CHAPTER 2

Finding and describing archaeological sites

INTRODUCTION

Alexandre Livingstone-Smith[1]

Finding and describing archaeological sites is the first step of any archaeological enterprise. It generally consists of two phases: desktop assessment and fieldwork.

During a desktop assessment, one may assess the archaeological potential of an area using published research, archaeological databases, museum archives, but also literary sources or old maps. The exact extent of the survey needs to be plotted on a map as accurately as possible, with all the data collected during the desktop assessment (topography, hydrography, vegetation, archaeological finds, resources, settlements and tracks, etc.). One may then develop a survey strategy and survey grid, or in other words, the type of survey and the degree of detail that one needs to achieve. Evidently, these two aspects are linked.

It may be possible to target specifically a single site previously reported, but one may want to survey a small area intensively (i.e. a plateau, a hill, the banks of a lake, a village or a city) or to cover a whole region extensively. This choice (which will probably depend on the overall goals of the operation), will affect the logistics and the survey grids in the field. If the target is a single site, a hill that is supposed to have been an important political centre for example, the need for vehicles will be limited and one can imagine an extensive survey of the area. When surveying a whole region, however, transport will be needed and some sort of sampling will have to be chosen. One can decide for example to make a linear survey every 5 km or 10 km. Clearly, in this way many sites may escape notice, but in the end the archaeological team will have an idea of the archaeology of the area without having to examine every square meter of an area.

Except in a few cases (if one uses a boat or a jeep), field surveying generally involves a lot of walking. Surveyors walk along lines (often called transects), looking for vegetation anomalies (some plants are associated with human activities), topographic anomalies (old structures), artefacts (often associated with charcoal) lying on erosion surfaces, or ploughed field, etc. In the latter case, sites can be found on a track, on the surface of a village, on the banks of a river, anything that will make the substrate visible. The people living in the surveyed area may have crucial information, particularly when the have been made aware of the aims of the survey.

The important thing is to be able to report the finds, describe them and possibly collect samples. In these matters much will depend on the means of the team, but it is possible to undertake extraordinary surveys with little equipment!

This chapter explains the principles of site identification, evaluation and location. It discusses how to define an archaeological site and how to evaluate its priority within overall project planning, as well as emphasising the importance of survey strategies and site localisation. Depending on the context, the research questions the archaeologist has in mind, or the type of site he is investigating, these general principles are applied in varied ways.

For instance, **Alfred Jean-Paul Ndanga** offers an exemplary case showing how African urban areas provide good grounds for low tech and low budget surveys. He brilliantly uses Bangui, the capital of CAR, as a case study and underlines the advantages of this kind of survey. Reviewing the preparation, site identification procedure and description, as well as the methodological advantages and challenges he encountered, he shows how archaeological surveys can be organised, in difficult circumstances and with limited means.

Manfred K. H. Eggert examines rainforest archaeology, reviewing the research strategies, results and evaluation. He explains why and how he developed river-born surveys in the Inner Congo Basin of Central Africa. While he had, in the end, rather significant means to achieve his goals, his contribution explains how heavily forested environments can be efficiently surveyed from an archaeological point of view. It is also apparent how, at a modest scale, one may easily find archaeological sites inside forest villages.

Kevin MacDonald looks at a completely different type of environment: the semi-arid Sahel. It goes without saying that conditions of visibility are very different and field surveys may be prepared, to a degree, analysing aerial photographs or satellite imagery. He then examines the advantages and disadvantages of pedestrian and vehicular surveys, before addressing the crucial question: What is a site? What should one record and what should be collected?

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Akinwumi Ogundiran and Babatunde Agbaje examine the question of archaeological surveys with a view to exploring ancient polities, using as an example the survey of a metropolis, Oyo-Ile, and one of its outlying colonies, Ede-Ile, both located in modern Nigeria. In doing so, they show how research questions frame archaeological surveys and how one can prepare the excavation of complex sites.

One step further, **Jeffrey Fleisher** explores the surveying of towns, explaining how to go from non-invasive and less-destructive techniques to geophysical survey, then to ground-truthing and sub-surface testing, and the interpretation of results. As in the previous case, one can see how the accumulation of small scale observations can help the archaeologist understand the layout of large scale archaeological phenomena.

Paul J. Lane gives a thorough overview of the questions of site recording and cataloguing. To do so, he reviews the necessary preparations and equipment, the crucial cataloguing and archiving. As with other authors, he provides essential guidelines, lists of equipment and examples of site recording forms that can easily be used or adapted in various parts of Africa.

James Denbow examines the case study of surveys he undertook in the Loango region on the western coast of Central Africa. This case study offers an interesting view on a project that initially started as an academic undertaking and turned into a preventive and rescue archaeology project facilitated by the private sector. This case study also illustrates one of the earliest examples of this kind of collaboration in Central Africa.

Pascal Nlend is charged with the difficult task of considering the question of student participation in impact assessments. This contribution is designed to offer students taking part in large scale operations some insights on what will be expected of them – a rarely considered aspect of fieldwork. He uses his experience in Cameroon, but the situation can certainly enlighten students from other countries.

Isabelle Ribot's contribution deals with the specific aspect of funerary sites in field surveys. She reviews aspects pertaining to desktop assessments (archives and oral history), surface and sub-surveys, as well as the planning of the excavations. Here the relationship with local communities is particularly important, as ethical issues may hinder the process of cemetery excavations.

Benjamin Smith examines the essential aspects of rock-art surveys, beginning with what type of artefact qualifies as rock art. He reviews issues concerning the importance of research questions, preliminary investigations, desktop survey and survey proper, with some cautionary advice to keep one's eye open for the unexpected.

ARCHEOLOGICAL EXPLORATION IN AN URBAN AFRICAN CONTEXT: THE CASE OF BANGUI IN THE CENTRAL AFRICAN REPUBLIC

Alfred Jean-Paul Ndanga[1]

Surveys conducted on foot in and around the city of Bangui beginning in 2002 identified approximately 40 archaeological sites ranging in typology from the late Stone Age to the period of iron production. The approach combines a cartographic division of the city into archaeological zones with on-foot surveys. Visits involve the whole team and require swift action in the areas to be surveyed.

The survey of archaeological sites in an urban area resulted from a lack of material or financial resources, but above all from the country's recurring military crises, which have restricted archaeological activity.

In general, however, the opportunity for urban archaeology in the Central African Republic, a poor country, arises from the fact that Bangui is under construction. The use of the space and the evolution of the infrastructure offer fantastic opportunities for archaeological investigation and, subsequently, development.

I. THE ARCHAEOLOGICAL CONTEXT IN BANGUI

The bare spaces of a city allow archaeologists to read the ground directly.

Established during colonisation, Bangui has only slowly 'modernised' (**fig. 1**). Ground cleared by human occupation is exposed to the elements and/or anthropogenic actions that regularly allow the identification of archaeological sites.

Archaeological research in Bangui began in 1966, but was limited to the acquisition of a few flaked stone objects by first R. Bayle des Hermens and, later, P. Vidal. The next few decades were lost in the archaeological doldrums.

This inactivity was both caused and aggravated by political instability. The resulting politico-military crises limited all scientific initiatives. There was also a shortage of financial resources, materials, and qualified personnel.

As a response to these problems, the Centre universitaire de Recherche et de Documentation en Histoire et Archéologie centrafricaines[2] initiated a survey programme in Bangui and surrounding areas in 2002. CURDHACA's response to the issues facing the development of archaeology opened a broad field of investigation.

II. PREPARATION, TECHNIQUES, AND SITE IDENTIFICATION

Surveying begins in the laboratory. Neighbourhoods in the metropolitan area are divided into archaeological sectors. This is done first to delimit the city so that spaces to be surveyed can be visualised along with the results obtained. The maps used for Bangui were scaled at 1/200,000 and 1/80,000. Their analysis allows the identification of localities – such as riverbanks, the confluences of rivers, the edges of plateaux, and toponyms linked to metallurgical activities – likely to have accommodated ancient human activities.

The surveyor teams are made up of six to ten people. They are joined by archaeology students, who take part as of their first year of training. While walking from habitation to habitation, the surveyors spread out in a line and walk in the same direction, crossing one another's paths. This allows inspection of areas examined by one's nearest neighbour.

In the field, open spaces around habitations, earthen roads and embankments, lateritic crust, ditches near houses, the walls of trenches that served as dumping grounds or as clay quarries, areas and slopes furrowed by rainwater, and trees testifying to vegetation since vanished or uprooted by wind are examined.

Everything on the surface is closely observed. Flaked stone, potsherds, and scraps from ancient metal production are easily spotted. The surfaces of the lateritic crust or large rocks – which could be the sites of rock art – and surviving forest trees may signal the existence of an archaeological site.

III. DISCOVERY AND DESCRIPTION OF SITES

A survey file is filled out following the discovery of a single artefact or a visible cluster of pieces. This document collects information including the name of the site, the GPS coordinates, digital photographs, measurements (in the case of structures), the designation of artefacts, and an initial typological classification. The area of the site is estimated following a more intense survey of the area of

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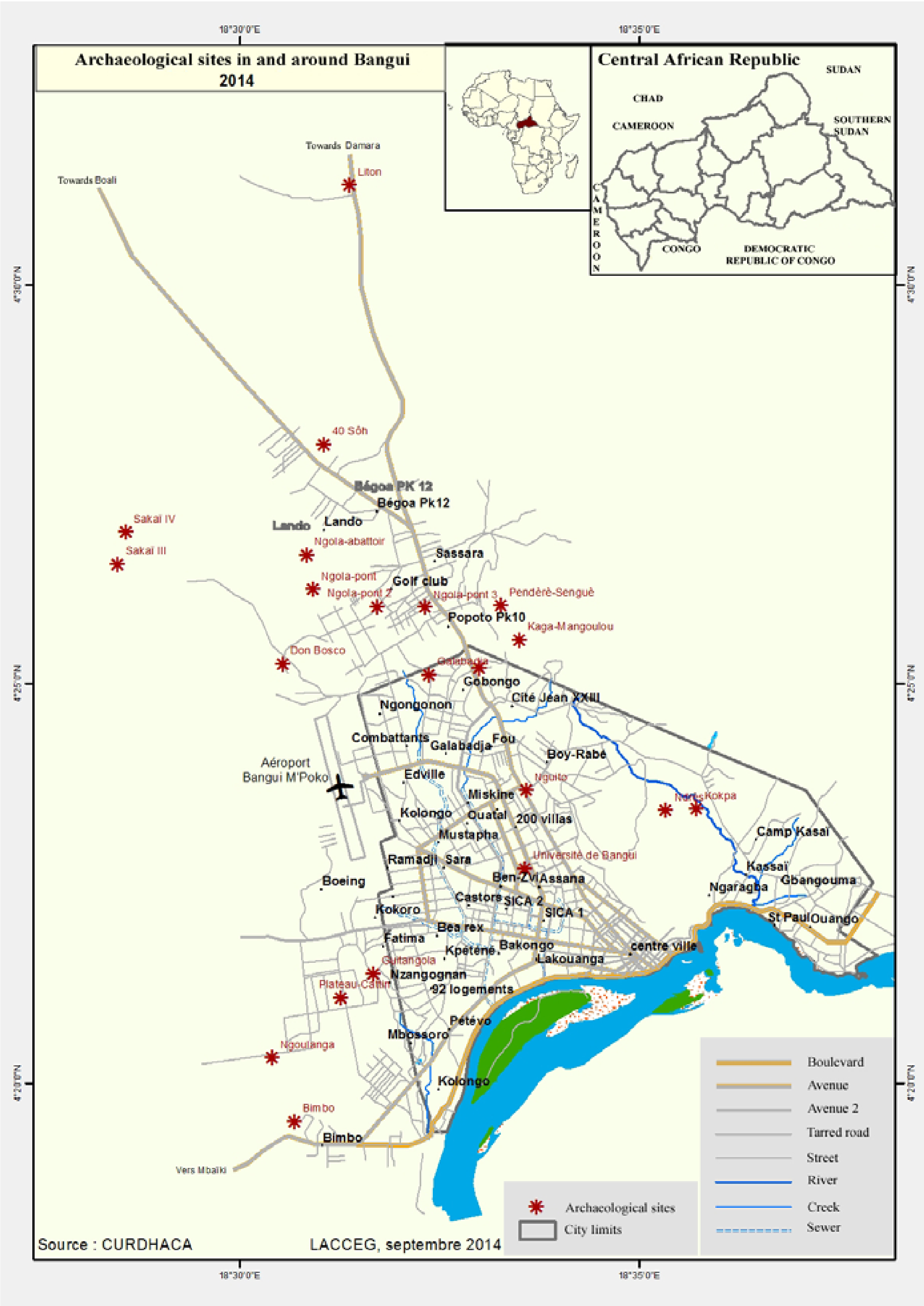

Fig. 1. Archaeological sites in Bangui and surrounding areas.

Fig. 2. (**a**) Bimbo, one week after discovery; (**b**) Bimbo today. (Photos © J.-P. Ndanga.)

discovery and a close reading of the ground. The extent of the site is assessed by the distribution of pieces on the surface or embedded in the talus of roads, as is the case on the sites of Sôh, Bimbo, and Ngola.

A. A lithic quartz industry in Sôh

The Sôh site was found in 2005. Easily accessed, it sits in a new development in the city's northern suburbs. It is located three kilometres from the PK 12 district on the Bangui-Boali road. The discovery occurred following the use of bulldozers to score the ground, sometimes deeply. The lithic pieces uncovered were on and around a residual mound along the eponymous River Sôh.

Three major clusters of quartz flakes were discovered at the site, two above and one to the east of the mound. The eastern cluster consisted for the most part of debitage, ceramic, and a polished shale-rock axe. All were embedded in the wall of the talus.

In addition to the lithic pieces, two small laterite slabs with holes were also found on and at the foot of the mound. The first, located 100 metres from the deposit of the lithic materials described, has a dozen randomly distributed holes. The widest of these are about 15 cm deep and 33 cm in diameter, and the sides are carefully polished. The second slab has 11 holes, of which five are arranged in a cross, and six in a line. These are physically similar to the others, but noticeably smaller.

B. Bimbo: archaeological remains in the roots of a fallen tree

This site sits at the southern exit from Bangui, about 300 metres north of the police checkpoint known as PK 9 Bimbo. The site occupies the left bank of the Mpoko, near housing for Catholic nuns. Trees such as *Terminalia superba, Cola gigantea, Triplochiton scleroxylon, Musanga cecropioïdes, Ceiba pentandra* and so on have survived here, relics of a cleared forest. The discovery of the site was serendipitous in more than one respect.

In fact, an uprooted *Ceiba pentandra* (a kapok) made it possible to identify artefacts (ceramics, iron slag, river shells, and animal bones) that were present in the roots of the fallen tree. A close inspection of the zone led to the discovery nearby of large pottery fragments and bones uncovered by hoeing. This open-air site is spread over an area measuring 1.5 kilometres long and 800 metres wide, at least according to what is visible on the surface. A week after it was discovered, the tree which led to the discovery burned. If the surveyors hadn't been there at the right time, it would have been difficult to detect the site, which is located in a rural area. In fact, rescue excavations are automatically scheduled, for two main reasons:

- the site is threatened by ploughing (which disturbs the site's surface layer); and
- cultivation of the fields might limit future activities.

At present, the excavated area and the rest of the site are completely occupied by new construction (**fig. 2**).

C. The iron furnaces of Ngola

Surveying the banks of the Ngola, which crosses several neighbourhoods in the western part of the city, led to the discovery of four iron production sites. Only the first will be described. Called Ngola-Pont, it is located 200 metres south of the bridge leading to the PK 12 district. The discovery of a single smelted iron slag led to a more intense

Fig. 3. Ngola-Pont: slag heap on a low mound; the black arrow indicates the furnace. (Photo © J.-P. Ndanga.)

survey of the area based on this initial discovery (**fig. 3**).

An iron working area is generally found within one hundred metres of the first slags encountered, and indeed, the uppermost ring of the furnace was found near a house and within fifty metres of the first iron slag found. It rises eight centimetres from the ground and is partially deteriorated; the clay wall is six centimetres thick, and the diameter of the circle is 70 centimetres. There is a slag mound adjacent to the furnace.

Construction of a house has damaged two structures, causing partial deterioration of the slag heap. No other elements of the metallurgic workshop are visible because housing in the area is extremely dense.

IV. METHODOLOGICAL ADVANTAGES AND LIMITS

The advantage of this method is the ease of access to the survey areas and later to the discovered archaeological sites. Mobility is facilitated by urban transport and the general cost of operations represents a small fraction of the Institution de recherches archéologiques centrafricaines's[3] finances. This proximity also allows rapid intervention, such as rescue excavations, if needed. Archaeology students have a field school at their disposal and training is less costly.

These archaeological sites are nevertheless under immediate threat from human occupation and its associated activities affecting the space. The presence of a site on private property is often the subject of endless discussions with the location's owners, who may refuse the team permission even to take photographs of visible artefacts. Worse still, the digging of a test pit must sometimes be interrupted, which is extremely frustrating for the archaeologists. Further activities, such as excavations, often depend on the perspicacity of archaeologists and the relations they are able to establish with the landowner. It should be noted that there are often no laws governing the subject, and those that do exist tend to be unfamiliar to the average citizen.

CONCLUSION

As the example of Bangui proves, the African urban environment is conducive to archaeological development and in particular to the practice of on-foot surveys. It is essential to be familiar with the place and to persevere. It is highly desirable that investigators have a good grasp of the physical appearance of artefacts commonly encountered in these places (lithic material, ceramic shards, metal slag, etc.), especially when these are scattered across a complex landscape. Open areas between the houses of urban areas are places with a good deal of potential for archaeological discovery.

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3 Institution of Central African archaeological research.

CASE STUDY: RAINFOREST

Manfred K. H. Eggert

INTRODUCTION

It is a truism that the equatorial rainforest is characterised by intense vegetation. And it is another truism that dense vegetation constitutes a major obstacle for archaeological research. The ‘visibility’ of material remains and structures from the past or, rather, their potential of being visible, is of crucial importance wherever archaeological fieldwork is intended. In contrast to densely settled areas in more or less open landscapes, be it in Central Africa or in Central Europe, rainforest habitat all over the world is almost by definition inimical to archaeological research.

Given this, it is not surprising that the Central African rainforest constituted, until the late 1970s, the last immense inner-African territory which was virtually unexplored archaeologically. In geomorphological terms, the equatorial rainforest of Central Africa is largely equivalent to the inner Congo Basin, the better part of which belongs to the Democratic Republic of the Congo (‘Congo-Kinshasa’) and the Republic of the Congo (‘Congo-Brazzaville’). The present distribution of the evergreen tropical rainforest extends over about 2,500 km west-east and 1,600 km north-south and thus amounts to approximately 8% of Africa’s surface. In 1990, its coverage was estimated at c. 2.04 million square kilometres which means that it has decreased to about 51% of its maximal extent of about 3.95 million square kilometres between 8000 to 5000 BP (Wilcox 1995). Since a rather detailed paper on the current state of Central African rainforest archaeology has been published recently (Eggert 2014), the following will concentrate on some basic aspects which are determinant for archaeological fieldwork in the forest.

There might have been other reasons than the low archaeological visibility that led to the fact that the Central African rainforest remained an archaeological *terra incognita* for so long. First of all, the internal political situation in both Congos after independence in 1960 very often was not favourable for systematic and prolonged research. Furthermore, until the late 1970s there were hardly professional Central African archaeologists and the very few who, after obtaining an academic degree in Europe or North America, returned home were not provided with any funds for archaeological field projects if they had a paid job in the administration or universities at all. As to European or North American archaeologists, some may have refrained from an archaeological engagement because of general equatorial climatic conditions or specific Western perceptions of forests as ‘the shadow of civilization’ (Harrison 1992; specifically for the Central African rainforest see Eggert 2011).

Be this as it may, it is idle, in our context, to give further thought to this, not least since the last two points, though they may have played a certain role, will not stand

Fig. 1. The drainage system of the Congo River (adapted from G. Laclavère (dir.). 1978. *Atlas de la République du Zaïre*, series ‘Les Atlas Jeune Afrique’. Paris: Éditions Jeune Afrique, p. 11).

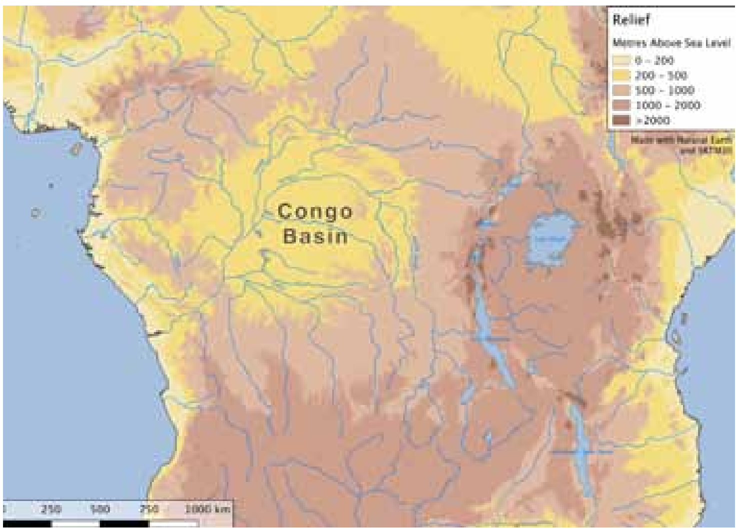

Fig. 2. The Congo Basin (adapted from R. Van Chi-Bonnardel (dir.). 1973. *Grand Atlas du continent africain*. Paris: Éditions Jeune Afrique, p. 27).

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Fig. 3. Fisher camp on the Ruki River near the village of Ikenge (Democratic Republic of the Congo). Former high water levels are marked by different colouring of the tree trunks. (Photo © M. Eggert.)

Fig. 4. Two archaeological features at the village of Munda on the Likwala-aux-Herbes River (Republic of the Congo). (Photo © M. Eggert)

the test. Rather, the following will be devoted to some strategic and tactical considerations concerning archaeological fieldwork in the Central African rainforest.

I. MAKING USE OF THE RAINFOREST'S CHARACTERISTICS

So far, I have stressed the difficulties with which any archaeologist striving for fieldwork is confronted in the evergreen equatorial rainforest. There are, however, some fundamental positive circumstances as well. As a glimpse at a hydrographic map will show, lowland rainforests are characterised by a multitude of watercourses and sometimes even lakes, both of varying dimensions (**fig. 1**). As for the Congo Basin, it shows a gentle relief of roughly 20 to 40 m (**fig. 2**). It is linked to the many rivers, lakes and creeks as well as swamps and seasonally induced inundation zones in such a way that the topography alternates between zones of low-lying land and more elevated surfaces. Due to the annual fluctuation of the intensity of rainfall, the water levels rise and fall in keeping with the season. Accordingly, the difference between the highest and the lowest water level often amounts to about 3 m, if not more (**fig. 3**).

Year-round settlement along rivers and lakes necessitates sufficiently high banks to protect the villages against rising water levels during the rainy season. Therefore, low-lying territory, that is, land subjected to seasonal inundation, harbors only a very limited archaeological potential, if any. Some activities, particularly intense fishing and the smoking of the fish takes place during the great dry season in provisional fisher camps sometimes erected on poles within the inundation zones of rivers (**fig. 3**). At such places, relics of some ancient occupants may be found by the archaeologist, but the chance for it is necessarily very low.

In view of the predominant non-visibility of vestiges of archaeological interest in the forest, successful fieldwork is dependent on open spaces. These are available wherever permanent settlements are present. In Central African villages, be they on rivers and lakes or in the hinterland, most of the surface between and around wattle and daub huts and mudbrick houses are kept devoid of vegetation, mainly for fear of snakes. Moreover, these surfaces are exposed to often torrential rains in the wet season which leads to constant erosion. This in turn provides an excellent opportunity for the archaeologist to detect not only material relics like ceramics or stone tools, but also structures resulting from excavations in ancient as well as more recent times. These excavations may have served, for example, for the fixing of house poles, as burials, that is for the deposition of human corpses, as well as for pits of all kinds (e.g. rubbish pits vs. pits as cultic depositories of objects, particularly ceramics). Whatever the function of such structures may have been, they clearly stand out from the surrounding soil by their different colour and, very often, fragmented ceramics and burnt clay (**fig. 4**).

As far as rivers are concerned, archaeological potential is linked to more or less steep banks. Here again, the specific climatic conditions of the tropical forest result in constant erosion of river banks. Wherever villages were once installed on these banks, but have long been

Fig. 5. Pit with ceramic vessel in the bank of the Likwala-aux-Herbes River (Republic of the Congo). (Photo © M. Eggert.)

abandoned since, their traces are potentially visible in the banks's profile (**fig. 5**). Evidently, the same is true for villages that are still existent.

II. RESEARCH STRATEGIES

Generally, we may differentiate between an intensive and an extensive research strategy. Any decision between the two is contingent on the archaeological questions to be resolved. As far as the inner Congo Basin in the 1970s was concerned, the most pressing question of all resided in the fact that this vast territory constituted an archaeological *terra incognita.* There, not even a very rough relative chronology was established, let alone regional sequences, their interrelationships and their position according to an absolute timescale. Under these preconditions it would obviously have been rather futile to opt for an intensive strategy.

Fig. 6. The Baleinière on the Likwala-aux-Herbes River (Republic of the Congo). (Photo © M. Eggert.)

However, when I started fieldwork in 1977, I had no logistics let alone any firmly established research base to rely on. Consequently, field equipment had to be limited to the absolutely necessary in order to conduct some reconnaissance work and test excavations. The sphere of activities was limited to an area of about 60 kilometres on the Ruki River, which is one of the main left tributaries of the Congo River. Mobility was assured by a *pirogue* (dugout canoe). Necessarily, the results of this first six-month field campaign of 1977-1978 were quite interesting on the mini-regional level, but virtually nonexistent on the broader scale. It became evident that a reliable logistic infrastructure was imperative to surmount the extremely regional or even local bias. The basis for this was realized within the next six-month campaign of 1981-1982 and 1983. On the one hand, the missionary order M.S.C (Missionaires du Sacre-Cœur or Missionaries of the Holy Heart), especially Father Honoré Vinck, was of great help in furthering our plans. On the other hand the Société industrielle et forestière zaïro-allemande (SIFORZAL, then of the Karl Danzer Group at Reutlingen in Germany) was vital in terms of technical and logistic support (e.g. in supplying large quantities of gasoline for outboard motors).

With the end of the 1983 field season the basic outline of what became to be called the 'River Reconnaissance Project' was established and its practical utility tested. Our team had a wooden boat with an overall length of about 18 m and a maximum width of 2.5 m encompassing a gross tonnage of roughly 20 metric tons. This boat, locally called *baleinière*, was spacious enough to house a team of seven people over an extended time period as well as to accommodate not only the necessary equipment but also a maximum of 3,600 litres of gasoline (**fig. 6**).

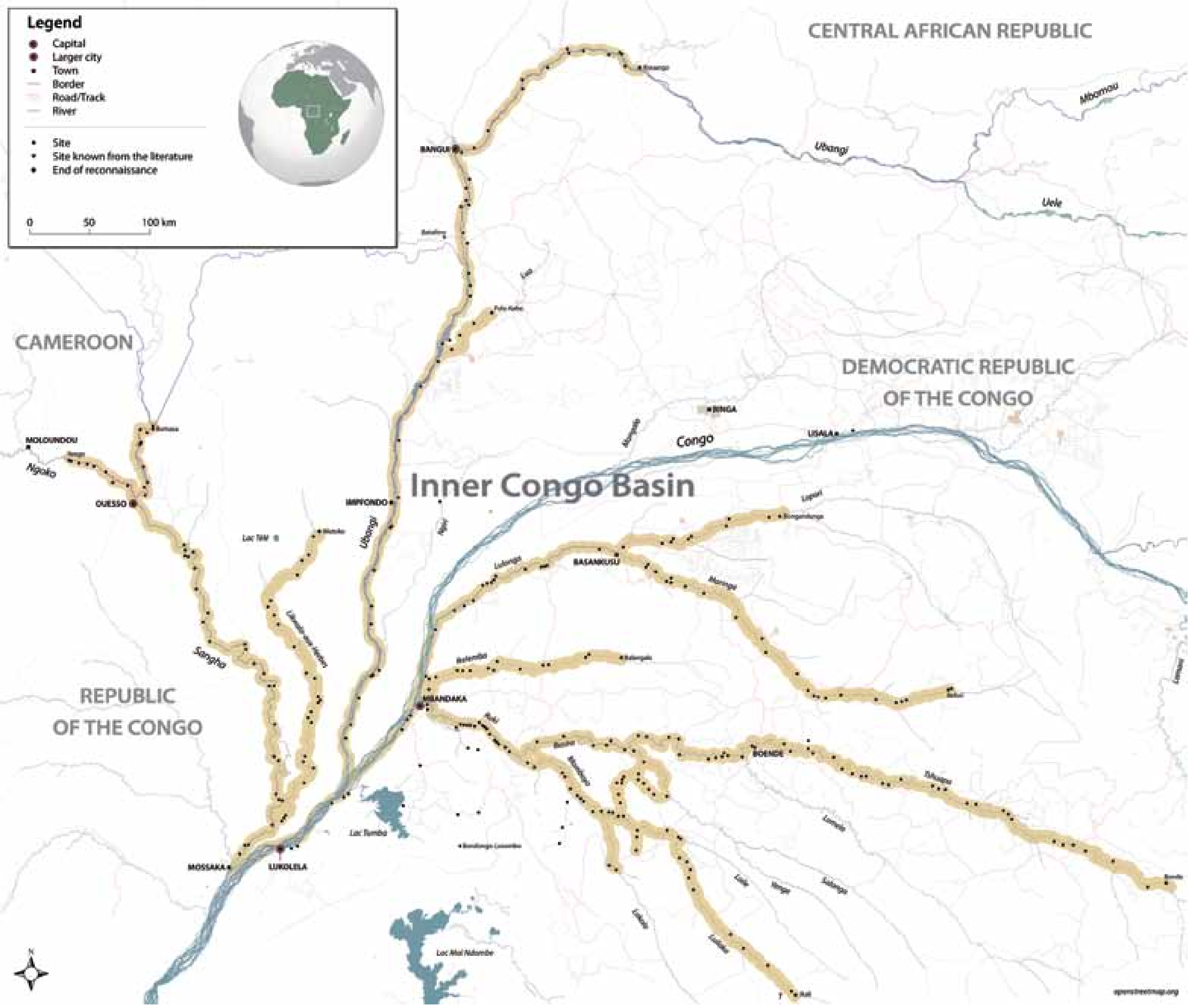

Fig. 7. Rivers in the Congo Basin explored by the 'River Reconnaissance' Project. (© M. Eggert.)

It was propelled by a 25 HP outboard motor which allowed a maximal speed of approximately 8.5 km/h upstream and 16 km/h downstream. Another motor of the same power was mounted on a dugout which served for inspection of village surfaces and river banks whenever the opportunity arose. In the meantime, the *baleinière* was steadily moving on. Finally, in 1985 and 1987, we even had radio contact between the two units.

With the tactical base of the River Reconnaissance Project firmly established in 1983, the procedure to follow offered itself. While going upstream in the archaeologic exploration of some of the major tributaries of the Congo River, a reconnaissance of as many prospective places as possible was effected. On this basis, those offering the greatest archaeological potential were chosen for surveys and small-scale excavations on the way downstream (see Eggert 1983 on this).

III. RESEARCH RESULTS AND EVALUATION

Within ten years of fieldwork and five six-month campaigns in the inner Congo Basin (1977 through 1987), a number of major tributaries of the Congo R. were prospected and a basic and regionally differentiated sequence of ceramics groups as well as their relative and absolute position in time was established (see Eggert 1993, 2014; Wotzka 1995). Looking back, it is obvious that implementing an archaeological survey over so vast a territory in so short a time was only possible in using the waterways in much the same way as the early European explorers did. The overall distance covered by our project amounted to some 5,000 river kilometers (**fig. 7**).

In summary, it can be stated that our expectations of the River Reconnaissance Project were met. Nevertheless, it is important to realize that the archaeological insights thus gained are necessarily river-centred. Our very few surveys into the hinterland by means of bicycles and motorbikes did in no way balance this bias. However, we started out from the conviction that in a vast region which hitherto represented a blank on the archaeological map one ought to try to establish age-area schemes, that is, regional cultural sequences on the basis of the archaeological material at hand (in our case ceramics). These sequences will eventually serve as a backbone for more comprehensive as well as more detailed studies of a local as well as regional focus.

In a 'survey of surveys' in sub-Saharan Africa, John Bower devoted some space to our survey strategy (Bower 1986: 34-36). His very thoughtful and well-reasoned critical remarks on our sampling procedure and other aspects deserve attention, although they are not always relevant to the conditions of fieldwork in the equatorial forest and the aims pursued. In apparently realizing this himself, Bower is somewhat vacillating between the pure doctrine of site definition and sampling procedures on the one hand and the insight into the problem of locating archaeological sites in the forest at all. Nevertheless, his contribution stands out in that it is, at least to my knowledge, the only critical commentary on our project at all.

As I stated about 20 years ago in the context of Bower's remarks, our waterborne river reconnaissance, for all its methodological simplicity, has allowed us to explore a very important part of the major rivers in the inner Congo Basin (Eggert 1993: 296). Much more fieldwork in the Congo Basin was intended. However, for political as well as for professional reasons, our archaeological commitment to fieldwork in the Congo Basin of then-Zaïre (now DR Congo) came to an end. It was only from 1997 through 2008 under much more comfortable circumstances and with a totally different strategy that our rainforest research was resumed, but now in southern Cameroon. In getting this started, my old friend Pierre de Maret with his project Avenir des Peuples des Forêts (APFT) was of vital importance in that he provided me with the necessary research facilities in Yaoundé from 1997 through 1999. But that's another story.

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FIELD SURVEY IN THE SAHEL: AN INFORMAL GUIDE

Kevin MacDonald[1]

I. BEFORE YOU GO INTO THE FIELD: REMOTE SENSING

Fieldworkers in the African Sahel will be undertaking their survey in situations of relatively good surface visibility. This means that it is possible to employ 'remote sensing' prior to embarking for the field by analyzing aerial photos and satellite images.

Aerial photos can be examined at, or purchased from, a national Geographic Institute, the IGN in Paris or the UK National Collection of Aerial Photography. These were usually made around 1960, are in black and white, square in shape and cover relatively limited areas of ground, with each image representing roughly 8 by 8 km. They normally come in pairs (with consecutive code numbers). These pairs are slightly offset so that they can be placed beneath a stereoscope and seen in three dimensions. This feature, although antiquated today, can be a very good way for seeing the rise and fall of topography – making it easier to spot settlement mounds. For all the advantages of satellite imagery, this is something which they do not provide. Once you locate mounds and other surface features you can trace them onto calque (tracing paper) and make composite plans of the landscape, including geographic features like watercourses, villages, areas of acacia scrub, etc. A mixed blessing of old aerial photos is their very age: they show you what the landscape looked like in 1960. On the negative side villages could have moved or expanded and road networks changed; on the positive side you may see sites which are now obscured or partially destroyed by development (**fig. 1**).

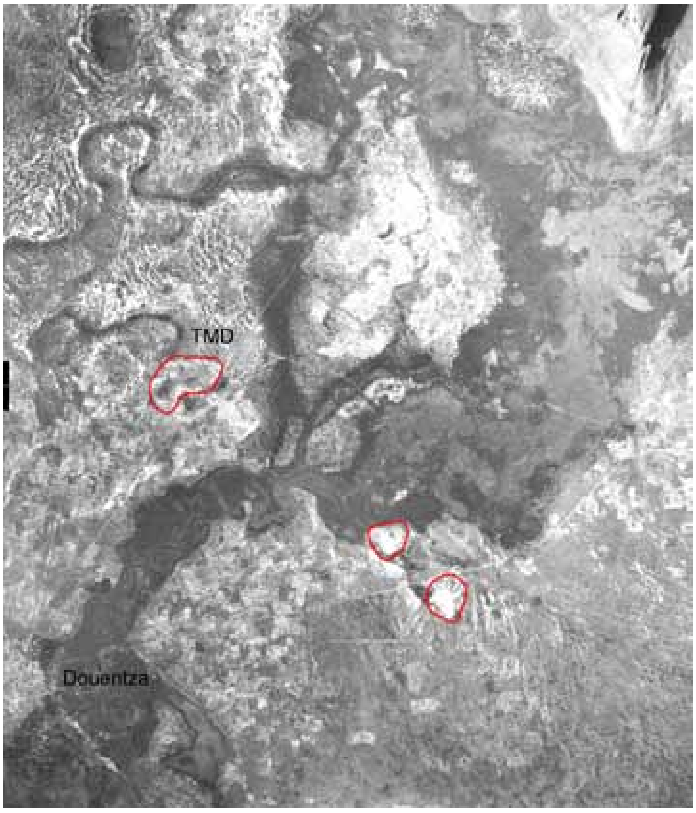

Fig. 1. Example of IGN aerial photo of 1960 showing Douentza, Mali and a fossil drainage system to the north of it. Tell sites, including Tongo Maaré Diabel (TMD), are outlined in red. Note that TMD is rather difficult to distinguish; only revealed by the light bands of sand built up at its flanks. The other tells, with less vegetative cover are easier to see. Viewed as stereo pairs all three of the tells 'pop up' quite nicely. (1960 IGN aerial photo adapted by K. Macdonald.)

Modern satellite imagery is provided through free online services like Flash Earth or Google Earth. Custom-produced satellite imagery can be purchased from various agencies (such as QuickBird) which may have higher resolution and availability in a range of bandwidths (including infrared). Satellite imagery has the advantage of being in colour, which makes some landforms (like wood cover) easier to identify. On sites such as Google Earth they are usually up-to-date and images may exist for different times of the year, offering useful contrasts in vegetation and hydrology. Also key towns are usually marked as points of reference and wherever your cursor is can supply you with coordinates (longitude and latitude) which you can record

Fig. 2. The tell sites of Kolima, Mema region, Mali. As there is very little vegetation in this region the mounds are relatively clear – this is not often the case. Image via Google Earth.

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Fig. 3. The 18th century capital of Segou Ton Masala as viewed via Google Earth.

Fig. 4. Vehicular Survey in the Mema (1989), Crossing a Palaeolake, observer atop the vehicle. (Photo © MacDonald.)

and match up on the ground with a handheld GPS. Satellite images are, however, rather one dimensional and the settlement mounds you are looking for may blend into the landscape and become difficult to pick out. Larger mound complexes are sometimes visible by the drainage patterns which work their way down the sides of the mounds (though this is also the case for hills!). Alternatively, artefact density may inhibit vegetation growth (leaving distinctive visual patterns) and decaying mud architecture (once tempered with laterite) may appear on the photos as dark red brown patches (**fig. 2**). More recent sites – especially the walled sites of the 18th and 19th century – are often incredibly clear (**fig. 3**).

Whichever remote sensing option you choose, it is wise to spend some days or weeks before your survey carefully going over imagery and selecting sites to visit. If using satellite imagery, you can record the coordinates of each suspected site and also print out views of your survey area, marking potential sites, for consultation in the field. If using aerial photos, make the traced overlays, being careful also to include key landmarks and points of reference which will allow you to situate yourself by taking compass bearings or odometer readings from point to point with your survey vehicle.

If it is at first difficult for you to discern sites in your chosen survey area, an initial field visit and the identification of a few sites on the ground may help afterwards to recognize these on the imagery.

II. PRACTICALITIES: SURVEY OPTIONS

The practicalities of your survey will be dictated by a number of factors: the openness of the terrain, and the dimensions of the area that you wish to survey and the availability of a 4x4 survey vehicle. If the landscape is relatively open you can cover an incredible amount of ground using a vehicle. If the terrain is hilly or covered with high grass or trees then foot survey will probably be your only option. Foot surveys do well in limited zones (e.g. 5 by 5 km in size). If you wish to traverse a vast area, e.g. transects of 25 km or more in length (see Togola 2008), and your region is safely traversable with a 4x4, then vehicular survey becomes a viable option (**fig. 4**).

A. Foot survey

This type of survey is best undertaken in groups, for maximum coverage and safety. Generally, such surveys begin at a fixed point, with each surveyor spaced out within maximal visual distance of one another (50 m or 100 m). One person at the end of the row of surveyors is the guide holding a handheld GPS, or at least a good pocket compass, to make sure that they stay in a straight line. If the other surveyors keep a consistent distance from this person then it is possible for a team of four trained individuals to cover an area of 500 m wide by 5 km of distance in a morning. The size and type of sites being sought, as well as ground cover, will dictate whether or not a 100 m spacing is excessive or not – this gap may need to be modified accordingly. A vehicle can either pick up the group at a pre-arranged point at the end of the transect, or the surveyors can move single-file to their left or right to 'paint' another 500 m wide transect on the way back to their start area. An alternative form of survey is the 'radius' or 'dog leash' survey – in which surveyors walk in a widening or narrowing arc around an easily visible central point (a town with high buildings, an inselberg or a large settlement mound for example).

B. Vehicular survey

This type of survey requires a good driver, a navigator and a spotter. The navigator rides beside the driver with a GPS (or in a worst case scenario with a vehicular or boat compass – never a pocket compass which will be hopelessly skewed by the magnetic field of the vehicle!). It is the role of the navigator to keep the driver on course as you move along very slowly at 10-20 kph. The spotter rides atop the 4x4 and calls for the driver to stop if a point for investigation is sighted. This may seem a health and safety nightmare, but in the more open areas of the northern Sahel this works very well, and sites (whether lithic scatters reflecting in the sunlight) or settlement mounds are routinely visible from 200 m or more from atop the vehicle. It helps to have way-points to steer for and to verify that you are 'on course' (villages, elevations, etc.) but in the desert one must really trust the GPS!

When using a vehicle in more heavily vegetated areas – you can tailor your transects to move along cart-trails. This is not entirely satisfactory, as you are then constrained by how people move around the modern landscape – but it does allow you to cover long pathways quickly, provided there is enough surface visibility for you to still see sites from the top of the vehicle.

The type of survey that you undertake is guided by a variety of factors. You may wish to randomly and systematically survey landscapes. In this case you will conduct a 'stratified sampling', selecting comparable segments of different geographic zones (e.g. floodplain, hilly areas, different distances from watercourses, etc.). The specific survey blocks might be randomly chosen, or focused on areas where your remote sensing turned up the largest number of prospective sites.

Alternatively you may do a 100% remote sensing reconnaissance of your survey region and then verify out in the field the putative sites of which you recorded the coordinates on your GPS. There is however a risk that you will utterly miss site types not visible remotely unless you also build in some forms of systematic transect survey to your plans.

Finally, there are some regions where high ground cover and local sentiments may prevent you from working systematically on the landscape at all. Villagers may not like to have you wandering across their fields or traipsing over sacred sites without their permission. In more traditional and densely farmed landscapes one may have to work from village to village, doing what is sometimes called a locally-led survey as explained in the chapters by Nic David and by Hans-Peter Wotzka.

III. WHAT IS A 'SITE'? WHAT TO RECORD AND COLLECT

The definition of what constitutes an archaeological 'site' as opposed to isolated surface finds is often contentious. Generally speaking, a site is a place where focussed human activity took place over an extended period of time – at the very least a campsite or tomb – and not just a place where a pot was broken or a tool dropped. One minimum definition which I have used is that it contains at least 10 different artefacts (not all fragments of the same object) in a 10 by 10 m area. If such a grouping is not associated with physical features or clear stratification (mounding or erosion from a cut) it is recorded as a **scatter**. Other site categories would include **unstratified habitations** (flat sites with surface features indicative of settlement – hearth stones, granary bases, stone architecture), **settlement mounds and/ or middens** (some relief caused by deposit build-up, with eroding artefacts and surface features), **metal working or smelting sites** (with traces of slag mounds or furnace bases), and **burial monuments** (eroding cemeteries, stone or earthern tumuli). These comprise the bulk of site types encountered, though more idiosyncratic localities (e.g. ritual/cult localities and rock art) do occur and any site typology must remain flexible.

When you arrive at a site, make certain baseline observations:

- a GPS coordinate reading at the approximate centre of the site;
- dimensions across two axes of the site (usually N-S and E-W). This can either be determined with your GPS or by metre pacing (adjust the length of your step to this long stride by practice using a metre tape laid on the ground). This can be used to make an estimate of the site's size in hectares later;
- a brief description of the site: what kind of locality it is, the amount of vegetation cover, its approximate height and any visible surface features;
- a brief description of the surface artefacts encountered, including the full range of different types of material (ground/ chipped stone, pottery, metal slag, metal objects, animal or human bone, etc.);
- a summary of local traditions about the site;
- photo numbers taken of the site on your camera.

It helps if you have a registry sheet for each site to prompt you to record the basic information (see Lane, this volume, pp. 84-85).

If you have more time, for more important localities, you should also make a sketch plan of the site and record a representative sample of artefacts. The sketch plan may be aided by any aerial/satellite images you have brought along with you, or by walking the boundaries of the site with your GPS 'track' mode switched on. If you set your GPS to give grid coordinates rather than latitude and longitude, you can more easily transfer your plan to graph paper and add in the locations taken of any features that occur within the site.

When collecting diagnostic artefacts for quantification and comparison with other sites, there are at least two ways to make your collection. The first is a systematic collection of all pottery rim forms. A sample of 50 to 100 is a minimum for comparative work. The second approach is to lay out a collecting square on the ground using metre tapes: 5 by 5 m or 10 by 10 m are good sizes depending on artefact density. Then, gather all sherds and worked stone artefacts within such collecting squares, with some size cut off for pottery (say, no sherds smaller than 2 cm).

Finally, it is worth considering just how much material you wish to remove from the site for future analysis. Such material has to be both carried and curated. Thus, you may choose to record sherds from your collecting square while on site. This consumes more time, but you have to do it eventually anyway and it saves transport and curation.

Of course the analytical use that you make of all this information and material is another matter, and beyond the scope of this particular entry.

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ANCIENT POLITIES: ARCHAEOLOGICAL SURVEY IN A METROPOLIS AND ITS COLONY

Akinwumi Ogundiran[1] & Babatunde Agbaje-Williams[2]

INTRODUCTION

Africanist archaeologists have developed several methods of archaeological survey to answer a myriad of questions dealing with issues of social complexity and ancient polities – city-states, kingdoms, and empires. Such survey strategies have sought to account for the origins and evolution of polities, settlement and social hierarchies in a political landscape (e.g. Norman 2012), materialization of power (Monroe 2014), urban-rural networks (e.g. Fleisher 2010), structure of sociopolitical organization (e.g. McIntosh 1999), and political ecology of state formation (e.g. Sinclair 1987), to mention but a few. The physical attributes of the landscape often affect the survey techniques employed. In general, regional surveys have been implemented more in the savanna and Sahel landscapes with good to excellent ground visibility than in the rainforest belt. The latter has poor ground visibility. More than a coincidence, it is also the savanna-Sahel area that has enjoyed more funds to implement large-scale archaeological survey programs.

Many questions beg for attention in the study of ancient polities. It is therefore important to develop and deploy appropriate survey strategies that are amenable to the type of polity being investigated, the environmental context of its location, and the resources at hand. This chapter is about two complementary survey projects that sought to study the Oyo Empire in West Africa from two spatial perspectives: the metropolis and the colony. These projects shed light on the role of metropolis-hinterland interactions in the creation of the Oyo Empire.

The savanna-based city-state of Oyo launched its political expansionist program into the rainforest belt of Yorubaland between the last quarter of the sixteenth and the first quarter of the seventeenth century. By 1730, Oyo had become the largest political formation in West Africa south of the River Niger, stretching its arms across both the savanna and the rainforest belts, with a vast network of towns, villages, colonies, and kingdoms under its control (**fig. 1**). Until recently, archaeological investigations had concentrated on the imperial capital itself – Oyo-Ile – focusing on the questions of urbanization and demography (Agbaje-Williams 1983). Recent archaeological efforts have extended attention to the role of the outlying regions and provinces in shaping the rise of the Oyo Empire; the strategies of the imperial expansionist process; and the ways of consolidation that legitimized the power of Oyo in the conquered territories (Ogundiran 2012; Usman 2000). The archaeological survey strategies that have been used to address both topics are the subject of this chapter. The first to be discussed is the survey strategy for mapping the city of Oyo-Ile, the capital of Oyo Empire located in the savanna landscape. The second survey focuses on the Oyo colony that was established in the upper reaches of the rainforest belt (Upper Osun region) to advance the project of Oyo political expansion.

I. OYO-ILE: SURVEY

On the basis of the wall system identified from aerial photographs in the 1960, it was known that Oyo-Ile covered an area of more than 5,000 hectares at its peak in the mid-eighteenth century. However, the inventory and spatial distribution of archaeological surface materials, and their relationship to the natural environment, was not known. In 1978, the second author launched a survey strategy that would provide this information (Agbaje-Williams 1983). He sought to survey 10% of the urban landscape (the area within the Oyo-Ile wall system) using a systematic interval transect survey strategy. This meant dividing the archaeological landscape into surveyed tracts (transects) in west to east direction (**fig. 2**). Fourteen transects, with 500 m intervals, were established in order to achieve the targeted 10% coverage. The width of each transect line was kept constant at 50 m, and the surveyed team walked south to north at the mid-point of the transect line, using prismatic compass and metric tapes for recording. The length of each transect line was determined by the outermost walls. As a result, the lengths of the surveyed tracts varied between one and a half to ten kilometres.

Visibility and mobility were easy because of the grassland vegetation and the fact that the survey was conducted in the dry season. The surveyed area covered 525.25 hectares (of the total area of the capital within the walls: 5,252.5 hectares). Out of this, the compound-courtyard

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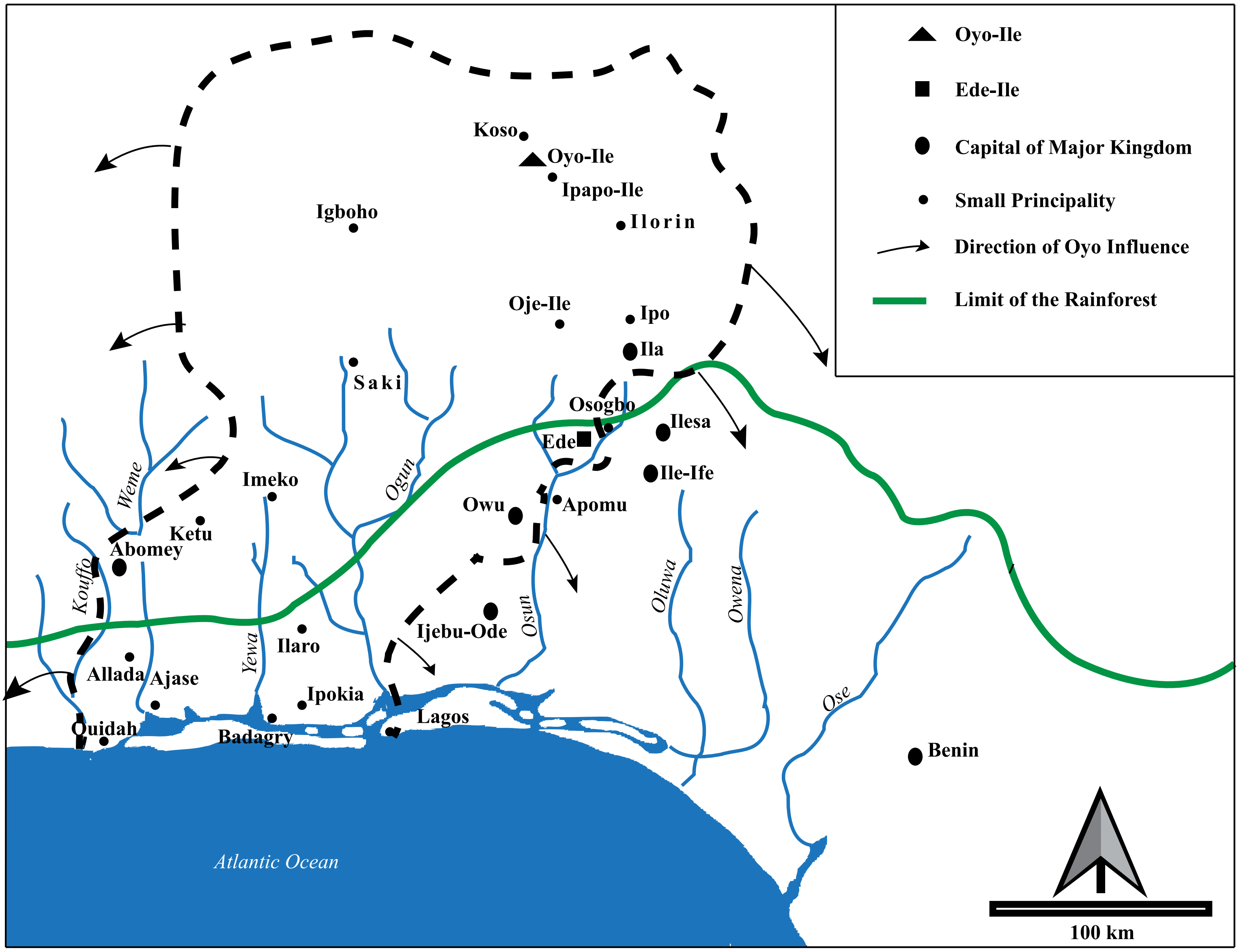

Fig. 1. Oyo Empire at its peak, ca. 1730. (© Ogundiran.)

structures were found to cover an area of 884 hectares (8,840,000 sq.m.), about 17% of the area within the walls. This was the main built-up area of the city. On the other hand, the surface distribution of potsherds extends beyond the residential area covering 1870 hectares, about 35.6% of the total area. As in other parts of West Africa's Sahel and savanna, baobab trees (*Adansonia digitata*) are ubiquitous at Oyo-Ile. The multiple wall system at Oyo-Ile – the palace (innermost) wall, main outer (defence, with deep ditch) wall, outer wall 2 (with shallow ditch), and the northeast and northwest walls – demonstrates a complex history of urban formation (**fig. 2**). At its peak, the ancient capital had a north-south dimension of 10 km while its east-west spanned 6 km.

The survey achieved three goals: (1) It led to the identification of the residential area, comprising mostly compound-courtyard structures (impluvium architecture), granary stone structures, a vast palace complex, a dug-out water reservoir, refuse mounds, as well as grinding stones and grinding hollows on rock outcrops. (2) It provided the spatial and density distribution of artifacts, mostly pottery. (3) It made purposive problem-oriented selective excavations possible because the provenance of many of the features is known.

II. EDE-ILE: SURVEY AND EXCAVATIONS

Although Oyo's metropolis was in the savanna belt, it was in the rainforest that Oyo-Ile scored its first major

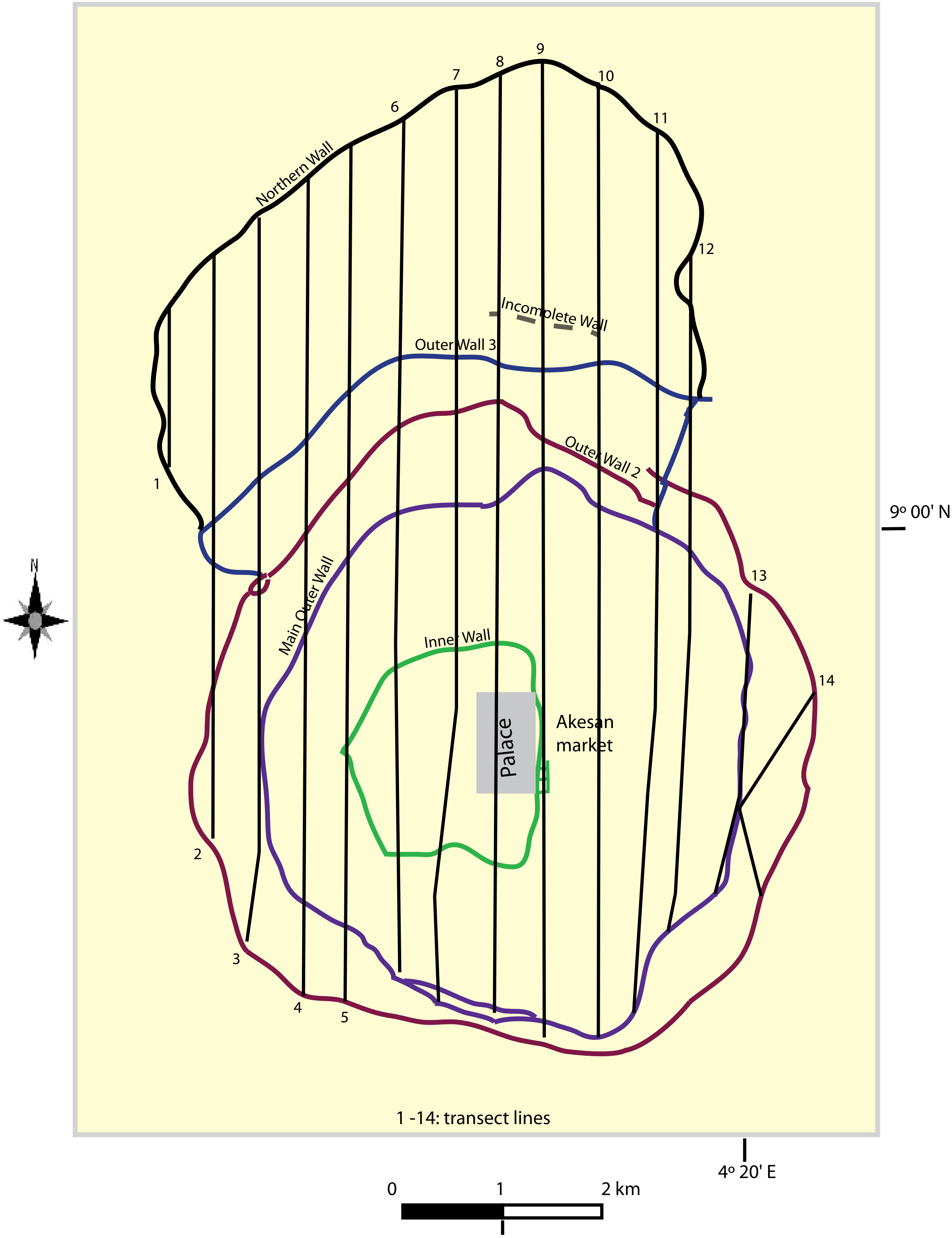

Fig. 2. Oyo-Ile wall system and survey transects, adapted from Agbaje-Williams 2005. (© Ogundiran.)

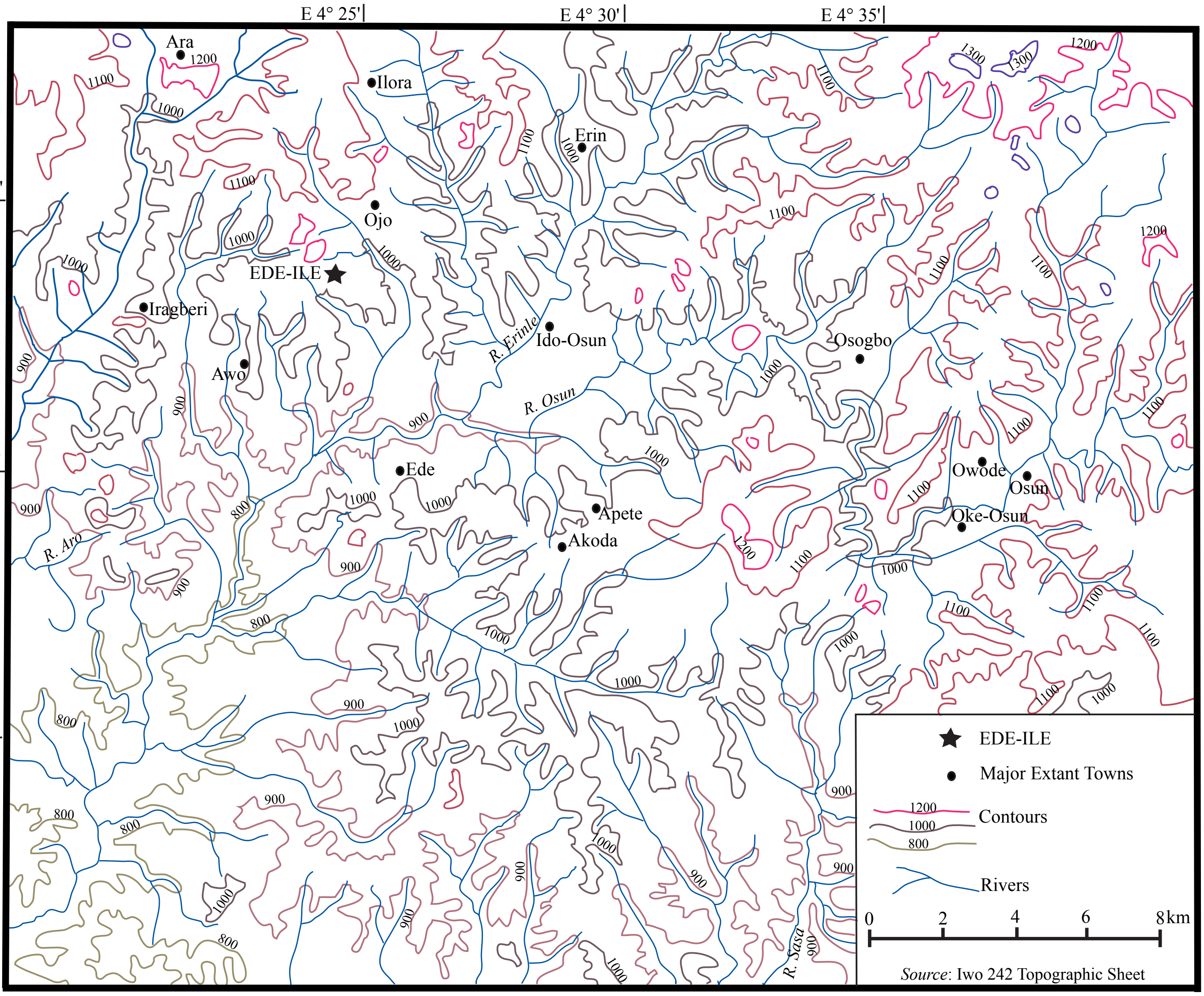

Fig. 3. Topography of a cross-section of Upper Osun. (© Ogundiran.)

success towards becoming an empire. It achieved this by establishing colonies on trade routes that linked the savanna hinterlands to the coast. The official oral traditions of the Oyo palace bards, popular imagination about the empire's history of origins, as well as folkloric representations of the empire's history point to one of these colonies – Ede-Ile – as the place where the march of the city state of Oyo-Ile towards imperial status began. However, this frontier town was abandoned ca. 1840 in the aftermath of the collapse of the metropolis and the empire in the 1830s. Finding this abandoned colony became important to the quest to understand the political, economic, and cultural processes that shaped the trajectories of the Oyo Empire during the late sixteenth through the early nineteenth centuries.

Most informants point to the area between the present-day Awo and Ojo towns as the location of the site (**fig. 3**). This is roughly a 24 sq.km. area with a mosaic of rainforest and derived savanna vegetation characterized by thick undergrowth that makes surface visibility and pedestrian survey difficult. However, a dedicated informant who was familiar with the area led the research team to Ede-Ile where we counted twenty-one standing baobab trees, and we noticed the massive number of ceramics on the surface that are very much the same as the ceramics (both in decorations and forms) at Oyo-Ile (Ogundiran 2012). On these two lines of evidence alone, we recognized that we were dealing with an Oyo-related settlement. Hence, we embarked on mapping the extent and archaeological features of the site in order to understand the settlement size, layout and activity areas at the time of its abandonment, as well as to guide the choice of sites for excavations. The archaeology survey strategy used a direct historical approach in the sense that two representatives

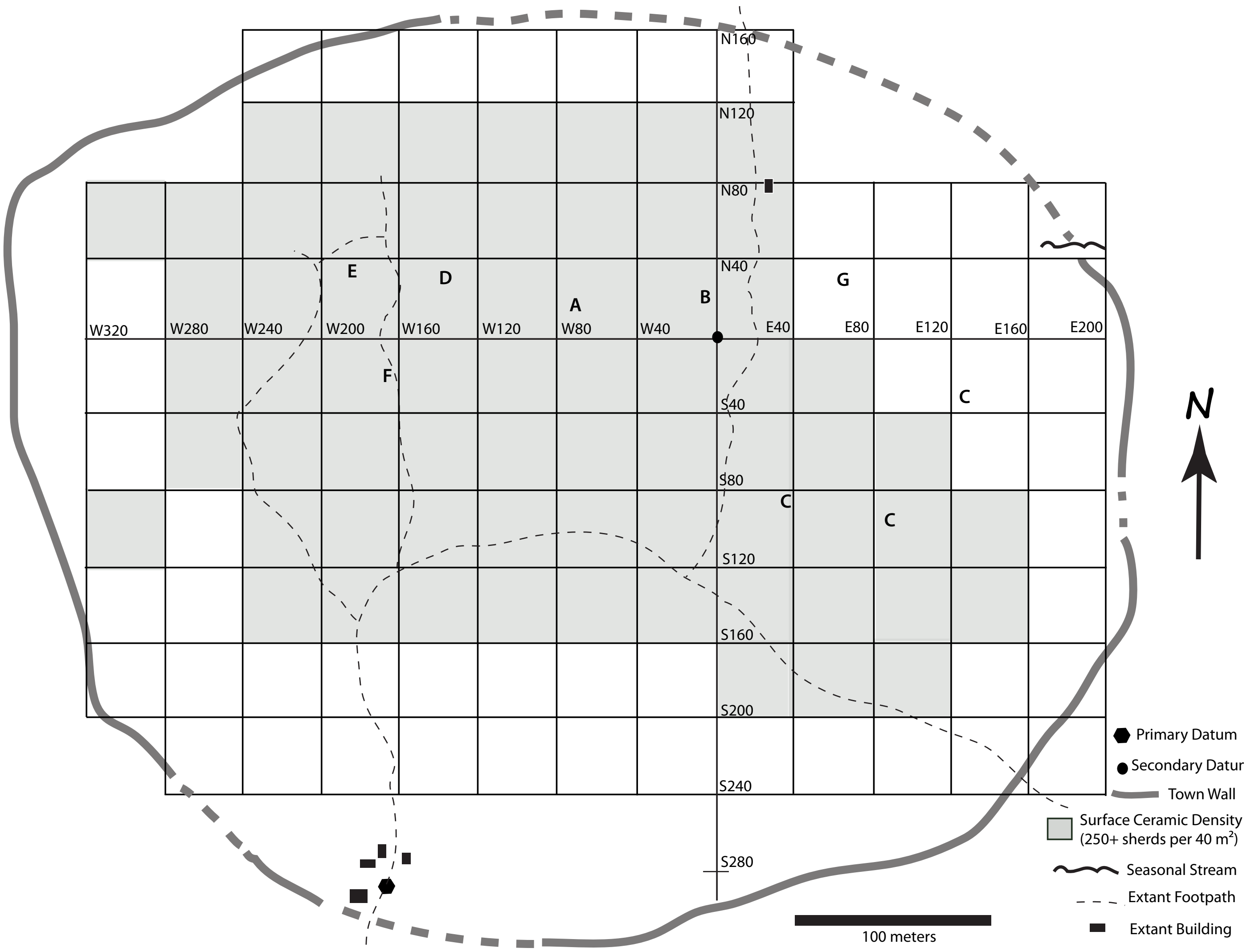

Fig. 4. Ede-Ile: site map. (© Ogundiran.)

of the descendant population living in the nearby hamlet were invited to join the survey team. These representatives belong to a family lineage whose ancestors not only lived in Ede-Ile before 1840 but which has also been farming at the site since the late nineteenth century. They were asked questions about how they had been using the landscape, the activity areas of the old settlement, and any observation they may have had about the archaeological landscape.

Using the *Ficus thonningii* tree at the center of the extant hamlet on the southern corner of the archaeological site as the primary datum point (**fig. 4**), the seven-member survey team mapped the location of each of the standing baobab trees and the other archaeological features at the site with a combination of GPS and compass as well as measuring tapes. Apart from the standing baobab trees, no structural remains such as building walls survive at the site. However, we were able to identify and map the rump of the perimeter walls that enclosed the settlement. Likewise, five refuse mounds were identified in the core area of the settlement.

In order to systematically map the density of ceramic distribution and other features on the surface, the area within the perimeter walls was first divided into east-west and north-south base lines using the summit of the site's largest refuse mound as the reference point. These base lines were divided into 20 m units. Then the entire archaeological site (within the perimeter walls) was divided into 40 sq.m. grids as shown in fig. 4. Each square was individually investigated for archaeological features, special artifacts (e.g., tobacco pipes, cowrie shells, beads, and lamps) and ceramic density. The shaded area refers to the concentrated residential and activity zones in Ede-Ile. This is where more than 200 ceramic shards occur per

40 sq.m. grid. There was a sharp drop in the number of potsherds in the units outside the shaded area. With one exception, all the baobab trees coincide with the area of concentrated surface ceramic distribution.

During the survey, local informants identified a number of important activity areas. They identified Locus B as the area where the imperial governor, his family and his attendants lived, with the stable of horses located in Locus G. The pottery-making workshop and a market site were reportedly present in Locus C, while iron-manufacture took place in Locus F. Another market site was reportedly located in Locus E. Test excavations were carried out in each of these loci and other areas in order to better understand the settlement pattern and the material life of Ede-Ile. Here are the results:

(1) Locus B: This locus has the largest refuse and residential mounds in Ede-Ile. A total of four test units, totaling 28 sq.m. and ranging from 2x1 m (three) to 7x3 m (one), show that this was an important political elite center in the colony. Horse remains were almost exclusively found in Locus B and the highest density and finest finishing of certain artifacts – tobacco pipes as well as bone, wood, and ivory jewelries – were found in this locus, confirming that indeed this was the residential area of the governor of Ede, the most important person in the settlement. Cavalry was the backbone of Oyo army and imperial expansion. It is insightful, therefore, that horse remains were present in Ede-Ile and these are spatially concentrated in Locus B. We know from historical sources that the purchase and breeding of horses were centrally managed by the king of Oyo and the most important political elite in the metropolis (Law 1977).

(2) Locus C: An extensive ash deposit and a dug-out water reservoir are located in Locus C. Between these two features is an open area that our informants refer to as edge-of-the-town market site. The ash deposit area is described as an *ebu* – a dedicated industrial site for pottery (and possibly dyestuff) manufacture. A 21 sq.m.area comprising seven test units (mostly 2x1 m) was excavated in the locus.

(3) Locus D: Seven test units (20 sq.m.) demonstrate the residential nature of Locus D.

(4) Locus E: A total area of 12 sq.m. was excavated to probe the nature of the archaeological deposits in the area that local informants referred to as a market site. Among the finds are a pit (bowl-shaped) blacksmithing furnace, a human burial, a terracotta animal head and other terracotta fragments, in addition to domestic artifacts such as pottery and fauna remains. All of these indicate the presence of a residential-iron workshop-religious complex in Locus E. The blacksmithing forge would have been a hub of commercial and social activities, which may explain why local informants called Locus E a market site.

(5) Locus F: Eight test units totaling 32 sq.m. were used to probe the archaeological deposits of Locus D. The contexts comprised of one residential deposit (5x4 m), a refuse mound, and an iron-smelting waste (slag) deposit.

(6) Locus A is a long corridor between Locus B and Locus D. The archaeological deposits in this area are shallow (not more than 30-36 m deep) and the artifacts here are sparse. The five 2x1 m test units reveal pottery, lamps, cowries, and few animal bones. We suspect that this area might have served as the central market site following the general plan of Yoruba settlement pattern whereby a market is located in front of the residence of the highest political authority. Such an area usually served as the piazza of the settlement. One would not expect any residential or permanent structure in such an area as our survey and test excavations demonstrated in Locus A.

CONCLUSION

The size and vegetation of each site affected the surveyed strategy employed. In Oyo-Ile, the goal was to survey a 10% sample of the vast metropolis (over 5,000 hectares) using transect lines. On the other hand, the goal was to carry out a total survey of Ede-Ile, a settlement of ca. 80 hectares in size. The survey at Oyo-Ile allows us to understand the spatial density of the imperial capital's occupation, urban configuration, and maximum population, estimated at ca. 100,000 in the second half of the 18th century. On the other hand, the survey of the imperial colony of Ede-Ile shows a much smaller settlement constructed in the image of the metropolis. The findings at Ede-Ile reveal something about the use of colonization as a strategy of the Oyo imperial project, a process that involved the movement of populations from the Oyo metropolitan core in the savanna into the frontier rainforest belt. At the time of its abandonment in 1836 or 1837, Ede-Ile was a compact town of about eighty hectares in size but it was a highly diversified and specialized landscape. In baobab trees, Oyo ceramic wares, and horse remains, Ede-Ile manifests the material signs consistent with its origins and purpose as part of the political landscape of the Oyo Empire. It was a colony that was vital to the military, political, and economic interests of the empire.

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SURVEYING TOWNS

Jeffrey Fleisher[1]

I. NON-INVASIVE AND LESS-DESTRUCTIVE TECHNIQUES

There are currently a variety of non-invasive techniques that allow archaeologists to examine the extent of urban contexts without disturbing archaeological deposits. These include examinations of the surface deposits and mapping their distribution, as well as more sophisticated techniques that can be grouped under 'geophysical surveys', including ground-penetrating radar and electro-magnetic techniques.

A. Surface examination

Surface surveys of urban contexts are the most cost-effective way to understand the extent of the settlement, and to record information on the final occupation of the settlement, as well as alterations that have occurred since the site was occupied. Such post-occupation alterations must be considered at the outset, since an understanding of the nature and extent of modern cultural and natural disturbances should shape the overall approach to the archaeology of any urban site (**fig. 1**).

Mapping surface finds can proceed by walking systematic transects over the surface of a site, preferably at a small enough interval (10-25 m) in order to observe and record the density of different classes of archaeological materials present on the surface. Each survey team should have a sketch map of the site with relevant and obtrusive features so that artifact scatters may be plotted precisely. If Global Positioning System (GPS) equipment is available, points may be taken marking the boundaries of artifact scatters or of newly-discovered features, such as architectural remains. If this is the first stage of a long-term project, surface collections should be kept to a minimum, and photographs of diagnostic materials in the field should be substituted to record potentially significant finds. The goal of this stage of work is to enable the creation of a map of the extent of the site, discover unknown obtrusive features, and to map the distribution of surface finds that might provide clues to the variable uses of the urban settlement. At this stage, it is important to note where the site appears disturbed (if at all), as this will provide an important guide for future research. Disturbances can include the imposition of modern settlements, looting, erosion, vegetative changes and alterations from animals (termites, burrowing animals, etc.).

B. Geophysical survey

If funds allow, a next step should include geophysical surveys, which provide an important means of looking below the ground surface. A number of techniques have been applied to archaeological contexts; the most common include ground penetrating radar (GPR), magnetometry and electro-magnetic techniques. The consideration of what type of technique to use must be made based on the types of soils found at the urban context, the expected materials that were used to construct the urban contexts, and the depth of the deposits. In general, geophysical surveys are useful in locating anomalies related to past disturbances to soils – including pits, ditches, and other features where earth was disturbed – as well as material that has magnetic conductivity, including particular types of soils, but also materials related to metals and metal production, and episodes were burning occurs. This means that geophysical surveys can be useful in locating archaeological features like hearths, graves, and pits, but also help in determining areas related to the production of metals and other materials. Although geophysical surveys can be very productive, they have many limitations. First, there must be clear and relatively even ground surfaces to run the instrumentation for most survey techniques. Second, most geophysical techniques do not penetrate below 50-60 cm below the ground surface; GPR, however, does

Fig. 1. Modern occupation at the site of Kilwa Kisiwani, Tanzania. (Photo © J. Fleisher.)

1 Rice University, Houston, USA.

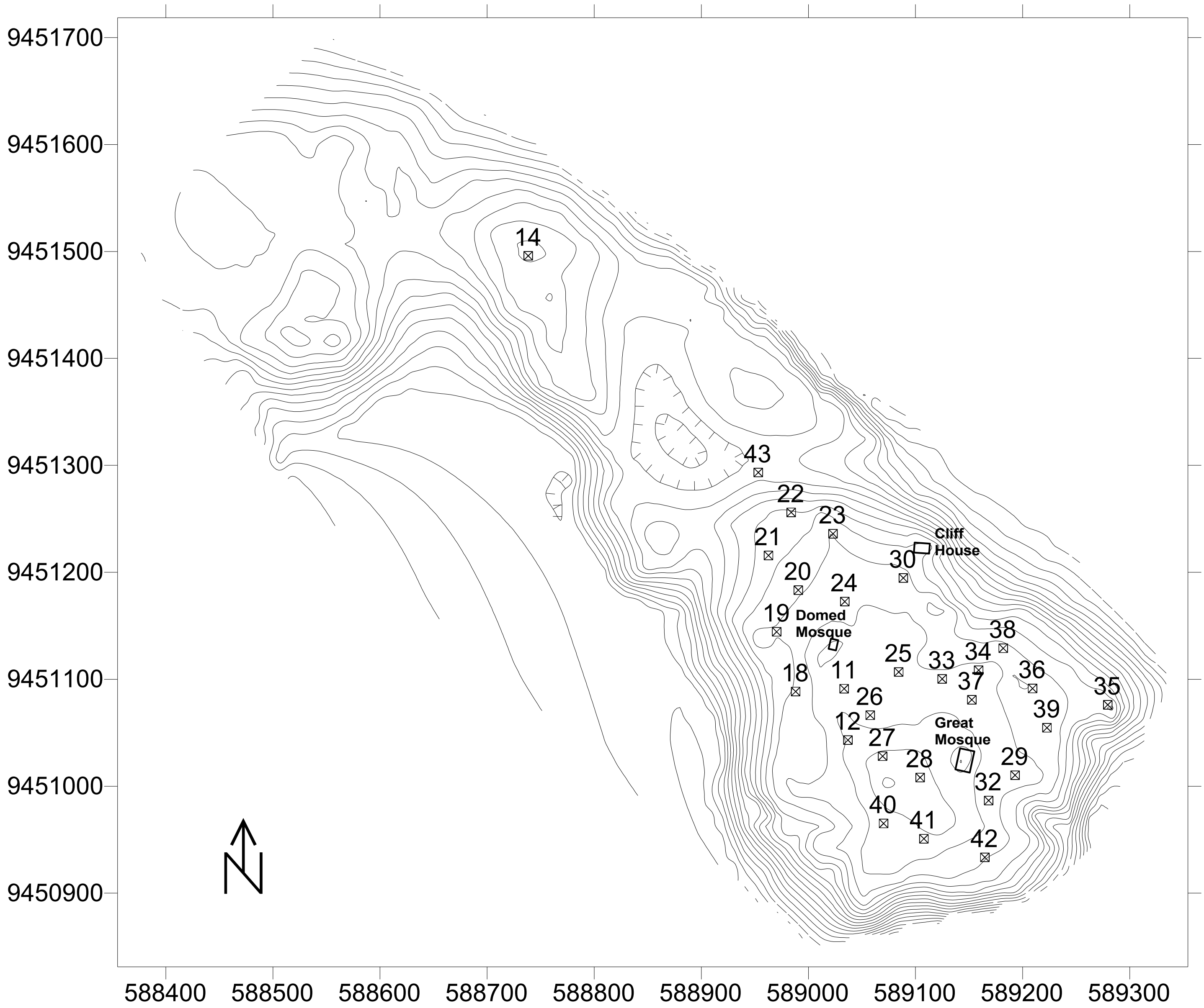

Fig. 2. Test pit program at the site of Chwaka, Pemba Island, Tanzania.

allow for deeper examinations. Third, these techniques do not distinguish between natural or cultural anomalies, and so any geophysical survey must be followed up with ground-truthing excavations to understand the nature of these anomalies. Finally, geophysical surveys require specialized training to operate, process, and interpret the data, and so often involve hiring specialists and their equipment.

II. GROUND TRUTHING AND SUBSURFACE TESTING

The next step in a multi-stage approach to urban contexts includes the ground truthing of anomalies discovered during the geophysical surveys. Without geophysical surveys, this stage will include the testing of areas within the site that offer the promise of revealing data related to particular types of features or activities. To ground truth geophysical surveys, small-scale excavations should be located in such a way as to straddle the anomaly rather than placed squarely within it; this will allow an assessment of the materials that caused the anomaly, as well as those that cause no readings on the instrumentation used.

Other possible approaches at this stage might include a systematic program of test pit excavations. These can be small, 1 x 1 m trenches, located strategically throughout the urban context. Mark Horton's research at Shanga provides a good example (1996); before opening larger trenches, he excavated 29 test pits situated across the site and the data from these carefully excavated and recorded pits provided an important step toward understanding the settlement. The data from these pits offered a glimpse at the overall stratigraphy of the site and provided an initial understanding of the depth and integrity of deposits in different locations within the urban context. Such test pits also provide small windows into the types of deposits that can be found across a site, and can help guide the researcher to the next stage of large-scale excavations (**fig. 2**).

Another approach to understanding large areas of urban contexts is through the excavation of hand-dug, shovel test pits (STPs) or through coring (**fig. 3**). When carried out systematically, and recorded thoroughly, this approach can provide a very detailed overview of large expanses of urban space. These differ from the test pits previously discussed in that they are dug more quickly. When carrying out these approaches, the precise locations of each STP or core hole must be recorded, as well as the soils encountered, and artifacts retrieved. These approaches can also be coupled with soil chemistry and phytolith studies. The pairing of these different techniques and datasets – stratigraphy, artifact distributions, soil descriptions, soil chemistry, and phytoliths – can provide more than just an overview of the settlement; they can offer primary data in areas that do not contain architecture or archaeological features, offering a way to explore spaces that stood 'open' and outside of structures, while offering an appraisal of different areas of the site.

III. ANALYSING SURVEY RESULTS

All of these testing programs – whether accomplished through test units, coring or STPs – are all amenable to spatial analysis in a Geographic Information System. Therefore, these data should be prepared in such a way as to create coverages for each data set. For procedures such as a STP program, this will require plotting each STP with either a Total Station, or with a DGPS unit which allows for high accuracy mapping. By importing data into a GIS, spatial patterns across the settlement can be examined.

Fig. 3. Students digging shovel-test pits (STPs) on Pemba Island, Tanzania. (Photo © J. Fleisher.)

Within GIS programs, such as ESRI ArcGIS (or Quantum GIS, which can be downloaded free at http://www2.qgis.org/fr/site/), data that has been systematically collected, such as in test units or STPs, can be interpolated into kriged density maps, and show the variable distribution of different materials and how they correlate.

All of the procedures discussed thus far allow for a detailed assessment of the extent, depth, and complexity of deposits at an urban site. In some cases, this program of work might offer sufficient evidence to answer basic questions about urban chronology, site size, and the variable use of urban areas. However, these types of approaches do not often provide sufficient data to answer questions on the variability of intra-site deposits (comparisons between different types of housing or neighborhoods), or on specific activity areas within an urban settlement (workshops or production areas). Larger scale excavations are required to address these issues, a topic to which we now turn (Fleisher, this volume, pp. 121-124).

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ARCHAEOLOGICAL FIELD SURVEY AND THE RECORDING AND CATALOGUING OF ARCHAEOLOGICAL MATERIALS

Paul J. Lane[1]

INTRODUCTION

Site recording is a fundamental aspect of surveying, and provides one of the most basic building blocks for further fieldwork, analyses and interpretation. Archaeological field survey without any form of recording of the materials encountered is a waste of time and resources. Hence, the issue is *not* whether or not to record – that is a given. Instead, the key issues are what to record, how to record, and what to do with the records after they have been made. Everybody working on an archaeological field survey should be trained in record keeping and in how to log the fundamental details. Key to all these elements is being consistent and systematic. If some simple rules are followed before, during and immediately after fieldwork, then many future problems can be averted. It is thus essential, and well worth the time taken, to document your observations while still at the 'site' or other archaeological trace (such as an isolated artefact) rather than relying on memory and waiting until back in camp or after having left the field altogether before logging these details.

Time can be a scarce resource on surveys, and there are often pressures to cover as much ground as possible during the course of a survey. As a result, the temptation to rely simply on a few notes, with the plan to 'add details later' is often great. There are ways to minimise this problem, however, by being well-prepared before going into the field; having a clear idea about how much detail needs to be recorded (which is often determined by the aims of the survey and the research questions being addressed); by using pre-prepared (or pro forma) recording forms; and making more effective use of digital recording methods.

Cross-checking records before leaving the field site is also critical, as this can help identify gaps or mistakes in the records. These are much easier to fill or correct while still in the field before the team has dispersed and it is still relatively easy to return to the 'site' in question. Ultimately, all the effort expended on recording and cataloguing in the field will be wasted effort if these records are not eventually deposited in some form of archive where other researchers can access them, both now and in the future. It is therefore important to be familiar with national and regional requirements, prepare records in formats that meet international archiving standards, and consider creating security copies in both a digital and hard copy form which are stored in different locations so as to minimise subsequent damage or destruction as a result of some future unforeseen event.

I. PREPARATION AND EQUIPMENT

Being prepared is often a key to success! In the case of site recording, time spent on preparation ahead of going into the field often saves time and reduces mistakes.

A. Degree of detail

A key issue to determine in advance is the level of detail about site types, their locations, physical extent and constituents, current condition and topographic location, ownership and similar matters that the survey is expected to generate. These are to a great extent determined by the aims, objectives and research questions of the survey. A rapid assessment of the research potential of an area, for example, is likely to call for less comprehensive recording and greater areal coverage than a survey aimed at determining the influence of environmental factors on archaeological distributions.

B. Site categorisation

Decisions also have to be made in advance as to how to categorise discoveries, for instance: whether or not to document isolated finds; what constitutes an 'archaeological site'; and how this is distinguished from an 'artefact scatter' (i.e. a low-density spread of archaeological materials indicative of past activities but unlikely to represent prolonged occupation). Familiarisation with the range of site types, historic buildings and other kinds of archaeological traces known from the general survey region will help with planning recording strategies that are sufficiently flexible to cope with encounters with any and all of these. When making such decisions, however, it is important to provide scope for the documentation of completely unexpected and even unknown forms and types.

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C. Standardisation and archiving

In many countries the national or regional authority with responsibility for the management of archaeological and historical sites and monuments, and/or who monitor archaeological research, maintain national site registers. Consequently, they have sometimes developed standardised recording forms for cataloguing archaeological discoveries (see below). If these exist, then they should be used. This will avoid time-consuming transcription of field notes when records and finds are being deposited with the relevant curatorial authority (such as a national museum). The standardisation of recorded information also benefits the creation of site databases for use in subsequent research and site management activities. In particular, it allows informed comparison, especially in terms of site significance, which is critical for effective archaeological heritage management. It is also critical to know the archiving requirements of the intended archive repository so as to ensure records are prepared in a manner that meets their conditions. The archive process *begins* with planning the creation of the first record and *not* at the end of fieldwork (Brown 2007).

D. Equipment

In terms of basic equipment, the following are essential:
- maps (at as large a scale as is available) of the survey area
- notebook – ideally with a combination of lined (for notes) and gridded (for sketches and measured drawings) alternating pages
- clip-boards
- pro-forma survey forms (either use the national/regional standard, or if not available prepare your own based on some of the examples in Appendix 1). These should be printed, as photocopies tend to fade and are not ideal for archiving
- pens, permanent marker pens, pencils, erasers, sharpeners, permanent labels
- tapes – 1 x 30m tape and at least one hand tape
- prismatic compass
- a graduated photographic scale – at least one metre in length
- resealable plastic bags in a selection of sizes (use bags with a panel for writing on)

While not essential, the use of a handheld Global Positioning System (GPS) receiver to log the latitude and longitude coordinates of each archaeological trace encountered is also highly recommended, and can be especially useful where detailed maps are lacking and in relatively featureless or heavily vegetated terrain – all of which are commonplace in many parts of Africa. If available, the GPS should also be used to log the survey track followed each day. A camera, ideally digital, is also desirable as it can help speed up the recording process provided each shot is carefully framed and meta-data concerning this is logged at the time the photograph is taken (see below). Another useful piece of equipment is a small handheld tape recorder or Dictaphone, which can be used to record observations and impressions that supplement the information logged in notebooks and on pro-forma survey forms.

II. WHAT AND HOW TO CATALOGUE

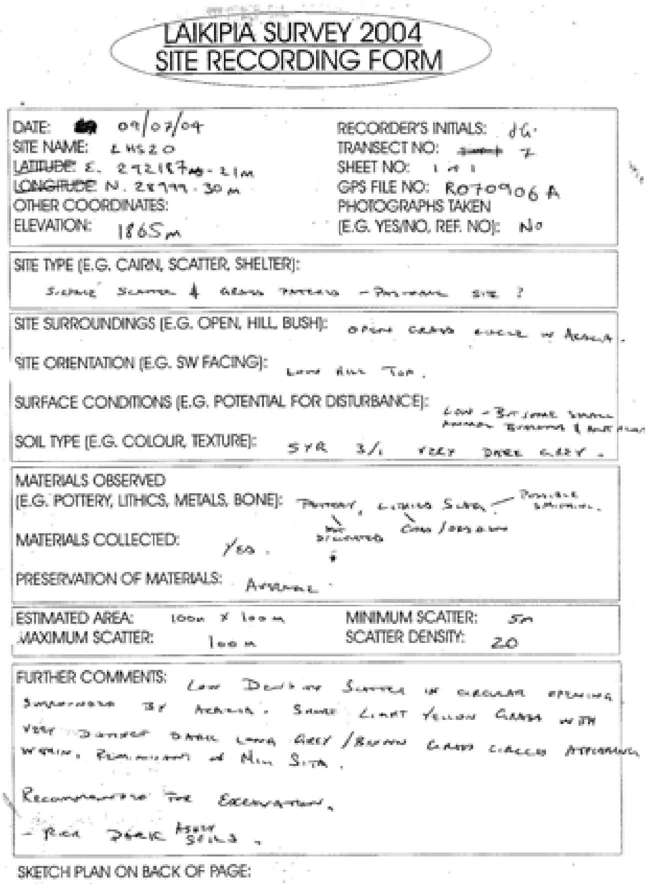
As mentioned above, different surveys have different requirements and it is important that recording systems are sufficiently flexible and evaluative so as to allow documentation of the unexpected. However, there are some basic standards about the nature of the records and their content that all site catalogues should meet. In order to meet basic project archive standards (Brown 2007), it is important that:
- project records are produced to a consistent format
- pro-forma sheets are used for recording primary data
- records are written legibly using clear language
- consistent terminology is used throughout.

On encountering archaeological remains in the field, unless this is clearly an isolated artefact, it is important to first explore the extent of the site/scatter before starting to record, so as to observe its main characteristics with an aim to identify the site type, its contents, boundaries, condition, likely date and similar information. It can be helpful, and often more efficient, if different team members are assigned different recording tasks – one to complete the pro forma record forms (**fig. 1 and Appendix 1 to 3**), another to take photographs, another to take detailed measurements and so forth. They need tcorrelate their records however, to ensure that their individual records can be identified correctly with the same site.

In terms of content, the minimum level of information that all surveys need to capture is as follows:

A. A unique site or isolated find identifier

Often referred to as a Site Number – this can be an alphanumeric code unique to the project (e.g. Ranaka 92-12 – which identifies the records as being associated with the twelfth site located during the 1992 survey of the Ranaka


LAIKIPIA SURVEY 2004
SITE RECORDING FORM

DATE: 09/07/04
RECORDER'S INITIALS: JG
SITE NAME: LHS20
TRANSECT NO: 7
LATITUDE: E.
SHEET NO: 1 of 1
LONGITUDE: N.
GPS FILE NO: R070906A
OTHER COORDINATES:
PHOTOGRAPHS TAKEN (E.G. YES/NO, REF. NO): No
ELEVATION: 1865m

SITE TYPE (E.G. CAIRN, SCATTER, SHELTER): Sparse scatter & grass pattern – Pastoral site ?

SITE SURROUNDINGS (E.G. OPEN, HILL, BUSH): Open grass circle w Acacia.
SITE ORIENTATION (E.G. SW FACING): Low hill top.
SURFACE CONDITIONS (E.G. POTENTIAL FOR DISTURBANCE):
SOIL TYPE (E.G. COLOUR, TEXTURE): 5YR 3/1 very dark grey.

MATERIALS OBSERVED (E.G. POTTERY, LITHICS, METALS, BONE): Pottery, lithics
MATERIALS COLLECTED: Yes.
PRESERVATION OF MATERIALS: Average.

ESTIMATED AREA: 100m x 100m
MINIMUM SCATTER: 5m
MAXIMUM SCATTER: 100m
SCATTER DENSITY: 20

FURTHER COMMENTS: Low density scatter in circular opening surrounded by Acacia.
Recommended for excavation.

SKETCH PLAN ON BACK OF PAGE:

Fig. 1. Example of completed, project specific pro forma from a 2004 survey in the Lolldaiga Hills, Kenya.

area, southern Botswana). Alternatively, and preferably, the national or regional site coding system can be used, in which case a sequence of numbers uniquely assigned to the survey project should be requested from the relevant authority in advance of fieldwork. This is so as to avoid duplicate use of the same site numbers by different survey teams with the result that two or more distinct sites are allocated the same identifying number. In many parts of Africa, the SASES system proposed by Charles Nelson (1993) is in use. This is an alpha-numeric system based on the Universal Transverse Mercator (UTM) coordinate system.[2]

B. Geographical location

The location can be recorded using either a GPS receiver or by using a map and compass bearings. Ideally, locations should be recorded in terms of latitude and longitude *and* as a two-dimensional Cartesian map coordinate recorded with reference to the relevant national grid. Most 1:50000 scale map grids for sub-Saharan Africa are based on the UTM coordinate system. The latter is an ellipsoidal model of the Earth, which divides the earth between 80°S and 84°N latitude into 60 zones with a six-degree band of longitude, to which a unique alpha-numeric code is assigned. Modelling of the Earth's ellipsoid has changed over the years. The current global standard known as WGS84 should be followed unless using maps prepared from an older model, such as ARC 1960. It is important that GPS receivers used to record UTM coordinates should be set to the agreed system, and this information entered onto the record forms so as to allow possible conversion in the future.

C. Site type, characteristics and date

It is important to note the basic characteristics of the 'site'. Is it an open air site or a cave or rock-shelter? Are there any visible earthworks, such as banks and ditches, or building remains visible on the surface? How large an area does it cover? Are archaeological materials present, and if so what types of finds can be seen? What is the approximate extent of the site? Where is it situated within the landscape (at the foot of a hill, along a river bank and so forth)? Can an approximate age of the site be estimated from the finds on the site, or from other sources, such as oral information, collected in the field?

D. Current condition and archaeological investigation

Topics include the condition of the 'site' when encountered, in terms of vegetation cover, surface visibility of finds (ranging from easy to see to very hard to detect), land use, land owner if known, names and details of local informants knowledgeable about the site, possible and actual threats to the site (both human and non-human), and the level of archaeological investigation undertaken (e.g. no surface collection/surface collection, test-pitting, detailed mapping with GPS, etc.). If surface collections were made, then document the guiding principles involved – e.g. unsystematic collection, selected collection of diagnostic/representative artefact types, gridded surface collection.

E. Additional records

It is important to note and cross-reference all other types of record made in the field. These might include photographs, and it is important to make an immediate note of the relevant frame number/s (and film number if the pho-

2 See for instance: http://commons.wikimedia.org/wiki/File:LA2-Africa-UTM-zones.png

Fig. 2. Annotated survey map of Lower Democratic Republic of Congo. Sites are carefully located by observing the landscape and positioning the site on maps (courtesy of Pierre de Maret).

tographs are not digital) while in the field; any sketches or measured plans; recorded interviews with informants, and so forth. It can be helpful to have separate pro-forma forms for each of these types of records to ensure relevant information is captured in a timely and efficient manner. Field notebooks should be used for recording additional information, details concerning the composition of the team, the weather and light conditions at the time of the survey, key landscape features that might help with the relocation of the 'site', and as a general field diary.

F. Date of completion of the record

If follow-up visits are made to the site, the dates of these visits should also be added.

G. Recorder's name & contact details.

In case clarifications are needed.

III. PROJECT ARCHIVES

- Archaeological projects should always aim to produce, stable, orderly and accessible archives (Brown 2007). Project archives are important for at least the following reasons:
- to provide a permanent record of the work undertaken and the information collected
- to add to national and regional inventories of archaeological resources for the purposes of management, research and public education
- to avoid duplication of effort during future research
- To allow reinterpretation and restudy of the original findings
- to contribute to assessments of significance at local, regional and national levels

Project archives should be prepared so they can be assimilated easily into the collections of recognised repositories (Brown 2007). On return from the field, it is helpful to organise records into different categories. Typically these will comprise written forms and field notes, photographs, drawings and sketches, and digital data of different types. Once these are systematically organised – by map sheet and then sequentially according to site number is the most standard approach – then a master catalogue of these records should be compiled (see Ozainne, this volume, pp. 157-162). It is also helpful at this stage to plot the location of all located finds on a clean map (or maps) of the survey area, with their unique identifying number against each point on the map. It is important to bear in mind that digital data often get detached from other records. It is therefore recommended that hard copies of these data be produced and included with the media (CD-ROMs, flash drives etc.) on which the digital data are recorded. Information about the format in which the data are stored and the software used to open the relevant files must be stated. The latter information is especially helpful when it comes to ensuring data migration as data formats and software change. Finally, it is important to prepare project archives promptly and to deposit them with the recognised authorities responsible for their curation in a timely manner.

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SEGOU Fiche de Village Abandonné (Survey Form) 2005

Form No. /Fiche	Date	Recorder/Chercheur:
Site Name/Nom de Site		

Croquis / Sketch of Site and Collection Zones:

GPS Coordinates (Centre):
Carte IGN:

Closest Village(s)/ Villages le plus proche:	Nearby Sites/ Sites du Voisinage

Longest Axis/ Axe le plus longue: m	Shortest Axis/ l'Axe le Plus Court: m	Stratified?::

Type of Site/ Nature du Site:	Time Period/ Age (basis of estimate):	Features/ Structures?

No. du Sacs / Sacks				
Potterie-	Broyage /Gr. Stone-	Small Finds-	Faune-	Scories/ Slag-
How Collected?				

Notes on Artifacts: (Assemblage Archéologique)	Photos:
	Plans:

Observations/ Traditions:

SEGOU Fiche de Village Habité (Survey Form) 2006

Form No. / Fiche	Date	Recorder/Chercheur
Village Name/Nom de Site		

Croquis / Sketch of Village Zones, Points of Interest:

GPS Coordinates (Centre):
Carte IGN:

Dependent Villages/Hamlets:	Nearby Abandoned Sites/ Tomos du Voisinage

$18^{th}/19^{th}$ c. Longest Axis/ Axe le plus longue: m	$18^{th}/19^{th}$ c. Shortest Axis/ l'Axe le Plus Court: m	Stratified?:

Functions of Site:	Occupation Periods (basis of estimate):	**Pre-1890 Features/Structures?**
Agricultural-		Tata?
Military-		Market-
Political-		Mosque-
Religious-		Other-
Other-		

Notes on Artifacts (if any): (Assemblage Archéologique)	Photos:
	Plans:

Other Observations/ Traditions (summary only):

Appendix 1a & b. Pro forma recording forms used in Mali (courtesy of Kevin MacDonald).

FICHE D'ENREGISTREMENT DES VESTIGES

SITE	FRT	Surface	
SIGLE	FVD	Sondage	Chercheurs
X	FRS	Carré	Chrono
Y	FKT	Niveau	Phase
Z	Village	Couche	Datation
LAT		Lever	14 C
LONG			TL

	VESTIGES	BORD	PANSE	ANSE	BASE	PIED	COUV	AUTRES	TOTAL	OBSERVATIONS
POTERIE LOCALE	Sans décor – Sans enduit									
	Avec décor – Sans enduit									
	Sans décor –Avec enduit									
	Avec décor – Avec enduit									
Chlorito	Avec motif									
	Sans motif									
	Brut									
Pot. importée	Sassanide									
	Sgraffiato									
	Black on Yellow									
	Pot. Islamique									
	Céladon									
	Bleu & Blanc chinois									
	Pot europ.									
Autres	Métaux	Fer	Cuivre	Bronze	Argent	Or	Aluminium	Autres	Total	
	Divers	Os	Perles	Verre	Pierre	Bois	Plastique	Autres	Total	

SITE CGN Lat./Long./Alt. Travaux Secteur Carré Niveau Profondeur Observations Date	SITE CGN Lat./Long./Alt. Travaux Secteur Carré Niveau Profondeur Observations Date
SITE CGN Lat./Long./Alt. Travaux Secteur Carré Niveau Profondeur Observations Date	SITE CGN Lat./Long./Alt. Travaux Secteur Carré Niveau Profondeur Observations Date
SITE CGN Lat./Long./Alt. Travaux Secteur Carré Niveau Profondeur Observations Date	SITE CGN Lat./Long./Alt. Travaux Secteur Carré Niveau Profondeur Observations Date

Appendix 2a & b. Pro forma recording forms used in Madagascar (courtesy of Chantal Radimilahy).

Archaeological Survey Record Sheet
National Museum Monuments and Art Gallery, Botswana

Site No:

Recorders No:

Cultural Components:

Site Name:

Local Area:

Land owner and address:

Map Location: Map No: Grid reference:
Latitude S Longitude E

Site type: (shelter/open)

Site activity: (eg settlement, smelting, etc)

Site topography: (eg hill top, hill base, dune, river bed, terrace, pan edge)

Site area: (measured/estimated) Site aspect:

Geology: (eg granite, alluvium,nearby ores etc)

Vegetation: (eg mopane scrub, coppiced thorn)

Nearest water: (eg stream, pan, spring) Distance

Artefacts seen or collected: Total collected: (approx/estimate)
a. flaked stone
b. ground stone
c. pot sherds
d. iron/copper
e. bone/ivory
f. shell
g. glass (eg beads)
h. slag/tuyeres
i. clay
j. wood
k. others

Materials, features:
a. bone, shell
b. charcoal, fruits, seeds
c. graves
d. paintings
e. engravings
f. ash middens
g. dung(vitrefied)
h. stone walls/platforms
i. clay structures
j. pits/mines
k. others

Legends etc: (informants names)

Dating evidence:

Published references:

Photographs: (where kept)

Location of collections:

Comments: (sketch plan, map of how to get there – attach separate sheet if necessary)

Site importance: (eg density of material) Proclamation:

Nature and degree of disturbance: (eg vandalism, tree roots, rodents, erosion, exfoliation)

Possible future disturbance: (eg dam, road, urban expansion)

Development potential:

Site first reported by: (name/address) Date:

Site excavated by: Date:

Sheet recorded by: Date:

Site confirmed by: Date:

Office:

National Museum, Monuments asnd Art Gallery, Private Bag 00114, Gaborone, Botswana. Telephone 374616

Appendix 3a & b. Pro forma recording forms used in Botswana (courtesy of NMMAG – National Museum, Monuments & Art Gallery).

LARGE SCALE RECONNAISSANCE AND EXCAVATION STRATEGY ON THE LOANGO COAST OF THE CONGO: A CASE STUDY

James Denbow[1]

INTRODUCTION

This chapter describes an archaeological project conducted on the Loango coast of the Republic of Congo between 1987 and 1993. A full description of the work can be found elsewhere (Denbow 2014, see references therein). The project was begun in 1987 as an academic undertaking designed to investigate an archaeological occurrence discovered by geologists working for Conoco Oil Company. Conoco's objective was to use the archaeological investigation as a means to enhance their competitive position in a bidding competition for oil leases in the Congo. From my side, the project was initially envisioned as a small-scale test excavation to date the ceramics and lithics that Conoco geologists had found eroding from a borrow pit at a place called Tchissanga.

As luck would have it, the initial test excavations were completed early, leaving a few days for additional exploration before returning to the United States. A short trip was therefore organized to investigate a similar physiographic zone to Tchissanga on the opposite bank of the Kouilou River 15 km to the north. Here more ceramics were discovered eroding from a darkly-stained midden 40 cm below surface in another borrow pit. I had been expecting to find materials similar to those from Tchissanga, but these were completely different. Given their depth below surface they were undoubtedly of some antiquity, but I had no way of knowing whether they were earlier, later, or coeval with those from Tchissanga. The possibility that they were later was suggested by the fact that no lithics were observed, as they had been at Tchissanga. The site was named Madingo-Kayes after a small village on a nearby hilltop. Charcoal samples were recovered from a quick test excavation and I returned to Texas excited by the thought that I had the beginnings of an archaeological sequence that could be broadened into a more compete cultural chronology of a hitherto archaeologically unknown part of equatorial Africa.

I. THE FIRST SEASONS: OPTIMISTIC PROSPECTS

Before the first exploratory excavations in the fall of 1987, I had asked Conoco if they would arrange for local Congolese archaeologists to be active participants in the project from its inception. Mr. Aimé Manima-Moubouha, an archaeologist at Marien Ngouabi University in Brazzaville, and Ms. Nicole Sanviti, a visiting scholar from France, met me in Pointe Noire for the first test excavations. The dates for the samples from Tchissanga were among the earliest for Ceramic Later Stone Age materials from the Atlantic coastal region south of the tropical forest. Financial prospects for expanding the work were also good because, as I learned later, the archaeological project fit in with the longer-term interests of Conoco in the Congo.

The following summer more extensive excavations were carried out with the support of Conoco and a small grant from the National Geographic Society in the United States. In Brazzaville, Conoco had organized a signing ceremony for their new oil lease and I was asked to design a small display for the office of the Minister of Energy and Mines. Much to my surprise, and that of the Conoco officials who had come from the United States for the signing, the Minister was so impressed with the display that he arranged for it to be immediately moved to the presidential palace where I presented it to Denis Sassou-Nguesso, President of the People's Republic of the Congo. After a brief televised interview, I returned to Tchissanga with high hopes.

The work went well and, bolstered by the success and publicity of the first field season, I felt we would be able to work together for several field seasons. Unfortunately, Mr. Manima-Moubouha and his students could not participate the following year because the university had gone on strike earlier in the year and the time had to be made up in June and July. It was only in 1992 that Manima-Moubouha and his students could again fully participate. They carried out additional excavations at the Early Iron Age site of BP 113, which had been discovered and preliminarily investigated by my team from the University of Texas in 1990. Thus, in spite of the best of intentions, the local participation that I had wished for did not happen. Such uncertainty is a fact of life in Africa and is something each researcher will have to negotiate. In addition, every African country has a different infrastructure to oversee archaeological research and heritage

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management. In the case of the Congo and many other countries in Africa this infrastructure is still, in practical terms, meagre to non-existent.

II. DISASTER STRIKES

While the Brazzaville students could not take part in 1988 excavations, we were able to expand the small test excavations at Tchissanga to several promising locales at Tchissanga West, Tchissanga East, and Tchissanga Base (Denbow 1990). Good contacts were made with the local authorities in Madingo-Kayes and, with the televised publicity of the meeting the President, prospects looked good for the following year. But I never expected what happened next.

One cannot imagine my astonishment when I crested the hill at Tchissanga in 1989 to find the entire terrace, including the site, planted in eucalyptus. Indeed, eucalyptus plantations now seemed to cover nearly every savannah between the city of Pointe Noire in the south and the Kouilou River 60 km to the north! Since there was no coordinating body to oversee heritage management or archaeological research in the Congo, Congolaise de Développement Forestier (CDF), a subsidiary of Shell Oil, London, and l'Unité d'Afforestation Industrielle du Congo (UAIC), a local eucalyptus company that had operated in the Congo for many years, were granted carte blanche to plough under what they viewed as 'non-productive' savannah for eucalyptus. The process of land acquisition followed a long tradition of colonial land expropriation in the region in which 'land "not effectively used," a definition which was especially unfavourable for the population in areas using BaKongo's extensive production methods [...] was granted to large companies: the mining company UMHK, for example, had an area half the size of Belgium' (Ekholm 1972: 72-75).

Such neglect of archaeological resources is compounded by prejudiced views of an empty or circular African past (Denbow 2012). These biases, when coupled with the scarcity of archaeological research on the continent, combine to reinforce a pattern of neglect and the on-going destruction of cultural resources by multi-national ventures – as well as local development schemes. In the Congo case, it was assumed there were no archaeological sites of significance because there were no records of them in the existing literature. Because there had never been any sustained archaeological investigation of the coast, nothing stood in the way of covering tens of thousands of hectares of supposedly 'unused' savannah with eucalyptus plantations. There was no serious consideration of the need for pre-development archaeological surveys on the part of the overseas corporate offices that financed the project. An absence of local oversight or national infrastructure for heritage management in the Congo contributed to the problem, with the result that despite the national publicity of the project on one level, no connection was made between that and the excavation units at Tchissanga that were simply ploughed over as an inconvenient nuisance by UAIC tractors! The end result was that the resources of the archaeological project had to be quickly shifted from an academic investigation designed to construct a cultural chronology to a 'salvage' project focused on a rapid large-scale site discovery and preservation operation in advance of on-going planting. Test excavations continued at some important sites, but the scientific excavations now had to come second to developing a methodology to discover and then protect important sites across a very large region that encompassed almost a quarter of the coastal littoral of the Congo. This was complicated by the fact that much of the area was either covered in tropical forest or blanketed by tall grass savannah, making the detection of sites by surface survey almost impossible. In addition, there were no earthworks, stone walls, or other monuments in this region that could be used to locate sites.

III. DESIGNING A RECONNAISSANCE

Three considerations had to be taken into account in designing the reconnaissance strategy. The first consideration was the need for speed. At its peak, the eucalyptus campaign was planting roughly 10,000 hectares of new savannah each year. The second consideration was how to locate buried sites in areas where there had been little cultivation or erosion to bring buried materials to the surface. While sites could be located by walking along the eroding edges of roads, ditches, and the shoulders of gullies and stream terraces, these were few in number and provided little coverage of the vast expanse of rolling plains in between where there was usually nothing to be seen on the surface. Subsurface testing using shovel pits, or remote sensing using devices such as ground penetrating radar, were not practical on such a large scale. The third consideration was how to mark sites once they were found. There were no detailed maps available for the region, and GPS systems were not then in wide use. We made our own maps by tracing proprietary side-scan radar images provided by Conoco. Fortunately, these were

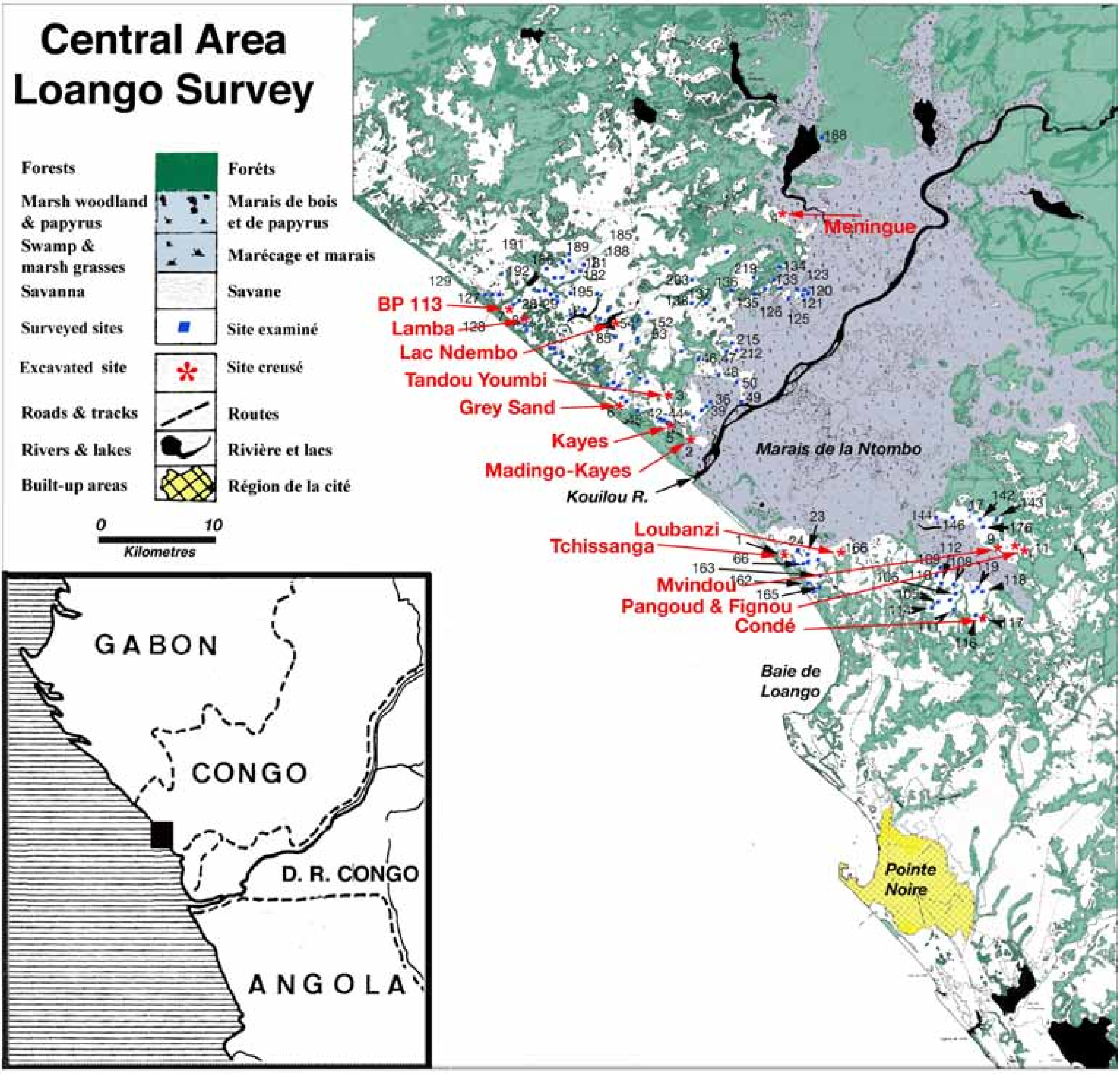

Fig. 1. Map showing the locations of the 204 archaeological sites located during the reconnaissance. Sites labeled in red were test excavated and radiocarbon dated. The savanna grasslands during the time of the reconnaissance is indicated in white. Most of the area south of the sites of BP 113 and Meningue is now planted in eucalyptus. Tropical forest are shown in green; Ntombo marsh is colored gray. (© J. Denbow.)

detailed enough to accurately plot site locations (**fig. 1**). A final problem was how to convey location information to the local tractor drivers doing the actual ploughing. These men, often illiterate, were not experienced in reading large-scale maps.

With the cooperation of CDF and UAIC, a strategy was developed that made the best of available resources. In order to locate buried sites, UAIC/CDF agreed to provide tractors, drivers, petrol, and vehicles to carry out an intensive archaeological reconnaissance in advance of new planting. The sites we had already located were small and averaged between 100 and 150 meters in diameter, with cultural deposits between 30 and 70 cm below the present ground surface. In order to locate buried sites, archaeological cut lines were ploughed at 100 m intervals across each new savannah in advance of planting; each line was 2 m wide and 50 cm deep. This enabled us to locate buried sites that would be directly impacted by eucalyptus planting. If materials existed at greater depths, they would not be directly disturbed by the eucalyptus planting, which was confined to the upper 40-50 cm of the soil.

Cut line ploughing (**fig. 2**) took place during the rainy season so that the rains had time to wash away the dust and more clearly reveal artefacts and other features. CDF hired one of my Congolese assistants, Romain Mougani, to work full time on the project. While academically untrained, he had gained experience in archaeological survey and excavation while working with me in 1989 and 1990. Over the course of several field seasons, he walked approximately 450 km of cut lines, collecting samples of decorated pottery, lithics, and other materials and making note of each site location. When I returned to the Congo at the beginning of each dry season, we revisited the sites Romain had located and marked their locations on the detailed map made from the aerial photography. The variety of the cultural materials recovered, along with assessments of site stratigraphy and the possible existence of sub-surface features, were factors used in determining which sites should be afforded protection. The conserved sites were then marked with 4x8 foot plywood placards. Tractor drivers were told to leave a 100 m in diameter circle unploughed around them. Over the course of the project over 200 archaeological sites were plotted on the master map, with copies left with CDF in Pointe Noire and the district authorities in Madingo-Kayes. Because the reconnaissance found a very high density of sites on the 100 m terrace immediately overlooking the Atlantic Ocean, CDF agreed to leave this zone unploughed.

CONCLUSIONS

In the end, the Loango project located over 200 sites, conducting excavations at 13 of them in order to develop a preliminary cultural chronology. Forty radiocarbon dates were obtained which ranged from Later Stone Age horizons dating to the late 2nd millennium BC through three phases of the Early Iron Age dating between 150 BC and 800 AD. Many Later Iron Age and historic period settlements dating from 1100 to 1900 AD were also located.

Fig. 2. Plowing an archaeological cut line. A second cut line is just visible near the top left of the savanna near the forest edge. Each cut line was 2 m wide, 50 cm deep, and plowed at intervals of 100 metres across each savanna to be planted in eucalyptus north of the Kouilou River. This cut-line depth and spacing was selected based on estimates of average site size and depth of cultural deposits from our test excavations. Plowing was done several months in advance of eucalyptus planting so that the rains could wash the cut-lines and enhance artifact visibility. Sites thought to contain significant cultural deposits were marked by signboards. An area 100 m in diameter was left unplowed around each sign to preserve the buried cultural deposits. (Photo © J. Denbow.)

Because of the systematic nature of the cutline ploughing campaign, one can have some confidence in the settlement patterning uncovered. This is often not the case with less systematic reconnaissance methodologies. On the Loango coast, Neolithic settlements were found to be dispersed around the edges of Ntombo and smaller marshes in both coastal and inland locations. In contrast, Phase I Early Iron Age settlements were highly concentrated on the high coastal terrace overlooking the Atlantic Ocean; far fewer settlements were located further inland. Phase II and III sites were more widely dispersed in both coastal and inland areas. Only two sites were located that contained ceramics dating to the first half of the second millennium AD. Both are situated in more inland locations, but because of the small sample size, settlement preferences for this period remain uncertain. After 1500 AD, historic sites are numerous, reflecting population expansion. These settlements occur in both coastal and inland locations, suggesting more diversification in the ecological, economic and political parameters that impacted settlement choice over the four centuries of interaction with European powers.

The systematic reconnaissance found that even though iron tools and ornaments were recovered from most of the excavations at Early Iron Age sites dating from 100 BC onward, no iron smelting furnaces or slag heaps were found. This suggests that iron-working took place in more inland locations and not on the littoral where iron ores were absent. In addition, neither the survey nor the excavations found evidence for the exploitation of copper before the arrival of Europeans on the coast. This suggests there was little to no access by coastal peoples to the extensive copper deposits east of the Mayombe mountains before the middle of the second millennium.

While financial and logistical constraints mean that extensive regional sub-surface sampling methodologies have so far only been practical in unusual circumstances such as those surrounding the large-scale eucalyptus planting in Loango, or the oil pipeline survey carried out in Cameroon and Chad (Lavachery *et al*. 2010), they can provide useful regional summaries of settlement patterns. Systematic aerial reconnaissance on a regional basis has also been fruitful. particularly in more arid regions such as the margins of the Kalahari and the highveld of South Africa where tree cover is less extensive than in Central Africa (Denbow 1979; Maggs 1976).

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CASE STUDY: PARTICIPATING AS A STUDENT IN AN IMPACT ASSESSMENT

Pascal Nlend[1]

Doctoral students, regardless of scientific field, usually seek to enrol in science programmes at universities and research institutes in order to pursue work that is often expensive to carry out. Archaeology is no exception, because it remains a costly science in which relevant results typically depend on the availability of financial resources. Even if some impassioned individuals manage to conduct excellent research on a tight budget and in isolation, the science of archaeology is best carried out by a team that these days is often interdisciplinary. This interdisciplinarity is necessary not only to augment our knowledge of humanity's past, but also to mobilize major financial resources. Today it is undeniable that archaeologists struggle considerably to mobilize funds without allying themselves with related sciences. If this situation is obvious in the West, in Africa it is even more prominent. In recent years, in Cameroon as in the rest of Africa, preventive and rescue archaeology offers a welcome solution. This new situation deserves attention (see the contributions of Mitchell, Arazi, Brandt and Oslisly in this volume), because it allows trainees to acquire tools from actual field experience.

I. FROM SCHEDULED ARCHAEOLOGY TO RESCUE ARCHAEOLOGY

In Cameroon, the question of student access to training is perennial. It had already been raised back in 1986 by several speakers at a conference on archaeology in Yaoundé (Essomba 1992). Many mentioned the crucial role of research programmes in solving the problem, and some pointed to the necessity of foreign archaeologists working in Cameroon to take on a greater number of local students. In reality, they already had, even if the number of students was insufficient. One of the projects that could be cited as an example was managed jointly by the Université libre de Bruxelles (ULB) and the Royal Museum for Central Africa (RMCA), led by P. de Maret, and focused on southern Cameroon. Some Cameroonians who participated went on to complete their doctoral dissertation. Others, meanwhile, were members of the Université de Yaoundé team and also participated in the archaeological excavations. In their work in northern Cameroon, J.-P. and A.M.D. Lebeuf also included in their team a student who had previously participated in missions with A. Marliac.

This period, which began at the dawn of the 1980s, can be considered the golden age of Cameroonian archaeology. In the early 1990s, a few research programmes continued to include local students: the Grassfields excavation of Shum Laka codirected by P. de Maret and R. Asombang; the archaeological component of the Tikarie project coordinated by M. Delneuf on the Tikar plain (central Cameroon); M. Eggert's team deployed in eastern areas of Cameroon's coastal province; even S. MacEachern's project in the far north.

In the early 2000s, some Cameroonians received training thanks to programmes such as that of the universities of Frankfurt and Tübingen in the eastern, southern and coastal provinces, as well as those of the universities of Nanterre (France) and Sofia Antipolis (France) and Bowdoin College (US) in northern Cameroon. It was thus to overcome the difficulty of obtaining more research funds for student training that in the late 1990s and early 2000s archaeologists dedicated themselves to building the awareness of public authorities, donors and businesses to incorporate the component of rescuing cultural heritage into the projects in which they were stakeholders.

II. IMPACT ASSESSMENT: A TRAINING AND RESEARCH FRAMEWORK FOR STUDENTS

Even if preventive archaeology programmes constitute an opportunity for the training of students, not all students can join, and are thus selected based on criteria unique to each team.

A. Student selection

The essential point in selecting students for archaeological assessments lies in their level of academic knowledge. The student must do everything he can to be above average in his university course. He must show a will to learn, consistency in his work, availability and, above all else, a good attitude. He must explore all leads and contacts that might help and guide him in his course. The majority unfortunately remain confined to the university without informing themselves of the myriad of available possibilities (fellowships from the cooperation services

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of Northern countries or research organizations, NGO internships, etc.).

In Cameroon, the first students to have acquired archaeological expertise were selected by IRD (Institut de Recherche pour le Développement) researchers based on the above criteria. In the case of the archaeological rescue of the Bertoua-Garoua-Boulaï road (eastern Cameroon), codirected by R. Asombang, M. Delneuf and C. Mbida Mindzié, the six students who were chosen performed monthly missions. For the archaeological inspection of the Lolodorf-Kribi-Campo main highway (coastal province) coordinated by R. Oslisly and C. Mbida Mindzié, seven students participated in missions each month. In the context of the protection of the archaeological heritage of the Ngaoundéré-Touboro road (northern Cameroon), supervised by R. Oslisly and B. Nizessété, approximately ten students collaborated on different missions.

B. Opportunity for research and student training

The inadequacy of practical training in archaeology at Cameroonian universities is explained mainly by the weak funding allocated to this subject and the lack of student financing. Students are encouraged to conduct their research in their home town in order to reduce costs – an approach that has the advantage of contributing significantly to the preservation of the national cultural heritage. These are archaeological rescue interventions that currently, to a great extent, allow students to conduct fieldwork that complements their theoretical knowledge and also provides the opportunity to defend theses and dissertations.

In Cameroon, four graduates carried out work related to preventive archaeological interventions. Archaeological inspection of the Lolodorf-Kribi-Campo main highway on the coast allowed for the defence of two master's theses, a DEA (diplôme d'études approfondies, 'diploma of advanced studies') thesis, and one doctoral dissertation. Along the same lines, a master 2 degree and a doctorate were defended in the context of the archaeological rescue undertaken during the construction of the Chad-Cameroon pipeline. A master's thesis was also defended in connection with the archaeological component of the Bertoua-Garoua-Boulaï road in eastern Cameroon. A doctoral dissertation currently underway relies on data from the archaeological inspection of the Kribi-Mpolongwé gas power plant on the coast.

The student who joins a team must seize this advantage to learn from more experienced colleagues. The experience not only entails analyses and excavations but also writing different types of reports in order to complement the training. Over time, he will learn to contact contributors to development projects, manage negotiations, and respond to bidding documents. Once he acquires a wide range of experience, he will logically be promoted to the rank of junior consultant.

1. From student in training to junior expert

The transition from student to junior expert implies a salary and more responsibilities. The effect of this change in status is firstly financial: the new junior expert is paid and signs a contract. He must know how to manage this transition and certainly not focus solely on financial gain. He should concentrate on his training, curriculum vitae and scientific production, which will allow him to apply to all firms recruiting experienced archaeologists.

Usually, expert assessments are coordinated by senior experts who rely significantly on junior experts. The latter lead teams in the field, analyse artefacts and collaborate on writing reports. They also participate in negotiations with donors and contracting authorities. The primary example is the archaeological component of the Chad-Cameroon pipeline. Three former Université de Yaoundé 1 students were recruited as junior experts under the coordination of a senior expert (Lavachery *et al.* 2010). Other teams subsequently adopted the same structure, including the archaeological inspections of the Dibamba and Mpolongwé power plants on the coast (see Oslisly, this volume).

2. Relations between the junior expert and the university

When the student becomes a junior expert, his relations with the university sometimes become complicated. He is solicited with increasing frequency for archaeological inspections, which has an impact on his academic curriculum. He has less time for class and often puts his studies on hold. To overcome this situation, he can, for example, decide to participate in assessments to gain experience and save money that will allow him to re-enrol at the opportune time in an academic institution. He must maintain contact with the academic world in order to facilitate his return. Professors, on their side, should accept and encourage the development of experienced junior experts. The ties between the junior expert and an academic institution provide the former the possibility to teach seminars, given his experience.

CONCLUSION

It is quite difficult to write an article on the role of the student in rescue archaeology assessments in Cameroon without being subjected to criticism. Despite this, what we learned is that anyone interested in joining archaeological impact assessments must be very intelligent, bold and patient. He has to focus on his training and not give priority to financial interests. His relations with the university must remain cordial so that he can, when appropriate, play a role in training younger researchers. The many challenges he will face include taking part in the publication of results of the projects in which he participates.

The examples presented here will be beneficial and help him to manage often complex situations.

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SURVEYING FUNERARY SITES

Isabelle Ribot[1]

INTRODUCTION

Prior to excavation, it is essential to document any potential site (e.g. location, historical context, and surface findings). This is especially true for a funerary site, as the latter often reflects a complex chronology and historical context. It is therefore recommended to work according to three main phases: firstly, search the archival, oral and historical records; secondly, locate the potential site *via* surface surveying and/or using Ground Penetrating Radar (GPR); and finally, plan the excavation. To illustrate these steps, a few African sites are taken as examples.

PRELIMINARY STAGES BEFORE EXCAVATING HUMAN REMAINS: DOCUMENTING THE POTENTIAL FUNERARY SITE

A. Archives and Oral History

For historical sites in particular, archival records (e.g. deed maps, written accounts, journals) can help to locate ancient graveyards. This is not always the case as informal graveyards are often undocumented. The latter are usually colonial cemeteries for low socioeconomic groups or African slaves, such as in South Africa (Prestwich Street) (Finnegan *et al.* 2011) and in the United States (New York African Burial Ground) (Perry *et al.* 2009).

In addition, oral history can sometimes provide hypotheses on the origin of a particular site (e.g. anecdotes, topographic names), although it is susceptible to being altered over time. For example, in Central Mali, the Tellem caves (a series of funerary sites in the Bandiagara cliffs dated to 11th-13th century A.D.) have been known by oral tradition to be used by people other than the present Dogon. In fact, these pre-Dogon groups were possibly trying to escape from the control of the Malian Empire. This hypothesis on the nature of the site and the identity of the burials helped archaeologists and bioarchaeologists redirect their research questions and reflect on the uniqueness of the Tellem burials (Huizinga *et al.* 1979).

B. Surface and/or Subsurface Surveys

Accurately locating concentrations of burials is one of the most challenging aspects of archaeology, especially when there is no archival data and little or no surface remains (e.g. tombstones, disturbances in the soil, exposed skeletal elements). Due to expanding cities, preliminary observations on the surface are very rare and cemeteries are often discovered by accident during construction work (e.g. historic cemetery, South Africa: Van der Merwe *et al.* 2010). Nevertheless, some funerary sites found in rural context and dated to the Iron Age, such as the Senegalese megaliths, are an exception to this rule as they have been identified by surface architectural structures (Thilmans *et al.* 1980).

Techniques to locate burials, prior to excavation, are directly influenced by their environmental setting (e.g. a site sheltered or unsheltered from external factors such as wind, rain, regular ploughing). Archaeologists or bioarchaeologists have to first start observing surface changes (e.g. soil erosion, soil compaction, presence of animal/human/artefactual remains and ecofacts, architectural structures) (Steyn *et al.* 2000). These changes have to be recorded, photographed and localized as precisely as possible, using global positioning system (GPS), in order to be able to pinpoint the site in the future. Written notes should include all possible soil disturbances (e.g. erosions, depressions, changes in soil colour and texture). If human remains are found during surface surveys, none of them should be collected unless they are threatened by soil erosion (e.g. on a beach and exposed to the waves) or imminent loss, but their position still needs to be recorded.

Disturbed surface soil as a result of natural erosion, faunal, or human activity can indicate hidden structures, such as funerary pits whose colour and/or texture of infill often 'demarcate' it from its surroundings. Human remains found on the surface may imply the existence of an exposed burial (e.g. prehistoric burials found in eroded paleodunes, Niger) (Sereno *et al.* 2008).

Surface concave depressions where a body was interred are some of the most obvious examples (**fig. 1**). This phenomenon can be seen in recent cemeteries where there has been less urban development obscuring or disturbing the surface (Steyn *et al.* 2000). Varying in size, these depressions are due to the fact that, with time, the soil used to fill the burial tends to compact, and in addition, the body also

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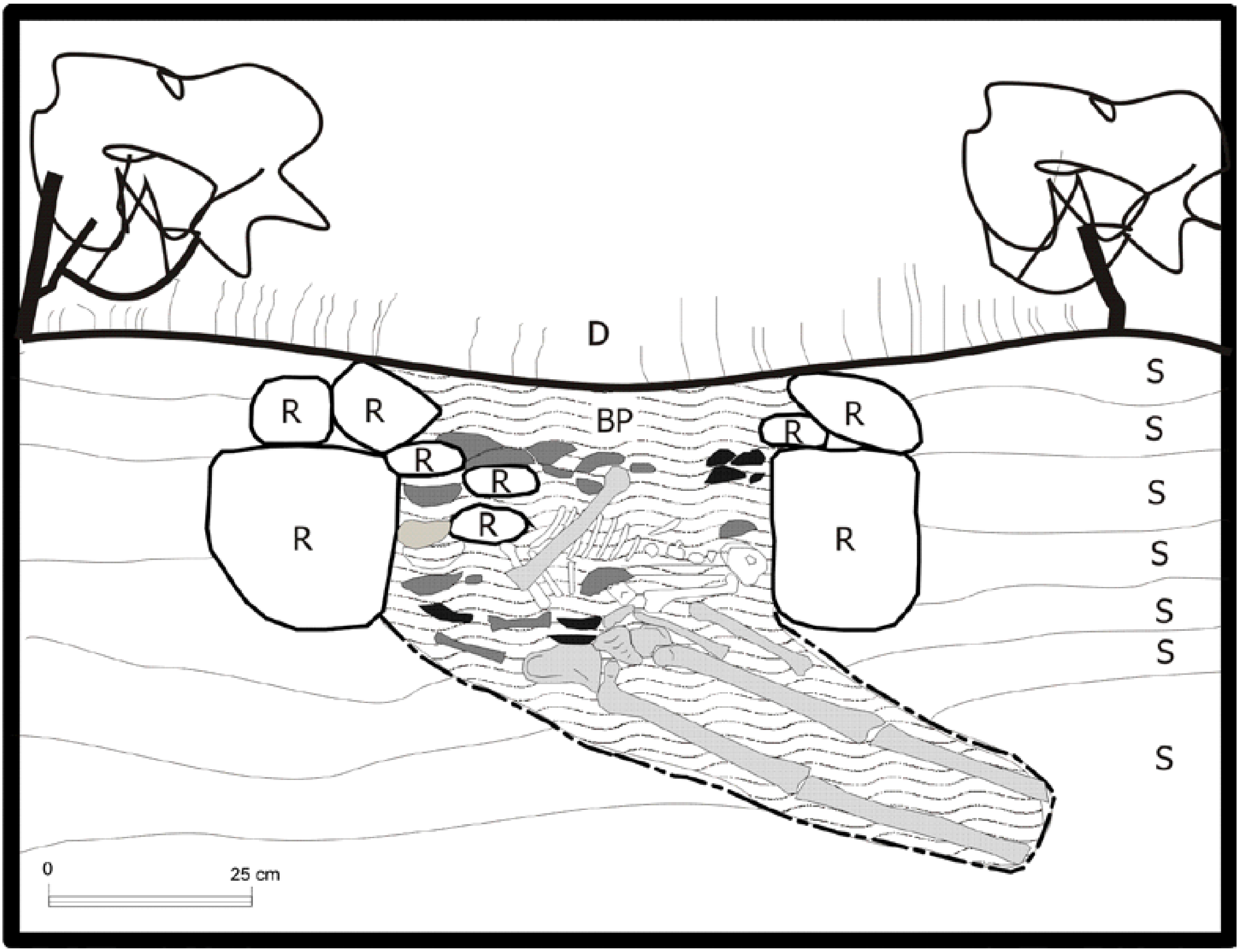

Fig 1. Stratigraphic section of a collective burial (containing several partly disarticulated individuals), showing both surface and underground features: D=concave depression on surface; BP=burial pit (disturbed stratigraphy); R=rocks; S=undisturbed stratigraphy. (Schematic drawing of I. Ribot.)

collapses during decomposition. However, if the soil is hard, rich in rocks and not well-watered, this phenomenon will not be as visible. Furthermore, even if ideal conditions are present (e.g. high quantity of water in well-absorbing loose soil), surface depressions tend to vanish due to the following factors: i) time; ii) vegetation growth; iii) subsequent soil accumulation; and iv) sub-surface disturbances from recent buildings or municipal works (e.g. South Africa: Van der Merwe *et al.* 2010; Finnegan *et al*. 2011).

New vegetation growth on the surface might also be taken into account as indicating the presence of fresh graves when body decomposition processes are still active. However, vegetation indices (e.g. weeds) are less reliable if the graves are too old (more than 50 years), especially when the body has decayed.

When there are sufficient funds, more sophisticated means to pinpoint historic graveyards without excavation are possible, including: aerial photography (e.g. landscape interpretations), metal detectors (e.g. presence of coffin nails) and/or Ground Penetrating Radar (GPR). The latter is a particularly good geophysical technique that complements other data (e.g. surface depressions) (Ruffell *et al.* 2009). Although very rocky and wet soils are not ideal, the GPR technique can detect underground structures such as grave shafts via magnetic anomalies, and therefore can locate funerary pits with no surface features (e.g. South African 19th century A.D. cemetery: Nienaber 2014).

C. Planning the excavation: ethical considerations, time and budget

Once the preliminary data have confirmed the presence of burials at a particular site, the researcher may need to consult the descendants, especially in the case of recent cemeteries. Ethical permits and legislation will vary from one country to another, as will procedures for acquiring an excavation permit. Heritage resources agencies of each country will make the final decision about exhumation, investigation and/or even reburying of human remains (e.g. South Africa: Van Der Merwe *et al.* 2010; Saccaggi & Esterhuysen 2014). The excavation can then begin, but its length often will depend on budget, and therefore the researcher may have to limit the number of test questions regarding the site under study.

CONCLUSION

These preliminary stages will help to explore the broad context of the potential site with as many lines of evidence as possible (e.g. environmental, historical, cultural, archaeological, ethical). In the ideal situation, if the excavation is the result of a long-term archaeological project with a detailed research agenda (e.g. survey of potential sites, questions to test), the nature and location of the site will be better anticipated. However, as funerary discoveries are often accidental, especially in the case of urban historical sites, these preliminary investigations are frequently initiated just prior to excavation (e.g. 18th century African graveyards: Van der Merwe *et al.* 2010; Perry *et al*. 2009; Finnegan *et al.* 2011). This is of course not an ideal situation, as ethical issues often need to be raised simultaneously, and they can slow down or even prevent a cemetery excavation. Nevertheless, even if the surveying phase is not followed by an excavation, the data obtained remains extremely useful for mapping unexcavated ancient funerary sites and can prevent the ancient site's future destruction.

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FINDING ROCK ART

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Fig. 1. Rock paintings in a typical African sandstone rock shelter context. The images were made using finger-painted white kaolin clay. Location: Limpopo Province, South Africa. (Photo © Benjamin Smith.)

Fig. 2. Multi-period rock engravings on an exposed sandstone boulder. The images are made by pecking; the animal was subsequently polished. Location: Twyfelfontein World Heritage Site, Namibia. (Photo © Benjamin Smith.)

In every part of Africa there are rich assemblages of images placed in rock shelters and on boulders. These do not require excavation in order to be studied and different sets of techniques are needed for their recording, analysis, and conservation. These images come in two main types: the first is painted or daubed onto rock surfaces using pigments. Typical pigments include purple, red, and yellow ochre (iron oxides), black charcoal, and white kaolin. Images made using pigments are termed **rock paintings** (pictographs in North America) and they are generally found on protected rock faces or in rock shelters (**fig. 1**). Unlike in Europe, Africa does not have art in deep caves and so the term cave painting is not appropriate. The second type of image is engraved into rock surfaces by pecking, gouging or scratching using a harder implement, usually a harder stone. These are termed **rock engravings** (petroglyphs in North America) and they are generally found on open boulders and exposed rock pavements (**fig. 2**). Collectively, these two types of images are termed **rock art**. In very rare cases, such as at a handful of sites in South Africa and Zambia, one finds painted engravings. In addition to rock art there are a variety of other forms of rock marking that often get recorded alongside rock art (**fig. 3**).

Rock art is one of the most widespread forms of African archaeological heritage. It should be expected that rock art will be found in archaeological surveys in all parts of Africa where there is rock. In those areas where the geology produces cliffs, overhanging boulders, and rock shelters the typical type of art is rock painting. The most common rocks for painting upon in Africa are sandstone, granite and gneiss. Those areas with boulders and rock pavements, but where there is an absence of rock shelters, are more likely to have rock engravings. Typical engraving rocks are sandstone, ironstone, dolerite, andesite, quartzite and, more rarely, granite. In parts of Africa dominated by limestone, lava (e.g. basalt, gabbro) and marble, rock art is rare, but not always absent.

I. RESEARCH QUESTIONS

When starting any work on rock art the key first step is to ask why you are doing this work. What are the limits (geographic and temporal) of your study? What do you and others wish to achieve from this work? The answers to these questions will determine what you do. There are almost unlimited numbers of things you can observe and record concerning rock art. Whatever some may claim, you can never record everything: all recording is necessarily selective (Whitley 2011). Therefore the only sensible way to decide what to search out and to record is to consider what things you can collect that will be most

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Whilst rock paintings and rock engravings make up at least 90% of African rock art, there are some other classes of archaeological artefact that are sometimes lumped with the term ‘rock markings’ (Rosenfeld 1999) such as man-made cups, hollows and grooves, cut into rock surfaces. Some of these are the by-product of the grinding of foods, minerals and pigments. In this sense they are not ‘art’, as they are unintentional marks left by a production process. However, they are often recorded along with rock art. Residue analysis can identify the remains of whatever was ground in the rock depression and thereby recognise why they were made. However, not all such marks are inadvertent; cupules and lenticular grooves are sometimes placed metres above the ground and on vertical surfaces where they cannot have served any practical function. These can be some of the oldest rock markings and can be of great significance (Coulson *et al.* 2011).

Another anomalous class of artefact commonly included within ‘rock art’ are rock gongs. These are resonant rocks that have been played by hitting them with another object, usually a stone. They can be identified from the stress markings that repeated hitting has left upon the rock surface. These should more properly be classified as musical instruments, but because they involve rock and are often associated with other types of art, they are sometimes recorded as rock art.

Mobile art in the form of loose pieces of rock, bone, eggshell or wood that have been carved or painted (and including painted and engraved burial stones) and then transported before being lost/intentionally deposited may also be included within ‘rock art’. These are typically located during excavation and are not commonly found in surface archaeological surveys. Mobile art is comparatively rare in Africa, but is becoming an increasing focus of attention because of important examples from some of the earliest modern human sites (Henshilwood *et al*. 2009; Texier *et al*. 2013a).

A final category that is generally included within ‘rock art’ is carved and/or painted monoliths. These are boulders that have been shaped and then erected. They are typically used to mark graves or shrines and are mostly found in West Africa and the Horn of Africa.

Fig. 3. Rock Markings.

useful to you and to others likely to use your data. If you work for a heritage agency then you will need to collect information relevant to the future management of the site, such as a list of the major stakeholders with interests in the site, the significance of the site, the cultural values of the site, its state of authenticity and integrity, the major conservation issues facing it, etc. If you are a conservator then a highly detailed study of the condition of the site, factors affecting this condition, and monitoring of previous conservation interventions at the site will be needed. If you work for a research institution and wish to interpret the meaning of the art, then a recording of the shape, size, colour, and style of each individual image may be necessary, together with a comprehensive recording of image overlays and juxtapositions within every art panel.

II. DESKTOP SURVEY

For a wide variety of purposes a comprehensive list of rock art sites will be needed. To create this begin by compiling all existing records held by heritage agencies, museums, universities, private collections and in past publications concerning the area in which you wish to work. This work, whilst laborious, will save you considerable time and money in the field and it can provide important information that is no longer available. It will also give you a baseline from which to monitor changes at the sites. This is often called a ‘desktop’ survey, although in practice it can rarely be conducted from your desk because much of this information will not be found online; a thorough job will require you to visit various institutions and archives. Set up a basic site database in which to store all of the information you collect. A typical format for a site database is by: site name or site number, district (or county), province, country. This database can be on paper in a filing cabinet, with each site having its own folder, or (better) on computer. Be careful how you name sites as this will become your primary reference for all of the data you record. People generally name sites either a) by 1:50 000 map sheet number and then consecutively on each sheet in the order in which they are found (so 1434A1 1, 1434A1 2, 1434A1 3 etc.) or b) by the local name of the hill, farm or area in which the sites are found and then by number if there is more than one site in the same named area (so Pahi 1, Pahi 2, Pahi 3 etc.). You may find during your ‘desk-top’ survey that there are multiple site naming systems already in place. Wherever possible follow the most commonly used and/or ‘offical’ (i.e. government authorised) system and record all other names as ‘alternative names’ so that no matter what name is used you will know to which site it refers.

III. SURVEY PROPER

With your 'desktop' survey completed you are ready to go into the field. Make sure that you have the necessary permits in place and that all necessary authorities, including traditional authorities, have been informed of your work before you begin fieldwork. When beginning a survey in an area in which sites are already recorded, it is common practice to start by visiting the known sites and then to expand the survey outwards from these sites in a systematic manner that ensures that all areas are covered. When working in an area in which no sites have been recorded, a common place to start is by consulting with members of local communities. They will generally know the location of major rock art sites; however it should not be assumed that people will automatically divulge their knowledge. Sites may be sacred and still used for important local ceremonies, such as initiation ceremonies. Their location may therefore be kept secret. Commonly, there can also be confusion around the term 'rock art'. Just as the concept of 'rock art' is vague in English, it also has no exact equivalent within most African languages. Translators tend to use terms equating to 'the written rock' and I have regularly walked for many hours to be shown an unusual geological formation, some tourist graffiti or a triangulation pillar. Even when one is able to convey the concept of rock art successfully, it is by no means guaranteed that all sites will be known to all locals. Often the larger more spectacular sites are known, and the smaller, more hidden and more faded sites are missed. When I began research in a fairly densely populated part of central Malawi, around 50 rock painting sites were known to locals. A full survey discovered 127 sites. So, local knowledge and engagement is essential to fieldwork in all parts of Africa and locals must be consulted and involved in all archaeological work, but this does not mean that local guiding can replace thorough survey.

IV. SEEING THE UNEXPECTED

One also needs to be cautious of one's own expectations. If one is used to looking for human and animal paintings then one tends to miss geometric images and handprints, especially if they are faded. Equally if one has recorded many images in shades of red, it is surprisingly easy to overlook even quite prominent images painted in white. And, if one is looking for paintings, one tends to miss engravings, other markings and so on. It is therefore important to go into the field with broad expectations and looking for a diversity of art. The traditional wisdom in the southern African Drakensberg, for example, was that rock paintings are restricted to the Drakensberg sandstones and do not extend to the overlying basalts. Many surveys have tacitly confirmed this expectation by not looking at the basalts. A recent survey in Lesotho looked equally at sandstones and basalts and found, for the first time, considerable evidence of rock paintings on basalt (Hugo Pint pers. comm. 2014). A thorough survey must therefore initially include at least a quick look at all sections of the landscape. If certain sections prove to be especially rich then these can be afforded special attention.

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