



Revolutionary Government of Zanzibar

Ministry of Agriculture, Natural Resources, Environment and Cooperatives
Department of Fisheries and Marine Resources

Rapid Assessment of the Proposed Pemba Channel Conservation Area (PECCA)

**Marine and Coastal Environment Management Project
(MACEMP), Tanzania**

GEF/World Bank: PDF B Preparation Phase





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FOREWORD

Pemba is a remarkable and unique island in the Western Indian Ocean. Together with the Unguja Island it forms Zanzibar, an archipelago that is part of the United Republic of Tanzania (URT). Pemba lies in the Eastern African Marine Ecoregion, which contains high levels of biodiversity, important feeding and breeding areas and migratory routes for endangered marine mammals. Having recognised the importance of its coastal and marine natural resources, the Government of URT is preparing the Marine and Coastal Environment Management Project (MACEMP) to preserve the global biological diversity in critical marine ecosystems in Zanzibar and mainland Tanzania. With funding from the Global Environment Facility (GEF) through the World Bank, MACEMP aims to enhance the contribution of marine and coastal resources to economic growth and reduction of poverty and to develop scientific understanding of the status of the resources and major threats to them. The Pemba Channel Conservation Area (PECCA) and its adjacent and surrounding communities is one of the priority areas selected to receive support through MACEMP.

The biological diversity and richness of Pemba Island has been widely acknowledged yet scarcely studied. MACEMP finally brings the opportunity to study and protect the unique and valuable west coast of Pemba Island that flanks the Pemba Channel. A team composed by EcoAfrica Environmental Consultants, the Departments of Fisheries and Marine Resources (DFMR) and Environment (DoE) of Zanzibar and local NGOs carried out a “rapid assessment” of the west coast of Pemba Island, with a view to assisting MACEMP during the preparation phase. The results and recommendations produced by the team are presented in this report and aim to shed light into how MACEMP can support sustainable natural resource management in the area and address existing threats to biodiversity. Suggestions on the recommendations presented in this report are welcome and can be sent to the EcoAfrica investigators (francois@ecoafrica.co.za) or the MACEMP Programme coordinator (shahahamdan64@yahoo.co.uk).

The Rapid Assessment Team

February 2005

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ACRONYMS

ARC	Alliance of Religions and Conservation
CODECOZ	Community Development and Environmental Conservation of Zanzibar
COLE	Commission for Land and Environment
DCCFF	Department of Commercial Crops, Fruits and Forestry
DLIST	Distance Learning and Information Sharing Tool
DFMR	Department of Fisheries and Marine Resources
DoE	Department of Environment
EAME	Eastern African Marine Ecoregion
EDG	Environment Development Group
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
GDP	Gross Domestic Product
GEF	Global Environment Facility
ICD	Integrated Conservation and Development
ICM	Integrated Coastal Management
IMS	Institute of Marine Science
IUCN	The World Conservation Union
JSDF	Japanese Social Development Fund
LA 21	Local Agenda 21
LED	Local Economic Development
M&E	Monitoring and Evaluation
MACEMP	Marine and Coastal Environment Management Project
MANREC	Ministry of Agriculture, Natural Resources, Environment and Cooperatives
MICA	Misali Island Conservation Association
MICP	Misali Island Conservation Project
MIMCA	Misali Island Marine Conservation Area
MFA	Ministry of Foreign Affairs (Finland)
MPA	Marine Protected Area
MSRASD	Ministry of State for Regional Administrative and Special Departments
NGO	Non Governmental Organisation
NACOMA	Namib Coast Biodiversity Conservation and Management Project
OUV	Outstanding Universal Value
PAD	Project Appraisal Document
PADEP	Participatory Agricultural Development Empowerment Project
PDF	Project Preparation and Development Facility
PECCA	Pemba Channel Conservation Area
PIRO	Pemba Island Relief Organisation
PRS	Poverty Reduction Strategy
SEA	Strategic Environmental Assessment
SMOLE	Sustainable Management of Land and the Environment
TASAF	Tanzania Social Action Fund
ToR	Terms of Reference
UNDP	United Nations Development Programme
URT	United Republic of Tanzania
VCC	Village Conservation Committee
WECOC	Wete Environmental Conservation Club
WHS	World Heritage Site
WIO	Western Indian Ocean
WWF	World Wildlife Fund
ZILEM	Zanzibar Integrated Land and Environmental Management Project
ZPRP	Zanzibar Poverty Reduction Plan

EXECUTIVE SUMMARY

1. A Rapid Assessment was conducted on the island of Pemba, which together with Unguja makes up Zanzibar that forms part of the United Republic of Tanzania. The purpose of the assessment was to do an initial scoping of a potential conservation area known provisionally as the Pemba Channel Conservation Area (PECCA) that has been proposed for the west side of Pemba, in terms of its significance from a biodiversity point of view as well as where its potential borders may lie. The study's main purpose would be to inform the preparation phase of the *Marine and Coastal Environment Management Project (MACEMP)*¹, and it would *inter alia* recommend how MACEMP could support sustainable natural resource management by addressing threats to biodiversity and root causes as identified under this assignment.
2. In order to fulfil its main objective the study would provide a short general overview of the geographic aspects of the broader target area, and the proposed conservation area in particular; a short description of the coastal population in and adjacent to PECCA; a short presentation of key socio-economic indicators of PECCA; a presentation of the development plans, land use plans and natural resource use plans and activities in PECCA that target the coastal and marine zone; a rapid assessment of biodiversity (in particular biodiversity of global importance), i.e. description of key habitats, endangered species, endemic species, migratory species, approximate species diversity); and, finally, an analysis of threats and root causes/barriers to biodiversity conservation in PECCA. In addition to giving input into MACEMP Project design, the assignment would also yield a photo and video library of PECCA, a technical paper on rapid assessment and an information booklet aimed at both the local and international audience.
3. The study was conducted by a composite team of biodiversity and development experts, scuba divers, photographers, representatives of the Department of Fisheries and Marine Resources (DFMR) and the Department of Environment (DoE) and members of local Non Governmental Organisations (NGOs) and Community-Based Organisations (CBOs). The team liaised closely with a broader group of people from the lead department, the DFMR, both in the head office on Unguja and in the Pemba office. The methodology that is fully described in the main text involved interviews with resource users and other stakeholders, site

¹ The Ministry of Natural Resources & Tourism, the Ministry of Agriculture, Natural Resources, Environment and Cooperatives (Zanzibar) and the President's Ministry of Regional and Local Government Administration will lead project implementation.

visits above and underwater to assess biodiversity and the general state of the environment, aerial photography, video filming, and considerable desk top research. The team worked in a highly integrated manner to come up with the following main findings:

4. Pemba is a remarkable and unique island in the Western Indian Ocean (WIO). It contains high levels of biodiversity, important feeding and breeding areas and migratory routes for endangered marine mammals. Ten million years older than Unguja, Pemba is a true oceanic island with depths of 1,000 metres in the Pemba Channel separating it from the Tanzanian mainland. Its west side in particular has a heavily indented coastline with numerous bays, islets and deep braided channels that form the physical basis for its diverse range of marine habitats. The island contains the only oceanic reefs in the Eastern African Marine Ecoregion (EAME) with high diversity and coral growth in excess of 64 metres depth, possibly the deepest seagrass beds in the EAME, and impressive concentrations of sailfish, black marlin and tuna. Pemba Island is thought to be a unique example of a diverse and deep-water coral community on a granitic island with spectacular underwater scenery² that has been considered as a potential area for World Heritage listing³. This Rapid Assessment has provided indications that the island has potential for a cultural and natural World Heritage Site (WHS) and a feasibility study should be undertaken during implementation.

5. Separated from the mainland by the Pemba Channel, the island's highly diverse and productive marine habitats, including coral reefs, seagrass beds and extensive mangrove stands are generators of biodiversity and biomass that undoubtedly influence the entire region. Consequently Pemba Island has been classified as a regionally important site in the EAME during the Eastern African Marine Ecoregion Visioning Workshop held in 2001, although the report published by the World Wildlife Fund (WWF)⁴ notes that there was debate as to whether the site should be globally or ecoregionally important, and that it was put in the latter category because of lack of data to compare it with other known granitic islands such as the Seychelles. Team members who worked in other WIO islands, including Madagascar, the granitic islands of the Seychelles, Aldabra, and the mainland countries in East Africa thought that Pemba's marine habitats can hold a candle to the best of them. Considering its own inherent characteristics, its unique

² World Heritage Marine Biodiversity Workshop Regional Paper for East Africa. World Heritage Biodiversity: Filling Critical Gaps and Promoting Multi-Site Approaches to New Nominations of Tropical Coastal, Marine and Small Island Ecosystems Potential Tropical Coastal, Marine and Small Island World Heritage Sites in the Eastern Africa Region. <http://international.nos.noaa.gov/heritage/documents.html>

³ In the World Heritage Marine Biodiversity Workshop: Filling Critical Gaps and Promoting Multi-Site Approaches to New Nominations of Tropical Coastal, Marine and Small Island Ecosystems" held in Hanoi, Vietnam from 25 February to 1 March, 2002. Available at www.environmentaldefense.org/documents/2599_KNCHanoiStatement.pdf. The Workshop was convened by UNESCO's World Heritage Center, in collaboration with the U.S. National Oceanic and Atmospheric Administration (NOAA), the World Conservation Monitoring Center (WCMC) and IUCN.

⁴ WWF, 2001. Proceedings of the Eastern African Marine Ecoregion Visioning Workshop. Mombasa, Kenya, April 21st -24th 2001, pp 1-36.

- geographic position along the East African coast and the broader functional role it plays in the WIO, the case that Pemba is a globally significant site can be made.
6. The environment is in a relatively healthy state but there are clear signs of stress on the system. Exploitation of marine resources has attained giant proportions and many of the methods are destructive to the environment, including the use of dynamite, small gauge nets, metal hooks for extracting octopus, removal of keystone species such as sharks and rays, and simply the harvesting of organisms at unsustainable levels. Further threats to the marine environment include the unsustainable extractive use of mangroves, uncoordinated tourism planning and development, coral bleaching, and urban, agricultural and industrial activities. Root causes include increasing numbers of fishers that rely on the inshore resources, lack of compliance with laws and regulations, lack of alternative livelihoods, insufficient public awareness, lack of a common vision for tourism, poor coordination between government institutions, poor environmental management and land use planning, climate change and poverty that lies at the heart of many of the root causes and results in a growing population being increasingly dependent on current methods of using the natural resource base.
 7. The natural assets in terms of biodiversity, habitat range and natural resources are particularly prevalent along the west side of the island that is far more indented and contains more islets than the eastern shore which is lined by coral rag and relatively smooth. The west side is also where most exploitation of living marine resources and other coastal resources takes place. Taking the lead from the Ministry of Agriculture, Natural Resources, Environment and Cooperatives (MANREC) in Zanzibar and in particular the DFMR, the main intervention proposed to counter the rising degradation is the establishment of a multi-zone, multiple resource use conservation area that will be known as the Pemba Channel Conservation Area (PECCA). From the outset it was understood that the intervention will be to assist people to improve their lives by putting in place an effective management for the sustainable use of the natural resource base.
 8. The current study focused on a target area that was previously agreed upon in meetings with the DFMR and DoE. It proposes that PECCA will include all of the west side of Pemba from its northern tip at Ras Kigomasha to the southern tip of Panza Island. The establishment of PECCA will involve a phased approach with different steps in each phase that will include the identification and establishment of core conservation areas and multiple-use areas under sustainable management regimes. Close collaboration with the fishers' population will be key. Assistance will be provided in terms of training, establishment of structures, enhancement of fishing gear and value-adding activities to marine resource utilisation, while attention must also be paid to alternative livelihood creation. The approach furthermore will be cooperative in terms of collaboration between government departments as well as with other key stakeholders such as those involved in the tourism industry.

9. It is important to note that the coastal inhabitants, including the fishers' population, are ready for the proposed intervention which is country-driven and comes at a very necessary time. Fishers have expressed strong interest in collaborating with the authorities and NGOs to implement PECCA. Many support structures are already in place, and suggestions are made on who should drive what part of the project. However, it is proposed that during the preparation phase all institutional arrangements be clarified so that implementation can be off to a brisk start. Furthermore, with poor public awareness having been identified as a root cause of biodiversity degradation, there is every reason why a public awareness campaign should be launched during the latter part of the preparation phase as effective implementation will be easier to attain with an informed constituency. In spite of the low level of awareness in terms of ecosystem functioning and root causes that affect its health, the fishers are very aware that there is a need for a management system to be put in place, one that is fair and will protect the resources for future harvests.

10. The "rolling out" of PECCA should take a phased approach in which each phase has different steps, described in the main text. The boosting and creation of new livelihood options for which funding is already available should start in earnest. However, livelihood creation projects should not ensue in a haphazard manner but need to follow a carefully thought out and commonly agreed upon Local Economic Development (LED) Strategy to avoid duplication and ensure that the right projects are in fact funded. How money flows is equally important and a set of criteria needs to be established for targeted investments that will bring value to the overall framework within which PECCA will operate. This will ensure a higher degree of feasibility and all important transparency. Potential guidelines are presented in the main text.

11. Finally, it should again be pointed out that PECCA is not a conservation area in the old paradigm but in fact an area where a multi-faceted development strategy will be deployed, one in which an Integrated Conservation and Development (ICD) approach will be combined to bring opportunities to the people of Zanzibar as a whole and Pemba in particular while at the same time conserving their valuable natural heritage. This approach requires putting in place people-centred strategies in combination with conservation activities that will be founded on solid knowledge of this relatively poorly known area. It will also require the incorporation of all types of heritage, including the tremendously rich archaeological, historical and cultural heritage that enhances Pemba's status as a place of global significance.

PART I: BACKGROUND AND APPROACH

1 INTRODUCTION

Pemba is a remarkable and unique island in the Western Indian Ocean (WIO). Together with Unguja Island it forms Zanzibar, an archipelago about 40 km off the East African coast that is part of the United Republic of Tanzania (URT). The Eastern African Marine Ecoregion (EAME)⁵, which encompasses Tanzania, contains high levels of biodiversity, important feeding and breeding areas and migratory routes for endangered marine mammals. East Africa is one of the most diverse tropical areas on the planet and an area of high levels of marine endemism⁶. An assessment of the status of coral reefs in East Africa⁷ showed that coral bleaching events and the increasing coastal population are the two primary threats the coral reefs face, and called for significant investments in management capacity particularly funding to mitigate the likely effects on coastal communities. Having recognised the importance of its coastal and marine natural resources, the Government of URT is preparing the Marine and Coastal Environment Management Project (MACEMP) to preserve the global biological diversity in critical marine ecosystems in Zanzibar and mainland Tanzania.

With funding from the Global Environment Facility (GEF) through the World Bank, MACEMP aims to enhance the contribution of marine and coastal resources to economic growth and reduction of poverty and to develop scientific understanding of the status of the resources and major threats to them. Ensuring the sound management of Exclusive Economic Zone (EEZ) resources, developing an effective Marine Protected Area (MPA) network, and promoting integrated coastal management and investment into coastal livelihoods are the main components of the project. MACEMP focuses on target areas that have been identified through a consultative process. The Pemba Channel Conservation Area (PECCA) —the west coast of the island and the adjacent and surrounding communities—is one of the priority areas selected to receive support through MACEMP.

The biological diversity and richness of Pemba Island have been widely acknowledged yet scarcely studied. A report produced in the early nineties⁸ identified a number of sites

⁵ WWF, 2001. *Proceedings of the Eastern African Marine Ecoregion Visioning Workshop*. Mombasa, Kenya, April 21st -24th 2001, pp 1-36.

⁶ Abdullah, A., A.S. Hamad, A.M. Ali, and R.G. Wild, undated. *Misali Island, Tanzania – An Open Access Resource redefined*. Paper presented in the 8th Biennial Conference of the International Association for the Study of Common Property (IASP), pp1-11.

⁷ Obura, D. *et al.*, 2004. *Status of Coral Reefs in East Africa 2004: Kenya, Tanzania, Mozambique and South Africa*. In: Wilkinson, C. (ed.), 2004. *Status of Coral Reefs of the World: 2004*. Available on: <http://www.aims.gov.au/pages/research/coral-bleaching/scr2004/>

⁸ Faki, O.M, undated. National Consultancy Report. Biodiversity Project UNO/RAT/006/GEF, pp 1-29.

on the western coast of Pemba for conservation (Misali Island, Matumbini reef complex and Makoongwe). A multitude of studies have hitherto been conducted to assess the biodiversity, but these studies have mostly concentrated on Misali Island. This clearly important biodiversity node has been declared a conservation area in 1995, though studies focusing on Misali often acknowledged the role of the entire western coast and islets in the region's biodiversity, its pristine state and the growing threats to its biodiversity. Pemba Island has been classified as a regionally important site in the EAME during the Eastern African Marine Ecoregion Visioning Workshop held in 2001, although the report published by WWF⁹ notes that there was debate as to whether the site should be globally or ecoregionally important, and that it was put in the latter category because of lack of data to compare it with other known granitic islands such as the Seychelles. The island contains the only oceanic reefs in the EAME with high diversity and coral growth in excess of 64 metres, possibly the deepest seagrass beds in the EAME, and unique concentrations of sailfish, black marlin and tuna. Moreover, Pemba Island is thought to be a unique example of a diverse and deep-water coral community on a granitic island with spectacular underwater scenery¹⁰ and has on these grounds been considered as a potential area for World Heritage listing¹¹.

Pemba Island is the oldest geologically in the Zanzibar archipelago, which partly explains its heavily indented coastline with a large number of bays and a braided network of deep channels separated by sandbanks, peninsulas and archipelagos of islets of different shapes, sizes and geology. Pemba is a true oceanic island, with depths of 1,000 metres in the Pemba Channel separating it from the Tanzanian Coast. In 2004 the Department of Fisheries and Marine Resources (DFMR) of Zanzibar reiterated the value of the western coast of Pemba Island when it proposed the establishment of the Pemba Community-Based Marine Conservation Area, the northern part of the western coast extending from Mkia wa Ng'ombe in the North to Vikunguni Island near Misali¹². MACEMP finally brings the opportunity to study and, following the results of the current assessment and previous sentiments expressed by officials of the Revolutionary Government of Zanzibar, to protect the western coast of Pemba Island from north to south.

This study aims to describe and assess the proposed Pemba Channel Conservation Area (PECCA) with a view to assisting MACEMP during the preparation phase. Due to limited time available during the preparation phase, the study consisted of a "Rapid Assessment" of the *target area*, defined as stretching from the northern tip to the southern tip of Pemba following meetings with the lead department. The results and

⁹ WWF, 2001. Proceedings of the Eastern African Marine Ecoregion Visioning Workshop. Mombasa, Kenya, April 21st -24th 2001, pp 1-36.

¹⁰ World Heritage Marine Biodiversity Workshop Regional Paper for East Africa. World Heritage Biodiversity: Filling Critical Gaps and Promoting Multi-Site Approaches to New Nominations of Tropical Coastal, Marine and Small Island Ecosystems Potential Tropical Coastal, Marine and Small Island World Heritage Sites in the Eastern Africa Region. <http://international.nos.noaa.gov/heritage/documents.html>

¹¹ In the World Heritage Marine Biodiversity Workshop: Filling Critical Gaps and Promoting Multi-Site Approaches to New Nominations of Tropical Coastal, Marine and Small Island Ecosystems" held in Hanoi, Vietnam from 25 February to 1 March, 2002. Available at www.environmentaldefense.org/documents/2599_KNCHanoiStatement.pdf. The Workshop was convened by UNESCO's World Heritage Center, in collaboration with the U.S. National Oceanic and Atmospheric Administration (NOAA), the World Conservation Monitoring Center (WCMC) and IUCN.

¹² Department of Fisheries and Marine Resources, 2004. Pemba Community-Based Marine Conservation Area (PMCA), Zanzibar. Project Proposal, pp 1-7.

recommendations produced by the team will nonetheless shed light into how MACEMP can support sustainable natural resource management in the area and address existing threats to biodiversity.

This report presents the results and recommendations of the Rapid Assessment of the Proposed PECCA and is divided into three parts. Part I describes the terms of reference, the team and the methodology used to undertake the assignment. Part II presents the results obtained, both from the field work and literature review. Part III highlights the main recommendations and conclusions of the study. This report is complemented by technical guidelines for rapid biodiversity assessments, a library of photos and film of the proposed PECCA and an information booklet on PECCA.

2 TERMS OF REFERENCE

The full Terms of Reference (ToR) for the *Assessment and Description of Target Area for the Marine and Coastal Environment Management Project (MACEMP): Pemba Channel Conservation Area (PECCA)* are presented below.

1. Background – Project Description

The Government of the United Republic of Tanzania (URT) received funds from the World Bank to prepare the Marine and Coastal Environment Management Project.

The global objective of the proposed project is to preserve the globally significant biological diversity in critical marine ecosystems of mainland Tanzania and Zanzibar through effective integration and implementation of marine and coastal resources management strategies.

The project development objective is to enhance the contribution of marine and coastal resources to economic growth and reduction of poverty, and to develop the scientific understanding of the status of the resources and major threats to them.

The MACEMP project has *three components*¹³:

- a) Sound management of EEZ resources;
- b) Development of an effective MPA network;
- c) Integrated coastal management and investment into coastal livelihoods.

The Ministry of Natural Resources & Tourism, the Ministry of Agriculture, Natural Resources and Cooperatives (Zanzibar) and President's Ministry of Regional and Local Government Administration will lead project implementation.

2. Overview of Ongoing Preparatory Phase

The focus of the currently ongoing preparatory phase is to carry out a comprehensive review of the project context and project design as well as a detailed economic analysis, to assess institutional capacity, to prepare key project document including the GEF Project Brief, the Project Appraisal Document, the Project Implementation Manual and a number of specific

¹³ Component titles are tentative and may change during project preparation.

associated manuals (M&E, financial management, etc.), and to consult with stakeholders at all levels.

The next milestone for project preparation is the development of the GEF Project Brief to be submitted to the GEF by early December 2004 for approval by the GEF Council. Upon GEF Council approval, this document will evolve into the Project Appraisal Document (PAD), based on which the legal agreements for the MACEMP project will be drafted and based on which the World Bank Board of Directors are expected to approve the project in early 2005.

Project preparation activities are funded under a PHRD grant, GEF PDF B grant. In addition, pilot activities are carried out with funds made available to the URT from the Japanese Social Development Fund.

3. Selection of Target Areas for MACEMP

The MACEMP project will focus activities and investments on selected target areas in order to concentrate effort and not spread activities and investments too thinly. Target areas have been identified based on selection criteria established in a consultative process with a broad range of stakeholders.

Site selection criteria for MACEMP:

- Areas with strong community-driven demand and ownership for marine/fisheries managed areas and/or co-managed marine conservation areas;
- Areas of national priority as per PRS II, specifically, highly impoverished areas with high dependence on natural resources;
- Areas with strong potential for sustainability (from an institutional and financial point of view);
- Areas of global environmental importance (i.e. biodiversity hotspots);
- Areas where MACEMP can play a catalytic role (i.e. MACEMP support for institutional strengthening, capacity building, development of a management regime, etc. would lead to leverage of additional financial resources from other donors).

In line with MACEMP's ecosystem management principle, site selection follows an "area-based approach" meaning that selected target areas cover a larger area to ensure a) ecosystem functioning in terms of resilience, comprehensiveness (adequate size and spatial distribution), and representativeness (coverage of all types of biodiversity) and b) that relevant resource users with their respective natural resource management schemes are covered. This means for example, that each target area could cover all of the following within its boundaries: i) areas managed or proposed for conservation purposes (i.e. a marine protected area or conservation area, and ii) areas managed for sustainable use purposes (i.e. community managed fisheries areas), and iii) areas with no existing management schemes.

One of the priority areas selected to receive support through MACEMP is the proposed Pemba Channel Conservation Area (PECCA) plus its adjacent and surrounding communities.

4. Objectives of the Assignment

The objective of the assignment is to assist the Government of the United Republic of Tanzania, specifically the Project Coordination team for Zanzibar, with assessment and description of the Pemba Channel Conservation Area (PECCA) with view to MACEMP project preparation.

The assessment of the target area would result in a description of i) sector issues pertaining to management and use of coastal and marine resources in PECCA, ii) biodiversity assets available in PECCA (species, distribution, endemism, etc.), iii) threats and root causes affecting the coastal and marine environment in PECCA in general and global biodiversity in particular, iii) the coastal population of PECCA and related socio-economic aspects, and iv) economic activities ongoing or proposed for PECCA and their potential impact on the marine and coastal environment.

The consultant will work under the supervision of the MACEMP Project Coordination Team for Zanzibar and in close collaboration with staff from the Environment Divisions. Line ministries/departments, local authorities and relevant local organizations would be visited to collect already available data.

5. Approach for Carrying out the Assignment

MACEMP places high importance on collaborative planning with local partners. While the Fisheries Department under MANREC is the overall lead agency for MACEMP it is fully recognized that other departments as well as local NGOs can play an important role in pursuing the overall objectives of MACEMP. Therefore the approach to this assessment should be participative in as far as it is possible in the limited time available. The assignment would be carried out with close collaboration of the Department of Environment, and would be designed and carried out as a training exercise for department staff to undertake environmental and biodiversity assessments.

6. Outputs

1. The consultant will prepare a report containing the following information for the proposed Pemba Channel Conservation Areas (PECCA):

- A short summary of recommendation as to how the MACEMP project can support sustainable natural resource management to address threats and root causes to biodiversity as identified under this assignment
- A short general overview on the geographic aspects of the target area (including marine extent of PECCA), i.e. size, habitats, structure, etc.)
- A short description of the coastal population in and adjacent to PECCA, i.e. number of villages and approximate size of population per village;
- A short presentation of key socio-economic indicators of PECCA;
- A presentation of the development plans, land use plans and natural resource use plans and activities in PECCA that target the coastal and marine zone;
- A rapid assessments of biodiversity (in particular biodiversity of global importance), i.e. description of key habitats, endangered species, endemic species, migratory species, approximate species diversity);
- An analysis of threats and root causes/barriers to biodiversity conservation in PECCA.

The draft report would be presented to the Project Coordination Team for comments and questions. Comments and input received would be incorporated before final submission of the report.

2. Technical guideline for conduction of rapid biodiversity assessments.

3. Library of Photos and film on PECCA.

4. Information booklet on PECCA incorporating key information and data collected during the rapid biodiversity assessment as well photos taken of the PECCA area. The booklet would provide an outreach tool to raise awareness on the proposed Pemba Channel Conservation area. It would be targeted as international as well as local audience and would thus contain English as well as Swahili text sections.

7. Qualifications

The project wishes to engage a consultant or firm with the following expertise:

- At least 10 years of experience in coastal zone management in Eastern Africa;
- At least 10 years of experience in carrying out environmental and biodiversity assessments;
- Strong record in training and awareness raising activities at community and local government level;
- A record of previous work in Zanzibar islands, in particular Pemba;
- Proven knowledge of World Bank and Global Environmental Facility (GEF) priorities and principles; and previous contributions to development of GEF Project Briefs or Project Concept Documents.

3 METHODOLOGY

3.1 APPROACH AND METHODS USED

A composite methodology was used to carry out the Rapid Assessment of the target area (Table 1 and Map 1). The socio-economic aspects were captured by socio-economic interviews with fishers, a review of the literature (including publications, reports and memoranda) as well as discussions with relevant stakeholders. These methods also enabled the collection of information about existing plans and projects targeting the area under study, and gave insight on the existing institutional capacity for conservation areas management.

The biodiversity and ecosystem health was assessed through observations, photography and filming during coastal visits for above water biodiversity and observations and filming during dives for underwater biodiversity, as well as through a review of existing studies. The team analysed the information collected and impressions gained through all these methods to identify threats and root causes of biodiversity loss and outline recommendations. Throughout the project, the team interacted and discussed preliminary conclusions with the donor and the lead government agency namely the DFMR.

Table 1 Approach and methods used for the Rapid Assessment

1. INCEPTION MEETINGS WITH TEAM AND LEAD DEPARTMENT				
<i>Meeting in Unguja:</i> The team composed of EcoAfrica, local NGOs and government representatives met first at the DFMR in Stone Town (Unguja) to analyse the ToR, agree on project objectives and approach, share preliminary perspectives, define the work plan, assign tasks and organise the logistics for the field work.		<i>Meeting in Pemba:</i> A second meeting was held in the DFMR in Wete, Pemba, between the full project team and the DFMR to analyse the ToR and project objectives, agree upon the geographic area to be covered by the study (entire western coast) and the specific sites to visit.		
2. FIELD DATA COLLECTION				
<i>Socio-economic interviews:</i> Structured interviews were conducted by the local team with fishers in selected sites in the target area.	<i>Diving and filming:</i> The diving team dived, filmed and recorded species and habitats observed in selected sites along the target area.	<i>Coastal visits, photography and filming:</i> Different habitats and economic activities in the target area were observed, filmed and photographed.	<i>Aerial filming and photography:</i> a flight over the target area and the use of aerial photographs and filming provided a useful overview of the system.	<i>Literature review and stakeholder discussions:</i> Discussions were held with key players and literature about target area collected.
All data collected was recorded and gathered for analysis. The team met regularly to discuss preliminary results and make adjustments to the work plan as required.				
3. DATA ANALYSIS AND DISCUSSIONS				
<i>Team discussions:</i> The team met regularly to analyse the results, fill gaps, assemble and summarise information for the report, and discuss recommendations.		<i>Meetings with the lead department:</i> The team met with the DFMR on several occasions to discuss preliminary results and recommendations.		
4. REPORT WRITING AND REVIEW PROCESS				
The draft report was sent to all members of the team, the lead department and the donor for comments before final submission.				

3.1.1 Socio-economic interviews

The fishers are the major users of coastal and marine resources in the target area and have therefore been the target of the socio-economic interviews. The aim was to understand how the fishers exploit the living marine resources and how such activities support their livelihood as well as affect the resource base. A template for the interviews with fishers was prepared (Table 2) and used to conduct individual interviews with both men and women. A total of 154 interviews were conducted and the full interviews are presented in Appendix IV in a separate document.

Table 2 Template used for socio-economic interviews with fishers

A) PERSONAL DETAILS	
1	What is your name?
2	How old are you?
3	How many people depend on you?
4	What is your education level?
5	How long have you been a fisher?
6	What is your father's profession?
7	How long have you lived here?
8	What other activities do you have?
9	Is the income you get from fishing sufficient?
B) LOCATION	
10	Where do you fish?
11	Which place do you prefer to fish?
12	What types of ecosystem are available in this location?
13	What are the problems you encounter in the area where you fish?
14	Are there other fishers coming to fish here?
C) METHOD AND GEAR	
15	What kind of boat do you use?
16	Do you work alone or in group?
17	What kind of gear and method you use?
18	Do you own the boat?
19	Is there any fishers association or cooperative?
D) CATCH ANALYSIS	
20	What type of organisms do you fish?
21	Do you sell the fish? Where?
22	How many kg you sell a day?
23	How do you keep your fish?
E) FISHING STOCK	
24	How do you compare the amount of fish you catch with 5 years ago?
25	And 10 years ago?
26	What is the reason for the change?
27	What is the most common fish?
28	How do you feel about giving you assistance to conserve the fishing stock?
29	What alternative activities could you do?

3.1.2 Assessment of marine biodiversity

The team of divers carried out a series of dives in sites that were selected by the team and the DFMR in Pemba and was assisted by advice from local diving operators. Based on observations underwater and subsequent viewing of the film, the team composed a rough species list and assessed the health of the coral reefs and the potential for tourism according to specific criteria (Table 3). A total of 13 dives using two divers were conducted along the proposed PECCA. Profiles of the dive sites—including the rating of the reefs—is presented in Appendix I and the lists of species observed in Appendix II.

Table 3 Criteria for rating reefs

CRITERIA FOR RATING OF REEF DAMAGE	CRITERIA FOR RATING OF REEF POTENTIAL FOR TOURISM
1) Signs of anchor and boat damage (anchor drag marks or keel marks) 2) Signs of fishing activities (coral heads turned around or dragged along bottom and pieces of net and fishing line) 3) Storm damage and bleaching 4) Explosives used for fishing	1) Diversity of species of (a) fish and (b) invertebrates 2) Colourful and big fish 3) Signs of destruction 4) Numbers of fish and coral on site 5) Abundance of <i>Diadema</i> and other “nasties” The following was not taken in consideration: <ul style="list-style-type: none"> ▪ On land facilities ▪ Ease of travel to dive site ▪ Distance to travel to site ▪ Boat availability and construction ▪ Currents and sea conditions

3.1.3 Assessment of coastal biodiversity

Many different places along the coast were visited during the entire exercise, where the team observed the existing habitats and recorded them on video and with stills photography. A flight at low altitude over the target area, supported by aerial photographs of limited sections of the target area made available by the Sustainable Management of Land and the Environment (SMOLE) Project¹⁴, provided an overview of the area and showed aspects that are difficult to see on the ground.

3.1.4 Literature review and discussions with stakeholders

An extensive literature review was carried out using the EcoAfrica library, the Distance Learning and Information Sharing Tool or DLIST Agulhas and Somali¹⁵ library that is currently being created, the Government Departments and NGOs in Zanzibar, and the Internet. The team met with key stakeholders in the target area, from Government to NGOs and other projects and programmes (see Appendix III).

¹⁴ Sustainable Management of Land and Environment (SMOLE) is a strategy being currently implemented through the Department of Environment, Department of Lands and Registration and Department of Surveys and Urban Planning with assistance from the Foreign Ministry of Finland. SMOLE activities include aerial photography to map Zanzibar, clarification of land tenure, updating the land registration and environmental management. Its environmental component focuses on Environmental Assessment (EA), State of Environment Reporting and public awareness about environmental issues. Clear land tenure and improved implementation of EA regulations will facilitate sustainable coastal management and planning in Unguja and in Pemba and hence have particular relevance for the envisioned PECCA.

¹⁵ The Distance Learning and Information Sharing Tool (DLIST on www.dlist.org) is an online mechanism dedicated to distance learning and information sharing between coastal players. It was piloted with trust funds from the World Bank for the Benguela Current Large Marine Ecosystem (BCLME) and its functions such as the library and discussion forums are currently used by a cross-section of society. Under the GEF programme “Towards an Ecosystem Approach for Sustaining the Agulhas and Somali Currents Large Marine Ecosystems” DLIST will be replicated on the east side of the continent and discussions for its implementation with local institutions in Tanzania and other countries are well underway. Already it has a growing library that will soon be made available on the internet.

3.2 DURATION AND GEOGRAPHIC AREA COVERED

The field work was carried out during approximately three weeks between 1 and 20 November 2004. The boundaries of the proposed PECCA had not been clearly defined before and, based on guidance by the DFMR and a collective assessment of the island's geography¹⁶, the team decided to concentrate on the entire western coastal area of Pemba. This open minded approach would enable a complete assessment of the region and would still allow for more limited boundaries if appropriate. Based on DFMR's knowledge of the area, the team selected key areas to visit and apply the different assessment methods (listed on Table 4 from North to South and mapped on Map 1).

Table 4 Geographic areas selected for the Rapid Assessment

DISTRICT	INTERVIEW SITES AND VISITS	DIVING SITES
Micheweni	1: Tondooni, Makangale 2: Ras Kigomasha	1: Tondooni 2: Tondooni
Wete	3: Kimeleani, Fundo Island 4: Ndooni, Fundo Island 5: Ngagu, Fundo Island 6: Miti Ulaya, Wete Port 7: Mabaoni, Fundo Island 8: Chanjaani, Mtambwe North 9: Kokota, Kokota Island 10: Mitambuu, Mtambwe South 11: Kinazini, Mtambwe South	3: Fundo Gap 4: Uvinje Island (Northeast) 5: Uvinje Island (West) 6: Uvinje Island (Southeast) 7: Uvinje Gap 8: Kokota Island (East)
Chake	12: Kichanjaani, Ndongoni 13: Weshu Port, Weshu 14: Mbuyuni, Misali Island	9: Ras Mkumbuu 10: Misali Island 11: Misali Island
Mkoani	15: Kwa Azzan, Wambaa 16: Mkoani Port, Mkoani 17: Kinyasini, Makoongwe Island 18: Liko Kuu, Chokocho 19: Panza, Panza Island	12: Ndweni Islets 13: Ndweni Islets

¹⁶ The west side of Pemba is flanked by the Pemba Channel. Its coast is heavily indented, and there are numerous small islands and channels as opposed to the coral rag-based east side of the island that faces the open ocean and is much less indented.

4 THE TEAM

The approach taken to this assignment was participative, involving a range of local partners that will in the future have a role to play in MACEMP implementation. Table 5 lists the members of the team that worked in the Rapid Assessment.

Table 5 Team members

NAME	ORGANISATION
François Odendaal	EcoAfrica Environmental Consultants, South Africa
Peet Joubert	EcoAfrica Environmental Consultants, South Africa
Raquel Garcia	EcoAfrica Environmental Consultants, South Africa
Claudio Velasquez	Francois Odendaal Productions, South Africa
Issa Ameir Suleiman	MANREC – Department of Fisheries and Marine Resources (DFMR), Unguja Island
Sharrif Moh'd Faki	MANREC – Department of Fisheries and Marine Resources (DFMR), Pemba Island
Asha Ali Khatib	MANREC – Department of Environment (DoE), Unguja Island
Peter Shunula	MANREC – Department of Fisheries and Marine Resources (DFMR), Unguja Island
Fatma Mohammed Omar	Community Development and Environmental Conservation of Zanzibar (CODECOZ), Pemba Island
Mbarouk Mussa Omar	Misali Island Conservation Association (MICA), Pemba Island
Said Mbarouk Juma	Wete Environmental Conservation Club (WECOC), Pemba Island
Daudi Othman Kondo	Pemba Island Relief Organisation (PIRO), Pemba Island

PART II: RESULTS AND DISCUSSION

5 OVERVIEW OF GEOGRAPHIC ASPECTS

The following overview of geographic aspects has its origin in both the existing literature and first-hand observations by the Rapid Assessment Team.

5.1 THE PEMBA CHANNEL AREA

The Zanzibar Archipelago (formed by Pemba and Unguja islands) and Mafia Island form a chain of islands from the ancient Miocene Rufiji/Ruvu delta. The core of these islands consists of rocks ranging in age from Miocene to recent calcareous sediment with limestone of marine origin. Believed to have emerged from the sea later compared to Pemba, Unguja Island was connected to the mainland of Tanzania as late as the beginning of the Pleistocene age. Pemba is comprised of a simple fault block and it rose earlier than Unguja. Topographically, it is a single ridge and watershed with a raised east coast. Ten million years older than Unguja, Pemba is a true oceanic island with depths of 1,000 metres in the Pemba Channel separating it from the Tanzanian Coast (Figure 1).

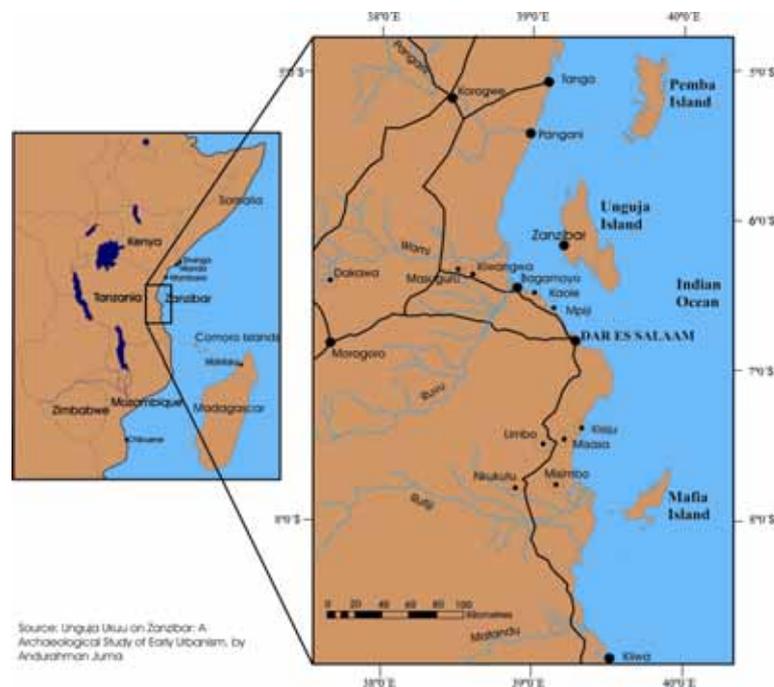


Figure 1 Location of Pemba Island off the East African coast

Today, the three islands are large and conspicuous landmarks along the East African coast. The Zanzibar Archipelago lies about 40 km off the East African coast and is part of the United Republic of Tanzania (URT). The islands are part of the Eastern African Marine Ecoregion (EAME), which contains high levels of biodiversity, important feeding and breeding areas and migratory routes for endangered marine mammals. Resulting in part from the very different ages, the geological differences between Pemba and Unguja are striking: the latter has a smooth coastline while the coastline of ancient Pemba is heavily indented with countless large and small bays, and a braided network of deep channels separated by sandbanks, peninsulas and archipelagos of islets of different shapes, sizes and geology.

5.2 SHORT DESCRIPTION OF PEMBA

Separated from the African mainland by the deep Pemba Channel, the Island of Pemba is a true oceanic island surrounded on all sides by deep water reaching a maximum depth of 1,092 m¹⁷. It lies approximately 45 km north east of Unguja Island, between the latitudes 04° 50'S and 05° 30'S, bisected by the longitude 30° 45'E¹⁸. Pemba is about 62 km long and 22 km wide at its broadest point, covering an area of around 900 km² (different figures were found in the literature: 1,505¹⁹, 985²⁰, 961 excluding mangrove area²¹, 868²², and 920²³ km²). Pemba has more undulating landscape and more continuous tree canopy than what is found in Unguja. Pemba was previously called the “Green Island” because of the tropical forest that covered much of the surface area. Some sources say that the island is still sometimes referred to as the “Green Island” because of its lush appearance. On the north-western tip of Pemba Island lies the Ngezi Forest, a remnant of the forest that used to cover much of the west side of the island.

With a coastline of 450 km, Pemba Island shows a magnificent array of marine and coastal habitats. The eastern side of the island is dominated by deep reefs and a more uniform coastline than the western side, which is heavily convoluted with many bays fringed by healthy mangroves and shallow sandbanks with abundant sea grass beds. The west coast of Pemba Island is a unique indented coast fronted by low lying Pleistocene coral islands. Pemba has 50 islets—of which 37 are inhabited²⁴—and the ones on the west coast harbour characteristic deep water coral reefs (see Map 2).

¹⁷ UNEP, 1989. *Coastal and Marine Environmental Problems of the United Republic of Tanzania*. UNEP Regional Seas Reports and Studies No. 106, Annexes, pp 1-114.

¹⁸ UNEP, 1989. *Coastal and Marine Environmental Problems of the United Republic of Tanzania*. UNEP Regional Seas Reports and Studies No. 106, Annexes, pp 1-114.

¹⁹ Freeman, P., 1997. *Zanzibar's Protected Areas. An Assessment of Revenue Generating Potential from Tourism. A discussion paper*. The Environment & Development Group, Zanzibar Protected Areas Project, pp 1-30.

²⁰ Grootenhuis, F. and Lopez, J., 2003. *Household Economy Analysis for Zanzibar. Final Report*. Revolutionary Government of Zanzibar, World Food Programme, Save the Children, pp 1-192.

²¹ Arup Environmental, 1999. *Environmental Impact Assessment for the Proposed Development of a Luxury Lodge at Tondooni, Pemba Island, Zanzibar*. Draft EIA Report, pp 1-146.

²² Revolutionary Government of Zanzibar, 1996. *Human Settlement Development Programmes for Zanzibar. 1996-2010*. The Ministry of Water, Construction, Energy, Lands and Environment, pp 1-25.

²³ CARE, 2003. *Pemba Rural Livelihood Security Assessment*. May 2003, pp 1-109.

²⁴ According to map series Y742 (D.O.S.408); SHEET P1;ED. 1.0.S.D1986.

The high biodiversity of reef fish, invertebrates and many endangered species as their migratory routes have potential biological values of national and global significance. These islets, especially those that are uninhabited, provide habitat for Zanzibar's indigenous plants and animals. Settlement in many of these islets is hampered by lack of freshwater, but some are used by fishers as camping sites, or for agriculture and collection of poles and firewood. They can thus be of great economic importance to users of the islet resources and marine areas accessible from the islets. These users usually come from villages covering a wide geographic area, a good example being Misali Island that is used by fishers coming from 36 *shehias*²⁵ spread around Pemba (including several from the east side).

Lying in the Pemba Channel 15 km west of the main island, Misali is a coral island of 0.9 km² with unique and diverse marine and terrestrial environments that are relatively undisturbed compared with other areas in Zanzibar and Tanzania²⁶. Misali is surrounded by coral reef with seagrass beds to the south, and its coral reefs are in relative good health despite some damage caused by destructive net fishing techniques and the island is an important turtle nesting site. Studies²⁷ have indicated that the island's habitats, the high overall species diversity and the strong tidal currents could make the area an important "seed bank or source" that may be supplying other areas of Tanzania and East Africa. Misali Island is today the only marine conservation area in Pemba Island.



Figure 2 The islands of Misali and Kokota, and the mangrove areas in the south

North of Misali there is a unique group of islets (Vikunguni, Kashani, Mapanya, Kokota, Funzi, Pembe and Uvinje) where there are also fish landing sites and seasonal camping. Fundo and Njao are two long islets along the northwest coast of Pemba where there are settlements and fishing and agricultural activities. On the south-western corner of Pemba, the inhabited Makoongwe islet lies next to the Kwata, an islet consisting of leached and weather coral outcrops that is seldom used by humans but is a significant breeding site for birds. The Matumbini reef complex includes several islets that are not inhabited, though there are seasonal fishers camping sites. The site is exposed to deep sea and is rich in coral fauna and mangrove vegetation, and has been proposed for conservation in

²⁵ The administrative government divisions in Zanzibar are Region, District, *Shehia*, and Village (see chapter 7.1).

²⁶ Horrill, J.C., Machano, H. and Omar, S.H., 1994. *Misali Island; Rationale for a Marine Protected Area..* Zanzibar Environmental Study Series Number 17. The Commission for Lands and Environment, Zanzibar, pp 1-12.

²⁷ Horrill, J.C., Machano, H. and Omar, S.H., 1994. *Misali Island; Rationale for a Marine Protected Area..* Zanzibar Environmental Study Series Number 17. The Commission for Lands and Environment, Zanzibar, pp 1-12.

the early nineties²⁸. Linked to the Matumbini Island by an extensive mangrove area is Panza Island, as well as a number of small islets (Nduwan, Mzingani, Ngezi, Panani and Mwinzi), all of them with fringing reefs supporting important fishing and other marine species.

The whole island can be considered of high regional and global significance because there are few islands in the WIO that equal Pemba's diverse and ecologically sound marine environment. Pemba seems to be in a relatively healthy state yet clearly requires adequate conservation and management initiatives to protect the high marine biodiversity while at the same time providing sustainable yields of marine protein to the local population. The west coast of the island undoubtedly plays a key role in generating and maintaining the region's high marine biodiversity, and its sustainable management and a conservation area that will be known as the Pemba Channel Conservation Area (PECCA) are thus being proposed.

5.3 MAIN HABITATS

5.3.1 Coral Reefs

Pemba Island's steep reefs with their high diversity and coral growth and sloping down in excess of 64 metres have been considered to be of ecoregional importance and unique as the only oceanic reefs in the EAME²⁹. The 1,100 km of coral reef around Pemba Island represent 50% of the coral reefs in Tanzania³⁰ and support a high diversity of coral genera, fish and over 40 species of sponges³¹. Coral cover in Pemba Island was 40 to 60% with 40 genera observed³², representing two thirds of the coral genera known to occur in Tanzania³³. The dominant species are *Porites spp.*, *Montipora spp.*, *Montastrea spp.*, *Diploastrea spp.*, *Acropora spp.* and *Galaxea spp.*³⁴.

The 40 coral genera observed in Pemba are present in the 9.4 km ring of coral reef surrounding Misali Island³⁵. Coral reefs have been predominantly recorded to the west of Misali Island with some coral outcrops to the east and small reef areas to the north and south. Studies recorded that coral cover within the reef areas was intermittent and ranged from small outcrops and patchy reefs to physically complex coral walls. The number of

²⁸ Faki, O.M, undated. *National Consultancy Report*. Biodiversity Project UNO/RAT/006/GEF, pp 1-29.

²⁹ WWF, 2001. Proceedings of the Eastern African Marine Ecoregion Visioning Workshop. Mombasa, Kenya, April 21st -24th 2001, pp 1-36.

³⁰ Church, J., 1997. Marine Conservation and Tourism in Pemba. A report on scuba diving and deep sea fishing operations around Pemba prepared for the Misali Island Nature Conservation Area Project. Commission for Natural Resources, Zanzibar Protected Areas Project, pp 1-36.

³¹ WWF, 2001. Proceedings of the Eastern African Marine Ecoregion Visioning Workshop. Mombasa, Kenya, April 21st -24th 2001, pp 1-36.

³² UNEP, 1989. Coastal and Marine Environmental Problems of the United Republic of Tanzania. UNEP Regional Seas Reports and Studies No. 106, Annexes, pp 1-114.

³³ Horrill, J.C., Machano, H. and Omar, S.H., 1994. Misali Island; Rationale for a Marine Protected Area.. Zanzibar Environmental Study Series Number 17. The Commission for Lands and Environment, Zanzibar, pp 1-12.

³⁴ UNEP, 1989. Coastal and Marine Environmental Problems of the United Republic of Tanzania. UNEP Regional Seas Reports and Studies No. 106, Annexes, pp 1-114.

³⁵ Horrill, J.C., Machano, H. and Omar, S.H., 1994. Misali Island; Rationale for a Marine Protected Area.. Zanzibar Environmental Study Series Number 17. The Commission for Lands and Environment, Zanzibar, pp 1-12.

coral genera and morphotypes indicates high species diversity around Misali Island. Fleshy algae and soft coral growth were minimum, which implied that the hard corals were able to establish themselves without competition from these organisms³⁶. It is important to note that only Misali has been studied to any extent and that it is likely that many more species of coral occur in the coastal waters along the west side as a result of the diverse habitats and complex current regime.



Figure 3 Coral outcrop in the lagoon at Misali Island

With an outstanding variety of reefs, Pemba has coral communities that range from shallow to deep reef (down to 64 meters depth) and some highly diverse and productive reefs with large biomass of filter feeders at the head of lagoons such as the one off Ras Mkumbuu in the target area. By being located at the lagoon head, these reefs receive a larger load of organic material than reefs located closer to the open ocean. Large coral formations were seen in these areas, reflected in a large diversity and number of fishes. One possible reason for this fish diversity and abundance is the use of traditional and non-destructive fishing methods. This type of reef, with its high productivity and diversity, certainly requires a closer examination since it is probably easily overlooked because the low visibility in those areas makes diving less attractive.

Studies³⁷ have shown that along the western coast of Pemba Island, the fringing reef flat top is extensively damaged in places, while the reef slope has few dead corals, with between 21% and 60% coral cover. There has been some damage of the reefs in Misali by dynamite fishing and dragging seine nets. Coral mortality resulting from 1998 coral bleaching event ranging from 50% to 90% was recorded on different reefs along the Tanzania mainland coast, Mafia and Pemba Islands. On Misali reefs coral cover decreased from 74% to 17% and from 57% to 7% in 2 different sites. Recovery begun one year later yet the recovery rates appear to be influenced by levels of human activities on the reefs³⁸. The Rapid Assessment Team found the coral reef system in the proposed PECCA to be affected but largely in a healthy condition (Appendix I). At some sites the coral communities appeared to be pristine, except perhaps for the number of fish that obviously has been affected by fishing.

³⁶ Frontier-Tanzania, 2004. *Misali Island: A detailed description of the subtidal regions*. Frontier Tanzania Environmental Research Report 103. Daniels, C., Fanning, E. & Jiddawi, N. (eds). Society for Environmental Exploration, UK with the University of Dar es Salaam including the Institute of Marine Sciences and the Ministry of Agriculture, Natural Resources and Cooperatives, Zanzibar, pp 1-24.

³⁷ Wagner, G. M., 2000. Coral Reefs. In Ngusaru, A. S. (ed), 2000. The present state of knowledge of marine Science in Tanzania – Synthesis report. Tanzania Coastal Management Partnership, pp 101-137.

³⁸ Muhando, C.A., 1999. *The 1998 Coral Bleaching and Mortality event in Tanzania: Implications for Coral Reef Research and Management*. Conference on Advances on Marine Sciences in Tanzania, 28th June – 1st July 1999, Zanzibar, Tanzania. Institute of Marine Sciences. July, 1999, pp 1-14.

5.3.2 Mangroves

There are 10 species of mangrove (out of 11 present in Tanzania) growing in extensive stands in the PECCA area (*Avicennia marina*, *Ceriops tagal*, *Lumnitzera racemosa*, *Xylocarpus granatum*, *Xylocarpus molucensis*, *Heritiera littoralis*, *Bruguiera gymnorrhiza*, *Rhizophora mucronata*, *Sonneratia alba*, and *Pemphis acidula*)³⁹ and often associated with extensive seagrass and algal beds. The mangrove stands in Pemba Island appear to be in higher quantities than those in Unguja—Pemba Island has a mangrove area of 12,000 ha out of the 20,000 ha in Zanzibar⁴⁰—and the mangrove stands are less impacted by human activities than those in Unguja⁴¹.

There are important areas of mangrove around Mgelema and Chake Chake, Chokocho to Michenzani, Jamvini to Kisiwani, and Matumbini (see Map 2). Misali Island is constructed of coral rag and therefore much of the vegetation consists of coral rag forest and coral rag bush or coastal thicket⁴². There are some mangrove stands scattered around the intertidal areas of the island, but also in small stands within its interior, the most predominant species being *Rhizophora mucronata* and *Sonneratia alba*⁴³.

5.3.3 Seagrass beds

Seagrass beds provide shelter, food and nursery area for some of the important and valuable species of fish, shellfish, and the green turtle. Worldwide there are 58 species of seagrasses of which twelve species are found in the WIO. Pemba Island has possibly the deepest seagrass beds in the EAME⁴⁴. Common genera are *Thalassia*, *Thallasodendron* and *Zostera*⁴⁵.

5.3.4 Forest

On the north-western tip of Pemba Island lies the Ngezi Forest, a remnant of the forest that used to cover the island and a reserve since 1959. The reserve represents the richest

³⁹ Some authors mention 9 species of mangroves present in Pemba Island, as there is considerable debate around the status of *Pemphis acidula*, described by some authors as an intermediate between a strand plant and a mangrove. Some authors regard it as a mangrove similar to *Pemphis madagascariensis*, a mangrove restricted to Madagascar, while others regard it as a mangrove associate. Local experts, including Dr. J. P. Shunula from the IMS, regard it as a mangrove.

⁴⁰ Shunula, J.P., 2002. Public awareness, key to mangrove management and conservation: the case of Zanzibar. *Trees: structure and function*. Vol 16 (2-3), March 2002, pp 235-238.

⁴¹ Shunula, J.P., 1990. A Survey on the Distribution and Status of Mangrove Forests in Zanzibar, Tanzania. Nov-Dec 1990. Zanzibar Environmental Study Series Number 5 1990. The Commission for Lands and Environment, Zanzibar, pp 1-29.

⁴² Cooke 1972 In: Frontier-Tanzania, 2004. *Misali Island: A detailed description of the subtidal regions*. Frontier Tanzania Environmental Research Report 103. Daniels, C., Fanning, E. & Jiddawi, N. (eds). Society for Environmental Exploration, UK with the University of Dar es Salaam including the Institute of Marine Sciences and the Ministry of Agriculture, Natural Resources and Cooperatives, Zanzibar, pp 1-24.

⁴³ Frontier-Tanzania, 2003. *Misali Island: A description of the mangrove regions*. Frontier Tanzania Environmental Research Report 102. Daniels, C., Fanning, E. & Jiddawi, N. (eds). Society for Environmental Exploration, UK with the University of Dar es Salaam including the Institute of Marine Sciences and the Ministry of Agriculture, Natural Resources and Cooperatives, Zanzibar, pp 1-43.

⁴⁴ WWF, 2001. Proceedings of the Eastern African Marine Ecoregion Visioning Workshop. Mombasa, Kenya, April 21st -24th 2001, pp 1-36.

⁴⁵ UNEP, 1989. Coastal and Marine Environmental Problems of the United Republic of Tanzania. UNEP Regional Seas Reports and Studies No. 106, Annexes, pp 1-114.

forest habitat on Zanzibar⁴⁶, comprising coral rag forest, mangrove, swamp (riverine) forest, giant *Philippia* heathland, and freshwater swamps⁴⁷. *Philippia* heathland is unique to Mafia and Pemba Islands and is being destroyed on Mafia Island. The assemblage of flora species on Ngezi Forest is unique in the East African context. The most common Ngezi forest species, *Odyndea zimmermannii*, is globally rare and the Ngezi endemic Mpapindi palm (*Chrysalidocarpus pembanus*) is considered vulnerable⁴⁸. Despite its conservation status, the Ngezi Forest is used by the local communities for collection of wild honey, bungo fruit, hunting of birds and small mammals, and collection of mangrove poles for construction purposes⁴⁹. Misali Island's forest, in turn, is a relatively undisturbed example of coral rag forest, which is becoming increasingly rare in Zanzibar and Tanzania⁵⁰.

6 THE NATURAL SYSTEMS

6.1 THE PEMBA CHANNEL SYSTEM

Pemba Island is a strong generator of marine resources for the region due to highly productive and relatively pristine and diverse habitats that are closely linked and functionally connected. Located not far from the African continent, Pemba Island creates a centre for production of marine resources, as many species of fish and other marine organisms are attracted to its shores for foraging and breeding. Pemba increases the marine diversity in the East African region simply by forming a nucleus of productivity in the Pemba Channel that exports marine life to adjacent areas including deep and shallow waters around the island and mainland.

6.2 DESCRIPTION OF BIODIVERSITY

6.2.1 Fish

The marine habitat diversity is reflected in the diversity of fish species. The North Pemba Channel, with its steep drop off causing upwelling, supports important concentrations of sailfish, black marlin and tuna⁵¹. The Pemba Banks, together with the North Kenya Banks

⁴⁶ Freeman, P., 1997. *Zanzibar's Protected Areas. An Assessment of Revenue Generating Potential from Tourism. A discussion paper*. The Environment & Development Group, Zanzibar Protected Areas Project, pp 1-30.

⁴⁷ Arup Environmental, 1999. *Environmental Impact Assessment for the Proposed Development of a Luxury Lodge at Tondooni, Pemba Island, Zanzibar*. Draft EIA Report, pp 1-146.

⁴⁸ Beentje, H., 1993. *Botanical assessment of Ngezi Forest, Pemba*. Technical Paper No. 1, Zanzibar Forestry Development Project, Phase 2. In: Arup Environmental, 1999. *Environmental Impact Assessment for the Proposed Development of a Luxury Lodge at Tondooni, Pemba Island, Zanzibar*. Draft EIA Report, pp 1-146.

⁴⁹ Arup Environmental, 1999. *Environmental Impact Assessment for the Proposed Development of a Luxury Lodge at Tondooni, Pemba Island, Zanzibar*. Draft EIA Report, pp 1-146.

⁵⁰ Frontier-Tanzania, 2003. *Misali Island: A description of the mangrove regions*. Frontier Tanzania Environmental Research Report 102. Daniels, C., Fanning, E. & Jiddawi, N. (eds). Society for Environmental Exploration, UK with the University of Dar es Salaam including the Institute of Marine Sciences and the Ministry of Agriculture, Natural Resources and Cooperatives, Zanzibar, pp 1-43.

⁵¹ WWF, 2001. *Proceedings of the Eastern African Marine Ecoregion Visioning Workshop*. Mombasa, Kenya, April 21st -24th 2001, pp 1-36.

and the Latham Island, are globally important congregations of Black Marlin (*Makaira indica*) that only occur in these densities in East Africa and Australia⁵². The Pemba Channel is a world renowned big game fishing area. The presence of considerable numbers of large predators such as the Black Marlin, Yellowfin tuna and Hammerhead Shark indicate a significant interaction with oceanic species.

The deep channels contain many other pelagic species in large numbers, while the reefs are as diverse as the best reefs observed by the Rapid Assessment Team anywhere else in the WIO, including the diverse granitic islands of the Seychelles and the Radamas Islands in north-western Madagascar. A total of 350 species of fish have been recorded in Misali Island⁵³ and it is suspected that there are many more. A remarkable lack of sightings of the *Caranx* group as well as larger fish such as Groupers and Hump head wrasses during the Rapid Assessment dives is, however, cause for concern. Very few Moray eels were noted in a region that should support scores of these fish (see Appendix II).



Figure 4 The Red Fire Goby, Rip Butterflyfish, and a marine turtle⁵⁴

6.2.2 Marine turtles

Five species of sea turtles can be found in the WIO, of which four have been recorded on Pemba Island (Green Turtle, Hawksbill, Leatherhead and Loggerhead) although only the Green and Hawksbill Turtles are known to nest⁵⁵. A nest recording programme that was initiated in Pemba Island in 1995 has shown that Pemba is a significant nesting area for sea turtles with a minimum of 120 nests over a 12 month period⁵⁶. More than 80% of the

⁵² World Heritage Marine Biodiversity Workshop Regional Paper for East Africa. World Heritage Biodiversity: Filling Critical Gaps and Promoting Multi-Site Approaches to New Nominations of Tropical Coastal, Marine and Small Island Ecosystems Potential Tropical Coastal, Marine and Small Island World Heritage Sites in the Eastern Africa Region. Available on <http://international.nos.noaa.gov/heritage/documents.html>

⁵³ Redding, D., 2003. *Fish Species List. Misali Island*. Marine Research Programme, Phase One: Misali Island. Frontier Tanzania, University of Dar es Salaam, pp 1-7.

⁵⁴ Photos by Greg Becker.

⁵⁵ Clark, F., 1992. *Pemba Sea Turtle Survey. Report on Pre-Survey Training Workshop for Village Contacts*. Held at Shamiani School, Chake Chake, Pemba, December 3 1992. department of Environment, Zanzibar and Department of Natural Resources (Fisheries), Zanzibar. ZILEM Project, pp 1-16.

⁵⁶ Slade, L., A.A. Khatib, M.H. Yussuf, 1997. *Sea Turtles in Zanzibar: Pemba Sea Turtle Conservation Education and Community Nest Recording Programme. November 199 –March 1997*. Department of Environment, Zanzibar, pp 1-50.

turtle nesting sites identified by this Programme are located in the target area, with major sites in the islets of Misali and Makoongwe⁵⁷.

Unfortunately turtles are eaten widely on Pemba in spite of this being an illegal practise, and turtle products are also exported although not openly. Such actions constitute serious threats to the turtle populations and breeding areas. Poorly planned tourism has also been cited as a threat to turtle nesting sites⁵⁸. Fortunately, the right interventions apparently have had positive effects thus far as has been shown by pilot sites for environmental education⁵⁹. Under MACEMP the pilots can be resumed, expanded and institutionalised, for instance through incorporation into the school curriculum.

6.2.3 Marine mammals

Dolphins are found on Pemba and the target area is considered a significant area for dolphins in the region based on the regular sightings by fishers and commercial diving operations. Indo-Pacific bottlenose dolphins (*Tursiops aduncus*), Indo-Pacific humpback dolphins (*Sousa chinensis*) and spinner dolphins (*Stenella longirostris*) are the species most often encountered in Zanzibar coastal waters⁶⁰. Spinner dolphins (*Stenella sp.*) have been recorded around Misali and there are occasional sightings of humpback dolphins (*Sousa sp.*) in the bay between Misali and the main island of Pemba (Ras Tundaua)⁶¹. Unfortunately dolphins are still caught and eaten.

Along the west side of elongated Fundo Island there are significant numbers of whales in the inshore waters and the *sheha* estimated that five or more whales are sighted from one spot on land per day. Whale species regularly sighted in the Pemba Channel are the Humpback whales (*Megaptera novaeangliae*) and the Spermwhales (*Physeter catodon*). The fishers regard them as a nuisance and they appear to have no value. Occasionally whales get entangled in nets, when they are sometimes killed and eaten. The Rapid Assessment Team believes that the whales can add value to potential ecotourism operations on Fundo Island.

The Pemba-Zanzibar Channel is one of the centres of dugong (*Dugong dugon*) population in Tanzania, the other being the Rufiji–Mafia area. Killed for flesh and oil, the local

⁵⁷ Khatib, A.A., M.H. Abdalla and N.S. Jiddawi, 2002. *Sea Turtle Nest Recording Programme. Progress Report March – September 2002*. Zanzibar Turtle Conservation Committee. Fisheries Department, Zanzibar, pp 1-17.

⁵⁸ Slade, L., A.A. Khatib, M.H. Yussuf, 1997. *Sea Turtles in Zanzibar: Pemba Sea Turtle Conservation Education and Community Nest Recording Programme. November 1995 – March 1997*. Department of Environment, Zanzibar, pp 1-50.

⁵⁹ Khatib, A.A., M.H. Abdalla and N.S. Jiddawi, 2002. *Sea Turtle Nest Recording Programme. Progress Report March – September 2002*. Zanzibar Turtle Conservation Committee. Fisheries Department, Zanzibar, pp 1-17.

⁶⁰ Ortlund, N. (1997) *Species composition, behaviour and movement patterns of dolphins in Nungwi, Zanzibar*. SIT, Marine research report. Institute of Marine Sciences, Zanzibar, University of Dar es Salaam. (unpublished report available from Institute of Marine Sciences, Zanzibar); Stensland, E., Berggren, P., Johnstone, R. & Jiddawi, N. S. (1998) Marine mammals in Tanzania: Urgent needs for status management. *Ambio* **xxvii** 8: 771–774; and Todesco, A. (1999) *Dolphin tourism in Kizimkazi, Zanzibar: What is it? Who profits? What has it meant for the village?* In: Jiddawi, N. S. & Stanley, R. D. (Eds) *Fisheries stock assessment in the traditional fishery sector: The information needs. Proceedings of the National Workshop on the Artisanal Fisheries Sector, Zanzibar, 22–24 September, Zanzibar, Tanzania*. pp. 144–152. In: Amir, O. A., P. Berggren and N. S. Jiddawi, 2002. The incidental catch of dolphins in gillnet fisheries in Zanzibar, Tanzania. *Western Indian Ocean Journal of Marine Science*, Vol. 1, No. 2, pp. 155–162.

⁶¹ Daniels, C., 2002. *Data Synopsis and Research Update*. Internal Update of Research Programme, Frontier-Tanzania Marine Research Programme, Phase One: Misali Island, pp 1-16.

populations in Tanzania have almost been decimated⁶². Further studies are needed to quantify marine mammals on the Pemba Channel and assess the associated potential for tourism activities.

6.2.4 Invertebrates

There appears to be healthy populations of invertebrates in the coastal waters along the west side of Pemba, including crustaceans (shrimps, prawns, lobsters and crabs), holothurians (sea cucumbers), cephalopods (octopus and squids) and edible shell molluscs (such as *Anadara sp.*). Large quantities of octopus are exploited on Pemba Island, Misali Island being a favourite site, involving somewhat destructive methods. Large middens of shells were sighted around villages, an indication that molluscs are heavily utilised as a source of protein. It is interesting to note that the Giant Clam (*Tridacna sp.*) is still found in reasonable numbers at most of the sites investigated, while there was a definite shortage of sea cucumbers on most of the shallow reefs. Sea cucumber is collected and dried for export to countries such as China where it is considered a delicacy.

6.2.5 Birds

Pemba Island is an important bird area in the WIO. The tentative list of bird species for Ngezi Forest⁶³ contains 26 species, including three endemic subspecies of Pemba—the Pemba African Goshawk (*Accipiter tachiro pembaensis*), the Bronze-naped Pigeon (*Columba delegorguei ssp.*) and the Pemba Black-breasted Glossy Starling (*Lamprotornis corruscus vaughani*)—and four endemic species of Pemba and classified by the World Conservation Union (IUCN) as globally threatened—the Green Pigeon (*Treron pembaensis*), the Russet Scops Owl (*Otus pembaensis*), the Pemba Sunbird (*Nectarinia pembae*) and the Pemba White-eye (*Zosterops vaughani*)⁶⁴.

The aerial survey revealed Kwata Islet to be a significant breeding island for birds. Consisting of leached and weather coral outcrops the islet is seldom used by humans but can easily be disturbed by uncontrolled ecotourism. Misali Island has low and high canopy forest and there are nesting bird colonies on the west island⁶⁵.

6.2.6 Reptiles and Mammals

Large numbers of reptiles were observed in Misali Island, although species diversity is low. Twenty-seven terrestrial mammal species, 13 of which are bats, occur on Pemba

⁶² Richmond, M.D., 1997: A Guide to the Seashores of Eastern Africa and the Western Indian Ocean Islands. Sida/Department of Research Cooperation, SAREC, pp 1-448. In: Mgaya, Y. D., 2000. *Other marine living resources*. In: Ngusaru, A. S. (ed), 2000. The present state of knowledge of marine Science in Tanzania – Synthesis report. Tanzania Coastal Management Partnership, pp 166-182.

⁶³ Abdullah, H.S., Ali, M.S. and Kurikka, T., 1996. *Ngezi Forest Reserve Management Plan*. Technical Paper No. 31, Zanzibar Forestry Development Project.

⁶⁴ Arup Environmental, 1999. *Environmental Impact Assessment for the Proposed Development of a Luxury Lodge at Tondooni, Pemba Island, Zanzibar*. Draft EIA Report, pp 1-146.

⁶⁵ Freeman, P., 1997. *Zanzibar's Protected Areas. An Assessment of Revenue Generating Potential from Tourism. A discussion paper*. The Environment & Development Group, Zanzibar Protected Areas Project, pp 1-30.

Island⁶⁶. The Pemba blue duiker (*Cephalophus monticola pembae*) is possibly endemic to Pemba. The Zanzibar Red Colobus (*Colobus badius kirkii*), an endangered Zanzibar endemic, was translocated to Ngezi Forest but its status is uncertain. The Pemba flying fox (*Pteropus voeltzkowii*) is a subspecies endemic to Pemba and is classified as endangered by IUCN. Threats to flying fox include loss of habitats (due to forest clearance and degradation), loss of roost trees (felling), roost disturbance and direct hunting. The flying fox is considered a traditional delicacy in Pemba yet there is a rising consciousness of its value and the need to protect it.

There is a large concentration of flying fox near Chake Chake with a population of around 2,000 individuals. The Rapid Assessment Team visited this colony, located near a village and basic training where conservation efforts have been initiated by the Department of Commercial Crops, Fruits and Forestry (DCCFF) with support from Fauna and Flora International and the Lube Foundation. The project has focused on increasing public awareness of the threats faced by the flying foxes, and on the opportunities to protect this symbol of the island's uniqueness. Outreach officers have targeted communities living near to bat roosts and schools. In some cases villages have enacted local bylaws to protect the bats and their roosts, with enforcement by environmental club members. In addition to working with the community, the DCCFF has undertaken a survey of 43 roost sites in early 2003, which revealed a total population estimate of over 6,900 flying foxes—the highest count recorded in recent surveys⁶⁷. These results indicate a relatively stable population and underline the importance of a community-based approach to the conservation of this species and other important species of Pemba Island.

6.3 HEALTH OF THE SYSTEM

The coral reef system along Pemba's west side was considered by the Rapid Assessment Team to be affected by humans but largely in a healthy condition. Some places could be considered close to pristine while others clearly showed stress. Signs of destruction have been observed during Rapid Assessment activities (see Appendix I). Extensive areas of destroyed coral were noted in the Northern area near Manta Reef Lodge, where the lowest damage rating was assigned (8–9). It is possible that a combination of dynamite fishing and coral bleaching may be the cause of this problem. In other areas such as near Panza Island in the South, evidence of large scale coral death is present (damage rating 7–8), but reef regeneration is taking place at encouraging levels.

The reefs considered by the operators⁶⁸ as degraded were those between Njao and Fundo Gap, and Fundo and Uvinje gap; sections of the southern reef, between Matumbe Makupa and Panza lighthouse; and areas around the northern lighthouse at Ras

⁶⁶ Abdullah, H.S., Ali, M.S. and Kurikka, T., 1996. *Ngezi Forest Reserve Management Plan*. Technical Paper No. 31, Zanzibar Forestry Development Project. In: Arup Environmental, 1999. *Environmental Impact Assessment for the Proposed Development of a Luxury Lodge at Tondooni, Pemba Island, Zanzibar*. Draft EIA Report, pp 1-146.

⁶⁷ Fauna and Flora International, undated. *Pemba Flying Fox Conservation project*. Available at <http://www.fauna-flora.org/africa/pemba.html>

⁶⁸ Church, J., 1997. *Marine Conservation and Tourism in Pemba. A report on scuba diving and deep sea fishing operations around Pemba prepared for the Misali Island Nature Conservation Area Project*. Commission for Natural Resources, Zanzibar Protected Areas Project, pp 1-36.

Kigomasha. The corals surrounding Ras Mkumbuu were found by the Rapid Assessment Team to be in exceptionally healthy conditions and were assigned the lowest damage rating (0–1), as well as the Uvinje island reef. Ras Mkumbuu and the Uvinje reef were also assigned the highest overall tourism value.

The impression of Pemba after a visit by land and an aerial overview is that the entire transition from mangrove to deep reef is in a healthy state, with full ecological function despite the large amount of fishing activities that are taking place from shallow to deep water. There are, however, clear signs that biodiversity on the Pemba Channel side is under threat from destructive fishing activities and over-exploitation of marine and coastal resources. These threats to the natural system underscore the need for effective community-based conservation and management. The establishment of PECCA clearly is a much needed and highly desirable country-driven intervention, and the DFMR should be lauded for taken a pro-active approach to conserving this valuable system.

6.4 UNIQUENESS OF THE SYSTEM

The coastal and marine ecosystems of mainland Tanzania and Zanzibar are part of the EAME, a WWF Global 200 Ecoregion considered globally outstanding for marine biodiversity. The coral reefs contribute to Pemba's high biodiversity of reef fish, invertebrates and many endangered species like sea turtles, dolphins and whales as their migratory route, while the islets and sandbanks have potential biological values of national and global importance⁶⁹. Pemba Island was, however, considered of ecoregional importance only due to paucity of biodiversity information for Pemba Island in general that has often been acknowledged^{70,71}. Yet not only the island's high diversity of species and habitats but most importantly its overall role in terms of the healthy functioning of the Pemba Channel make a strong case for Pemba being of global significance.

Pemba Island has furthermore been considered as a potential area for World Heritage listing and it was included in the B-List for East Africa—"areas that were identified by experts to have significant components of Outstanding Universal Value (OUV)"⁷². Inclusion in this list means that State Parties are recommended to carry out further studies in co-operation with national and international experts to ascertain which OUV components would be of World Heritage value and prepare nominations as appropriate.

⁶⁹ Department of Fisheries and Marine Resources, 2004. Pemba Community-Based Marine Conservation Area (PMCA), Zanzibar. Project Proposal, pp 1-7.

⁷⁰ Frontier-Tanzania, 2004. Misali Island: A detailed description of the subtidal regions. Frontier Tanzania Environmental Research Report 103. Daniels, C., Fanning, E. & Jiddawi, N. (eds). Society for Environmental Exploration, UK with the University of Dar es Salaam including the Institute of Marine Sciences and the Ministry of Agriculture, Natural Resources and Cooperatives, Zanzibar, pp 1-24.

⁷¹ Horrill, J.C., 1992. Status of the Coral Reefs of Misali Island, Pemba. Zanzibar Environmental Study Series Number 13. The Commission for Lands and Environment, Zanzibar, pp 1-12.

⁷² In the World Heritage Marine Biodiversity Workshop: Filling Critical Gaps and Promoting Multi-Site Approaches to New Nominations of Tropical Coastal, Marine and Small Island Ecosystems" held in Hanoi, Vietnam from 25 February to 1 March, 2002. Available at www.environmentaldefense.org/documents/2599_KNCHanoiStatement.pdf. The Workshop was convened by UNESCO's World Heritage Center, in collaboration with the U.S. National Oceanic and Atmospheric Administration (NOAA), the World Conservation Monitoring Center (WCMC) and IUCN.

Pemba Island is thought to be a unique example of a diverse and deep-water coral community on a granitic island with spectacular underwater scenery⁷³. World Heritage Site criteria applied to Pemba Island were “(iii) contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance; and (iv) contain the most important and significant natural habitats for *in situ* conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation”. The need for further studies of PECCA’s natural and cultural values^{74,75,76} and comparison with the granitic communities in the Seychelles⁷⁷ has been recognised and a WHS feasibility study should be undertaken.

It is always difficult to compare different places over a large geographic area such as the WIO in terms of their potential “global uniqueness”, particularly if they were visited in different contexts and sometimes for different purposes. The people in the EcoAfrica team that participated in the current Rapid Assessment have however visited a large number of sites and islands in the WIO, including mainland sites in South Africa, Mozambique, Tanzania and Kenya, and islands such as Madagascar (many different sites), Mauritius, the main granitic islands of the Seychelles and the coral atoll of Aldabra. They are of the opinion that the west side of Pemba can hold a candle to any of the best sites they have visited in terms of marine diversity and system health. The underwater researchers felt that they have seen more fish in terms of species and abundance in Pemba than anywhere else in the WIO, but possibly more corals in the Radamas off the west coast of Madagascar. Furthermore, the intricate geographical features of the Pemba Channel side of the island and especially its functional importance in the larger system calls for its consideration as a site of global importance⁷⁸, at least in the context of the WIO.

The abundant reefs and mangroves of the island require extensive taxonomic studies that surely will add more weight to the value of the west coast of Pemba in the regional and global context. Identification of migration and breeding patterns of marine fauna such as fish, turtles and marine mammals are needed to visualise the importance of the island for certain species in a regional and global context.

⁷³ World Heritage Marine Biodiversity Workshop Regional Paper for East Africa. World Heritage Biodiversity: Filling Critical Gaps and Promoting Multi-Site Approaches to New Nominations of Tropical Coastal, Marine and Small Island Ecosystems Potential Tropical Coastal, Marine and Small Island World Heritage Sites in the Eastern Africa Region. Available on <http://international.nos.noaa.gov/heritage/documents.html>

⁷⁴ Horrill, J.C., 1992. Status of the Coral Reefs of Misali Island, Pemba. Zanzibar Environmental Study Series Number 13. The Commission for Lands and Environment, Zanzibar, pp 1-12.

⁷⁵ Frontier-Tanzania, 2004. Misali Island: A detailed description of the subtidal regions. Frontier Tanzania Environmental Research Report 103. Daniels, C., Fanning, E. & Jiddawi, N. (eds). Society for Environmental Exploration, UK with the University of Dar es Salaam including the Institute of Marine Sciences and the Ministry of Agriculture, Natural Resources and Cooperatives, Zanzibar, pp 1-24.

⁷⁶ WWF, 2001. Proceedings of the Eastern African Marine Ecoregion Visioning Workshop. Mombasa, Kenya, April 21st -24th 2001, pp 1-36.

⁷⁷ World Heritage Marine Biodiversity Workshop Regional Paper for East Africa. World Heritage Biodiversity: Filling Critical Gaps and Promoting Multi-Site Approaches to New Nominations of Tropical Coastal, Marine and Small Island Ecosystems Potential Tropical Coastal, Marine and Small Island World Heritage Sites in the Eastern Africa Region. Available on <http://international.nos.noaa.gov/heritage/documents.html>

⁷⁸ The area’s uniqueness lies not only in its biology but also its archaeology, culture and history that mirrors its natural uniqueness and should be investigated as a matter of urgency as it may influence outcomes in terms of overall global heritage recognition.

7 THE COASTAL POPULATION

7.1 DISTRIBUTION

Pemba Island has two regions (North and South), 4 districts (Micheweni, Wete, Chake and Mkoani), 72 *shehias* and over 360 villages (see Map 3). Chake Chake is the capital, centrally located on the island. According to the 2002 population census, Pemba Island has a population of 362,166 inhabitants, which represents 37% of Zanzibar population (984,625)⁷⁹. 45% of the population in Zanzibar lives on the coast⁸⁰ and a total of 146,955 people live in the *Shehias* that are covered by the target area (Table 6). This figure represents almost half of Pemba Island population, even though only a part of it lives in the proposed PECCA (whereas the other part lives more inland, thus outside the proposed boundaries). Appendix IV lists the villages in each *Shehia* that are included in the proposed PECCA.

Table 6 Population in the *Shehias* in the target area

NORTHERN REGION		SOUTHERN REGION	
MICHEWENI DISTRICT	WETE DISTRICT	CHAKE CHAKE DISTRICT	MKOANI DISTRICT
Makangale 9135 Konde 8849 Mgogoni 6033	Mtambwe Kaskazini 5772 Fundo 2134 Kisiwani 3247 Gando 4559 Utaani 10064 Mtambwe Kusini 3679 Bopwe 8458 Ukunji 2110 Kipangani 6589 Piki 5845	Chanjaani 6134 Ziwani 6651 Ndagoni 3534 Kwale 5306 Mgelema 1188 Kilindi 2753 Tibirinzi 5323 Chachani 3140 Mvumoni 3708 Wesha 3209	Ngombeni 4573 Makoongwe 1359 Shidi 1011 Michenzani 5651 Chokocho 4201 Kisiwa Panza 2721 Wambaa 2603 Mbuguani 3312 Makombeni 1809 Uweleni 2295
Total population in <i>Shehias</i> covered by target area is 146,955			

⁷⁹ Grootenhuis, F. and Lopez, J., 2003. *Household Economy Analysis for Zanzibar. Final Report*. Revolutionary Government of Zanzibar, World Food Programme, Save the Children, pp 1-192.

⁸⁰ Shunula, J.P., 2002. Public awareness, key to mangrove management and conservation: the case of Zanzibar. *Trees: structure and function*. Vol 16 (2-3), March 2002, pp 235-238.

7.2 HUMAN ACTIVITY

The majority of people in Pemba lives from agriculture, fishing and animal husbandry. According to the 2002 Census, 52% of the population in Pemba is employed in the agriculture sector and 8% in fishing. In reality, the proportion of the population that is directly or indirectly dependent on fisheries is larger—between 10% and 30% of Zanzibar's population is involved in fishing and/or the collection of shellfish such as crab and various types of molluscs⁸¹. Significant numbers of women rely on marine resources, especially through shells and octopus collection. Lacking appropriate fishing vessels and gears, most fishers fish in inshore waters and sometimes use destructive gears to increase their catch. The fish is used for consumption in the household and sold fresh in the villages or the nearest markets. There is hardly any processing of fish products in Pemba. A small proportion of the fisheries products (1–5%) such as sea cucumbers, shells, octopus and lobsters are exported⁸².



Figure 5 Artisanal fishers' catch displayed on the beach at Misali Island

The west side communities in particular are heavily dependent on the coastal and marine resources, especially through artisanal fishing. In most of the target area, it is the poorest groups that are involved in fishing activities, which make up between 11 and 39% of their income⁸³. In Fundo Island and Tondooni agricultural yields are very low as the coral based soil is shallow and less fertile. Here, most households engage in fishing activities or seaweed production except richer households, which are exclusively dedicated to clove and other businesses. In the urban areas around Wete, Chake Chake and Mkoani households have better economic opportunities than in rural areas, including access to markets and non agricultural income generating activities.

⁸¹ Shunula, J.P., 2002. Public awareness, key to mangrove management and conservation: the case of Zanzibar. *Trees: structure and function*. Vol 16 (2-3), March 2002, pp 235-238.

⁸² Department of Fisheries and Marine Resources, 2004. *Pemba Community-Based Marine Conservation Area (PMCA), Zanzibar*. Project Proposal, pp 1-7.

⁸³ Grootenhuis, F. and Lopez, J., 2003. *Household Economy Analysis for Zanzibar. Final Report*. Revolutionary Government of Zanzibar, World Food Programme, Save the Children, pp 1-192.

About 74% of land is cultivated in Pemba, as compared to 42% in Unguja⁸⁴ where the land is less productive. Zanzibar's economy is greatly dependent on the agricultural sector, which constitutes 40% of Zanzibar's GDP, with the contributions from trade and tourism and administration services increasing (21% and 23% in 2001 respectively)⁸⁵. Pemba grows cloves, fruits and vegetables, coffee, rubber and many other tropical crops, mainly in smallholding farming. Zanzibar remains a monoculture economy because of its dependence on cloves export for running its socio-economic programmes⁸⁶.

Apart from clove production as commercial crop, most people in western coastal communities engage in agricultural activities for subsistence, such as cassava, cocoyam, maize, millet, sweet yams, orange, banana, and mango. The socio-economic interviews undertaken by the Rapid Assessment Team revealed that most fishers are also farmers (67% of the fishers interviewed) or livestock keepers. The use of crude tools and low level of technology and farming techniques, plant diseases, and adverse weather conditions are some of the problems they encounter that lead to low production. An additional problem, often heard from farmers in small islets, is the lack of transport to take their products to the main markets in Pemba. During fruit season large amounts of fruit are wasted and rot due to lack of alternative uses apart from immediate consumption.

Agricultural activities in Pemba not only have direct benefit to the human population in the island but also indirect benefit to the marine environment by releasing the pressure on marine resources. However, farming needs to be further developed if such desirable effect is to be obtained. For instance, several local initiatives can take place including training farmers to produce alternative products such as dried fruits, which create an alternative use for the excess production. This practice has been used in Madagascar with success.

7.3 SOCIO-ECONOMIC ASPECTS

Living conditions in Pemba rural areas are often precarious. The power supply, solely dependent on diesel generators, is erratic. Firewood and charcoal are the main sources of energy for 99% of the population in Pemba⁸⁷, with obvious negative effects on mangrove and other forests. Women spend considerable amounts of time and effort collecting firewood for cooking and water purification. The water supply network is recognized as inadequate and only 44% of the population in Pemba gets their water piped, protected wells or springs and 68% of the population has no toilet facility⁸⁸. Only 7% of the

⁸⁴ Revolutionary Government of Zanzibar, 1996. *Human Settlement Development Programmes for Zanzibar. 1996-2010*. The Ministry of Water, Construction, Energy, Lands and Environment, pp 1-25.

⁸⁵ Grootenhuis, F. and Lopez, J., 2003. *Household Economy Analysis for Zanzibar. Final Report*. Revolutionary Government of Zanzibar, World Food Programme, Save the Children, pp 1-192.

⁸⁶ Revolutionary Government of Zanzibar, 1996. *Human Settlement Development Programmes for Zanzibar. 1996-2010*. The Ministry of Water, Construction, Energy, Lands and Environment, pp 1-25.

⁸⁷ National Bureau of Statistics, 2002. *2002 Population and Housing Census*. United Republic of Tanzania. Available at <http://www.tanzania.go.tz/census/censusdb/index.html>

⁸⁸ National Bureau of Statistics, 2002. *2002 Population and Housing Census*. United Republic of Tanzania. Available at <http://www.tanzania.go.tz/census/censusdb/index.html>

population use cement or baked bricks for wall construction, and the use of coral bricks, lime and stones as construction materials is common.

Malaria and diarrhoea are common diseases, affecting especially the children. In a study of the patterns of livelihoods in rural Pemba⁸⁹ 90% of the 456 households covered reported to have experienced some food shortages, and 18% of the children were malnourished and underweight. HIV/AIDS is also a major concern and the fishermen who camp in fishing grounds throughout the island are more vulnerable. The literacy rate in Pemba Island is 48% and the net enrolment rate 62%, child labour being a problem as children start fishing at an early age. The problem of child labour was especially evident in Ndagoni. Table 7 presents some social indicators that are revealing of the difficult conditions in Zanzibar.

Table 7 Social indicators for Zanzibar

SOCIAL INDICATOR	ZANZIBAR ⁹⁰	TANZANIA ⁹¹	SUB-SAHARAN AFRICA ⁹²
Life Expectancy	48 years	43.5 years	46.3 years
Infant mortality rate	83 per 1,000	104 per 1,000	108 per 1,000
Under 5 mortality rate	114.3 per 1,000	165 per 1,000	178 per 1,000
Adult literacy rate	48%	77.1 %	63.2 %

Investment in infrastructure on Pemba Island has been limited. The island has a main arterial route running the length of the island and connecting the principal towns of Chake Chake, Wete and Mkoani. The need to support the development of the manufacturing and tourism sectors with investment in infrastructure has been recognized⁹³. Lack of employment opportunities for youth, lack of arable land for people to engage in agriculture and political instability during the 1995 election conflicts have resulted in migration of the labour force out of the Island⁹⁴.

The vast majority of fishers interviewed indicated that their income was not sufficient to satisfy the needs of their households, which had 6 people on average. The insufficient income often led them to engage in both fishing and farming activities, which can complement each other in terms of seasonality. Around half (51%) of the fishers interviewed were younger than 30 years old and most have started fishing at childhood. Child labour in Pemba has been reported (at levels of up to 63% of children being

⁸⁹ CARE, 2003. *Pemba Rural Livelihood Security Assessment*. May 2003, pp 1-109.

⁹⁰ United Republic of Tanzania, 2002. *Zanzibar Poverty Reduction Plan (ZPRP) Progress Report 2002/2003*. Government of Tanzania, Dar es Salaam.

⁹¹ UNDP, 2004. *Human Development Report 2004 – Cultural Liberty in Today's Diverse World*. Available at <http://hdr.undp.org/reports/global/2004/>

⁹² UNDP, 2004. *Human Development Report 2004 – Cultural Liberty in Today's Diverse World*. Available at <http://hdr.undp.org/reports/global/2004/>

⁹³ Arup Environmental, 1999. *Environmental Impact Assessment for the Proposed Development of a Luxury Lodge at Tondooni, Pemba Island, Zanzibar*. Draft EIA Report, pp 1-146.

⁹⁴ CARE, 2003. *Pemba Rural Livelihood Security Assessment*. May 2003, pp 1-109.

engaged in labour) as a manifestation of economic hardship at household level⁹⁵. Child labour is reflected on the education level as many children start fishing at an early age instead of attending formal education. Around half of the fishers interviewed (48%) were illiterate.

8 PATTERNS OF MARINE AND COASTAL RESOURCE USE

8.1 AN OPEN RESOURCE SYSTEM

During Rapid Assessment activities it was clear that the communities depend heavily on the coastal and marine resources for their livelihoods. The coastal population exploits living marine resources including fish and molluscs, as well as the mangrove stands in the transition zone. These resources are not only used by the west coast population but also by fishers from the east coast, where the deep waters are difficult to negotiate with traditional fishing vessels. Fishers from Unguja and as far as mainland Tanzania also come to fish in the Pemba Channel and to cut mangroves on the west coast.

For most of the target area these resources have not seriously been disturbed yet, but the picture is changing with areas on the island where there has been dramatic destruction of mangroves. Therefore if properly utilised the mangrove stands can likely support these communities in a sustainable manner in years to come, through various economic development activities. However, this will require more initiatives to replant mangroves which at present exist only at the level of small pilot efforts. Unfortunately, the insufficient control of fishers, fishing methods and catch are increasingly impacting on the marine resources and signs of destruction and overexploitation can already be seen.

The target area is still an open system and, if checks and balances are not put in place soon, there is every reason to believe that the area will follow the same unfortunate route of other inshore open access marine systems in the WIO. Only a small area in the Misali Conservation Area has been closed to fishers. Enforcement of the prohibition to fish in the non-extractive zone as well of control of fishing activity and regulation of gear used in the extractive zone are insufficient. Nevertheless, Misali Island has clearly served to increase the fishers' awareness of the importance to preserve Pemba's high diversity of fish.

8.2 TYPES OF EXPLOITATION

8.2.1 Artisanal fisheries

In the coastal areas of Zanzibar 80 to 90% of the local fishing takes place in waters close to mangrove-vegetated areas, creeks and bays⁹⁶. The same is true along the west side of Pemba, where most communities depend on traditional fisheries in the nearshore areas. Lacking efficient fishing vessels and gears, fishers have been operating in inshore waters

⁹⁵ CARE, 2003. *Pemba Rural Livelihood Security Assessment*. May 2003, pp 1-109.

⁹⁶ Shunula, J.P., 2002. Public awareness, key to mangrove management and conservation: the case of Zanzibar. *Trees: structure and function*. Vol 16 (2-3), March 2002, pp 235-238.

for decades. Most of the fishing takes place on the west coast of Pemba, which is used not only by local fishers but also by fishers from the exposed east coast and even Unguja and mainland Tanzania. The Zanzibar Frame Survey⁹⁷ identified 108 landing sites in Pemba. Muongoni Bay and Matumbini in the south and Misali Island in the centre are major fishing grounds in the target area, as well as Msuka and Kiuyu in the north of the island⁹⁸. Misali Island is heavily exploited. Today fishers from villages in 36 *shehias* in Pemba use Misali resources on a regular basis, a number that has increased from 13 villages reported in 1994⁹⁹.

The Rapid Assessment Team was witness to a dramatic display of cooperative fishing that occurs night after night in the waters surrounding Misali. No less than thirty outriggers arranged themselves over an area of several square kilometres with paraffin lights (mostly two per boat) burning for hours to attract fish and other organisms to their vessels. At midnight a larger vessel with a crew of 22 started to visit each of the vessels where a large net was laid out in a circular pattern around the vessel with the lights and then pulled in with the catch (which in the case of the three rounds witnessed by the researchers was rather meagre). Interviews on the boat revealed that the fishers would be eager for a conservation area to be established as long as they can fish in parts of it and outsiders are subject to the same restrictions. They are well aware and worried about the decline of fishing stocks that is obviously reflected in their own catches. They ascribe the decline to more fishers being active in the inshore waters and give the root cause as lack of fishing gear that will allow them to utilise the Pemba Channel further away from the land (on the west side of islands such as Fundo and Uvinje).



Figure 6 Octopus collection and drying

The major groups contributing to fisheries resources in Zanzibar include: fish resources (demersal and pelagic fish), crustaceans (shrimps/prawns, lobsters and crabs), holothurians (sea cucumbers), cephalopods (octopus and squids) and other edible shell

⁹⁷ Jiddawi, N.S. and S.A.S. Yahya, 2003. *Zanzibar Fisheries Frame Survey, 2003*. Department of Fisheries and Marine Resources, Ministry of Agriculture, Natural Resources and Cooperatives, Zanzibar, Institute of Marine Sciences, University of Dar es Salaam, pp 1-79.

⁹⁸ Revolutionary Government of Zanzibar, undated. *Zanzibar Sectoral Biodiversity Strategy. Part two: Sectoral Papers*, pp 1-93.

⁹⁹ Horrill, J.C., Machano, H. and Omar, S.H., 1994. *Misali Island; Rationale for a Marine Protected Area..* Zanzibar Environmental Study Series Number 17. The Commission for Lands and Environment, Zanzibar, pp 1-12.

molluscs (such as *Anadara sp.*)¹⁰⁰. Octopus fishing is very popular in Pemba and it is done by using simple spears and hooks. Observations of fishers over extensive lagoon reef during Rapid Assessment activities revealed that this activity has enormous potential to expand and benefit many more fishers. Several of the reefs where fishers capture octopus are flat with few potential hiding places for octopus. Many of the fishers walked for several hours before they captured an octopus. Despite that the total landing is large and one kg of octopus can reach about US \$1. Some fishers were observed to break soft and hard coral in order to get to the octopus. Experimental fishery using clay pot for octopus has the potential to increase the capture rate, while at the same time reducing damage to the reef.

Team members observed a boat bringing over 30 octopus fishers to Misali from Makoongwe Island, located some 15 km south of Misali. There were also 4 octopus fishers from Mwambe in the same boat. The team had the opportunity to engage in discussions with some of them as well as observe their methods of fishing. These fishers come to Misali twice every month for several days when the tides are lowest. Typically a hook is used to hook onto the octopus and, while the fishers were aware of the importance of trying not to destroy the coral, this sometimes happened.

The octopus fishers had a surprisingly high level of understanding of the importance of looking after the resource in general, and generally supported the non-extractive use zone on the west side of the island. More than 200 kg of octopus was harvested over two days, after which the merchant who buys them for 1000 Tsh/kg¹⁰¹ and resells them for 2500 Tsh/kg ran out of cash so that the fishers took the leftovers catch to Mkoani to sell there. Eight fishers were observed selling their daily catch to the merchant after the tide came in. They sold between 0.7 and 9 kg each, with an average of 3.8 kg. This means that the eight fishers earned between 700 Tsh (less than 1 US\$) and 9 US\$ for the day. The team was told that sometimes a fisher would return empty-handed to the shore and earned no money for that day.

The most common fishing vessel in Pemba is the *mtumbwi*, a dug out canoe without outriggers constructed from a single log or a few pieces of a tree and usually propelled by oar, long pole or rudimentary sail. It is used by 60% of the fishers in Pemba Island, while 32% use *ngalawa* and 6% *mashua*¹⁰². Around half of the fishers interviewed use *mtumbwi*. The *ngalawa* is a type of dug out canoe with outriggers, which provide stability to the vessel, and propelled by sail. A *mashua* is a wooden planked boat with pointed bow and transformed stern. It is usually propelled by sail but can also be fitted with an engine. Also used are dhows, wooden planked boats with pointed bow and rounded system and usually propelled by sail.

Fishing gears mostly used include gillnets, scoop nets, hand lines, long lines, troll lines, and cast nets (Table 8). A total of 13 distinct gear types have been described to be used in

¹⁰⁰ Jiddawi, N.S and C. Muhando, 1990. *Summary of Marine Resources in Zanzibar*. Zanzibar Environmental Series Number 1. The Commission for Lands and Environment, Zanzibar, pp 1-20.

¹⁰¹ At the time of writing 1 USD = 1,092.00 Tanzania Shilling (TZS).

¹⁰² Jiddawi, N.S. and S.A.S. Yahya, 2003. *Zanzibar Fisheries Frame Survey, 2003*. Department of Fisheries and Marine Resources, Ministry of Agriculture, Natural Resources and Cooperatives, Zanzibar, Institute of Marine Sciences, University of Dar es Salaam, pp 1-79.

Misali waters, with most fishers using single gears¹⁰³. According to the Zanzibar Frame Survey¹⁰⁴, 45% of the fishers in Pemba use hand line, especially those in the Wete and Chake Chake districts, and 28% trap fishing, especially those in the Mkoani and Micheweni districts.

Table 8 Fishery types and gears used in Pemba Island¹⁰⁵

FISHERY TYPE	GEARS AND TECHNIQUE
Hand line fishing (<i>mshipi wa kawaida</i>)	Conducted mostly in shallow waters with sand, seagrass bed or coral bottoms. A line with 1 to 3 baited hooks is used. Fishers can either be on foot or onboard the fishing vessel.
Troll line fishing (<i>mshipi wa kurambaza</i>)	Done by fishers onboard the fishing vessel in motion.
Gill net fishing (<i>jarife</i>)	Employs either set or drift gillnets, usually in intertidal, subtidal and reef areas. Drift nets are normally set in open sheltered waters of the Pemba Channel. Four to seven pieces of gillnet with small mesh size (3-4 inches) are tightened to a drifting boat.
Beach or boat seine fishing (<i>juya</i>)	Very common technique in Zanzibar that employs drag nets with small mesh size of 0.5 to 1.5 inches. The <i>Juya</i> technique, using a net in intertidal areas that is dragged on to the beach, is illegal.
Purse-seine net fishing, <i>Kojani</i> or <i>Kigumi</i> style	Using large numbers of fishermen with poles and snorkelling gear, a patch of reef is encircled by a weight seine net. Fishers beat and break the coral scaring the fish into the net. Once closed the contents are extracted with an extremely fine mesh such that even fry are caught. Once sorted the large by-catch is discarded
Spear gun fishing (<i>msumari</i>)	Usually carried out in coral reef areas. Fishers use mask, flippers and spear gun to harpoon manta rays, for example. It is an illegal practice.

¹⁰³ Richmond, M. and M.S. Mohammed, 2000. *A Review of the Fisheries of Misali Island Marine Conservation Area (MIMCA), Pemba, with recommendations for monitoring*. Marine Education, Awareness & Biodiversity (MEAB) Programme, pp 1-42.

¹⁰⁴ Jiddawi, N.S. and S.A.S. Yahya, 2003. *Zanzibar Fisheries Frame Survey, 2003*. Department of Fisheries and Marine Resources, Ministry of Agriculture, Natural Resources and Cooperatives, Zanzibar, Institute of Marine Sciences, University of Dar es Salaam, pp 1-79.

¹⁰⁵ Based on Jiddawi, N.S. and S.A.S. Yahya, 2003. *Zanzibar Fisheries Frame Survey, 2003*. Department of Fisheries and Marine Resources, Ministry of Agriculture, Natural Resources and Cooperatives, Zanzibar, Institute of Marine Sciences, University of Dar es Salaam, pp 1-79.; Revolutionary Government of Zanzibar, undated. *Zanzibar Sectoral Biodiversity Strategy. Part two: Sectoral Papers*, pp 1-93.; Richmond, M. and M.S. Mohammed, 2000. *A Review of the Fisheries of Misali Island Marine Conservation Area (MIMCA), Pemba, with recommendations for monitoring*. Marine Education, Awareness & Biodiversity (MEAB) Programme, pp 1-42.; and Abdullah, A., A.S. Hamad, A.M. Ali, and R.G. Wild, undated. *Misali Island, Tanzania – An Open Access Resource redefined*. Paper presented in the 8th Biennial Conference of the International Association for the Study of Common Property (IASP), pp1-11.

FISHERY TYPE	GEARS AND TECHNIQUE
Trap fishing (<i>dema</i>)	Moveable basket traps (<i>dema</i>) are usually set in seagrass beds, wild seaweed and coral reef areas.
Fishing weir (<i>uzio</i>)	Weirs are set in intertidal areas near the beaches to block fish passing through with the ebbing currents from returning to the open or deep waters.
Surrounding net fishing	Uses purse seine, ring net or <i>dagaa</i> net (<i>nyavu</i>) with small mesh size.
Scoop net fishing (<i>senga</i>)	Hand held net attached on a frame used at night with lights.
Mosquito net fishing	Small hand held net with very small mesh size.
Octopus spear fishing	Stick and spear are used to collect octopus.
Shark net fishing	Bottom set gillnet with large mesh size.
Cast net	A circular net that is thrown over a shoal of fish and allowed to sink to the bottom.
Shell and sea cucumber collection	Collection by hand.
Dynamite fishing	Illegal practice still in use according to some sources.

Catches are claimed to have declined in the last years, especially of species commonly consumed in Pemba, such as emperors, groupers, mullets, mackerels, parrot fish, kingfish and sword fish¹⁰⁶. Discussions in the west side villages also indicated that catches of octopus, shells and other intertidal organisms are declining, at least in terms of catches per fisher. Most respondents to the interviews carried out for this Rapid Assessment perceive a decline in the fishing stock over the last 10 years. Most of the fishers interviewed (50%) ascribe this decline to the increasing number of fishers in Pemba Island. The total number of fishers reported for Pemba was 7,199 in 1989¹⁰⁷ and 11,769 in 1997¹⁰⁸. The figure reported in the 2003 Zanzibar Frame Survey of 7,830 fishers on Pemba thus seems underestimated.

Destructive fishing gear is another major reason for reduced catches indicated by 41.5% of the fishers interviewed. A surprising 28% of the fishers interviewed reported to use spear gun fishing, an illegal practice in Zanzibar. Around 40% engage in net fishing, often using nets with small mesh size, and around 34% of fishers use line fishing (of which 12% is hand line fishing). The Kojani method was perceived by many fishers as a

¹⁰⁶ Revolutionary Government of Zanzibar, undated. *Zanzibar Sectoral Biodiversity Strategy. Part two: Sectoral Papers*, pp 1-93.

¹⁰⁷ Hoeskstra et al. 1990. In: Richmond, M. and M.S. Mohammed, 2000. *A Review of the Fisheries of Misali Island Marine Conservation Area (MIMCA), Pemba, with recommendations for monitoring*. Marine Education, Awareness & Biodiversity (MEAB) Programme, pp 1-42

¹⁰⁸ Lyimo et al 1997. In: Richmond, M. and M.S. Mohammed, 2000. *A Review of the Fisheries of Misali Island Marine Conservation Area (MIMCA), Pemba, with recommendations for monitoring*. Marine Education, Awareness & Biodiversity (MEAB) Programme, pp 1-42

major reason for destruction of the coral reef and decline in their catches. Octopus fishing is a common practice among the fishers interviewed (6%) and often causes destruction of the coral cover, as described earlier.

There was plenty of evidence that there is large-scale exploitation of shellfish on the intertidal flats and sandbanks (both in terms of discarded shells and typical “shovelling”-like damage) but this was not witnessed first-hand in any large numbers on account of the study having been conducted in the Holy Month of Ramadan when women and children, especially girls, appeared to be more housebound than normal.

During the Rapid Assessment activities it became clear that one of the main problems for fishers is the lack of proper gear to fish in deeper waters and target pelagic species. The large majority of fishers do not own a boat and work on commission. These fishers use *mtumbwi* (54%), *mashua* and *ngalawa*, but only 32% of them own their own boat and 12% go fishing on foot. Another issue that transpired from discussions and the interview results is that the fishers are not organised in groups or cooperatives and their activities are not well regulated and recorded. There was no daily catch recording in any of the villages visited. Another impression is that the fishing activities are not properly regulated on the island and a management plan for marine resources that includes coastal zoning is urgently needed.

8.2.2 Tourism

Unlike Unguja Island, tourism development in Pemba is still in its early stages. The target area boasts coral reefs with diverse ornamental fish and nocturnal marine life and other organisms such as sea turtles, dolphins, whales and pelagic fish species (marlin, sword fish, billfish and tuna species), and for that reason it has potential to expand tourism activities. Map 4 shows there are currently in the target area 3 hotels in the northern west coast of Pemba and 4 next to Wambaa north of Mkoani. Four more tourism developments have however been allocated for the northern peninsula. The major commercial diving sites in the target area are in Ras Kigomasha, the west northern tip of the peninsula, Njao Island, the area around Misali and the group of islets north of Misali, and Panza Island.

Zanzibar’s natural resources including the beaches and the marine resources offer the possibility for game fishing, cruising, sailing and scuba diving¹⁰⁹. Unspoilt islands and their reefs are important features of Zanzibar’s tourism image¹¹⁰. Zanzibar’s tourism potential lies not only in its natural resources but also in its rich cultural heritage that can be traced back to the fifth century. The Pemba and Unguja Islands are renowned as the former centre of the Arab slave trade and form a country on their own in terms of their culture, religion and inhabitants¹¹¹.

¹⁰⁹ Freeman, P., 1997. *Zanzibar’s Protected Areas. An Assessment of Revenue Generating Potential from Tourism. A discussion paper*. The Environment & Development Group, Zanzibar Protected Areas Project, pp 1-30.

¹¹⁰ Commission for Lands and Environment, 1994. *Policy for allocation and use of Zanzibar’s small islets. Integrated Planning Unit*, pp 1-19.

¹¹¹ Grootenhuis, F. and Lopez, J., 2003. *Household Economy Analysis for Zanzibar. Final Report*. Revolutionary Government of Zanzibar, World Food Programme, Save the Children, pp 1-192.



Figure 7 Ruins of ancient mosque at Ras Mkumbuu

Not only are Pemba marine habitats more diverse and healthier than those in Unguja, but also the culture and tradition that has been well preserved throughout the years. Pemba's potential for tourism, with the marine experience as its main attraction, has often been recognised: "*There is enough evidence to suggest that the island has worthwhile income potential which would be significantly enhanced if ever the Pemba Channel, in its entirety, was gazetted*"¹¹². The natural attractions of Pemba Island indicate that it would be better suited to a more specialised type of tourism such as ecotourism and sport-based activities, complemented by cultural attractions. With around 30 archaeological sites, the west coast of Pemba Island has the highest concentration of archaeological sites in Zanzibar¹¹³.

A study of the tourism sector in Zanzibar¹¹⁴ painted a picture of a tourism industry that is not very well controlled. It further pointed to the fact that tourism sites are limited in Zanzibar and that land reserve is diminishing very quickly by allocating hotels—when the borders were open to foreign investors in 1986 a real “gold rush” started. The study raises concerns about securing the rights of the local people in the land rush associated with tourism, making suggestions for improved land management. Pemba Island attracts only between 5 and 10% of Zanzibar's tourists lagging behind Unguja in infrastructure, accommodation, restaurants and emergency services development¹¹⁵. Misali Island has a pivotal role in that process, and there is considerable scope for terrestrial and sea-borne guided explorations. Even though there has been an assessment of the potential for tourism of Zanzibar's protected areas¹¹⁶, the study focused on Misali Island, Ngezi and Jozani Forests and it now needs to be reviewed under the new conservation policies and strategies in place and the PECCA framework.

8.2.3 Other types of exploitation

The only mariculture activity undertaken by coastal communities in the target area is seaweed cultivation. Seaweed farming activities take place on Panza Island in the west coast, as well as in Kangani, Kiuyu and Mjini Kiuyu in the rest of the island¹¹⁷ but the major problem is market. If successful, mariculture can become an alternative source of income for a large percentage of the population living in coastal communities who are

¹¹² Freeman, P., 1997. *Zanzibar's Protected Areas. An Assessment of Revenue Generating Potential from Tourism. A discussion paper*. The Environment & Development Group, Zanzibar Protected Areas Project, pp 1-30.

¹¹³ Abdurahman M. Juma, personal communication, 20 November 2004.

¹¹⁴ Dahlin, P. and P. Stridh, 1996. *Huts or Hotels? A minor Field Study on Land Management within the Tourism Sector in Zanzibar*. Royal Institute of Technology. Masters of Science Thesis, Stockholm, pp 1-.

¹¹⁵ Freeman, P., 1997. *Zanzibar's Protected Areas. An Assessment of Revenue Generating Potential from Tourism. A discussion paper*. The Environment & Development Group, Zanzibar Protected Areas Project, pp 1-30.

¹¹⁶ Freeman, P., 1997. *Zanzibar's Protected Areas. An Assessment of Revenue Generating Potential from Tourism. A discussion paper*. The Environment & Development Group, Zanzibar Protected Areas Project, pp 1-30.

¹¹⁷ Revolutionary Government of Zanzibar, undated. *Zanzibar Sectoral Biodiversity Strategy. Part two: Sectoral Papers*, pp 1-93.

disadvantaged, including retired fishers and particularly women who work in inshore waters. Mariculture thus has the potential to increase employment, income generation and food security. Mariculture practices can also be a source of attraction for tourists in the target area, where there is large variety of ornamental fish. Potential areas and appropriate technologies for mariculture activities should thus be assessed, not only for seaweed but also for fish, oysters and mussels. This assessment should be accompanied by the development of environmental and social guidelines for mariculture activities.

People on Pemba also exploit coral bricks, lime, stones and aggregates (broken stones) to generate income, especially in areas with coral based soil such as Fundo Island and Tondooni¹¹⁸. Local communities depend on the forest for a variety of socio-economic activities, such as timber as building material, wood and charcoal as source of energy, and fruit and crops as food. The most affected forest in the coastal areas is the mangrove forest, with consequences on the marine resources due to siltation, decreasing food for fish and reduced protection for young fish. Although “protected” as national forests, the mangrove stands are under growing threat with boats coming as far as Unguja to collect mangrove.

Mangroves are traditionally used for firewood, charcoal, construction poles, boat building, furniture, leather tanning dye, and medicinal purposes among other uses. They are typically cut with a cicle-shaped saw known as *msumeno*. Exploitation of mangrove stands on Matumbini is reaching staggering proportions according to verbal reports gathered by the team. People come from Makoongwe, Kangani and even as far as Unguja to harvest mangrove wood there. These mangroves in the south-western part of Pemba are extensive with relatively few local human populations nearby and hence can be protected from outside marauders by the proposed conservation initiative. Ongoing pilots at Weshu and Misali within the target area show that mangroves can be replanted easily in the region, and the team thought that a sustainable mangrove harvesting industry can be investigated by MACEMP.

8.3 ATTITUDES

Pemba’s fish species, coral reefs, seagrass beds and mangrove vegetation have for time immemorial been directly supporting activities such as fishing and wood and building material cutting and, in recent years, tourism. Due to the long history of public use of natural resources for subsistence, the fishers’ attitude towards conservation is sometimes of caution and fear that conservation initiatives will jeopardise their economic survival. While striving to improve their living standards, the communities of the west side of the island aim to increase the effectiveness of their harvesting techniques and therefore do not always acknowledge the need to conserve the coastal and marine environment. This may result in tensions between immediate socio-economic needs and the need to preserve those same natural resources for their livelihoods in the long term.

Yet the attitude of Misali fishers demonstrates the value that Pemba people attach to their marine resources. In 1993 the Government of Zanzibar leased the island to a private

¹¹⁸ Grootenhuis, F. and Lopez, J., 2003. *Household Economy Analysis for Zanzibar. Final Report*. Revolutionary Government of Zanzibar, World Food Programme, Save the Children, pp 1-192.

company for hotel development. The fishers joined to raise one voice against this decision. As result of the fishers' reaction and a number of other reasons, the government reversed its decision, leading the way to the establishment of a conservation area. Misali has indeed been very useful in creating a source of "awareness" in the fishing community.

During Rapid Assessment activities it was encouraging to see that most fishers are positive and willing to support conservation initiatives in Pemba. There are examples of local management measures implemented by communities that become aware of these threats. Closed seasons for certain species, when fishers experience changes in their catch, is one of those measures. The Makoongwe community has planted trees in areas faced with soil erosion, and mangroves in areas that have been overexploited¹¹⁹.

Traditional cultural beliefs have also contributed to the conservation of some sites in PECCA and can indeed make up one aspect of a larger conservation plan for the target area. The Ngezi Forest and Misali Island, for example, are perceived by the islanders as sacred sites¹²⁰. The efforts by Muslim fishing communities to conserve Misali Island have been presented as a "Sacred Gift for the Living Planet" at an event in 2000 organised by WWF and the Alliance of Religions and Conservation (ARC). Integrated in the Misali Island Conservation Project, the Islamic Conservation Programme aims to train religious leaders to introduce principles relating to conservation¹²¹. The programme has shown that Islamic environmental education helps raising awareness among the population of Pemba by tying conservation with familiar ideas¹²². School Environmental Clubs have been created in Kiswani Panza Island and Makoongwe¹²³ and the use of an education film in villages has been highly successful. There are also positive examples of integration of conservation concerns in the school curriculum^{124,125}.

The tourism sector in Pemba also seems to be aware of the need for conservation. In a study about marine conservation and tourism in Pemba¹²⁶, operators consider Pemba Island to be unique and possess high biodiversity. However, divers witness lower fish abundance in reefs used by artisanal fishers than in other reefs where they dive. They express concern regarding future development and the use of destructive fishing techniques such as the Kojani method, small mesh nets, turtle and manta ray hunting, and

¹¹⁹ Faki, O.M, undated. *National Consultancy Report*. Biodiversity Project UNO/RAT/006/GEF, pp 1-29.

¹²⁰ Slakie, E., 2003. *Sacred Sites and Conservation: The Mizimu of Northeast Pemba*. School for International Training, Zanzibar Coastal Ecology, pp 1-45.

¹²¹ Ali Khamis Thani, personal communication, 6 Nov 2004.

¹²² Arensberg, W.A., 2003. *Islamic Environmental Education: Misali Ethics Project*. School for International Training, Zanzibar Coastal Ecology, pp 1-40.

¹²³ Ali Khamis Thani, personal communication, 6 Nov 2004.

¹²⁴ Francis, J., S. Mwinuka, and M. Richmond, 2000. *A Schoolteacher's Guide to Marine Environmental Education in the Eastern African Region*. UNEP/FAO, pp 1-40.

¹²⁵ Frontier-Tanzania, 2004. *Marine Environmental education: A Teacher's Guide*. Frontier Tanzania Environmental Research Report 100. Mumby, R., Fanning, E., Muruke, M. & St. John, F. (eds). A. Simtoe (translation). Society for Environmental Exploration, UK, The University of Dar es Salaam, The Institute of Marine Science, Zanzibar, DfID Small Grants Scheme and the Ministry of Agriculture, Natural Resources and Cooperatives, Zanzibar, pp 1-41.

¹²⁶ Church, J., 1997. *Marine Conservation and Tourism in Pemba. A report on scuba diving and deep sea fishing operations around Pemba prepared for the Misali Island Nature Conservation Area Project*. Commission for Natural Resources, Zanzibar Protected Areas Project, pp 1-36.

collection of sea cucumber, octopus and shellfish. The operators acknowledge that Pemba's natural resources are the source of livelihood for them and for all inhabitants and therefore support the need for more marine conservation.

9 DEVELOPMENT AND CONSERVATION FRAMEWORK

9.1 DEVELOPMENT GOALS

9.1.1 Vision 2020

Under the Ministry of Planning and Investment, the Vision 2020 is a national development tool to be used in planning for the development of the quality of village life. The document describes the country's main socio-political and economic objectives and strategies for a period of 20 years. The development vision enunciates general policy objectives and strategies on sectoral development, human resources development, population growth, government revenues and expenditures, social welfare, governance, peace and security, economic and political developments¹²⁷.

9.1.2 Poverty Eradication and Livelihood Creation Programmes

Due to concern about democratic procedures and governance sparked by election instability, donors suspended their aid to Zanzibar from 1995 up until 2000. According to the UN Common Country Assessment of 2001, this has had an impact mainly at the "grassroots" level, when bilateral donors halted activities involving health, water and sanitation, education and malaria control. This has affected the delivery of services to the majority of the "poor". In a lengthy stakeholder process involving stakeholders from government, civil society and the private sector in 2002, the Government of Zanzibar launched Zanzibar's Poverty Reduction Plan (ZPRP), which is the first step on the road to implementing the Zanzibar Vision 2020¹²⁸.



Figure 8 House on Panza Island

The Poverty Eradication Programme is a five years action plan with the ultimate goal to mitigate the extent of poverty and improve the people's living conditions¹²⁹. The five action priorities are: community-based projects, improvement of health services for the

¹²⁷ UNEP/FAO/PAP/CDA, 2000. *Progress in Integrated Coastal Management for Sustainable Development of Zanzibar's Coast: Unguja Island Coastal Profile and Management Strategy*. East African Regional Seas Technical Reports Series No. 7 Split, Croatia, UNEP/FAO/PAP, pp 1-116.

¹²⁸ Revolutionary Government of Zanzibar, 2002. *Zanzibar Poverty Reduction Plan*. Prepared by the Ministry of Finance and Economic Affairs, Zanzibar, Assisted by UNDP.

¹²⁹ UNEP/FAO/PAP/CDA, 2000. *Progress in Integrated Coastal Management for Sustainable Development of Zanzibar's Coast: Unguja Island Coastal Profile and Management Strategy*. East African Regional Seas Technical Reports Series No. 7 Split, Croatia, UNEP/FAO/PAP, pp 1-116.

“poor”, better education facilities for all, improved agricultural productivity and better use of natural resources, and public service reform and capacity building¹³⁰.

The Tanzania Social Action Fund (TASAF)¹³¹ is a government programme funded by the World Bank that aims to provide basic services, including water, education and health. It encompasses both community development initiatives and broader initiatives addressing agricultural development and market access. Specific attention is given to the HIV/AIDS epidemic, the involvement of civil society and NGOs and rural development issues. Also funded by the World Bank and implemented by the Government of Tanzania, the Participatory Agricultural Development Empowerment Project (PADEP)¹³² started in 2004 to provide assistance to agricultural development in communities and capacity building and institutional strengthening in the sector.

9.2 LAND USE PLANNING

9.2.1 Land Use and Tourism Zoning Plans

A number of land use programmes and initiatives were implemented, such as the Zanzibar Integrated Land and Environmental Management Project (ZILEM) project before the donors pulled out of Zanzibar, and a Human Settlement Development Programme¹³³. In response to the increasing number of tourism development applications and in the absence of a land use plan, the Tourism Zoning Plan¹³⁴ was compiled in 1993. It provided proposals for tourism zones, including a description of their planned use, capacity and restrictions; the implementation strategy for the plan; and guidelines to enforce control of development in the designated zones.

The National Land Use Plan¹³⁵ was prepared in 1996 under the auspices of the now abolished Commission for Land and Environment (COLE) in the Ministry of Water, Construction, Energy, Lands and Environment. The plan provides a description of the social, economic and social issues that Zanzibar needs to address in terms of resource management, including a section on coastal resource management, as well as the strategies to address them. The Government planned to shift the dependence on agricultural activities, with a diversification of the country’s economic structures into manufacturing and tourism development. The purpose of the Plan was to be used as guidance but its status is uncertain and its content outdated. Land use planning that

¹³⁰ Revolutionary Government of Zanzibar, 2002. *Zanzibar Poverty Reduction Plan*. Prepared by the Ministry of Finance and Economic Affairs, Zanzibar, Assisted by UNDP.

¹³¹ Information about the project can be obtained at <http://www.tasaf.org/>

¹³² Information about the project can be obtained at <http://www.agriculture.go.tz/PADEP.htm>

¹³³ Revolutionary Government of Zanzibar, 1996. *Human Settlement Development Programmes for Zanzibar. 1996-2010*. The Ministry of Water, Construction, Energy, Lands and Environment, pp 1-25

¹³⁴ Revolutionary Government of Zanzibar, 1993. *Tourism Zoning Plan – Main Report*. Commission of Lands and Environment in the Ministry of Water, Energy, Construction, Lands and Environment. Zanzibar Integrated Land and Environment Project (ZILEM), Finnish International Development Agency (FINNIDA), pp 1-140.

¹³⁵ Revolutionary Government of Zanzibar, 1995. *National Land Use Plan – Planning Policies and Proposals*. Commission of Lands and Environment in the Ministry of Water, Energy, Construction, Lands and Environment. Zanzibar Integrated Land and Environmental Management Project (ZILEM), Finnish International Development Agency – National Board of Survey, pp 1-25.

ensures the protection of the west coast's biodiversity and sustains the coastal population calls for a Strategic Environmental Assessment (SEA) of the area.

The Sustainable Management of Land and the Environment (SMOLE) Project is ongoing with funding from the Finnish Government. This project can play a key role in trying to avoid in Pemba what occurred in Unguja with respect to tourism development on the coast and consequent displacement of people to marginalised land. Furthermore, SMOLE can cover issues that need to be effectively addressed in conjunction with the proposed conservation initiatives on the west coast, such as land registration, planning and environmental management in the three main urban centres of Wete, Chake Chake and Mkoani, and potentially coastal management on the eastern coast of the island.

9.2.2 Tourism Policy and other Guidelines

The Tourism Policy for Zanzibar¹³⁶ sets the framework for tourism development in the archipelago and is conducive to community participation in the sector. In addition to the development of long term programmes towards better and timely strategies for resources utilisation and environmental protection, the policy mentions the creation of a zoning system to encourage the establishment of marine parks areas. The policy emphasises sustainable projects, the enforcement of Environmental Impact Assessment (EIA) requirements for tourism developments, the use of technologies that impact less on the environment such as solar energy, and monitoring programmes to understand the impacts of tourism development.

The Zanzibar Biodiversity Strategy¹³⁷ defines the strategy and action plan for the tourism sector (Table 9). Other guidelines for the tourism sector exist, such as the Guidelines to Investors¹³⁸, which do not address sufficiently environmental concerns, and the Guidelines for the Preparation of Preliminary Environmental Reports for Hotel Projects¹³⁹. Nevertheless, there is a need for a SEA as well as a Tourism Plan and guidelines to be conducted in the target area. In 1994 COLE brought out a Policy for Allocation and Use of Zanzibar's Small Islets that at least partially flowed from the Tourism Zoning Plan and aimed to establish a basis for future planning of the use of small islands around the main islands of Unguja and Pemba (see 9.4.3 below).

¹³⁶ Revolutionary Government of Zanzibar, 2004. *Zanzibar Tourism Policy*. Ministry of Trade, Industry, Marketing and Tourism, pp 1-43.

¹³⁷ Revolutionary Government of Zanzibar, undated. *Zanzibar Sectoral Biodiversity Strategy. Part two: Sectoral Papers*, pp 1-93.

¹³⁸ ZIPA, undated. *Guidelines to Investors*. Zanzibar Investment Promotion Agency (ZIPA). Ministry of Finance and Economic Affairs, pp 1-7.

¹³⁹ Commission for Lands and Environment, 1994. *Guidelines for the Preparation of Preliminary Environmental Reports for Hotel Projects*. Department of Environment, pp 1-48.

Table 9 Objectives for the tourism sector defined in the Zanzibar Biodiversity Strategy

N.	OBJECTIVE
1	To create the basis for Ecotourism activities and to identify specific sites which possess the potential for development
2	To protect and conserve the marine biodiversity as tourist resource and to ensure their sustainable use
3	To widen participation of the local residents in Ecotourism activities as decision makers and benefit sharers (...)
4	To ensure that tourist sites, historical places and nature conservation trails and reserved areas of all types are sustainable as business and contribute to the conservation, running and management of the areas
5	To achieve a close cooperation and coordination between all the institutions, public and private concerned directly or otherwise with tourism
6	To ensure that the Ecotourism sector is well managed in a professional manner and according to certain standards and norms and is integrated into the international framework
7	To ensure that the general public and the tourists are well informed and are aware of the government policies towards tourism, their role and the progress of the sector so as to enable them to make a fair contribution to the development
8	To ensure that only the right kind of tourists or visitors are attracted that is those who seek to experience, gain a better understanding of the history, local culture and richness of the biodiversity of Zanzibar
9	To ensure that Ecotourism fits in and is incorporated in the national development policies and programmes and that it forms part of the every day activities

9.3 ENVIRONMENTAL PROTECTION

9.3.1 Environmental Legislation and Policies

Despite Zanzibar's unique biodiversity, it was not until the nineties that there was a policy shift towards conservation and active involvement of people in sustainable planning, management and conservation of the islands' resources. The new forestry, environment and fisheries policies allow for the effective participation of local communities. In the case of the target area, this need for integrated management of natural resources stated in the legislation once again underscores the need for an overdue SEA.

The Environmental Policy and Programme¹⁴⁰ highlighted the threat of environmental degradation by unplanned tourism development stimulated by the Economic Recovery Programme as one of the main issues in Zanzibar. Another issue listed was the need to bring coastal zone areas under integrated management combining traditional use of resources, tourism and resource conservation. The Environmental Management for Sustainable Development Act of 1996 emphasises the same need for participatory and integrated planning of renewable natural resource management. Activities such as

¹⁴⁰ Department of Environment, 1991. *An Environmental Policy and Programme for Zanzibar*. Zanzibar Integrated Lands and Environmental Management Project of the Commission for Lands and Environment, The Revolutionary Government of Zanzibar, pp 1-82.

“developing environmentally sensitive area; including forests, mangroves and small islets and water catchments” require a Scoping Study to assess environmental impacts. The Act aims to guarantee “uses of renewable resources in the public domain which are indispensable to meet basic daily living needs of individuals, families and communities and are compatible with [the Act’s] principles of sustainable development.”

9.3.2 Protected areas and reserves

Protected areas are declared under dedicated legislation in Zanzibar and Pemba. The Menai Bay Conservation Area and Jozani-Chwaka Bay Conservation Area have been established in Unguja and the Misali Island Conservation Area in Pemba. A second form of marine protection found in Zanzibar is the management by private companies of small protected areas with the agreement of the government, as is the case of Chumbe Island Coral Park and Mnemba Island Marine Reserve, both in Unguja Island¹⁴¹.

The first forest reserves were established in the forties and fifties with timber production goals. Recognising the dependence of the people of Zanzibar on forest for basic needs such as fuel wood and building materials, the National Forest Policy was prepared to establish priorities for integrated management and conservation. The policy dealt with community-level planning and management, conservation and biodiversity of forest, mangrove and watershed habitats, forest products, and capacity building and financial policies. The Ngezi Forest Reserve was gazetted in the fifties, but has been systematically utilised despite its conservation status. Two proposals have already been evaluated for hotels next to the Ngezi Forest. The cultural, ecological and economic significance of the forest for the surrounding communities needs to be adequately acknowledged. A study¹⁴² has recommended that a national park be established in the Ngezi Forest and has called for a land use plan to be prepared for the northwest of Pemba Island.



Figure 9 Mangroves at Ras Mkumbuu

¹⁴¹ Tanzania Coastal Management Partnership, 2003. *Tanzania State of the Coast Report 2003: The National ICM Strategy and Prospects for Poverty Reduction*. National Environmental Management Council, the University of Rhode Island Coastal Resources Centre, and the United States Agency for International Development, pp. 1-62.

¹⁴² Härkönen, K.R. and C.J. Seitz, 1993. *Conservation and Tourism Development in Ngezi Area, North-West Pemba, Zanzibar*.

The multiple functions of mangroves have been recognised by the Government of Zanzibar and all mangrove forests are classified as forest reserves under the Forest Reserve Decree and most wood cutting activities are now officially restricted. According to the Zanzibar Biodiversity Strategy¹⁴³, mangrove conservation has been dedicated a separate policy due to the special characteristics and importance of mangroves. Mangroves require an integrated management approach because they contain forest, marine and other coastal resources. The Forestry Sub-Commission has started working with the Fisheries Sub-Commission, DoE, the Institute of Marine Science (IMS) and villagers in pursuit of more integrated management, taking Chwaka Bay as a pilot area. The policy prescribes community involvement in management and protection as the most important option towards sustainable utilisation of mangrove areas. Some mangrove areas may be set aside for permanent basis as forest conservation areas to preserve biodiversity, and ecotourism activities should be encouraged to increase the benefits to the communities from conservation efforts¹⁴⁴.

9.4 COASTAL AND MARINE MANAGEMENT

9.4.1 National Integrated Coastal Management Strategy

The State of the Coast Report¹⁴⁵ provides an overview of the status, issues and threats to the coastal and marine environment in mainland Tanzania and Zanzibar. In 2003 the National Integrated Coastal Management (ICM) Strategy was published to provide a framework and process for linking different sectors and balancing their decisions about conservation and use of coastal resources. Some of the means to achieve this balance include local level integrated planning and management and stakeholder involvement in the coastal development process and policies. The strategy calls for innovative ways to be devised to promote the sustainable development of economic uses of coastal resources, as well as for scientific and technical studies and programmes to inform ICM decisions. Under this strategy, Special Area Management Plans can be established in critical areas of economic interest which are vulnerable.

9.4.2 Integrated Coastal Management Programme of Zanzibar

The National Environmental Policy of Zanzibar¹⁴⁶ acknowledges that “the coastal environment is an area of great ecological diversity and complexity, major economic importance and rapid development” and highlights the need for an integrated approach to management. The policy thus recommended that a programme for Integrated Coastal Area Management be developed. In line with the policy directive, the Chwaka Bay – Paje

¹⁴³ Revolutionary Government of Zanzibar, undated. *Zanzibar Sectoral Biodiversity Strategy. Part two: Sectoral Papers*, pp 1-93.

¹⁴⁴ Revolutionary Government of Zanzibar, undated. *Zanzibar Sectoral Biodiversity Strategy. Part two: Sectoral Papers*, pp 1-93.

¹⁴⁵ Tanzania Coastal Management Partnership, 2003. *Tanzania State of the Coast Report 2003: The National ICM Strategy and Prospects for Poverty Reduction*. National Environmental Management Council, the University of Rhode Island Coastal Resources Centre, and the United States Agency for International Development, pp. 1-62.

¹⁴⁶ Department of Environment, 1991. *An Environmental Policy and Programme for Zanzibar*. Zanzibar Integrated Lands and Environmental Management Project of the Commission for Lands and Environment, The Revolutionary Government of Zanzibar, pp 1-82.

site was selected in 1994 as the pilot area for the coastal management programme in Zanzibar. A Coastal Profile for Unguja Island has been prepared by an inter-sectoral planning team comprised of COLE, Commission for Natural Resources, Commission for Tourism, and the IMS¹⁴⁷. The Coastal Profile examines strategies and lessons learned, and its extension to Pemba Island was recommended at the National Workshop carried out in July 1999.

9.4.3 Islets policy

Zanzibar takes special attention to its islets, with a view to avoiding any development that will impact on their biodiversity and often undisturbed nature. The Zanzibar Tourism Zoning Plan proposes that no further islets should be allocated to hotel developers. This decision accords with the recommendations of an international tourism consultant, Barbara Koth, who undertook a tourism and environment consultancy for COLE in 1990¹⁴⁸ and gave special attention to the question of islets.

The current policy on Tanzania mainland is that no further islets will be allocated to private developers. The policy for allocation and use of small islets in Zanzibar¹⁴⁹ draws on experiences from islets that have been allocated for development and should be fully taken into account during the recommended SEA for the target area. The exact status and applicability of the policy is not clear but it certainly has widespread support when discussed with people, including government officials. The team encountered strong sentiment on the ground that the small islets should not be given out to investors but rather should serve as bases for the fishers and day visitors. However, the idea was brought up that limited ecotourism operations should be allowed to possibly overnight on small islands if this will bring benefits to the local people.

9.4.4 Fisheries policy and strategy

Motivated by the increased use of destructive fishing gears, overfishing and growing tourism industry, the 1985 fisheries policy was reviewed in 2000 to integrate conservation of marine resources. The overall objective was to ensure that conservation and sustainable use of biological diversity are promoted. The policy recognises the need for better understanding of the current status of coastal and marine habitats and associated species, improved control of use of resources, and higher levels of awareness in coastal villages. It underscores the importance of involving communities in conservation and encourages the establishment of conservation areas. This strategy has led to the support by the Sub-Commission of Fisheries to community initiatives such as in Makoongwe in Pemba Island. In collaboration with the DoE, the Sub-Commission of

¹⁴⁷ UNEP/FAO/PAP/CDA, 2000. *Progress in Integrated Coastal Management for Sustainable Development of Zanzibar's Coast: Unguja Island Coastal Profile and Management Strategy*. East African Regional Seas Technical Reports Series No. 7 Split, Croatia, UNEP/FAO/PAP, pp 1-116.

¹⁴⁸ Koth, B., 1990. *Integration of Tourism Development and Environmental Issues: A Strategy for Zanzibar*.

¹⁴⁹ Commission for Lands and Environment, 1994. *Policy for allocation and use of Zanzibar's small islets*. Integrated Planning Unit, pp 1-19.

Fisheries has engaged in awareness raising initiatives using radio programmes, video shows, seminars and study tours and resource monitoring programmes¹⁵⁰.

According to the Zanzibar Biodiversity Strategy¹⁵¹ for the fisheries sector, “the overall objective of aquatic biodiversity in Zanzibar, as perceived by the Sub-Commission of Fisheries, is to stop further damage on biodiversity and improve it to sustainable levels”. This overall objective shall be achieved in two ways: a) total protection of rare and endangered species (e.g. turtles and coconut crabs) and habitats facing irreversible destruction; and b) rational and sustainable exploitation of the biodiversity resources. Table 10 summarises the priorities defined in the Zanzibar Biodiversity Strategy for the fisheries sector.

Table 10 Fisheries Sector priorities defined in the Biodiversity Strategy¹⁵²

PRIORITY	OBJECTIVE	RESPONSIBLE INSTITUTIONS
1	Building Institutional Capacity	Fisheries
2	Protection of rare and endangered species	Fisheries, Environment, Local Communities
3	Halting depletion of inshore water fish species	Fisheries
4	Fostering sustainable use of mangrove, sea grasses and coral reefs	Commission for Natural Resources, Attorney General Chambers, Security Forces
5	Promoting the establishment of marine protected areas	Fisheries, Attorney General Chambers, Local Communities
6	Promoting the management of freshwater bodies	Water Department and Fisheries Sub-Commission

9.4.5 Sea Turtle Conservation Programme

The Pemba Sea Turtle Conservation Education and Community Nest Recording Programme was initiated in Pemba Island in 1995 with the aim to verify the important nesting beaches and to conduct a conservation education programme. Seven locations were selected for the work, which ran for a 16 month period from November 1995 to March 1997 and was supervised by COLE. Contacts in selected locations were asked to record the occurrence of turtles nesting on the beaches in their area. An education programme



Figure 10 Sea turtles on Misali Island

¹⁵⁰ Revolutionary Government of Zanzibar, undated. *Zanzibar Sectoral Biodiversity Strategy. Part two: Sectoral Papers*, pp 1-93.

¹⁵¹ Revolutionary Government of Zanzibar, undated. *Zanzibar Sectoral Biodiversity Strategy. Part two: Sectoral Papers*, pp 1-93.

¹⁵² Revolutionary Government of Zanzibar, undated. *Zanzibar Sectoral Biodiversity Strategy. Part two: Sectoral Papers*, pp 1-93.

was designed in collaboration with the villages, and included village meetings, a mobile video show, the production and showing of a drama about turtle conservation, filming of the drama, school lectures, the production of a leaflet about turtle poisoning and a final wrap-up workshop¹⁵³. One of the most important achievements in efforts to conserve turtles in Zanzibar was the establishment of the Zanzibar Sea Turtle Conservation Committee in February 2002 as a recommendation of the Sea Turtle recovery plan for Zanzibar¹⁵⁴.

9.4.6 Misali Island Conservation Project

Misali Island's uniqueness in terms of biodiversity has for long been recognised and the island was in 1987 considered as one of Tanzania's five sites containing intact shallow coral reef formations that should be proclaimed strict reserves¹⁵⁵. Subsequent surveys^{156,157} reported relatively pristine conditions of the marine habitats, yet they also acknowledged the need to establish some form of management to safeguard Misali resources from destructive methods used by fishers. The Misali Island Conservation Project (MICP) was initiated in 1996, with the aim to establish a financially self-sustaining marine and terrestrial protected area at Misali Island, Pemba, based on fishing and ecotourism as the main activities.

The MICP was a project of the Commission for Natural Resources supported by the Environment and Development Group (EDG) and funded by the European Union. Fishers were fearful of the loss of the island to private interests and insisted that it remained government property. At the same time, fishers were concerned with the decreasing catches in the area and therefore supported that Misali should be declared a marine conservation area, with the condition that fishers still had access¹⁵⁸. The Misali Island Marine Conservation Area (MIMCA) was established on 22 May 1998 under both Forestry and Fisheries legislation¹⁵⁹. The management committee has 15 members, including 9 fishers, the DCCFF, fisheries and tourism¹⁶⁰.

The conservation area in Misali covers 21.58 km² in total, with the marine area totalling 20.68 km² and the terrestrial area 0.90 km². The conservation area is divided into 2 main zones, a non-extractive use zone (1.4 km² or 8.5% of the total area) that is necessary to ensure that fish stocks are given a chance to replenish, and an extractive use zone (19.3

¹⁵³ Slade, L., A.A. Khatib, M.H. Yussuf, 1997. *Sea Turtles in Zanzibar: Pemba Sea Turtle Conservation Education and Community Nest Recording Programme. November 1995 – March 1997*. Department of Environment, Zanzibar, pp 1-50.

¹⁵⁴ Tanzania Coastal Management Partnership, 2003. *Tanzania State of the Coast Report 2003: The National ICM Strategy and Prospects for Poverty Reduction*. National Environmental Management Council, the University of Rhode Island Coastal Resources Centre, and the United States Agency for International Development, pp. 1-62.

¹⁵⁵ UNEP, 1989. *Coastal and Marine Environmental Problems of the United Republic of Tanzania*. UNEP Regional Seas Reports and Studies No. 106, Annexes, pp 1-114.

¹⁵⁶ Horrill, J.C., 1992. *Status of the Coral Reefs of Misali Island, Pemba*. Zanzibar Environmental Study Series Number 13. The Commission for Lands and Environment, Zanzibar, pp 1-12.

¹⁵⁷ Horrill, J.C., Machano, H. and Omar, S.H., 1994. *Misali Island; Rationale for a Marine Protected Area*. Zanzibar Environmental Study Series Number 17. The Commission for Lands and Environment, Zanzibar, pp 1-12.

¹⁵⁸ Ali Said, personal communication, 7 Nov 2004.

¹⁵⁹ Fisheries Act, No. 8 of 1988 and Forest Resources Management and Conservation Act No.10 of 1996.

¹⁶⁰ Ali Said, personal communication, 7 Nov 2004.

km² or 89.9% of the total area). In the non-extractive zone on the west side of the island, with important turtle nesting beaches and coral reefs, no extractive uses are allowed yet diving, snorkelling, swimming, boating and scientific research are permitted. In the extractive zone all legal fishing is permitted and two areas have been designated as fishers camping areas (Mbuyuni and Mkwajuni).

The Misali Island Conservation Association (MICA) has been created under the project to ensure the sustainable utilisation of Misali resources and other areas of Pemba while improving the livelihood security of communities that use Misali resources. MICA management includes coordination of a team of rangers who reside on the island on a rotation basis¹⁶¹ and community development projects financed by 40% of the tourism revenues. Misali Island is an important tourism diving site in Pemba Island and nature trails have been developed¹⁶². In future it will be the management committee's responsibility, advised by MICA, to allocate this revenue and decide what projects to implement. MICA will then assist in implementation¹⁶³.

The management of the conservation area is no longer with the DFMR but with DCCFF. Most activities in the project are marine-oriented, however, and it is a commonly heard opinion that the project should be managed by the DFMR. The ministries' roles and mandates are not clear and MACEMP is an opportunity to review the institutional setting of the Project. CARE works in partnership with DCCFF, DFMR and MICA and aims to build their capacity.

A number of "lessons learned" have been generated from the Misali Island Conservation Project¹⁶⁴. Firstly it is imperative to address the issue of the coastal communities' livelihood security before aiming to engage them in conservation initiatives. The Misali Island Conservation project constitutes a positive example where government departments and NGOs work together. The project also aimed to work with the *shehias*, which represent an ideal entry point to the communities. Misali is a meeting point for fishers from all over Pemba and beyond and can thus serve as an information/education centre for fishers.

¹⁶¹ Frontier-Tanzania, 2004. *Misali Island: A detailed description of the subtidal regions*. Frontier Tanzania Environmental Research Report 103. Daniels, C., Fanning, E. & Jiddawi, N. (eds). Society for Environmental Exploration, UK with the University of Dar es Salaam including the Institute of Marine Sciences and the Ministry of Agriculture, Natural Resources and Cooperatives, Zanzibar, pp 1-24.

¹⁶² Abdullah, A., A.S. Hamad, A.M. Ali, and R.G. Wild, undated. *Misali Island, Tanzania – An Open Access Resource redefined*. Paper presented in the 8th Biennial Conference of the International Association for the Study of Common Property (IASP), pp1-11.

¹⁶³ Ali Said, personal communication, 7 Nov 2004.

¹⁶⁴ Ali Khamis Thani, personal communication, 6 Nov 2004.

10 THREATS TO BIODIVERSITY IN PEMBA ISLAND

10.1 EXISTING AND POTENTIAL THREATS

10.1.1 Destructive Fisheries and Overexploitation

Destructive and over-fishing in Pemba Island have been documented and were reflected in the results of the Rapid Assessment interviews. Overfishing and the catching of juvenile fish result in the depletion of fish stocks, alteration in species composition, loss of species diversity, disruption of food webs, and disturbance of the natural equilibrium of reef ecosystems¹⁶⁵. Overfishing of the Triggerfish, for example, results in a proliferation of sea urchins which are known to be bio-eroders of reefs¹⁶⁶. Coupled with the open access nature of the fisheries and unregulated catch rates, fishers are now reporting a decline in catch¹⁶⁷. A large number of fishers that were interviewed (37%) identified the use of destructive gear as a cause for decreasing fish stock. Beach seining, dynamiting, spear gun fishing, poison or noxious substances, and small mesh nets are used by fishers in an attempt to increase their catch and have all taken their toll.

The use of dynamite has been reported in several occasions in the past^{168,169}. It is an illegal practice that kills fish of any age group and size and causes damage to coral reefs. Divers from the Fundo Lagoon Hotel as well as Swahili Divers reported that dynamite fishing is still in practise and that they hear explosions regularly. Some divers also reported that they have seen craters caused by dynamite fishing, especially in the northwest of Pemba.

The use of seine nets around coral reefs is also destructive, when the net entangles with the corals causing breakage or when fishers using the “*Kojani* or *Kigumi* technique” hit the coral heads in order to scare the fish. This technique, especially used by fishers from Kojani and Kiuyu, catches fish of any age group or size and can break the corals on the reefs or uproot plants in seagrass beds¹⁷⁰. Kojani is an island located on the east of Pemba with high population density concentrated on the area immediately facing the mainland and poor conditions for agriculture and relatively few livelihood options. It is very probable that due to over-exploitation of marine resources within the boundaries of their home village, Kojani fishers have few alternative opportunities and are thus highly

¹⁶⁵ Wagner, G. M., 2000. *Coral Reefs*. In Ngusuru, A. S. (ed), 2000. The present state of knowledge of marine Science in Tanzania – Synthesis report. Tanzania Coastal Management Partnership, pp 101-137.

¹⁶⁶ Kamukuru, A.T., 1997: Assessment of the biological status of the Dar es Salaam Marine Reserves System off the Kunduchi coast, Tanzania. Western Indian Ocean Marine Science Association (WIOMSA), Zanzibar and IOC/UNESCO Paris, France, pp 1-31. In: Wagner, G. M., 2000. *Coral Reefs*. In Ngusuru, A. S. (ed), 2000. The present state of knowledge of marine Science in Tanzania – Synthesis report. Tanzania Coastal Management Partnership, pp 101-137.

¹⁶⁷ Lim, L.C., 2000. *A Situational/Status Analysis of the Misali Island Project, Pemba, Zanzibar*, pp 1-35.

¹⁶⁸ Faki, O.M, undated. *National Consultancy Report*. Biodiversity Project UNO/RAT/006/GEF, pp 1-29.

¹⁶⁹ Revolutionary Government of Zanzibar, undated. *Zanzibar Sectoral Biodiversity Strategy. Part two: Sectoral Papers*, pp 1-93.

¹⁷⁰ Revolutionary Government of Zanzibar, undated. *Zanzibar Sectoral Biodiversity Strategy. Part two: Sectoral Papers*, pp 1-93.

committed to fishing in other areas¹⁷¹. Interestingly the people of Kojani operate a traditional management system for mangroves whereby they harvest timber or firewood from dead or fallen trees or branches. This traditional behaviour could be used as a positive example to raise the awareness of Kojani fishers that currently represent a threat to the west coast resources.



Figure 11 Fishing traps near Ras Mkumbuu

Poison such as herbicide and noxious substances such as leaves of certain trees have been used in fishing until recent years. Banned by law, the use of poison kills fish and other aquatic organisms including their eggs. Octopus fishing, collection of shellfish (which entails reef walking and diving), and the use of basket traps may also be destructive to reefs, if carried out in an improper fashion. Spear fishing can cause coral damage when fishers break soft and hard coral in order to reach the octopus, a practise that was observed by the Rapid Assessment Team. Fishers from Chake Chake and Kojani are the main users of spear guns in Pemba Island and Misali Island is one of the most affected areas¹⁷². Other harmful activities related to fishing include the dropping of anchors and boat grounding¹⁷³.

10.1.2 Unsustainable Extractive Use of Mangroves

Mangroves are traditionally used for firewood, charcoal, construction poles, boat building, furniture, leather tanning dye, and medicinal purposes among other uses. Consequences of mangrove destruction include a decrease in flora and fauna, fish and prawn catches, impacting on the local communities' food source and income. Increased coastal erosion occurs with the removal of natural mangrove stands. The mangroves also act as a coastal buffer and prevent nutrient-rich waters or sediments flowing and affecting coral adversely¹⁷⁴.

Currently there is no effective management regime of mangrove resources except to control cutting and closing and opening the mangrove areas for a period of 10 years. The Forestry Sub-Commission has also been trying to use cutting permits to control individual exploitation and to allow cooperatives to carry out the harvesting business¹⁷⁵. Although bans are legally in place, licenses for cutting poles and for the construction of

¹⁷¹ Richmond, M. and M.S. Mohammed, 2000. *A Review of the Fisheries of Misali Island Marine Conservation Area (MIMCA), Pemba, with recommendations for monitoring*. Marine Education, Awareness & Biodiversity (MEAB) Programme, pp 1-42

¹⁷² Revolutionary Government of Zanzibar, undated. *Zanzibar Sectoral Biodiversity Strategy. Part two: Sectoral Papers*, pp 1-93.

¹⁷³ Wagner, G. M., 2000. *Coral Reefs*. In Ngusaru, A. S. (ed), 2000. *The present state of knowledge of marine Science in Tanzania – Synthesis report*. Tanzania Coastal Management Partnership, pp 101-137.

¹⁷⁴ Frontier-Tanzania, 2003. *Misali Island: A description of the mangrove regions*. Frontier Tanzania Environmental Research Report 102. Daniels, C., Fanning, E. & Jiddawi, N. (eds). Society for Environmental Exploration, UK with the University of Dar es Salaam including the Institute of Marine Sciences and the Ministry of Agriculture, Natural Resources and Cooperatives, Zanzibar, pp 1-43.

¹⁷⁵ Revolutionary Government of Zanzibar, undated. *Zanzibar Sectoral Biodiversity Strategy. Part two: Sectoral Papers*, pp 1-93.

salt pans are issued. Confusion has arisen from both commercial and artisanal users over the legal situation and their rights as local villagers have felt distanced from mangrove policy formulation creating conflict with the government¹⁷⁶. The recently established approach is to encourage community participation in mangrove management, which should be actively promoted in the target area.

10.1.3 Uncoordinated Tourism Development

Tourism in Pemba Island is only starting yet the potential threats associated with unsustainable tourism development are well known. In fact, many people in Pemba are fearful that the tourism industry in Pemba takes a similar path as it took in Unguja. The natural attractions of the target area offer great potential for tourism and therefore proper planning and zoning, with the participation of communities, need to take place. The existing tourism zoning plan aims to provide guidance but its status is uncertain and its content outdated. The team heard frequent complaints that tourism allocations appear to occur on an *ad hoc* basis and are not coordinated with other relevant parties who should have the opportunity to give input.

10.1.4 Coral Bleaching

The coral bleaching event of 1998 has taken its toll on the target area's coral reefs and climate change poses the threat of new events. There is a need to promote research on coral bleaching and to establish an effective system to monitor coral health.

10.1.5 Urban, Agricultural and Industrial Activities

Even though land-based pollution sources on Pemba Island pose only a medium threat to the marine and coastal environment, there are examples that cause concern and require action. The use of pesticides and herbicides in rice fields has often been causing death of freshwater organisms such as fish, molluscs, crustaceans and reptiles¹⁷⁷. The power generator at Weshu is leaking, affecting one of the largest areas of mangrove in the west side of the island (1.366 ha) around Mgelema and Chake Chake. Motorised marine vessels (boats, ships and oil tankers) are causing oil spillage, and waste water disposal into marine environment is another concern¹⁷⁸. These issues are rooted in poor inter-ministerial coordination and poor environmental management in industries, fields and towns.

¹⁷⁶ Frontier-Tanzania, 2003. *Misali Island: A description of the mangrove regions*. Frontier Tanzania Environmental Research Report 102. Daniels, C., Fanning, E. & Jiddawi, N. (eds). Society for Environmental Exploration, UK with the University of Dar es Salaam including the Institute of Marine Sciences and the Ministry of Agriculture, Natural Resources and Cooperatives, Zanzibar, pp 1-43.

¹⁷⁷ Revolutionary Government of Zanzibar, undated. *Zanzibar Sectoral Biodiversity Strategy. Part two: Sectoral Papers*, pp 1-93.

¹⁷⁸ Revolutionary Government of Zanzibar, undated. *Zanzibar Sectoral Biodiversity Strategy. Part two: Sectoral Papers*, pp 1-93.

10.2 ROOT CAUSES

10.2.1 Livelihood Needs

The population in the target area depends heavily on coastal and marine resources, with the entire Pemba Island exploiting the fishing resources on the west coast. The fisher population lack appropriate fishing vessels and gears to fish in the deep sea and thus concentrate in core breeding sites and shallow coral areas. Alternative livelihoods are poorly developed and are hampered by deficient infrastructure and difficult access to markets. Education levels are generally low and many children engage in fishing activities early in age instead of investing in education.

10.2.2 Insufficiencies at Institutional and Planning Levels

Due to the weakness of the Zanzibar economy, government funds assigned to conservation areas are small, with consequences even at the level of basic patrolling¹⁷⁹. Lack of resources for conservation was indeed a common complaint heard in Misali Island by the Rapid Assessment Team. There also appears to be a lack of institutional procedures to deal with development applications and insufficient institutional capacity and integration of sustainable development approaches¹⁸⁰. Activities to monitor fishing activities, catches and the health of the marine ecosystem are currently insufficient to support adequate management of the target area. Staff working in Zanzibar protected areas has insufficient training in protected areas management¹⁸¹.

10.2.3 Weak Law Enforcement

There is insufficient capacity to enforce laws such as those concerning destructive fishing gears and methods, fishing restrictions in Misali Island, mangrove cutting, and industrial, urban and agricultural pollution sources. An assessment of the status of marine protected areas in Zanzibar¹⁸² has recognized inadequate enforcement of legislation relating to fisheries, as well as environmental issues, as a major problem.

10.2.4 Insufficient Understanding of the Value of Pemba Island

The natural and cultural values of Pemba Island have been acknowledged by many people yet are still insufficiently studied and poorly understood by their users. Further research into the target area's habitats and species will add more weight to its value in the regional and global context and thereby make it easier to obtain support. Often the fishers and communities in general are not informed about the resources around them and for

¹⁷⁹ Abdullah, A., A.S. Hamad, A.M. Ali, and R.G. Wild, undated. *Misali Island, Tanzania – An Open Access Resource redefined*. Paper presented in the 8th Biennial Conference of the International Association for the Study of Common Property (IASP), pp1-11.

¹⁸⁰ Arup Environmental, 1999. *Environmental Impact Assessment for the Proposed Development of a Luxury Lodge at Tondooni, Pemba Island, Zanzibar*. Draft EIA Report, pp 1-146.

¹⁸¹ Hamad, A. S. and Faki, O.S., 2000. *Status of Marine Protected Areas, Zanzibar*. Paper presented at the Regional Training Course in Marine Protected Areas Management in the Western Indian Ocean Region, held at Malindi Marine National Park, Mombassa – Kenya 7th to 19th February 2000, pp 1-10.

¹⁸² Hamad, A. S. and Faki, O.S., 2000. *Status of Marine Protected Areas, Zanzibar*. Paper presented at the Regional Training Course in Marine Protected Areas Management in the Western Indian Ocean Region, held at Malindi Marine National Park, Mombassa – Kenya 7th to 19th February 2000, pp 1-10.

that reason exploit them in unsustainable manners or overlook opportunities for sustainable income generating activities.

10.3 LINKING THREATS AND ROOT CAUSES

Pemba Island is still in a healthy and in many cases pristine condition. Despite the threats described above, there has been minimal degradation of corals and mangroves, no considerable land based pollution and pressure on resources is lower than in other parts of northern Tanzania¹⁸³. There are, however, increasing signs of threats from destructive fishing practises, overexploitation of natural resources such as living marine resources and mangroves, and recently growing tourism. These threats are more evident on the west coast, where most of the fishing activities take place. The island's natural resilience and restoration potential is luckily high, as it is a large and diverse area with sufficient larval supply to provide for natural recovery at current levels of use¹⁸⁴. Nevertheless, there are clear signs of strain related to the root causes above, and adequate protection and proactive restoration is required.

A strategy for the conservation and sustainable development for Pemba does however require a clear understanding of the links between threats to biodiversity and their root causes so that sensible recommendations can be made, and hopefully applied during the MACEMP Project. Table 11 presents the main threats to the unique biodiversity of the target area, their root causes as well as the resulting recommendations that can be addressed both by MACEMP and parties, programmes and projects that lie outside MACEMP. Recommendations are elaborated upon and further recommendations listed in Part III below.

¹⁸³ WWF, 2001. *Proceedings of the Eastern African Marine Ecoregion Visioning Workshop*. Mombasa, Kenya, April 21st -24th 2001, pp 1-36.

¹⁸⁴ WWF, 2001. *Proceedings of the Eastern African Marine Ecoregion Visioning Workshop*. Mombasa, Kenya, April 21st -24th 2001, pp 1-36.

Table 11 Main threats to biodiversity in the target area

THREATS	ROOT CAUSES	RECOMMENDATIONS
1) Destructive fisheries and overexploitation of marine resources	Increasing number of fishers due to insufficient alternative livelihoods	<ul style="list-style-type: none"> ▪ Diversification of livelihoods by stimulating income generating activities such as agriculture, animal husbandry, beekeeping, and conservation activities, paying special attention to women ▪ Promotion of new fishing methods on the east coast to relieve pressure from the west coast ▪ Careful investigation of the development of low-technology mariculture, including the harvesting of wild stocks of certain species ▪ Work in collaboration with appropriate government departments to improve the conditions, and give incentives for children to attend school instead of engaging in fishing activities from an early age
	Insufficient income to purchase proper fishing gear and vessels and invest in more sustainable fisheries	<ul style="list-style-type: none"> ▪ Promotion of fisheries products value-adding activities and improvement/creation of markets ▪ Exchange of illegal gear by legal gear (perhaps through a loan arrangement)
	Insufficient understanding by the fishers of impacts of fishing activities and sustainable techniques	<ul style="list-style-type: none"> ▪ Awareness raising among fishers of sustainable harvesting techniques and the value of a healthy and well functioning marine ecosystem ▪ Establishment of a community training centre (e.g. in Misali Island) for marine ecosystem and sustainable fisheries related issues, for fishers, community management committees and rangers ▪ Study tours to areas where fisheries management systems are in place ▪ Using cultural (religious) leaders to raise awareness of communities
	Poor organisation of fishers and stakeholder groups, including dealers in marine resources	<ul style="list-style-type: none"> ▪ Creation of fishers groups or cooperatives to increase power to invest in fisheries management and facilitate access to saving and credit system to these groups or cooperatives. Working in collaboration with appropriate government departments, use these groups to raise awareness of HIV/AIDS
	Open access to marine resources	<ul style="list-style-type: none"> ▪ Establishment of a controlled system of marine resource utilisation in the proposed PECCA area ▪ Creation of new non-extractive areas around small islets ▪ Implementation of opening and closing system for certain species
	Weak enforcement of fisheries legislation	<ul style="list-style-type: none"> ▪ Enhancement of law enforcement through creation of community management committees ▪ Surveillance and compliance systems installed for the PECCA area and EEZ

THREATS	ROOT CAUSES	RECOMMENDATIONS
	Weak control and monitoring of fishing activities including number of fishers, species targeted and catches	<ul style="list-style-type: none"> ▪ Improvement of control and monitoring of fishing activities ▪ More effective system recording catches and sales of resources ▪ Creation of community patrolling teams to monitor turtle nesting sites
	Incomplete knowledge about marines resources to inform sustainable management of fisheries	<ul style="list-style-type: none"> ▪ Promotion and investment in research into the functioning of the marine system ▪ Installation of well conceived pilot projects ▪ Establishment of a training system, facility or school(s) for fishers
	Insufficient support to community-based groups or initiatives	<ul style="list-style-type: none"> ▪ Establishment by communities of demonstration plots and pilots for alternative activities ▪ Research and development of alternative livelihoods, including value-adding activities to existing resources
2) Unsustainable extractive use of mangroves	Lack, unreliability or high cost of alternative energy sources	<ul style="list-style-type: none"> ▪ Testing and promotion of other sources of energy, such as other species of trees that can easily be replanted, and solar energy (including an assessment of the existing mangrove biomass and usage) ▪ Replacement of stoves and cooking methods to ones that are more energy-efficient ▪ Boosting the replanting of mangroves to a quasi commercial scale
	Lack or high cost of alternative building materials	<ul style="list-style-type: none"> ▪ Switching to use and replanting of other species for pole construction such as <i>Casuarina</i> tree (exotic species)
	Insufficient understanding by the population of the importance of mangroves and impacts of unsustainable harvesting	<ul style="list-style-type: none"> ▪ Awareness raising among coastal communities of the importance and value of mangroves and of sustainable harvesting practices ▪ Using cultural (religious) leaders to raise awareness of communities
	Weak law enforcement and monitoring	<ul style="list-style-type: none"> ▪ Enhancement of law enforcement through creation of community management committees
	Insufficient support to community-based groups or initiatives	<ul style="list-style-type: none"> ▪ Involvement of the communities in reforestation and promotion of community-based management of mangroves in areas seriously destroyed, building on and using lessons learned from existing community initiatives
	Insufficient understanding of the ecological functions of mangroves	<ul style="list-style-type: none"> ▪ Promotion and investment in research into mangrove habitats and species

THREATS	ROOT CAUSES	RECOMMENDATIONS
3) Uncoordinated tourism development	Lack of a vision for tourism and uncoordinated tourism development planning	<ul style="list-style-type: none"> ▪ Public awareness campaign and visioning exercises for Pemba, and in particular PECCA as a tourism destination ▪ Review of policy and legislation pertaining to tourism planning, making it known to all relevant parties and starting to implement policy frameworks and regulations ▪ Conducting EIA for particular proposed projects and, for strategies and regional planning, starting to use Strategic Environmental Assessment (SEA) ▪ Drawing up an ecotourism plan for the proposed PECCA area with full input of all stakeholders ▪ Assessment of the target area's potential for eco- and cultural tourism, perhaps as part of SEA ▪ Conducting a feasibility study for PECCA being nominated for World Heritage Site status ▪ Definition, with full stakeholder participation in particular the local communities, of comprehensive guidelines for tourism development in the proposed PECCA area
	Insufficient community participation	<ul style="list-style-type: none"> ▪ Definition and development of a comprehensive plan and clear mechanisms for community involvement in the tourism sector
	Poor coordination between governmental institutions	<ul style="list-style-type: none"> ▪ SEA of the target area and inter-departmental workshop to scope out tourism development in Pemba in general and PECCA in particular
	Weak law enforcement	<ul style="list-style-type: none"> ▪ Improvement of law enforcement both for new and existing tourism developments such as applying the mandatory EIA for new developments ▪ Creation of monitoring systems that include the tourism sector, communities and all tiers of government to monitor tourism activities
	Low environmental awareness among tourists and in general of the target area's values	<ul style="list-style-type: none"> ▪ Dissemination of information and awareness raising of the biological and cultural values of Pemba as well as the positive contributions that tourism can make to their preservation and the economy in general
4) Coral bleaching	Climate change	<ul style="list-style-type: none"> ▪ Linking Pemba into international coral bleaching networks such as CORDIO ▪ Monitoring of coral health on pilot sites

THREATS	ROOT CAUSES	RECOMMENDATIONS
5) Urban, agricultural and industrial activities	Poor environmental management and land use planning	<ul style="list-style-type: none"> ▪ Definition of environmental standards in collaboration with all key players ▪ Creation of Committee of the Revolutionary Council on Environment as provided for in <i>Sheria Mazingira</i> ▪ Environmental auditing for existing areas/activities and EIA for new areas/activities ▪ Incorporation of environmental planning in town development for new areas and promotion of initiatives such as Local Agenda 21 (LA 21) ▪ Addressing “burning issues” such as oil leaks and pollution ▪ Boosting the Pemba Department of the Environment so it can fulfil its role
	Poor coordination between governmental institutions	<ul style="list-style-type: none"> ▪ SEA of the target area with participation of local institutions and communities to define broad zones for tourism and other developments ▪ Harmonization of sectoral laws
	Weak law enforcement	<ul style="list-style-type: none"> ▪ Enhancement of law enforcement ▪ Supporting the establishment of bylaws in the communities

11 “READINESS” FOR A CONSERVATION AREA

The United Nations List of Protected Areas for 2003¹⁸⁵ lists a total of 4,116 protected areas containing marine and coastal elements. There is concern, however, that many of these areas are not achieving their management objectives and are protected areas merely on paper. A survey assessing management performance of 342 MPAs showed that only 14% were effectively managed¹⁸⁶. One reason for this is that the communities living in the area and the national and local institutions that have the capacity to collaborate are not sufficiently involved in the planning and management of the protected areas. In the case of the proposed PECCA, however, there are several factors that create a good ground for this initiative, as highlighted below.

1. The natural system is still relatively healthy

The target area’s coastal and marine environment is predominantly healthy and several reefs and mangroves are in relatively pristine condition. The high biodiversity and the healthy habitats in the area, and most importantly the function of the west coast of Pemba Island as a generator and seed bank of biodiversity for the whole Pemba Channel and East African region, make a strong case for establishing PECCA. The time is ripe to create PECCA, before the early signs of destruction caused by improper fishing gears and over-exploitation of marine and coastal resources become too evident. Misali is a good start yet a much larger area under protection is required to make a long term difference to the global biodiversity and the livelihoods of Pemba people.

2. Environment is conducive to conservation and risks are low

It was encouraging to see that most fishers are positive towards the idea of conservation and are willing to support PECCA. Even though some fishers are reluctant to the creation of more areas like Misali where fisheries are restricted, the majority acknowledges a decline in catches and the need for improved fisheries management. In the northern area of Tondooni a hotel development has left the communities very averse to “outside” interventions, yet PECCA is an idea flowing from the Zanzibar government itself and will be implemented through a cooperative approach involving many parties from within Pemba. Several *shehias* in the island already have Village Conservation Committees (VCC) established by MICA (and in fact another village requested assistance to establish one after interviews with the fishers were done there). These VCCs already play a crucial role in raising the fishers’ awareness of sustainable fishing practices and are ideal entry points for PECCA. By targeting not only communities in PECCA but all communities that use PECCA resources, the risk of threats to the area’s environment are reduced and the project brings benefits in the context of the whole

¹⁸⁵ Chape, S., S. Blyth, L. Fish, P. Fox and M. Spalding (compilers), 2003. *2003 United Nations List of Protected Areas*. IUCN, Gland, Switzerland and Cambridge, UK and UNEP-WCMC, Cambridge, UK, ppi-ix + 1-44.

¹⁸⁶ Ehler, C., 2003. Cross Cutting Theme “Marine” paper prepared for the Vth IUCN World Parks Congress, 8-17 September 2003, Durban, South Africa, pp1-2.

island. Targeting the fishers of Kojani, for example, can help reduce the threat of destructive fishing on the west coast of Pemba. This can be done in a positive way, focusing on their famed maritime skills and knowledge first, before addressing the negative impact their fishing methods have.

3. Local human resources are ready and committed

PECCA is an idea that was born in Pemba Island. The need to conserve the natural resources of Pemba and of several sites along its west coast has for long been recognised¹⁸⁷ and has been translated into a proposal for the creation of the Pemba Community-Based Marine Conservation Area¹⁸⁸ that encompassed the northern area of the west coast. Conservation is a familiar concept in Zanzibar yet most initiatives have been started by outside parties¹⁸⁹. The case of PECCA is different because there is certain continuity because of the central role that the Government will play in its establishment and management. The government institutions, as well as NGOs that work together with them, are thus supportive of PECCA and ready to participate fully in its management. Government departments and NGOs maintain exceptionally good relations and have been working together. The DFMR, DoE, IMS, NGOs and other institutions that deal with coastal and marine issues are prepared and ready to participate in PECCA. These institutions will, moreover, build their capacities during the PECCA process and thereby ensure full participation in the protection of Zanzibar and even mainland Tanzania's coastal and marine environment.

4. The potential for Integrated Conservation and Development (ICD) is high in the target area

The target area has much latent value beyond biodiversity only. There are opportunities for multiple land use in which biodiversity conservation can be integrated. The need for conservation and sustainable use is not limited to the marine biodiversity, but sustainable use of the area's rich cultural and archaeological treasures need to be investigated urgently. Research in this direction surely will enhance and highlight the value of the area in the context of the entire island as well as in the regional and global contexts. PECCA has enormous potential for improving fishing activities and promoting aquaculture and game fishing. The area's rich soils and other natural resources offer the possibility of alternative livelihoods such as agriculture, livestock keeping, tree plantation and bee keeping. Tourism activities can be expanded on a sustainable manner based on the area's natural and cultural attributes, with a view to declaring the proposed PECCA a cultural and natural World Heritage Site (WHS).

¹⁸⁷ Faki, O.M., undated. *National Consultancy Report*. Biodiversity Project UNO/RAT/006/GEF, pp 1-29.

¹⁸⁸ Department of Fisheries and Marine Resources, 2004. *Pemba Community-Based Marine Conservation Area (PMCA), Zanzibar*. Project Proposal, pp 1-7.

¹⁸⁹ Levine, A., 2004. *Local Responses to Marine Conservation in Zanzibar, Tanzania*. Centre for African Studies, Breslauer Symposium on Natural Resource Issues in Africa, University of California, Berkeley, pp 1-19.

PART III: RECOMMENDATIONS

12 WHAT SHOULD PECCA BE LIKE?

12.1 DEFINITION AND BENEFITS

The target area of the study stretched from the northern tip to the southern tip of Pemba. The Rapid Assessment Team approached the entire area with an open mind. Some parties consulted felt that the entire island of Pemba should be protected, while some publications suggested that significant sections on the west side should be consolidated into a network of areas that should enjoy special protection. However, while everyone recognises the value of Pemba as a whole, people by and large agreed that practicalities as well as the current level of awareness would require a phased approach in which significant results would be achieved before the conservation area or activities are expanded beyond initial core areas. It was also recognised that the entire west side forms one interlinked system, not only biologically but also in terms of patterns of resource exploitation, and that it should be treated as such. The area is a large one and hence a phased approach is advocated that would include core areas and areas in between that would function as multiple resource use areas where fishers will be assisted to utilise resources in a sustainable manner.

It is thus proposed that the Pemba Channel Conservation Area (PECCA) would comprise the entire west side of Pemba Island from its northern tip in Ras Kigomasha to its southern tip in Panza Island (see Map 2). It encompasses an approximate area of 747 km² of marine habitat and a total area of 910 km² that also includes an area of 1 km inland from the shoreline. This area includes an approximate 2,700 ha area of coral reef and 5,400 ha of mangrove, which represents 45% of the total area of Pemba covered by mangrove¹⁹⁰. The benefits of PECCA will, however, extend far beyond this area. PECCA is the area most used by fishers coming from villages in the entire island and thus conserving and managing it will bring benefits for the population of Pemba as a whole. In reality benefits will extend to Zanzibar as a whole, especially since the proper development of PECCA will draw more and more tourists, many of whom will stop over in Unguja as well.

The creation of PECCA will enable the protection of the area's biodiversity against existing or potential threats by addressing the root causes behind these threats. A more sustainable fisheries system will thus be needed to stop the use of destructive fishing gears, such as the beach seining technique used by fishers from Kojani on the east coast, and over-exploitation of marine resources. This will not, however, be enough to address

¹⁹⁰ This area was calculated by the Institute of Marine Sciences (IMS) in Zanzibar according to IMS data and the boundaries proposed for PECCA.

poverty. Alternative livelihoods will need to be created to relieve the pressure from the marine environment, including agriculture and community-based tourism. Finally, some areas will need to be conserved to allow the ecosystem to replenish. The benefits of this approach will extend beyond the boundaries of PECCA. PECCA represents a node of biodiversity in the WIO by creating a channel between the mainland and the island that serves as a generator of biological diversity and drives the regional system. Therefore, protecting the western coast of Pemba Island means protecting a larger system.

12.2 A PHASED APPROACH USING ZONATION

Establishing a conservation area in a large area and with multiple components or tiers as proposed for PECCA requires a phased approach. One of the options discussed during the Rapid Assessment was to divide PECCA in the northern and southern regions, which would be targeted in successive phases during PECCA implementation. Because the fishers and other PECCA resources users are familiar with Misali Island, this could be the ideal place to start with and from where conservation initiatives could be expanded.



Figure 12 Lagoon on Misali Island

The villages in the small islets on the west coast of Pemba Island, where living conditions are lower and opportunities fewer than in the mainland, are also considered priority. The urban centres of Wete, Chake Chake and Mkoani should be addressed through a separate strategic action plan or Local Agenda 21 (LA 21) initiatives that take into account the potential social and environmental impacts on the surrounding conservation area. The following target areas should thus be approached in phases comprised of different steps:

12.2.1 Phase One: Boost Existing Livelihood Options or Plan and Implement New Ones

It is generally accepted that the PECCA will stand or fall depending on whether it will benefit the local population. Fortunately, there is already funding available from the Japanese Social Development Fund (JSDF), and other funding opportunities such as GEF-funded Small Grants through UNDP and others may also be relevant.

Step 1 – Identify Options and Opportunities

Local Economic Development (LED) is more complicated than merely taking a shotgun approach to assisting people by haphazardly starting projects. It is highly recommended that a simple but thorough LED study be done on the PECCA area that investigates and lists opportunities, and rates them according to their feasibility and acceptance by local people. The output should not be a thick consultants' report but rather a simple manual that lists options and provides the steps that can be taken to ensure their realisation. The manual will effectively serve as a LED Strategy that is ready to be implemented. The alternative could be a scenario where various projects are started amidst great enthusiasm that may very well wane two or three years from now at a critical point that will influence the success or failure of PECCA.

Step 2 – Put Protocols in Place for Implementation

How money will flow to target beneficiaries in PECCA can also play a big role in the ultimate success of such funding. There needs to be a very transparent and equal opportunity process and place beyond the initial tendering out for implementers to manage the funding. The question immediately arises as to where to start first, as everyone appears to be needy and will imagine that they deserve to get the funding. For the protection of the MACEMP project, it is important that funding be allocated according to a set of criteria. During short brainstorming sessions in Unguja and Pemba during a follow-up visit by the Team Leader in January 2005, the following potential criteria surfaced for implementation of projects, or the development of livelihood options:

- Areas where there are exceptionally high biodiversity or unique/special ecological systems should have a higher priority than areas where such features do not exist;
- Areas where human need is the greatest should have a higher priority than areas where there are more livelihood opportunities already;
- Areas where money can make a big difference quickly because of certain opportunities that may exist there (again emphasising the need for a LED study) should have preference over areas where more money will take a longer time to bring benefits;
- Opportunities that are environmentally sound, and that are based on sustainable use of renewable resources should have priority over projects/options that are one-off, or may have negative outputs;
- Small islands and pristine areas should carry a high premium in terms of investments but care should be taken that investments will not produce the opposite effects, such as lure more people to these areas; and
- Investments that will add value to existing livelihoods should get preference over those who are high-risk and of unproven potential.

There are more criteria that can be developed for targeted investments, and much can be learned from projects that have walked this road recently such as the Namib Coast Biodiversity Conservation and Management (NACOMA) project in Namibia where criteria have been worked out for targeted investments (although they are not entirely applicable to Pemba). For the sake of transparency, criteria must be developed collaboratively as far as possible and well publicised to role players and beneficiaries to ensure that they know them and decisions can be defended.

Step 3 – Install Collaboratively Developed Monitoring Systems

Monitoring will have to be ongoing to make sure that funding is in fact spent according to the LED Strategy and cannot simply be left up to the implementing agents. History has shown that even the best implementing agents can have their own agendas or can be paralysed by the realities of implementation.

12.2.2 Phase Two: Establish and Boost Core Conservation Areas

Step 1 – Misali Island

The *first target area* of PECCA should be Misali Island, a scientifically proven “seed bank” of biodiversity for PECCA and the entire region and a meeting point for fishers from the entire island. Misali has been pivotal in creating “awareness” among fishers and can become a centre for information, training and research through the creation of the Misali Island Resource Centre. The existing information centre could be expanded to include a fishers’ school, as well as a research centre to pursue biodiversity studies and monitoring activities, not only in Misali but also in the entire PECCA, and thereby fill existing knowledge gaps to make informed decisions in the project. The Misali Island Resource Centre should also become the main provider of information about PECCA, which should reach fishers, tourism operators and tourists, and the communities in general. Misali has a high standing amongst the fishers and although only part of it will be a core area, it is well worth boosting this core area where management is lagging due to the lack of resources but where most fishers spoken to have already accepted the existence of a non extractive use zone (and believe that it is working – at least to some extent).

Step 2 – Small Settlements and Villages on Certain Small Islets

The “outer” elongated islands of Uvinje, Fundo and Njao form a natural barrier that protects the inshore waters and bays that lie on their east side. The archipelago of small islands that includes Vikunguni, Kashani, Kokota, Mapanya, Pembe and Funzi should be considered a precious part of Pemba and a high priority in a phased approach. The key to conservation on these islands lie in working with the people who live there. In villages in the small islets living conditions are harder and opportunities are fewer than in the mainland. These communities are often more heavily dependent on fisheries as their main livelihood source. These villages should thus be the *second target area*, through awareness raising and training initiatives that build on phase one, as well targeted investments for fisheries management and development of alternative livelihoods. Simple low-technology solutions can be found to water shortages as one example. It is important to note that, soon after the interviewing team had left Kokota they were contacted by representatives of the village with the request to establish a Village Conservation Committee there.

Ras Mkumbuu peninsula stands out as a highly promising pilot site that is connected to the main island through a narrow strip of land that becomes inundated at high tide. This isolated site is not only spectacular in terms of its reefs, mangroves and traditional fishing methods that are still relatively intact but it is one of the most significant sites in terms of cultural and historical heritage¹⁹¹ with ruins dating a thousand years back. During the assessment the team discovered preliminary signs that there might be highly significant undocumented

¹⁹¹ Read also: Abdurahman Juma (2004). *Unguja Ukuu on Zanzibar*. Studies in Global Archaeology 3, Uppsala University, 198 p. and: Martin, E.B. (1978). *Zanzibar Tradition and Revolution*. Hamish Hamilton, London.

archaeological heritage on the site that may boost the overall significance of PECCA considerably in the global area, but further urgent investigation is required in this regard.

Step 3 – Other Small Islands

There are a number of other small islands that are uninhabited that can become core conservation areas without too much work since they are naturally protected to some extent by not having freshwater, because they are relatively out of the way (such as Kwata Islet), or because they are inundated during high spring tides (such as Matumbini Island). These islands can be included in the *first target area* of PECCA. Including them as core conservation areas will have little impact on the livelihoods of fishers.

12.2.3 Phase Three: Expand the Core Areas to Multiple Use Zones that complete the rest of PECCA

Step 1 – The entire PECCA

Efforts to install sustainable resource utilisation can then extend to the entire PECCA. This phase will be informed by the results and “lessons learned” from Misali Island and the pilot islets. Additional studies and consultations will also have been undertaken that can inform PECCA decisions and definition of priorities. PECCA should look at partners and strategies such as SMOLE that can potentially be of use here.

Note: Different phases and steps can run concurrently but it is believed that boosting the existing activities on Misali and extending them, and adding new ones will help to move the entire PECCA along. Therefore, other than the LED funding that should start to flow as soon as possible, Misali should be regarded as a practical starting point where an information centre for fishers can grow from humble beginnings such as an awareness campaign using the existing staff and a video machine to a school for fishers.

12.3 PROJECT INSTITUTIONAL ARRANGEMENTS

Key to the success of PECCA is the definition of roles and approach to be adopted, through multi-stakeholder consultation and village meetings, as well as wide dissemination of information about the project. The DFMR and DoE, the Commission for Tourism, the IMS, NGOs and VCCs should be included in the PECCA management committee (as well as potentially private sector players that can make a contribution to its management). Furthermore, there should be strong liaison with other projects in the area, such as PADEP and SMOLE. However, it is recommended that roles, although preliminary at this stage, need to be defined as soon as possible during a workshop. The expatriate members of the Rapid Assessment Team were highly impressed by the strong collaborative spirit that existed between members of the team that hail from different departments and sectors outside government. The current situation bodes well for the eventual success of PECCA and can be strengthened by defining roles more clearly at an early stage. As soon as institutional arrangements have been clarified, a professionally driven awareness campaign should ensue with strong involvement of the various stakeholders.

It is also important to configure PECCA with other ongoing or starting up initiatives such as SMOLE that can have strong synergy with MACEMP and unlock possibilities of mutual support. SMOLE, for instance, can focus on environmental problems that affect PECCA, such as point source and other forms of pollution by implementing a Local Agenda 21 type of programme in the three major towns that border PECCA. MACEMP, in turn, can focus on the establishment of PECCA, generating “lessons learned” that can be applied by SMOLE on the east side or northwest and southeast parts of Pemba.

13 SPECIFIC RECOMMENDATIONS

13.1 BUILDING A COMMON VISION FOR PECCA

- Extensive workshops and discussions should be held with the various stakeholders to agree on a common vision for PECCA. These discussions, supported by the required studies and consultations, should lead to a PECCA plan that defines the aims and policies of PECCA. Other conservation areas, such as Misali Island and Mnemba Island, have generated “lessons learned” that are useful for PECCA and should be extracted and studied. It is proposed that MICA, WECOC, PIRO and other NGOs and CBOs be involved in this activity with MICA playing a lead role. Parties involved in the awareness and visioning campaign should first be trained and organised during a workshop where a common strategy will be agreed upon by participants with clearly defined roles.
- Misali Island has been pivotal in raising awareness of the importance of Pemba’s natural resources. The existing information centre in Misali Island could be expanded to a Resource Centre, including a fishers’ school, a research centre and information point about PECCA. The very first step should be to boost the existing staff who clearly verbalised their modest materials and training needs during various discussions with the team. These dedicated individuals know the situation very well and are generally respected by the fishing community. They will form the core of a team of trainers that will disseminate information to the fishing community. Later an expanded team can visit remote sites together with relevant government officials to work at the level of *shelia* like extension officers, or “out stations” can be established on islands that are far away such as Njao in the North and Panza in the South.
- Environmental education has proven successful in Zanzibar and should be strengthened. Existing manuals^{192, 193} can be reworked to include PECCA issues and, more importantly, should be integrated in the official curriculum. Study tours to other conservation areas should also be promoted. Teachers should be trained on conservation issues.

¹⁹² Francis, J., S. Mwinuka, and M. Richmond, 2000. *A Schoolteacher’s Guide to Marine Environmental Education in the Eastern African Region*. UNEP/FAO, pp 1-40.

¹⁹³ Frontier-Tanzania, 2004. *Marine Environmental education: A Teacher’s Guide*. Frontier Tanzania Environmental Research Report 100. Mumby, R., Fanning, E., Muruke, M. & St. John, F. (eds). A. Simtoe (translation). Society for Environmental Exploration, UK, The University of Dar es Salaam, The Institute of Marine Science, Zanzibar, DfID Small Grants Scheme and the Ministry of Agriculture, Natural Resources and Cooperatives, Zanzibar, pp 1-41.

- Apart from booklets and posters, other awareness and education tools include a VCR and film travel box, which has proven successful in Madagascar. Environmental ethics and religion has also proven to be a good avenue to raise the communities' awareness of the importance to protect the natural and cultural resources and should be strengthened.
- Recognised as a cross-cutting issue by the Revolutionary Government of Zanzibar, HIV/AIDS should also be included in education and awareness raising programmes, especially because the fishermen in fishing camps—and their wives—are a vulnerable group.
- The lead DFMR impressed the Rapid Assessment Team with their collaborative approach and attitude and is well placed to continue to play a leading role in drawing in other key departments such as the DCCFF and the DoE that was already part of the Rapid Assessment Team. The Pemba DFMR office in particular should be well resourced to play this important coordinating role on Pemba itself.

13.2 FRAMEWORK FOR SUSTAINABLE MANAGEMENT OF PECCA RESOURCES

- A Strategic Environmental Assessment (SEA) should be undertaken of the proposed PECCA in order to help steer development in a sustainable and equitable direction with optimal utilization of natural resources while mitigating negative environmental impacts as far as possible.
- Pemba Island has been listed for World Heritage nomination and this Rapid Assessment has provided indications that the island has potential for a cultural and natural WHS. A feasibility study should be undertaken during implementation.
- While the diversity of Pemba's natural resources and the importance of PECCA in the regional context are acknowledged, a number of information gaps remain. It is of paramount importance that ecological and biological research in PECCA is enhanced. A full scale systematic survey of reefs should be done to determine the extent of, and cause of coral damage and death, including further research into coral bleaching. The IMS is ideally positioned to play this role. The abundant reefs and mangroves of the island require extensive taxonomic studies that surely will add more weight to the value of the west coast of Pemba in the regional and global context. Identification of migration and breeding patterns of marine fauna such as fish, turtles and marine mammals are needed to visualise the importance of the island for certain species in a regional and global context.
- An Environmental Economic Analysis would assist in understanding the values of PECCA and in defining the most suitable and sustainable use alternatives.
- Proper zoning of PECCA should be defined, perhaps as one outcome of the SEA to allow for extraction zones, conservation zones and even possibly "diving only" zones. The outer barriers of reefs around Pemba Island should get urgent attention and can also be a very good tourism draw card if well managed.
- An efficient monitoring and control system should be put in place in PECCA involving the communities, rangers, tourism operators and the police. Local

communities must be involved in the management of PECCA and trained in various fields of marine activities including diving. The Misali ranger corps should be expanded and empowered, including in terms of training and equipment for patrolling and communication, to be able to enforce the various laws and regulations available to them. Police and village authorities from each area should be invited to become part of the reef monitoring system by supplying them with the relevant legislation at each station. An orientation course in the reef and environment will make it easier for such parties to understand why they need to apply the relevant legislation.

- Much can be done to improve the financial self-sustainability of Misali¹⁹⁴, including highly controlled low-density overnight stays and the diversification of tourism activities on the island.
- PECCA can benefit from synergy that should be developed between the Sustainable Management of Land and Environment (SMOLE) strategy funded by the Ministry of Foreign Affairs (MFA) in Finland and lodged in the Departments of Land Registration, Surveys and Urban Planning and the Department of Environment. SMOLE can for instance focus on Local Agenda 21 programs in the three main towns affecting the Pemba Channel in terms of pollution. SMOLE can also play a key role in zoning, defining land ownership, etc.
- Potential to link terrestrial protected areas, or areas worth protecting into PECCA should be investigated, including Ngezi Forest and the coastal forests of Tondooni that are contiguous to the former. These valuable habitats may benefit from being included in PECCA even though they may require a different management regime.

13.3 FISHERIES MANAGEMENT

- A fisheries management system should be devised and implemented in close collaboration with the fishing community and those parties dependent on the fishing in the broader sense and supported by NGOs, government departments and other potential partners. This system should address the issues of open access; registration of fishers and monitoring of catches; fishers associations; training on sustainable fishing gears and methods, conservation principles and small business development; non-extractive zones and opening and closing system; fish conservation and access to market; fish products processing; and saving and credit schemes.
- Fisheries further offshore, with appropriate vessels and gear, should be promoted to relieve pressure from inshore waters. The feasibility of promoting fishing activities in the eastern coast, with the appropriate vessels and gears, should be assessed as it would relieve pressure from the west coast.
- Fishers already work cooperatively to some extent throughout the area. They are ready to be assisted to organize themselves in a PECCA-based fishing cooperative,

¹⁹⁴ The team leader examined the visitor records, including numbers and profiles and different types of revenue. While this fell outside the scope of the current study the figures and trends clearly show that the management of the island can become self-sustainable and can increasingly help to carry extension and monitoring type activities in and around the island provided certain modifications are made to how the island operates.

but such an initiative should be undertaken carefully and implemented very thoroughly according to a previously agreed up strategic plan¹⁹⁵.

13.4 TOURISM PLANNING

- PECCA is considered a development mechanism for Pemba Island, as it can help increase the percentage of tourists that visit Pemba and their length of stay in Pemba. PECCA will furthermore strengthen the protected areas market in Zanzibar. A Tourism Plan should be drawn up for PECCA in conjunction with the Commission for Tourism that will be based on a common vision for tourism development on Pemba Island, the means for local involvement in the tourism industry, training needs, and the financial mechanisms to ensure that the communities benefit from tourism activities.
- Large scale removal of tourist draw cards such as Mantas and other rays, as well as turtles and game fish should be discouraged.
- Each area of pristine reef, set aside for diving tourism should be divided into two or three sections. A section can be zoned for diving, the other for reserve, and a third for research use only.
- A forum for dive tour operators should be set up in order to assure their cooperation on voluntary application of the various zones proposed. They can also help with reef monitoring and protection programmes at no cost to the DFMR.
- Boat owners should be made aware of the potential damage their boats can cause to shallow reefs as well as the implications on their income. A system of accreditation for “coral friendly” boat operators may help to develop a protective culture towards protecting access to the reefs.
- Guidelines for the Environmental Assessment of Coastal Tourism should be drawn up that will cover all aspects of tourism development or, to save time and money, existing guidelines¹⁹⁶ can be adapted and then adopted through a series of workshops.
- Well conceived and carefully planned community-based tourism enterprises can be supported as pilots. However, the parties involved must be carefully chosen, properly exposed and then trained, and supported to financial sustainability.
- It is critically important that links be formed with the Commission for Tourism as early as possible as the latter has already identified and allocated sites for tourism development in the PECCA area. Guidelines for tourism development should be collaboratively developed for PECCA, involving the Commission for Tourism, the DoE and the DFMR.

¹⁹⁵ For instance, see: Odendaal, F.J. (2002). *Strategic Plan for the Sustainable Use of Marine Resources in the Vilanculos Coastal Wildlife Sanctuary*. Produced for the IFC and IUCN, 105 p.

¹⁹⁶ See: Grange, N. and Odendaal, F. (1999). *Guidelines for the Environmental Assessment of Coastal Tourism*. Secretariat for East African Coastal Areas Management (SEACAM), 197 p.

13.5 LIVELIHOOD CREATION

- The diversification of activities is essential to relieve pressure from PECCA marine resources and create better opportunities for the communities. A Local Economic Development (LED) Programme should be initiated to identify potential alternative livelihoods, hand in hand with market access. These can include agriculture, livestock keeping, beekeeping, handicraft, but also processing of fish products. Special attention should be paid to women who rely solely on marine resources. The team briefly visited a camp on Ras Mkumbuu that consisted almost entirely of fisherwomen, but the inhabitants were elusive and further investigations were not done as previous arrangement had not been made.
- Close collaboration in a mutually supportive situation should be sought with other programmes, projects, initiatives and strategies including PADEP and SMOLE, in order to best support those local inhabitants and other parties who are dependent on PECCA for their livelihood as well as those parties who are responsible for its proper planning and development.
- Potential areas and appropriate technologies for mariculture activities should be assessed, not only for seaweed but also for fish, oysters and mussels. This study should be accompanied by the development of environmental and social guidelines for mariculture activities and an assessment of the potential of mariculture areas for tourism.
- A management system for mangrove areas should be established that includes restoration of disturbed areas, and sustainable harvesting and monitoring of mangrove stands in PECCA.
- Beneficiation and/or value-adding activities should be undertaken in terms of marine resources. These can be as simple as providing refrigeration, improving access to markets, etc.
- Key to having diversified and sustainable livelihoods in the medium to long run is to increase the school enrolment rate in Pemba Island and ensure children receive proper education instead of engaging in fishing activities from an early age.

13.6 ENHANCING THE CONCEPT OF A CONSERVATION AREA

There is much more to the proposed PECCA than biological diversity. There exists tremendous heritage in terms of archaeological assets that can bring greater value to PECCA as a concept and also make it more appealing to the local population to whom biodiversity is still a relatively new and lone-standing concept. Incorporation of the cultural and historical dimensions at an early stage of PECCA should add value and power to the initiative overall and it is proposed that an extension to the Rapid Assessment be approved and implemented quickly with the full involvement of the Department of Archives, Monuments and Antiquities in the Ministry of Education and Moral Ethics.

14 TOWARD AND INTEGRATED CONSERVATION AND DEVELOPMENT APPROACH

At the first meeting with the lead department the Head of the Department of Fisheries and Marine Resources, Mr Mussa Aboud Jumbe, pointed out that from the government's side "*the key point of PECCA will be to support the people*". The final conclusion of the Rapid Assessment Team is that PECCA will indeed be a development mechanism for Pemba, with plenty of spin-offs for Unguja as well, and that it can become a prime example of how an Integrated Conservation and Development (ICD) approach will support the people while protecting their environment and resources at the same time. The notion that is sometimes heard that conservation and development cannot be reconciled will be totally dispelled if the project is driven correctly, and in fact it will be clear that without development there can be no conservation, and vice versa.

The proposed SEA will carefully weigh up information on the natural resource base, the physical and other characteristics of the island, and the needs of the people in order to present different development options. It can for instance examine how other natural assets such as Ngezi Forest can be optimally configured together, or even as part of PECCA to ensure its survival and increase the benefits it will bring to the people. Finally, the large scope of PECCA and the tremendous influence that PECCA can have on Pemba in the short-, medium and long term should be recognised from the start, and together with that, the reality that its establishment will require a careful, thorough and above all a *collaborative* approach in which the local inhabitants will play the central part.

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APPENDICES

APPENDIX I: DIVE SITES PROFILE

A team of two divers, Peter Shunula, from the Menai Bay project and Peet Joubert from EcoAfrica, carried out a rapid assessment of underwater biodiversity, tourism potential and state of damage of the underwater reefs in the proposed PECCA. Dives were performed in a number of sites on the west coast of Pemba Island as illustrated on Map 1. Due to the short time available for the survey, observations may have been done in areas of localized damage or otherwise in relatively small undamaged areas, and it is imperative to undertake a more comprehensive survey to confirm the team’s findings with more dives in each area. This Appendix presents the profile of the 13 dive sites.

Site 1&2 Tondooni (reef at Manta Reef Divers Hotel)			
Depth 5-30 m	Visibility 30 m +		
Description and profile: Strong longshore current. Reef almost totally destroyed. The place looks like a rubble dump. Dead coral everywhere. Pink encrusting algae cover most of the coral. Some signs of new colonisation. Surprisingly there are still fish around.			
	◆ Coral × Sea grass		
Number of species swimming	32	Number of sedentary species	28
Tourism value	4-6	Damage rating	8-9

Site 3	Fundo Gap (gap or channel near Fundo Island)		
Depth	10-20 m		
Description and profile:	Bottom: white sand. Broken reef with patches of coral, mostly brain coral in 2-4 m depth. Over edge into the channel coral gets more dense and diverse. Large concentration of <i>Diadema savigny</i> in shallower sections. Large school of juvenile fish visible.		
Number of species swimming	20	Number of sedentary species	20
Tourism value	6	Damage rating	6

Site 4	Uvinje Island (Uvinje Channel between Uvinje and Kokota Islands)		
Depth	4-8 m		
Description and profile:	Flat profile. White coral sand with spotty patches of coral. Few large “bommies”. Sea weed and sea grass <i>Cymodocea sp.</i> in shallower areas. Less <i>Diadema savigny</i> than in Site 1.		
Number of species swimming	24	Number of sedentary species	32
Tourism value	5	Damage rating	5

Site 5 Uvinje Island			
Depth	25 m	Visibility	25-30 m
Description and profile: The dive site was very similar to dive site 7. Steep drop off .Transect done at about 25 meters. Very nice reef. High diversity. Some signs of human damage in the shallower regions. Pieces of fishing net and heavy fishing line stuck to coral. Three sites of coral destruction, possibly by dynamite. Shattered pieces of coral sliding down the steep slope. Good overhangs with many coral caves. Current fast. Drift dive along the slope face. <i>Diadema sp.</i> colonies visible on edge of drop off in shallower water.			
Number of species swimming	31	Number of sedentary species	35
Tourism value	8-10	Damage rating	1-2

Site 6 Uvinje Channel			
Depth	2-6 m	Visibility	20 m
Description and profile: Flat bottom, white coral sand. Scattered coral colonies. Foliose coral dominant on this site. <i>Diadema sp.</i> very visible, not as much as at Site 1. Coral damage visible. Tabular corals tipped over by anchor or nets.			
Number of species swimming	23	Number of sedentary species	24
Tourism value	7	Damage rating	5-6

Site 7 Uvinje Island - Reef of Uvinje Island (Attaturk)			
Depth	± 20-30 m	Visibility	25-30 m
Description and profile: Steep drop off to ± 60 m. Very fast current. Healthy reef with almost no sign of human damage. Two or three sites along the wall show signs of slippage as seen when big coral heads are pulled over. First Napoleon wrasse and three turtles. Few <i>Diadema</i> visible.			
Number of species swimming	37	Number of sedentary species	44
Tourism value	8-10	Damage rating	1-2

Site 8 Kokota Island (reef opposite Kokota village)			
Depth	2-9 m	Visibility	Low: ± 5 m
Description and profile: Shallow sloping reef. An old limestone sill is visible near the beach. Breaks up further away from shore. Sandy bottom. Isolated columns of corals form a base for sedentary organisms. Reef damage visible. Remains of fishing nets and fishing line.			
Number of species swimming	28	Number of sedentary species	32
Tourism value	7	Damage rating	4-6

Site 9 Ras Mkumbuu (inside lagoon, near underwater house)			
Depth	5-10 m	Visibility	5-10 m
Description and profile: Bottom: shell grit, dead oyster shells. Huge coral bommies and extensive of columnar coral. Soft corals cover large areas of the bottom. Sea urchins very prominent and 5-8 m long. Big schools of small fish, possibly sweepers school over coral clumps.			
Number of species swimming	22	Number of sedentary species	26
Tourism value	5-9	Damage rating	0-1

Site 10 Misali Island (site at the back of the island near exclusion zone)			
Depth	9-30 m	Visibility	30 m
Description and profile: Flat topped shallow area 10 m sloping down to 30 m with 40° angle. Old limestone reef base with coral bommies. Scattered coral towers. Good diversity. Many signs of damage old and new. Very few foliose corals. Many black sea urchins (possibly <i>Diadema sp.</i>). Two fish traps containing <i>Chaetodus</i> , <i>Nasutus</i> , <i>Pomocanthus</i> .			
Number of species swimming	30	Number of sedentary species	20
Tourism value	6	Damage rating	6

Site 11 Misali Island (in front of rangers office)			
Depth	25 m	Visibility	20 m
Description and profile: White sandy beach leading to a slope of $\pm 50^\circ$. Broken reef with coral patches and limestone rock. Some signs of damage, possibly by bleaching. Encrusting algae covering dead coral.		<p>Legend: ◆ Coral ✗ Sea grass</p>	
Number of species swimming	20	Number of sedentary species	24
Tourism value	5	Damage rating	3-4

Sites 12&13 Nduwan Islets (Panza Island outside of reef off 3 small islands)			
Depth	9-20 m	Visibility	25 m +
Description and profile: Broken shallow reef. All big coral bommies, coral heads and tables are dead. Covered by thin layer of mostly filamentous algae. New colonisation on top of old dead corals everywhere. Signs of coral eaters on new growth of coral heads. Possibly parrot fish. Plentiful juvenile fish and rich coral fish life. Many species of algae visible. <i>Turbinaria</i> <i>Caulespa hypnea</i> . No <i>Diadema</i> visible.		<p>Legend: ◆ Coral ✗ Sea grass</p>	
Number of species swimming	44	Number of sedentary species	30
Tourism value	6-7	Damage rating	7-8

APPENDIX II: LIST OF SPECIES IDENTIFIED DURING DIVES

The species lists presented here are made from visual sightings during dives and will need to be confirmed by follow up work by specialists. Due to the limited number of sites inspected as well as the depth limit of 30 meters it is possible that certain species were missed completely. Discussions with dive operators have brought to light some of the species not seen on dives. Those are listed at the end of the species list.

Table 12 Fish species observed during dives

Common name	Scientific name	Common name	Scientific name
Moray eel	<i>Gymnothorax meleagris</i>	Damsel fish	<i>Abedefduf</i>
Squirrel fish	<i>Myripristis sp.</i>	Mose stripe anemone fish	<i>Amphiprion sp.</i>
Trumpet fish	<i>Aulostomus sp.</i>	Two bar anemone fish	<i>Amphiprion sp.</i>
Flutemouth	<i>Fistularia sp.</i>	Chocolate dip	<i>Chromis dimidiata</i>
Lionfish	<i>Pterois miles</i>	Chromis 1	<i>Chromis sp.</i>
Lionfish	<i>Pterois radiata</i>	Chromis 2	<i>Chromis sp.</i>
Scorpion fish	<i>Scorpaenopsis sp.</i>	Unicorn fish	<i>Naso brevirostri</i>
Goldie 1	<i>Pseudanthias sp</i>	Convict surgeon	<i>Acanthurus triostechus</i>
Goldie 2	<i>Pseudanthias sp</i>	Domino	<i>Dascyllus trimaculatus</i>
Yellow tail goldie	<i>Pseudanthias evansi</i>	Humbug	<i>D. carneus</i>
Coral rock cod	<i>Cephalophus sp.</i>	Bluespotted tamarin	<i>Anampses caeruleopunctatus</i>
Tomato rock cod	<i>C. sonnerati</i>	Clown wrasse	<i>Coris sp.</i>
Bigeyes	<i>Priacanthus sp</i>	Cleaner wrasse	<i>Labroides dimidiatus</i>
Spiny head cardinal	<i>Apogon kallopterus</i>	Green wrasse	
Wolf cardinal	<i>Cheilodipterus artus</i>	Birdfish	<i>Gomphosus sp.</i>
Oriental sweet lips	<i>Plectorhinchus orientalis</i>	Goldbar wrasse	<i>Thalassoma hebraeicum</i>
White barred rubber lips	<i>Plectorinchus sp.</i>	Parrot fish	<i>Scarus sp.</i>
Blue banded snapper	<i>Lutjanus kasmira</i>	Parrot	
Black spot emperor	<i>L. harak</i>	Parrot	
Yellow back fusilier	<i>Caesio caeruleaureus</i>	Green Goby	
Goldstripe fusilier	<i>Caesio xanthonota</i>	Firegoby	<i>Nemateleotris magnifica</i>
Batfish	<i>Platax sp.</i>	Blue surgeon fish	<i>Acanthurus leocosteron</i>
Striped goatfish	<i>Maloidichthys flavolineatus</i>	Brown surgeon fish	<i>A. nigrofuscus</i>
Dotted goatfish	<i>Parupeneus barberciras</i>	Pencilled surgeon	<i>A. dussumieri</i>
Emperor angelfish	<i>Pomocanthus imperator</i>	Two spot bristletooth	<i>Ctenochaetus trigostegus</i>
Royal angelfish	<i>Pygoplites diacanthus</i>	Clown triggerfish	<i>Balistoides conspiculum</i>
Threespot angelfish	<i>Apolemichthys trimaculatus</i>	Picasso	<i>Rhinecanthus aculeatus</i>
Brown burnie	<i>Chaetodon blackburnii</i>	Sand sole	<i>Bothus mancus</i>
Half moon	<i>C. lanula</i>	Puffer 1	<i>Arothron</i>
Maypole butterfly	<i>C. meyeri</i>	Puffer 2	<i>Arothron</i>
Vagabond	<i>C. vagabundus</i>	Puffer 3	
Longnose	<i>Forcipiger flavissimus</i>	Model toby	<i>Canthigaster valentini</i>
Coachman	<i>Heniochus acuminatus</i>	Striped catfish	<i>Plotosus lineatus</i>
Knigfish	<i>Caranx sp. 1</i>	Lizardfish	<i>Synodus sp.</i>
	<i>Caranx sp. 2</i>	Black snapper	<i>Macolor niger</i>
Moorish idol	<i>Zanclus cornatus</i>	Golden sweeper	<i>Parapriacanthus</i>
Hawkfish 1	<i>Paracirrhites sp.</i>	Mudskipper	
Hawkfish 2	<i>Paracirrhites sp.</i>	Orange lined trigger fish	<i>Balistapus undulatus</i>

Table 13 Invertebrate species observed during dives

Common name	Scientific name	Common name	Scientific name
Octopus	<i>Octopus vulgaris</i>		<i>Cycloseris</i>
Conus			<i>Fungia</i>
Conus			<i>Herpolitha</i>
Cowrey			<i>Halomitra</i>
Spider shell			<i>Aconthastrea</i>
Hermit crab			<i>Favia</i>
Giant clam			<i>Favites</i>
Giant oyster			<i>Platygyra</i>
Rectangular shell			<i>Pterogyra</i>
Barrel sponge			<i>Turbinaria mesenterina</i>
Blue tube sponge		Fanworm 1	
Black branching sponge		Fanworm 2	
Foliose sponge		Barnacles	
Mangrove jelly		Cleaner shrimp	<i>Stenopis hispidus</i>
Hydrozoans 1		Crayfish	<i>Panulirus</i>
Hydrozoans 2		Mantis shrimp	
	<i>Chicoreus sp.</i>		<i>Vermetus</i>
Cuttlefish	<i>Sepia</i>		<i>Phyllidea varicosa</i>
	<i>Coelogorgia</i>		<i>Diadema sp.</i>
	<i>Sarcophyton</i>		<i>Toxopneustes</i>
	<i>Heteroxenia sp.</i>		<i>Pearsonothuria graeffi</i>
	<i>Junceela sp.</i>		<i>Holothuria edulis</i>
	<i>Cerianthus sp.</i>		<i>Holothuria scabra</i>
Colonial anemone			<i>Holothuria atra</i>
	<i>Entacmaea sp.</i>		<i>Holothuria pervicax</i>
	<i>Stichodactyla sp. 1</i>		<i>Synapta maculata</i>
	<i>Stichodactyla sp. 2</i>		<i>Choriaster</i>
	<i>Heteractis sp.</i>		<i>Culcita</i>
	<i>Zoanthidea 1</i>		<i>Protoreaster lincki</i>
	<i>Zoanthidea 2</i>		<i>Linckia guildingi</i>
	<i>Zoanthidea 3</i>		<i>Acanthigaster</i>
	<i>Montipora</i>		<i>Macrophiothrix</i>
	<i>Acropora</i>		<i>Ophiomyxa</i>
	<i>Acropora formosa</i>		<i>Crinoidea 1</i>
	<i>Porites</i>		<i>Crinoidea 2</i>
	<i>Pavona clavis</i>	Black nudibranch with red mouth	
	<i>Pacyceris speciosa</i>		

APPENDIX III: SOME STAKEHOLDERS CONSULTED

NAME	ORGANISATION	CONTENT OF DISCUSSION	DATE & PLACE
Mussa Aboud Jumbe (Director) and DFMR staff	Department of Fisheries and Marine Resources (DFMR)	PECCA ToR and work plan; PECCA team composition and planning; after the field trip another feedback meeting was held, this time without the director	Stone Town, 1.Nov.04; 17.Nov.04
Mussa Hamad Mussa (Chief Officer of Fisheries) and DFMR staff	Department of Fisheries and Marine Resources (DFMR) in Pemba	PECCA area; PECCA ToR and team work planning; plans and studies available about PECCA	Wete, 4.Nov.04
Sheha	Fundo Island Shehia	Fundo Island's resources and fishing activities; MACEMP Project and PECCA	Kimeliani, Fundo Island 5.Nov.04
Ciska Swiers and Farhat Jah	Swahili Divers	Feedback on draft report; general discussion on management and tourism of PECCA area	Chake Chake, 6.Nov.2004; 25.Jan.2005
Masoud Juma Mohammed (Executive Director)	Misali Island Conservation Association (MICA)	MICA, threats to biodiversity; MACEMP Project and PECCA	Wete, 6.Nov.04
Shaib Khamis Uledi, Haji Mohamed Haji, Mohamed Said Suleiman, Khamis Hamad Said	Misali rangers	Obstacles encountered regarding management; needs for environmental education	Misali, 8-10.Nov.04
Ali Khamis Thani	CARE Tanzania (Misali Island Conservation Project)	Misali Island Conservation Project; MACEMP Project and PECCA; institutional capacities in Pemba; threats to biodiversity	Wete, 6.Nov.04
Ali Said (Coordinator)	Misali Island Conservation Project	Misali Island Conservation Project activities	Wete, 7.Nov.2004
Abdurahman Juma	Department of Archives, Museums and Antiquities, Ministry of Education, Culture and Sports	Archaeological sites on Pemba island, cultural assets of in proposed PECCA	Stone Town, 20.Nov.2004
NOTE: Numerous other people were engaged by way of informal conversations during the Rapid Assessment Team's period in Pemba and afterwards on Unguja; however, the Team stayed clear of formal consultation or public participation beyond interviews with fishers as such activities will be part of a public participation campaign by MACEMP that should not be pre-empted by the current study.			

APPENDIX IV: SHEHIAS AND VILLAGES IN PROPOSED PECCA

WETE DISTRICT	CHAKE CHAKE DISTRICT	MKOANI DISTRICT
Mtambwe Kaskazini Nyali Chanjaani Kidundo	Chanjaani Zaire Chanjaani	Ngombeni Jondeni inst Jondeni inst
Fundo Kimeleani Ndooni Chumbuni Mbaoni Uvinje Island Ngagu	Ziwani Ziwani Machengwe Mavungwa Langoni Mchangani Kiwapwa Mtemani Mbuzini	Makoongwe Kinyasini Kizambarauni Matumbi Makubwa Kidutani Midodoni
Kisiwani Kibwechano Mleteni Piki Tundwa Mtomkuu	Ndagoni Ngagu Kichanjaani Jamvini Ndagoni Ndagoni mjini Buyuni	Shidi
Gando	Kwale Birikau Kichuwani Kidemeni Kichungwani	Michenzani Mkadini Tovukuu Chanjaani Kizungu
Utaani Jadida	Mgelema Mgelema Utaani Ngomeni Kipapo	Chokocho Ulenge Likokuu Michecheni
Mtambwe Kusini Mitambuuni Kinazini Makongeni Kokota Kivumoni Mkanjuni Fimbo Tondooni Mtekofi Migombani Muembeni Mchanga mle	Kilindi Kitundwini	Kisiwa Panza Pungua Panza Mtajuu
Bopwe Bopwe	Tibirinzi Kichungwani Pondeani Kibirinzi	Wambaa Tondooni
Ukunjwi Raha Chanjaani Ukunjwi Minyenyeni Mipopooni	Chachani Chachani Mkanjuni	Mbuguani
Kipangani	Mvumoni	Makombeni Makombeni Makombeni Katomeni
Piki Matuuni	Wesha Hemani Choani Mchochani Kijangwani/Rambwe Kiwandani Kombani/Tondooni Kaole Kisiwani	Uweleni
		MICHEWENI DISTRICT
		Makangale
		Konde
		Mgogoni



This report was produced by EcoAfrica and local collaborators from the Department of Fisheries and Marine Resources and the Department of Environment of the Revolutionary Government of Zanzibar, the Pemba Island Relief Organisation (PIRO), the Misali Island Conservation Association (MICA), the Community Development and Environmental Conservation of Zanzibar (CODECOZ) and the Wete Environmental Conservation Club (WECOC).

