TANZANIA

Archaeological Reconnaissance of the Mkulumuzi and Sigi River Valleys, Tanga District, Tanzania

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Introduction

This report summarizes the results of a phase one archaeological reconnaissance, conducted in June and July of 1995, of the Mkulumuzi and Sigi River Valleys, two limestone gorges in northeastern coastal Tanzania, Tanga district. The gorges include several stretches of limestone cliffs that include large caves and rockshelters. Limestone caves in Africa often preserve long prehistoric sequences and provide excellent preservational contexts for faunal materials. However, limestone caves and rockshelters are rare in Africa and particularly in East Africa. We conducted our reconnaissance because we deemed it likely that the limestone caves and rockshelters in these gorges would preserve faunal and technological sequences of substantial antiquity. We particularly hoped to find caves/rockshelters with remains dating to the Middle Stone Age (MSA) and thus contribute to an understanding of the origins of modern humans in Africa.

Background to the Research Region

We defined the research region as the valley of the Mkulumuzi River, the Sigi River, and their tributaries within the Tanga district (see Figure 1). The area covered by our archaeological reconnaissance included most of the river valleys and tributaries beginning at the eastern end of the Mkulumuzi gorge at 39° 2' 50" E by 5° 4' 30" S, just west of the village of Kiomani, about 2 km west of the point at which the Mkulumuzi River enters Tanga Bay, and extending 20 km inland. Our permit area did not extend beyond the Tanga district boundary so we did not survey outside this area. Both rivers flow out of the Usambara Mountains near the north-eastern coast of Tanzania. The mouths of both rivers flow into Tanga Bay, which opens into the Indian Ocean near the city of Tanga.

Tanga is a large port city with Swahili roots. During the boom of the sisal trade many migrants from other African countries, notably Mozambique and Kenya, settled the Tanga region and entered the sisal business. Most of the arable land around Tanga on the coastal plain was planted with sisal. Most of the sisal plantations collapsed after the sisal market deteriorated. Many migrants began cropping the arable land around the sisal plantations, while the main parts of the sisal plantations became overgrown with bush and tall grass. Fallow sisal plantations cover much of the landscape.

Scattered through the countryside are many small villages and farming settlements numbering between several hundred people down to small families. The village of Amboni is one larger settlement and it lies between the mouths of the two rivers. The caves that form a National Monument are named after this small agricultural community (the Amboni Caves).

Rainfall in the region is high, averaging over 1500 mm per year, and this results in a thick lowland tropical vegetation throughout the coastal plain where sisal cropping is absent. Most of the vegetation in the research region is secondary. On the coastal plain outside the river valleys sisal, in long rows with tall grass growing wild between the plants, covers the rolling hills. Trees are uncommon in these areas because most have been cleared for sisal cropping, or cut for timber and charcoal. The few rare and protected trees are found in villages where they provide some valued shade.

The alluvial plains along the river banks are typically small, rarely more than one hundred meters wide. Further west these alluvial plains widen as the gorge becomes less pronounced. Most of these areas are in active cultivation with coconut, banana, and plantain trees dominating. These small *mashamba* (farms) also include oranges, onions, maize, sugarcane, and cassava. In areas not actively cultivated thick bush and sometimes tall grass covers the ground. Domestic animals such as goats and chickens are common,

but pastoralism is not a major component of the local economy.

The wild fauna is depauperate, presumably due to intense hunting and environmental degradation. The only large mammal that appeared reasonably abundant was the bushpig (*Potamochoerus porcus*). Many of the small trails that we used were probably bushpig trails. Local inhabitants told us that crocodiles inhabited the Sigi River but we did not observe any.

The entire research region falls in an area underlain by the Tanga limestone. The Tanga limestone is Jurassic in age and is very pure with a chemical composition of 98% calcium carbonate (Cook 1967). The limestones occur in porcellanous, oolitic, and coralliferous varieties, and are jointed and well bedded. The Tanga limestones outcrop over an area of about 90 square miles, but a mantle of sands, clayey sands, and silty clays of Pleistocene age cover the extent of the limestone outside the gorges. Further west the sands and silty clays give way to black cotton soils.

The research region is a karst landscape of deep gorges with rock walls, extensive pavements of limestone cut by deep fissures and grykes, fields of eroded limestone pillars, circular solution hollows, and extensive systems of caves and rockshelters opening to the surface within the gorges. The most common area of limestone outcrop is where the Mkulumuzi and Sigi rivers and their tributaries have cut through it. However, on the rolling hills and plains outside the gorges there are numerous horizontal exposures of limestone occurring as large plates with cracks and fissures. Many of these fissures are fairly shallow and chocked with vegetation. Some are deeper and may link with more extensive cave systems.

The Mkulumuzi River gorge runs west to east, and the limestone cliffs of the gorge open on to the coastal plain and turn away north and south. The gorge varies in the first km from 20 to 60 m high, and the limestone beds vary from 40 cm to 1 m thick (Harpum 1949). We found that many of these smaller beds can be grouped into larger beds based on color and texture of the limestone. These larger rock units vary in resistance to erosion and this results in the formation of the rock shelters. Many large caverns and caves riddle the walls of both the northern and southern sides of the gorge. Geologists have explored the gorge up to 4 km to the west (Smith 1963; Cook 1967). We explored approximately 15 km further upriver. We found that the limestone formations were exposed more intermittently to the west and eventually disappear. The limestones to the west also show less gradient and the gorge eventually gives way to a meandering river profile prior to entering the Usambara Mountains, where it becomes a fast-moving mountain stream.

Field Methods

Our goals and the local terrain determined our reconnaissance and survey methods. Our plan was to cover most of the research region on foot, walking the river valley and gorge walls looking for sites and caves/rockshelters (Figure 2). Several realities of the local terrain interrupted our plans. The local vegetation posed the most severe interruption. The vegetation in most areas was thick and often impenetrable. Along the walls of the gorge the brush and tree growth was dense, so much so that the walls of the gorge were often completely obscured even when we were within several m of the wall. To reach the gorge walls it was generally necessary to hack a trail with machetes. This required substantial time and effort, and generally this gained access to only a small area.

A second problem was the lack of footpaths through the entirety of the gorge. Footpaths generally entered the gorge from above, and then continued only a short distance along the riverbanks, generally leading to a farm. Once these paths ended there was no other option than to again blaze a new path. This meant that substantial amounts of time were spent entering and exiting the gorge, looking for new access points. This restricted our ability to access some areas, and generally cost valuable time.

A third problem was the general lack of ground visibility. The sediments along the riverbanks were, for the most part, completely obscured by vegetation. Erosion exposed a few areas and we generally checked these for artifacts. This was also a problem in the abandoned sisal fields where weeds and grass had grown up between the sisal rows. However, it was often possible to observe the sediments in these areas and we did so regularly. Also, the small farms currently in cultivation often had visible sedi-

Figure 1. East Africa and the Tanga Region.

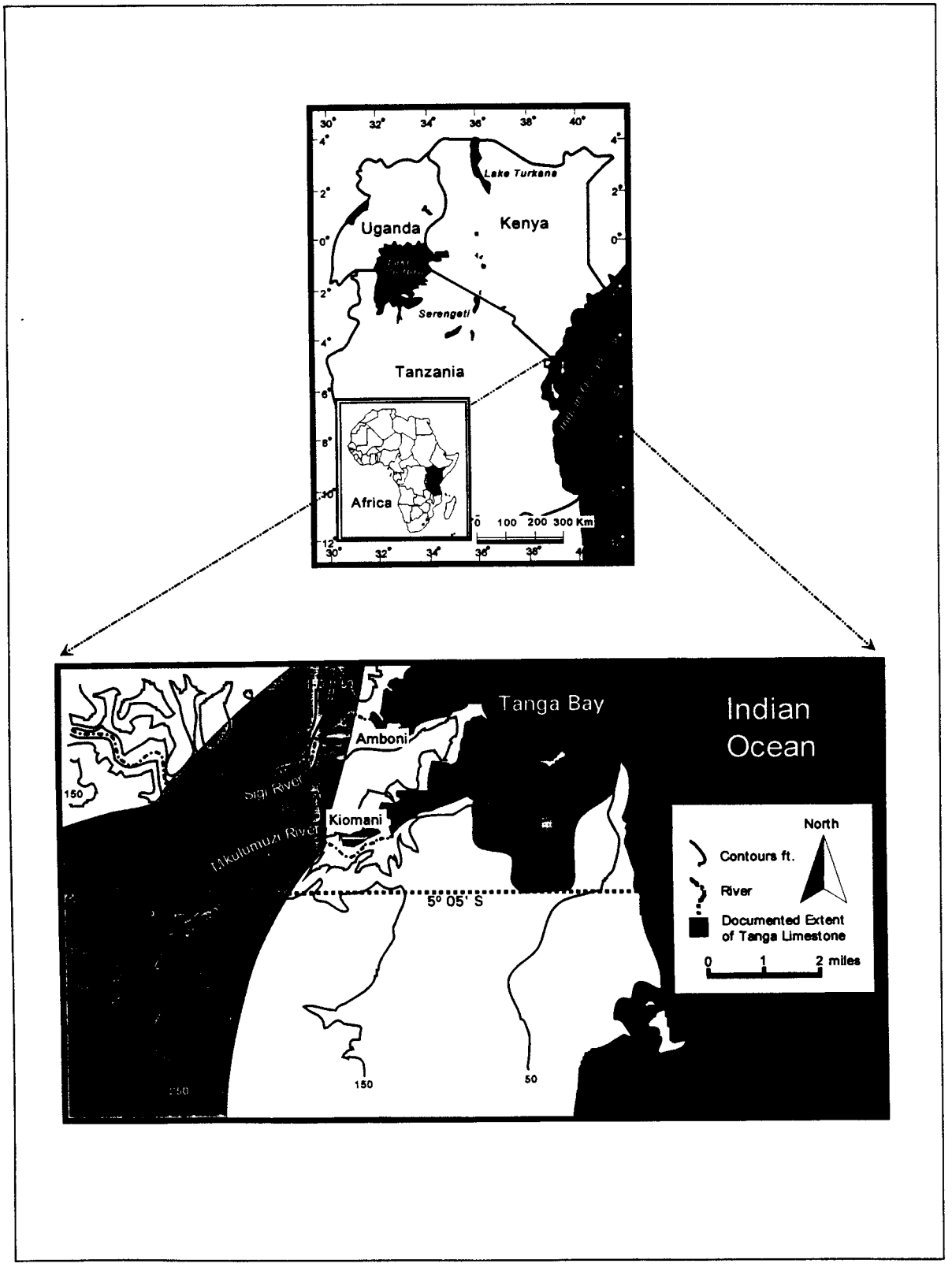


Figure 2. The estimated area covered on foot by the reconnaissance.

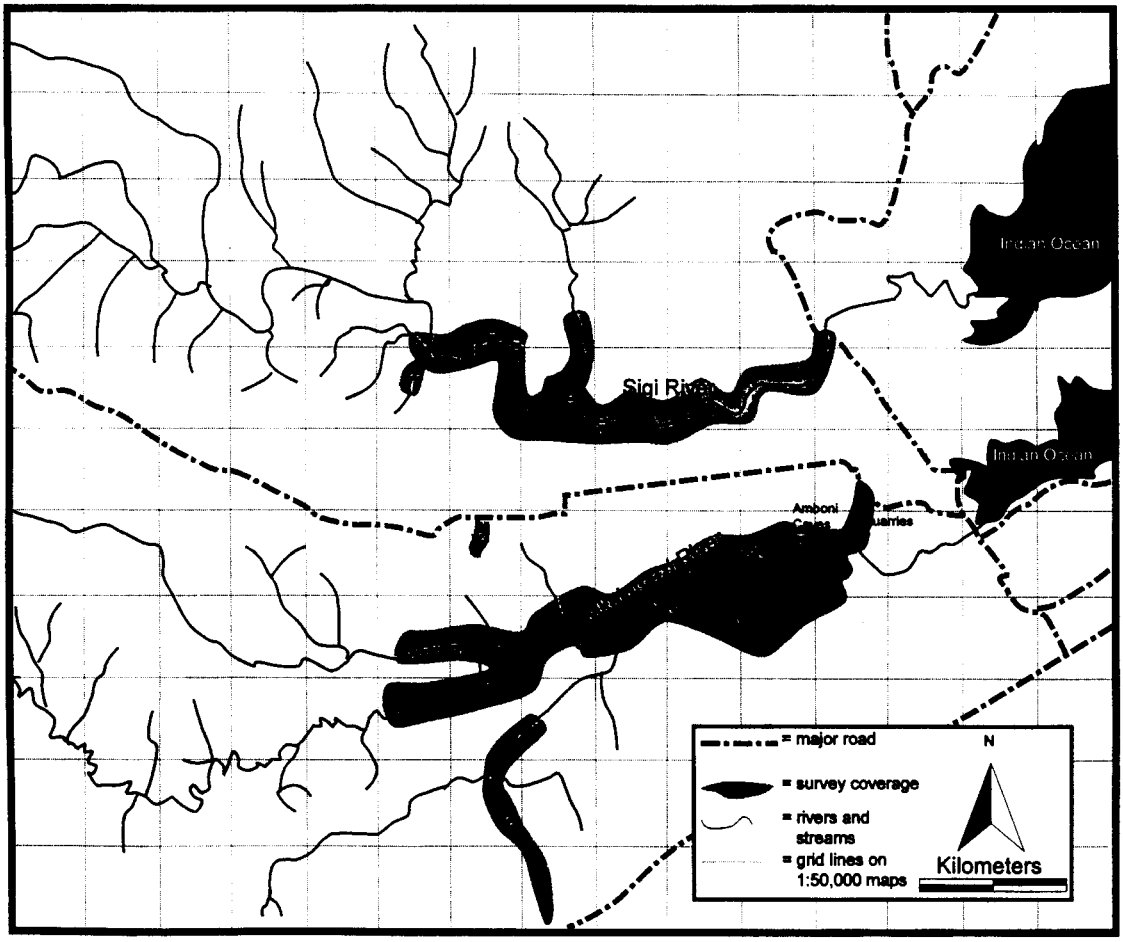
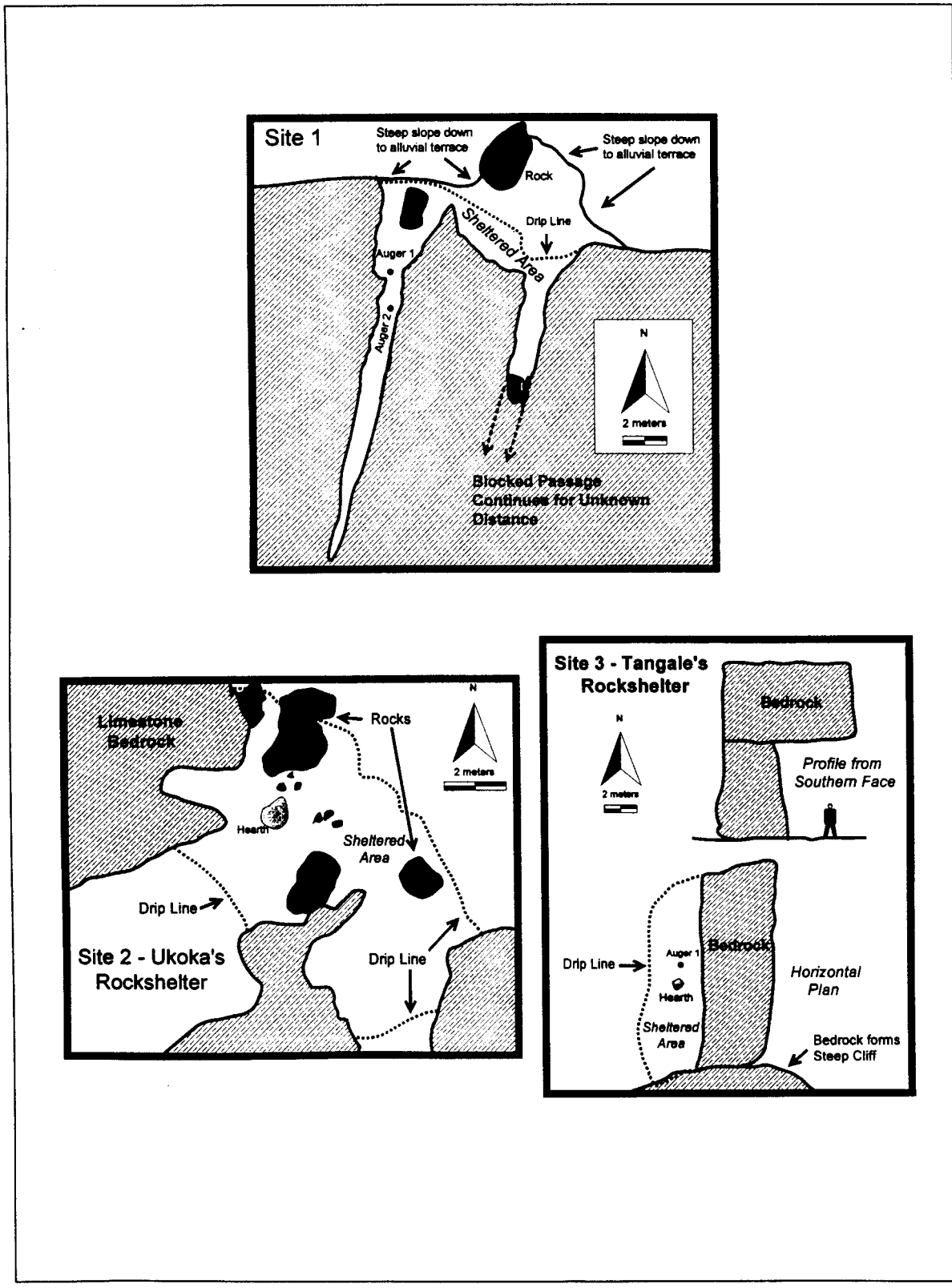


Figure 3. Plans of Sites 1, 2, and 3.



ments, and we checked these for artifactual remains as well.

This lack of visibility forced us to change our plan. Instead of attempting to walk the entirety of the gorge, we began a program of relying on local informants to direct us to promising rockshelters and caves. This proved to be the most effective approach as most of our discoveries resulted from guides. Many local farmers had been in this region a long time, and many of them had used several caves/rockshelters in the past.

We plotted all discovered sites on 1:50,000 topographic maps. A hand-held Global Positioning System (GPS) was then used to attain an exact horizontal and altitude fix on the site. We then described all sites with a standard data form that recorded ecological, archaeological, and geological information. We photographed all sites and the local terrain. We mapped and augered sites that proved promising.

Results of the Fieldwork

Our survey of the research region found a surprising lack of evidence for Stone Age occupation. Lithic artifacts were extremely rare on the surface of the research region, and this rarity includes the Sigi and Mkulumuzi gorges, agricultural fields, and the surface of the caves and rockshelters. Iron age and historic pottery was common on the surface in the Sigi and Mkulumuzi gorges, the agricultural fields, and in the caves and rockshelters.

Despite the lack of surface material we found numerous caves and rockshelters that looked promising as possible Stone Age occupation sites. Many of these had substantial floor space covered by cave ceilings and rock overhangs and were well protected from the wind and rain. They appeared relatively dry (at least during the dry season), and most showed signs of recent occupation. Any of these sites, if found elsewhere in eastern Africa, would likely have had archaeological sediments. Our auger tests failed to reveal conclusive evidence of Stone Age occupation in these sites. However usually we were not able to penetrate to the bottom of the deposits, either because the sediment was too hard or too deep. Most of the sites we discovered require test excavations for proper evaluation. However, our small budget did not provide sufficient funds for both reconnaissance and test excavation.

Below we describe the most promising caves/rockshelters. All positions are as degrees.minutes.meters. A researcher could enter these measurements into any modern GPS unit and the GPS used to lead the researcher directly to the site with an error of just 10 m. The GPS provided reasonably accurate altitudes for some sites, while others had high error factors and these are noted.

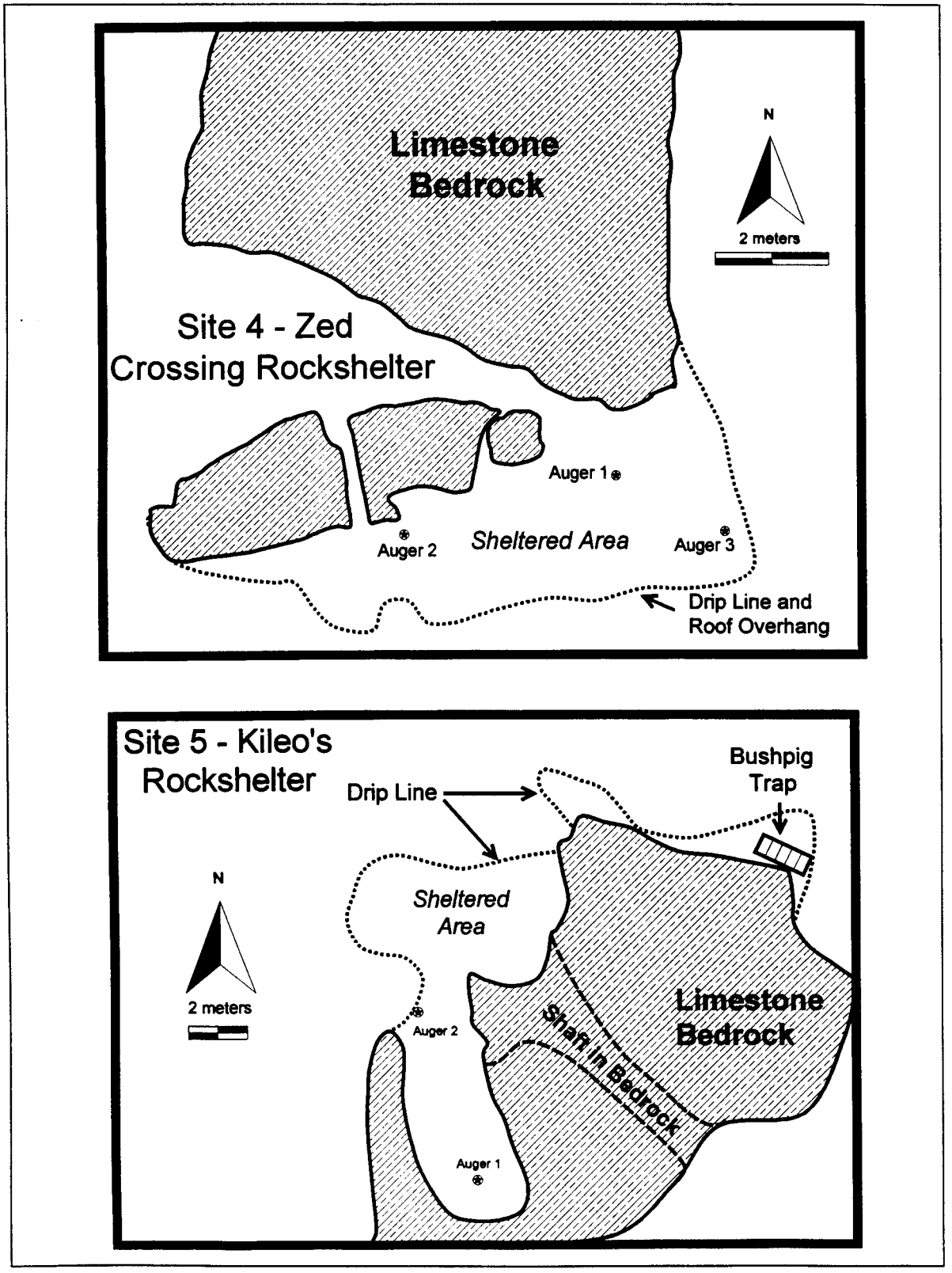
Site 1 - see Figure 3 (S5.4.377 E39.2.562, alt 34 m a.s.l.)

This is a reasonably large cave complex composed of 2 solution cavities. The eastern cave is about 2 m wide by 8 m deep, and the western cave is about 2 m wide by 34 m deep. The solution cavities connected by a small overhang and together form a fairly large and well-sheltered location. The mouths of the caves open onto an alluvial terrace along the edge of the Mkulumuzi. The Mkulumuzi flows just 50 m to the north.

The surface sediment is a hard brownish clayey silt. Polygonal cracks are abundant near the back of the solution cavities suggesting regular wetting and drying during the wet season. Ceramics were found on the surface near the sides of the cave and were a mix of historic and Iron Age. A few possible lithic flakes were found on the surface but they were not diagnostic being made on the same raw material as the walls of the cave. Faunal remains were also present on the surface, including one fossilized and cutmarked calcaneum of a small bovid.

The sediments were augered in two locations. The sediment was extremely hard and resistant to augering. The deepest auger penetration was only 61 cm and did not reveal any artifactual remains or signs of archaeological sediments. The context of the site is such that we would predict this to be a good location for prehistoric occupation. The augering failed to show signs of occupation, but to really answer this question a test excavation is warranted.

Figure 4. Plans of Sites 4 and 5.



Site 2 (Ukoka's Shelter) - see Figure 3 (S5.04.215 E39.00.561, alt 42 m a.s.l.)

This shelter is at the base of several slopes in a landscape characterized by several limestone pillars and cliffs. The sheltered area is formed by three large limestone blocks, cemented together, that are perched on pillars of limestone that project under the soil. The sheltered area is about 41 m^2. The floor of the shelter is flat and dry and the shelter provides excellent protection from the elements. Modern rock art is present, and there is ample evidence for modern cooking and camping. Unfortunately two nests of extremely agitated wasps occupied the shelter and harassed us regularly.

Thick bush surrounds the shelter in the middle of several agricultural fields of maize and cassava. It is outside the gorge of the rivers and is roughly 1 km from the Sigi. Ceramics were abundant on the surface, but most appeared modern. We augered the sediments in two locations but the sediment was hard and our auger penetrated a maximum of only 20 cm. The augering revealed neither artifacts nor archaeological stratigraphy.

The context of the site is such that we would predict this to be a good location for prehistoric occupation. The augering failed to show signs of occupation but test excavations would be necessary to answer this question.

Site 3 (Tangale's Shelter)- see Figure 3 (S5.3.429 E39.1.033, altitude error too high)

This shelter was probably the most promising location found. This is a classic overhang shelter near the base of the gorge of the Sigi River, which flows just 100 m to the north. The overhang of the shelter provides about 20 m2 of sheltered floor space. The shelter provides excellent protection from wind, sun, and rain. The shelter sits on an alluvial terrace about 10 m above the flow of the Sigi. Agricultural fields of coconut, cassava, and bananas blanket the terrace.

The floor of the shelter is flat. A stone-lined hearth in the center of the shelter attests to its attractiveness to people. Modern and potentially Iron Age ceramics were present on the surface. The sediments under this shelter were soft and the auger penetrated them very easily. The deepest auger penetration reached 2.4 m, when we could no longer pull the auger out due to the roof interfering. The auger displayed a long sequence of alternating sandy, silty, and clayey sediments interspersed with clear archaeological layers represented by ash lenses, ceramics, and shell. No stone artifacts were found.

This site has excellent potential as an Iron Age locality. Its potential as a Stone Age locality remains questionable as we did not find any Stone Age remains. However, we note that it is likely that our auger did not penetrate deeply enough to sample Stone Age deposits if they are present. This site would require deep and extensive excavations. Even test excavations would require considerable sediment removal.

Site 4 (Zed Crossing Shelter) - see Figure 4 (S5.3.677 E39.1.011, altitude error too high)

This is a promising shelter formed in a limestone bluff. There are 3 layers of limestone, the lowermost being more heavily eroded and undercutting the upper to form the shelter. Erosion of the limestone was by solution. The overhang of the shelter provides about 36 m^2 of sheltered ground space.

The sediment of the shelter was a hard reddish clayey silt. Much of the sediment shows polygonal cracking suggesting wet conditions, maybe with standing water, during the wet season. Some of the surface sediment was disturbed, perhaps by bushpigs. We discovered no artifacts on the surface.

We augered the sediments in 3 locations. Augering was difficult due to the hardness and we could not penetrate more than 40 cm. These top 40 sediments were sterile and showed no stratification. The shelter was an ideal location for human settlement. However, our preliminary investigations revealed no evidence of human occupation. Test excavations would be necessary to properly evaluate this site.

Site 5 (Kileo's Cave) - see Figure 4 (S5.3.677 E39.1.11, altitude error too high)

This is an excellent shelter formed by a massive and precariously overhanging piece of limestone that leads into a solution cave. The best area for habitation is below the overhang, but it is so

precarious that we felt worried standing under it just for the time necessary to sample the sediments. There was about 22 m^2 of sheltered floor space. The surface sediments were dry and hard red-brown sandy silts.

Iron Age and modern ceramics were present on the surface. However, there were no lithics or fauna on the surface. Recent signs of occupation included several hearths and a bushpig trap near the shelter.

We augered the sediments in 2 locations. The deepest penetration only reached 42 cm due to the hardness of the sediments. These sampled sediments were sterile and featureless. Like several of the other shelters, this one appears to be ideal for prehistoric settlement. Our investigations did not reveal evidence of Stone Age occupation, but test excavations would be necessary to properly evaluate the site's archaeological potential.

The Main Amboni Caves - (S5.4.395 E39.2.817, 33 m a.s.l.)

These are the main Amboni Caves that are a regular tourist attraction and have been described by visiting geologists. However, no one has provided any archaeological evaluation of the sediments.

There are several chambers, openings, and overhangs that provide excellent shelter from the elements. Any of these would be fine locations for prehistoric settlement, particularly given the close proximity to the Mkulumuzi. We did not find any lithics on the surface surrounding the caves nor in the caves. However, exposed by the road-cut just outside the caves is a shell-midden with small bones and pottery. This is perhaps an important Iron Age locality that warrants further investigation.

We augered in several locations to examine the deposits. These caves are extremely complex and we lacked the means to map them appropriately, so we have not included maps. All of our augerings penetrated deeply, well over 2 m. The sediments displayed many alternating bands of clayey silt and ash. We found no artifactual evidence of human occupation, nor did we find any microfaunal layers, which is unusual for a cave such as this. The burned ash layers could be natural, possibly burnings of bat dung.

Conclusions

Our results provide the first systematic survey for Stone Age sites in north coastal Tanzania. We found several caves/rockshelters that appeared to be excellent locations for Stone Age settlement. Examination of the surface deposits and augering, however, provided no conclusive evidence for Stone Age occupation of these sheltered locations. Our surface survey of the surrounding regions, including agricultural fields, alluvial plains, ridges, and valleys showed little evidence for Stone Age occupation. However, Iron Age occupation was present. Test excavations of the caves/rockshelters would be necessary to test conclusively for Stone Age occupation.

There are many deep crevasses and solution cavities in the limestone that open to the surface in the surrounding countryside. Many appear similar in structure to the solution cavities in South Africa that preserve breccia sites. We explored several of these crevasses and found flowstone and cemented breccia on the crevasse walls. Most of the crevasses had sediment on the floors that clearly washed in from above, and many of these sediments appeared deep. Some of the breccia we examined had low frequencies of micromammal remains. A systematic survey and testing of these locations could be paleontologically valuable. Our time and budget constraints did not allow detailed examination and mapping of these crevasses.

We are puzzled by the lack of evidence for Stone Age occupation in this region. It is possible that the Stone Age material is simply buried so deeply that we did not discover it. However, we did not find Stone Age material on the surrounding landscape and there were sufficient exposures, deflated and eroded areas, and cultivated fields where this material should have been in evidence if it was present. Further west toward the Usambara Mountains we did find Stone Age material outside the river valleys, but this was near the boundary of our permit area.

If in fact Stone Age material is lacking, then what are the possible reasons? One possible explanation is that dense lowland rainforests are poor locations for foraging peoples because they lack of edible plant foods (Bailey et al. 1989). The Tanga region receives about 1500 mm of rainfall annually, and the natural vegetation state of

the region is dense lowland rainforest and mangrove swamps. During warm and wet phases of the Pleistocene, it is likely this area received even more rain than it does today.

During cold and dry Pleistocene intervals, it is possible that this region did not see the aridification that other areas in Africa have shown. Studies of species diversity (flora and fauna) show that the Usambara Mountains and the Tanga region is one of five pockets of extremely high forest endemism. These regions are widely considered to be forest refugia during glacial stages in Africa (Hamilton 1982). If this is correct, perhaps the Tanga region was densely forested with wet lowland forest and thus unattractive to human settlement until iron-equipped farmers entered the region in the late Holocene.

Alternatively, it is possible that the recurrent pattern of expansion and contraction of the forest zone centered around the Usambara Mountains made the region between Tanga and the Usambaras only intermittently inhabitable by hunter-gatherers. This unstable forest edge may have been an ecotone where risks of subsistence failure were sufficiently high as to deter settlement or require special adaptations, such as with the Okiek hunter-gatherers that recently inhabited the montane forest ecotones (see Blackburn 1982). If this is correct, then remains of Stone Age human settlement west of Tanga would be rare and/or concentrated at `settlement magnets'. Testing these competing ideas requires further investigation including excavations at the recently discovered sites and reconnaissance and survey further west toward the Usambaras.

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