

Above: Monitoring the extent of agricultural expansion along the Nile in the fifth cataract region of Sudan from 1968 to 2022. Remote sensing can be used to monitor this expansion of agriculture and its effect on archaeological sites such as burial tumuli (displayed as blue dots), as shown in this CORONA satellite image from 1968 (which shows cultivated fields in darker grey) compared to a false colour infrared Landsat image from 2022 (which shows cultivated fields in red). For further details, and for other examples of threats monitoring for heritage sites, please visit the case studies at Arcadia Fund. Map created by Ed Burnett, University of Cambridge.

Welcome to this issue

For readers who find their way to this fifth issue of the MAEASaM project newsletter, welcome. The start of a new year is a good time to look ahead to upcoming schedules, new developments and planned activities. It's also a time to reflect on the past year, of milestones reached, collaborations formed and partnerships made.

It has been a busy couple of months for the MAEASaM project, with the development of the Beta version of the [Arches](#) Database and the expansion of the project's Site Resource Model. The latter caters for the diversity of heritage data derived from archaeological legacy records and has six complementary resource models to support this (Remote Sensing, Chronology, Administration, Grid, Actor, and Information). The project continues to grow the Arches database multilingual thesauri, covering a range of concepts frequently used in African archaeology and related fields. It is an exercise that has prompted our introspection on past and current ontologies shaping our discipline, and the important work needed to build more inclusive terminologies.

Last year, the second year of our project, over 500,000 square kilometres were visually inspected using different remote sensing techniques such as Google Earth Pro, satellite image processing and predictive modelling – and new perspectives are being gained about past and present landscapes.

The theme of landscape is explored in this issue. Within the context of Ancient Mali, Kevin MacDonald and Éloïse Noc of UCL are applying remote sensing techniques to build a picture of past settlement systems in the Middle Niger and adjoining regions (p. 2). This is followed by a report of the recent mission carried out by UCAD-IFAN's Nicolas Sagna and colleagues to locate and record archaeological shell mounds that form part of Senegal's coastal heritage landscape. The mission is part of ongoing ground-truthing work by the Senegalese team and is based on the visual inspection of satellite imagery (p. 3). The creation of a mobile site recording form has been an important development in the MAEASaM project and helps to facilitate ground verification. A contribution by WITS, Origins Centre's Serge Kiala delves a little deeper

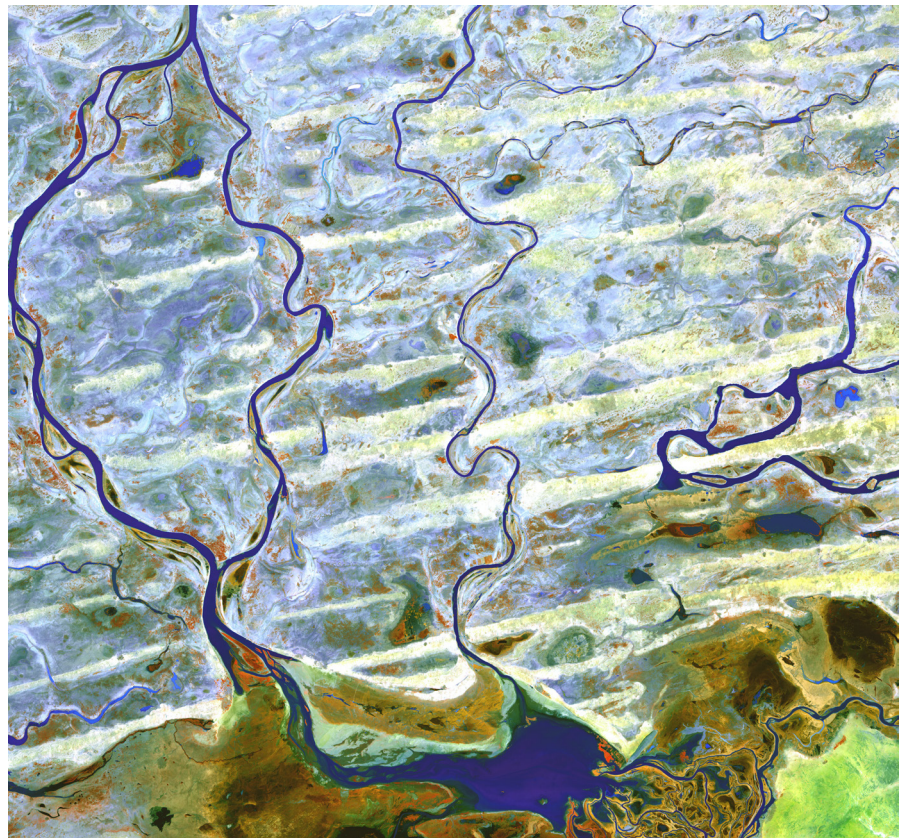
SNEAK PEEK

- (p.2) Remote Sensing in Ancient Mali: Situating Monuments, Redefining Settlement Systems, by Prof. Kevin MacDonald and Dr. Éloïse Noc.
- (p.3) Mission de validation des résultats de photo-interprétation : le cas des amas coquilliers au Sénégal par Nicolas S.E. Sisset Sagna. (Shell middens in Senegal: validating photo interpretations in the field'. [English version](#) available on MAEASaM website).
- (p.5) An innovative mobile data collection platform for field recording and site verification, by Dr. Serge Kiala.
- (p.7) Heritage Management in Zanzibar: Mariam Mansab, Director of Zanzibar Museums and Antiquities, in conversation with Dr. Akinbowale Akintayo, University of York.
- (p.9) January 2023 highlights

into the use of tools such as KoboToolbox and Open Data Kit (ODK) that are being deployed by local teams on the ground (p. 5).

All these milestones are enabled by collaboration, particularly with the national museums and heritage custodians whose advice and expertise inform the project. The importance of collaboration is reflected in a conversation between Akinbowale Akintayo, University of York, and Zanzibar's Director of Museums and Antiquities, Mariam Mansab, who gives her perspective on Zanzibar's heritage management within the wider context of the promotion and conservation of Africa's heritage sites (p. 7).

To our collaborators and to all readers, we wish you a successful 2023 and we hope this issue of the MAEASaM Newsletter will be of interest to you.



Above: Confluence of the Niger and Bani Rivers in Western Africa. Image by [USGS](#) on [Unsplash](#).

🕒 REMOTE SENSING IN ANCIENT MALI: SITUATING MONUMENTS, REDEFINING SETTLEMENT SYSTEMS

[Prof. Kevin MacDonald](#) and [Dr. Éloïse Noc](#)
UCL, Institute of Archaeology

Kevin and Éloïse's work within the MAEASaM project is focused on Mali. In October 2022, they presented a UCL Institute of Archaeology departmental seminar on their MAEASaM remote sensing research, which is briefly summarised in this article.

The work has systematically gathered settlement data, site dimensions and plans to discuss modes of urbanisation and monumentality in ancient Mali. Research questions concern variability in the layouts of major (25ha+) settlement centres in the Middle Niger (e.g. clustered or nucleated?), the nature of rural settlement networks, and the place of Mali's Lakes region heritage monuments in this wider landscape. Work has also focused on the spread, plans and dimension of Tichitt Tradition stone architectural sites in Mali first signalled by [Peter Coutros](#) in 2017.

The degree to which major early foci of urban development like Dia and Jenne-jeno are scattered across Mali's landscape has been an ongoing mystery in the absence of comprehensive survey.

Recent field surveys in the Segou region by MacDonald ([et al. 2011](#)), and Gestrich and Keita ([2017](#)) have located major (70+ ha) ancient urban nucleations at Sorotomo, Duguné tu, and other localities dating to the time of the Empire of Mali. How many other such sites are out there?

Comprehensive satellite surveys of the Macina, Djenné, Mopti South, Méma and Lakes regions (c.13,000 square kilometres) have found that potential ancient settlement centres (tell sites of 20ha+ in dimension) are relatively rare, in the order of 1 per 1000 sq. km. Additionally, such sites are more frequently nucleated (a few very large mounds) (Fig. 1, p.3) rather than clustered (10's of smaller mounds around a centre) – the distinctive dispersed and networked urbanism of Dia (Fig. 2, p.3) and Jenne-jeno being exceptional thus far.

Regarding monuments, tumuli such as El Oualadji and megalithic sites like Tondidarou, which have previously been viewed as isolated from domestic occupations, are now clearly in proximity to major settlement sites. Remarkably,

the Tondidarou megalithic complex is dominated by a massive 70ha escarpment-top Tichitt Tradition site with stone enclosures, the site being heretofore unrecorded (Fig. 3, p.3). While the presence of Tichitt ceramics and occupations in Mali was indicated by MacDonald (1996, [2011](#)) decades ago, Tichitt stone villages in the Lakes Region are proving more numerous and substantial than Coutros ([2017](#)) anticipated. There are both regional centres and smaller sites, with over 50 registered so far and more being found in adjoining areas.

The implications of this gradually expanding total survey of the Middle Niger and adjoining regions is transforming our understanding of Mali's past and providing a sound basis for protecting and researching this heritage going into the future.

Further information

Further presentations on this subject by Kevin and Éloïse are scheduled at the June 2023 '[Society of Africanist Archaeologists Conference](#)' in Houston (USA) and at the July 2023 '[International Medieval Congress 2023](#)' in Leeds (UK).

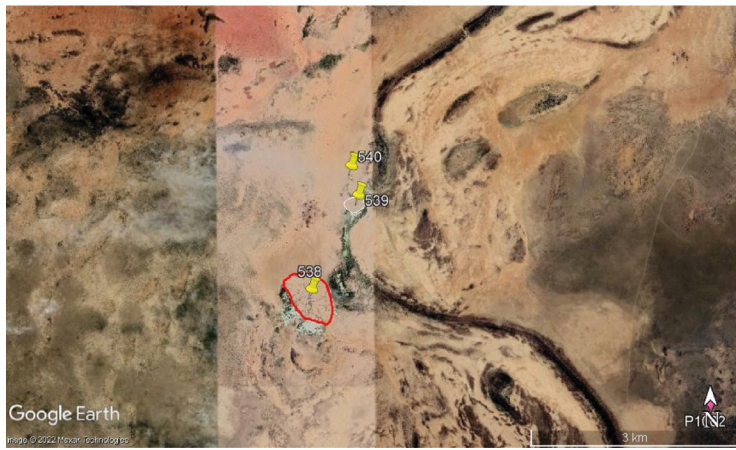


Figure 1. An example of a non-clustered centre – Pehe. Google Earth.

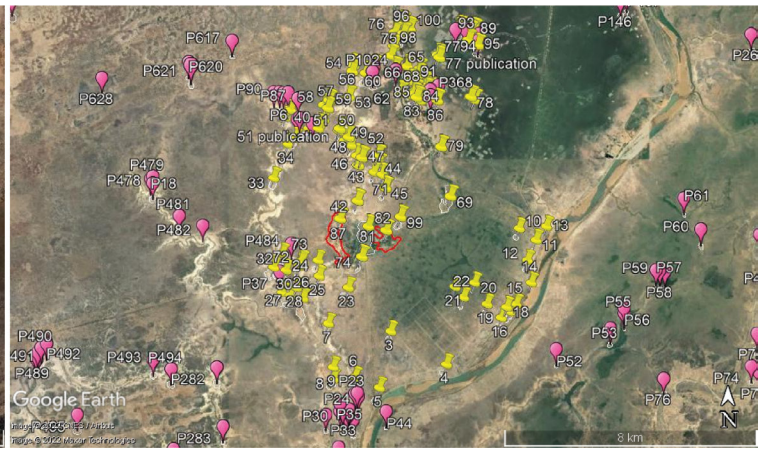


Figure 2. Dia as a Clustered Centre. Sites in yellow are recorded based on publications (legacy data) and sites in pink are recorded by remote sensing. Google Earth.

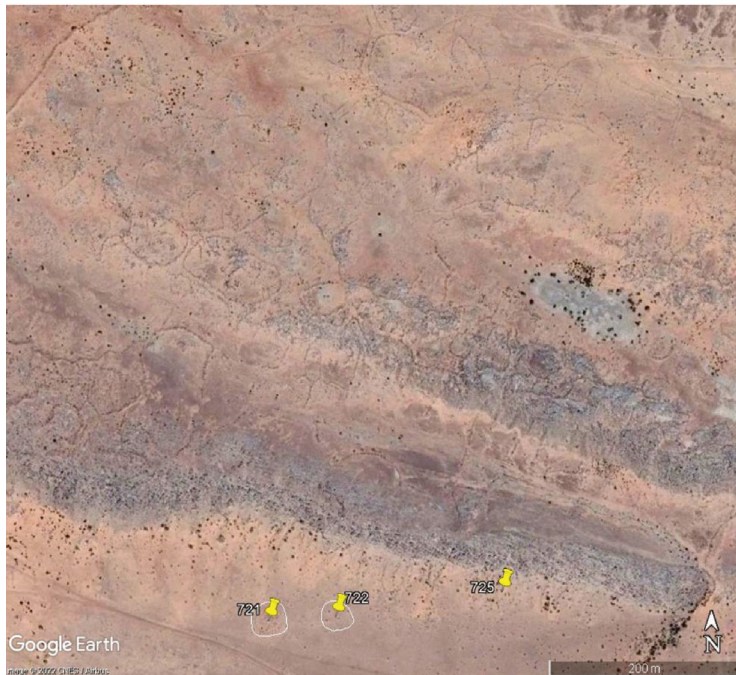
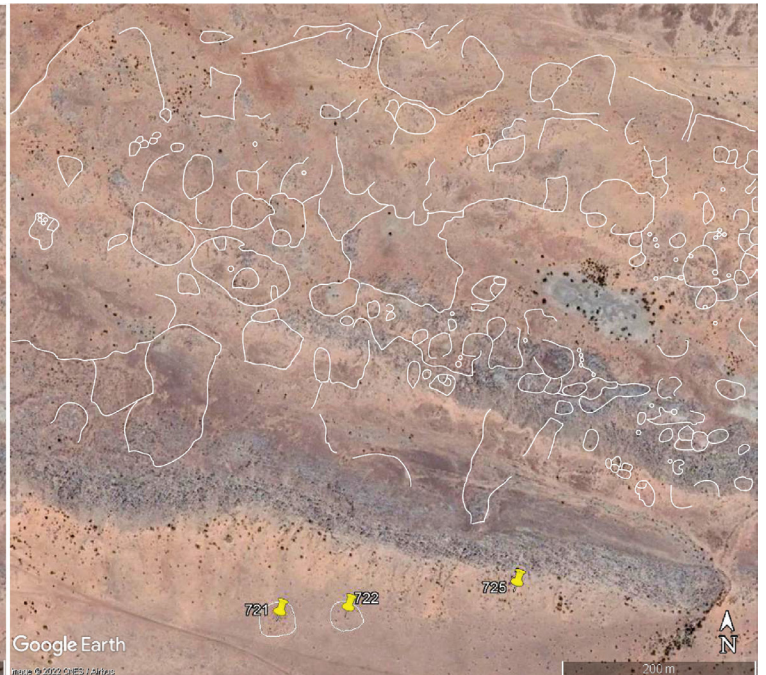


Figure 3. The Tondidarou megalithic complex is dominated by an escarpment-top 70ha Tichitt Tradition site with stone architectural enclosures and domestic spaces. Note that the satellite image shows only a portion of the Tichitt Tradition architectural site. Google Earth.



MISSION DE VALIDATION DES RÉSULTATS DE PHOTO-INTERPRÉTATION: LE CAS DES AMAS COQUILLIERS AU SÉNÉGAL

Nicolas S. E. Sisset Sagna
IFAN, l'Université Cheikh Anta Diop de Dakar

Dans le cadre du projet MAEASaM, un travail important sur les amas coquilliers a été entrepris au Sénégal. Le technicien supérieur Nicolas Sagna en est l'un des membres basés à l'Institut fondamental d'Afrique noire (IFAN) de l'Université Cheikh Anta Diop de Dakar. Dans cet article, il résume une mission récente effectuée avec des collègues du laboratoire de Géographie de l'IFAN : Dr Meissa Fall (géographe), Dr Modou Ndiaye (géographe), Abdou Aziz Faye (Doctorant géographe) et Tamsir Maïga (Chauffeur).

Remarquables par leurs dimensions, les amas coquilliers sont des accumulations de coquilles de mollusques d'origine humaine datant plus de 2000 ans (Thilmans & Descamps 1979, 2006; Bocoum et al. 2010 ; Camara 2010 ; Diouf 2010, 2019; Hardy et al. 2016; Camara et al. 2017; Holl 2022). Estimés à plus de 218 sites, certains sont surplombés de tumulus funéraires, d'où leur caractère sacrés et leur importance archéologique. Tous les amas coquilliers sont à ce titre classés patrimoines nationaux et parmi eux 96 entrent de la classification du Delta du Saloum comme patrimoine mondial de l'UNESCO. Malheureusement,

les sites du complexe laguno-insulaire de Joal-Fadiouth, dont il est question dans cet article, sont menacés par les activités anthropiques et aussi par la montée des eaux au vu de la géomorphologie la zone.

Entre le 6 et le 16 septembre 2022, une mission sur l'impact des digues anti-sel a eu lieu à Joal-Fadiouth. Il s'agit d'une commune située sur la Petite Côte dans le département de Mbour, dans la région de Thiès. Célèbre pour avoir donné au Sénégal son premier président, le Président Léopold Sédar Senghor, elle est aussi connue pour son cimetière islamo-chrétien édifié sur un amas de

coquillages.

Cette mission a offert au projet MAEASaM, l'opportunité de valider les résultats d'identification des amas coquilliers par analyse visuelle (photo-interprétation) avec les images Google Earth et QGIS. Cela a également été l'occasion de vérifier l'exactitude des «Legacy Data», c'est-à-dire les données héritées que l'équipe MAEASaM collecte à partir de sources publiées (Martin & Becker 1977; Diouf 2017).

La validation des résultats s'est faite par des visites sur les sites, en pirogue à travers les bolongs. Des prises de points GPS et des photos ont été réalisées. Faute de temps, tous les sites identifiés par photo-interprétation n'ont pu être visités. 6 échantillons retenus pour validation se sont avérés être des amas coquilliers.

Six autres sites ont été répertoriés grâce à une publication («legacy data»), avec



Figure ci-dessus: Vu Village de Fadiouth et pont reliant cimetièrre à île de Fadiouth depuis Cimetièrre Amas muslino chrétien.

leurs coordonnées géographiques (voir carte). Deux sites ont été retrouvés à l'emplacement donné par la publication. Le site n° 3 se situe à mi-chemin entre deux autres amas coquilliers, à environ 257m du premier et à 278m du deuxième. Le site n° 4 correspond également à un amas coquillier, à la sortie de Joal en direction de Fadial, à droite du pont. Deux autres sites n'ont pas été retrouvés à l'emplacement indiqué. Dans la publication, le site n° 5 était à 290m près, vraisemblablement l'île de Fadiouth, un amas coquillier elle-même. Quant au site n° 6 (Faboura), les coordonnées du « legacy data » le positionne à 1km de Faboura, un amas coquillier. Celui-ci pouvait peut-être s'étendre jusqu'au point de coordonnées donné par la publication. Les sites n° 1 et 2 ont probablement été absorbés par l'expansion urbaine, mais nous n'avons pas pu visiter ces deux sites pour confirmer ou infirmer cette théorie.

continued on page 5

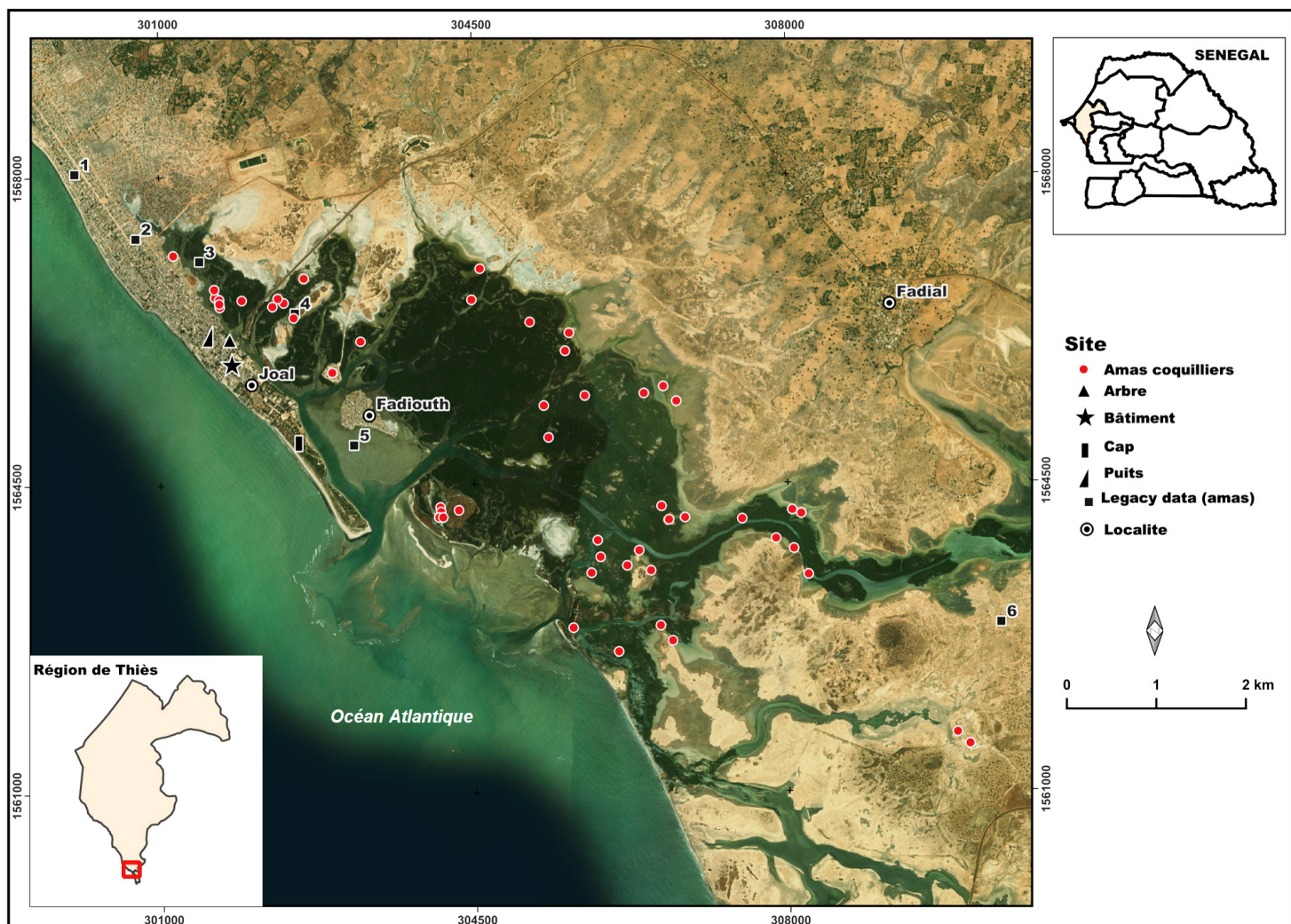


Tableau 1. Liste des autres sites à Joal-Fadiouth.

Site Name	Type	Description
Ngoussé Diokhé	<ul style="list-style-type: none"> Amas coquillier 	<ul style="list-style-type: none"> Amas coquillier sur lequel pousse un baobab
Finio	<ul style="list-style-type: none"> Cap Vestiges de bâtiments 	<ul style="list-style-type: none"> Site sacré Anciennes bâtisses des anciens colons portugais
Puits	<ul style="list-style-type: none"> Puits 	<ul style="list-style-type: none"> Ancien puits du 16e siècle

D'autres sites (Tableau 1) de natures différentes ont été répertoriés et nous semblent intéressants à explorer davantage. Parmi ces sites, l'îlot de Ngoussé Diokhé est un site sacré d'environ 30m de long sur 18m de large, constitué d'un amas coquillier sur lequel pousse un baobab. D'un point de vue culturel, Ngoussé Diokhé s'inscrit dans le chapelet des sites sacrés répertoriés dans la zone de Joal-Fadiouth et constitue un patrimoine culturel très important tant pour les « Fadiouthiens » que pour le Sénégalais.



Figure ci-dessus: Ngoussé Diokhé

AN INNOVATIVE MOBILE DATA COLLECTION PLATFORM FOR FIELD RECORDING AND SITE VERIFICATION

Dr. Serge Kiala
Origins Centre, WITS

In year two of the MAEASaM Project, local teams in collaboration with national heritage authorities conducted three field site verification missions in coastal and northern Kenya, Unguja Ukuu in Zanzibar, and in the Joal-Fadiouth region of Senegal (see p. 3), using a customised mobile field recording form developed for site verification and documentation. Dr. Serge Kiala of the Origins Centre, WITS, is part of the project's mobile data collection working group and discusses Open Data Kit (ODK), KoboToolbox, and the benefits of digital data collection in the field.

KoboToolbox is a community driven open-source suite of tools for data collec-

tion, management, and visualisation. It includes the KoboCollect app, the KoboToolbox form builder and the KoboToolbox server, among others. Based on the Open Data Kit (ODK) platform, KoBoToolbox is fully compatible and interchangeable with it, but supports other useful functionalities, such as the possibility to cascade selections in forms. The platform was developed by the Harvard Humanitarian Initiative (see HHI Harvard KoboToolbox and related case studies) and led by co-founders Phuong Pham and Patrick Vinck in 2009. Platforms such as KoboToolbox and ODK have allowed the transition of field data collection efforts from a paper-based approach to an electronic approach.

The KoboCollect app for example allows users to fill out digital forms and send

this information to an online server in real time. It can also work offline, which allows its deployment in areas with poor internet connectivity since data can be uploaded to the KoboToolbox server once internet connection is made available. This is one of the many reasons the MAEASaM project has chosen this platform for managing the documentation and verification of archaeological sites during field surveys. It allows users to collect and make precise geolocation data for more accurate heritage monitoring purposes. Once a digital form has been uploaded to the server, the data captured in the field can also be reviewed, edited, and downloaded for further analysis. Data collection has never been more efficient, and it turns out to be fun to use.

How it works

There are several steps towards developing a successful mobile field data collection workflow (Fig 1). The first step starts by creating a form from a questionnaire either using the KoboToolbox form builder for simple forms or Microsoft Excel for more complex forms. The MAEASaM project customised a form, initially designed by the [Mapping Archaeological Heritage in South Asia \(MAHSA\)](#) project, using Microsoft Excel which allows for the collection of heritage information in five areas: contextual information, site information, features and artefacts, site condition assessment, and environmental information. Once a form has been created it can then be uploaded to the online KoboToolbox server. Thereafter, forms can be downloaded from the server by users with a protected password to an Android device using freely downloadable [KoboCollect](#) or [ODK Collect](#) apps.

The benefits of mobile data collection

This innovative way of electronically collecting data in the field comes with several benefits. For instance, data types, such as GPS location, photos, video, and audio, can be collected. The time for capturing such data is significantly reduced and it allows for data to be standardised for comparative purposes. This method can also reduce the number of errors in the data capturing process through logical checks and pre-fillable answers.



MAEASaM-BIEA member, Angela Kabiru, conducting site verification in coastal Kenya using the KoboCollect app on an Android device.

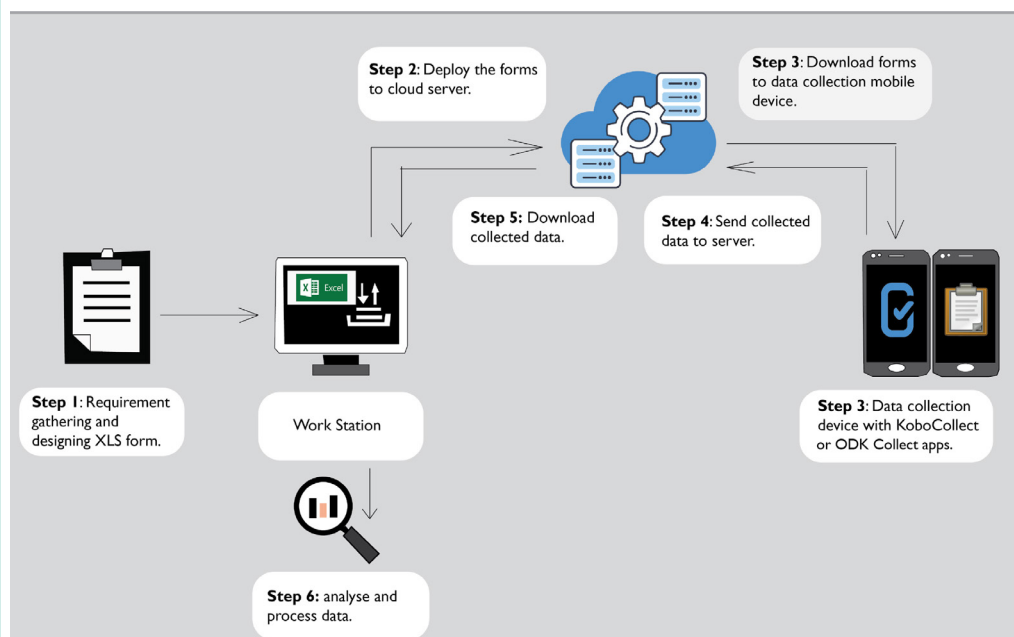


Figure 1. Steps in the field data collection workflow.

HERITAGE MANAGEMENT IN ZANZIBAR

Mariam Mansab, Director of [Zanzibar Museum and Antiquities](#), in conversation with [Dr. Akinbowale M. Akintayo](#), University of York, Department of Archaeology

During a visit to Zanzibar, Dr Akinbowale Akintayo, MAEASaM-University of York Postdoctoral Research Associate, met with Mariam Mansab, Zanzibar's Director of Museums and Antiquities, who gave her perspective on heritage management in the island. Ms Mansab has been in the department for ten months and was appointed to her role by the President of the Revolutionary Government of Zanzibar.



AA. Which heritage site in Zanzibar stands out for you?

MM. I would say Kuumbi Cave in the Unjuga region. I haven't visited all 86 of the gazetted sites of Zanzibar but the Kuumbi Cave is the most interesting among those that I have seen so far. I find it compelling because of how it looks and because of its history. It provides early evidence of links between Zanzibar and the Tanzanian mainland. It's also a naturally beautiful place to visit. The other interesting aspect of Kuumbi Cave is how it was discovered. The story tells of two lovers who were looking for a place to sit and talk. They threw a stone and heard the sound when it hit water that was in the cave at the time. They then went back and told the village about what they had found. A very romantic discovery!

Above: Ms Mariam Mansab, Director of Zanzibar Museum and Antiquities, in conversation with Dr. Akinbowale Akintayo.

AA. What would you say are the conservation challenges for sites in Zanzibar?

MM. There are many challenges. We can see the deterioration of our larger heritage sites, most of which are being encroached by farming and urbanisation. We haven't linked ourselves very well with the community and this is an important step because Zanzibar's heritage is part of our shared identity. If we do not protect and preserve it, we will have nothing to show for it. We need to get the community involved as well as increased support by government to prevent the dilapidation

of heritage sites.

AA. What do you see as some of the practical steps towards addressing these challenges?

MM. I believe that projects like MAEASaM can make a difference. The training that has been provided has been helpful as it lends itself to better understanding of heritage sites on the island and to collect the data to help monitor them. It's imperative to understand the needs of these sites and having a database will help us to know what is going on with them. We have never had this kind of project in Zanzibar before, especially in this Department. We are very pleased that this training has happened, and we want it to be sustainable and continue with it.

AA. Which types of threats are facing heritage sites?

MM. We have two sites that are under severe threat from sea level rise and soil erosion linked to climate change. The Chuini Palace is at serious risk, and the concern is that we are going to lose it completely. The site Ras Mkumbuu in Pemba has already lost part of its building. I fear that we will lose this built heritage in no time if we don't do anything about it now.



Kuumbi Cave. Photograph by Ceri Shipton (CC BY-SA 4.0).



Above left: Akinbowale Akintayo in Ungua Ukuu, Zanzibar. Above right: Big Mosque, Tumbatu Island.

AA. In your opinion, where do you see the most pressing need for the monitoring of sites in Zanzibar?

MM. Monitoring is vital as most of the sites are facing increasing threats. But to do this, we need to install barriers around all our sites, otherwise it is very difficult. Most of the built heritage are deteriorating, and we are trying to keep them in proper shape. I'm dealing right now with farming and urbanisation. We could lose the two sites I mentioned in the next five years. I'm working with the government and trying to find support and funding to be able to implement a

barrier around these historical sites.

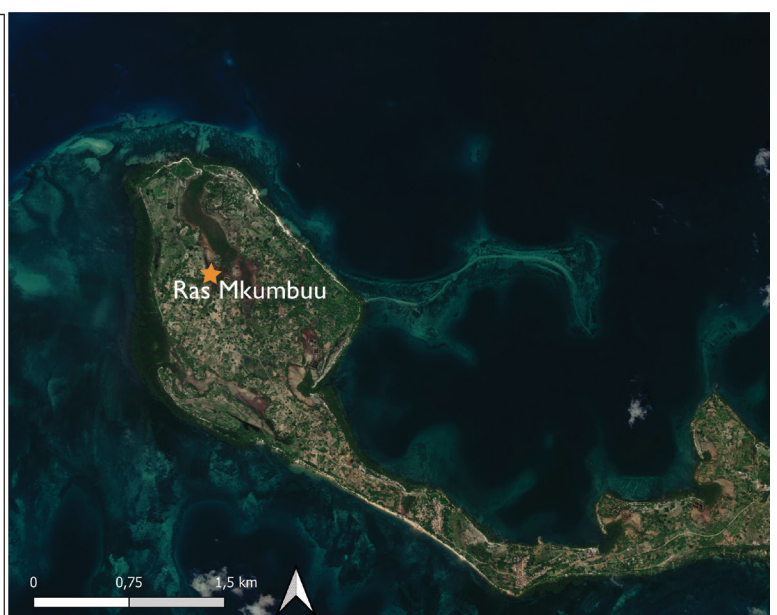
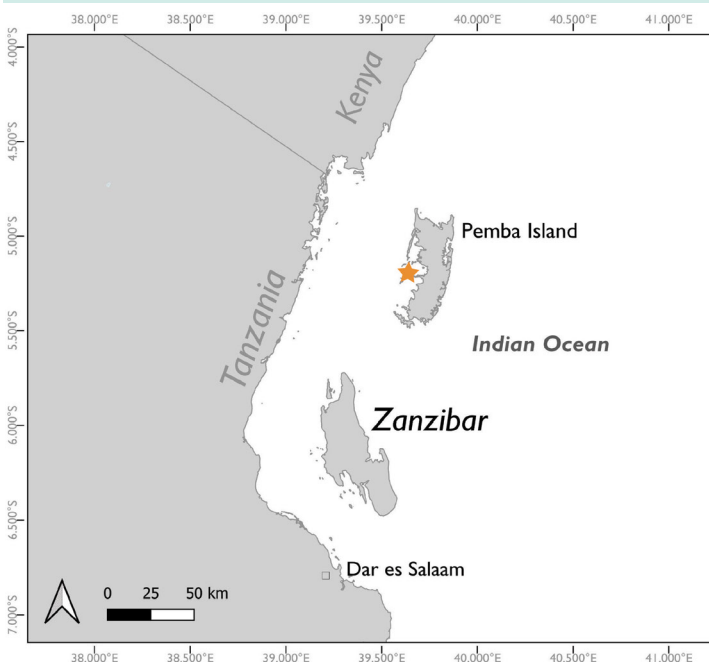
The other issue is that we don't have site management plans. That is my next mission: a five-to-ten-year plan to help us control and monitor these sites.

AA. What do you see as the value of 'going digital'?

MM. In Zanzibar, our records are on paper, and we do not have the special storage capacity to protect such records from damage and possible loss. If these records are lost, future generations will never know our cultural legacy. But

having computers is not enough. We have problems with electricity, plus we need good servers and cloud storage as well as experts to maintain digital infrastructures. We can't rely on having information in a database that is safe somewhere else, as it becomes pointless. Without all these in place, digital information becomes just as much at risk as our paper records.

Training is also very important so that there are people who understand and can do what is necessary. We need sustainable cloud servers. They aren't cheap and we are all looking for funds. We need something that can be used across Africa.



Ras Mkumbuu is in Chake Chake District on Pemba Island near the end of a long narrow peninsula, also named Ras Mkumbuu. The area contains diverse underwater archaeological heritage and currently remains under researched. Information provided by local people suggests that the area was once thriving; however, a large part of it is now submerged by about 12m of seawater.



January 2023 got underway with a joint two-day workshop in Nairobi, Kenya with the MAEASaM project, the British Institute in Eastern Africa (BIEA) and the National Museums of Kenya (NMK). The workshop was officially opened by Dr Emmanuel Ndiema, Head of the Department of Earth Sciences and Dr Frederick Manthi, Director - Directorate of Antiquities, Sites and Monuments, both from the National Museums of Kenya. On day one, MAEASaM-BIEA members, Dr Pamela Ochungo and Angela Kabiru shared with partners and collaborators the progress of the MAEASaM project. This was followed by a demonstration of the Google Earth platform for the detection of archaeological sites and their monitoring using high resolution satellite imagery by MAEASaM's project manager, Dr Stefania Merlo.

This is part of a series of several workshops that we will be holding jointly with collaborators and partners in the project.

STAY IN TOUCH!

This newsletter is published as print and online. To subscribe, visit <http://maeasam.org/newsletter/>. Contributions and suggestions for future issues should be sent to: MAEASaM-info@arch.cam.ac.uk. MAEASaM, McDonald Institute for Archaeological Research, University of Cambridge, Downing Street, Cambridge CB2 3ER, UK +44 (0)1223 333538

EDITORS
Faye Lander
Regional Project Manager, Southern Africa, MAEASaM Origins Centre, University of the Witwatersrand, South Africa.

Stefania Merlo
Project Manager, MAEASaM McDonald Institute for Archaeological Research, University of Cambridge, UK.

Christine Matthews
Project Administrator, MAEASaM McDonald Institute for Archaeological Research University of Cambridge, UK.



On 19 January 2023, the Cambridge Research Heritage Centre held its annual heritage fair. Team members Ella V. Beaudoin and Ed Burnett, both based at the University of Cambridge, created complementary posters describing the MAEASaM project's work across eight countries.



ARCADIA
A CHARITABLE FUND OF
LIBBET RAUSING & PETER BALDWIN