

Mozambique TIPAs Fieldwork Report:

Inhambane Province – Panda, Mabote and Lagoa Poелеla, Jan-Feb 2019

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Inhambane Province in southern Mozambique supports significant areas of a range of natural habitats and a wealth of biodiversity. It is also a well-known tourist destination and an important area for production of cashew and coconut crops. Over 50 of Mozambique’s endemic plant taxa occur in Inhambane as well as a similar number of regional near-endemics. The province has three protected areas, coastal Pomene Game Reserve and Bazaruto National Park and inland Zinave National Park bordering Manica Province. However, across most of the Province, areas of forest and natural vegetation are under pressure from timber extraction, urban development, cattle and agricultural expansion and are not protected by legislation.

As with much of Mozambique, Inhambane province is relatively under-recorded botanically. Previously most botanical exploration has been concentrated in coastal habitats, though even some of the coastal areas in Inhambane are little known botanically. In this fieldwork we have focussed on three districts in Inhambane, Panda (Panda-sede and Mawayela local post), Mabote (Mabote local post), and Inharrime (in Inharrime-Sede local post). We identified areas of potential botanical interest, targeting patches of natural vegetation identified from Google Earth imagery with the aim of (i) documenting the vegetation, (ii) gathering distribution data for a target list of nationally endemic, regionally endemic and threatened plants, (iii) assessing land-use, protection and threats and (iv) identifying potential Important Plant Areas (IPAs).



Figure 1: Androstachys johnsonii dry forest at Chichococha in Panda district. Photo J. Osborne

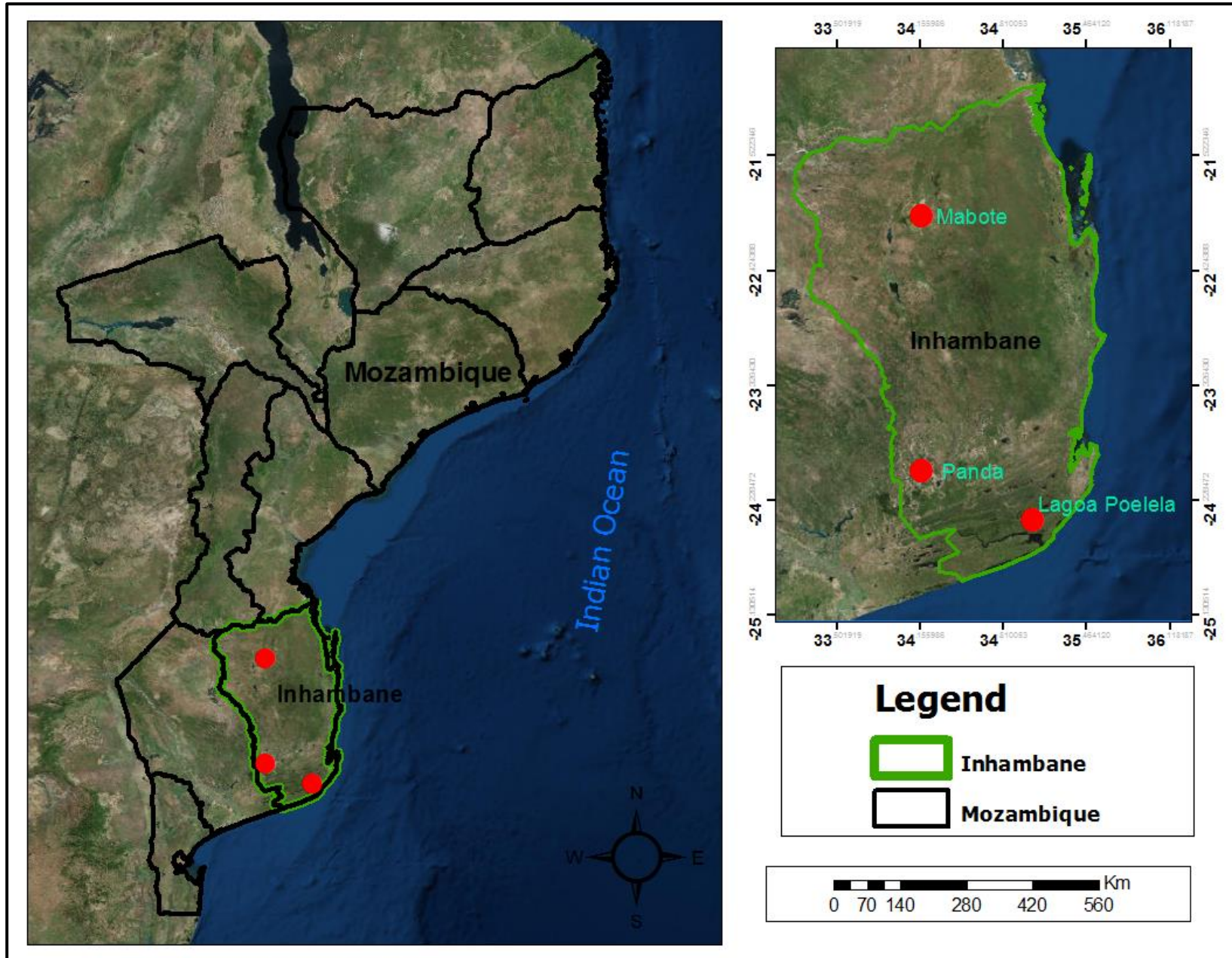


Figure 2. Maps showing the locations of the three fieldwork sites in Inhambane Province

Field team

The field team was made up of Clayton Langa, Castigo Datizua and Jossias Zandamela from the Instituto de Investigaç o Agr ria de Moçambique (IIAM) in Maputo; Jo Osborne and Iain Darbyshire from the Royal Botanic Gardens, Kew. Two 4WD vehicles were driven by Bernardo Melecua, Cremildo Bucua and Emilio Tembe from IIAM in Maputo.

Working with local communities

At each of the field sites we first introduced the field team at the district offices (Serviço Distrital de Planeamento e Infra-Estrutura - SDPI) and to head of the locality. The head of the locality introduced the team to the community leaders to obtain permission for fieldwork and to local guides to work with us. We are very grateful for the kind welcome, hospitality and information that we received from the communities at all three districts.

In Panda District permissions for fieldwork and a fieldcamp site were agreed with the Primeiro chefe da Comunidade, Jo o Pande and the Second chefe da Comunidade, Fernando Macuacua. We worked with local guide, Augusto Samson Macuacua, *chefe das 10 casas* local to our fieldcamp and a second local guide, Almeida Neves joined us for one day to advise on sites within Mawayela Locality.

In Mabote District the Chefe da Comunidade for Maloka Ule, Sr Muthuque gave permission for field work and a field camp site at the edge of the forest. We worked with local guide Nelson Muthuque. In addition, elders from the local community performed a traditional ceremony asking the ancestors to ensure that nothing bad should happen to us while we were visiting them. Ten people from the community attended the ceremony and alcoholic beverages, including the traditional beverage mal-cuado made from maize, were offered to the ancestors by pouring a little of each into the sand. The elders noted that they do not often have visitors.

At Lagoa Poelela we were hosted at Lagoa Poelela Fisheries and worked with local guide Eusebio Chilosse, *Chefe da Zona 1 do Sihane*.



Figure 3: In the early morning at Maloka Ule in Mabote district, elders from the local community perform a traditional ceremony asking the ancestors to ensure that nothing bad should happen to us while we are visiting them. Photo C. Langa

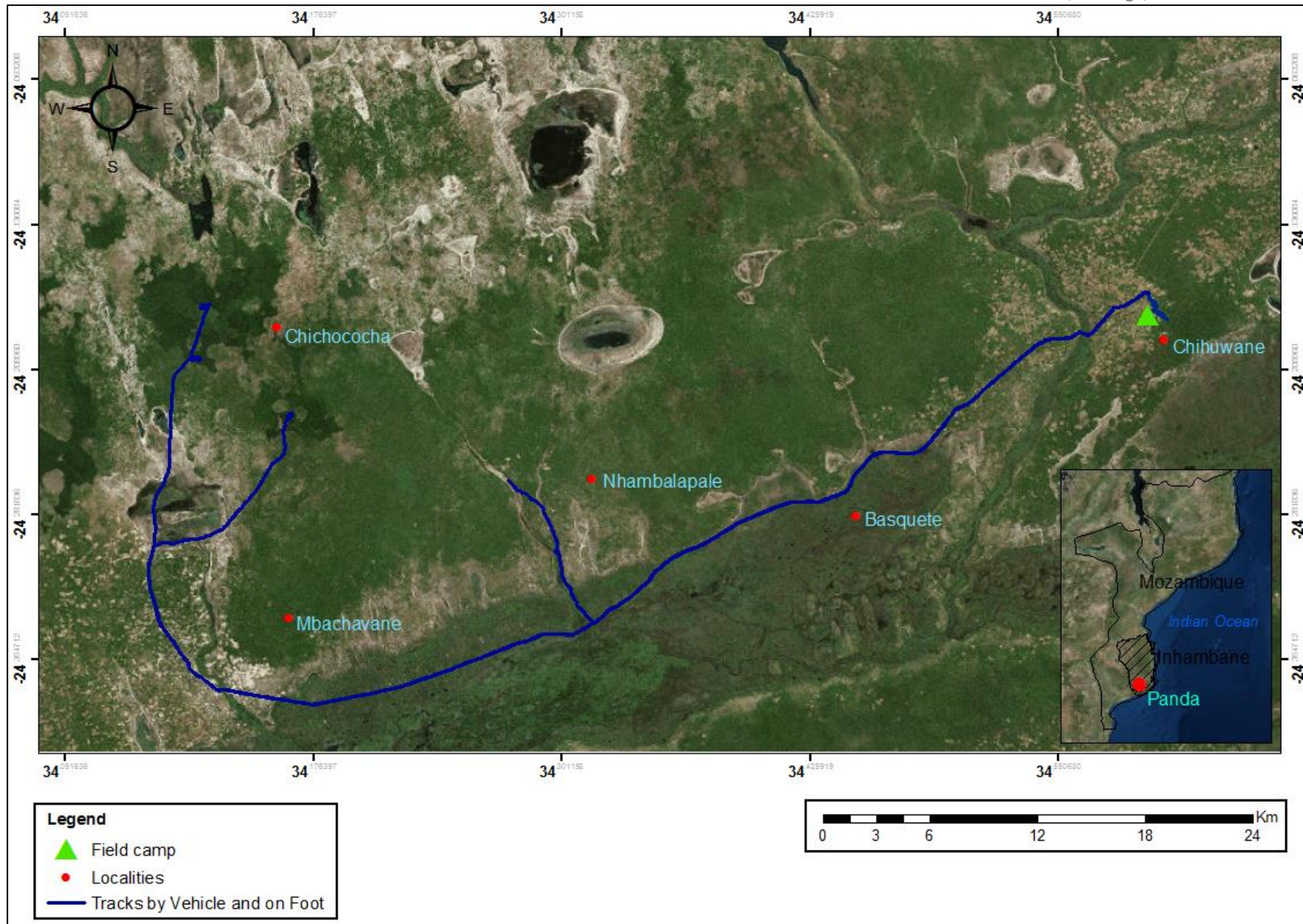


Figure 4: Botanical exploration in Panda District over five days of fieldwork. Locality names were provided by local guides Augusto Samson Macuacua and Almeida Neves.

1. Panda district

Panda district lies inland in the south-west of Inhambane Province. To the south-west of Panda town large areas of woodland (green) and seasonally wet savannah grassland (grey-green) are visible on satellite imagery, with smaller areas of darker green indicating remaining fragments of forest, while lakes and seasonally flooded areas can be identified from their rounded pale edges. Small, rectangular agricultural fields (machambas) are conspicuous, spreading out from towns and villages. The terrain here is mostly flat and low-lying, on sandy soils between 30 and 90 m in elevation.

Fieldwork in Panda district, 29 Jan - 2 Feb

From a field camp at the woodland edge in Chihuwane we investigated the miombo woodland at this site. Other sites and habitats investigated included savannah grassland at Basquete, *Syzygium cordatum* groundwater forest and seasonally flooded grassland at Nhambalapale, miombo woodland at Mbachavane and *Androstachys johnsonii* dry forest, secondary forest and miombo woodland at Chichococha. One of our main aims in this district was to identify *Androstachys johnsonii* dry forest on the ground to see if it would be possible to distinguish from the other forest and woodland types using satellite imagery, and to investigate the extent to which this critical habitat is threatened. In Panda district we collected 156 plant specimens for identification.



Figure 5: Miombo woodland at Chihuwane in Panda district supports a population of the cycad *Encephalartos ferox subsp. ferox* (left, photo C. Langa) and provides edible mushrooms for the local community (right, photo J. Osborne)

Panda district - preliminary observations

In Chihuwane there is a fragment of miombo wood ca 15 km² (estimated from 2013 satellite imagery) surrounded by machamba agriculture. Much of the woodland is secondary with a canopy height of ca 8 m though occasional larger trees remain including *Brachystegia spiciformis* to 15 m tall and 50 cm dbh (trunk diameter at breast height). The understory and ground layer include sparse but diverse shrubs, lianas and herbs with notable species including the cycad *Encephalartos ferox subsp. ferox*. Invasive prickly pear *Opuntia* sp. is frequent particularly towards the woodland edge. Local people use this woodland as a source of timber for construction and for harvesting edible

fungi, medicinal plants, fruits and other plant materials. The dominant miombo species, *Brachystegia spiciformis* provides poles for construction and stringy under-bark for cord. While there is clearly a threat to the woodland through expansion of agricultural land, there are also many abandoned machambas and areas of recent secondary vegetation towards the woodland edge, indicating that expansion is not happening at present.

South-west of Chihuwane there are much larger areas of intact miombo woodland. At Mbachavane we investigated an area of miombo woodland again dominated by *Brachystegia spiciformis* and including succulent species such as *Sansevieria* sp. and *Huernia hystrix* var. *hystrix* in the ground layer. *Encephalartos ferox* subsp. *ferox* also occurs here, though only a few individuals were seen.

Remaining patches of *Androstachys johnsonii* dry forest can be found at Chichococha. This timber tree is the only species in the genus *Androstachys*. It occurs in southern Africa and Madagascar, forming dense stands usually in well-drained rocky areas. In Inhambane it forms a distinctive dry forest on raised sands. The timber, known locally as cimbirre or mecrusse, is durable and sought after for construction and as a result the *Androstachys* forest is fast disappearing. In satellite imagery of Panda district *Androstachys* forest fragments are distinguishable by their darker green colour. This *Androstachys* forest has a canopy ca 18 m high and is often mixed with *Guibourtia conjugata*. In the understorey *Drypetes arguta*, *Croton pseudopulchellus*, *Salacia* sp., *Hyperacanthus microphyllus*, and *Vepris* sp. are common and seedlings of both *Androstachys* and *Guibourtia* are plentiful in the ground layer. An interesting *Cola* species was also found here, believed to be *Cola dorrii*, a recently described and globally endangered species, previously known only from KwaZulu-Natal in South Africa.



Figure 6: Forest clearance as a result of *Androstachys johnsonii* “cimbirre” timber extraction in Panda district.
Photo J. Osborne

Adjacent to the *Androstachys* forest at Chichococha there is dense secondary forest dominated by *Guibourtia conjugata* and *Warneckea* sp. These areas can be distinguished on satellite imagery by their paler grey-green colour. Very little *Androstachys* occurs here and no *Androstachys* seedlings or regeneration were seen.

Throughout the fieldwork in Mawayela localidade (around Chichococha and Mbachavane) we searched unsuccessfully for the endemic tree *Guibourtia sousae*, which is known only from the type specimen collected in *Androstachys* forest in this area in 1936. However, this species can be distinguished from *Guibourtia conjugata* only in flower or fruit and unfortunately much of the *Guibourtia* seen here was not fertile at the time of our fieldwork, so the survival of this species remains unknown.

At Nhambalapale we explored a small patch of *Syzygium cordatum* groundwater forest and adjacent seasonally flooded grassland beside a seasonal river bed. The canopy here consists almost entirely of *Syzygium cordatum* while the forest floor is dominated by the giant climbing fern *Stenochlaena tenuifolia* with few other plant species in the understorey and ground layer. Elephant footprints were visible in the mud at the forest edge. The seasonally flooded grassland supports a range of herbs and grasses. Low intensity cattle and goat grazing were noted here.

Savannah grassland forms a large part of the vegetation in this area of Panda. We explored savannah vegetation at Basquete, a low-lying, seasonally wet area where the wooded grassland is interspersed with small woodland patches. Common woody species here include the palm *Hyphaene coriacea*, *Terminalia sericea*, *Syzygium cordatum*, and *Acacia* sp. *Brachystegia spiciformis* occurs in drier areas and the palm *Phoenix reclinata* is also present. The shrub *Salacia kraussii* is abundant at the transition between woodland patches and open grassland. Overall the habitat supports a high diversity of grass and herb species. It is grazed at low densities and will burn naturally in the dry season, indicated by an abundance of perennial suffruticose species with signs of previous burning at the stem bases. Threats to the grassland habitat appear to be minimal.

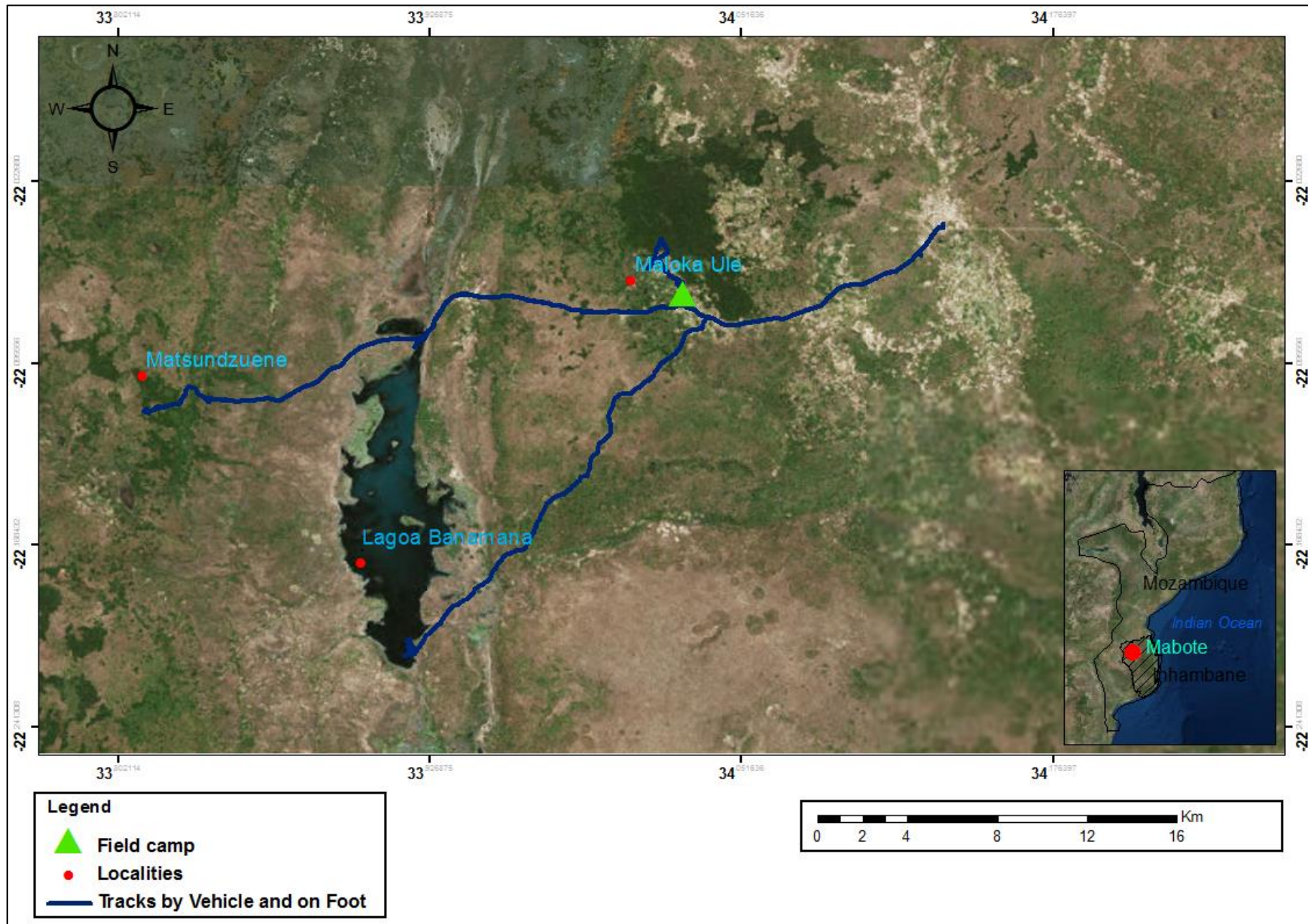


Figure 7: Botanical exploration in Mabote District over four days of fieldwork. Locality names were provided by local guide Nelson Muthuque.

2. Mabote district

Mabote district lies inland in the north-west of Inhambane Province. It is the largest district in Inhambane Province and includes the Zinave National Park, which covers about a quarter of the district. In this fieldwork we have focussed on an area outside the national park, to the west of Mabote town. The terrain here is at higher elevation than in Panda with dry forest patches occurring on the higher ground from 170-220 m on sandy soils and Lagoa Banamana at ca 120 m.

Preliminary observations:

Our field camp site in Maloka Ule was situated within an area of open miombo woodland, differing from the woodland in Panda in having *Brachystegia torrei* as the predominant miombo species. Notable species recorded here include *Chascanum angolense* subsp. *zambesiicum*, a near-endemic white-flowered perennial herb. Homesteads and machamba agriculture are encroaching on the woodland though our local guide reported that as the soil fertility is low, they do not foresee further encroachment. During our stay in Mabote, local people were harvesting several wild fruits from the woodland including *Manilkara mochisia*, *Landolphia kirkii* and *Berchemia discolor*.

The *Androstachys* dry forest patch at Maloka Ule covers about 20 km² (estimated from 2013 satellite imagery). This forest has low botanical diversity but forms a distinct evergreen forest habitat, supporting populations of birds and mammals that eat the fruits. The forest is under threat from both timber extraction and clearance for agriculture encroaching from all sides. *Androstachys* seedlings and regeneration were not seen in cleared areas at the forest edge.



Figure 8: *Androstachys* dry forest at Maloka Ule in Mabote district (left). Jossias Zandamela presses herbarium specimens in *Androstachys* forest with the help of IIAM driver Bernardo Melecuane. Photos J. Osborne

At Matsundzuene the *Androstachys* forest forms a conspicuous pattern of dark green fragments on satellite imagery. However, the extent to which these fragments were joined in the recent past is not clear (Google Earth historical imagery goes back to 2011). The *Androstachys* forest in Mabote district differs from that in Panda district, where the *Androstachys* is mixed with *Guiboutia conjugata* and includes some different species in the understorey. In the areas that we investigated in between the forest fragments we found secondary miombo woodland with abundant *Baphia massaiensis* subsp. *obovata*, a characteristic pioneer of disturbed sandy areas and as in Maloka Ule, *Androstachys* seedlings and regeneration were not seen. To the east of the *Androstachys* forest there is a band of mopane (*Colophospermum mopane*) woodland indicating an area of poorly drained soil.

Lagoa Banamana provides significant habitat diversity in Mabote district, supporting many interesting plant species, water fowl and wading birds. The lake water is reported to be slightly salty and not used by local people though cattle are grazed around the lake. There are different zones of vegetation radiating from the lake edge from semi-aquatics and seasonally flooded grassland to drier savannah grassland and miombo woodland. We recorded the endemic shrub *Commiphora schlechteri* in woodland bordering the lake though only one individual was seen here.



Figure 9: Near-endemic plants: white flowered *Chascanum angolense* subsp. *zambesiacum* at Maloka Ule (top left) and ripening fruits of *Commiphora schlechteri* in woodland bordering Lagoa Banamana (top right). Photos J. Osborne



Figure 10. Clayton Langa investigates the lake edge vegetation at Lagoa Banamana in Mabote district (bottom). Photo J. Osborne

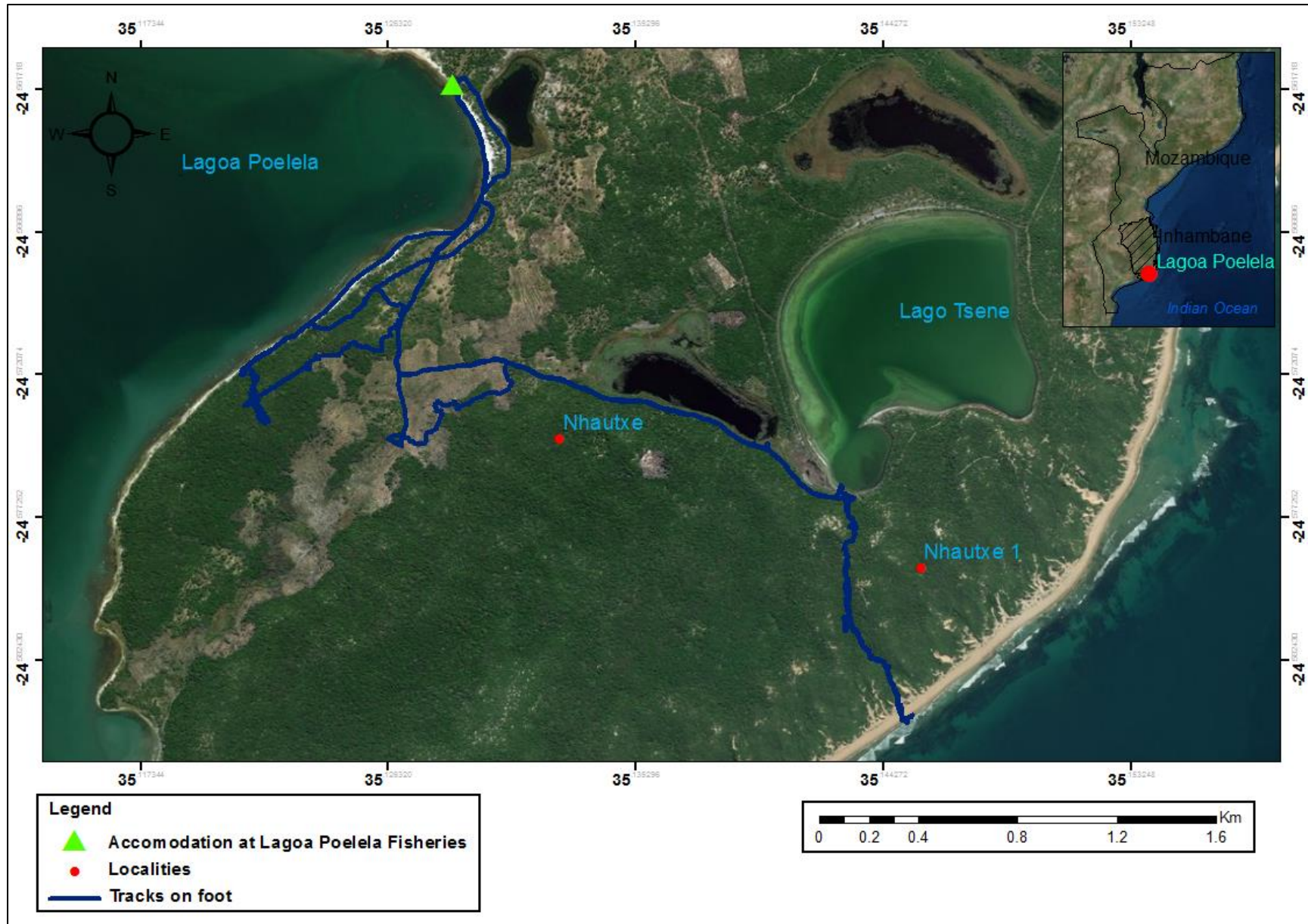


Figure 11: Botanical exploration at Lagoa Poelela in Inharrime District over three days of fieldwork. Locality names were provided by local guide Eusebio Chilosse.

3. Lagoa Poelela

Lagoa Poelela is situated near the coast in Inharrime district in the south of Inhambane Province. Many of the endemic and near-endemic plant taxa recorded in Inhambane Province occur in coastal habitats, which are also under intense pressure from settlement and agricultural expansion. This site was chosen for botanical exploration because there is a relatively undisturbed area of coastal vegetation between the lake and the ocean, visible from satellite imagery.

Fieldwork at Lagoa Poelela, 10-12 February

From the lodge at Lagoa Poelela Fisheries on the shore of the lake we investigated the lakeside vegetation, Lago Tsene Salt Lake vegetation and the coastal vegetation from the pioneer plants on the front dunes to the coastal dry forest, thicket and scrub on the old dune system. We collected 64 plant specimens for identification.

Preliminary observations:

The coastal vegetation on the older dunes is botanically diverse with areas of coastal dry forest and areas of dense and impenetrable coastal thicket. The forest canopy reaches ca 5 m tall including abundant *Mimusops caffra* and common *Suregada zanzibariensis* and *Drypetes natalensis*. Moving towards the middle of the dunes the vegetation becomes more thickety and lower in height including *Olex dissitiflora* and *Cassia abbreviata*. The tall, undulating dunes provide a range of micro-habitats from more exposed dune crests to more sheltered dune slacks where occasional cycads *Encephalartos ferox* subsp. *ferox* occur. Notably there is a small population of the endemic succulent *Euphorbia baylissii* growing with *Sansevieria* sp. under *Craibia zimmermanii* and *Afzelia quanzensis* on the dune slopes. On the foredunes pioneer shrubs include *Eugenia capensis* subsp. *capensis* and near-endemic *Diospyros rotundifolia*.



Figure 12: A burned area of coastal vegetation at Nhautxe 1 is cleared for machamba agriculture.

There is a high level of threat to this coastal vegetation from clearance for machamba agriculture, particularly towards the back of the dune system though we also recorded a burned and partially cleared patch towards the front of the dunes. Secondary coastal vegetation with shrubs and cashew trees indicates areas that were cleared in the past and are now abandoned. *Salacia kraussii* is abundant in the secondary vegetation and the near-endemic, small, yellow-flowered shrub *Chrysocoma mozambicensis* was also recorded here.

Along the shore of Lagoa Poelela, *Mimosops caffra* is dominant in the forest edge growing with *Hyphaene coriacea*, *Hilsenbergia petiolaris* and the endemic *Commiphora schlechteri*. *Phragmites australis* grows in the water at the lake edge with *Typha domingensis* and diverse rushes and sedges. There are narrow zones of moist and drier sand vegetation between the lake edge rushes and sedges and the forest edge.

Between Lagoa Poelela and the ocean, Lago Tsene is a small salt lake with a different aquatic and lakeside vegetation to Lagoa Poelela. The arrowgrass *Triglochin striata* grows in the water's edge with *Schoenoplectus* sp. and cattle are grazed in the grassland around the lake. Coastal scrub vegetation near the lake edge includes the endemic shrub *Elaeodendron fruticosum* with near-endemics *Diospyros rotundifolia* and *Gymnosporia arenicola*.

In this season (February) many edible wild fruits are harvested from the coastal vegetation. Fruits of *Mimosops caffra*, *Phoenix reclinata*, *Salacia kraussii* were abundant during the fieldwork and the near-endemic *Diospyros rotundifolia* fruits, common locally, were reported by our guide to be edible when ripe.



Figure 13: Jossias Zandamela and Castigo Datizua collect a specimen of endemic shrub *Elaeodendron fruticosum* in coastal scrub vegetation at Lagoa Poelela (left). Another endemic, *Euphorbia baylissii* grows in the dry forest on the dune slopes (right). Photos J. Osborne



Figure 14: Vegetation at Lago Tsene salt lake. Photo J. Osborne

Next steps:

The plant specimens will be identified by specialists at Kew and a full list of identifications appended to this report. The specimens will be incorporated into herbarium collections at the National Herbarium of Mozambique (LMA) and the Herbarium at the Royal Botanic Gardens, Kew (K). As many of the collections were not identified in the field, it is quite likely that new records for the province and for endemic and threatened taxa may be found. Plant records for rare and endemic species and threats information for the areas surveyed will contribute to upcoming plant Red List assessments and Tropical Important Plant Areas assessments. Working with IIAM, the field data and images will be used for policy briefs, posters and factsheets to provide management recommendations and to raise awareness of the plant biodiversity value of these sites.

ITINERARY

25-26 Jan: Preparing and packing equipment, food and supplies for Inhambane field expedition.

27 Jan: Drive from Maputo to Inharrime. Overnight stay at Jolly Roger Hotel.

28 Jan: Visit to the District Offices in Panda to register our fieldwork plans, meeting with the Administradora Distrital: Laurina José Titoce and the Chefe do Reparação e Gestão Ambiental: Antonio Feijão Mugwambe. Meeting with the Chefe do Localidade: João Dezanove. Permission for fieldwork and fieldcamp site in the area to the south-west of Panda agreed with the Régulo, João Pande and the Second Régulo, Fernando Macuacua. Set up field camp. Meeting with local guide, Augusto Samson Macuacua and cook Gastina [Magdalena] Augusto Macuacua.

29 Jan – 2 Feb: Five days of fieldwork in Panda District including botanical survey of *Androstachys* dry forest (*Androstachys johnsonii*), *Syzygium cordatum* ground water forest, miombo woodland (*Brachystegia spiciformis*), savannah and grassland vegetation, recording threats and levels of disturbance.

- 29 Jan: Chihuwane in Chivalo Localidade
- 30 Jan: Mawayela Localidade, working with second local guide Almeida Neves
- 31 Jan: Basquete and Nhambalapale
- 1 Feb: Chichococha
- 2 Feb: Mbachavane in Mawayela Localidade

3 Feb: Packed up field camp. Drive to Mabote. Overnight stay at 'Complexo A Família' hotel.

4 Feb: (National Holiday - Dia dos Heróis Moçambicanos) Meeting at our hotel with Sr Hilário from SDAE (Serviço Distrital de Actividades Económicas) in Mabote and Sr Osvaldo from SDPI (Serviço Distrital de Planeamento e Infra-Estrutura – responsible for forestry within the district). Meetings with Augusto Nhanice, Chefe do Localidade for Mabote, Sr Muthuque, Chefe de Comunidade and Carlos Sebastião Chissingue, Primeiro Secretario de Partido. Set up field camp at Maloka Ule to the west of Mabote.

5 Feb: Meeting with local guide Nelson Muthuque and cook Delsa Matsinhe. Visit to SDPI to register our fieldwork, meeting with Sr Osvaldo. Fieldwork in Maloka Ule including botanical survey of miombo woodland (*Brachystegia torrei*) and *Androstachys* dry forest (*Androstachys johnsonii*), recording threats and levels of disturbance.

6 Feb: Traditional ceremony with elders from the local community (10 people). Fieldwork in Maloka Ule continued.

7 Feb: Fieldwork at Lagoa Banamana including botanical survey of lake-edge vegetation, grassland and woodland, recording threats and levels of disturbance.

8 Feb: Fieldwork at Matsundzuene (Xinguengue) to the north-west of Lagoa Banamana including survey of *Androstachys* dry forest (*Androstachys johnsonii*), secondary woodland and mopane woodland (*Colophospermum mopane*).

9 Feb: Drive from Mabote to Lagoa Poelela. Meeting with Arthur and Jenni de la Mare who hosted the field team for four nights at Lagoa Poelela Fisheries.

10-12 Feb: Fieldwork at Lagoa Poelela including botanical survey of lake edge vegetation, coastal forest and thicket on sand dunes and secondary coastal vegetation.

11 Feb: Meeting with Director João Domingos Fernandes, Ermidio Manuel and Armino Pedro Massique at SDPI in Inharrime. Meeting with local guide Eusebio Chilosse, Chefe da Zona 1 do Sihane.

13 Feb: Drive from Lagoa Poelela to Maputo.



Figure 15: Native palm Hyphaene coriacea is a valued natural resource for making matting and baskets in Inhambane Province. When Datizua's sun hat goes missing, Jossias makes one in just a few minutes. Photos J. Osborne

The fieldwork was funded through the Mozambique Tropical Important Plant Areas (TIPAs) program with logistical support and vehicles provided by IIAM in Maputo. We are grateful to Jenni and Arthur De La Mare for hosting the field team at Lagoa Poelela Fisheries.