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Eastern equatorial forest variant of acheulean and subsequent stone age industries: a report of stone age industries discovered in Kabanga, Northwestern Tanzania

Abstract

Following the desire by Kabanga Nickel Company Ltd. to develop nickel mining in Ngara District, north-western Tanzania, the Kabanga Nickel Project (KNP) commissioned assessment and retrieval of cultural heritage, i.e. (property and sites having archaeological, paleontological, historical, cultural, artistic or religious value) followed by mitigation measures as required by both the Government of Tanzania and the International Finance Corporation. Consequently archaeological fieldwork was undertaken in four phases in October 2007, January 2008, November 2009 and June 2010. The fieldwork discovered archaeological assemblages spanning the Acheulean Later Stone Age (LSA) continuum on technological and typological grounds in a total of 59 sites. This discovery is important for exposing the cultural heritage of this part of north-western Tanzania and by extension that of the neighbouring Rwanda and Burundi hitherto an archaeological terra incognita and for widening the distribution of the Acheulean in Tanzania. Archaeological knowledge of the neighbouring countries is restricted to the later prehistory and proto history fieldwork included vehicle and pedestrian survey and subsurface testing of locations that were determined to posses moderate to high potential of archaeological remains. In addition to survey, archaeological potential was surmised by using topographic maps of the area. Ultimately survey identified and recorded a total of 59 archaeological sites from which more than 10,320 (13,000) artefacts were retrieved.

The distribution of archaeological sites across the study area was variable in content and density. The baseline work established that four technologically and chronologically differentiated assemblages are represented in the Project area. These are the Acheulean, Middle Stone Age (MSA), Late Stone Age (LSA) and Iron Age. In addition, some of the artefacts found indicate the possibility of a fifth, technologically earlier industrial complex, either pre-Acheulean or Oldowan. However, a firm establishment of an Oldowan industry, hitherto only known in Tanzania from Olduvai Gorge and Peninj, would require more fieldwork, outside the scope of the study. The sites recorded suggest an unbroken occupation of the area for at least 300,000 years on the basis of relative dates of the assemblages. However this report discusses only the Acheulean/Sangoan component and the assemblages that are roughly subsumed under the rubric of MSA though a summary of the later industries is provided. Some of their tool composition would have been part of the tool kit required for the exploitation of the rainforest savannah ecotone as the area is imagined to have been in the later part of the Pleistocene.

Keywords: acheulean, cultural heritage impact assessment, equatorial ecotone, northwesten tanzania

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Abbreviations: CHIA, Cultural Heritage Impact Assessment; IFC, International Finance Corporation; MSA, Middle Stone Age; LSA, Late Stone Age

Introduction

The study objectives were to conduct a Cultural Heritage Impact Assessment (CHIA) of property and sites having archaeological, paleontological, historical, cultural, artistic or religious value, as required by both the Government of Tanzania (United Republic of Tanzania, 2005) and the International Finance Corporation (IFC, 2006). The assessment investigated the possible impact of the proposed mine footprint and infrastructure, access road, water supply pipeline right of way, sand pits and quarry locations Figure 1. The field work was undertaken in four phases during October 2007, January 2008, November 2009 and June of 2010, with reporting and artefact cataloguing following the field programs. Field work included pedestrian survey and subsurface shovel testing of locations that were determined to posses moderate to high archaeological potential of previously unrecorded archaeological sites. Cultural heritage potential was determined using topographic maps, surveys and excavations. The field work identified and recorded a total of 59 archaeological sites and more than 10,320(13,000) artefacts that were subsequently analyzed.

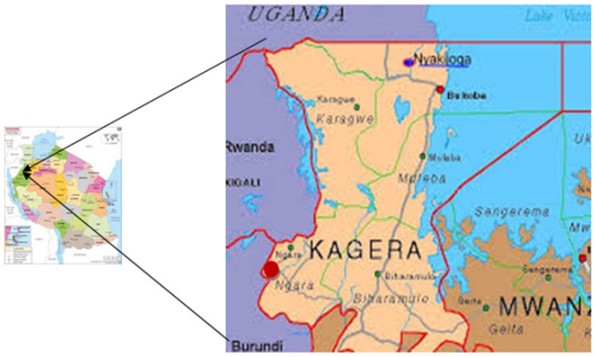

Figure 1 Location of the study area in northwestern Tanzania close to Tanzania/Burundi border. indicated by red blob with regards to the region

Location, description and potential impacts

Project location and setting

The study area is in Bugarama Ward, Ngara District, Kagera Region, in northwest Tanzania Figure 2. The landscape is formed by northeast/southwest trending ridges, often with steep slopes overlooking the Ruvubu River, the major drainage system in the area and a branch of Kagera River, the main input to Lake Victoria. People are primarily subsistence farmers who restrict their activities down slope of the ridges and in the river valleys between the ridges. Beans, maize, cassava and bananas are the main crops. Supplementary to agriculture is livestock keeping, predominantly of goats, but there are several herds of Ankole cattle. Where agricultural activities have not impinged the area, the landscape is covered with scrub and disturbed woodland. Water for household use, livestock and dry season farming comes from rivers, streams and shallow groundwater. The project's alteration of the landscape can result in the destruction of all or portions of cultural heritage resource sites. These alterations often involve the displacement of artefacts resulting in the loss of valuable contextual information or may involve physical destruction of the artefacts and features themselves resulting into complete information loss. Since cultural resource sites are non-renewable, these losses are permanent and irreversible. However, site inspections that identify areas of potential concern and adoption of specific mitigative strategies can minimize these impacts. The Project site is almost 3,900 ha in size Figure 1. Proposed infrastructure will include a tailings disposal facility, aerodrome, mine and ore processing facilities, accommodation complex and access roads.

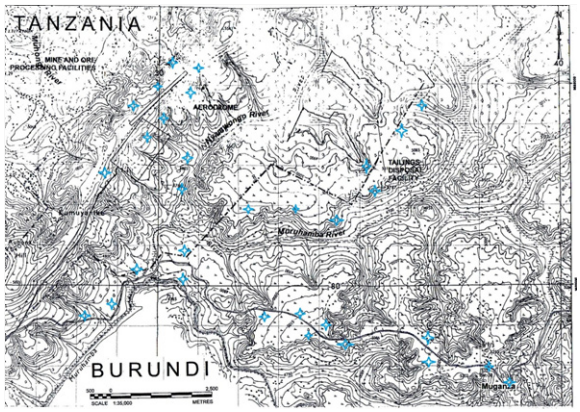

Figure 2 Map of Kabanga showing distribution of archeological sites.

Environmental setting

The physiography of the area of study can be described as consisting of undulating hills and valleys. Before agricultural activities impinged on the land, it can be assumed that the vegetation in the area was akin to that characterizing the eastern equatorial forest of Africa.[1,2] Present day vegetation is composed of papyrus reeds in the river beds, dense and open forest, as well as scrub on the valley slopes and hill tops. The nearest area of known Pleistocene history is at Nsongezi in L. Victoria, north east of the area, where two sets of lacustrine beds along the lower valleys of rivers entering Lake Victoria along its western shore are revealed. These sets of beds are recognized at elevations of 61-67 m and 33-35 m above the modern lake level[3] suggesting that the lake was at a higher elevation and located further west than today for a period of about 250,000 years. The lake seems to have been dry at least once during this phase, but the basin eventually filled up until it reached its peak ca. 30 m above the present level[4] For the last 150,000 years, Lake Victoria has existed episodically in something near its present position and size.[5,6] The upper and older set of lacustrine beds, the Nsongezi Beds, contain Acheulean and Sangoan lithic industries which would suggest an age of a few hundred thousand years.[6] Since the Kagera River and its tributary the Ruvubu could not have acted barriers, it is plausible infer that Rwanda and Burundi are likely to have comparable assemblages though other than the proto-historical Urewe tradition not much more of the archaeology is known.[7,8] The Project's location in the south western part of the lake would likely have been affected by the high lake waters.

Objectives and goals

The objectives of the CHIA were to identify, retrieve and conserve cultural resource information prior to ground disturbing activities associated with the Project. These included, in addition to identification and retrieval of endangered heritage, making recommendations for further mitigative procedures to offset and minimize any impacts that may occur to the heritage identified during the studies.

The goals were formed from principles outlined in the relevant regulations and guidelines.[9,10] The studies included the following requirements:

A. Complete pre-field studies to review the nature and distribution of local and regional cultural resources and analyze the character of the affected terrain to enable design of an effective program of field studies to identify and evaluate potential cultural resource conflicts.

B. Complete appropriate levels of inspection for all areas of high and moderate potential situated within the Project development footprint.

C. Identify any previously recorded cultural resource sites in the vicinity of the proposed development areas.

D. Identify and record new cultural resource sites in the vicinity of the proposed development areas.

E. Evaluate the significance of the cultural resources identified.

F. Evaluate the potential impacts to cultural resource sites that could result from the development of the Project.

G. Recommend conservation strategies appropriate for offsetting potential impacts.

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Methods

Pre-field studies

Pre-field studies included reviewing all the relevant archaeological and geological literature of previous research in the Project area. Topographic and satellite image maps were studied in order to obtain an overview of the study area.

Field studies

The cultural resources field studies for the Project were conducted in four phases during October 2007, January, 2008, November 2009 and June 2010. Landscape potential was determined by studying topographic maps, visual vehicle based reconnaissance and previous experience of the archaeological crew. Fieldwork included both vehicular and pedestrian survey and subsurface testing of locations that were determined to posses moderate to high potential of previously unrecorded archaeological sites. Sites were generally discovered as surface scatters of artefacts and subsequently subsurface tested in order to determine whether there were undisturbed cultural deposits present. A total of 59 sites numbered sequentially as they were recorded with initials KBN, for Kabanga Nickel were discovered by the survey operations. A sample was obtained from some of the sites through random but unsystematic surface survey collection, deliberate total surface collection of some localities, subsurface collection by test pitting and excavation.

When archaeological materials were encountered, the extent of the surface scatter was determined by pacing the area and shovel tests placed in proximity to concentrations of surface artefacts or locations where diagnostic artefacts were recovered. The extent of subsurface testing, in the form of shovel tests or trenches, depended on the significance of the surface scatter and/or potential for the immediate area to contain undisturbed cultural resources. Sites considered to have low potential were not tested at all. Shovel tests were generally 40x40 cm; test pits 1x1m and most trenches 2 x 3 m. All subsurface testing was excavated to sterile subsurface sediments and all sediments were hand sorted for the presence of cultural material.

Sites were recorded on site forms that were specifically designed for the Project. The spatial extent of each site was measured by the compass and pace technique and the use of GPS waypoints around the perimeter. Sketch maps of the site area and shovel test locations were created. Sediment characteristics were recorded and photographs of the sites were taken. All artefacts were bagged according to the locations from which they were recovered. This information was then transferred to the Project specific archaeological site data forms.

Finds retrieved from surface collection, test pits and excavations

Survey and total collection

The survey covered as much of the area as possible (see map) and revealed several patches of artefact littering the surface in varying degrees of concentration as reported in Table 1. Purely on the basis of form, the lithic artefacts would be considered characteristic of the Acheulean, Middle Stone Age (MSA) and Later Stone Age (LSA) as will be discussed in subsequent sections of this report. All together 10,320 artefacts were recovered from the study area; (Tables 2) (Table 3). As discussed later the focus assemblage possesses many technological and typological attributes which strongly suggest belongingness to the Acheulean-Middle Stone-Later Stone Age industrial complexes and as can be seen from the photographs many diverse forms are represented.

Table 1 Sites recorded during the assessment of the water supply pipeline

Site number	Location (UTM ARC 1960)	No of artifacts collected and affiliated industry	Recommendations
KBN 11	36 M 226320 9680027	15-MSA/LSA	None
KBN 12	36 M 226320 9680027	69-MSA/LSA	Further mitigation
KBN 18	36 M 221206 9677635	142-MSA/LSA	None
KBN 19	36 M 224858 9678163	66-MSA/LSA	None
KBN 20	36 M 225528 9679435	N/A	None
KBN 30	36 M 218309 9677757	83-MSA/LSA/IA	None
KBN 39	36 M 225749 9678278	65-MSA/LSA	None

Table 2 Sites recorded during the assessment of the Project site

Site number	Location (UTM ARC 1960)	Artifacts collected and affiliated industry	Recommendations
KBN 1	36 M 230401 9684478	2,331-MSA/LSA	None
KBN 2	36 M 231540 9686103	54-MSA/LSA/IA	None
KBN 3	36 M 231171 9686338	31-MSA/LSA	None
KBN 4	36 M 230846 9685479	1,210-MSA/LSA	None
KBN 5	36 M 230534 9685647	384-MSA/LSA/IA	None
KBN 6	36 M 231564 9687031	LSA	None
KBN 7	36 M 231088 9686657	464-MSA/LSA	None

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Table Continued....

Site number	Location (UTM ARC 1960)	Artifacts collected and affiliated industry	Recommendations
KBN 8	36 M 230993 9686503	49-MSA/LSA	None
KBN 9	36 M 230728 9685771	21-MSA/LSA	None
KBN 10	36 M 228927 9684011	141-MSA/LSA	None
KBN 13	36 M 231444 9685705	27-MSA/LSA	Further mitigation
KBN 14	36 M 230239 9683333	250-MSA/LSA	Further mitigation
KBN 15	36 M 229642 9682779	3,397-MSA/LSA/IA	Further mitigation
KBN 16	36 M 229332 9681691	109-MSA/LSA	None
KBN 17	36 M 231634 9683117	133-MSA/LSA	Further mitigation
KBN 24	36 M 229284 9684957	746-MSA/LSA	None
KBN 26	36 M 234075 9685043	511-MSA/LSA/IA	None
KBN 27	36 M 229138 9682269	991-MSA/LSA	None
KBN 28	36 M 230310 9682568	75-MSA/LSA	Further mitigation
KBN 29	36 M 231200 9682337	55-MSA/LSA	None
KBN 33	36 M 235606 9682799	36-MSA/LSA	Further mitigation
KBN 34	36 M 234587 9682404	18-MSA/LSA	None
KBN 35	36 M 234649 9684492	3-MSA/LSA	None
KBN 36	36 M 234841 9683855	9-MSA/LSA/IA	Further mitigation
KBN 37	36 M 234969 9683669	N/A	None
KBN 38	36 M 234908 9683687	4-IA	None
KBN 50	36 M 230158 9686267	N/A	None
KBN 51	36 M 230217 9686474	46-MSA/LSA	None
KBN 52	36 M 230200 9686831	N/A	None
KBN 53	36 M 233595 9686500	49-MSA/LSA	None
KBN 54	36 M 231135 9682777	82-MSA/LSA	None
KBN 55	36 M 229110 9692345	19-LSA	None
KBN 56	36 M 228727 9692059	1-IA	None
KBN 57	36 M 229775 9688264	185-MSA/LSA	None
KBN 58	36 M 229036 9691863	47-MSA/LSA	None
KBN 59	36 M 230995 9686503	8-MSA/LSA	None

Table 3 Sites recorded during the assessment of the Access Road

Site number	Location (UTM ARC 1960)	Artifacts collected - cultural industry	Recommendations
KBN 21	36 M 246892 9676197	64-MSA/LSA/IA	None
KBN 22	36 M 243197 9679283	51-MSA/LSA/IA	None
KBN 23	36 M 236748 9678400	530- MSA/LSA	None
KBN 31	36 M 239019 9678044	N/A	None
KBN 32	36 M 239848 9679284	164- MSA/LSA/IA	None
KBN 40	36 M 277073 9693384	7-LSA	None
KBN 41	36 M 276974 9688562	9-MSA/LSA	Further mitigation
KBN 42	36 M 268803 9684749	103-MSA/LSA	Further mitigation

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Table Continued....

Site number	Location (UTM ARC 1960)	Artifacts collected - cultural industry	Recommendations
KBN 43	36 M 267406 9683284	19- MSA/LSA	None
KBN 44	36 M 264721 9680982	21-MSA/LSA	None
KBN 45	36 M 263396 9676479	90-MSA/LSA	Further mitigation
KBN 46	36 M 261439 9674462	N/A	None
KBN 47	36 M 255499 9670585	13-MSA/LSA	None
KBN 48	36 M 249127 9671173	28-MSA/LSA	None
KBN 49	36 M 248456 9672244	18-MSA/LSA	None

Test pits

Nine 1x1m pits were excavated one each on the Access Road and Water pipeline, while the rest were distributed randomly over the footprint area (area of maximum impact). The test pits exposed a two or three layered stratigraphy spanning a depth of ca. 1m. In areas with grass cover, the top layer was composed of loamy or humus soil with varying inclusions of pisoliths/schist gravels, but where the top soil had been eroded the top layer consisted of small sized pisoliths. Invariably the second stratigraphic unit was dominated by large sized gravels while in the third unit the size of the gravels increased to large blocks or even boulders of the underlying schistose rock. Artefacts occurred throughout the stratigraphic succession, but layer two was the most implementiferous. Finding artefacts in their primary depositional context, allows suitable comparison with and evaluation of the surface finds. While some of the surface archaeological materials are comparable to the stratified finds, there are also artefact types which were only found in stratified deposits. The excavations and the survey finds have provided a window, though small, to the prehistory of Kabanga and the neighbouring area. Test pits were positioned at UTM coordinates 0228965/9683802, 0229422/9684824, 0236744/9678400, 0224938/9677862, 0234124/9684758, 0233673/9686206, 0230295/9683376, 0230176/9683288 and 0229335/9681680. Altogether 898 artefacts were recovered from the test pits.

Excavations

The team excavated 10 trenches at the localities represented by the UTM coordinates as shown on the table. Unfortunately some of the trenches turned out to have artefacts very diffusely distributed. Standard pre-excavation procedures, including clearing the area of the trench and the vicinity, noting and collecting artefacts within the gridded area, describing the vegetation and topography, photographing the area, etc. were observed. The teams experimented digging with trowels, but this proved futile due to the hardness and compaction of the soil and was consequently eschewed in preference for large picks. Starting with hard scrape, excavation was conducted by natural layers and artefact were collected and bagged according to the layers from which they occur.

Site 1 The team excavated two 2x3m and one 1.5x2m trenches at locality represented by UTM coordinates 0230474/9684266 and specifically located at 0230443/9684236, 0230444/9686320 and 0230405/9684476 and referred to as trenches 1, 2 and 3 respectively. The third and smaller trench was excavated to increase the sample size as the two large trenches did not produce enough material to be representative.

In all the three trenches, the generalized stratigraphy can be subsumed under three distinct units, Black sandy clay invariably Very rich in grass roots and measuring 40cm thick on the average. A few artefacts occur but the concentration is rather thin compared to the underlying units. Artefacts may include pottery, but they are dominated by LSA forms. However in this trench no potsherds were encountered. Reddish sandy clay rich in artefacts. This is 30 cm thick and richer in artefacts than the overlying layer. In this trench the matrix consisted, in addition to the clay, of isolated schistose gravel. Artefacts were very diffuse and consisted of LSA and MSA.

Gravely layer overlying the schistose bedrock

This is about 30cm thick and overlies the schistose bed rock. At 1.00m depth below surface, it becomes solid schist and completely devoid of artefacts. Overall most of the artefacts recovered from the trench would fall under the category flakes, but there is a sizeable proportion of other forms .They are all made from quartzite.

Site 2 Two 2x3m trenches (Tr.4and 5) were excavated at the locality represented by UTM points 0229811/9682660 and 0229721/9682716. The same procedures were followed as for the other trenches. In both trenches, two stratigraphical units were observed after the capping 10cm thick, had been cleared as hard scrape; dark sandy clay and more compact red brown sandy clay.

Dark sandy clay: This includes the top soil rich in roots, but no change of either colour or compaction was discerned down to the depth of 40cm. The sediments measured 69cm and 40cm thick in trench 4 and 5 respectively. Artefacts of Iron Age and LSA affinity were observed to be diffusely distributed.

Red brown sand clay: Other than the difference in colour and increasing compaction, varying concentration of gravels were encountered becoming more prominent with depth. Both layers were stratified with artefacts but while the artefacts in layer 1 were dominated by LSA forms and some pottery, the second layer yielded MSA and LSA artefacts only. In the first trench the stratification reached a depth of 130cm below surface but in the second trench the sediments spanned a depth of 195cm. Artefacts recovered are summarized in the table below.

Site 27 of the contract: (UTM: 0229260/9682498): The team proceeded with excavating two 2x3m trenches hereby referred to as trench 6 and 7 specifically at 0229085/9682234 and0229201/9682308.

Having removed the top 10cm as hard scrape the excavations revealed a one and two layered stratification in trenches 6 and 7 respectively.

Brown sandy clay: This appears in trench 7 only and contains no artefacts. Presumably the layer, 35m thick, was removed by farming activities in trench 6 as suggested by a good scatter of artefacts on the surface.

Reddish brown sandy clay: This is the only layer in Tr. 6 and in both trenches the sediments consist of inclusions of gravel in a sandy clay lithology. At a depth of 85cm below surface, excavation had to be brought to a halt as contact with the schistose bedrock was encountered. However in Tr. 7 excavation was taken down to 1.7m below surface. Tr. 7 happened to be in an area that has had very little agricultural impact and hence the thicker sediments. In both trenches, the upper part of the layer yielded artefacts suggestive of the MSA such as bifacial points while the lower part produced Acheulean types including crude bifaces. Further excavation was halted on encountering the bed rock. Artefacts are summarized in the tables below.

Three 2x3m trenches were excavated one at 0236723/and 9678390 and two at 0239847/9679280 and 239781/9679244 in the Access Road. The team decided not to conduct any excavation here as stratification appeared poor. The first or Tr.8 was on a different part of the access road while the last two, Tr.9 and 10 were on the same locality.

Trench 8 (0236732/9678390): Two stratigraphic units were observed:

1. Top layer consisting of loose sandy clay with few types of gravel measuring about 20cm thick. Artefacts of LSA and MSA types were retrieved.
2. A compact gravely and sandy clay layer rich in artefacts and measuring about 30cm in thickness. The gravels increase in size with depth so that by 50cm below surface they turned into boulders and artefacts cease to occur. Artefacts are predominantly of MSA type.

Trenches 9 and 10 (239847/9679280) and (0239781/9679244): Both trenches were deeply stratified reaching a depth of 2.3m in both. Three different stratigraphic units were recognized.

1. Top layer of dark sandy clay with neither pottery nor artefacts. In the first trench this layer was 35cm and in the second 30cm thick.
2. Brown compact sandy clay varying in thickness from 120 to 125 cm. Artefacts, both LSA and MSA were as a rule very few, but distributed throughout though they included an elaborately made disc.
3. Reddish brown compact sandy clay varying in thickness from 75 to 80 cm. The compaction was observed to increase with depth so that at a depth of 230cm. no more artefacts were recovered. Artefacts were predominantly MSA.

The Assemblage

Raw material

Almost all the lithic artefacts are made from quartzite, which together with schist are the main outcrops. Artefacts are made from two different types of quartzite coarse and fine-grained. Coarse grained quartzite seems to have been selected for the manufacture of heavy duty implements characteristic of the Acheulean/Sangoan, presumably ca 350,000 yrs ago.[6] These would be the large bifacial implements≤5cm, while on the other hand fine grained quartzite appears to have been preferred by the MSA and LSA makers who are presumed to have been *Archaic H Sapiens* and Anatomical modern man/*H. sapiens* respectively. There are also artefacts of *quartz,* though in negligible proportion.

While schist is relatively soft and too laminated to have been suitable for artefacts, there are few very intriguing artefact-like pieces which were observed during survey. The author has seen a limited number of artefacts made from calcite which is as soft as schist in some Crater Highlands sites and thus raising the possibility of schist to having been used. At any rate this would be an interesting problem to investigate though not within the scope of this assignment. It should be noted however that the Mankala/Bao cupules are carved in slabs of schist.

Artefacts

The reconnaissance survey together with the test pits, total surface collection of four areas of high concentration and the excavations have recovered a total of 10,320 artefacts mostly belonging to MSA/LSA but also to the Acheulean. The Acheulean-like crude bifacial tools are probably Sangoan, an early MSA industry". However given the size of the study area, this number cannot constitute a statistically representative sample. Nevertheless it affords strong evidence attesting to the archaeological potential of the area.

Although most of the artefacts are surface, finds recovered from nine small test pits and an equal number of trenches, suggest that the surface material are a good mirror image of the archaeological potential of the area. It should be mentioned that most of the surface artefacts were seen in areas that had been impacted by human activities, especially road construction and hence of mixed traditions. The assemblage seems to be dominated by cores, flakes and core fragments which account for 7324 or ca.71% of the artefacts recovered. Since some of the bifaces display unworked butts suggestive of core axes, the proliferation of core tools and the proximity of the type site of Sangoan; Sango Bay in Uganda,[11] the term Sangaon has been informally introduced simply to suggest that more concerted fieldwork in undisturbed contexts might reveal a Sangoan-like industry. Having said that one must underscore the fact that some of the artefacts retrieved are reminiscent of deftly made lanceolates and points which are also associated the Lupemban/Tshitolian.[1]

Artefact types and reduction techniques

As shown in the tables and photographs different artefact types attributed to Acheulean, Sangoan, MSA and LSA and historical pottery, have been recovered. The Acheuelan industrial complex is taken to be the cultural expression of *Homo erectus, H.eargester, Archaic Homo sapien* and spans the longest period of prehistory, ca. 1.6-0.35 myrs.[6] Referred to as the handaxe culture due to the proliferation of bifaces, the *fossillles directeur*, the Acheulean is dominated by various forms of bifaces, including hand axes, cleavers, knives, picks, discoidal and Levalloisian cores.[6,12] Almost all of the Acheuelan artefacts are made from coarse grained quartzite. In short the Acheulean artefacts recovered include a variety of bifacial tools, such as crude handaxes, cleavers, picks and discoid cores. As remarked earlier the use of the term sangoan is informal simply based on the fact that some of the bifaces are crude, display unworked buttts suggestive of core axes of the Sangoan and also because of the proximity of the area to the Sangoan type site in Uganda.[11] Future concerted fieldwork in the area in undisturbed contexts might indeed reveal an industry that would have many more sangoan attributes.

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The Middle Stone Age (MSA) as defined by Goodwin[13] includes flake tool industries, which succeed the Acheulean, but precede blade-based microlithic industries. The absence of handaxes and cleavers, the employment of the Levalloisian and particularly the facetted platform techniques, convergent and parallel flaking on flake and a variety of flake-tool forms are some of the dominant features of these cultures.[14] The MSA is characterized by typological variation among stone artefact assemblages. This variability has been interpreted as a reflection of different economic activities, different raw materials or different environmental adaptation by MSA populations.[15] Being derived from the biface-dominated Acheulean industrial complex, the MSA possesses many of the earlier artefact forms such as different types of bifacial implements, Levalloisian flakes and core artefacts. The most frequent artefacts are detached pieces popularly known as flakes and now shown experimentally to be perhaps the most utilitarian tools on account of their sharp edges and ease with which they are made, though this assertion has also been questioned.[16] Blades are also a feature of the MSA although they also appear in a microlithic form in later industries. In the assemblages reported here however, blades and blade implements are rare.

Flakes and blades

A total of 347 (18%) detached pieces were recovered. Of these, 10 are Levalloisian flakes while 13 are blades recognized as such on account of their being at least twice as long as they are broad. There is a wide variety of flakes, distinguished on the basis of the platform type, number of dorsal scars, absence or presence of cortex and length-width ratios (Length/width ratios have not been computed for this report). While the majority of the flakes exhibit facetted platforms there are also some with point and scaled platforms signifying the bipolar core reducing technique. A good number of the flakes exhibit broad dorsal negative scars again signifying employment of the prepared core technique.

Utilized flake

As already remarked, flakes are perhaps the most utilizable implements for all functions involving cutting. A total of 123 (6.4%) flakes exhibited some edge damage, which, could have resulted from utilization, although the damage, it has been argued, is not directly related to use and that utilization should be recognized on the basis of minimally secondary retouch[16] However since most of the flakes are of quartzite, some of which is coarse grained, it is presumed part of the edge damage seen is natural.

Scrapers

Many types of scrapers are represented in this assemblage and form the third most frequent artefact type after flakes and utilized flakes and the largest formal tool category accounting for a total of 102 (5.3%) of the assemblage. In this study no effort has been made to classify the scrapers into categories, obviously a task for the future.

Becs/burins/percoirs/borers

These are implements, which are technically or intentionally spalled or flaked at one end to produce a bit-like point, presumably for boring. They make up a significant proportion of the assemblage and account for 49 or (2.6%)

Unifacial and bifacial points

Although there were only 13 such artefacts, they are considered important as being among the *fossil directeurs* of LSA. They measured 10cm on average length and exhibited a pointed end achieved by trimming the implement either from one or both sides.

Biface

Five Acheulean-like bifaces were recovered. Although worked from both sides to produce an almond shaped implement, one side seems to have been deliberately more intensively trimmed. They are all made from coarse grained quartzite.

Cleavers and knives

These are also Acheuelan tools and both start as large detached pieces. For the knives the trimming emphasis is concentrated on one of the sides so that a cutting edge is produced while the other side is minimally worked or not worked at all. The trimming is bifacial. The other edge is not worked. Cleavers on the other hand have a flat working end produced by the intersection of trimming on both the dorsal and ventral side of the flake. Altogether 11 artefacts were scored as knives and cleavers Table 4.

Core axes and picks

These are also considered to be the *fossil directeurs* of the Acheulean/Sangoan. Six implements were on account of the bifacial short stepped trimming at one end while leaving the butt crude and unworked, recognized as either picks or core axes. For the picks the end is more pointed than is the case with core axes. All are made of coarse grained quartzite.

Table 4 Summary of Artifact Types recovered from the survey test pits total surface collection and excavations

Artifact categories	Survey	Test pits	Total surf col	Excavation	Total	%
Flake including Kombewa	212	167	405	751	1535	14.87
Blade	6	0	18	68	92	0.88
Levalloisian Flake	57	41	20	41	159	1.54
Utilized Flake	80	84	92	130	386	3.74
Flake Scrapers	45	20	46	38	149	1.44
Core Scrapers	11	5	19	34	69	0.67
Notched Scr			40	38	78	0.77
Geometrics	28	3	15	56	102	0.98
Percoir/bec	9	2	20	91	122	1.18

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Table Continued....

Artifact categories	Survey	Test pits	Total surf col	Excavation	Total	%
Bifaces (Heavy duty)	31	8	9	4	52	0.5
Biface Light duty			3	6	9	0.09
Bifacial point	4	4	5	5	18	0.17
Other points	6	1	18	8	33	0.32
Outils ecailles	14	2	18	37	71	0.69
Knife			3	3	6	0.06
Cleaver			3	2	5	0.05
Pick			5	5	10	0.1
Adze	8	0	8	4	20	0.2
Core axe			3	4	7	0.07
Chopper			5	2	7	0.07
Discoidal core	5	9	17	66	97	0.94
Bipolar Core	21	9	122	151	303	2.94
Other Cores	114	65	319	322	820	7.95
Hammerstone			6	1	7	0.07
Flake fragments	107	242	449	2790	3588	34.77
Core fragments	43	226	608	1639	2516	24.38
Grind Stone			2		2	0.02
Whet stone				1	1	0.01
Pottery	6	10	2	38	56	0.54
Total	807	898	2280	6335	10,320	100.01

Cores

A total of 183 flaked pieces were recognized as cores, thus making this the second largest category after flakes and blades. On the basis of where the flaking originates and the direction of the flaking, they may be described into fix main categories:-

Polyhedral cores sometimes referred to as multiplatform cores are characterized by several striking platforms with multiple flaking directions. This was the most dominant category accounting for 60% of all the cores.

Single platform cores are the flaked pieces, which possess one platform from which the flaking originates. They can easily intergrade with core scrapers especially when the flake scars are small and close to each other.

There are also a few discoidal cores, another Acheulean/ MSA artefact type in which the flaking originates from one platform, but in opposite directions so that a flaking perimeter or equator is created.

Another category is the bipolar type in which the flaking originates from opposite ends, perhaps by placing the core on an anvil during flaking. Cores of this type will exhibit scaling or crushing on one or both ends.

5. The last one has been described as irregular on account of falling into none of the other classes. While the majority of the cores were made of quartzite, a few were made of other types of material.

Notched pieces

A persistent category in all the samples from the project area is detached pieces that show a deliberate notch on one of the sides. Depth of the notch is variable but it can be up to 8mm. For the present preliminary analysis, they have been lumped together with scrapers. The notch results from incessant removal of small flakes concentrated on a small area of the edge of the detached piece resulting in a wide U-shaped notch.

LSA Forms

The LSA is represented by several microlithic flakes and blades exclusively made from fine grained quartzite and even quartz. Typical LSA formal tool categories include geometrics such as lunates (crescents), triangles, trapezes and backed blades, denticulates, outils ecailles, etc.

Discussion

Acheulean/Sangoan

Curiously the discovery of Acheulean and Sangoan in the north western part of Tanzania not very far from the Uganda border, must assume far reaching significance as it is the only known occurrence of Acheulean north west of Olduvai and Lake Ndutu. This necessitates further investigation before the remains are relegated to oblivion through the imminent destruction by the project.

The study area is, as already remarked, a landscape of ridges and valleys with streams. The latter empty their waters into the Ruvubu River, the major drainage system in the area and a branch of Kagera River, the main input of L. Victoria. Early geological investigations of the Kagera River near Nyabusora, Bukoba District recognized evidences of continued ancient human habitation on its banks. In particular the report (unpublished) mentions the existence of an implementiferous bone deposits between the Nsongezi terrace and the Kagera River and also a laterite containing Kafuan tools (Wayland 1954). Within the Nsongezi M-N- complex of terraces are deposits with many tools representing several stages of the great handaxe (Acheulean) culture. Wayland further describes the Kagera as a "great father to the Late Acheulean and early Sangoan men as the Nile had been to the Ancient Egyptians" (Wayland). Despite all these archaeologically favourable reports, the area has remained an almost archaeological terra incognito and hence the significance of this discovery. During the study several people from Burundi across the river visited the team and assured us the "stones" we were studying also occur across the river and without any solicitation one of them brought to us an artefact we recognized as a biface, which he claimed he had picked up on the Burundi slopes overlooking the river valley. It is therefore more than likely that the Kabanga archaeological landscape extends to Burundi and perhaps to Rwanda.

The investigation has established that three technologically and chronologically differentiated assemblages, with the possibility of a fourth one, though in negligible occurrences are represented. These are the Acheulean/Sangoan MSA, LSA and a few IA potteries. It is more than likely comparable prehistoric, protohistoric and historic industries.

The Acheulean and Sangoan probably represent, as suggested by Clark,[17] an eastern facies found in the peripheral parts of the Congo basin in northeast Angola and the Lower Congo, distinguished by the rather crudely made heavy duty tools of pick-like forms, some parallel sided bifaces and large flakes and a general lack of well made hand axes and cleavers. Typical Acheulean artifacts, (a variety of handaxes, cleavers, knives, large duty scrapers and discoidal cores) were as a rule not as frequently encountered with as the Sangoan-Lupemban and MSA artifats, but this can be explained by the fact that being older, the Acheulean artefacts may still lie down stratified in sediments and that further excavations might yield more of the Acheuelan forms.

In Tanzania, the Acheulean has been reported from several sites, but the best known are Olduvai Beds II to the Masek Beds, Lake Natron (Peninj), and Isimila. Late Acheulean assemblages have also been reported from Haubi in Kondoa, Tanzania.[18–20] Unfortunately, most of the Acheulean bearing sites in the area of the Project may have succumbed to massive slope erosion leaving very shallow stratification as observed during the field work or as pointed out above, may not have been sampled.

The MSA

The Middle Stone Age (MSA) is thought to have emerged between 250,000 and 195,000 years and lasted until about 20,000 years ago in Africa. The MSA as defined by Goodwin[13] includes flake tool industries, which succeed the Acheulean, but precede blade-based microlithic industries of the Later Stone Age. The absence of handaxes and cleavers, the employment of the Levalloisian prepared core technique as well as a variety of flake-tool forms are some of the dominant features of these cultures.[14,21] The MSA or mode 3 industries are the Sub-Saharan rough chronostratigraphic equivalent of the Middle Palaeolithic in Europe and North Africa. Like the European counterpart industries, they are associated with the emergence and spread of anatomically modern man, successor of Archaic *Homo sapiens*.[15,17,22–26] The first anatomically modern humans and Middle Palaeolithic or MSA industries may have emerged between 251,000-195,000 years ago. Early modern humans are associated with Middle Palaeolithic or MSA assemblages, while archaic humans are often found with Acheulean artifacts. However, there are transitional forms between archaic and modern which in Africa include among others, specimens from Eliye Springs (Kenya), Florisbad (South Africa), Ngaloba (Tanzania) and Omo Kibishi (Ethiopia).[27] In some regions, notably in the Congo, Lake Victoria and part of the Lake Tanganyika basins, a new form of tool makes its appearance. This is the long lanceolate point of stone delicately worked on both faces as was found in one of the excavations by the access road. Clark[17] remarks that "these were too carefully retouched to have been part a jobbing carpenter's kit and were obviously an end product in themselves".

Compared to the earlier and later industries, the MSA is still relatively unknown in Tanzania. Barely over two decades ago, it was only in South Africa that the MSA, was on the basis of the sequence from the type section at Klasies River and other sites, well documented. Four MSA stages MSA I to MSA IV with a distinct microlithic Mode 5, industry sandwiched in the middle have been recognized.[27] In Kenya the MSA became a focus only in the 1990s when MSA/LSA sites in Koobi Fora, Karari escarpment, Kapthurian Formation, Makodo Hill in the Laikipia Plateau in north Kenya, Tol and Kipsing River valley were excavated and studied. However the most intensive studies have been directed at both MSA and LSA sites in the Rift Valley and the Lake Victoria Basin. Sites such as Engapune ya Moto, Prospect Farm, Prolonged Drift, Lukenya Hill, Songhor, Simbi and Muguruk are now well known to African Prehistorians. In many of these sites, the MSA/LSA transition may have occurred before 46,000 years ago.[27–31]

Tanzania on the other hand has lagged behind as Willoughby puts it." While there have been many Middle and Later Stone Age sites excavated in Kenya, Tanzania is a different story. Most of the research hitherto conducted has been carried out in the north while the rest of the country has hardly been studied at all".[27] The discovery of Acheulean/MSA sites in Kabanga must therefore assume a unique importance.

The nearest area with adequately described MSA industries in Tanzania is the L. Eyasi Basin and the Serengeti where they have been described as Njarasan, Kisele, Sanzako and Loyangalani followed by MSA/LSA industry named Mumba.[32, 33] MSA/LSA industries have also been reported from Buzwagi in Kahama, the Kilwa area in the south east coast of Tanzania, in Masasi southeast Tanzania,[34] Southern Highlands at Mgongo in Iringa, and South-west Tanzania both at the Lake Rukwa Rift and also many open air sites associated with the terraces of Songwe River which flows to L. Malawi.[27,34]

In the Lake Eyasi Basin uranium-series dating technique has produced dates of 131,000 years ago for the Sanzako and Kisele MSA industry while the MSA/LSA Mumba industry is estimated to be 90,000 BP.[32, 35] The only other well-documented MSA/LSA industries reported in the literature come from the Serengeti open air site of Loyangalani, the Ndutu and Nasiusiu Beds at Olduvai and Kisese rock shelter in central Tanzania.[18,33,35–38] The Loyangalani has produced both

MSA and LSA artefacts whereby the MSA includes many scrapers, borers, few points or bifaces along with disc and Levalloisian cores[36] and in this case could easily be considered comparable to the industry discovered at Buzwagi[34] and Kabanga. Unlike the Serengeti sites of Loyangalani where evidence of symbolic behaviour in the form of ostrich egg shell beads, has been found and dated to 70,000BP (Curtis 2004) no such remains were observed at Kabanga. However, the last three decades have witnessed a growing interest in the study of the MSA, resulting from a number of factors, but most importantly current debates about the emergence of anatomically modern man and the associated cultural behaviour.[27]

The later stone age

In addition to the Acheulean/Sangoan and MSA industries there is another component, the LSA. Unlike the MSA, the LSA has been more extensively studied. We know that this industrial complex represents the cultural expression of *Homo sapiens sapiens* which *inter alia* had attained a highly specialized mode of hunting while later and in some areas in northwestern Tanzania, e.g. the Serengeti and perhaps Mwanza and Shinyanga, there was incipient food production based on pastoralism or Pastoral Neolithic (Bower 1968). To perform activities such as advanced hunting and food production, the tool kit had to have improved from that of the MSA. This improvement is referred to in the literature as the microlithic revolution of the LSA or Mode 5 industries.[39] The LSA is characterized by the preponderance of microlithic implements, which include whole and broken flakes, thumbnail scrapers, a variety of geometrics e.g. lunates, wood working implements such as outils ecailles, boring implements such as burins, prcoirs and becs. In many cases the assemblages have ostrich egg shell beads.

The iron age (protohistorical and historical)

The Iron Age (IA) dates from 2,000 years ago when most of Tanzania would have been settled. Iron Age artefacts include pottery, relics of iron smelting furnaces and iron implements. Very early knowledge of metallurgy, indeed perhaps the earliest in East Africa, has been documented in Buhaya west (North north east) of the Project area while several other IA sites, although not as ancient, have been described from Shinyanga and Mwanza.[41,42] Despite the proximity of the project area to the earliest IA sites in Buhaya, few early IA diagnostics were found. The Mankala (Mancala) or Bao game cupules, though the people of the area, have denied knowledge of its antiquity, has to belong to the Iron Age. While bao games are known all over Africa and many countries in Asia, the cupules are more usually scooped out of a wooden board, but they can also be made on the ground or engraved in rock. Its introduction to eastern central Africa, may span several centuries and in that context contemporary with the Late Iron Age, ca. 300 b.p (Phillip 1979).

Results and discussion

The cultural heritage impact assessment for the Project resulted in the discovery of 59 previously unrecorded archaeological sites. Although the sites were recorded all over the landscape in the area of the Project, the majority were found on hill tops and slopes. The area of the Project has been subjected to extensive erosion leaving shallow soils, for the most part, that resulted in rich concentrations of cultural lithic material visible on the surface. However, there were also a few buried stratified sites, KBN 1, 15, 24 and 27 with depths over 2 m. The surface material collected from most of the sites is of secondary context. Despite this observation, the majority of the artefacts were hardly weathered, suggesting that they could not have been exposed for a long time. It should also be noted that some of the sites have also been impacted by activities of the present day inhabitants, particularly tilling of the land and the construction of roads. Although these sites yielded the most chronological and culturally diverse assemblages, they were found to be the most shallow having been disturbed by the road construction activities.

The results of the impact assessment have established that there are four technologically and chronologically differentiated assemblages present in the area of the Project, with the possibility of a fifth. These are the Acheulean, MSA, LSA and IA, while the few choppers raise the possibility of an earlier industrial complex, perhaps a pre-Acheulean or Oldowan. Oldowan cultural assemblages are characteristically represented by choppers but on the basis of assemblages from Olduvai and other Oldowan sites they should also include polyhedrons, spheroids, subspheroids and a variety of scrapers and sundry tools.[18] (The Oldowan is succeeded by the Developed Oldowan Industries which, in addition to possessing the typical Oldowan types, also have proto-bifaces. This raises the question as to whether some of the crudely made bifaces recovered during the current study considered to be Acheulean are actually Developed Oldowan though they are more likely to be Sangoan as it has been argued elsewhere in this report. More data would be needed from the study area to resolve this question.

The Acheulean artefacts that were recovered during the present study may represent a western facies that is found in the peripheral parts of the Congo basin in northeast Angola and the Lower Congo. This facies is distinguished by the rather crudely-made, heavy duty pick-like forms, some parallel sided bifaces, large flakes and a general lack of well made hand axes and cleavers.[17] Obvious Acheulean artifacts among the artifacts recovered were, as a rule, rare. This rarity may be explained by the fact that, being older than MSA artifacts, they may still lay deeper down in stratified sediments and further excavations might yield more of the diagnostic Acheulean forms. Alternatively, being so obvious and different from natural pieces of rock, they are more liable to recognition and to frequently be picked up by the local population. The presence of Acheulean in this part of Tanzania is of a singular importance for, unlike later industries (i.e., the MSA and LSA), localities with sealed Acheulean industries are very rare. Only Olduvai, Lake Natron, Isimila and perhaps Haubi can claim to possess a fully fledged Acheulean industrial complex. Aside from this is the likelihood that, just as the nickel bearing deposits occurs across the river in Burundi, comparable archaeological potential is recorded in Burundi.[42–47]

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Conflict of interest

Author declares there is no conflict of interest in publishing the article.

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