

INHACA
MARINE
BIOLOGY
RESEARCH
STATION
MOZAMBIQUE





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ABBREVIATIONS

Sida	Swedish International Development Cooperation Agency
UEM	Universidade Eduardo Mondlane
EBMI	Marine Biology Research Station (Estação de Biologia Marítima de Inhaca)

FOREWORD

I**NHACA MARINE BIOLOGY** Research Station (EBMI) extends a warm invitation to visit and explore magical Inhaca Island with its rich and almost unspoilt biodiversity, moderate temperatures and friendly welcoming community. The biodiversity is beyond all expectations and the wealth of dunes, lagoons, coral reefs, mangroves, rock shores and intertidal areas are a sight to behold. The white sandy beaches attract travellers from all over the world who set up camp under the thatched roofed huts or in improvised campsites. The abundance of tourism activities only adds to the natural ambience of peace and tranquillity felt by tourists and residents alike. Among the attractions are gems like Ponta Torres, Ilha dos Portugueses, Barreira Vermelha and the EBMI Museum, the guardian of paleontological artefacts and findings.

Inhaca Island has benefited greatly from the presence of the EBMI since the day it opened in 1951. This research facility has been upgraded several times with funding from various donor agencies and friends. Swedish support, in particular, has always been forthcoming. This booklet therefore covers the wealth of biodiversity on the island as well as the research supported by Sweden.

The island's natural environment and perfect conditions have attracted students of all origins on study missions to the EBMI to carry out research and data collection, the results of which have influenced policies and decision-making in a host of countries around the world.

RESEARCHERS FROM THE five continents have published works about the wealth of biodiversity from the southernmost reefs in the world, the shallow and sometimes deep tidal pools, the diversified mangroves, the high and low sand dunes, rocky shores, seagrass meadows, and many other subjects. The 70 years of research on Inhaca has given us a wonderful insight into the behaviour of the endemic prawns. The discovery of new species has also contributed

significantly, not only in terms of the knowledge obtained, but also in the management of the fisheries in Maputo Bay. This is a unique bay where the vast mangroves protect the shrimp population, a resource of the utmost economic importance and value for the country's economy.

The presence of shrimps may be influenced by the chemical composition of the water around the island. For example the presence of pollutants that have inspired a number of research activities in the area, to either prevent and/or alert to future damage to the sea water. The crustacean, a vital resource for the mainly fishing community of the island, will benefit from these research activities into their sustainable use by the islanders. However, care should be taken not to spoil the natural richness of Inhaca Island, protected by the forest growing along the shores of the Indian Ocean that surrounds the Island. This forest and these shores are vulnerable to the impact of climate change, which has put protection and the need for adequate risk and disaster management research on top of the agenda. Inhaca Island offers the perfect micro environment for studying a broad range of ecosystems.

SEVENTY YEARS OF research conducted on Inhaca has not only produced scientific findings and publications, it has also improved the wellbeing and living standards of the islanders. From jobs to training in agricultural and fishing practices, EBMI has paved the way for the present and the future legacy of this magical island, a tourism and research destination that is up there with the best.

We think that this booklet from the Inhaca Marine Biology Research Station is also up there with the best and hope it provides inspiration for all young researchers.

Maputo, June 15, 2016

Orlando Quilambo
Rector, Universidade Eduardo Mondlane

RESUMO

A ILHA DE INHACA localiza-se na zona de transição do clima tropical ao clima sub-tropical quente e na fronteira entre a Baía rasa de Maputo e as águas oceânicas abertas do Índico. Isto cria uma rica diversidade tanto para os ecossistemas terrestres e marinhos, descritos como um microcosmo ambiental. Os mangais espalham-se ao longo das baías abrigadas das costas do sul e do norte. A erva marinha cobre cerca de 50% das áreas intertidais e a diversidade é muito elevada para uma área tão pequena. As margens localizadas a Este são dominadas por enormes dunas de areia, algumas das quais com 80 metros de altura, que protegem a Baía de Maputo do mar aberto. Ao largo da costa localiza-se parte dos recifes de coral do extremo mais ao sul do mundo.

A Ilha de Inhaca e a Estação de Biologia Marítima de Inhaca (EBMI) têm funcionado como o berço da pesquisa marinha moderna em Moçambique. A EBMI, que pertence à Universidade Eduardo Mondlane, foi criada em 1951. Desde então, os pesquisadores têm trabalhado na ilha, fazendo descobertas, recolhendo amostras e dados e a partilhar o seu conhecimento e experiências. Em 1983 a Suécia iniciou uma cooperação de longo prazo na área da pesquisa e que continua até ao presente momento.

Nos anos 90, a Suécia começou a apoiar na formação de pós-graduação para estudantes de biologia marinha, tendo obtido graus de Mestre e Doutor neste país, sendo que a EBMI foi o centro da maior parte da respectiva pesquisa. De igual modo, a Suécia apoiou estudantes de doutoramento que realizaram o seu trabalho de campo na Inhaca e houve afluência de cientistas marinhos para a estação, tanto na condição de docentes bem como na situação de parceiros de cooperação. A União Europeia começou a financiar projectos de cooperação internacional e cientistas da região ocidental do Oceano Índico têm realizado seminários e workshops na Inhaca. No presente momento, a EBMI é um centro de pesquisa consolidado e de reputação internacional.

Actualmente a EBMI está a dar um passo importante em direcção a uma nova era. Com apoio da Suécia, a estação está apetrechada de equipamento moderno e com hospedagem. A nova estratégia de pesquisa estabelece uma forte ligação entre a biodiversidade local e as mudanças globais que afectam a vida marinha em todo o mundo. Encoraja-se muito a realização de parcerias com instituições nacionais, regionais e internacionais, como forma de trocar ideias e experiências.

A ilha é visitada por pesquisadores provenientes de África, Europa e EUA, que participam em projectos de pesquisa multi-nacionais, programas de Mestrado e doutoramento, workshops, cursos e viagem de campo. Ao longo dos anos, esses pesquisadores têm estado envolvidos em pesquisas de grande qualidade não apenas na área de biologia marinha mas também em matérias tais como flora e fauna, geologia, oceanografia e sócio-economia. A maior parte dos pesquisadores que vão à Inhaca tendem a regressar mais vezes, o que contribui para o desenvolvimento da capacidade de pesquisa em Moçambique e na África Oriental.

A EBMI co-existe com 5,200 pessoas que vivem na ilha. Para que o único ambiente da Inhaca e a sua volta possam sobreviver, o uso dos recursos naturais deve ser sustentável. Simultaneamente, os ilhéus necessitam de meios de sobrevivência para melhorarem as suas vidas. De acordo com os seus depoimentos, os recursos marinhos estão cada vez mais escassos.

A criação de emprego é tão importante quanto a consciencialização ambiental. Juntos podemos preservar o ambiente único e simultaneamente desenvolver uma capacidade de pesquisa para responder aos desafios globais. A Estação de Biologia Marítima de Inhaca está preparada para consolidar a sua posição como um centro marinho vibrante na Região Oriental de África.



A DIFFERENT WORLD

WITH ITS HIGH dunes, shallow lagoons where dolphins swim and a mangal ecosystem where small fish and crabs find a safe harbour, Inhaca is an incredible place. It only takes a couple of hours by boat from the Mozambican capital of Maputo to get here yet it feels like a totally different world with its slower pace of life and its wildlife sanctuary. Twenty-eight per cent of the island is a protected nature reserve.

Inhaca forms a barrier between the Indian Ocean and Maputo Bay that protects the marine life in the shallow waters. Situated in a cross-zone between tropical and temperate climate zones, Inhaca is a haven for unique marine life.

The Marine Biology Research Station (known by its acronym in Portuguese EBMI) is part of the Universidade Eduardo Mondlane (UEM) and is managed by the Faculty of Sciences. It has been a



Inhaca under water. Research assistant Abdul Ada and local entrepreneur Miguel Bruno diving the reef.

popular destination for Mozambican and international researchers since the 1930s.

Today, the EBMI is taking steps into a vital new era. A new research strategy is creating a strong linkage between local biodiversity and the global changes that are impacting marine life the world over. Partnerships with international, regional and national institutions are strongly encouraged in order to exchange ideas, knowledge and experience, and make the newly upgraded laboratories and lodgings available to researchers from all over the world.

With sustainability in focus the EBMI research strategy is also contributing to improved living conditions for the people of Inhaca. Just like the mangroves that thrive on the island, we have strong local roots as well as vital links with global challenges.

Welcome to Inhaca!

RESEARCH COOPERATION PUT INTO PRACTICE

THE RESEARCH TEAM stands knee-deep in water carrying iPads, tubes and testing equipment. Their mission: to take water samples to determine how increased ocean acidification is affecting marine life in the shallow waters around Inhaca. The researchers come from a variety of African countries and academic backgrounds. Now they are meeting for the first time here at the EBMI to take part in an early career course on ocean acidification and marine biology. The course is one of many to have taken place on Inhaca over the years but is unique in being the first one to use the new laboratory facilities.

SAM DUPONT IS a researcher and assistant professor at the University of Gothenburg in Sweden. He is also the coordinator of the course. When he began researching into ocean acidification in 2007 there were relatively few scientists working in that field. But today, with climate change high on the global agenda, that has all changed. Despite there being a lack of data from Africa in general, the experiments around Inhaca confirm the hypothesis that ocean acidification has a very negative impact on marine life once it crosses a certain threshold.





From left to right: Morgana Taglioarolo (South Africa/Italy), Kika Ehiedu Philomena (Nigeria), Ilario Lucas Timba (Mozambique), Pili Kassim Kinguenge (Kenya).

“We’ve been running this experiment for only a few days and I’m amazed by the data collected so far. Often these experiments fail, but here we’ve definitely produced something of value. The change in the oceans is happening very quickly, and through these experiments we can see the negative impact. This is why it is so important to have data from all over the world, including Africa, as we cannot extrapolate data from Sweden in order to understand what is happening in Africa,” says Sam Dupont.

ONE GOAL FOR the course is to form a network and foster cooperation between the participants from the various African countries. The contacts made could serve as a springboard for future collaboration, giving people a helping hand to start experiments and programmes in their own countries. One of the researchers involved is Chibo Chikwilwa from Namibia:

“This is the first time I’m involved in South-South cooperation and I was actually very impressed with the course, especially since it gave us practical experience. I want to be able to publish my work to bring it level with international standards. To do so requires focus on quality control and here I have learned a great deal.”

Pili Kassim Kinguenge recently completed her MSc and is currently working as an assistant researcher in her home country Kenya.

“When I came here I knew very little about ocean acidification, so for me many things were completely new. I want to incorporate my knowledge in chemistry with my new awareness of ocean acidification when I continue my research at home. I enjoy being part of the pioneering team in Africa.”

KIKA EHIEDU PHILOMENA from Nigeria was also very satisfied with the course curriculum.

“I’ve learned a lot about how to set up experiments in the right way at a low cost. This course also highlights the need for collaboration and networking to share the knowledge between us and between the universities.”

Another objective has been to include young Mozambican researchers working at the EBMI in the course. In the future, they will collect their own data, but also help visiting researchers who conduct studies at the station.

“This way we create a win-win situation that will lead to increased



Testing water samples for ocean acidification. Under the microscope, tiny sea urchins under stress.

research capacity in Mozambique while letting international researchers benefit from the facilities by being able to collect some useful data,” adds Sam Dupont.

Ilario Lucas Timba is one of the research assistants at the station who took part in the course. He was born on the island and has a bachelor’s degree in oceanography. Ilario is now back on Inhaca and plans to take a MSc in the future.

“This is the first time I’ve taken part in a research cooperation of this kind and it’s a very good experience. My father is a farmer and I’m the first person from my family to go to university. Like myself, many people living on Inhaca have daily contact with the ocean, they see changes but don’t know the reasons for them. I can be a bridge between the researchers and the local people.”

A MICROCOSM OF SOUTHERN AFRICA

An aerial photograph of a coastal region in Southern Africa. The image shows a wide river delta with intricate channels and sandbars, surrounded by lush green mangroves. In the foreground, a large, forested island is visible, partially enclosed by a narrow strip of sand. The background features rolling hills and a clear blue sky with some light clouds.

2 SPECIES OF WHALES

2 SPECIES OF DOLPHINS

490 FISH SPECIES

SAND STONE

SAND DUNES

6 MANGROVE SPECIES

ILHA DOS PORTUGUESES

An aerial photograph of Inhaca Island, showing its coastline, vegetation, and surrounding waters. Several white callout boxes with teal text are overlaid on the image, listing various species and the research station. A yellow circle is also present on the right side of the island.

299 BIRD SPECIES

SHRIMPS AND PRAWNS

244 SEAWEED SPECIES

8 SEAGRASS SPECIES

71 SPECIES OF CORAL

INHACA MARINE BIOLOGY
RESEARCH STATION

DUGONGS

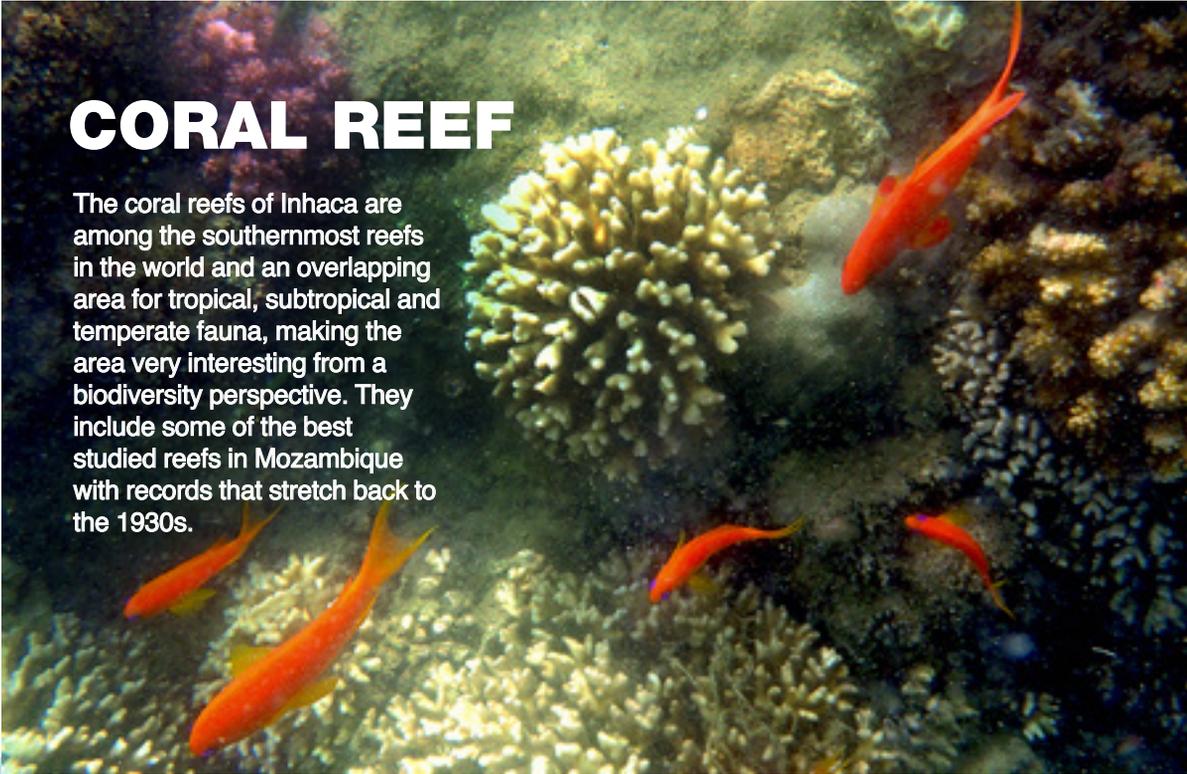
5 SPECIES OF TURTLES

SEAHORSES

EXCEPTIONAL BIODIVERSITY RIGHT ON YOUR DOORSTEP

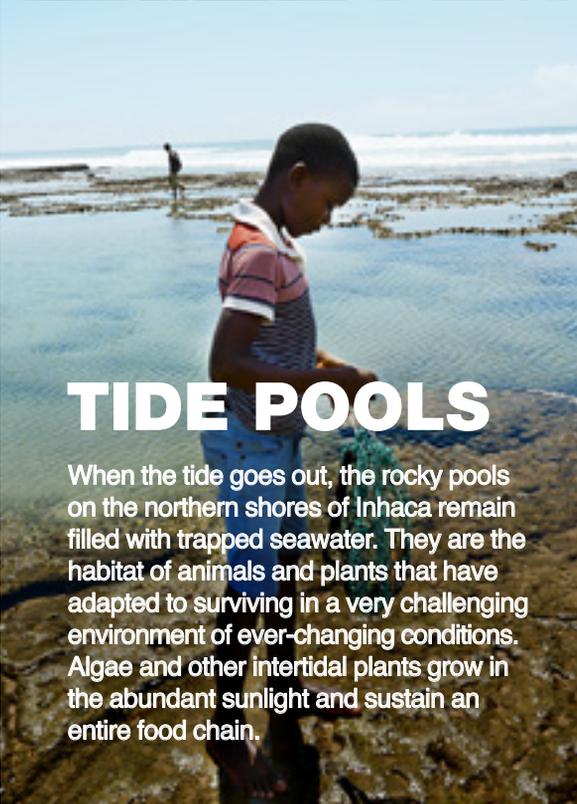
Inhaca Island offers exceptional environmental conditions for conducting research. Its location in the transition zone from tropical to warm subtropical climate and on the border between shallow Maputo Bay and the Indian Ocean creates a rich diversity of both terrestrial and marine ecosystems. The eastern coastline faces the ocean and is characterised by waves, strong currents and steep slopes while the western coastline is more protected.

Twenty-eight per cent of the island is protected by nature reserves. The 42 square kilometre island is transformed at low tide when vast intertidal areas are exposed. The diverse ecosystems on Inhaca represent most coastal Mozambican habitats in microcosm, making the island an excellent natural laboratory for a wide spectrum of research on the doorstep of Maputo and UEM.



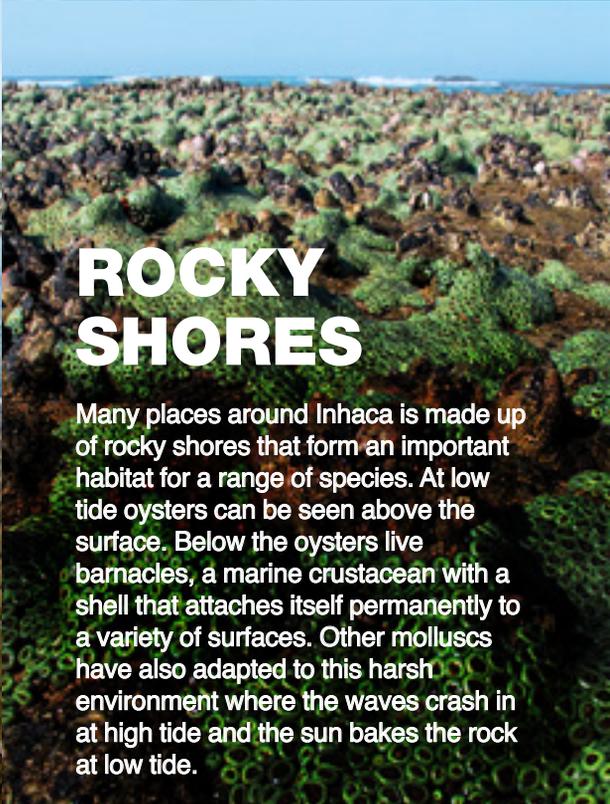
CORAL REEF

The coral reefs of Inhaca are among the southernmost reefs in the world and an overlapping area for tropical, subtropical and temperate fauna, making the area very interesting from a biodiversity perspective. They include some of the best studied reefs in Mozambique with records that stretch back to the 1930s.



TIDE POOLS

When the tide goes out, the rocky pools on the northern shores of Inhaca remain filled with trapped seawater. They are the habitat of animals and plants that have adapted to surviving in a very challenging environment of ever-changing conditions. Algae and other intertidal plants grow in the abundant sunlight and sustain an entire food chain.



ROCKY SHORES

Many places around Inhaca is made up of rocky shores that form an important habitat for a range of species. At low tide oysters can be seen above the surface. Below the oysters live barnacles, a marine crustacean with a shell that attaches itself permanently to a variety of surfaces. Other molluscs have also adapted to this harsh environment where the waves crash in at high tide and the sun bakes the rock at low tide.



MANGAL

Mangrove trees stretch along the sheltered bays on the southern and northern coasts of Inhaca Island, with some smaller groves on the west coast. The different root systems of the various trees found on Inhaca trap sediment to varying degrees, thereby providing the perfect habitat for a vast array of animal species.



SEAGRASS MEADOWS

Seagrass covers up to 50 per cent of the intertidal areas of Inhaca. The diversity is extremely high for such a small area, with eight different species identified in just one hectare. Many commercial fish and crustaceans grow to juvenile stages here before migrating to other areas. The meadows are important for the households of the island. At low tide, you see women with their buckets collecting mussels, sea urchins, crabs and other species.

SAND DUNES PROTECTING MAPUTO BAY

The eastern shores of Inhaca are dominated by large sand dunes. Some of them are up to 80 metres high and form an important barrier that protects Maputo Bay from the open sea. The forests covering the dune ridges protect the beach from erosion. The dunes provide nesting sites for birds and the endangered loggerhead (*Caretta caretta*) and leatherback (*Dermochelys coriacea*) turtles.







”Working with the community is fundamental for engaging them in the management of resources, while also using their traditional knowledge.”

Adriano Macia

At low tide, women collect crabs and oysters on the vast intertidal flats.

70 YEARS OF RESEARCH AT INHACA

NHACA ISLAND AND the EBMI is the cradle of modern marine research in Mozambique and has acquired an international reputation. The station was inaugurated in 1951 in collaboration with the South African University of Witwatersrand. Scientists and students had made frequent excursions to Inhaca since the 1930s and the establishment of a laboratory and dormitories soon increased the number of visits.

During Mozambique's struggle for independence and the ensuing civil war, the station was never abandoned. But while the buildings were looked after, there were no new investments and the laboratory equipment slowly deteriorated.

In 1983 long-term Swedish research cooperation was initiated that has continued until the present day. In 1985 it again became possible to work at EBMI, despite the civil war not ending until 1992. One of the key figures of the initial Swedish support was Dr Lars Hernroth, the then director of the Kristineberg Marine Research Station located on the Swedish West Coast. The main focus of the support was the rehabilitation of the EBMI. Basic infrastructure such as water, sanitation and power was improved, new laboratory facilities and field equipment were brought to the island and running seawater was installed in the laboratory.

Ten years later the upgraded research facilities were hosting numerous field courses, research projects and national and international scientists. As well as the support from the main cooperation partner Sweden, additional resources were coming from the Netherlands and Norway.

In the 1990s Sweden began supporting post-graduate studies to

enable Mozambican marine biology students to attain MSc and PhD degrees in Sweden. EBMI was the centre of most of their research. Sweden also supported Swedish PhD students who did their fieldwork on Inhaca and there was an influx of international marine scientists to the station, acting both as teachers and research partners. The European Union had started to finance international research projects, and marine scientists from the Western Indian Ocean region met on Inhaca for seminars and workshops.

Over the years scientists have conducted cutting-edge research, not only in the field of marine biology but also on subjects such as terrestrial flora and fauna, geology, oceanography and socio-economy. Some of the highlights of this research can be found in the book *The Maputo Bay Ecosystem* from 2014.¹ Decades of research have also resulted in a biological museum with an extensive collection of specimens from Inhaca.

EBMI is now reaching a new milestone in its history as the finishing touches are being made to a renovated and upgraded laboratory and lodgings. The station is ready to become a centre of vibrant marine research in Mozambique and the region.



The main building of the EBMI on Inhaca Island.

¹ *The Maputo Bay Ecosystem*, Editors Salomão Bandeira and José Paula, WIOMSA, 2014.

THE EBMI PREMISES

EBM I GIVES RESEARCHERS the opportunity to combine field and laboratory work. The research vessel has space for six people to work safely on board and is fitted with a boom crane to deploy light equipment at sea. Researchers will be able to use the equipment to collect water, sediment and biological samples and to take the materials straight back to the laboratory where they can study them using a wide range of equipment, from microscopes to analytical instruments. The laboratory is equipped with running seawater and facilities for live animal experimentation. The premises also have comfortable lodgings for both staff and students.

Strategic research areas²

- Biodiversity and conservation
- Effect of global change on marine and coastal ecosystems
- Human interaction and natural resources with a focus on sustainability

Mission for EBMI

- Conduct investigations in the marine ecosystems and the coastal areas
- Provide service to academic courses
- Protect the nature reserve
- Promote environmental education on the island
- Manage the nature reserve, infrastructure, human and financial resources of the EBMI

² Plano Estratégico de Investigação da Estação de Biologia Marítima da Inhaca (EBMI) 2016–2020.



The new laboratory.



The new lodging is ready, welcoming researchers from around the world.



The new boat of the EBMI.



Decades of research have resulted in a biological museum with an extensive collection of specimens.

Dry laboratory
Wet laboratory

Storage

Accomodation 1

Accomodation 2

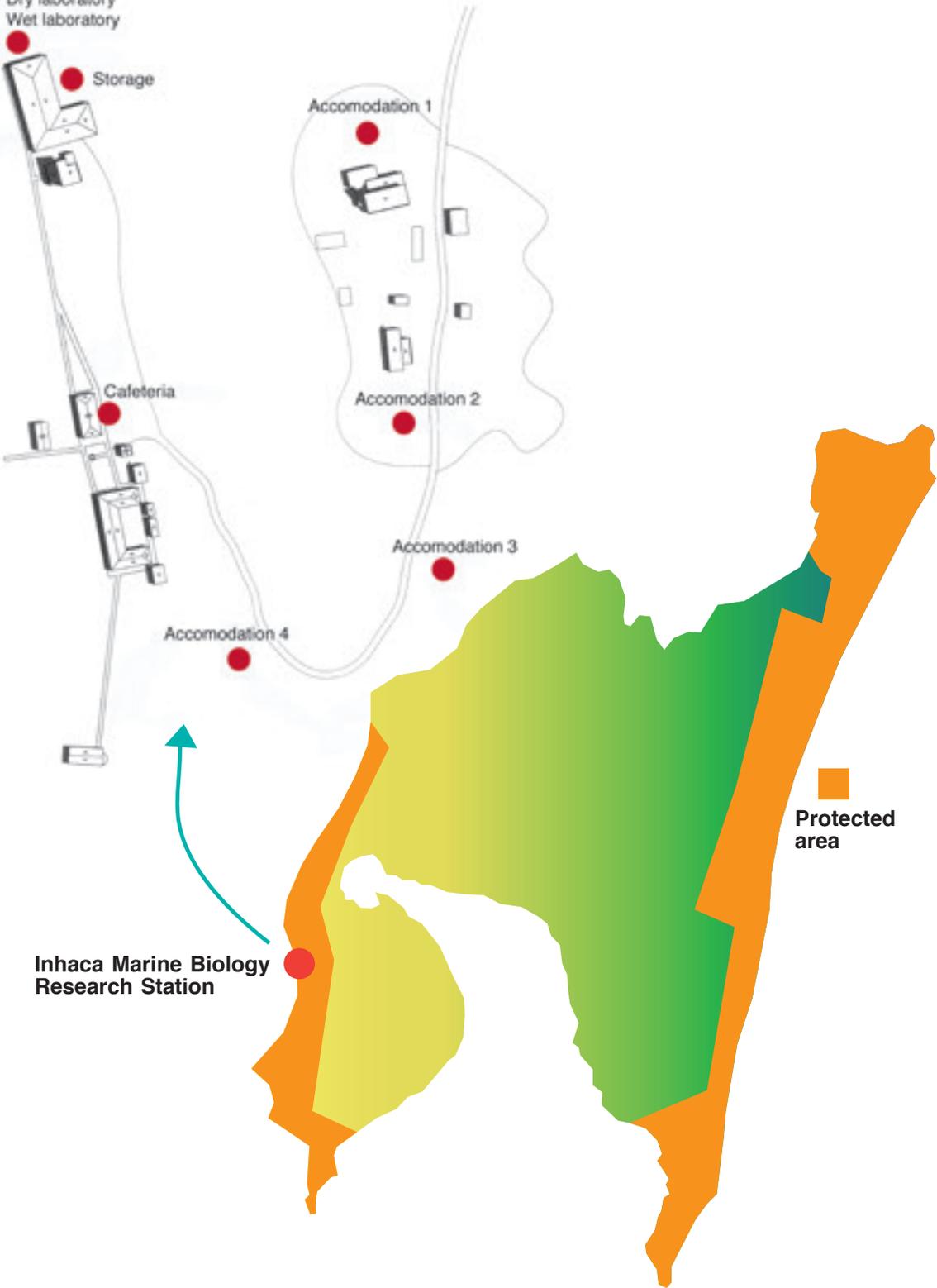
Accomodation 3

Accomodation 4

Cafeteria

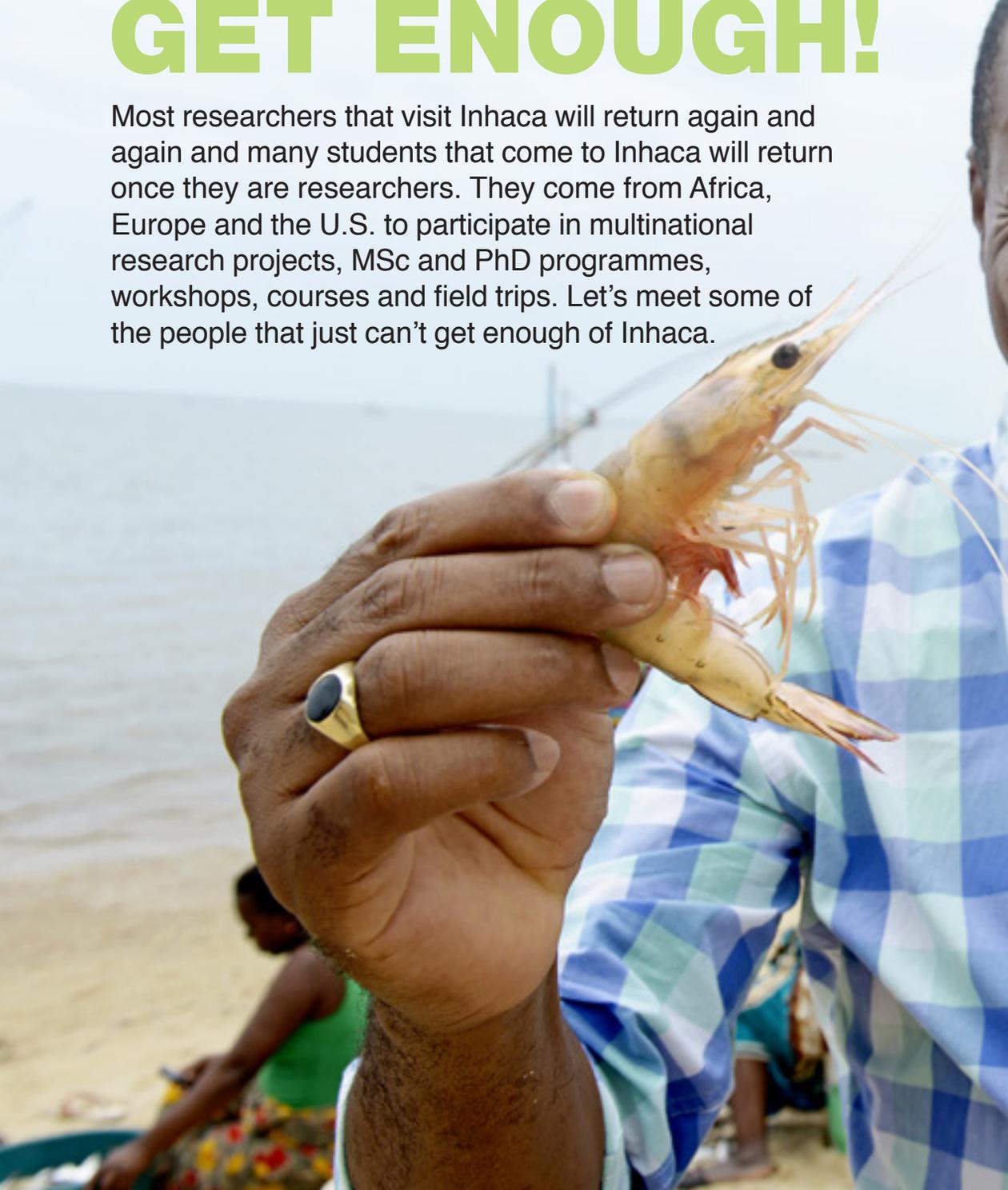
Inhaca Marine Biology
Research Station

Protected
area



JUST CAN'T GET ENOUGH!

Most researchers that visit Inhaca will return again and again and many students that come to Inhaca will return once they are researchers. They come from Africa, Europe and the U.S. to participate in multinational research projects, MSc and PhD programmes, workshops, courses and field trips. Let's meet some of the people that just can't get enough of Inhaca.



Researcher Adriano Macia with some *Penaeus indicus* (white shrimp).





Adriano Macia buying shrimp from a vendor on the beach.

ADRIANO MACIA:

CONTRIBUTING TO SOCIETY

ONLY A HANDFUL of prawn fishers are landing their catch at Maputo's Bairro dos Pescadores this afternoon. The women sitting in the sand have bucketsful of sardines to sell at the nearby market, but none of them seem to have any prawns. Maybe the weather has been bad, maybe it is still too early. Suddenly Adriano Macia stops one of them to take a closer look at her catch. It turns out to be white prawn, the most captured species in Maputo Bay and also part of the *penaeid* prawn family, for decades the focus of Adriano's research.

Thirty years have passed since Adriano was a first year biology student. He became passionate about marine life during a visit to the research station at Inhaca.

”Inhaca is really a microcosm. Here we work in a subtropical area, with tropical conditions and a variety of coastal ecosystems.”

“The frequent visits to the EBMI and the interaction with some of the visiting marine scientists inspired me. Once I selected prawn as my BSc graduation

subject, I fell in love. The prawn is very important in Mozambique and I felt that I could make a significant contribution to society and influence the management of prawn fisheries,” he explains.

Adriano’s main research subject, the *penaeid* prawn family, is the most important commercial prawn in Mozambique. He has showed that the catches of the artisanal prawn fishery in Maputo Bay are almost as big as the semi industrial, and he has also established why and how juvenile prawns use the mangroves and the adjacent coastal areas for both protection and as a food source. Adriano’s current work revolves around mangroves and other potential nursery areas in Maputo Bay, pinpointing the areas that need protection.

THE MANGROVES ON Inhaca Island are one of the few mangrove forests in the bay area not affected by direct fresh water. They have been important sites for his research. By comparing Inhaca with the Komati River area in northern Maputo Bay, Adriano has shown the correlation between good quality mangrove forests and the abundance of some of the juvenile prawns.

As for the benefits of conducting research at the Inhaca research station, Adriano says the importance of accessibility shouldn’t be underestimated. He recalls the logistical problems he faced when collecting samples from the Maputo estuary on the mainland for comparative purposes. Apart from the extra expenses for boat and fuel, there were risks involved in camping out along the rivers where crocodiles might be lurking. That made Inhaca an accessible and low cost starting point for his research, which he then expanded to other areas.

“Inhaca is really a microcosm. Here we work in a subtropical area, with tropical conditions and a variety of coastal ecosystems including coral reefs, seagrass areas, mangroves, muddy beaches, intertidal areas, rocky shores. And this is just in the water, you also have the terrestrial fauna and the local community on the island.”

The recent decline in the prawn population means that many questions remain about the population dynamics of these crustaceans. Apart from the increased fishing and use of inappropriate fishing methods, contributing factors that still need to be studied include climate change and related events such as ocean acidification and changing temperatures, as well as the presence of alien, invasive prawn species.

Thirty years after Inhaca first sparked his passion for marine biology, Adriano is now back at the island working on a new project with his assistant. They are doing an oyster re-population experiment to see whether the local communities, with assistance from the station, would be able to cultivate their own oysters in the island's seagrass areas or in captivity.

“Working with the community is fundamental for engaging them in the management of resources while utilising their traditional knowledge. The reason we study oysters is that we know that people depend on them for their livelihood.”

ADRIANO MACIA

Associate Professor at the Department of Biological Sciences, University Eduardo Mondlane

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This is the place where Matz Berggren has found several previously unknown species. And there are more to be found.

MATZ BERGGREN:

FINDING NEW SPECIES OF SHRIMP

STANDING IN THE bay, Matz Berggren takes a steady grip of the vacuum pump, he pulls hard and the pump fills with sand, water and – possibly – some tiny crustacean that has never been identified before. An hour later Matz is back at the research station, capturing the small details of crabs and shrimps with the macro lens of his camera. He points and explains why these tiny, non-descript animals are so important for the marine life.

For more than four decades, crustaceans and the research at the EBMI have been a part of Matz' life. He is a researcher but also a passionate disseminator, a person full of enthusiasm and knowledge ready to be shared. He points to one of the shrimps that he has just captured.

“They might be small and to most people they don’t look very significant, but if they disappear, that tells us that something dramatic has happened with the whole ecosystem and that’s why it’s so important to monitor them.”

In 1986 Matz Berggren began to work with the research programme in Mozambique. Together with Dr. Lars Hernroth, who was in charge of the programme, he became the contact person for EBMI. At the time the station had not been used for several years due to the Mozambican civil war, but now research was about to start again.

“That very first visit was an eye-opener for me. I understood how diverse and intricate the marine life is and this feeling is something that I have carried with me ever since. Because no matter how much you read about a subject, it’s never the same thing as experiencing it yourself.”

Since then Matz Berggren has been back on countless visits, bringing students and other researchers with him. In 1994 Matz wrote his PhD thesis based on his work on Inhaca comparing different shrimp habitats like Inhaca Island, Bahamas, Faroe Islands and the Gullmar Fjord in Sweden. While working on his thesis Matz found and named four previously unknown species, for example, the *Periclimenes nomadophila*, a shrimp that likes to hitch a ride with



MATZ BERGGREN

**Senior scientist at the Department of Marine Sciences,
University of Gothenburg**

Selected academic work

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Matz Berggren in his outdoor laboratory.

jellyfish. Matz believes that there are probably several more species waiting to be discovered around Inhaca.

“I found them in the bay right outside of the station. Once you start doing regular fieldwork there will most likely be new discoveries that help us explain the marine life.”

SINCE THE START of his research career, Matz has trained and worked together with several generations of Mozambican researchers, both on Inhaca and at the Sven Loven Marine Research Institute of Gothenburg University (the former Kristineberg Marine Research Station). He hopes that some of the young research assistants on Inhaca will follow in his footsteps and hopefully continue the investigations.

“Maputo Bay is a tropic enclave in a subtropical area and as such there are many unique species. Over the years I have found over 100 species of shrimps around Inhaca. Many of them are highly specialised and could be affected by small changes in the ecosystem. Studying them will enable us to measure how stable the ecosystem is and determine changes that could pose a threat to their survival.”

Matz emphasises that research should be used as a means to contribute to environmental sustainability while supporting the local economy. For example, if prawn trawlers learn more about the egg-laying habits of crabs, they can avoid fishing in some areas during certain periods and help the species grow, thus benefiting both the fishing industry and the environment in the long term.

Now that the rehabilitation of the station is complete, Matz can envisage an important future role for EBMI.

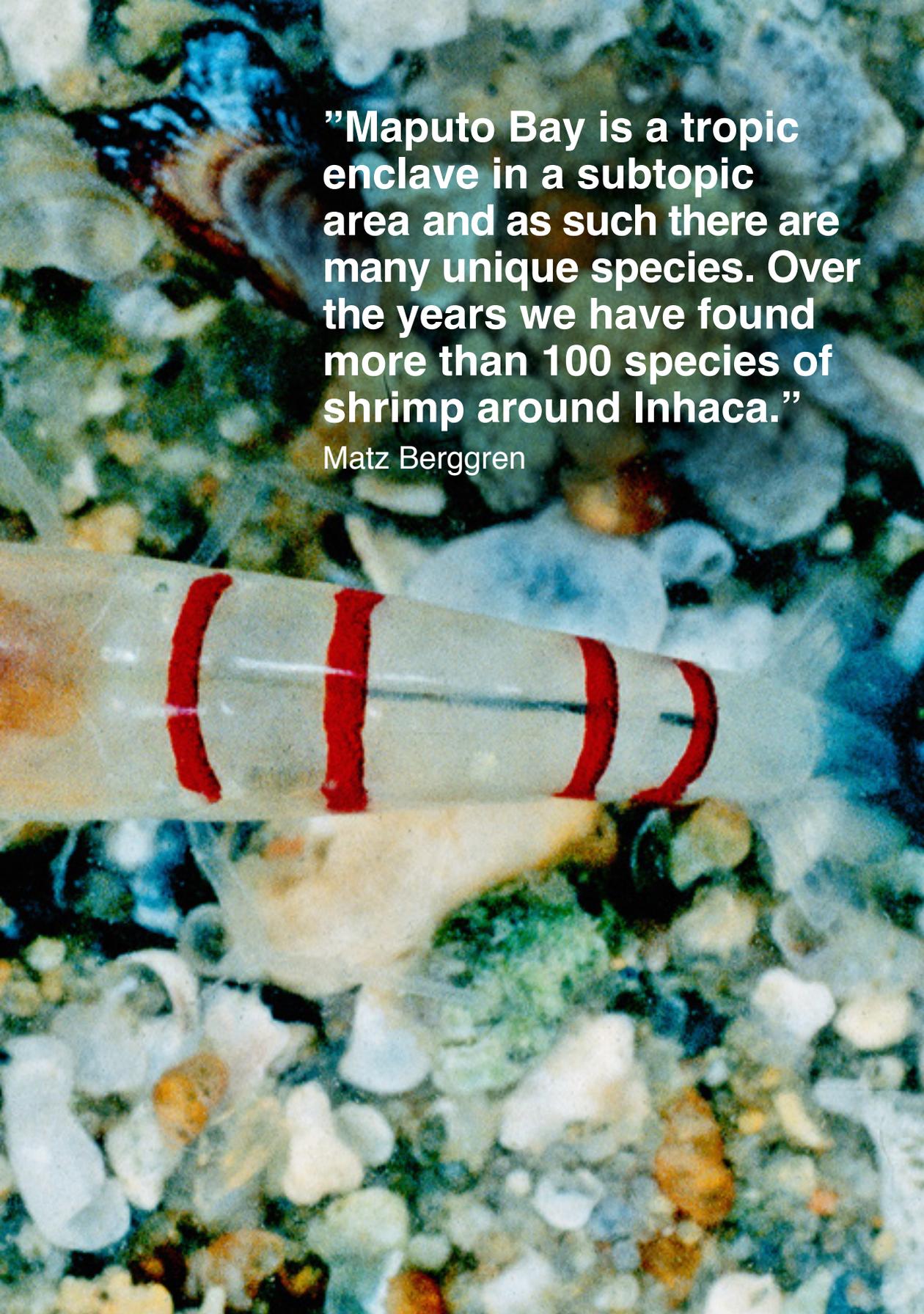
“EBMI could function as the base camp for studies in marine biology and a hub for research that could also take place in northern Mozambique where we have some of the world’s best protected coral reefs.”

Today, with oil and gas discovered along the northern Mozambican coast, Matz believes that marine research programmes are more meaningful than ever.

“When you see the potential riches in front of you it’s important to be aware of the natural habitats that could be destroyed and lost forever. The marine resources are of great importance for the people of Mozambique and must be sustained.”



A shrimp that Matz Berggren found and named *Athanopsis rubricinctata* (Berggren, 1991)



”Maputo Bay is a tropic enclave in a subtropic area and as such there are many unique species. Over the years we have found more than 100 species of shrimp around Inhaca.”

Matz Berggren



Salomão Bandeira at the mangrove forest in Gadzene on the outskirts of Maputo.

SALOMÃO BANDEIRA: **WITH A PASSION** **FOR SEAGRASSES**

THE ENTHUSIASM OF Salomão Bandeira is infectious as he steps out into the mangroves, holding up the branches and pointing out the different species growing along the beach on the outskirts of Maputo. The fair leaves of the white mangrove, the dark leaves of the Indian mangrove, the large leaves of the red mangrove and the distinctive round fruits of the cannonball mangrove. He is pleased as he points out some young trees repopulating the beach, estimating that they are just a couple of years old.

Salomão is a botanist and part of a small team specialised in mangrove at UEM. His research includes value chain analysis of the estuaries along the Mozambican coast to deduce how the mangrove

”I find that fascinating! I feel proud to be the first researcher on seagrasses in the country and one of the leading in the region.”

forest is used by the local population. He is also testing the carbon sequestration of mangroves – the mangrove ecosystems are famously

responsible for sequestering more than twice as much carbon as tropical and temperate forests. Mangroves are an important part of the Mozambican flora and the country ranks among the 15 countries with the largest mangrove forest coverage in the world.

“We have hundreds of kilometres of uninterrupted mangroves and around Maputo Bay there are nearly 18,000 hectares. Thanks to the mangroves the bay is the country’s second largest fishing ground for prawn.”

But the bulk of Salomão’s research has focused on seagrasses, another vital habitat in Mozambique that sustains communities that collect fish and invertebrates, and the bulk of the research has been carried out on Inhaca. His enthusiasm again becomes evident when he waxes lyrical over seagrasses, a plant that started its evolution in water, continued on land, and then readapted to life underwater. It is still one of few aquatic plants that reproduce through pollination.



Inhaca Island has one of the largest seagrass beds in southern Mozambique.

“I find that fascinating! I feel proud to be the first researcher on seagrasses in the country and one of the leading in the region.”

Being a pioneer in his field, Salomão did a lot of descriptive research at the beginning of his career and on Inhaca he discovered that the most common type of seagrass was actually a new species: a narrower form of the common *Thalassodendron*. He has also used his seagrass expertise to understand marine mammals like the endangered dugong. By following the animal’s feeding tracks in the seagrass meadows, he disproved the general theory that there was only one dugong left on the island.

“We saw many tracks in several different places. Now we think we have roughly ten of them around Inhaca and PhD students will study them by setting up cameras.”

Inhaca has one of the largest seagrass beds in southern Mozambique and Salomão is currently working on a new restoration technique for seagrass meadows damaged by the collection of clams. The pristine meadows of Inhaca can hopefully be used as donors for other parts of Maputo Bay. The island also has conservation areas for mangroves, which Salomão uses as control sites for comparisons with more damaged areas. As well as his own research, he visits the island regularly with his students where they learn the basics about seagrass and mangroves.

“More than half of our marine biology students get their training on Inhaca, with all the habitats basically in walking distance. It is really unparalleled, a miniature Mozambique.”

SALOMÃO BANDEIRA

Associate Professor in Marine Botany at the University Eduardo Mondlane

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Perpetua Scarlet in downtown Maputo. The city is growing which leads to environmental concerns.

PERPETUA SCARLET:

HEAVY METALS UNDER SCRUTINY

MAPUTO, TOGETHER WITH its largest suburb Matola, has around 2.75 million inhabitants and is expected to grow to over four million by 2025. Since much of the population live in informal or unplanned settlements, the population is likely to be much greater than the official figures suggest.

Many people live close to river basins and areas prone to flooding or erosion and the growing population and lack of city planning create environmental concerns, including for neighbouring Maputo Bay. But few people know the levels of pollution and contamination of biota along the coast. This lack of data inspired Perpetua Scarlet to study the effects of contaminants on the marine ecosystems in the

”A lot of people were saying that the levels of pollution in Maputo Bay were very high, that sewage and metals were a problem. We had research from the 1970s and 1980s but only scattered information.”

bay with a particular focus on shellfish, a vital food source and income for the women in Maputo Bay.

“A lot of people were saying that the levels of pollution in Maputo Bay were very high, that sewage and metals

were a problem. We had research from the 1970s and 1980s but only scattered information,” she explains.

She has analysed the levels of metals and pesticides accumulated in clams and prawns in Maputo Bay and also traced their origin. The Asiatic hard clam, introduced into Mozambique through ballast water brought by ships from other parts of the world, has been particularly useful. Since it filtrates water sediment for food, high levels of metals in the sediments quickly translate into high levels of metals in the clam.

PERPETUA’S RESEARCH HAS shown no significant difference of metals copper (Cu), manganese (Mn), nickel (Ni), cadmium (Cd), iron (Fe) and zinc (Zn) found in tissues from clams. As of yet, metals in the prawn in Maputo Bay are not at a critical level. Only manganese levels are above the level permitted for human consumption. The source of the metals is mostly natural but Perpetua is also keeping an eye on human influence, such as the open handling of coal and iron in the Port of Maputo, pesticides washed out from fields and wastewater from nearby hospitals.

“The levels are not that high but they are close to the permitted levels, so we must keep monitoring them,” she says, pointing out that the university is engaged in monitoring the on-going dredging of the harbour.

While the Asiatic hard clam is not found in Inhaca, the EBMI has nevertheless been absolutely essential for her research since all of her experiments were carried out there. The attraction was clean seawater a short distance from Maputo.

“The environment on Inhaca is very pristine, you can’t see any source of contamination. The laboratory also has running sea water so it would have been quite impossible for me to do my research

anywhere else,” she says, adding: “I am happy to have helped, through my PhD project, to keep the system running with the support of my supervisor and the efforts of seasonal staff.”

All of her samples from different sites in Maputo Bay were shipped to Inhaca by air and by boat – a local fisherman helped transport samples from seven different locations. At EBMI, Perpetua tested the clams in numerous ways to determine the different respiration rates depending on where they were collected, or the time required for them to burrow into the sand.

Having grown up by the coast and with a father who worked for a prawn company, marine biology was always going to be the most likely route for Perpetua to take. Like many other academics in Mozambique, she had to take a break from her studies and take up teaching after Mozambique gained independence in 1975 as many schools were left without teachers when the Portuguese left the country. That didn’t change her commitment to marine sciences, which is still very strong.

“I came back to the university after a couple of years to start over and I stayed.”

PERPÉTUA SCARLET

Head of Zoology at the Department of Biological Sciences at University Eduardo Mondlane

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”We have hundreds of kilometres of uninterrupted mangroves and around Maputo Bay there are nearly 18,000 hectares. Thanks to the mangroves the bay is the country’s second largest fishing ground for prawn.”

Salomão Bandeira

Mozambique ranks among the 15 countries with the largest mangrove forest coverage in the world.



Alberto Mavume at an informal settlement on the outskirts of Maputo that has been labelled vulnerable to flooding.

ALBERTO MAVUME:

WITH AN EYE FOR CYCLONES

“**VULNERABLE TO INUNDATION.** Forbidden to construct houses.” reads the sign along the highway passing through the Maputo suburb of Infulene. Alberto Mavume parks the car along the side of the road, where people are selling everything from locally grown vegetables to living room furniture. The valley was once farmland, but for the past ten years people have been setting up informal settlements on both sides of the road. Some houses are sturdy brick constructions. Others are made from reeds.

As the sign indicates, the area is flooded every year during the rainy season, forcing its inhabitants to evacuate and wait for the water to subside. Those with nowhere to go stay in their flooded

”We have tried to put our instruments in other areas but have lost them due to the fishermen wanting the buoys for their fishing nets. On Inhaca you can leave your stuff and nobody will touch it and we don’t lose any data.”

houses, piling all their belongings on top of the furniture, says local construction worker Simão with whom Alberto exchanges a few words.

Simão belongs to the quarter of Mozambique’s population who

live at risk from natural disasters such as floods, cyclones and drought. In 2014 the Mozambican parliament passed a disaster management law, thereby creating a legal framework for its policies for the prevention and mitigation of disaster effects and the reconstruction and recovery of affected areas. As the fine print on the sign indicates, it has been put up as a result of that law.

A FEW YEARS back, as an expert on tropical cyclones, Alberto was invited to form part of a multidisciplinary research team assembled by the government. The task at hand was to compile Mozambique’s first strategy on disaster risk reduction that would later lay the foundation for the new law. Originally trained in meteorology, Alberto was introduced to oceanography while doing his MSc in Sweden. It later became the subject for his PhD, which focused on climatology and tropical cyclones. It has been his passion ever since.

“We have more water than land in the world. Almost everything happens in the sea. Cyclones create an impact on land but form in the ocean,” he says, while also noting that climate change is a cross-cutting discipline involving subjects as diverse as health and marine biology.

For many years, Alberto has been one of the researchers from the UEM who has used the research station for lectures, scientific research and meetings. He has, for example, studied the throughflow in the strait between Inhaca and the mainland, describing the wave set up and how it is affected by storms. The research station is not the only thing that attracts him to Inhaca. The fact that the local community has an understanding of the work done by the visiting researchers is also a major factor.

“We have tried to put our instruments in other areas but have lost

them due to the fishermen wanting the buoys for their fishing nets. On Inhaca you can leave your stuff and nobody will touch it and we don't lose any data.”

UEM is starting a new MSc programme in disaster risk management and climate change adaptation. This will make Inhaca an important testing ground as the students can study the impact of climate change on a wide range of ecosystems confined within a very small area.

“You can save a lot of money by taking the example of Inhaca and transferring it to other places in the country,” continues Alberto. “There are a host of subjects that can be investigated in one single place, such as geology, forestry, biology, oceanography and disaster risk management.”



ALBERTO MAVUME
Associate Professor at the Faculty of Sciences,
University Eduardo Mondlane

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Water pipes at Infulene, an area that is regularly flooded during the rainy season.



José Paula is a long-time Inhaca visitor. He is also a passionate photographer.

JOSÉ PAULA:

EMOTIONALLY ENGAGED IN INHACA

INHACA ISLAND HAS been one of marine biologist José Paula's main sites for conducting research and teaching during his career. Once a year since 1991 he has left his office at the University of Lisbon in Portugal to conduct fieldwork in Maputo Bay and on Inhaca. Soon he will be returning again to teach an MSc programme in marine ecosystems at UEM.

"I have become engaged in Inhaca not only professionally but also emotionally. It's a fantastic place," he confesses.

Why Inhaca? It may have been his university's collaboration with UEM that first brought him here, but it is the fantastic environment and the inhabitants of Inhaca that have kept him coming back.

“The station is unparalleled in the region. Most other facilities for fieldwork in East Africa are located in urban areas or in coastal set ups with little interest, while Inhaca has a very interesting environment. It’s a mosaic of coastal ecosystems and it’s all very manageable. For those doing research at an ecosystem level, Inhaca is particularly attractive.”

OVER THE YEARS José has also formed a close relationship with the local community. As an amateur photographer he has become engaged with the fishermen who let him accompany them on their boats to photograph their work and the subsistence activities of the women. Much of his time on Inhaca has been devoted to researching crustaceans and larva development. In the early days, however, when the Mozambican civil war was still raging and the facilities at the research station were very rudimentary, there was only limited basic research to build upon. This meant that José started out by describing the various habitats and species on the islands – from mangroves to plankton. Over the years he has also studied resources together with Mozambican researchers, analysed the



JOSE PAULA

Associate Professor at the Faculty of Sciences of University of Lisbon, and researcher at MARE-Centre of Oceanography.

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Students performing photographic sampling at the rocky shore.

”The station is unparalleled in the region. Most other facilities for fieldwork in East Africa are located in urban areas or in coastal set ups with little interest, while Inhaca has a very interesting environment.”

subsistence activities of the local community, and worked on research projects with scientists from several European and African countries.

Collaboration has always been key for José. He even goes

so far as to say that, for him, there is little point in doing research on Inhaca without collaborating with local researchers and contributing to the local scientific development. Many of his 100 or so scientific papers have been written in tandem with Mozambicans.

Today José is focused on training a younger generation of scientists, teaching local MSc programmes as well as specialised courses on statistics and methodology that attract students from all over the Western Indian Ocean region. In the past he has also brought Portuguese students to Inhaca. He is content to have access to such a convenient location that provides students with a holistic view of habitats and ecosystems.

“It’s also very convenient to gather the students in a non-urban setting since you get a cohesive group that will interact not only professionally but personally and create personal links and networks,” he affirms.

JOSÉ DOES NOT hesitate to describe EBMI as one of the best research facilities in Eastern Africa. He says that the bureaucracy and degree of control sometimes found at other research facilities is virtually non-existent at EBMI.

“UEM has a very open attitude and you can be sure that if you propose something, they will help make it possible. They are very open to collaboration. They will support you if you wish but also let you be independent if that’s your preference.”





”More than half of our marine biology students get their training at Inhaca, with all the habitats basically on walking distance. It is really unparalleled, a miniature of Mozambique.”

Salomão Bandeira

An eye-catching rock formation on the northern shores of Inhaca Island.



Mozambican PhD student Daniela de Abreu is working on her thesis at the University of Gothenburg in Sweden, while also teaching at the UEM in Maputo.

DANIELA DE ABREU: **STUDYING MAPUTO BAY – IN SWEDEN**

MARINE BIOLOGIST DANIELA de Abreu is a part-time PhD student at the University of Gothenburg in Sweden, supported by Sida. The subject for her thesis, however, is far removed from the cold waters of northern Europe as it focuses on tropical Maputo Bay in her native Mozambique. Twice a year she travels between the two countries. In Mozambique she does her fieldwork and most of her laboratory work while also teaching marine sciences at UEM in Maputo. In Sweden she meets with her supervisor and focuses on analysis and writing.

This is called the “sandwich model”, which allows researchers from low-income countries to stay at their home institutions while providing them with the facilities they need to pursue a PhD. Since

”Inhaca has been the base for all of my degrees; there is so much to study so I feel compelled to go back. The station is in a great location, it’s really an awesome setting.”

their research is based on existing challenges in their home countries, it contributes to the development of their home countries and their home institutions. Commuting between two different countries can be demanding,

but Daniela says this is outweighed by the professional and personal growth that comes from the exposure to new ways of structuring and analysing her research.

“It can be challenging since I am working on a completely different project than those in Gothenburg. But the supervision I get is excellent and I like being able to keep doing research within my field and make a difference in my own country.”

LIKE MANY MOZAMBICAN marine scientists before her, Inhaca was the place where it all started for Daniela. She first put her foot on the island in 2000 when she was an undergraduate student. She describes that first visit as an amazing opportunity, and she has been coming back ever since.

“Inhaca has been the base for all of my degrees; there is so much to study so I feel compelled to go back. The station is in a great location, it’s really an awesome setting.”

Today she mainly visits Inhaca in her role as a lecturer in marine ecology at UEM, but for many years the motive for her visits was to study the connection between mangroves and seagrasses.

“The idea of connectivity is really beautiful. Certain fauna need both of these systems to go through all their lifecycles and I have been studying juvenile prawns that go and come with the tide. Why do they use these different ecosystems and at which moment?”

ONE OF DANIELA’S most memorable experiences on Inhaca came during her MSc studies when she discovered that the juvenile prawns in Inhaca’s Saco Bay do not actually eat from the mangroves, which was her hypothesis, but probably only go there to find protection.

“To me it’s amazing that they use all that energy to go there just for protection. When the tide goes out they go to other habitats like

the seagrass meadows to eat. At the time, similar studies in other parts of the world had not been this conclusive.”

When the time came for her PhD, Daniela decided to expand her focus from Inhaca to Maputo Bay. Using her knowledge from Inhaca of the biological cycles of prawns, she is now painting a bigger picture of how the estuaries around the bay contribute to the fishery by functioning as nurseries for the juvenile prawns.

“I used Saco Bay on Inhaca as one of the sampling areas in my preliminary study for logistic and safety reasons. Then I brought that perspective to the whole bay to see if it was different in other estuaries.”

The reason Daniela is so focused on fishery resources is that she wants to contribute with scientific information for their management, which is often based solely on the adult prawn population. This means that an important piece of the puzzle is missing.

“We need a broader view of the life cycles of these species. If you don’t know where they come from and how the estuaries contribute to the adult stock, management will be more difficult. If we know which estuaries contribute to the fishery, the industry will be interested in protecting those areas.”



DANIELA DE ABREU

**Assistant lecturer at University Eduardo Mondlane and
PhD Student at University of Gothenburg**

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Daniela de Abreu at the Gothenburg botanical garden.

WORKING WITH THE COMMUNITY:

SUSTAINABLE CO-EXISTENCE

E **BMI CO-EXISTS WITH** the people of the island. If the unique environment on and around Inhaca is to survive then sustainable use of the natural resources is an absolute must. At the same time, people living on the island need means to survive and improve their lives. Balancing the two can sometimes pose a challenge.

Currently, some 5,200 people live on the island. Most survive from artisanal fishing, working hard to make ends meet. The men go fishing and the women buy their catch and sell it on the market in Maputo. Women and children also search the reefs and tidal flats for mussels and crabs. Some people engage in subsistence farming, although growing vegetables in the sandy soil can be a challenge. Traditionally, people have also left the island to work on the mainland or in South Africa.

ILENA SWINGS HER hoe. Here, on the outskirts of a huge swamp she and many others tend to their fields, the machambas. Ilena is growing sweet potatoes. She says that there have been many developments on Inhaca during her lifetime.

“But we still need more things to happen like more jobs, for example. It doesn’t matter what kind of jobs, the important thing is that we get more jobs,”

Ilena’s last name is Nhaca and she belongs to the extended family that once gave the island its name. Although she knows of the EBMI, she has limited knowledge about what is actually happening there.

“We are poor people, we have to continue working,” she says.

In addition to agriculture and fishing, tourism is vital for the local economy. But recently the only major hotel on Inhaca closed down

to be put on the market and at time of writing it is uncertain when it will re-open. The closing led to a loss of much needed jobs. Some islanders sell food, beverages and souvenirs to the cruise ship tourists that arrive every week, but it is not enough to cover for the loss.

“We need to develop more small-scale and eco-friendly tourism. The island is very close to Maputo and we really have a lot to offer, we just need to work together and make more people aware of how pristine the Inhaca environment is,” says Miguel Bruno, whose family runs the popular Lucas Restaurant.

BEATRIZ MANGANHELA LIVES in a one-room house in the southern part of Inhaca. She is a single mother of three who, in her own words, is both the man and the woman of the family. A couple of years ago she decided to expand her business of producing and selling beer. Through a government-run fund she got the money she needed to invest in a freezer for storing fish. Buying and selling fish is now an important addition to the household economy.

“You have to diversify so you always have money coming in. The nature reserve doesn’t impede my activities. The problem is that resources are getting scarce. Sometimes two days pass without any fish.”

In his youth Soliane Manguale worked on an industrial fishing boat along the coast of northern Mozambique. Today his family lives from fishing and collecting crabs and mussels, which the women harvest on the rocky shores below the lighthouse. When we meet him in March it is the season for those activities, according to local legends, and people congregate on the beach to hold ceremonies before harvesting. But things have changed.

“Now we waste more energy and get fewer mussels. It’s a competition. We have to harvest as soon as they are big enough to eat or someone else will. In the past we could fill a bucket easily but don’t go so often now because we know it’s no use,” he says.

ONE CHALLENGE IS the sand erosion, which buries the mussels and other edible invertebrates, impeding their growth. With help from EBMI, Soliane Manguale had the chance to learn reforestation techniques and he noticed that the new plants growing on the beach slowed down the erosion of sand into the sea. But he hasn’t been able to get anyone to join him in his reforestation efforts.



Fishing has been the dominating livelihood on Inhaca Island for as long as anyone can remember.

Soliane Manguela has also invested in beehives that he harvests twice a year. The income from the honey helps to eke out his income, especially during the winter months when the fishing is bad. But the marine resources matter most to him:

“The sea is where we get everything. I can’t imagine what I would do without it. My life is attached to it, it’s where I’ve been getting food my whole life,” he says.

Dinis José Titosse, the local administrator of Inhaca, says that the research station is of great importance to the island. He welcomes increased cooperation with the local community, especially to prevent erosion and mitigate conflicts between people and wildlife, such as wild pigs and crows, and invest in alternative sources of income.

“We need to preserve the land but also solve the economic problems of the local people.”

GABRIEL ALBANO, HEAD of EBMI, is well aware of the situation. Creating local jobs is important, as is environmental awareness. In order to improve awareness of the need to protect the environment, staff from the station conduct community outreach activities.

“We have a good relationship with the local community and local authorities, and the fishermen protect our equipment when we put it out to sea,” he explains.

There is also a close bond between the researchers and the community. Abdul Ada, a research assistant at the station, was born on the island and he sees a strong link between his childhood and his current work.

“When I grew up on Inhaca, every day of my life had a connection to the sea, just like today but from a different perspective. Even if the fishermen and the women harvesting crabs can’t explain the ecosystem like a researcher would, they know how important it is to preserve the marine resources since they depend on them for their livelihood”, says Abdul Ada.

COMMUNITY OUTREACH

Sustainable beekeeping

Traditional beekeeping on Inhaca involves debarking of trees to construct the beehives and fires to harvest the honey. These practices are detrimental to the conservation of forest reserves and the bees. With German funding, EBMI trained heads of local households in sustainable beekeeping to enhance forest conservation and provide alternative income. As an outcome of the training, the local government provides annual funding for environmentally sustainable beekeeping.

Improved farming techniques

Farming is traditionally done through slash and burn practices. These practices exacerbate the unfertile condition of the sandy soils. To improve the soil quality, EBMI teaches school children how to make organic compost from dead leaves and branches that can be used in school gardens. This initiative aims to disseminate knowledge and awareness through the children to their families.

Environmental awareness

EBMI coordinates an environmental awareness programme broadcast through local radio. The programme aims at training, informing and discussing relevant environmental issues with the local people, including uncontrolled fires, illegal fishing, protection of coral reefs, mangrove conservation and illegal tree harvesting. Many of the issues covered are challenges raised by the population of Inhaca.

Reforestation

EBMI has trained and supports members of a local community-based organisation in reforestation techniques in order to protect areas heavily affected by erosion. Creepers and shrubs such as sweet thorn (*Acacia karroo*) are planted along the coastal dunes.

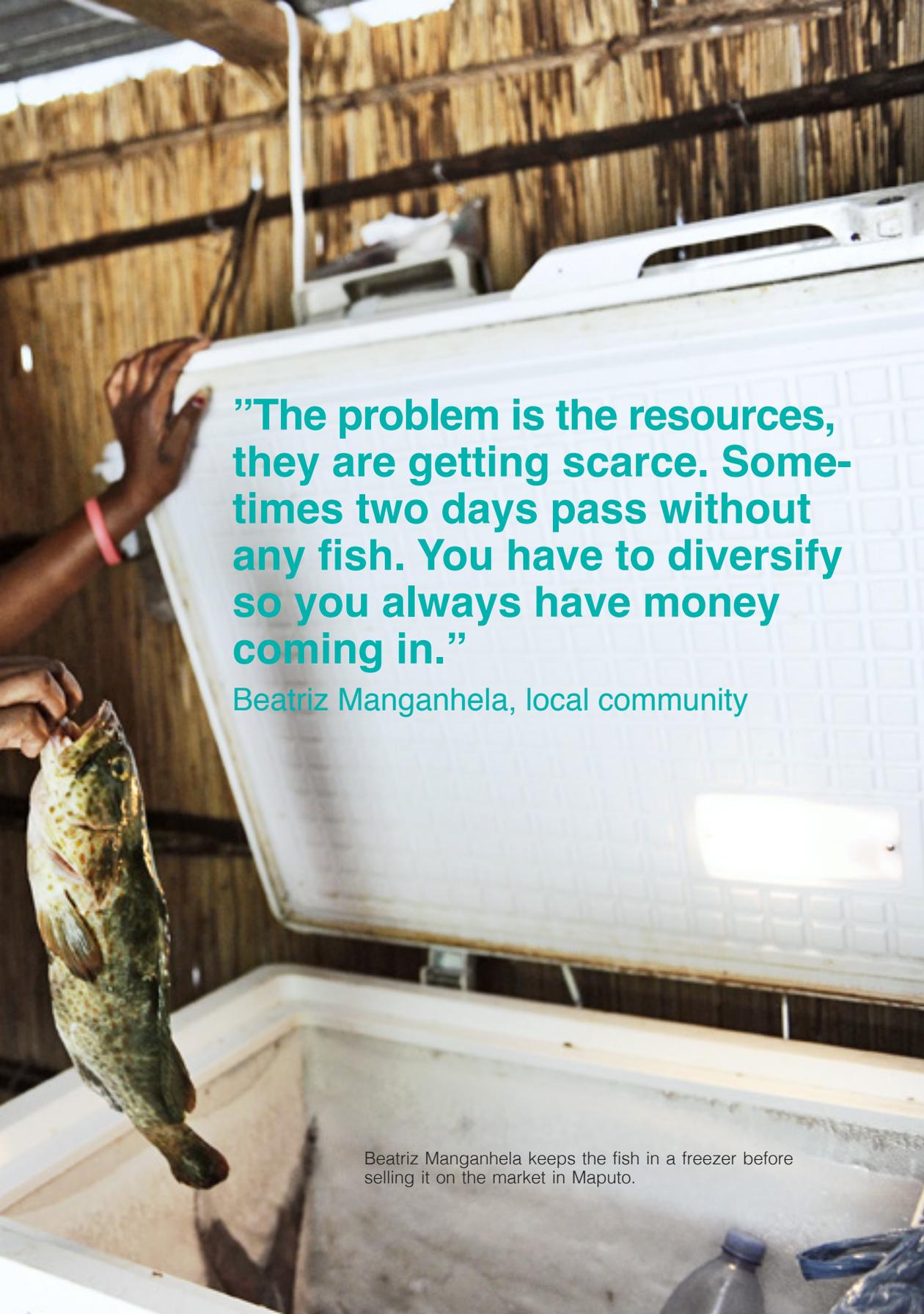
Water supply

Tourism activities in conservation areas in Mozambique are liable to taxes and tariffs. EBMI collects taxes and tariffs from tourism activities on Inhaca, 20 per cent of which is channelled back to the local community through the Community Development Council. So far, the funds have been used to build wells around the island that have improved access to drinking water substantially and reduced the spread of waterborne diseases.

Scholarships

UEM provides university scholarships for top students from the local secondary school. The first three students selected and trained at BSc level have all been employed at EBMI, the second largest employer on the island. Ninety per cent of the EBMI staff come from Inhaca.



A person's hands are visible, holding a large, spotted fish vertically. The fish is positioned above an open white chest freezer. The background shows a rustic structure with a thatched roof made of dried reeds or straw. The lighting is natural, suggesting an outdoor or semi-outdoor environment.

”The problem is the resources, they are getting scarce. Sometimes two days pass without any fish. You have to diversify so you always have money coming in.”

Beatriz Manganhela, local community

Beatriz Manganhela keeps the fish in a freezer before selling it on the market in Maputo.

VISIT INHACA!

Inhaca is a nice getaway from Maputo. Here are some things to see and do:

Accommodation

There are several small inns in the village close to the ferry landing. There are also villas for rent.

Transport

The Nyelethi ferry runs every day except Tuesday and Thursday from the centre of Maputo. Sometimes it is cancelled due to weather or technical problems so always check first. Private transport can be arranged by speedboat or airplane.

Bring

Sunscreen, mosquito repellent, sunglasses, hat and malaria prophylaxis.

Eat

A wide selection of fresh seafood, including fish, prawn, lobster and squid.

Buy

Locally made souvenirs can be purchased in the village. Do not buy dried specimens of sea-stars and shells!

Do

Tour the island, visit local families, go fishing, snorkelling or just hang out in the wonderful countryside. Watch the sunset from the lighthouse, see flamingos at Saco de Inhaca, visit EBMI and its biological museum, take a walk on a neighbouring Portuguese island.

Read more at www.inhaca.info



ABOUT THE SWEDISH RESEARCH COOPERATION

THE SWEDISH SUPPORT to research cooperation in developing countries started in 1975. Today, research cooperation is an integral part of the work of the Swedish development cooperation implemented by Sida.

Only a small portion of global research funding is directed to research on issues that affect low-income countries. This is despite the fact that some of the greatest challenges before us can be found in low-income countries. Universities are well placed to identify these challenges and need to be able to propose and conduct research based on local needs. This will make low-income countries better equipped to design effective interventions to improve people's livelihoods and reduce poverty.

The aim of the Swedish research cooperation is to contribute to strengthened research of high quality and of relevance to poverty reduction and sustainable development, with a primary focus on low-income countries and regions.³

The research cooperation should contribute to capacity building for research, research of relevance to low-income countries, and innovation.

A functional research system is important for:

- Generating the analytical capacity needed to identify research areas of relevance for sustainable development of the society
- Enabling universities to provide expert staff to the public and private sector.
- Advising and supporting the government to make evidence-based decisions.
- Facilitating the generation of innovations that can contribute to inclusive economic growth.

³. Strategy for research cooperation and research in development cooperation 2015–2021, Ministry for Foreign Affairs, Sweden.

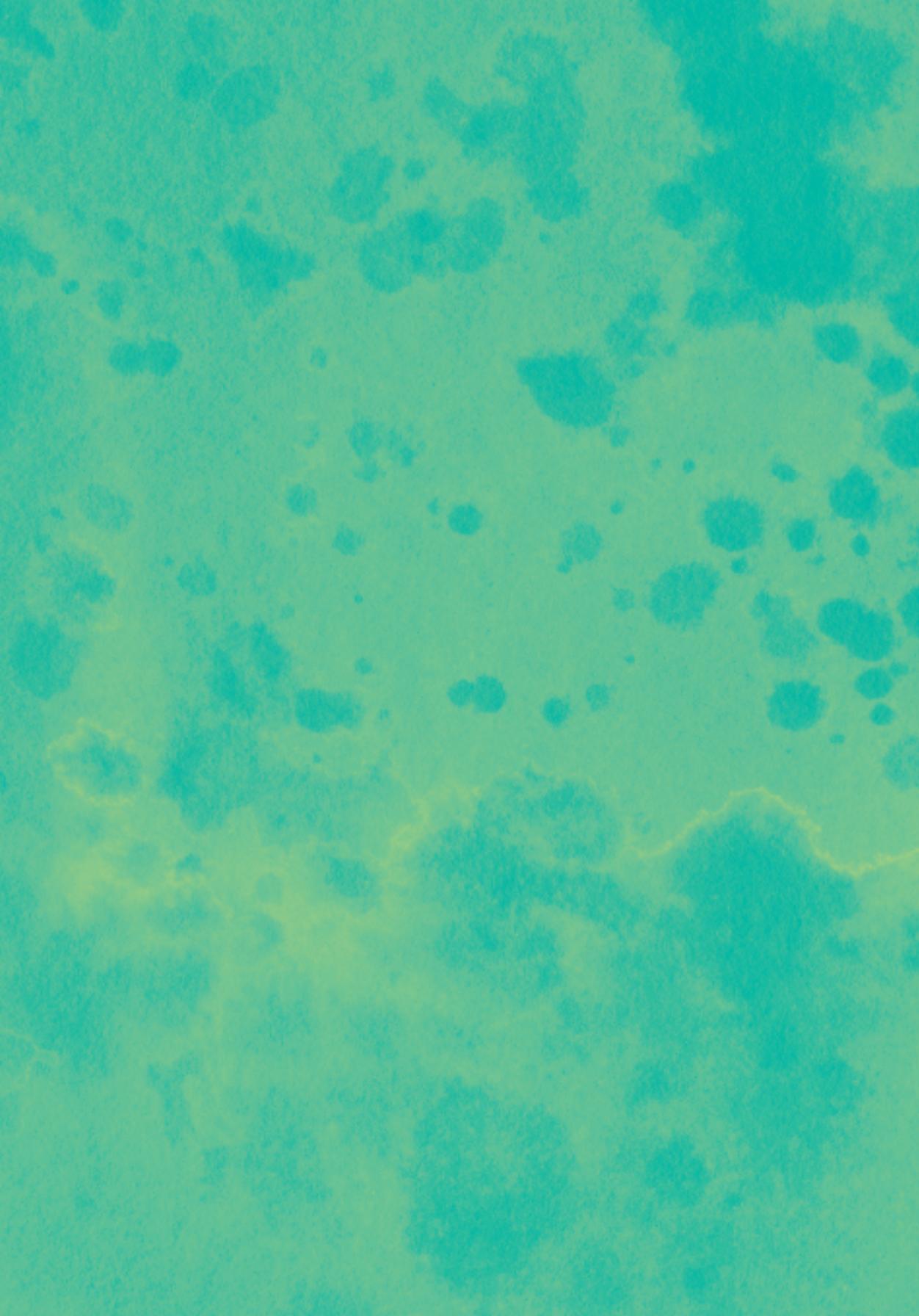


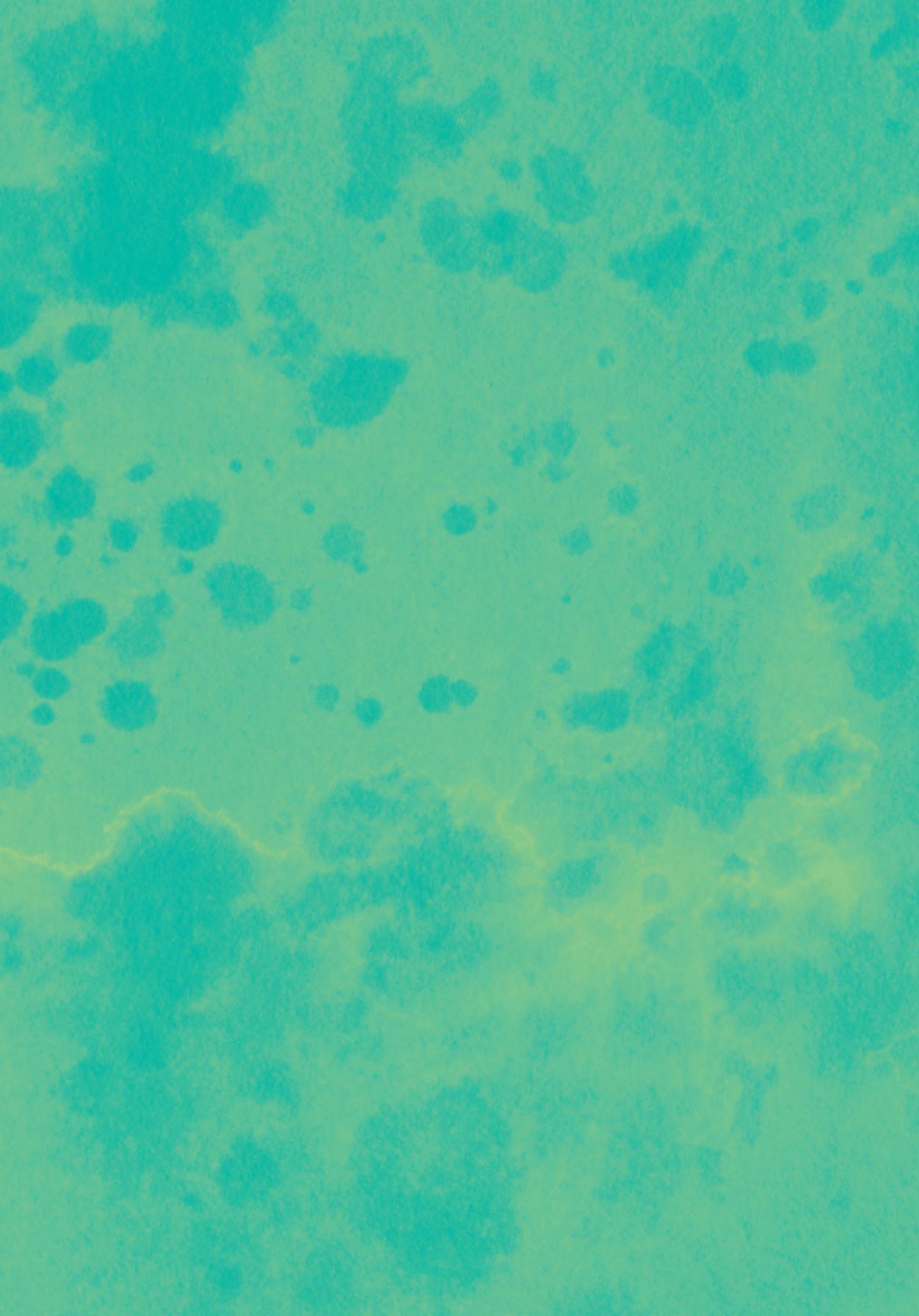
The UEM is the oldest and largest university in Mozambique. Since 1978, more than 130 Mozambican students from UEM have completed their MSc and PhD studies in Sweden as part of a research cooperation agreement.

Building a national research system takes time. This is why the research cooperation needs to have a long-term perspective while still being perceptive enough to respond to new needs and developments in the partner country.

Swedish research cooperation with Mozambique

Sweden's support to Mozambique has contributed to considerable research capacity at UEM through training at both MSc and PhD levels. In 2015, UEM had a total of 380 PhD-holders working at the university and 88 students were studying for a PhD in Sweden or South Africa with Swedish support. The degrees are acquired in a broad spectrum of fields such as agronomy, energy, climate change, marine biology, mathematics and maternal and child health. Sweden also supports four new MSc programmes at UEM with relevance for the development of Mozambique.





WELCOME TO INHACA!

INHACA ISLAND AND the Marine Biology Research Station (EBMI) have served as the cradle of modern marine research in Mozambique. The ecosystems on the island represent most coastal Mozambican habitats in microcosm, making the island an excellent natural laboratory for a wide spectrum of research, right on the doorstep of Maputo.

The EBMI is part of the Universidade Eduardo Mondlane (UEM) and is managed by the Faculty of Sciences.

Over the years scientists have conducted cutting-edge research, not only in the field of marine biology but also on subjects such as terrestrial flora and fauna, geology, oceanography and socio-economy.

NOW THE EBMI is taking an important step into a new era. With support from Sweden, the station has been upgraded with modern equipment and lodgings, providing excellent opportunities for researchers to combine field and laboratory work.

This booklet tells the story of Inhaca and its exceptional nature. You meet some of the key researchers on marine biology in Eastern Africa as well as people who have lived on the island for generations and whose livelihoods depend on its resources. The links between them and the surrounding environment are many and intertwined. Together they tell the story of a unique and fragile environment, and of a centre of vibrant marine research.



SWEDEN

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