of erosion and accretion.

Techniques

Evidence of landscape change was adduced from the presence of marine terraces and the results of depositional and erosional processes along the coast. These processes are likely to have been influenced by changes in sea level during the period of study, as well as sedimentation from currents within the estuaries and along the shorelines. Accretion contributed to the development of spits and beach terraces. Using the evidence obtained from archaeological excavations into coastal terraces and spits, an attempt was made to date their formation and reconstruct the landscape.

In order to determine position in relation to an old beach, modern beach stratigraphy was examined and compared to the evidence from test pits. For example, above the High Water Mark (HWM), deposits consist of fine sand derived mostly by aeolian processes, or soils supporting bush or farmland. The littoral fringe, found just below HWM and only covered by sea during spring high tides, generally grades coarser from the HWM to the boundary of the eulittoral zone. Just above the boundary the deposits are poorly sorted, including very coarse sand to small pebbles and sometimes shells. The eulittoral zone (the area covered by

the sea on every high tide) consists of very fine sand, silt and mud, and is normally stained black from the organic remains of mangrove growth.

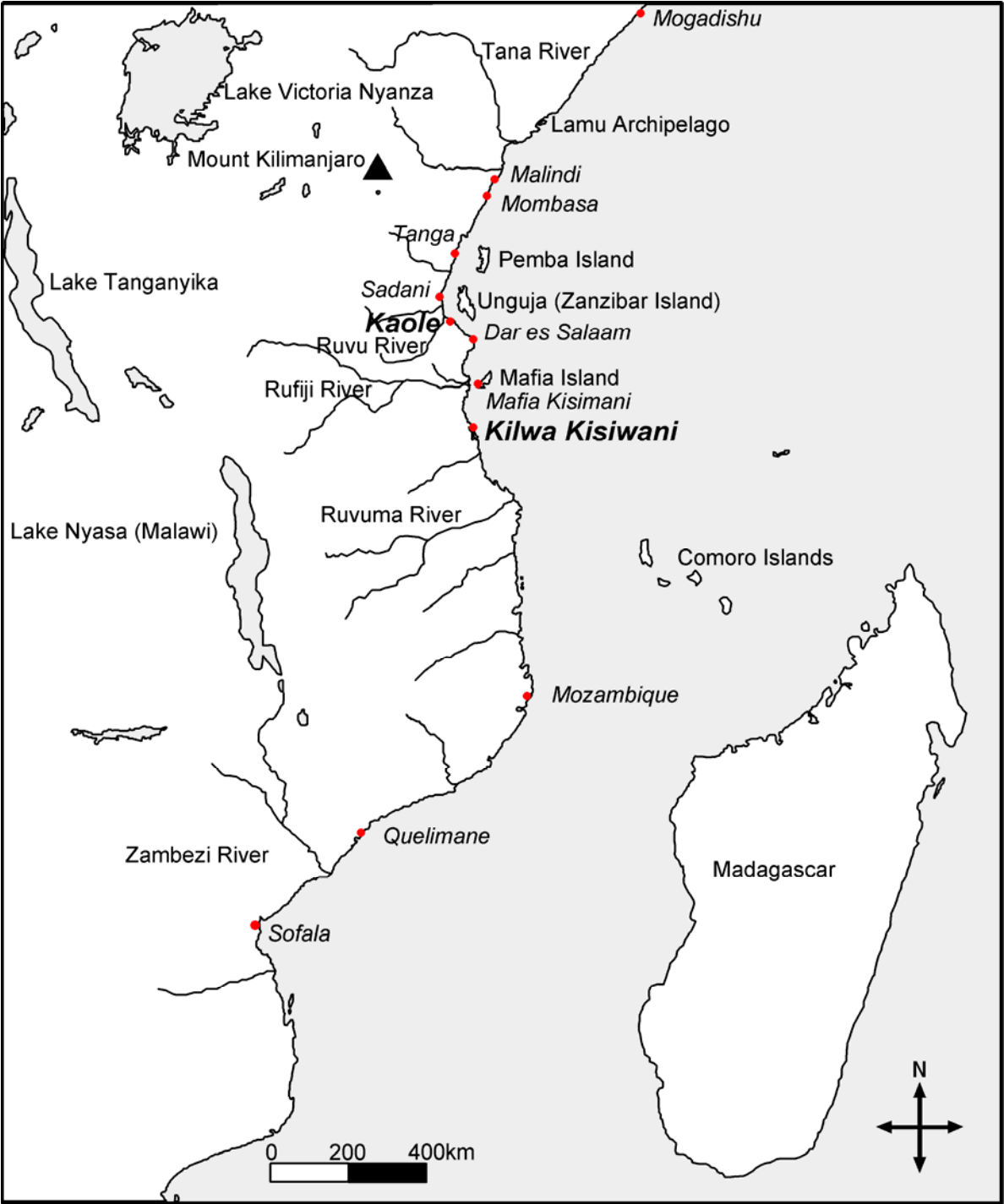


Figure 1: Location of Kilwa Kisiwani with other places in East Africa mentioned in the text.

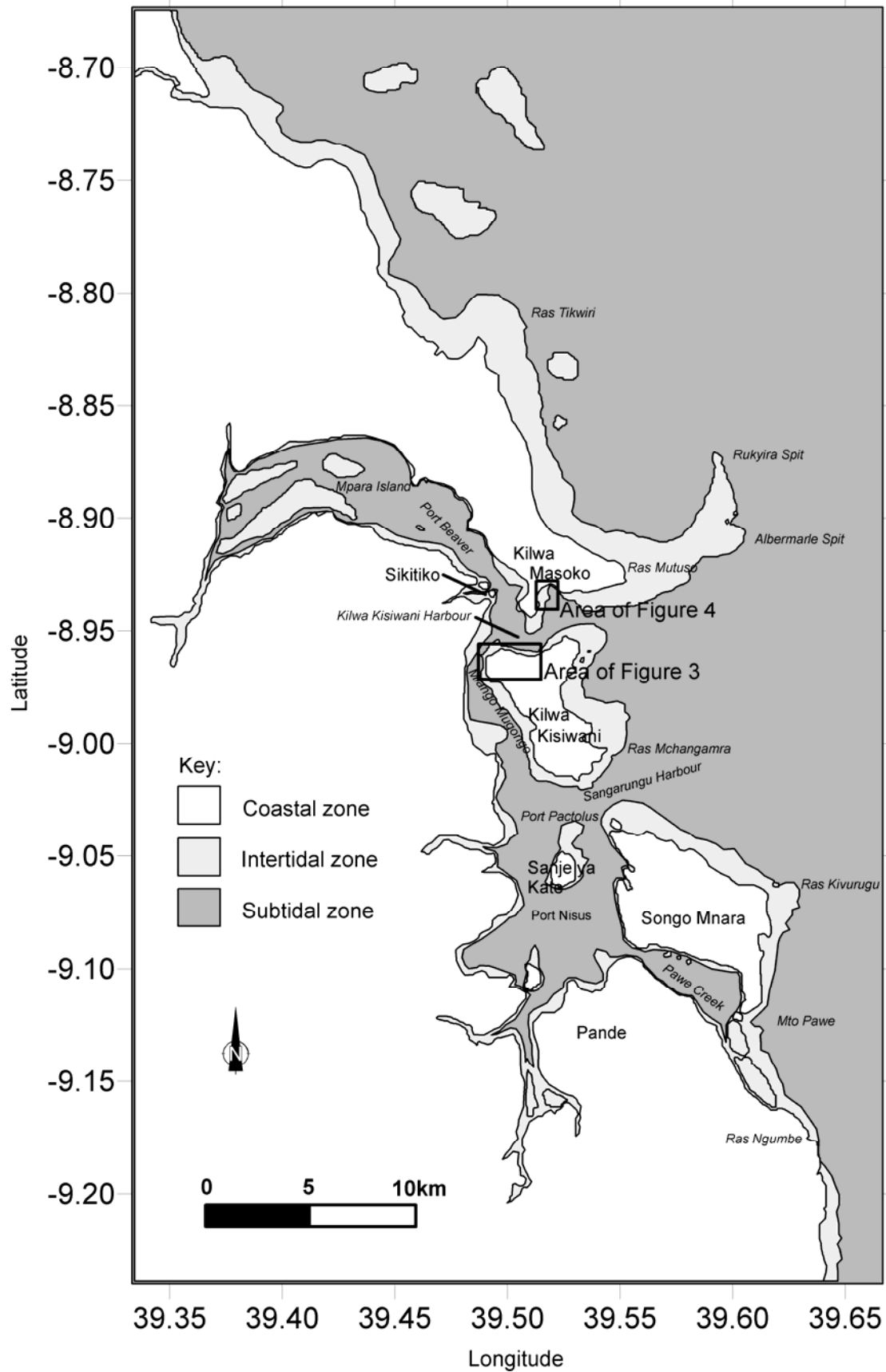


Figure 2: The Kilwa waterways showing the location of Kilwa Kisiwani Village enlarged in Figure 3 and Mso Bay enlarged in Figure 4.

The shape of artefacts in the test pits can indicate the position of the waterline and proximity to settlements and ports. Pottery from each context was described as angular, subangular, subrounded, rounded or well-rounded. More rounded pottery and stone from ruins indicates that it has at some stage been below the HWM and subject to wave action. It also indicates that the pottery was not covered quickly by beach sediment.

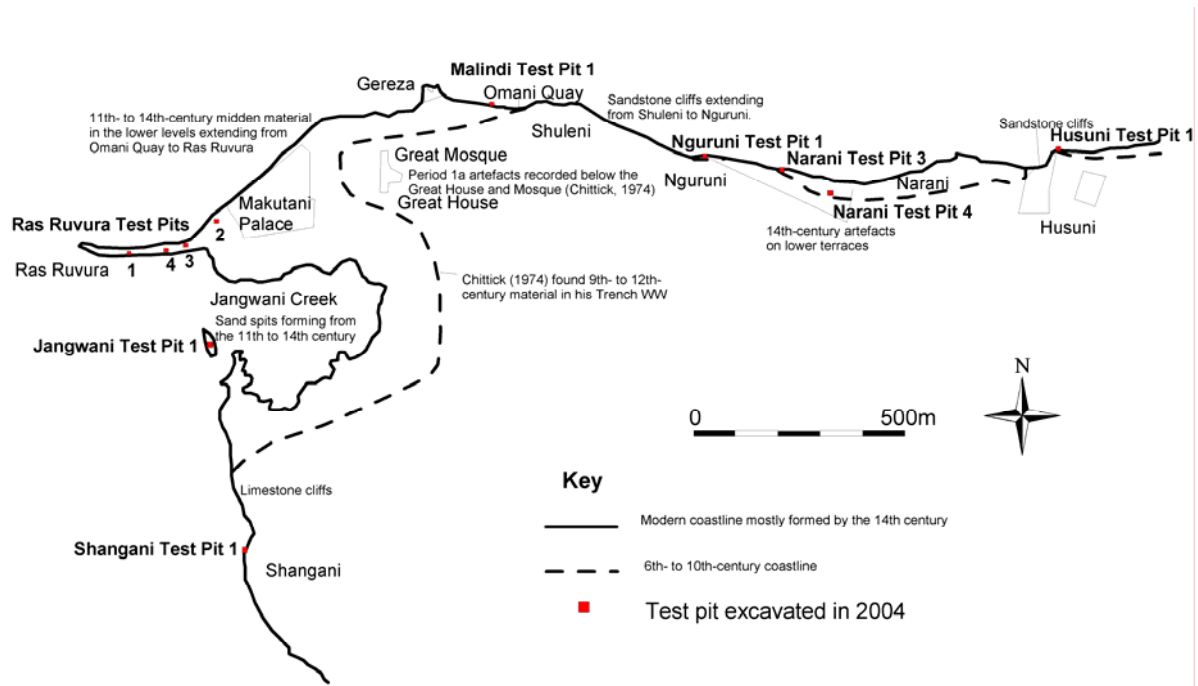


Figure 3: Reconstruction of the approximate position of the HWM in the late 1st millennium AD at NW Kilwa Kisiwani from evidence from test pits by Chittick (1974), Matteru (1989) and Pollard (2007).

Kilwa background

The Kilwa Estuary between Ras Ngumbe and Ras Matuso contains a number of islands, of which Kilwa Kisiwani and Songo Mnara are the largest (Figure 2). Kilwa Kisiwani is separated from the mainland to the north by a deep channel 1 to 2km wide. This area is referred to as Kilwa Kisiwani Harbour and was the centre of archaeological investigations. The land immediately above HWM consists of arenaceous and limestone cliffs with sandy beach terraces or beach plains in bays. Sand spits have also formed through the flow of currents in and out of the estuary e.g. Ras Ruvura (Figure 3).

Chittick (1974: 27) considered the settlement on Kilwa Kisiwani to have begun around AD800 (Figure 3). The modern village of Kilwa Kisiwani is on the same site as the ancient town of Kilwa, and is sited at the NW end of the island (Figure 3). An increase in wealth occurred in the late 12th to 14th century as Kilwa became involved with the gold trade at

Sofala (Freeman-Grenville, 1962: 91-2; Chittick, 1974: 237-40; Horton and Middleton, 2000: 81).

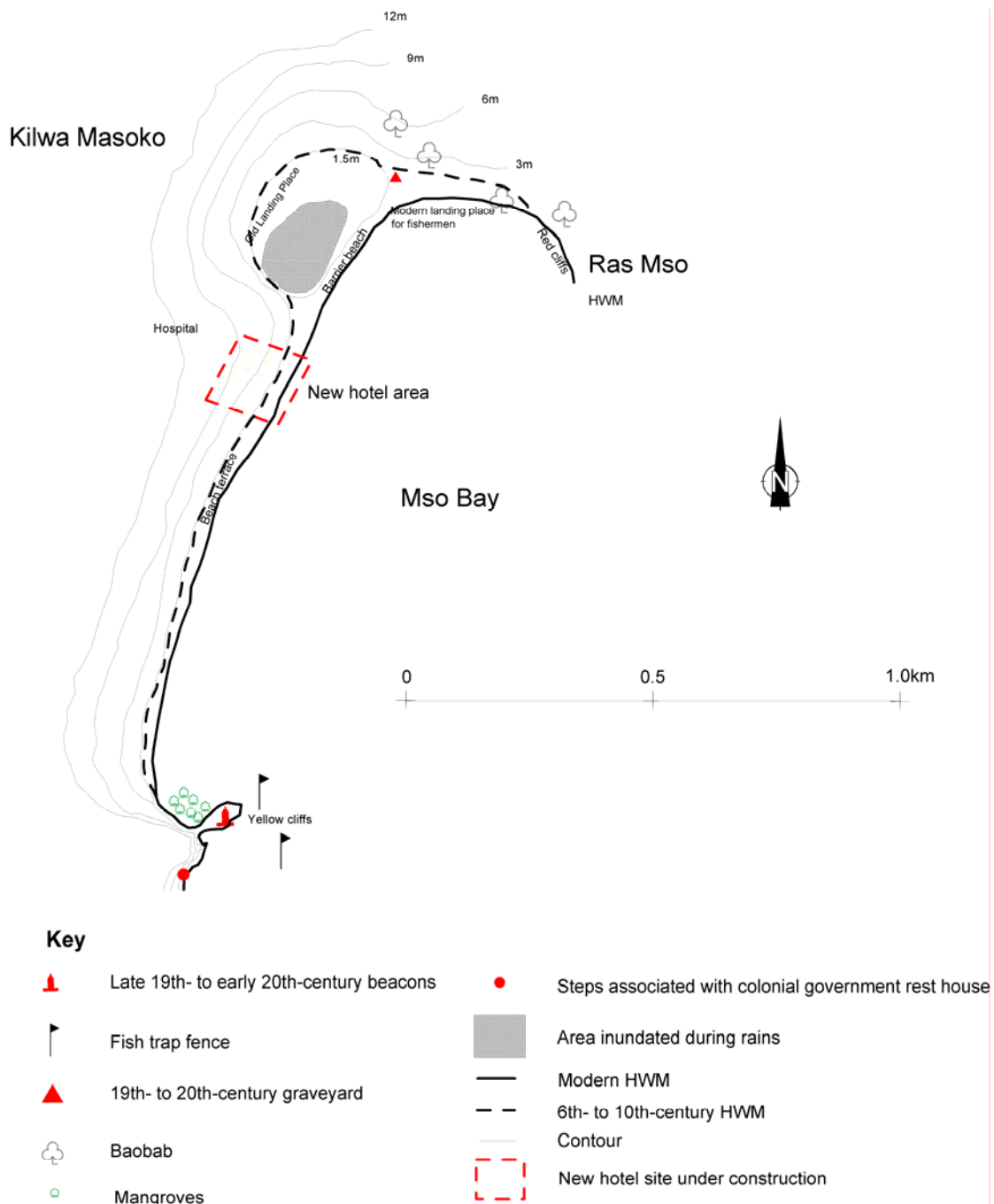


Figure 4: Map of Mso Bay at Kilwa Masoko showing the location of an older HWM.

The HWM during the late 1st millennium AD at Kilwa

6th to 9th century pottery was discovered landward at Mso Bay (Figure 4) in Kilwa Masoko separated from the modern HWM by a 50m wide beach terrace. The beach terrace forms a barrier beach blocking off a low area at the north end of the bay (Figure 4). This may have

been an important sheltered landing place. Chittick (1974) recorded the only other TIW in the area in the basal deposits of trenches near the Great House and Mosque (Figure 3). This was probably near the western end of a spit extending from the cliffs at Shuleni and Nguruni to the east.

Therefore, settlement in the latter half of the 1st millennium was either not near the HWM or, more likely, that coastal geomorphological change has occurred, and the coastline has moved seaward leaving the old HWM further inland. This may be due to a fall in sea level during the 2nd millennium.

Growth of spits and terraces in the early 2nd millennium AD at Kilwa

The beach terrace at Mso Bay is likely to have formed at the same time as the spits and terraces on the opposite side of the harbour on Kilwa Kisiwani. During the 2nd millennium AD more low sandy areas were exposed. The area where Chittick (1974) discovered TIW, below the Great Mosque and Great House, grew northward to Kilwa Kisiwani Port and Mbuyuni, and westward to Makutani and Ras Ruvura. These areas formed from currents depositing sand along the SW part of Kilwa Kisiwani Harbour (Figure 3).

The dating evidence for these newly exposed areas comes from excavations and artefacts eroded from the spits and terraces. A series of test pits was excavated at Ras Ruvura to date the growth of the spit (Figure 3). Ras Ruvura TP2 (Figure 5) was stopped at waterlogged sediment (Context 7) containing orange staining, probably mangrove root traces. This indicates the presence of mangroves on the lower part of the littoral fringe as the sand was mostly coarse.

The pottery implies an earliest date of 13th to 14th century for Context 7. This would probably indicate that Context 6 with its celadon, blue on white porcelain and lines of punctuation dates 14th to 15th century, though the relatively short time span between the contexts shows high siltation rates during the 14th to 15th century.

The growth of the Ras Ruvura sand spit was probably helped by the fall in sea level around the 13th to 14th century recognized by Möerner (1995) from eroded reef coral at Kilwa, of about 1m between the 11th and 14th centuries. It would appear that sea level was higher in the late 1st millennium when evidence of settlement is only on the low sandy areas around the

Great Mosque. During the early 2nd millennium sea level was falling and the HWM spit grew northwards to Kilwa Kisiwani Port, where the earliest evidence is around the 12th century, and westwards to Ras Ruvura by the 14th century.

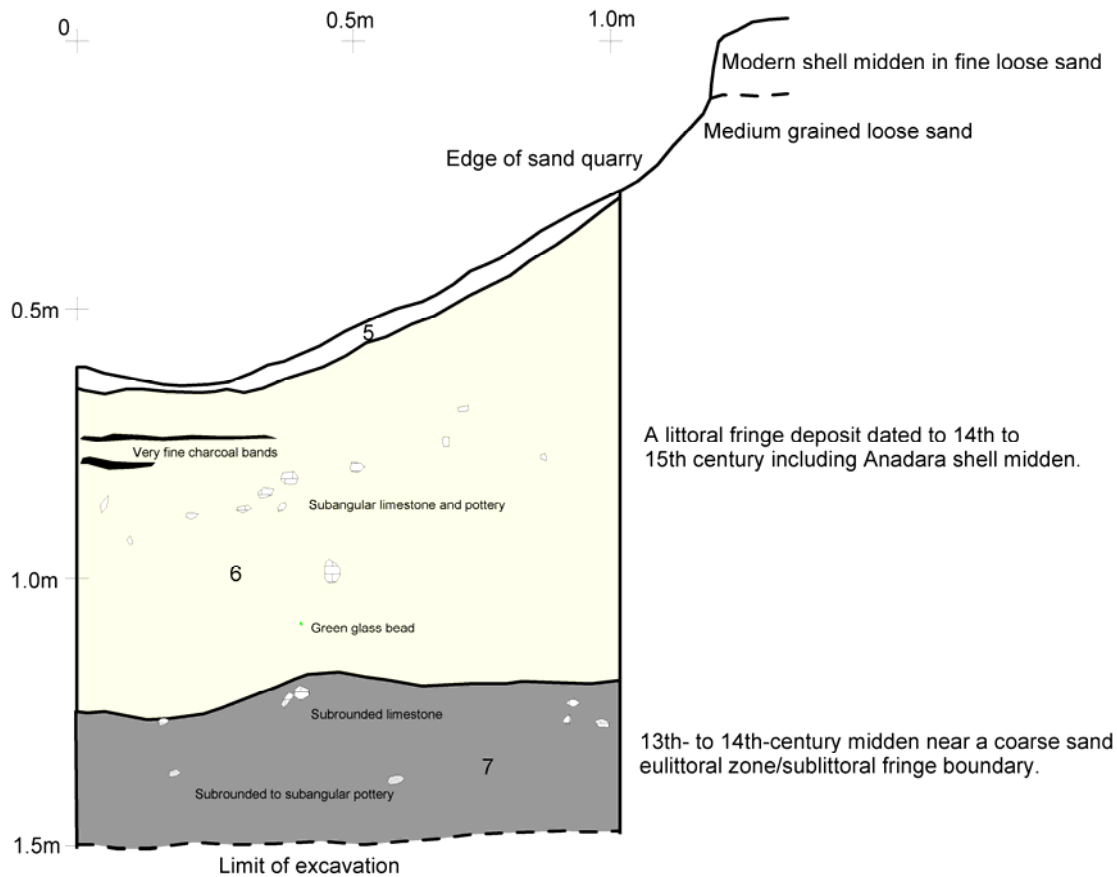


Figure 5: Ras Ruvura Test Pit 2 east wall.

Rise in sea level in the mid 2nd millennium AD at Kilwa

A subsequent rise in sea level at the end of the 14th century or 15th century may explain the erosion at Kilwa Kisiwani Port, as midden and building material built up during lower sea levels is now being worn away. An alternative explanation is the well-documented trade in mangrove poles (Lane, *forthcoming*) or local use of mangrove caused erosion due to their removal. The erosion may well have prompted the building of a sea wall at Shuleni dated by Chittick (1974: 232) to the 14th century and 15th century. Pottery behind the Omani Quay indicates a similar date for this sea wall. It does not explain why the same is not happening to other spits and terraces, such as Jangwani Creek and Narani Bay, though sediment deposition may be counteracting erosion.

Conclusions

The geomorphological evidence points to a likely fall in sea level, of c. 1 to 2m, between the 10th and 14th centuries, which allowed the appearance of greater areas of low sand terraces and spits at Kilwa as well as jangwanis and/or mangrove forests. Artefacts from before the 10th century were not found, in situ, on the spits and terraces during the survey, strongly indicating they did not exist prior to that time, and signifying a higher sea level.

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