

# PECCA GMP

PEMBA CHANNEL CONSERVATION AREA  
GENERAL MANAGEMENT PLAN 2022-2032

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## Pemba Channel Conservation Area General Management Plan, 2022-2032

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The Department of Marine Conservation has approved the implementation of this  
General Management Plan for the Pemba Channel Conservation Area

On behalf of the Department of Marine Conservation

Director

## EXECUTIVE SUMMARY

The Pemba Channel Conservation Area (PECCA) is located on the western seaboard of Pemba Island, straddling the entire coastline from its southernmost to northernmost tip. PECCA was declared a Conservation Area on 23 September 2005, under the Fisheries Act No. 7 of 2010. The PECCA comprises the previously gazetted Misali Island Marine Conservation Area, the Pemba Island Important Bird Area (IBA), part of the Pemba Channel

Important Marine Mammal Area (IMMA) and a portion of the Shimoni-Kisite-Pemba Environmental Biological or Scientific Area (EBSA). In addition, the mangrove forests of Ngezi Forest in northern Pemba are also included in the PECCA.

The PECCA and adjacent areas have exceptional resource values in terms of biodiversity, such as mangrove ecosystems, extensive seagrass areas and coral reefs. Such areas support populations of sea turtles, whales, dolphins, dugongs, coconut crabs and a diverse array of rich fish stocks. Scenic values of the PECCA include sandy beaches and numerous small and unique islands, like Misali, Fundu and Njao on the west, and Mkongwe, and Matumbini, Panza and other smaller islands to the south. Here, social values include tourism, fishing and cultural values such as historical ruins, archaeological sites, caves and sink holes. However, these are just some examples of the exceptional resource values described more comprehensively in the General Management Plan (GMP).

PECCA is administered and managed by the newly created Department of Marine Conservation (DMC) within the Ministry of Blue Economy and Fisheries (MBEF). Of fundamental importance to PECCA and the other four marine conservation areas (MCAs) of Zanzibar is the new administrative and management structure and new legislation that is soon to be rolled out under the MBEF.

The Micheweni, Wete, Chake Chake and Mkoani districts which fall within the current PECCA have 32 coastal wards and a total resident population of around 106,600. In terms of population, the principal wards are Konde, Tibirinzi, Ziwani, Bopwe, Mtambwe Kaskazini and Chokocho, together comprising over 4,000 inhabitants. Rapid population growth within the districts and associated human impacts are anticipated to have a strong influence on the coastal and marine ecosystem.

Resource-use in the conservation area includes fishing, the collection of sea cucumber and molluscs, aquaculture (seaweed farming), agriculture, harvesting of mangrove and forest products, lime making, beekeeping, small businesses and tourism operations. Most communities are heavily dependent on coastal and marine resources for their livelihoods and the coastal population exploit living marine resources including fish and molluscs, as well as mangrove stands. These resources are not only used by the west coast population but also by fishers from the east, where deep waters often restrict local vessel access. 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.

**The need for a revised management plan:** Unfortunately, the insufficient control of fishers and fishing methods have led to impacts on marine resources and thus signs of destruction and over-exploitation are common. Enforcement of fishing prohibitions in the non-extractive zone of Misali as well of the control of fishing activity and regulation of gear used are insufficient. However, Misali Island has served to increase fishers' awareness of the importance to preserve Pemba's high diversity of fish. Nevertheless, considerably more management and enforcement is required to safeguard marine biodiversity, the many endangered, threatened or protected (ETP) species, and the condition and productivity of this natural resource base (especially coral reef). There is an urgent need for a revised GMP to address the degradation of the natural marine environment, biodiversity and resources.

This is the second management plan for the PECCA; the first (not implemented) was drafted in 2010 for Misali Island Conservation Area, established in 1998 and supported by a management plan that was effective for many years, with rangers based on the island to monitor and enforce regulations.

However, the management of Misali became integrated into the PECCA in 2005. Since then, recent changes in the environment and natural resources management have highlighted the need for a revised strategic document to guide management decision making and to better define the vision statement, goal and objectives of the PECCA. Management planning and a clear strategy for management is a prerequisite if PECCA aims to begin monitoring its own effectiveness. Therefore, the PECCA GMP is accompanied by a Monitoring Control and Surveillance (MCS) Strategy, a Demarcation Plan, and a Management Information System (MIS).

This GMP and the MCS Strategy have been prepared in close consultation with the management of PECCA and a considerable number of stakeholders and stakeholder group representatives. The plan specifies management goals and strategies for the PECCA, related to the conservation area's vision and goal. Moreover, the GMP identifies major existing and potential threats and issues facing the conservation area from an ecological, social and cultural perspective. As such, the plan is designed to provide a framework for interactive management that relies on strong collaboration with the fisheries and tourism sectors and is supported by research, conservation and development partners.

The PECCA GMP has been formulated to provide a long-term vision and guidance required for the conservation and utilization of resource values found in the area. The plan has five key components:

- GMP Foundations
- Zonation Scheme
- Management Programmes (with six-year activity plans: from 2022 to 2027)
- Monitoring, Control and Surveillance (MCS)
- Implementation approach and principles (with Immediate priorities for the MCA Manager)

**GMP Foundations:** The plan foundations set out the purpose of the PECCA GMP that MCA Managers will aim to achieve. It describes the exceptional resource values that management will conserve and describes the planning process, plan structure and participation in planning.

One key feature of the GMP is that it is designed as a 'roadmap' on reaching the desired objectives within ten years, following a series of steps and procedures to be implemented over time. The GMP follows the Nature Conservancy's Conservation Action Planning (CAP) framework, recognized as one of the most widely used conservation planning tools in the world, and is designed to show the link between various variables and their impact on project completion. The CAP framework is based on a four-step project cycle and designed to be adapted to meet the needs of local planning teams while maintaining the integrity of the guiding principles. The start of this action planning cycle is defining the project people, scope and focal conservation targets. This has been well-covered in this GMP, resulting in the development of a set of strategies, measures and objectives, typically between 3 – 5 for each of the management programmes. Thereafter, the GMP describes how the implementation of strategies and measures might be approached through the actual implementation of the proposed actions, usually 4 – 8 for each of the management objectives identified. Actual implementation requires the participation of numerous stakeholders, ranging from local communities to international NGOs, under the leadership of the PECCA Manager. Emphasis will be on local community participation, including of fishers and other resource users. From there, the fourth and critical step in the CAP framework is to analyze the results of the actions, share findings and adapt going forward.

**Zonation Scheme:** The Zonation Scheme is a management tool that allows managers to set different goals to be achieved in different parts of the MPA. In this edition of the GMP, there is only one type of zoning applied in the PECCA: Replenishment Zone(RZs). The RZs are designed to protect and conserve biologically significant habitats that have or are being restored to their near pristine conditions (locally referred to as *tengefu*) and offer sites to be undisturbed for scientific research. They

also promote different types of visitor activities. The proposed RZs of the PECCA encompass Misali Island and three small areas further north: Makangale, Mkia Ng'ombe or Njao Gap and Fundo Gap. All activities prohibited under the existing national legislation (namely the Fisheries Act, 2010 and subsequent amendments and regulations) shall be prohibited in the entire PECCA boundaries, in addition to specific fishing practices, shore-based and seabed-extractive activities, other activities and fishing and tourism operations regulations, as defined in this GMP.

**Management programmes:** The management plan is divided into five programmes that address conservation and administration issues in the PECCA and adjacent areas:

#### *Ecological Management Programme*

The purpose of the Ecological Management Programme is to restore and maintain PECCA's ecological integrity through integrated strategic adaptive management. The PECCA ecological management programme (EMP) aims to enhance the biodiversity conservation and the ecological integrity of key ecosystems in the protected area. These ecosystems include mangrove forests, coral reefs, seagrass beds, sandy beaches, islands and their associated resources. The ecosystems serve as vital habitats for diverse flora and fauna that are important means of livelihoods for local communities and constitute an essential element for sustainable development. The following three management objectives are matched by 19 proposed actions under this programme:

- Populations of rare, endemic, endangered, threatened or protected (ETP) species restored and protected
- Marine ecosystems are restored and maintained in a healthy functioning state
- Marine biodiversity information is shared, understood and appreciated

#### *Tourism Development and Management Programme*

The purpose of this programme is to develop a unique tourism product, based on the special marine biodiversity, scenery and local culture at PECCA, that offers a memorable visitor experience. The following four management objectives are matched by 20 proposed actions.

- Adequate tourism support infrastructure and equipment provided
- Tourism activities and attractions diversified and managed
- PECCA's tourism marketing improved
- Visitor management systems improved and updated

#### *Fisheries Resource Management Programme*

The purpose of the programme is to ensure that PECCA's fisheries resources are restored and sustainably managed in collaboration with all stakeholders. The following five management objectives are matched by 14 proposed actions:

- Enforcement and surveillance of fishing activities strengthened
- Improved research on fishery management
- Effective stakeholder participation in fishery management
- Fishing pressure within MCAs at sustainable levels

- Impacts on emerging issues in fisheries resources assessed and addressed

#### *Mariculture Development Programme*

The purpose of programme is to empower and encourage local community to develop and benefit from sustainable forms of mariculture. The following two management principles are matched by six proposed actions.

- Seaweed farming production maintained or expanded sustainably
- Alternative mariculture options developed and implemented

#### *Community Support Programme*

The purpose of the programme is to empower and encourage local communities within PECCA to actively participate in sustainable conservation and management of marine resources. The following two management principles are matched by six proposed actions:

- Community environmental education and outreach programmes enhanced
- Community participation in natural resource management enhanced

#### *Monitoring, Control and Surveillance Strategy*

As well as pro-active enforcement, this MCS Strategy considers measures to improve voluntary compliance through education and outreach and incentives to fishers. Where available, best practice guidelines and case studies in enforcement and surveillance of MPAs have been utilised to suggest the most practical and impactful interventions. The application of alternative modern technologies for both surveillance and monitoring have also been included. This MCS Strategy has 10 objectives and 39 proposed actions.

**Implementation Approaches and Principles:** The final chapter of the GMP states that once the objectives and actions (and activities, or measures) have been reviewed, these need to be prioritized and the implementation timeframes then reviewed. This should be done by the MCA Manager working with the stakeholder management committee (SMC), community level organisations and research, conservation and development partners. The prioritised actions need to be costed and form the basis of the budget request. Only then will it be possible to decide which action should begin in the first year and those which can be developed in the subsequent years. The precise work plans needed to implement these actions should then be developed by the MCA Manager and management team.

Developed work plans need to be clear on the activities that are to be undertaken, including the identification of those individuals and entities responsible for each activity/task, and the associated budget. The plans also need to include measures defined to monitor progress. Progress monitoring is a key part of activity implementation and produces the information required to evaluate the efficacy of those activities. As per the guidance of the CAP approach, the evaluation sequence for monitoring should be based on analyse (or test), learning, adaptation and sharing. These are the last steps in the CAP approach, requiring that the MCA Manager and management team systematically take the time to evaluate the actions they have implemented, to update and refine their knowledge of the MCA objectives, and to review the results available from the monitoring data collected. This reflection provides insight on how the GMP actions are working, what may need to change, and what to emphasize in the following phases. This step then asks the MCA Manager to document what has been learned and to share it with other stakeholders so they can benefit from the successes and failures. Three critical elements are needed to carry out the implementation of the GMP: adequate funding, stakeholder involvement and their roles and responsibilities, and fisheries co-management systems.

### *Immediate priorities for the MCA Manager*

Once the GMPs have been formally approved by Government, the work of the MCA Manager will begin. In addition to the many internal tasks related to staffing, infrastructure and administration, the following three sets of tasks are important and relate specifically to GMP implementation:

Involvement of research, conservation and development partners

- Identify and meet with representatives of stakeholder groups that are relevant to the implementation of the GMP (at a minimum, these will include fisheries Committees (SFCs), seaweed farmers, Fisheries Department, Marine Conservation Department, NGO-SFC Collaboration representatives, hoteliers, SCUBA operators, sandbank or fishing trip operators, local tour operators, other investors, school and social or community groups, port authorities, etc)
- Keep stakeholders, partners and the new oversight committee (the SMC) informed on details of the final management framework as it become legally binding.
- Identify potential development and conservation partners for some of this work in the GMPs. Most of the narrative of the proposed actions indicate where partners have a role.
- Regularly remind stakeholders that the GMP and MCS Strategy are guiding documents and that their implementation is based on adaptive management; learning from doing, adapting and progressing. This recognises that periodic reviews of action implementation are needed.

Finalize the Replenishment Zones

- Revise all Replenishment Zones proposed in the GMPs, with the SMC and agree on the boundaries and regulations for each site. Site visits will be required. Zoning has to be defined only through collective agreement among all stakeholder groups, led by the MCA Manager.
- Once RZs are agreed, convene a meeting with the MCS, Co-Management and Conservation and Marine Resources units within the DMC to define the markers and zoning tools and markers and beacons that will be installed and the timeframe.
- Work with the relevant entities to re-draw any maps as required to accurately reflect the final decision on the RZ and ensure that RZ maps are distributed in appropriate languages and format for the understanding of those entities and stakeholders whom the RZ will affect.

Revise and prioritize proposed actions for the five GMP programmes and the MCS Strategy

- There are 65 proposed actions under the five thematic areas (ecology, tourism, fisheries, mariculture and community development), plus 36 actions related to MCS. The MCA Manager and SMC need to review each action and prioritize them with respect to the available budget, research, development and conservation partners, government priorities and other driving factors.
- Once prioritized, the timeframes for each proposed actions needs to be set and agreed with the person responsible and participating entities.

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## ACRONYMS

CAP	Conservation Action Planning
CBD	Convention on Biological Diversity
CBO	Community-Based Organisation
CHABAMCA	Changuu-Bawe Marine Conservation Area
CHICOP	Chumbe Island Coral Park
CMG	Collaborative Management Group
CORDIO	Coral Reef Degradation in the Indian Ocean
CPUE	Catch per unit effort
DAMA	Department of Archives, Museums and Antiquities
DFDMR	Department of Fisheries Development and Marine Resources
DFD	Department of Fisheries Development
DFO	District Fisheries Officer
DMC	Department of Marine Conservation
DoE	Department of Environment
DSFA	Deep Sea Fishing Authority
EAME	Eastern African Marine Ecoregion
EBSA	Ecologically or Biologically Significant Marine Area
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMP	Ecological Management Programme
ESIA	Environmental and Social Impact Assessment
ETP	Endangered, Threatened or Protected (Species)
FAD	Fish Aggregation Device
FAO	Food and Agriculture Organisation
FEC	Fisher Executive Committees
FMCAC	Fisheries and Marine Conservation Advisory Council
FMP	Fisheries Management Plan

GEF	Global Environment Facility
GMP	General Management Plan
GPS	Geographic Positioning System
GSM	Global System for Mobile communication
IBA	Important Bird Area
ICZM	Integrated Coastal Zone Management
IGA	Income generating activity
IMMA	Important Marine Mammal Area
IMS	Institute of Marine Sciences
IUCN	International Union for Conservation of Nature
KEA	Key ecological attributes
KIDOTOA	Kizimkazi Dolphin Tourism Operators Association
KMKM	Kikosi Maalum cha Kuzuia Magendo
KMPA	Kwanini Marine Protected Area
MACEMP	Marine and Coastal Environment Management Project
MANRLF	Ministry of Agriculture, Natural Resources, Livestock and Fisheries
MBCA	Menai Bay Conservation Area
MBEF	Ministry of Blue Economy and Fisheries
MCA	Marine Conservation Area
MCS	Monitoring, Control and Surveillance
MCTAG	Marine Conservation Technical Advisory Group
MCU	Marine Conservation Unit
MEP	MacAlister Elliott and Partners Limited
MICA	Misali Island Conservation Area
MIMCA	Mnemba Island-Chwaka Bay Marine Conservation Area
MIS	Monitoring Information System
MKUZA II	Zanzibar Strategy for Growth and Poverty Reduction
MLF	Ministry of Livestock and Fisheries

MO	Management objective
MPA	Marine Protected Area
NGO	Non-Governmental Organisation
OBM	Outboard Motor
PECCA	Pemba Channel Conservation Area
PRA	Participatory Rural Appraisal
PMSD	Participatory market system development
RGZ	Revolutionary Government of Zanzibar
SFC	Shehia Fishermen Committees
SMC	Stakeholder Management Committee
SUCCESS	Sustainable Coastal Communities and Ecosystems
SUZA	State University of Zanzibar
SWIO	South West Indian Ocean
SWIOFish	South West Indian Ocean Fisheries
SWOT	Strengths, Weaknesses, Opportunities and Threats
RZ	Replenishment Zones
ToR	Terms of Reference
TSH	Tanzania Shilling
TUMCA	Tumbatu Marine Conservation Area
UDSM	University of Dar es Salaam
UNEP	United Nations Environment Programme
URT	United Republic of Tanzania
USD	United States Dollar
VPO	Vice President's Office
WCS	World Conservation Society (New York)
WHS	World Heritage Site
WIO	World Western Indian Ocean
WIOMSA	Western Indian Ocean Science Association

WWF	World Wildlife Fund
ZAFIRI	Zanzibar Fisheries Research Institute
ZATI	Zanzibar Association of Tourism Investors
ZATO	Zanzibar Association of Tourist Operators
ZCT	Zanzibar Commission for Tourism
ZEMA	Zanzibar Environmental Management Authority
ZFFS	Zanzibar Fisheries Frame Survey
ZIPA	Zanzibar Investment Promotion Authority
ZMA	Zanzibar Maritime Agency
ZPC	Zanzibar Ports Corporation
ZPEP	Zanzibar Poverty Eradication Plan
ZTC	Zanzibar Tourism Corporation

## DEFINITIONS

The following definitions are provided from the Zanzibar Fisheries Frame Survey (2016):

**Beach-seine:** Refers to an encircling fishing net made of a piece of netting mounted between two ropes, one on either side; and whose method of operation involves pulling of such net towards the beach, sandbank, shallow waters area.

**Cast net:** Refers to a circular net that is thrown over a shoal of fish and allowed to sink to the bottom, trapping fish inside it.

**Gill-net:** Refers to a fishing net that catches fish by entangle them (commonly, but not always around their gills). These nets vary in lengths, mesh sizes and twine sizes. Usually, a sheet of net wedding is held vertically with help of floats and sinkers and set in a straight line in the water column. Gillnets are classified in terms of their mode of operation as shark nets (6" to 12" mesh, bottom set for sharks and rays), drifting gill nets (6" nets for tuna and other large pelagic fishes), shallow water gill nets (2" to 4" gill nets for shallow water reef fishes). Hand line: Refers to a line managed chiefly by direct contact with the hands on which baited hook(s) is/are attached

**Long line:** Refers to a long fishing line with a number of baited hooks, more or less evenly spaced, usually set close to the sea bottom in deep-sea fishing.

**Octopus stick:** refers to a stick with a pointed end used for capturing of octopus from the reef. It is locally known as *uchokoo*. There are some variants of this, where a thin iron rod (bar) is used in its place.

**Purse seine:** Refers to a surrounding net drawn around a school of fish and then closed at the bottom by means of a line passing through rings attached along the lower edge of the net

**Ring-net:** Refers to a surrounding net like a purse seine with bridles to help pull in the lead line. It is similar to a purse seine but without the running purse line. The bag is a separate net.

**Shark net:** Refer to a fishing net for catching sharks (see gill net)

**Trap:** Refers to a device for catching fish that has a mesh or other structure which diverts the fish into an enclosure so arranged that egress is more difficult than ingress

**Boat:** Refers to a fibre-glass boats or wooden planked vessel with pointed bow and a square or rounded stern which is usually propelled by engine.

**Dhow:** Refers to a wooden planked vessel with pointed bow and rounded stern, usually propelled by sailing only.

**Dugout canoe:** Refers to a vessel constructed from a single log or a few pieces of a tree. The bottom is usually flattened for stability and usually propelled by oar, long pole or rudimentary sail

**Mashua:** refers wooden planked boat with bow and transform stern usually propelled by sailing but can also fitted with an engine

**Outrigger canoe:** Refers to a type of a dugout canoe with outriggers which provide stability to the vessel, specially, as its main means of propulsion is by sail.

**Fisher/Fisherman:** Refers to an individual who participates in any part fishing activity and is earning whole part of their livelihood through fishing operations.

**Fish Shelter/Banda/shade:** is any permanent or temporary structure used for handling fresh fish. Fish Banda provides a suitable handling place for artisanal fish operators to process or assemble their products before sale.

**Landing site:** Refers to an area adjacent to the beach of a village where local fishers usually land their catches and park their fishing vessels upon return from their fishing activities.

**Sheha:** Refer to a leader of the lowest level of formal administrative unit (locally known as *shehia*), appointed by the District Commissioner

**Shehia:** Refer to a smallest government administrative unit, otherwise called ward.

# 1. GENERAL MANAGEMENT PLAN FOUNDATIONS

## 1.1 The General Management Plan

When designed well and effectively implemented, marine conservation areas (MCAs) can restore fisheries and ecosystems both within and beyond MCA boundaries, as well as alleviate poverty among coastal communities. The Pemba Channel Conservation Area (PECCA) General Management Plan (GMP) for the period 2022 to 2032, is the overarching management document for this protected area. The plan contains guiding principles, management objectives and actions aimed at achieving the purposes for which the MCA is established under the Fisheries Act No. 7 of 2010 Marine Conservation Unit Regulations. Furthermore, as stated in the MCU Regulations Part III 8. C. “In collaboration with the Managers, the coordinator shall prepare long-term management plans for controlled areas including management measures, annual implementation plans and their budgets.”

This GMP represents the first step in the formal process used by the PECCA management in planning, developing and managing its marine and coastal resources. The style and structure of this GMP is similar to those from Tanzania and other parts of the WIO region, in particular, the GMP model for the Kisite-Mpunguti Marine Protected Area Management Plan (2015-2025), produced in Kenya (KWS, 2015) which addresses very similar marine conservation challenges to those experienced by the MCAs of Zanzibar. The PECCA GMP was developed to fulfil the stated goals and objectives of the PECCA. More specifically to:

- Identify the key elements of the PECCA that make it a site of national and international significance.
- Articulate threats to the marine resources and other issues relating to management.
- Outline strategies to minimize threats.
- Provide framework for working in partnership with local communities to develop sustainable resource use and to diversify income-generating activities to support the livelihoods of local residents.
- Provide framework to work with local government authorities, economic enterprises including tourism developments, to ensure that environmental guidelines are observed in order to minimize negative environmental impacts.
- Provide a basis for the development of subsidiary legislations, subsidiary planning documents, operational plans and day-to-day management decisions.

The PECCA stakeholders completed the review of this GMP (2022-2032) in March 2022, through a process that involved key resource use stakeholders. The review was an opportunity to consider existing management approaches and actions, the roles, responsibilities and priority scheduling of the various activities. It also allowed for consideration of future direction of management in the MCA and provided an opportunity to evaluate the challenges and successes in implementing the previous GMP. Following the review, the PECCA GMP (2022-2032) was endorsed by PECCA stakeholders on 16 March 2022 at a GMP validation meeting held at Wete.

### The Planning Process

The preparation of this GMP comprised the seven tasks described below, of which the last four are aimed at directly contributing to improved management of the PECCA:

Task 1) Conduct preliminary consultations: Consultation with the Department of Fisheries Devel-

opment (DFD), now the Department of Fisheries Development and Marine Resources (DFDMR) DFAR, including staff of the DFD's Marine Conservation Unit (MCU), now the Department of Marine Conservation (DMC) and MCA field staff; the Technical Adviser for the Co-management component and the World Bank SWIOFish Task Team Leader; as well as other consultants responsible for preparation of priority fisheries management plans (FMPs) for Zanzibar, selected other MCA stakeholders including FEC members and representatives from the tourism sector.

Task 2) Conduct a review of literature: From the start of the assignment, literature relevant to this assignment including (but not limited to) legislation and regulations, sectoral policies, existing rapid assessments (2005) and GMPs (2010) for PECCA and other MCAs on Zanzibar; available routine reporting from DFD, MCA and MCS relevant to the target areas; relevant research outputs on fisheries, coral reef status, other environmental or socio-economic issues, and relevant SWIOFish preparation studies including Meyers (2014) and Shalli & Anderson (2013), among others.

Task 3) Prepare an Inception Report: An Inception Report that outlined in detail the strategic approach, methodology, implementation plan, staff roles, timeframe etc., drawing on the above consultations and literature review as well as guidance provided in sections items 4 to 7 (below).

Task 4) Draft the GMP: This task included maintaining a fully oriented MANLRF (now the Ministry of Blue Economy and Fisheries – MBEF) core team on the proposed planning approach with roles clearly identified. Stakeholders were closely consulted early in the planning process and had opportunities to provide input to draft versions of relevant sections of the GMPs, to build consensus, particularly on any proposed management regulations or zonation, with consultations properly documented with signed agreement of key stakeholder representatives.

Task 5) Prepare a Monitoring, Control and Surveillance (MCS) Strategy for each MCA: Preparing the MCS strategy for each MCA included a review of existing/proposed legal and management frameworks, notably existing fisheries and MCU regulations, proposed management actions in the PECCA GMPs (Task 4 above), relevant Fisheries Management Plans (FMPs), consultation with stakeholders (DFD and the SFCs among others), evaluation of the success of current and past approaches to MCS and identification of options for alternative approaches to MCS, including positive incentivization of compliance.

From a practical perspective, consideration was given to monitoring and reporting requirements for MCS measures identified and appropriate procedures and formats for monitoring and reporting, building on any already in existence at DFD. Capacity available within DFD and MCAs (including SFCs) in relation to MCS needs were evaluated, and equipment resources for implementing MCS in each MCA considered, both from MANLRF (now MBEF) recurrent and SWIOFish project funding.

Task 6) Prepare an over-arching MCA Demarcation Plan: With the goal being to support effective MCA management and related compliance and enforcement, the MCA

Demarcation Plan includes identification of priority boundaries in the official gazette, review of the zoning plans in the revised GMP, and through consultation with DFD personnel (including MCA managers), other relevant authorities and selected community and private sector stakeholders prioritised outer and/or internal zone boundaries for demarcation.

Task 7) Design an MCA Monitoring Information System (MIS) and train relevant users: Based on a literature review of current best practice on MPA management effectiveness monitoring, and consultations MANLRF and SWIOFish consultants, standardized monitoring indicators for assessing management effectiveness of MCAs with detailed protocols for monitoring each MCA was developed.

One of the key features of the development of this GMP is stakeholder participation. It is widely recognized that comprehensive stakeholder participation in the development of a GMP leads to greater success in the subsequent implementation.

To ensure the preparation of the draft GMP followed best practice, actions and procedures were developed that are viable, pragmatic and acceptable to all the entities affected by the MCA. In doing so, the following principles (as outlined in IUCN, 2004) guided the process:

- A review of existing information (e.g. physical, biological, social, economic, policies, legislation) and description of the context of each MCA.
- Analysis of copies of GMPs for other protected areas, both from within Zanzibar (e.g. CHICOP) from mainland Tanzania (e.g. Mafia Island) and within the region.
- Identification of stakeholders and establishment of a transparent consultation process, which involved meetings with individual interest groups and for all stakeholders together.
- Analysis of constraints, opportunities, threats, issues, problems and needs, and identification of solutions.
- Formulation of a vision, objectives and (where appropriate) targets.
- Design of management actions and interventions, including boundaries and zonation schemes and acceptable mechanisms for enforcement and compliance.
- Ensuring that the GMP is objective-oriented.
- Determining financing mechanisms, mindful of the need for benefit and revenue sharing with stakeholders. This is particularly important where certain stakeholders are required to surrender part(s) of their resource base to other stakeholders where compatibility of the two is not possible.
- Establishing monitoring and evaluation protocols, including a process for periodic review and revision.
- Preparation of the revised GMP to be shared with all stakeholders, and for public review.
- Incorporation of comments and submission of the final GMPs for formal approval.
- Publishing the final GMP (both as hard and electronic copies).

Furthermore, the development of this GMP follows the Nature Conservancy's Conservation Action Planning (CAP) framework, recognized as one of the most widely used conservation planning tools in the world. The CAP is designed to be adapted to meet the needs of local planning teams while maintaining the integrity of the guiding principles (Annex 1. Conservation Action Planning outline). It is based on a four-step project cycle summarised in Figure 1.

Once the project or protected area scope, has been defined, the CAP framework is based on the following three important but different features:

- **conservation assessment**, which includes target viability, threat analysis and situation analysis;
- **strategies** that guide conservation action, based on agreed conservation targets, and viability, threat and situation analyses; and
- **best practice** in conservation, e.g. participation, implementing work plans and using the results.



**Figure 1. Conservation area planning (CAP) cycle.**

## The Roadmap Approach to Implementing the GMP for the PECCA

One key feature of the present GMP is that it is designed as a 'roadmap' on reaching the desired objectives within ten years, by following a series of steps and procedures to be implemented over time. It is designed to show the link between various variables and their impact on project completion. The start of this action planning cycle is defining the project people, scope and focal conservation targets (see Figure 1). This has been well-covered in this GMP leading to the development of a set of strategies, measures and objectives, usually between three and five for each of the five management programmes. Thereafter, the GMP describes how implementation of strategies and measures might be approached, through the actual implementation of the proposed actions, usually between 4 and 8 for each of the management objectives identified. Actual implementation requires the participation of numerous and different stakeholders, from local communities to international NGOs, under the leadership of the PECCA Manager. Emphasis will be on local community participation, including of fishers and other resource users. From there, the fourth and critical step in the CAP framework, is to analyse the results of the actions, share findings and adapt going forward.

## Current Status of the PECCA

The current status of MCAs of Zanzibar is one where very little is actually taking place with respect to marine resource management or ecological conservation, and resource user confidence in management authorities is very low. Although quantitative evidence on the status of fisheries and ecosystems is fragmented and incomplete, there is a lot of anecdotal evidence as well as stakeholder recognition that the demersal shallow water fisheries (octopus and coral reef fish) within the MCAs of Zanzibar are overfished and that there are increased numbers of fishers and decreased fish stocks. One exception to this is the presence of several functioning and active collaborative management initiatives involving seasonal closures of certain octopus and fishing grounds in the south of PECCA. These are supported by local and international NGOs, and the Kwanini Marine Protected Area at Makangale which acts as a no take zone based on a mutually agreed bylaw with local communities facilitated by the Manta Reef Lodge and the Kwanini Foundation.

The marine ecosystems are also under increasing pressure from population growth and the impacts of climate change. This was also the case when the MCAs were created. The lack of implementation of management measures from the first GMPs (where they exist) has resulted in an increased gap between the status of the resources and ecosystems and the ability of management to address the issues. The status of the marine environment in PECCA matches this overview of Zanzibar's MCAs.

The no-take and other zones, the community participation initiatives in managing selected areas and other actions that are proposed in this GMP can be seen as piloting interventions, that need to be tested and assessed, adapted and modified or abandoned, as the case may be, as part of the 'roadmap' approach toward reaching the desired objectives within ten years.

## GMP Structure and Function

The GMP structure is simple, and aimed at promoting understanding and implementation of the GMP by the MCA Managers, resource users and other stakeholders. Table 1 presents the key components of the GMP and their functions.

**Table 1. GMP structure, functions and contents.**

Category	Function and contents
Plan	Introduces the plan, describes the plan's geographic scope, presents the plan structure and the framework used to develop it.
Foundations	Presents the Plan Purpose Statement and Exceptional Resource Values (ERVs) of the MCA.  Outlines management issues of specific concern for the PECCA.
Zonation Scheme	The zonation scheme proposed is meant to reconcile different types and intensities of use in different parts of the PECCA, and to help reconcile the sometimes competing and conflicting conservation and resource use needs.  Identifies and proposes areas of the PECCA where different types of visitor use, tourism developments and local fisheries are permitted.  It is also noted that the proposed zonation scheme needs to be finalized through a collective and participatory process involving all relevant stakeholders under the leadership of the MCA Manager.

<p>Management Programmes</p>	<p>The bulk of the GMP is addressed here, with a framework to guide management activities that contribute to achieving the future desired state for specific aspects of the PECCA. The PECCA GMP has the following five thematic programmes:</p> <ul style="list-style-type: none"> <li>• Ecological Management</li> <li>• Tourism Development and Management</li> <li>• Fisheries Resource Management</li> <li>• Mariculture Development</li> <li>• Community Support</li> </ul> <p>Each of the five management programmes has a purpose, followed by a set of three to five guiding principles that form the basis of the development and implementation of management actions. A set of three to five management objectives set out the specific goals of PECCA management, and for each objective a series specific management actions are described. The management actions will be implemented by the MCA management, often in collaboration with research, development and conservation partners.</p>
<p>Category</p>	<p>Function and contents</p>
<p>Monitoring, Control and Surveillance</p>	<p>For PECCA, the sixth management programme or component of the GMP is the Monitoring, Control and Surveillance (or MCS) Strategy, designed to ensure and support the implementation of the above programmes. As well as pro-active enforcement, this MCS Strategy considers measures to improve voluntary compliance through education and outreach and by generating incentives through management that benefits the general community.</p>
<p>Monitoring Framework</p>	<p>A monitoring framework for each of the five management programmes was designed to provide guidance for the assessment of the potential positive and negative impacts resulting from programme implementation. It includes easily quantifiable indicators for assessing impacts and potential sources of the information required. The detailed Management Information System (MIS) is presented as a separate document to accompany the GMP.</p>
<p>6-Year Implementation Schedules</p>	<p>Each programme is accompanied by an implementation schedule, that provides the link between the ten-year management actions and the annual work planning and budgeting of PECCA management. The schedules break down the programme’s management actions into a series of tangible and explicit activities, proposed for the first six years of implementation. For each proposed action responsible persons will need to be identified through a process led by the MCA Manager and supporting SMC, MCTAG and partners. The schedules include a proposed timeframe for activity implementation, and “milestones” for monitoring plan delivery. The final four-year schedule will be defined after a comprehensive analysis and review of each programme towards the end of year five, halfway through the overall implementation period of this GMP.</p>

## 1.2 Pemba Channel Conservation Area

The PECCA is located to the western part of Pemba Island (Figure 2), being declared a marine conservation under section 7(1) of the Fisheries Act No. 8 of 1988 and was officially gazetted by an order published in the legal Supplement (Part II) of the Zanzibar Government Gazette vol. C XIV No. 6111 of 23rd September 2005.

The PECCA is an IUCN Category VI MPA which encloses an area of about 825.8 km<sup>2</sup>, from the northern tip at Ras Kigomasha to southern tip of Ngazi Islet (MCU Regulations 2014). Its boundaries fall in four administrative districts of Micheweni, Wete, Chake Chake and Mkoani. The approximate coastline length in the PECCA is approximately 210 km. The PECCA is administered and managed by the Department of Marine Conservation (DMC), within the MBEF. All terrestrial areas within the overall boundaries of PECCA are excluded, but the terrestrial part of Misali Island remains protected under the Misali Forest Order.

Of note is that PECCA encompasses Misali Island, established as a marine protected area (MPA) in 1998, referred to as the Misali Island Marine Conservation Area (MIMCA), under both forestry and fisheries legislation (Abdullah et al., 2000). The Misali Island Conservation Association (MICA), an NGO supported by CARE, encouraged community involvement in the management of MIMCA, allowing input to the management of the island from representatives from local communities, together with government officials as part of a central management committee (Abdullah et al., 2000). On September 23<sup>rd</sup> 2005 the management of Misali Island changed hands with the establishment of the PECCA.

### Area Description

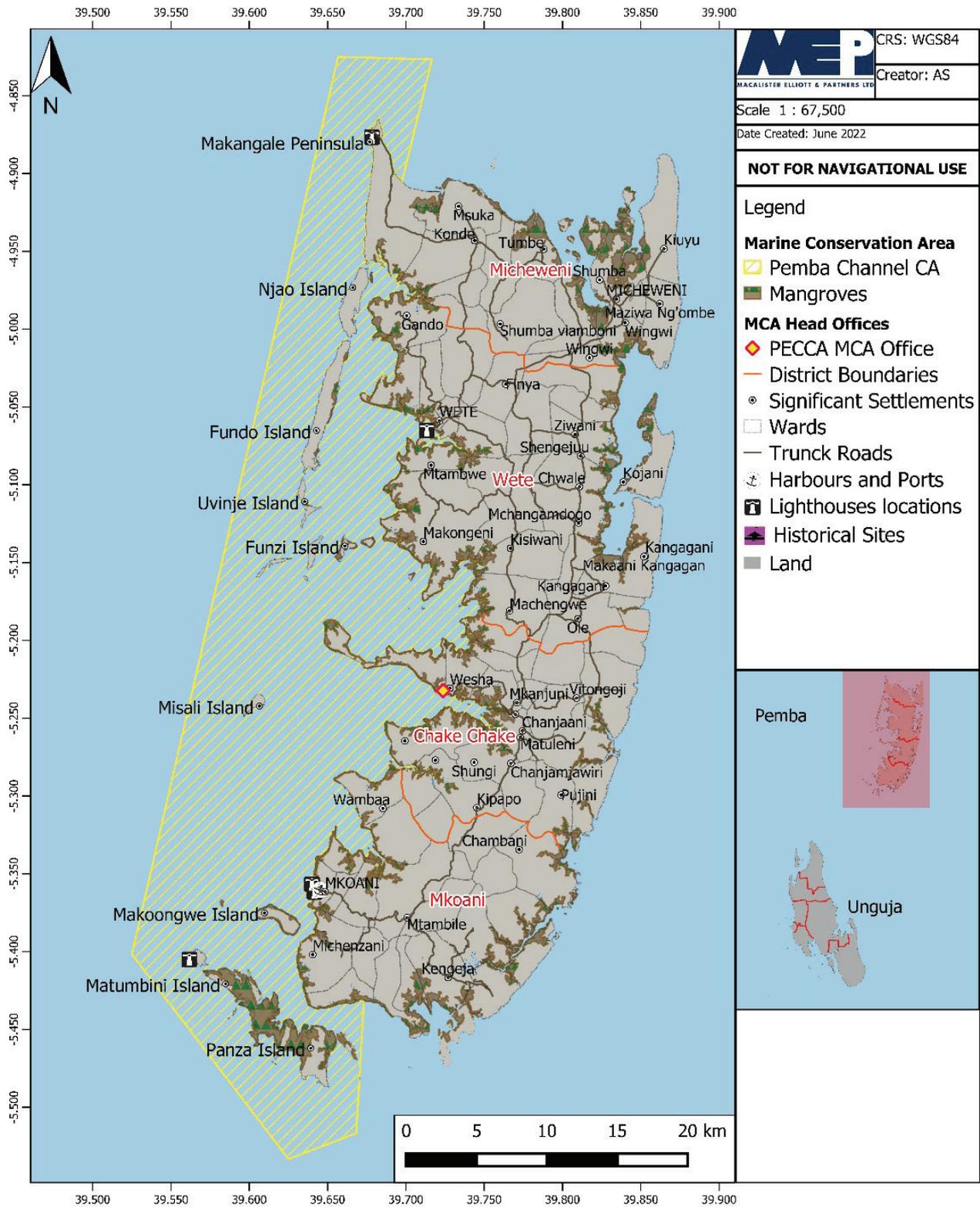
PECCA comprises all marine waters off the west coast of Pemba starting from the beach of Kangani at Ngazi Islet in the south to the north tip of the beach of Ras Kigomasha in the north. The coastline is heavily indented with numerous large and small bays, and a network of deep channels separated by shallow sandbanks, peninsulas and 13 main islands, plus numerous smaller islets and rocky outcrops.

Of the surrounding small islands, Fundo and Njao are two long islands along the northwest coast where there are settlements and fishing and agricultural activities, while on the south-western corner of Pemba, Makoongwe is also inhabited. Seasonal fishing camps are present on Panza, Ngazi, Jombe and Muinzi islands. On the northwest, PECCA is bordered by Ngezi-Vumawimbi Nature Forest Reserve.

The principal features of the PECCA are the small islands, fringing reefs to the 10 m contour depth at spring low tide, inlets and mangrove creeks, and extensive intertidal expanses. Most of the inlets are fringed by mangrove forest.

On the western side of PECCA is a deep Pemba Channel extending to a depth below 1,000 m, separating Pemba Island from the mainland Tanzania. It is a 50 km wide, has steep bathymetry and a north flowing current that provides productive conditions for fisheries and cetaceans.

Figure 2. Boundaries and main administrative and infrastructure features of the PECCA.



## Vision Statement

The vision for the PECCA needs to be a forward-looking statement that is inspiring and describes the area as it could be ten years from now, based on the result of the proposed management actions carried out. It provides the over-arching frame for determining the expected results, while describing the most outstanding features of the PECCA and how these might appear in future. The proposed PECCA's vision statement is presented below.

## Vision Statement

In 10 years from now, PECCA will be home to a rich diversity of marine plants and animals some of which are threatened and endemic (e.g. Hawksbill turtle and Humpback dolphins) to this area. A dynamic environment, the PECCA is rich in shorebirds, which enables it to retain its international recognition as an Important Bird Area (IBA). The coral reefs are restored and protected so that reef fisheries not only survive but also thrive. Cognizant of the effects of

climate change e.g. increased erosion, wave action, coral bleaching, the PECCA Management and community are informed and work with specialists and experts to guide mitigation measures.

This unique and inspiration setting is where people gather to reconnect with nature and have memorable experiences. Visitors are drawn to the PECCA by stories of pristine beaches, rich and diverse coral reefs in clear waters, seasonal whales, exquisite nature trails, people who utilize

the marine resources in a sustainable fashion. The understanding that PECCA is fragile commits

them to protect PECCA for all to discover and enjoy. Visitors experience and personally connect

with nature through the PECCA's special mosaic of marine and coastal habitats. They enjoy meaningful time through a rich selection of activities designed to meet their needs and interests, such as dolphin-viewing, snorkelling, SCUBA diving, canoeing, boat safaris and bird watching.

The story of this outstanding heritage is presented to the public through electronic and print media, and public outreach education activities increasing local and national support for PECCA.

The PECCA is a showcase of community participation in conservation. The local communities conserve and utilise fisheries resources sustainably, guided by specifications in the agreed

zoning scheme. A cooperative relationship ensures inclusion of stakeholders in all aspects of

PECCA operations and management creating opportunities for socio-economic benefits that promote diverse income sources and improved livelihoods of the fisher community. The health

and sustainability of the PECCA, its unique habitats and threatened species are maintained by passionate staff and through strong relationships with PECCA's terrestrial and adjacent ecosystems and communities.

## PECCA Goal

Based on the current status, the proposed goal to be adopted for the PECCA is:

“To restore and conserve the diversity, abundance and ecological integrity of all physical and biological resources in the PECCA, so that they may be enjoyed and used productively and sustainably by present and future generations”.

This aligns well with the definition of the term “conservation” in the Act No. 10 of 1999, The Establishment of the Zanzibar Nature Conservation Areas Management Unit Act, 1999. The objectives are the

specific statements that describe how the goal will be reached. The objectives help the managers with planning, measuring progress, and evaluating success. As per the Fisheries Act No. 7 of 2010 MCU Regulations, the proposed PECCA objectives are as follows:

## PECCA Objectives

1. To promote, coordinate and guide public understanding, awareness, appreciation and enjoyment of the natural resources through interpretation/education and the provision of recreational opportunities.
2. To restore and maintain the population of key species, especially the Critically Endangered Indian Ocean Humpback dolphin and Hawksbill turtle, all other species of marine turtles, critical seabed communities, especially coral reefs and other Endangered, Threatened and Protected Species (ETP species) - refers to species which are listed as endangered, threatened or protected under national and international legislation.
3. To undertake the restoration, sustainable development and utilization of the PECCA's natural resources, particularly fisheries, in a manner which will generate revenue to different stakeholders and therefore provide an economic justification for the setting aside of no-take zones.
4. To petition for internal and external financial grants for management purposes.
5. To promote research for the purpose of supporting PECCA management and education programmes.
6. To improve the management and conservation of the PECCA marine resources through gender sensitive, environmentally and socio-economically balanced approaches, in collaboration with stakeholders (especially fisheries and tourism) to ensure their active participation in the management.
7. To build the capacity of the marine conservation staff, SFC and other collaborating community organisations, to carry out effective management of fishing, tourism and other PECCA related activities.
8. To restore, preserve and maintain a typical representative area of the coral reef communities, migratory marine birds, and threatened and endemic marine wildlife for the benefit of present and future generations.

In doing so, the GMP will control the illegal harvest and use of fish, forest and land resources within its borders, by using special patrols with cooperation from citizens and other government agencies. Through its implementation, it will contribute to the three pillars of sustainable marine conservation: environmental, economic and social. It is also essential that the GMP delivers value for money for the tourist as well as the community and the coastal and marine ecology of the site.

## Exceptional Resource Values of the PECCA

The Exceptional Resource Values (ERVs) of the PECCA are the area's key natural resources and other ecological and physical features that provide diverse benefits to local communities as well as international visitors. The ERVs are critical for maintaining PECCA's unique qualities, characteristics and ecology and should be the focus of restoration and conservation efforts. The following sections describe the PECCA ERVs that were identified through reviews of the literature, from the personal knowledge of the consultant team and from information shared by stakeholders during the planning process, in particular with respect to their importance to the area. The PECCA ERVs are categorised into four broad categories: Socio-economic, Cultural, Scenic and Biodiversity (Table 2 below).

**Table 2. PECCA exceptional resource values.**

Category	Exceptional Resource Value
Socio-economic	Tourism Fishing Trade
Cultural	Caves and sink holes Historical ruins Archaeological sites
Scenic	Misali Island and other Islands Sandy beaches Numerous bays and mangroves inlets
Biodiversity	Marine mammals (whales, dolphins, dugong) Sea turtles Whalesharks and other Elasmobranchs Mangrove forests, Seagrass beds and Coral reefs Fish fauna Island refugia and Important Bird Area (IBA) Island coastal forest on Fundo, Misali and other smaller islands Endangered, threatened and protected (ETP) species Pemba Island is surrounded by deep water and has deep water coral reefs and habitats, significantly different coral reef and other habitats compared to the other MCAs, and unique to the WIO region. Pemba-Shimoni-Kisite Ecologically or Biologically Significant Marine Area (EBSA).

### ***Biodiversity values and Endangered, Threatened and Protected Species***

The waters around Zanzibar are home to a number of species that are listed as endangered, threatened or protected under national and international legislation. Because of the rich marine and coastal biodiversity, the area is included in the Pemba-Shimoni-Kisite Ecologically or Biologically Significant Marine Area (EBSA), and much of PECCA is also identified as an Important Bird Area (IBA). The following provides a summary of species and natural habitats that contributed to the unique natural features of PECCA.

## Marine Megafauna

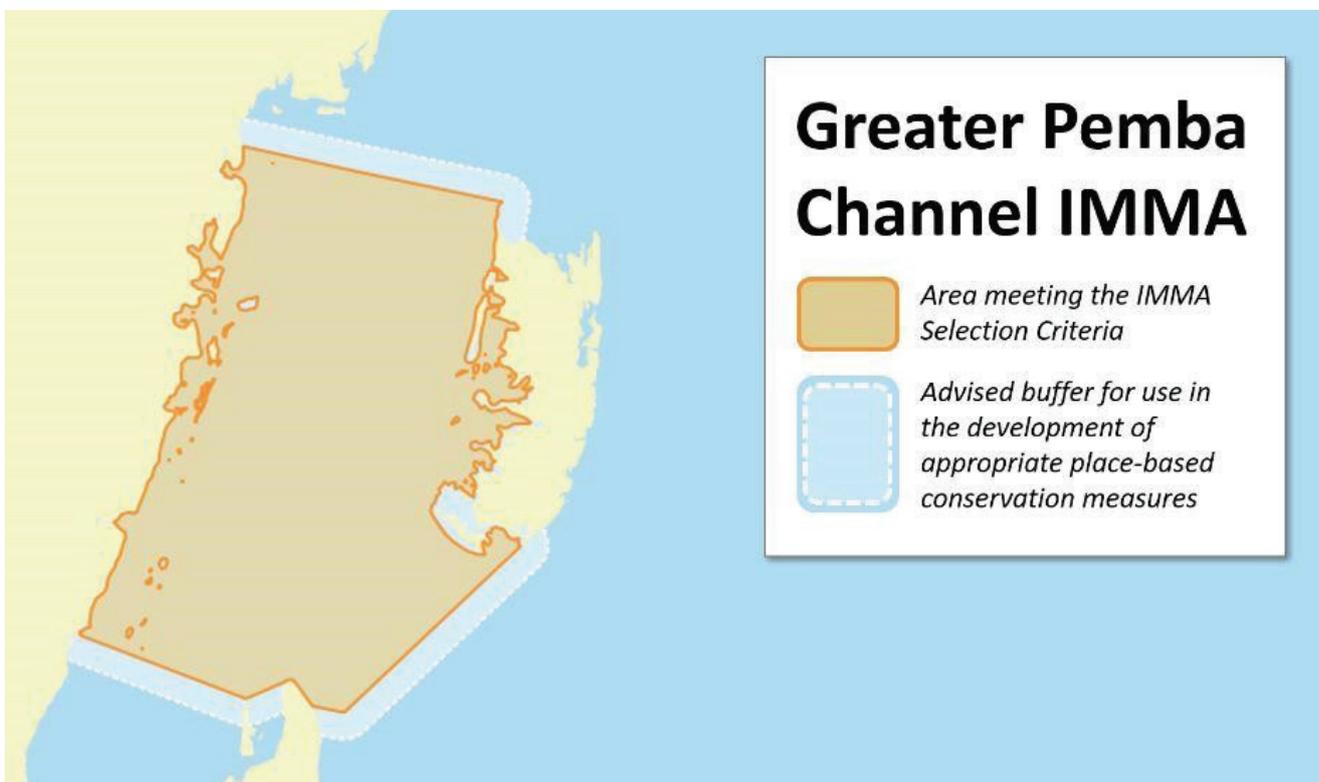
Marine megafauna that are resident or visit the waters of the PECCA include mammals (dolphins and whales), sea turtles and elasmobranchs (sharks and rays), and the dugong. Losses of marine megafauna (elasmobranchs, marine mammals and sea turtles) may have implications for the structure, function and productivity of ecosystems (e.g. Heithaus et al., 2008; Kiszka et al., 2015). These implications are especially concerning in small-scale fisheries areas like Zanzibar where coastal communities heavily on near-shore environments for their survival and livelihoods, with limited adaptive capacity to respond to ecosystem change.

A rapid assessment of cetaceans along the 1,424 km coast of Tanzania showed that the Pemba Channel had by far the highest cetacean diversity and relative abundance in the country. Currently, 13 cetacean species are recorded in the Greater Pemba Channel Important Marine Mammal Area (IMMA) (Figure 3). The most commonly encountered cetacean within the area is the spinner dolphin. Many deep-water species (e.g. Blainville's beaked whale, Dwarf sperm whale, False killer whale, Short-finned pilot whale) are also frequently sighted in the area.

Thirteen cetacean species have been recorded in the Pemba Channel, including *Delphinus delphis tropicalis*, *Globicephala macrocephalus*, *Grampus griseus*, *Kogia breviceps*, *Lagenodelphis hosei*, *Megaptera novaeangliae*, *Mesoplodon densirostris*, *Pseudorca crassidens*, *Sousa plumbea*, *Stenella attenuata*, *Stenella longirostris*, *Tursiops aduncus* and *Tursiops truncatus*. The Pemba Channel had the highest cetacean relative abundance and relative diversity of any other location in Tanzania (Braulik et al. 2017), justifying its designation as an IMMA.

**Figure 3. Great Pemba Channel Important Marine Mammal Area.**

Source <https://www.marinemammalhabitat.org/portfolio-item/greater-pemba-channel/>



### Whales

Humpback whales (*Megaptera novaeangliae*) migrate seasonally from temperate waters to warm tropical waters where they breed and calve. The humpback whale migrates along the east coast of Africa and are regularly sighted in PECCA from June-July to November every year. It is possible that the PECCA and other coastal waters of Zanzibar represent a breeding area for humpback whales, based on the high number of calves observed, indicating that the whales give birth to their young in or very close to Zanzibar waters. Boat-based research conducted 2008-2012 off the south coast of Unguja encountered 340 groups of a total of 744 humpback whales of which 3.6% were young of the year calves (Berggren et al. unpublished data).

Humpback whales are regularly encountered entangled in gillnets and lines to fish traps. This is a serious threat to the whales and also to the livelihood of the fishers that lose their gear when whales get entangled and swim away with nets and lines attached.

## Dolphins

The two most common species of dolphins occurring in PECCA are the Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) and the Indian Ocean humpback dolphin (*Sousa plumbea*) (Amir et al. 2002, 2005, 2012). Both species are present in the shallow waters inside the PECCA along the west coast of Pemba Island and because they are shallow water species, and Pemba is surrounded by deep water, and the same photo-identified individuals were sighted in multiple years, it is likely that both of these populations are small, isolated and resident. Other species reported in the PECCA include the spinner dolphin (*Stenella longirostris*), Risso's dolphin (*Grampus griseus*) and common bottlenose dolphin (*Tursiops truncatus*).

### *Indian Ocean humpback dolphin*

The Indian Ocean humpback dolphin shows restricted distribution and small populations where they are present. Reports suggest that this species prefers shallow nearshore waters of less than 25 m; and populations are usually found in locations with extensive shallows, such as protected bays and estuaries (Braulik et al., 2015; 2016; 2017). It is found in shallow waters on both sides of the Pemba Channel and the population around Pemba is small and assumed to be resident.

A photo-identification catalogue of Indian Ocean humpback dolphins from 2014-2016 generated a catalogue of 54 unique dorsal fins (including left and right side) and abundance of this endangered species is expected to be well under 100 individuals (Braulik unpublished). Comparative number from MBCA are of 19 non-calf individuals (Sharpe and Berggren, 2019). In that area, a possible local extinction is expected within the next 40 years if mortality rates prevail. For PECCA, there is no historic information so far for making any predictions, though Braulik (2016) suggests that this species is likely to be the most endangered cetacean in Tanzania and is now listed as Endangered on the IUCN Red List.

### *Indo-Pacific bottlenose dolphin*

Based on field surveys conducted west of Pemba Island from 2014-2016 abundance of Indo-Pacific Bottlenose dolphins was estimated as 83 individuals (Braulik et al., 2018). This compares with the latest population size estimates from MBCA, where 114 non-calf Indo-Pacific bottlenose dolphins were identified in 2015 (Sharpe, 2018). For the MBCA, there no detectable trend in abundance over the past 16 years (Stensland et al. 2006). For PECCA there are not data against which to examine trends. Around Misali and in the small bays, groups of 5 to 20 individuals may be sighted. It is not known how this population is responding to fishing pressure.

The primary threat to both species relates to incidental mortality and injury in fishing gillnets as the habitat overlaps the area where most artisanal fisheries occur (Amir 2010, Amir et al. 2002, 2005, 2012). The Indian Ocean humpback dolphins are primarily threatened by bottom set gill-nets used very close to shore whereas the Indo-Pacific bottlenose dolphins are mainly caught by drift-nets fishing

further offshore.

The second most significant potential threat to dolphins in the PECCA is dolphin tourism, in the PECCA, predominantly targeting the Indo-Pacific bottlenose dolphins, but also affecting Indian Ocean humpback dolphins opportunistically. In Unguja, the activity was initiated in the MBCA around 1992 and by 1997 the activity had replaced the hunt for dolphins in the area (Berggren, 2009). It has become more prevalent in the PECCA, where dolphin populations are encountered more opportunistically. The dolphin tourism in the PECCA, as elsewhere in Zanzibar, is currently unregulated and unmanaged in violation of the existing tourism regulation (Berggren et al., 2007, Zanzibar Tourism Act 2009). The effects of tourism activities for example, on the Indo-Pacific bottlenose dolphin population in MBCA, have been demonstrated to affect short-term behaviour of nursing females (Stensland and Berggren, 2007) and the daily activity budget, increasing the amount of time traveling and reducing the amount of time foraging, resting and socialising (Christiansen et al., 2010).

Suggested guidelines for the dolphin tourism were introduced in 1998. However, these were perceived as too strict and were rarely followed by the operators. In 2002, revised guidelines were issued by the Department of Fisheries and Marine Products and distributed in the form of a leaflet available in English and Swahili. Unfortunately, few operators to date have followed the guidelines and the activity now engage about 100 boats that take tourists out to watch and swim with dolphins. Humpback whales are also opportunistically targeted when seasonally present in the area.

In an effort to improve the dolphin tourism in the MBCA, the Kizimkazi Dolphin Tourism Operators Association (KIDOTOA) was formed in 2005. This was one of the outputs of the WIOMSA funded Sustainable Dolphin Tourism Project (Berggren et al., 2007). KIDOTOA is/was a non-governmental organisation dedicated to long-term sustainable development of the dolphin tourism in the MBCA. The focus of the Association was to promote sustainable dolphin tourism, dolphin research, education and environmental conservation. KIDOTOA further provided intensive training courses in sustainable dolphin tourism for tour guides and boat operators organised in collaboration with the Institute of Marine Sciences, University of Dar es Salaam. The courses included both theoretical and practical elements where participants were trained in land- and boat-based best practice for whale or dolphin watching. The course was offered at regular intervals and participants were issued a certificate on completion of the course. KIDOTOA also developed and posted information signs for marine mammals at public access areas where tourists, tour operators and local communities easily can access the information. KIDOTOA promoted the dolphin tourism guidelines and provided education and awareness to the community and schools. KIDOTOA was an advocate for the protection of dolphins from destructive and unsustainable fishing practices in the region such as the use of drag nets and dynamite blasting.

Methods to mitigate and release humpback whales entangled in fishing gear was one of the objectives in the three Humpback Whale Bycatch Mitigation and Whale Watching Workshops conducted in 2010, 2011 and 2012. The second aim was to introduce how sustainable and safe whale watching can be conducted. The workshops included both theoretical and practical elements and attracted around 40 participants per year with broad stakeholder group representation. The Workshops were organised by Newcastle University in collaboration with the Ministry of Livestock and Fisheries, Zanzibar, the Institute of Marine Sciences, University of Dar es Salaam and KIDOTOA. Funding for the Workshops and a donation of specialised disentangling equipment was provided by the International Fund for Animal Welfare, US.

Other threats to the dolphins and whales in the PECCA relate to anthropogenic impacts associated with habitat degradation including underwater sound from blast fishing (Braulik et al., 2017), use of outboard engines on boats and pollution.

### *Dugong*

The recent study by Said et al. (2020) on the population status and distribution of dugong *Dugong dugon* (locally known as *nguva*) in Pemba Island, found that over 36 % of fishers had seen dugong and that of the older fishers (aged 70 years more) over 63 % had seen them. The survey revealed that dugong were recorded from different areas of Pemba Island, being more commonly seen in the past off Tumbe and Msuka on the northern coast. However some had also been seen off Fundo, which is inside the PECCA.

The Said et al. (2020) study results indicate that there are many anthropogenic and natural threats that affect dugongs and their habitats which include entanglement in fishing gears, trawling, habitat destruction, bad fishing methods and natural environment changes. The findings further confirmed a more recent occurrence of dugong on Pemba Island since one live dugong was accidentally caught in a fishing net in Chambani Mapape area of Pujini on the east coast, in May 2017. The study recommends monitoring of dugongs and their habitats, and that conservation and management are needed, by establishing dugong hot spots at known dugong locations.

### **Turtles**

Five species of turtles occur in Zanzibar waters: Green (*Chelonia mydas*), Hawksbill (*Eretmochelys imbricata*), Loggerhead (*Caretta caretta*), Olive Ridley (*Lepidochelys olivacea*) and Leatherback (*Dermochelys coriacea*) (Frazier, 1975). Marine turtles spend almost their lives at sea except when the females go ashore to lay eggs in pits dug in sandy beaches. They travel large distances between laying, and often return to the very same beaches that they hatched. Individuals will take around 30 years to reach maturity. Sea turtles that forage in Zanzibar waters may be nesting in other countries in the region, such as Seychelles and even South Africa.

In Zanzibar waters, including those of the PECCA, the Green and Hawksbill as the most common (Khatib et al. 2002). The hawksbill is classified by IUCN as Critically Endangered based on a global population decline of over 80% in the past 50 years, mainly resulting from nesting beach damage, egg poaching and capture for the once-valuable shell. The other species are all categorized as Endangered. Both species nested regularly on Misali Island, with green turtle nests outnumbering hawksbill turtle nests by a factor of roughly three to one (Pharaoh et al, 2003). The highest number of nests in one year was recorded in 1999 (66) with as few as eight in 2001. Most green turtles nested in April whilst most hawksbills nested in March. 58% of nests were found on a single beach (Mpapaini). The hatching success of nests over the study period exceeded 70%. Data indicate that Misali Island is an important nesting site within Zanzibar and also suggest that it may be of East African regional importance (Pharaoh et al, 2003). A more recent study, based on nesting and hatching data collected on Misali since 2002 by the rangers who execute daily patrols looking for signs of turtle nesting and hatching events, found a consistent level of turtle nesting activity in the past 14 years, and their success rates, illustrating the continued importance of the beaches of Misali as nesting locations for both the Green and Hawksbill turtles (Giorno and Herrmann, 2016).

Human disturbance has reduced nesting to only a few isolated locations, and currently there is no certainty as to whether turtles continue to nest on beaches within the Matumbwini complex (Fundo Island and Njao Island), as reported in RGZ (2019). 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 Zanzibar. Whether this contributed to their conservation, and the status of this committee and plan are not known and need to be re-visited.

### **Whale sharks and other Elasmobranchs**

The capture of elasmobranchs (sharks and rays) allied species has been a feature of the Zanzibar fishery for hundreds of years, with a long tradition of trade in salted dried shark including shark fins. Recently though, the numbers of species and individuals caught have declined significantly and no licenses for export of fins are being issued (Barrowclift et al., 2017; Jiddawi and Shehe, 1999). Many

species continue to be landed around Zanzibar, with the meat for local consumption, the livers for boat wood oil and teeth and jaws for tourist trade. Recent research investigating the catch in small scale-fisheries in East Africa (Kenya, northern Madagascar and Zanzibar) have shown that catch records are massively underreported regarding the number of sharks and rays caught (Temple et al. 2018, 2019).

In Zanzibar, at least 21 species of elasmobranch species are caught (Barrowclift et al.

2017). *Mobula* spp. are caught in both mainland and Zanzibari small-scale fisheries (Temple et al. 2019). Catches of sharks appear seasonal, being highest during the NE monsoon, particularly between January and May (Barnett 1997; Schaeffer 2004), possibly due to seasonal weather affecting fishing effort. Batoids have a particularly high representation in Zanzibar, with various Dasyatidae species dominating the batoid catch (Barrowclift et al. 2017), which may reflect fishing practices, market demand or the suspected decline and partial collapse of shark stocks (Barrowclift et al., 2017; Jiddawi and Shehe, 1999). The high level of batoid landings, combined with limited understanding of the ecology and life history of many of the species recorded, demonstrate a need to allocate research efforts to document life history parameters for this group of rays.

Shark landings are dominated by ground sharks (Carcharhiniformes), within which requiem (Carcharhinidae), hammerhead (Sphyrnidae) and hound (Triakidae) sharks are most common (Temple et al. 2019). The largest contributors are small and moderately sized species occurring in a range of coastal, oceanic and deep-sea habitats, particularly smoothhounds (*Mustelus* spp.), slit-eye (*Loxodon macrorhinus*), spurdog (*Squalus* spp.), hardnose (*Carcharhinus macroti*), grey reef (*C. amblyrhynchos*) and spottail (*C. sorrah*) sharks. Scalloped hammerheads (*Sphyrna lewini*) are also common. Larger species, such as bull (*C. leucas*) and tiger (*Galeocerdo cuvier*) sharks, are caught in limited numbers including in the PECCA, and being landed at Nungwi. Further, oceanic and deep-water species, including shortfin mako (*Isurus oxyrinchus*), silky (*C. falciformis*), thresher (*Alopias* spp.) and bigeye sixgill (*Hexanchus nakamurai*) are also recorded in relatively low numbers.

Despite having only been recently described (Last et al., 2016b), Baraka's whipray (*Maculabatis ambigua*) is a common constituent of the elasmobranch catch in Zanzibar primarily caught in bottom-set gillnets (Barrowclift et al., 2017; Temple et al., 2019). Recent research on the biology of Baraka's whipray indicate that the species is a fastgrowing and early maturing species, with a relatively long lifespan. Yet, available data suggest the species is likely overfished and that the species is unlikely to be biologically sustainable in the face of current fisheries pressures (Temple et al. in prep).

Recently a new species of shark has been described from specimens caught by fishers in the MBCA, the sixgill sawshark *Pliotrema annae* (Berggren and Temple, 2020; Weigmann et al. 2020). This is an exciting discovery which also highlights how much is still unknown about the marine biodiversity around Zanzibar and how vulnerable it may be to poorly monitored and managed fisheries. We know very little about sawsharks. Until now, only one sixgill species (*P. warreni*) was scientifically recognised. With the discovery of a new species the need to properly assess the impact of small-scale fisheries on marine life is even more urgent. There may be other unidentified sharks and other species that are commonly caught in these fisheries with a risk of species going extinct before they are discovered.

Due to their slow reproductive rates, populations of sharks and rays are slow to recover from over-fishing, which has led to many species being now considered threatened and endangered. Elasmobranchs typically display life histories of slow growth, being long-lived, with late sexual maturity and low fecundity (Compagno, 1990). These traits indicate limited resilience to anthropogenic disturbances, such as fishing exploitation (Quetglas et al., 2016), due to low population growth rates and slow recovery rates (Hutchings et al., 2012). However, some elasmobranch species have life history traits more capable of recovery following exploitation and with appropriate management could be targeted as part of a sustainable fishery (Simpfendorfer and Dulvy, 2017).

Efforts to monitor and manage fisheries in this region must be expanded to prevent biodiversity loss and to develop sustainable fisheries. There are simple methods available that can work on small boats where monitoring is currently absent, including using cameras to document what is caught. Recent research clearly shows the potential effects from small-scale fisheries to a diverse range of coastal, oceanic, and even deep-water marine megafauna species, reinforcing small scale fisheries' potential to impact across multiple ecosystems (Temple et al. 2019). Thus, there is a clear need for further work in and over longer time periods to improve assessments and inform evidence-based management of small-scale fisheries. However, what is clear is that for the future sustainability of marine megafauna resources, further focus must be placed on management of the dominant smallscale fisheries.

The main value of sharks to the PECCA relate to their role in the ecology of the fish community, especially of coral reefs, for the viewing opportunity by visitors of whales harks on boat trips and of the smaller sharks and rays by SCUBA divers and snorkellers.

## Mangrove forests

Mangrove forests play an important role in the ecosystem of the PECCA, providing areas of high ecological productivity, breeding and nursery functions, roosting areas, feeding grounds; and providing other services such as trapping sediments and improving water quality, adding nutrients to coastal waters and preventing coastal erosion. They also provide ecosystem services to local communities such as through the provision of materials and habitat for bees (bee-keeping), sources of firewood and charcoal, medicines and building materials for houses and boats. Mangroves are thus an important source of income for many people engaged in selling mangrove forest products.

All ten species of mangroves known to be present in Zanzibar in varying degrees of relative density and dominance have also been reported in the mangrove survey done in 2009 in PECCA (RGZ, 2010). Mangroves are found on the fringes of numerous mangrove creek found along the highly indented coastline and can be conveniently grouped into the following blocks, Kisiwapanza-Matumbini, Michenzani-Shidi-Mwambani, MkoaniMakoongwe-Makombeni, Wambaa-Jambangome, Tundaua-Kilindi, Weshu-Misali, Ziwanikiwani-Pembeni and Mtambwe-Wete-Fundo (Mushi et al., 2009).

Harvesting is managed through a permit and licensing system, issued by the Forestry Department, which has defined a national mangrove management plan.

## Seagrass beds

Seagrasses are flowering plants that live submerged in the marine waters. They form dense beds which cover large areas of coastal waters and perform a wide spectrum of biological and physical functions. Twelve species of seagrass have been identified in Zanzibar coastal waters, with the most dominant being *Thalassia hemprichi* in intertidal areas, and *Thalassodendron ciliatum* and *Syringodium isoetifolium* in deeper water.

Seagrasses are a source of food for herbivorous invertebrates, fish and turtles; they trap and bind sediments thereby reducing particulate pollutants over coral reefs; and provide protection to shorelines by dissipating wave energy. Seagrasses serve as breeding, nursery and feeding areas for many invertebrates and vertebrate species. The Endangered Golden Sandfish (*Holothuria lessona*) and other sea cucumbers of commercial value occurs in seagrass areas; and seagrass beds are also important for the Endangered Napoleon Wrasse (*Cheilinus undulatus*) whose juveniles feed and seek refuge among seagrasses. Seagrass beds also provide important foraging areas for the qualifying critical habitat marine mammal species, notably the Indian Ocean humpback dolphin.

No direct human uses of seagrasses have been recorded so far in PECCA, though seagrass beds also support local livelihoods through shore-based gleaning of shrimp, gastropods and bivalves.

As noted in *Social and economic values* section (page 38) the extent of gleaning means that the pressure on intertidal habitats is likely to be significant. The Fisheries Act of 2010 prohibits the use of beach-seine, however, based on local consultations, various stakeholders confirmed that beach seine-nets continues to be widespread in the PECCA. This is considered a key threat to the status of seagrass habitat. Other key threats to seagrass habitats include high fishing pressures across the seascape, and in some locations, seaweed farming.

## Coral reefs

Coral reefs support diverse assemblage of fishes and invertebrates are an important biodiversity feature, fishery resource and a very important tourist asset of the PECCA, extending almost uninterrupted along the northern portion of the western seaboard, and from Misali Island to the northern tip of PECCA (Figure 4). The reefs of Pemba are unique examples of a diverse and deep-water coral community, containing the only oceanic reefs in the East African Marine Ecoregion (WWF, 2001). Pemba's reefs have been considered to be of ecoregional importance and also unique as the only oceanic reefs in the EAME. The 1,100 km of coral reef around Pemba Island represent 50% of the coral reefs in Tanzania and two thirds of the coral genera known to occur in Tanzania.

Numerous studies of coral reefs have taken place within the present-day boundaries of PECCA, mostly focused on the core zone area of Misali Island (e.g. Horrill, 1992; Horrill et al., 1994; Obura et al., 2004; Grimsditch et al., 2009). These describe exceptionally high diversity and coral growth in excess of 64 m depth.

The rapid assessment conducted by the EcoAfrica team reported coral 40% to 60% coral cover, with 40 genera observed representing more than two thirds of the coral genera known to occur in Tanzania (MANREC, 2005). The dominant genera were *Porites*, *Montipora*, *Montastrea*, *Diploastrea*, *Acropora* and *Galaxea*, present in the 9.4 km ring of coral reef surrounding Misali Island. Though most studies have been conducted around Misali, and it is likely that many more species of coral occur in PECCA waters, the baseline data allows for future comparisons.

One of the principal threats to the coral reefs within the PECCA is destructive fishing practices, the other being the volume and damage caused by unregulated recreational visitors. Currently, number of visitors are very low, yet with appropriate interventions to reduce destructive fishing practices, and additional actions implemented to promote natural reef regeneration, such as those proposed in this GMP, it is possible that the coral reef ecosystem in the PECCA can recover. The steep slope aspect of the reefs in Pemba make them difficult to naturally regenerate due to their increasing instability – although coral recruitment is high, survivorship is low. This contrasts with reefs on more shallow sheltered locations, for example on Chumbe Island, on the west coast of Unguja, where significant natural and un-aided coral regeneration has been demonstrated.

Other than anthropogenic threats, a third category of threat to coral reefs related to water quality, including temperature. An increase of water temperature by 2-3 °C, as happened in late 1997 and early 1998 (Muhando, 1999), led to discoloration and whitening or bleaching. Though bleached corals can survive for several months, if high temperatures continue for over five months, many coral colonies die. The rise in water temperature was attributed to a global phenomenon called the El Nino event. In certain parts of Zanzibar, Tanzania Mainland, Kenya and Seychelles over 70% of corals died.

## Fish fauna

The fish fauna of the PECCA has not been systematically documented, though some studies, such as described above and other academic studies, contribute to understanding certain aspects of this important reef community. Beyond the outer fringe and drop-off of the reefs, within the PECCA, the open sea is home to a host of pelagic fish, among those commonly encountered are various species of barracuda, mackerel, kingfish, sailfish and marlin. There is also a rich abundance of fish

species associated with the mangroves, including milkfish (*Chanos chanos*), rabbitfishes (*Siganus* sp.), parrotfish as well as crabs such as *Scylla serrata* of considerable fishery potential, and the large numbers of various types of fish larvae that can be found reveal the importance of the bay to the local fisheries. As such the PECCA is possibly a sink for the finfish fishery (as well as the octopus fishery), meaning that the abundance inside the PECCA is kept high through immigration from outside the area, and as a result abundance outside this area may be declining without being detected. This has not been proven though.

The fish fauna of the coral reefs of the PECCA are an important asset to the local fishing community as well as the tourism sector in this area. Building on the fish species list from Horrill (1992), Richmond and Mohammed (2001) extended the list to a total of 272 species, and RGZ (2010) reports on there being 350 species, but the total number is likely to be well above this.

### Island refugia

With the PECCA there are at least 13 main islands. In the northern portion these are Njao, Fundo, Uvinje, Funzi, Kokota, Kashani, Vikinguni and Mapanya. Misali Island is situated more centrally, with the following in the southern portion: Makongwe, Matumbini Kubwa, Matumbini Panza Ngazi and Jomba islands (Figure 4). Many of the smaller islands, especially the uninhabited one, support a special flora and a small but diverse fauna community, in addition to the turtle nesting (described above). For example, significant features of Misali Island are the island forest, the Pemba Vervet Monkey, fruit bats, Fisher's Turaco, coconut crabs (RGZ, 2005).

### Island coastal forests

There are at least twelve islands of various sizes within the PECCA that support dense rich coastal forest communities, including Misali and Fundu. Apart from Misali, little is known of the species composition and the importance of associated fauna.

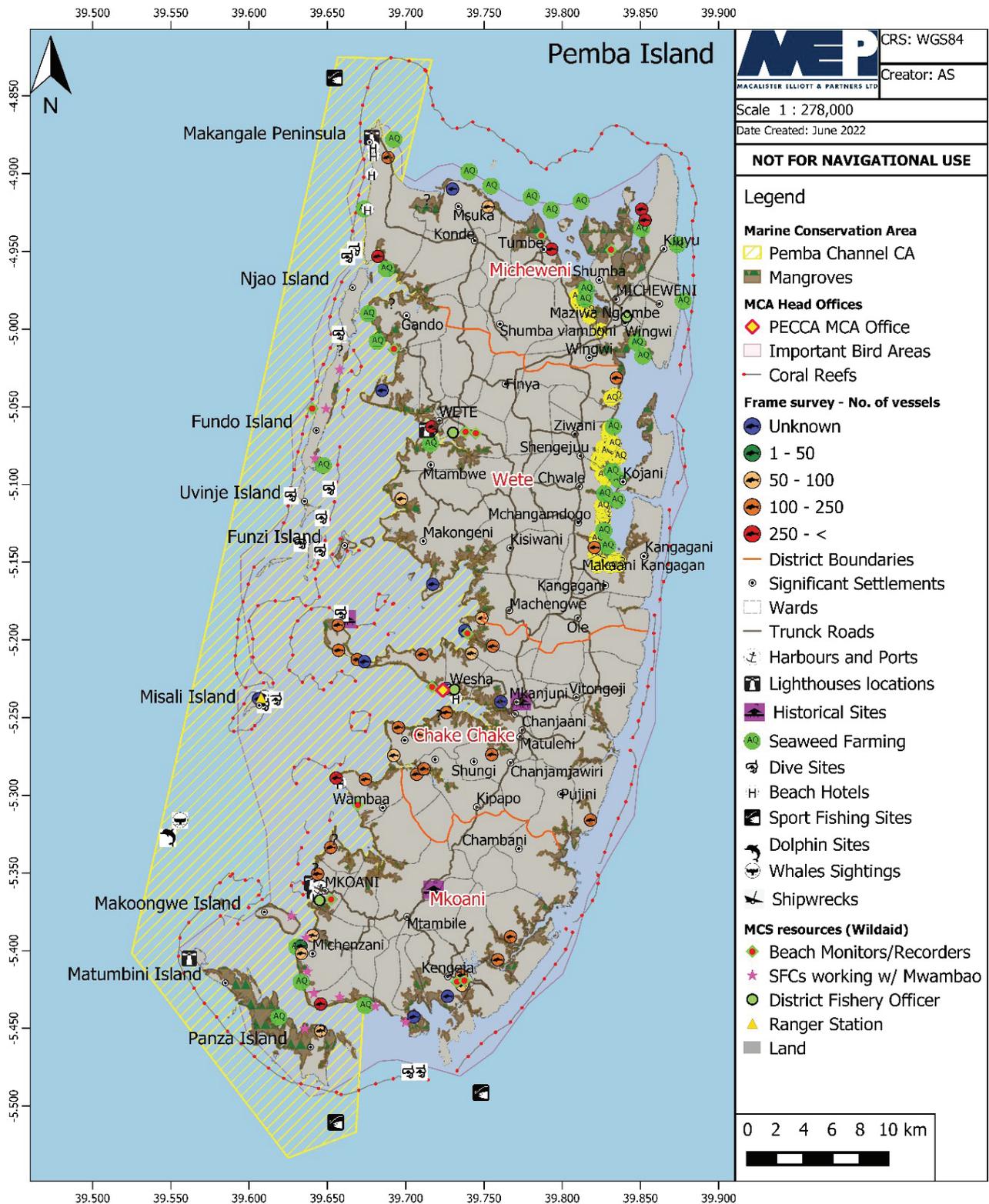
### Important Bird Area

Pemba Island is also an important bird area in the Western Indian Ocean. There are three endemic subspecies and four endemic species of bird on Pemba and classified by IUCN as globally threatened in Ngezi Forest.

About hundred bird species have been identified in PECCA, among which are herons, egrets, African fish eagles, brown noddy, terns, plovers and sandpipers. Misali Island is an important habitat for roosting seabirds, while expanses of soft sediment, especially in bays, creeks and intertidal expanses, attracts large numbers of Palearctic waders and the mangroves are also important roost sites.

There is one Important Bird Areas (IBAs) of relevance to PECCA, IBA TZ076, extending around the

entire Pemba Island (101,400 ha). There are only two small patches of natural forest remaining on Pemba, totalling less than 800 ha. These are Ngezi forest in the northwest and Mwita Mkuu in the



northeast, in addition to the considerable 'forests' of mangroves. All provide habitat for birds.

#### **Figure 4. Principal ecological, scenic and socio-economic values within the PECCA.**

Only 132 bird species are listed for the island, being an indication of Pemba's long isolation from the mainland. Data from Koenders (1992), Moreau and Pakenham (1941) and Rodgers et al. (1986) describe the avifauna, as summarised by Baker and Baker (2002). Apart from the four endemic species, there are two endemic races, Pemba African Goshawk (*Accipiter tachiro pembaensis*) and the Pemba Black-breasted Glossy Starling (*Lamprotornis corruscus vaughani*). There is also one old record of *Gallinago media*. In addition, there is an introduced population of *Padda oryzivora*, classified as globally threatened (Vulnerable) in its native Indonesia. Key species are Green Pigeon (*Treron pembaensis*) is widespread and locally common, the Pemba Sunbird (*Nectarinia pembae*), the Russet Scops Owl (*Otus pembaensis*) and the Pemba White-eye (*Zosterops vaughani*). The tentative list of bird species for Ngezi Forest according to the Rapid Assessment (RGZ, 2005) contains 26 species.

A small group of between 5-10 Sacred Ibis (*Threskiornis aethiopicus*) were seen nesting on West Island during the visit and regularly returning in the evenings past Mbuyuni beach from feeding grounds to the north of Misali (Richmond and Mohammed, 2001). The southern small islands of Kwata, consisted of leached and weather coral outcrops that is seldom used by humans but is a significant breeding site for birds (RGZ, 2010).

### **Ngezi Forest Reserve and its Endangered Species Summary**

The nearby Ngezi Forest Reserve is located adjacent to the PECCA forms parts of the northern shoreline, including overlapping mangrove forest. Ngezi covers an area of 1,440 ha, mostly comprising primary forest. It was established as a reserve in 1959. It is host to several important mammals, the most famous of which is the Red Colobus monkey *Colobus badius kirkii* (Endangered) and introduced to Ngezi from Jozani Forest on Unguja Island, to boost numbers as a conservation measure.

A recent survey by Nahonyo et al. (2005) documented a total of 30 mammal, 131 birds,

25 reptiles 9 amphibians, 87 marine fishes, 5 freshwater fishes, 35 Lepidoptera and 10 Odonata species. In total there were 15 new records of fauna to Pemba, including one mammal, the Cape Clawless Otter (*Aonyx capensis*).

The Pemba flying fox (*Pteropus voelzkowi*) is a subspecies endemic to Pemba and is classified as endangered by IUCN. Other threatened/endemic wildlife include the Pemba White-Eye, as well as the endemic Pemba Palm Tree. 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. 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 (RGZ, 2010).

The presence of these species in close proximity to PECCA, especially of animals and birds, raises the likelihood that at certain times of day or season they will move into the boundaries of PECCA, thus increasing its biodiversity significance.

A growing environmental awareness within Zanzibar, over the last 10-20 years, has led to improved

conservation of Ngezi, which has developed into a popular tourist destination, especially since the northwestern portion of PECCA has recently become the most popular tourist development area within the MCA. Success of Ngezi has benefits for the improvement of management within the PECCA.

Within the PECCA there are the following threatened ecosystems constitute critical habitat:

- Seagrass beds
- Nearshore shallow water coral reef communities
- Mangrove forests

The following threatened marine animals are confirmed or likely to be found within PECCA waters (Critically Endangered CE, Endangered ED, and Vulnerable VU):

- At least five coral species of the eight in the WIO region EN, plus most species VU
- Golden sandfish sea cucumber *Holothuria lessona* EN, plus six species VU
- Golden sandfish sea cucumber *Holothuria nobilis* EN
- Black teatfish sea cucumber *Holothuria scabra* EN
- Golden sandfish sea cucumber *Thelenota ananas* EN
- Longheaded eagle ray *Aetobatus flagellum* EN plus five other ray species VU
- Reticulate eagle ray *Aetomylaeus vespertilio* EN
- Largetooth sawfish *Pristis pristis* CE
- Green/Narrowsnout sawfish *Pristis zijsron* CE
- Scalloped hammerhead *Sphyrna lewini* EN plus another 20 shark species VU
- Great hammerhead *Sphyrna mokarran* EN
- Humphead wrasse *Cheilinus undulatus* EN plus another 7 fish species VU
- Brindled grouper *Epinephalus lanceolatus* EN
- Loggerhead Turtle *Caretta caretta* EN
- Green turtle *Chelonia mydas* EN
- Leatherback turtle (sub-pop) *Dermochelys coriacea* CE
- Hawksbill turtle *Eretmochelys imbricata* CE
- Indian Ocean Humpback dolphin *Sousa plumbea* EN

### *Scenic values*

## Misali Island

The only large island of PECCA that is currently uninhabited, though there are *dago* fishers much of the year. It's history as a marine conservation area, and presence of rangers and researchers over the last few decades have helped to maintain Misali natural and much of its biodiversity intact. It is one of the most popular tourist sites, with visitors coming from Weshu, as well as from hotels in Tundaa. Historically, Misali was also the destination of visiting cruise ships and dive charter boat from Kenya.

## Other smaller islands

The 13 main islands plus numerous islets and rocky outcrops along the shores of PECCA, with some being inhabited permanently and other supporting *dago* fisher camps. Some small islands and islets are uninhabited. Most would have originally been densely wooded, with some now heavily disturbed, yet during high tide, these may also provide refuge for seabirds to roost as well as nesting sites.

## Kigomasha Peninsula Lighthouse

White, hexagonal cast iron skeletal tower with lantern, gallery, and central cylinder, 38 m high, with white flashes every 55 seconds, alternately red and white. Built in 1904.

## Matumbi Makubwa Lighthouse

Located on the small island off the southwestern corner of Pemba. Square stone tower, painted with red and white horizontal bands, 33 m high, with white flashes every 20 seconds, alternately red and white.

## Sand beaches

The current area covered by the PECCA includes numerous, small and scattered, often isolated sections of open sand beach. In total, there is less than 15 km. Most of these are present along the western seaboard of the islands, with some beaches also along the margins of some of the inlets and bays. The general absence of beaches around Pemba (and within the PECCA), compared to Unguja, is an important reason for the low private sector investment in tourism infrastructure.

In some places, sand has been extracted from beaches as a building material (mixing with lime for mortar) and for spreading on footpaths and around tourist bungalows. Such activities threaten the existence of the beaches, reduce their role in combating coastal erosion and as a barrier against sea level rise. In some locations, beaches are also used a 'toilet area' by local residents, notably early in mornings, and a dump site for solid wastes.

## *Cultural and historical values*

With around 30 archaeological sites, the west coast of Pemba Island has the highest concentration of archaeological sites in Zanzibar (RGZ, 2010). There is a clear concentration of historical and cultural sites on the north of the island and a significant cluster of 14 different sites along the northwestern part (EcoAfrica, 2005). Sites include remains (buildings, graves and monuments), shrines and *mizimu* (inhabited by spirits), some of local significance, as well as traditional and cultural events.

For example, Ras Mukumbuu hosts historical sites (ancient ruins that are believed to be one of the first mosques in Pemba) at the very tip of the peninsula, and a "sunken" road running from the north east of the tip of the peninsula. Traces of 8<sup>th</sup> century are reported, and at Mtwambwe Kuu and Kwata islet 1,000-year old pottery is common. The Department of Antiquities have plans to develop the heritage site and there is a plan for involving the local communities in tourism activities on the site (EcoAfrica, 2011).

Other cultural sites include caves and sinkholes. There is one shipwreck, of a small coastal freighter, off the southern coast of Panza Island in the southern border of PECCA. As these contribute to the overall value of the area, it is important that these cultural and historic values are appropriately considered in the management of the PECCA.

### *Social and economic values*

#### **Finfish Resources**

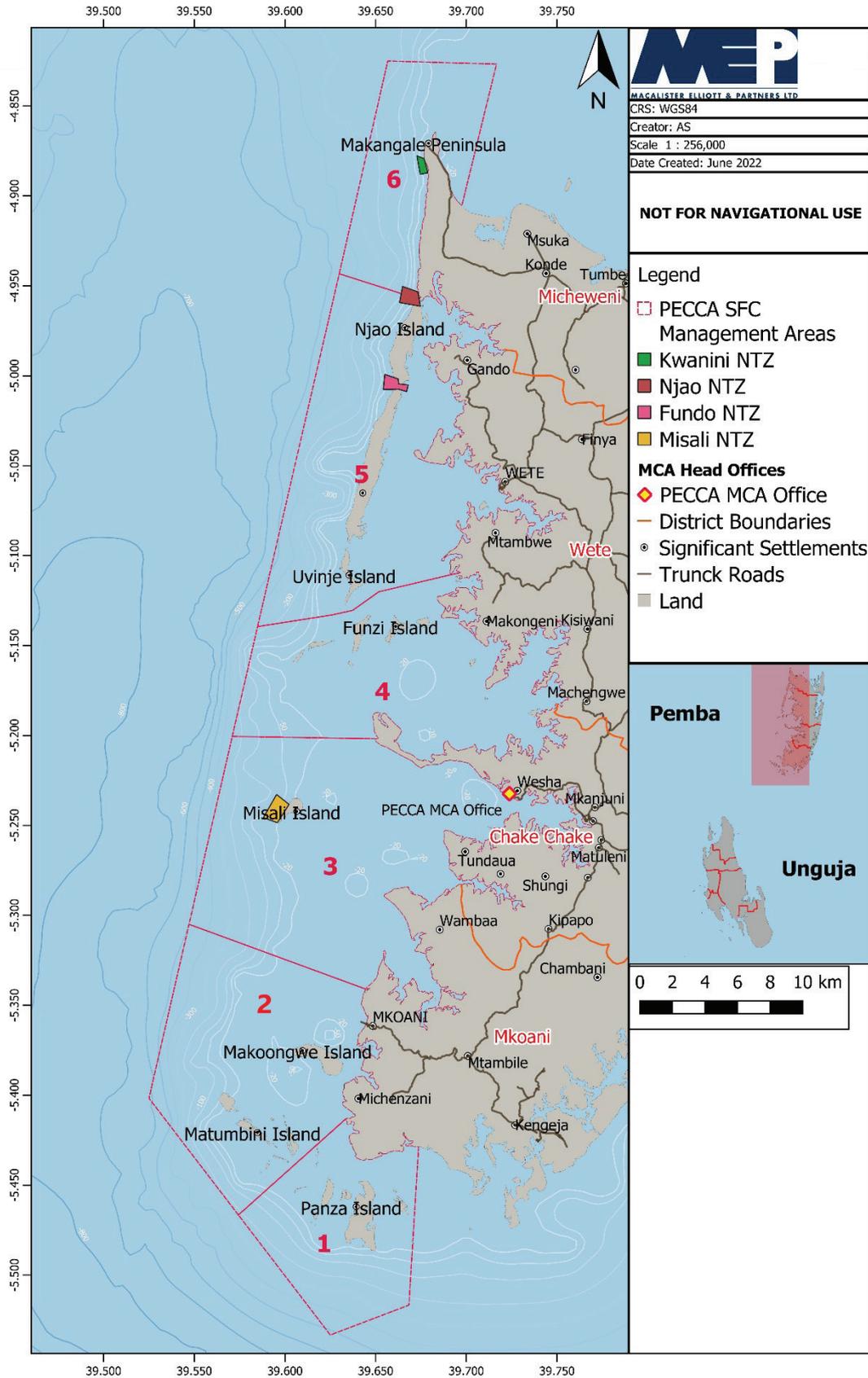
Fisheries in PECCA are a cornerstone of the local economy, as well as a major revenue earner for fishers from other regions using the rich fishing grounds accessible from PECCA shores. Most communities depend on traditional fisheries along the west side of Pemba, where fishers have been operating for decades. Muongoni Bay and Matumbini in the south and Misali Island in the centre are major fishing grounds, as well as Msuka and Kiuyu in the north of the island (RGZ, 2010). Most fishers sell their products at auctions directly at the landing sites, particularly at Mkoani, Ndagoni, Wesha and at many of the smaller landing sites along the coast (Figure 4), with some sold to visiting fishmongers, transported to the main market in town, or through agreements with tourist hotels.

Data from the 2016 Zanzibar fisheries frame survey (ZFFS) indicate that the PECCA has 72 landing sites serving 11,328 fishers, less than a quarter of which are women (Table 3). The area has 1,907 vessels, dugout canoes being the most common (1,060 vessels). With 296 outboard engines, fishers are capable of reaching a range of fishing grounds, using 28 boats, 141 mashua and possibly some of the other smaller vessels. It is likely that some of these motorized vessels are also used for carrying tourist on trips to Misali and other sights, for SCUBA and other excursions. There are currently 34 SFCs in PECCA, and their members have agreed to six fisheries management areas (see Figure 5).

The most important fishery resource in PECCA is for finfish, both pelagic and demersal, other resources including sharks, rays and skates. The fishery for the small pelagic species (collectively known as *dagaa*) is also important for PECCA, with ideal sea conditions, water depths and nutrient-rich waters that promote the growth of these species. There are 29 purse-seine nets and 42 ring-nets that can be used for this fishery (Table 3).

The most popular gear in the PECCA is handline fishing, with over 6,183 lines, while traps and longlines fall in second and third, respectively (Table 3). Other notable gears are spears and *uchokoo* (wooden hand spears), used by the relatively large number of foot-fishers (almost a third of all fishers). Of the illegal gears used within the PECCA, there are 1,010 spearguns and 159 beach-seines.

Figure 5. Agreed fisheries pilot management areas within the PECCA.



Using Misali fishing grounds as an example of how many villages use one area, Richmond and Mohammed (2001) describe the waters round Misali as comprising 13 different, individually recognised fisheries. An interview-based frame survey conducted with the rangers provided an estimate of 991 fishers who visited the area throughout the year. Except for a small number of women who visit occasionally to collect shells during spring low tides, the fishers of Misali are men, originating from 28 villages, including almost every coastal *shehia* (district) on Pemba. Given these rough figures for the total numbers of fishermen on Pemba, it therefore seems likely that Misali waters are visited annually by between 7-10% of the entire fishing population of Pemba.

**Table 3. Fisheries statistics for PECCA (ZFFS, 2016).**

Parameter	Number	Parameter	Number
Shehia Fishing Committees	34	Fisher density (no./km <sup>2</sup> )	14
Fish landing sites	72	Fishers (total)	11,328
Mkoani	20	Fishers (male)	8,990
Chake Chake	28	Fishers (women)	2,338
Wete	20	Fishing gears (total)	11,717
Micheweni	4	Castnet	35
Total fishing vessels	1,907	Gillnet	321
Boat	28	Handline	6,183
Dhow	271	Longline	1,462
Mashua	141	Purse seine	29
Dugout canoe	1,060	Ringnet	42
Outrigger (ungalawa)	407	Spear	1,010
Vessel outboard engines	296	Uchokoo	205
Vessel inboard engines	2	Trap	2,271
Vessel fishers (VF)	6,933	Spear gun	1,010
Foot fishers (total)	4,395	Beach seine	159
Foot fishers (male)	2,057	Surface area (km <sup>2</sup> )	825.8
Foot fishers (female)	2,338		

From the total of 991 fishermen reportedly using Misali waters, most fishers visit on a daily basis returning home or to temporary bases nearby in the afternoons (about 400 live in villages around Chake Chake Bay), while others camp on the island.

Key stakeholders involved include small-scale fishers, porters from the boat to selling or processing areas, traders, processors (boiling, drying and packaging), wood suppliers, and food vendors. Other actors include restaurant owners, suppliers of inputs such as salt and packaging bags. **Visiting (*dago*) fishers**

The main motivations for *dago* fishing are shelter from bad weather, the means to accumulate cash when away from their home villages, and nowadays, to avoid conservation areas. Camping locations are specific and are approved by the DFDMR.

Because of strong winds and waves conditions, there are no official *dago* camps on the east coast. If any, such *dago* sites are unofficial and short lived.

Within PECCA, there is considerably *dago* activity taking place, with main numbers of fishers visiting and staying in Ndagoni and other sites, depending on the season and time of year. For example, Richmond and Mohammed (2001) reported fishing in Misali waters include 240 fishers from more distant villages who come to camp, such as Kojani, Kiuyu, Maziwa Ng'ombe, Kojani, Kisiwa Panza and Michenzani, mostly camping at Kichanjaani (also in Chake Chake Bay). The most important villages are Muwambe, Makoongwe and Tundaua, accounting for 50% of the total camping nights on Misali. Other important villages which use Misali as a camping base are Kilindi, and Jambamgome.

*Dago* fishers may stay for several weeks over a period of up to three months, during which time fish sales and supply links are established with Chake Chake. In terms of numbers of *dago* fishers, the most dependent villages are Muwambe, Makoongwe and Tundaua whose men visit throughout the year using hand-lines and collect octopus. Fishermen from other villages visit and camp mainly during the Kusi period (June-September).

Among the *dago* fishermen community the hand-lining fishery is the most important, followed by collecting for octopus and use of small-meshed Kutega coralling nets. A similar analysis of ranger data found that the octopus fishery supported most *dago* fishermen accounting for 56.53% of the daily activity of the *dago* community.

The presence of camping fishermen has a number of implications for Misali and other similar *dago* sites, including public health (sanitation), fuel wood supply for cooking and smoking fish, fresh water supply, interactions with tourists and effects on rat infestation.

Other than the routine at Misali, which may no longer be operating, there is no attempt to record the numbers of *dago* fishers, fisher do not require a separate license, and camping fees may locally be charged, and are mostly related with compliance with safety and cleanliness rules. Depending on the relative locations, village administration may require some payments for certain services.

## Intertidal gleaning

Men, women and children participate in this foot-fishery, usually on days with large tides, to explore the lower reaches of the intertidal zone and to collect a range of molluscs, crabs, eels, octopus, sea cucumbers and fish. The importance of this fishery is often overlooked, but it contributes to household diets and shells may be sold as curios to tourists.

Over 2,000 PECCA women and a similar number of men are foot-fishers (Table 3). These fishers collect mostly cockles (*Anadara antiquata*), giant murexes (*Chicoreus ramosus*), conchs (*Pleuroploca trapezium*), and oysters (*Pinctada margaritifera*), usually twice per month, during days of every spring tide. Most of what is collected being consumed within the household, and very little sold com-

mercially. The abundance of the target species varies by area and season, which makes the price swing throughout the year.

Some small bivalve species (e.g. money cowrie *Cypraea annulus*, locally known as *simbi*) and a few other small species are collected and stockpiled for later sale. Material is then exported from Zanzibar for the manufacture of buttons and other items, usually in India or China. Collection can be relatively profitable, providing cash for women who have few other income generating options. Torell et al (2006) further suggest that since near shore stocks have been depleted, and women are forced to collect animals further away, collection of wild bivalves may be dangerously depleting the populations. Thus, these authors argue for some form of management through a conservation or zoning policy, to allow stocks to recover.

Other high-value invertebrates that are caught by specialized fishers in MCA waters, include prawns, lobsters and squid, using a range of gears. The octopus fishery is very important to many households, and usually involves men and women, on foot during low spring tide mornings, searching for them over the reef crest using a metal or wooden stick, or using snorkel and mask in deeper waters using spears.

## Holothurian fishing

The holothurian (or sea cucumber) fishery involves foot fishers and divers. Sea cucumbers are collected in shallow waters by hand with snorkel and SCUBA gear or as by-catch in drag nets. The number of fishers involved in this fishery in PECCA is not known, but observations of the large number of SCUBA bottles regularly lined up at Mkoani jetty suggest SCUBA is being used for fishing, but the target species are not known.

The harvested sea cucumbers are boiled and dried for export to SE Asian countries. Tanzania is the second largest exporter as of 2000 after Madagascar, according to Food and Agriculture Organisation (FAO) statistics, yet exports have been declining due to overfishing for the last few years. Holothurians play an important role in sediment cleansing and in reef recycling, and their excessive and uncontrolled removal causes hardening of the sea floor, eliminating habitat for other benthic organisms (EcoAfrica, 2005), with negative consequences on other marine life that are not fully understood. Despite some uncertainty, the trade in three species (*Holothuria fuscogilva*, *H. nobilis* and *H. whitmaei*) is now restricted under CITES Appendix II as they are considered Endangered. Appendix II classification applies to species that are “not necessarily now threatened with extinction but that may become so unless trade is closely controlled” and trade in these species may be authorized through an export permit (CITES [www.cites.org](http://www.cites.org)).

## Seaweed farming

Seaweed farming is a significant livelihood activity undertaken mainly by women within coastal communities. All the five of Zanzibar MCAs include individuals that are involved in seaweed production, which include farming and small-scale processing. Most of the villages started farming seaweed in the early 1990s when the farming started. The data presented here is from 2012 statistics from Department of Marine Resources. Where a more recent datum was available, it is shown. It should be noted there that farming seaweed is currently greatly affected by environmental changes (climate change), causing ice-ice disease and epiphytism that kill the seaweed. Seaweed production in Zanzibar is currently around 11,000 MT, dry weight, while there is no production data for each village or region.

According to the boundaries of PECCA the villages where most seaweed farming takes place Kiuyu Mbuyuni, Tumbe Mashariki, Shumba Mjini, Micheweni Majenzi, Kifundi, Makangale, Tondooni, Msuka mashariki, Msuka Magharibi, Kinowe, Sizini, Wingwi Mtemani, Mjini Wingwi, Michenzani, Kisiwa Panza, Chokocho and Kangani. Total number of farmers is 11,561 (8,093 women) and (3,468 men). Pemba produces approximately 75% of all seaweed in Zanzibar (Figure 4).

The activity is generally considered sustainable, though the form of farming widely adopted relies on using wooden stakes inserted into the seabed and collection by foot. Localised disturbance in intertidal areas where sea grass may be present and the use of mangrove sticks for supporting the growing lines, both of which are a concern.

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At present, only a few companies buy seaweed from the producers, usually providing all materials such as lines and seaweed seedlings to the producers at the start, which means that growers have negligible initial capital costs. Buyers then usually claim purchase rights for all seaweed produced in a village, which means the buyer sets the price with little room for negotiation.

## Other forms of mariculture

Currently, no information was found on other forms of mariculture being practiced in the PECCA. There is however potential for various forms, given the similar conditions with the those of the MBCA in southern Unguja, within which various forms have and are being trialled. These include bivalve sponge farming, sea cucumber ranching, and fish farming, all of which have potential to be developed in PECCA.

## Tourism

Since the early 1990s, tourism started to provide Zanzibar's largest and most important revenue stream, and by 2019, there were over half a million visitors. Many of these are attracted by the cultural, historic and natural history of Zanzibar, and especially the shorelines and marine life.

Tourism development along the shores of PECCA started in the early 1990s, and has grown very slowly since then, primarily because of the absence of the long white sand beaches, poor infrastructure (electricity and roads) and the cost and reliability of transport from Unguja Island to where most tourist arrive. Historically Pemba roads were some of the last roads to be re-surfaced in Zanzibar. Over the least ten years the conditions have improved, though the absence of beaches remains a feature that will always restrict 'beach tourism'.

Consequently, unlike Unguja Island, tourism development in Pemba is still in its early stages and attracts only between 5 and 10% of Zanzibar's tourists (Freeman, 1997), the key attraction being its coral reefs with diverse ornamental fish and nocturnal marine life and other organisms such as sea turtles, dolphins, whales and pelagic fish species (RGZ, 2010). 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.

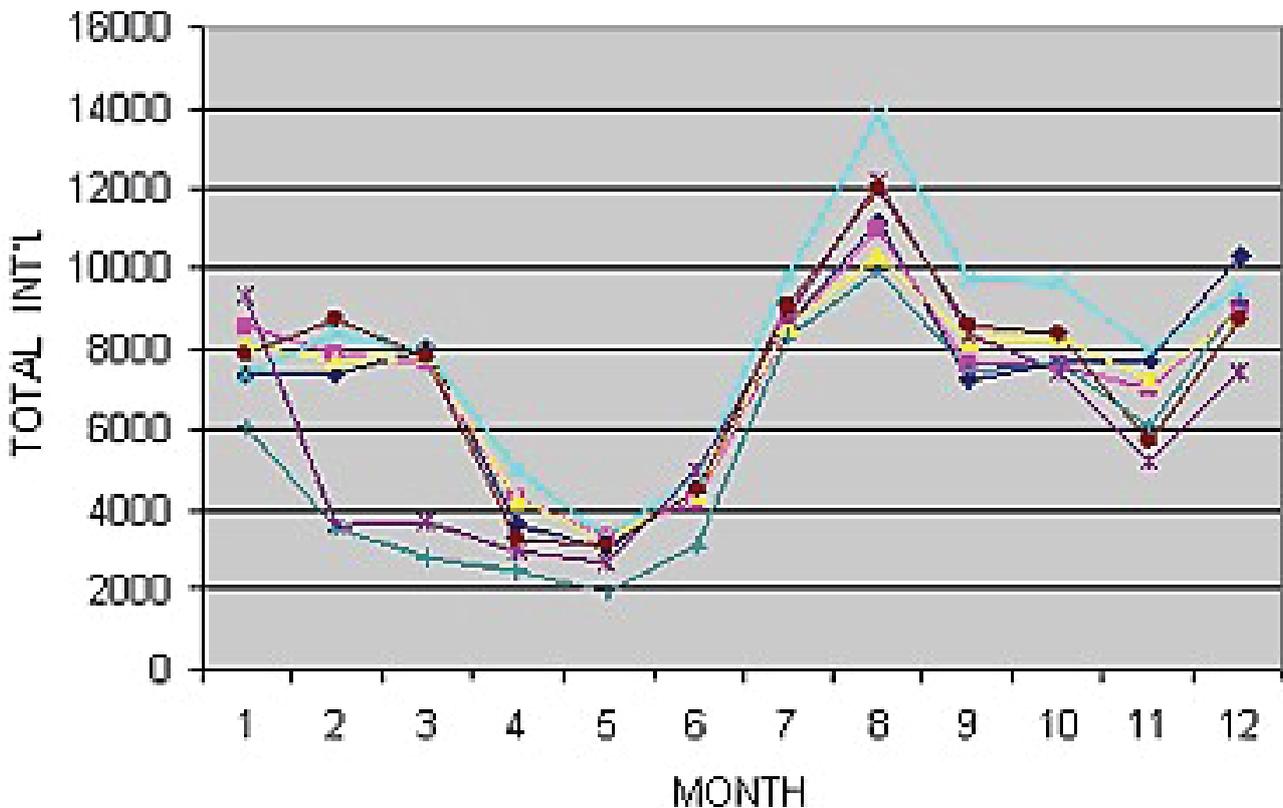
From 2005, tourist numbers for PECCA have steadily grown, from 2,907 in 2004/5 to over 23,124 in 2010/11 (Meyer et al., 2012). There are no data for the number of tourist visitors to the PECCA beyond 2011, but the figure is likely to be between 25,000 and 30,000. Revenue based on entrance fees will also have fluctuated, from USD 14,592 for 2006/07 to USD 11,755 for the year 2011/12 (Meyer et al, 2012). For the whole of Zanzibar, data for seven years (1997 to 2003), reveal the seasonal nature of international tourism arrivals (Figure 6), showing the marked July to September peak, corresponding to summertime in Europe from where most tourists originate. Low numbers of tourist in April to June reflect the wet season, and a small rise in December corresponds to the Christmas peak. From 2010 onward, the numbers have steadily increased, with less marked seasonal trends, except for the generally lower numbers during the wet season. It is also during these months that any hotels free their local staff for seasonal leave and carry out essential maintenance and repairs to the properties.

Tourists are a vital component of the vision and objectives of the PECCA, providing much needed fees that support the implementation of management strategies that will contribute to meeting the objectives and ultimately the vision for the area. The tourism sector also has a responsibility to adhere to the regulations of the PECCA and be an active participant in resolving issues and challenges as they emerge. Left unregulated, the tourism sector can potentially contribute towards degradation of the natural and social structure of the site.

Of relevance to management and revenue, tourist numbers may change with very little or no warning due to local and international events, some beyond the control of the PECCA, or the RGZ. The security, safety and personal experiences of tourists may significantly affect the way they communicate with travel operators and their choice of destination, affecting possible return visits and the travel choice of their families and friends. Civil unrest, political or elections-related manifestations, may contribute negative impressions that affect the choice of destination. These experiences can be influenced by local actions and behaviour of those involved in management of protected areas, the tourism sector and the security agencies.

**Figure 6. Monthly international tourist arrivals on Zanzibar<sup>1</sup>.**

<sup>1</sup> Source: <https://www.tanzaniainvest.com/telecoms/zanzibar-tourism-sector-profile>



Global and international events, such as the attack on the World Trade Centre in September 11, 2001, local and regional unrest, such as Al-Shabab attacks in neighboring Kenya, and the recent Covid-19 pandemic, can result in travel advisories issued against certain destinations. Zanzibar has suffered shocks to its tourist industry in the past, for example following the 1995 and 2000 elections, which set back tourism and harmed the economy<sup>1</sup>. Following the September 11 attacks in New York, a downturn of more than 40% in the annual visitor numbers was experienced from November 2002 to February 2003, with losses estimated of USD 18 million from the tourism industry. The reduced tourism from the two years of the Covid-19 pandemic is unprecedented.

From the perspective of the PECCA management, it is important that operational budgets are realistic and flexible, and stay focused on the highest priorities that can be achieved when budgets are available, meanwhile ensuring that enforcement of rules and regulations against degradation of the environment is maintained.

Within the tourism sector a range of activities exist that interact with and depend on the biodiversity and scenic values of the PECCA. The principal activities are described below:

### **Beach Hotels**

Currently, there are less than 20 hotels on the whole of Pemba (Figure 4). There are four hotels at the northwestern, Kigomasha Peninsula, a handful in the Wesha inlet, four near Wambaa north of Mkoani, and a few others scattered along the shore south of Mkoani.

Within the PECCA, hotels range from modest ten-bed operations to larger multinational 50-bed complexes. The hotels provide a valuable employment opportunity for hundreds of local residents and are a market for local products including fish. The beach hotels also require large amounts of electricity and freshwater which can at times exert pressure on the natural water supplies and reservoirs, and generate different forms of waste, from sewage to solid and organic wastes that need to be managed..

Using the hotels as a base from which to explore the surrounding areas and other parts of PECCA, tourists explore the local landscape and villages and engage with the local communities on many levels. More formal recreational activities that take place inside the PECCA include the following:

### ***Dolphin viewing***

This is an opportunistic tourist activity in the PECCA, because the dolphin population is not concentrated in a single area, and the habitat for dolphins is more fragmented. Bottlenose dolphins may be seen, and swam with, if encountered while travelling to sites for picnics, snorkeling or SCUBA sites, and depending on the season. Despite low numbers of encountered expected, as described under the section above on dolphins, the unregulated dolphin viewing is known to be threatening dolphin populations.

### ***Sandbank picnicking and snorkeling***

Though extremely popular on Unguja, especially in the MIMCA, CHABAMCA and MBCA, this activity is currently minor or non-existent in the PECCA. Appropriate sandbanks do exist, though are few in number and may be too distant from the present-day hotels.

Should such day-trips become commonplace in PECCA, MCA Managers need to be aware of the range of impacts associated with such trips, the most severe being anchor and tourist damage to corals through careless anchoring and uninformed tourists in the water. Other impacts are littering and various wastes that end up in the water during high tides including plastic water bottles, food packaging and wraps, plastic utensils, bags, food wastes and glass and metal containers. Disturbance to roosting seabirds also occurs when boats and tourists arrive at sandbanks, especially when roosting sites are few. Feeding of reef fish for the benefit of tourists may be disrupting normal feed behaviour and altering the fish community structure. The prevalence of sea urchins, due to over-fishing of natural predators, is the main complaint of operators and tourists.

### Coral reef SCUBA diving

SCUBA diving tourism is a very important activity in the PECCA (see Figure 4), mostly operating from hotel bases. SCUBA dive sites are known around Misali, and along much of the outer reef on the north-western portion along Ras Kigomasha, the west northern tip of the peninsula, Njao Island, and Panza Island where the shipwreck lies. There are at least 18 regularly used SCUBA dive sites between Misali Island and the north of Makangale Lagoon and the northern tip of PECCA. Though SCUBA dive sites do exist in the southern portion of PECCA, there are no SCUBA diver operators in that area, and few regularly used SCUBA dive sites for tourists. Few negative impacts arise from SCUBA operations, other than anchor damage and diver damage to corals, as with sandbank operations.

## 1.3 PECCA Local Communities

The Micheweni, Wete, Chake Chake and Mkoani districts which fall within the current PECCA have 32 coastal wards and a total resident population of around 106,600 (see Table 4). In terms of population, the principal wards are Konde, Tibirinzi, Ziواني, Bopwe, Mtambwe Kaskazini and Chokocho, all with over 4,000 inhabitants (see Table 4). The rapid population growth and the associated human impacts have a strong influence on the coastal and marine ecosystem.

**Table 4. Principal wards and population within PECCA (source 2012 census).**

Ward	Population	Ward	Population
<b>Chake Chake</b>		Ukunjwi	2,769
Chachani	3,140	Utaani	3,829
Chanjaani	3,311	<b>Micheweni</b>	
Kilindi	3,947	Konde	8,573
Kwale	3,780	Makangale	2,645
Mgelema	1,250	Mgogoni	2,482
Mvumoni	2,463	<b>Mkoani</b>	
Ndagoni	3,905	Chokocho	4,539
Tibirinzi	5,323	Kisiwa Panza	3,087
Wesha	3,893	Makombeni	1,846
Ziواني	4,023	Makoongwe	1,453
<b>Wete</b>		Mbuguani	1,725
Bopwe	5,212	Michenzani	2,932
Fundo	1,625	Ng'ombeni	3,159
Gando	2,210	Shidi	982
Kipangani	4,241	Uweleni	2,539
Mtambwe Kaskazini	5,417	Wambaa	3,271

Mtambwe Kusini	3,791		
Piki	3,274	<b>Total</b>	<b>106,636</b>

Relatively few men and women take part in the tourism sector, working in hotels, as guides, on boat trips for snorkeling or SCUBA diving on the reefs. There are few day visitors, given the distances to major towns. In most of the rural areas, social and health services and infrastructure are generally poor, in many locations within PECCA, worse than many other parts of Zanzibar.

The PECCA is an important local feature for these residents, as it can impose additional planning restrictions on what they can do. Meanwhile, the large number of visitors to the PECCA can be both positive in supporting the local economy but can also have adverse effects, for example, through excessive immigration of, for example, tourist-associated operators, into local settlements.

## 1.4 Principal Stakeholders

This GMP is intended to be a transparent document that describes the goals, objectives, guiding principles and actions to inform and lead the management and development of the PECCA for the next ten years. For that to be a success, the GMP is designed to be accessible to all stakeholders. The above sections described the principal socio-economic activities that take place in and around the PECCA. Each of these represents a value and important stakeholder group. These groups can be divided into those that are resource users and those that are involve in resource management. An important step in establishing effective stakeholder relationships is to identify the stakeholders and their roles within the PECCA.

Table 5 summarizes the stakeholder groups of PECCA and their expected roles in the development and implementation of the GMP. Those stakeholders met thus far in the preparation of this GMP are listed in '**Annex 2. PECCA Stakeholders Contacted**'.

## 1.5 Applicable Legislation, Policies and Management Plans

The setting up of PECCA is provided for under section 10 (1) of the Fisheries Act No. 7 of 2010, officially gazetted by an order published in the legal Supplement (Part II) of the Zanzibar Government Gazette vol. CXIV No. 6111 of 23rd September 2005. The order prohibits the use of certain destructive fishing methods such as beach seines, spear fishing, explosives, poison and drag nets ('kigumi') and provides for a system of permits and fees for the use of the area by non-residents. It describes controlled areas which may be created by order, pollution prevention, and control on sea life including corals, shells, trade and export.

The current legal tool for managing the MCAs in Zanzibar is the Fisheries Act No. 7 of 2010 MCU Regulations, which provided for the establishment of the Marine Conservation Unit (MCU), previously under the DFD, and in 2020 elevated to the Department for Marine Conservation (DMC). A new Fisheries Bill currently under development is envisaged to be presented to the House of Representatives in 2022. This new Act will repeal the Fisheries Act No. 7 of 2010 and its associated MCU Regulations, establishing instead a new legal and institutional management framework for ecosystem-based fisheries management. In keeping with RGZ policy, there is also a requirement for a more inclusive collaborative approach to the development and management of marine resources.

The Fisheries Act of 2010 also provides that any fishing vessel operating in the internal waters, territorial sea and EEZ of Zanzibar, of whatever size or method of propulsion, shall be licensed according to the categories of licenses as established by the Minister responsible for fisheries on Zanzibar. Zanzibar no longer has sole jurisdiction over its EEZ and the management of the shared EEZ with

mainland Tanzania is the role of the Deep Sea Fishing Authority (DSFA), which is based on Zanzibar.

Several government departments and agencies have statutory or management responsibilities in the PECCA. As a result of this sectoral management approach, there are different legislation and acts that influence coastal resource management in MCAs. A range of relevant legislation tools exist to support implementation of GMPs, from national legislation to obligations under international treaties and conventions. This GMP will be implemented in the overall context of these national legal frameworks and international obligations.

To ensure sound management of the marine environment, the RGZ has to date created five MCAs, of which the Misali Island portion of PECCA is the oldest. Furthermore, Chumbe Coral Park was gazetted in 1995, and three additional forest conservation areas, Ngezi Forest Reserve and Jozani-Chwaka Bay National Park and Kiwengwa Controlled Area are gazetted protected mangrove forest conservation areas. The Ngezi Forest Reserve is within the boundaries of the PECCA.

Institutionally, the MBEF oversees marine fisheries, and although the above are the overriding legislation relate to the marine environment, there are several laws, policies and strategies on Zanzibar that are directly relevant to the management of marine resources.

**Table 5. Summary of the stakeholder groups and their expected roles in implementation of the PECCA GMP.**

Stakeholder groups	Roles
<b>Resource management</b>	
PECCA Management	Overall responsible for implementing this GMP
Dept of Marine Conservation	Overall responsible for marine conservation
Dept of Fisheries Development	Overall responsible for fisheries related issues
Zanzibar Fisheries and Marine resource Research Institute (ZAFIRI)	Overall responsible for Fisheries and marine resources researches related issues in PECCA
Dept of Environment (including Zanzibar Environmental Management Authority)	Overall responsible biodiversity conservation, protection of endangered species, sharing of relevant environmental and social impact assessment (ESIA) applications with MCA Managers
Commission for Tourism	Overall responsible for issuance of tourism licences, and to ensure operators and enterprises adhere to best practice, especially with respect to pollution, waste management, agreed principles and practices under the GMP
Zanzibar Investment Promotion Authority	Responsible for issuance of business licences to investor and informing them of MCA objectives, principles and practices under the respective site-specific GMPs

Donors	Support socio-economic development programmes, community initiatives, enterprises, and improvement of environmental and natural resource management
NGOs/CBOs/Private sectors	Partner with environmental, cultural, heritage and non-governmental / non-profit groups within MCAs, including related to Fisheries and Mariculture activities
Legislators	Review and update applicable legislation on natural resource use with respect to MCAs, protected species, etc.
Law enforcement (including customs, police, KMKM)	Advise on legal matters, and maintain/enforce legal attributes per the proposed MCS Strategy of the MCA
Government planning and finance authorities	Permitting and maintaining the law. Facilitation and Communication towards user groups. The PECCA Management manages the conservation on behalf of Government
Courts and judiciary	Appraise contraventions to applicable fisheries and conservation laws, and be informed on the significance of contraventions with respect to MCAs
Ministry of Health	Maintain and monitor health and hygiene at sites with the MCA
Ministry of Education	Maintain/manage schools and other training institutions and provide opportunity for and encourage their participation in environmental awareness/education activities
Ministry of Finance	Participate in resolving and be informed on challenges related to funding for MCAs
District Governments	Participate in and oversee village compliance with objectives, principles and practices under the GMP
Village Governments	Participate in and oversee behaviour and compliance of local communities with the objectives, principles and practices under the GMP
Local universities (e.g.SU-ZA, IMS)	Conducting research on marine resources and related socio-economic aspects
Resource users	
Fishers	When fishing within or adjacent to MCA borders comply with hygiene, health and environmental standards and the objectives, principles and practices under the GMP
Seaweed farmers	When farming within or adjacent to MCA borders comply with hygiene, health and environmental standards and the objectives, principles and practices under the GMP
Fishmongers/traders	When storing or processing seafood within/adjacent to MCA borders, comply with hygiene, health and environmental standards and applicable GMP principles

Tourism sector (hotels, water sports, restaurants, excursions and ZATI and ZATO)	The tourism sector is dependent on the marine environment to a great extent, especially the condition of beaches and coral reefs for diving. Tourists use the PECCA on a daily basis. The CHICOP represents a successful tourism-conservation initiative.
Boat owners and operators	Ensure crews comply with hygiene, health and environmental standards and objectives, principles and practices under the GMP
Industry (including energy, oil and gas storage, construction)	Ensure practices comply with hygiene, health and environmental standards and objectives, principles and practices under the GMP
Community	The local community depends on the wellbeing of the PECCA indirectly for income.  Educational establishments use the marine Conservation Area as an education tool.
Local schools	Participate in educational and environmental awareness initiatives and support and promote the agreed goals, objectives, principles and practices under the GMP
Zanzibar Port Corporation	Ensure shipping comply with best practice, especially on pollution and waste
Tourist housing projects	Ensure property owners and occupants comply with objectives, principles and practices under the GMP

MKUZA III (Zanzibar Strategy for Growth and Reduction of Poverty) 2016-2020, recognises the importance of the marine resource and advocates for establishment and operation of a National Protected Areas Board (NPAB) to deal with marine and terrestrial protected areas. Other principal institutions that are directly relevant to different aspects of the coastal environment is the Second Vice President's Office, and its Department of Environment (DoE) that are responsible for environmental law, EIAs and setting of environmental standards under the Environmental Management Act No. 3 of 2015 and following the Environment Policy of 2013. Conservation of key breeding and feeding sites is enacted through the Nature Conservation Areas Management Unit Act, of 1999.

The need for integrated management of natural resources is stated in the Environmental Management Act of 2015 which also provides a legal basis for the establishment of integrated coastal management (ICM) in Zanzibar. It further requires that developments in environmentally sensitive areas, including forests, mangroves and small islets and water catchments undertake scoping studies 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.

The National Environmental Policy of 2013 focuses on conservation and development of environmental resources with a view to utilizing them in a manner that will improve people's welfare. The policy addresses, among other themes, environmental and climate change governance; terrestrial and marine resources and biodiversity; forest conservation; renewable and efficient energy; environmental information systems and awareness, climate change adaptation and mitigation, sustainable tourism and gender. It also states that a number of legislations and regulations related to environmental and natural resource management and conservation in the areas of forestry, fisheries and other sectors are inadequately enforced.

The Zanzibar Tourism Regulations of 2009, made under Section 31 of the Zanzibar Tourism Act No. 6 of 2009, address diverse issues, some of which are directly applicable to the behaviour and conduct of tourism entities within MCAs. One pertinent example is the very detailed items related to dolphin tourism, of which item 41 (Requirement of dolphin and whale watch vessels operator), item 42 (Maximum of vessels Guideline for whale and dolphin and watching), and item 44 (-Approaching whales and dolphins), are examples among others.

The Zanzibar Investment Policy requires mobilisation of investments that are socially and economically beneficial as well as environmentally sound in order to protect Zanzibar's natural heritage. The recent Zanzibar National Environmental Plan also highlighted the need for collaboration with the private sector in coral reef protection. Of special relevance are the recent 2019 Tourism for All Policy and the 2020 Blue Economy Policy.

Finally, a number of other management plans exist that relate in part to the PECCA. For example, the Mangrove Management Plan which relates to the management of mangroves close to the PECCA, and the Ngezi Forest Management Plan 1996-2001.

On the international landscape, Zanzibar is, either under the United Republic of Tanzania (URT) or as an independent entity, signatory to a number of international treaties and conventions relevant to PECCA. The most important are the Convention of International Trade In Endangered Species (CITES) 1975 [ratified 1979], the Convention on Biological Diversity (CBD) 1992 [ratified 1995], the Conservation of Migratory Species of Wild Animals (CMS/Bonn), the Ramsar Convention on Wetlands of International Importance 1971 [ratified 2000], the MARPOL International Convention for the Prevention of Pollution from Ships, the Nairobi Convention (UNEP Convention for the Protection, Management and Development of the Marine and Coastal environment of Eastern African Region) 1985, the UNCLOS United Nations Law of the Sea Convention 1982 [Ratified 1985], and the UNESCO World Heritage Convention 1975 [Ratified 1977].

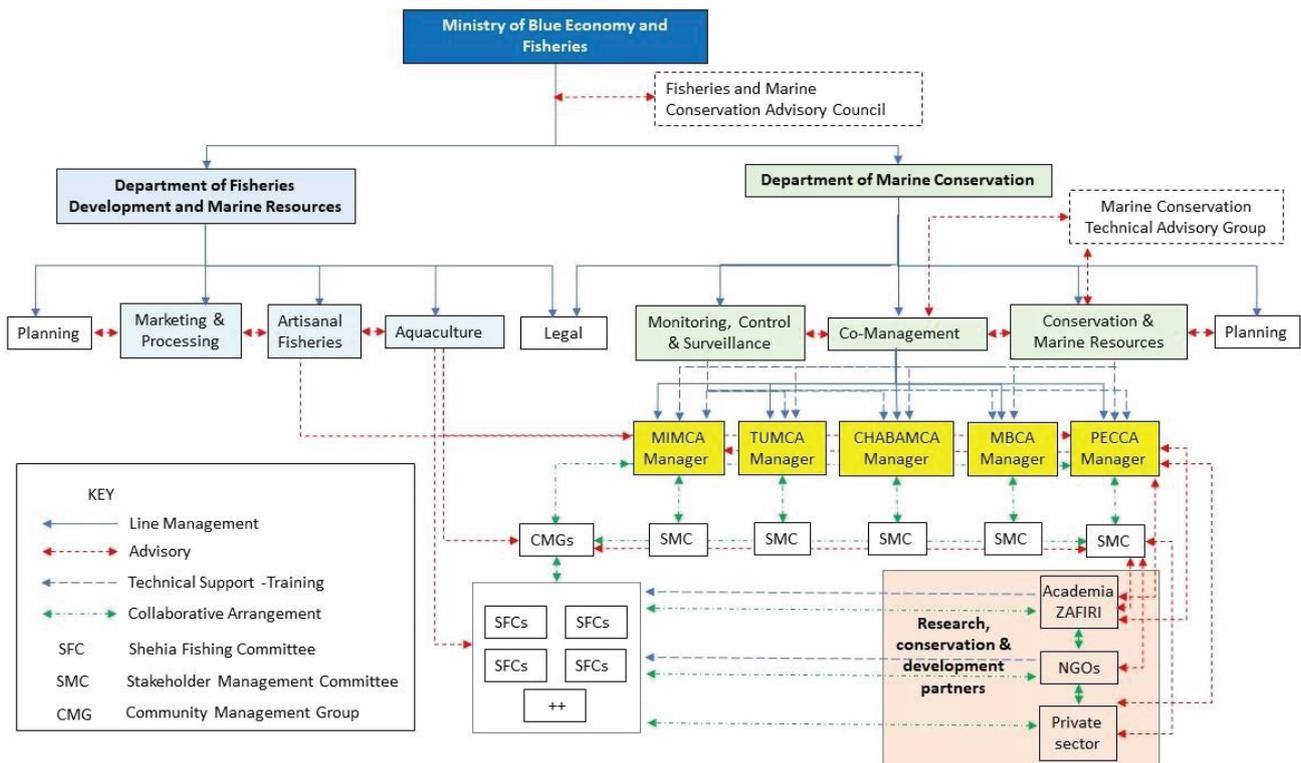
It is important that these plans take account of each other as far as practicable and that major policies in all these plans do not act against each other. The GMP programmes are designed to be implemented in compliance with the vision, strategies, programmes and laws of the RGZ and applicable international treaties.

## 1.6 Management Framework

The institutional framework for management and oversight of the MCAs in Zanzibar is both multi-sectoral and multi-scaled across the central government and local government authorities. In 2020, the Revolutionary Government of Zanzibar (RGZ) created the Ministry of Blue Economy and Fisheries (MBEF) with the overall aim of sustainable developing and managing marine resources. There are now two departments for the management of fisheries and MCAs, the Department of Fisheries Development and Marine Resources (DFDMR) and the Department of Marine Conservation (DMC). The creation and functions of these departments along with the newly formed Zanzibar Fisheries Research Institute (ZAFIRI) are set out in the new Fisheries Bill (in preparation)

The proposed management framework is predicated on the Ministry structure as determined by RGZ and the Directors of the two Departments and their respective Units (Figure 7). Within this structure there is also the Ministerial level Fisheries and Marine Conservation Advisory Council (FMCAC) which provides a high-level mechanism for intersectoral coordination/integration through provision of advice for the management of fisheries, marine resources and conservation. Its members are Directors from within the Ministry, the Director General of ZAFIRI and equivalent level representatives from other sectors such as Environment, the Maritime Authority (and Tourism) as well as the Chief Executive Officer of KMKM (Navy) and the State Attorney.

**Figure 7. Management structure of the MCAs on Zanzibar, based on work undertaken by a team of DMC staff under the direction of the Director of the DMC in consultation with staff from the DFDMR.**



Manager, supported by delegated professionals and support staff in the field. The management of the PECCA operates at the levels of the village, district and country. In each of the 33 coastal wards covered by the MCA there is now a Shehia Fisheries Executive Committee (FEC). About ten members are elected from fishing groups at each Shehia, who then either select or elect a Chairman, Secretary and Treasurer from those members. As such the SFCs represent the fishing groups within each Shehia. The MCA staff and the District based Fisheries Officer (DFO) provide support and act as the technical advisers, thus the SFCs provide the link between fishers and the Districts via the DFO. At the time of writing the chair of each SFC sits on the FEC which reports to respective MCA Executive Committee. The FEC will not exist as a formal body in the forthcoming changes to the MCA management framework but may continue as an informal body. Many of the current functions of the FEC will be undertaken by the Collaborative Management Groups (CMGs) and Stakeholder Management Committees (SMCs). The actual names and functions of these structures may change with the ongoing reorganisation. There are currently 34 SFCs in PECCA representing 33 *shehias*. Each *shehia* may have one or more villages.

## Ministry and Departments

### Divisions within the Department of Marine Conservation

1. Division of Monitoring, Control and Surveillance (MCS) – enforcement of fisheries and MCA regulations and by-laws.

2. Division of Conservation and Marine Resources Unit – technical aspects of marine resource management
3. Division of Co-Management and community development

The Division will also provide technical support and training to the SMC, CMGs and the SFCs (Figure 6).

#### ***Divisions within the Department of Fisheries Development and Marine Resources***

1. Artisanal Fisheries – Sustainable artisanal fisheries development
2. Aquaculture – Sustainable aquaculture development
3. Marketing and processing

The Planning Unit and the Finance Unit support both departments (Figure 6).

#### **Division of Co-Management and community development**

The MCA Managers report to the Co-Management Division whose functions amongst other will include:

1. Coordination of activities across all MCAs,
2. Development and monitoring of guidelines for the collaborative management of MCAs, including those for management agreements, and fisheries within the MCAs including for implementation plans and progress reporting,
3. Monitoring and managing management agreements with private investors and SFCs and/or CMGs.
4. Working with contact persons in relevant Ministries integrate relevant requirements from other sectoral policies (principally Environment and Tourism) into MCA management guidelines.
5. Act on behalf of the Director as the ultimate arbiter of disputes relating to fisheries or marine resource management within MCAs.
6. Others as defined by the Director of DMC

The Co-Management Division and MCA Managers are provided with technical support and training from other technical units in the DMC and DFDMR specific to their functions.

#### **Marine Conservation Technical Advisory Group (MCTAG)**

The proposed MCTAG shall serve as the mechanism to facilitate adaptive management as advocated in the GMPs for each MCA. Adaptive management has two main components, the first is the monitoring and evaluation of the effectiveness of implemented management measures and the second is the use of research findings to inform management. The MCTAG will provide a mechanism for facilitating both of these components and in particular for facilitating, and integrating the findings of, multi-disciplinary applied research specific to the needs of the MCA. The MCTAG will primarily advise the Conservation and Marine Resource and Co-Management Units within the DMC but also could have a broader role to include the MCS Unit as well as the Artisanal Fisheries and Aquaculture Units of DFDMR.

The role of MCTAG is to complement that of ZAFIRI, through providing a mechanism for the participation of other research institutions. Members of the committee could also be drawn from the Zanzibar State University (SUZA) and the Institute of Marine Science (IMS) of the University of Dar es Salaam as well as regional institutions e.g. KMFRI and CORDIO.

## Functions of the MCA Managers

Currently the functions of the MCA Managers are:

1. Ensure the development and implementation of the plan for the conservation area.
2. Prepare annual and monthly work plans, budgets and reports for the MCA.
3. Implement approved workplans and monitor the day-to-day management of the MCA.
4. To carry out any other activity as directed by the Coordinator for the benefit of the protected area.
5. Ensure that illegal fishing is controlled.
6. Manage and promote tourism activities in the MCA to increase income.
7. Ensure that all revenue from the sources within the MCA is controlled and no money is lost.

Under the proposed management framework, the MCA Managers have three mechanisms by which they can execute the management of the MCAs:

1. Management Agreements with SFCs or groups of SFCs the latter known as CMGs for defined collaborative management areas within the MCAs.
2. The Stakeholder Management Committee.
3. The proposed MCA staffing structure.

The operation of each of these mechanisms is described in the following sub-sections. Given these mechanisms, much of the work of the MCA Manager will be the facilitation and coordination of activities undertaken by their staff and partners with technical support and training provided from the relevant Units of DMC and DFDMR.

### ***CMG/SFC Management Agreements***

For the co-management of the coral reef fish and octopus fisheries, it is proposed that each

MCA be sub-divided into management areas. There are six SFC management areas in Pemba Channel MCA (PECCA). Each of these management areas contains between 3-10 SFCs that can operate individually or within groups. It is proposed that to optimise management effort, SFCs will be encouraged to form collaborative management groups whose functions and governance along with those for individual SFCs are set out in the SFC Standard Operating Procedures. These are currently being finalised for approval.

Therefore, it is envisaged that MCA Manager will work with up to 6-12 CMGs in PECCA. Under the Provisions of the Fisheries Bill (in preparation), the DMC can enter into management agreements with local communities through their SFCs and it is recommended that this also includes CMGs. Use

of CMGs will optimise the number of management units and hence management agreements and retain flexibility and options for implementing fisheries management measures.

In the proposed system the councillors of the individual SFCs are elected by defined fishing groups (by gear or fishery type and including mariculture) and represent that fishing group. As such SFCs will manage their fishers and their CMG that will then provide the collaborative partner for the MCA management. It should also be noted that SFCs may not necessarily choose to form CMGs in which case the MCA management would enter into agreements with individual SFCs.

Management agreements would have an agreed format that would include as minimum management objectives, activities and timeframe for activity implementation. They could also present zoning of the area (including closed areas) and management regulations. The latter could be formalised under the provisions set out in the Fisheries Bill (in preparation).

### ***Stakeholder Management Committee***

The SMC provides a mechanism for:

- a) Increased transparency as to the management of the MCA.
- b) Increased communication between stakeholders and between stakeholders and MCA management.
- c) Involvement of stakeholder groups in the planning, implementation and reporting, of activities relevant to the objectives of the MCA.
- d) Identifying and implementing opportunities for joint or collaborative working between stakeholders.
- e) The better coordination of those activities.
- f) Better engagement of the broad range of stakeholders in the sustainable management of the MCA.
- g) Linking of local level activities to policy implementation.
- h) Empowerment of communities and stakeholders to undertake the sustainable development and management of fisheries and marine resources within MCAs.

All of the above were identified as aspects of management that need improvement during the MCA GMP and MCS Strategy validation workshops.

The proposed functions of the SMC are:

1. Assisting with the development of MCA GMP implementation plans.
2. Identification of collaborative partners to implement or participate in the implementation of agreed activities.
3. Facilitate the production of progress reports.
4. Assist in the development and implementation of management guidelines.
5. Assist in strengthening stakeholder engagement and cooperation particularly for the implementation of agreed activities.

6. Assist the MCA Manager with conflict resolution.
7. Assist in raising stakeholder and/or community awareness concerning all aspects of sustainable fisheries and marine resource use and management.
8. Seek funding and support the cost of implementing agreed activities.

It is proposed that the SMC is made up of representatives of/from:

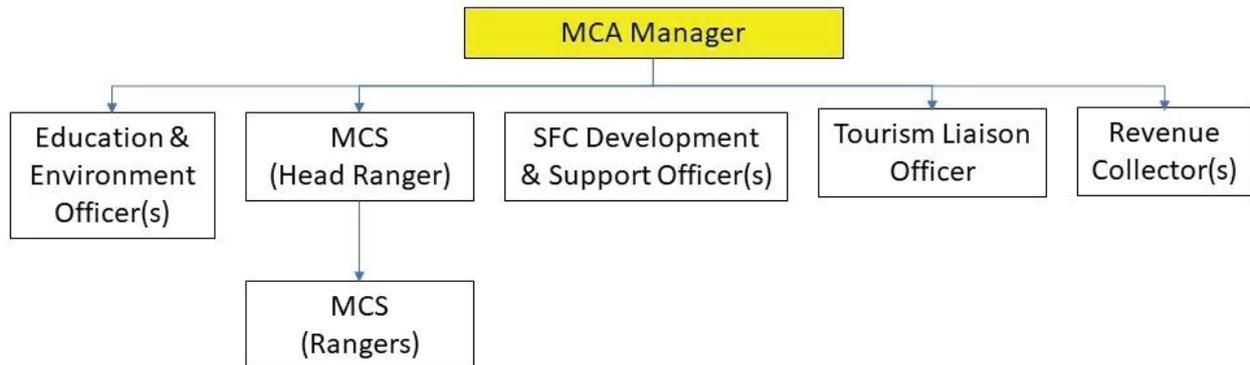
1. The CMGs
2. NGOs working on conservation, fisheries and marine resource management, aquaculture, sustainable livelihoods and/or local community capacity development.
3. Representatives from the tourism sector e.g. hoteliers, dive centres, local boats (*nahodha*)
4. Representatives from Districts e.g. forestry, community development, environment
5. Representatives from other relevant community-based organisations (CBOs).
6. Private investors managing islands or marine areas within MCAs.

The proposed SMC has both government and non-government members. The primary purpose of this committee is to develop and implement coordinated collaborative activities hence its proposed composition. The presence of sectoral representatives in this committee also allows it to implement activities across sectors. However as these have been proposed to include District level staff, and Districts do not have jurisdiction below the highest highwater mark, the possible multi-sector approach at MCA level for marine activities still needs to be agreed.

## MCA staffing structure

The proposed staffing structure (Figure 8) is proposed to enable the MCA Manager to delegate defined work responsibilities to specific officers. The work responsibilities reflect the requirements for enabling effective fisheries co-management with SFCs and groups of SFCs as well as the activity programmes as set out in the MCA GMPs and MCS strategy. As such there are specific officers for SFC Development and Support, Marine Control and Surveillance, Tourism Liaison and Education and Environment.

**Figure 8. Proposed MCA staffing.**



capacity of the SFCs to undertake their role in accordance with the management agreements approved by the DMC/DFDMMR. This will include ensuring good governance and financial transparency and management by the SFCs and CMGs within the MCA according to the approved SFC Standard Operating Procedures. They will also work closely with the technical officers from the Units of DMC and DFDMMR particularly relating to the requirements for effective co-management, conservation and marine resource management, aquaculture development, artisanal fisheries development and marketing and processing initiatives.

The **Tourism Liaison** officer will work with the relevant SMC collaborators and Department of Environment staff to implement the agreed activities from the MCA GMP. This will include but not be limited to the development of guidelines for tourism activities, promotional digital and hardcopy promotional and educational materials.

The **Education and Environment Officers** will deliver educational programmes as developed by the Conservation and Marine Resources Unit and Department of Environment with advice from the MCTAG and collaborative partners. They are also responsible for delivery of selected environmental work as defined in the ecological programme of the GMPs.

The position and role of **the Revenue Collector(s)** will depend on the eventual financing mechanism for the MCS of Zanzibar (see also Section 9.2). Currently, an important contribution to funding relies on visitor fees and fees for specific activities being collected and transferred to MCA accounts. As the funding mechanism is currently under review, the roles of terms of reference for this staff position will not be finalised for some time.

It should also be noted that further work is required to detail the functions of the Units within DMC and DFDMMR including job descriptions for staff at Unit and MCA level. However, before that work takes place the management framework as presented needs to be agreed. There are some questions concerning the proposed framework that require further consideration, in particular, in relation to there being a multi-sector integration mechanism at the Unit level to complement the MCTAG, depending on whether it is agreed that the FMCCAC is more of a policy making advisory body; consideration should also be given to a 'Forum' for NGOs and private sector entities that have projects or initiatives for the better management/conservation of coastal and marine resources – that could be formal or informal and would assist the DMC and DFDMMR in the coordination of their activities, identification and implementation of synergies, avoidance of duplication and developing guidelines (minimum requirements) on a range of matters; and, based on the initial staffing structure for the MCAs proposed, at present it does not include Monitoring Officers whose remit would be the collection of data related to the effectiveness of management, whether that be based on local level monitoring (e.g. SFCs and CMGs) and their members, which would necessitate consideration to staffing to facilitate, undertake and coordinate this work.

## PECCA Physical Resources

In 2010, the PECCA had two motor vehicles, four motorcycles, two patrol boats and SCUBA diving equipment to monitor the entire area. There were also computers, printers, photocopies and radio communication equipment installed, and a new field office building at Wesha. All the physical resources are supported by MACEMP.

## 1.7 Revenue Generation and Expenditure

### Revenue streams

Based on the existing MCU Regulations, the establishment of the Marine Conservation Areas Fund (hereafter referred to as the MCA Fund), provides the source of revenue for all MCAs on Zanzibar, with revenue streams being the government, international donor agencies, and visitor entrance fees. Most revenue at present is generated either through tourists' daily entrance fee (USD 3 per person) for international visitors and TSH 1,000 for residents, as per fee rates described in the Fisheries Act of 2010. Visitor's entrance fees are paid by tour operators and hoteliers that bring their visitors to the MCA, by purchasing tickets or vouchers from the MCA office in Stone Town or from respective offices or representatives in the villages. PECCA management (with the participation of the relevant District authorities) may also collect *dago* fees from visiting fishers.

The management and administration of the MPA Fund rests with the Permanent Secretary, with funds being divided into two parts: 70% for management purposes and 30% for community development activities. Eligible recipients potentially include fisher groups, tourism operators and community development projects.

The current situation appears to be all revenues accruing from MCAs held in the conservation area bank account, with the terms and condition for the use of funds being in accordance with the PECCA Order. It is not apparent whether there are any controls or detailed budgeting, clear account procedures or transparent reporting. Government revenue is reported to cover some of the salaries and most office costs.

For the period 2010/11 USD 49,000 was generated from tourist entry fees (Meyers et al., 2012). As described in the section on Tourism (see page 44), numbers of tourists visiting Zanzibar have increased overall since the 1990s, but are vulnerable to local, national, regional and international influences (as described above), which can significantly affect the number of tourists visiting Zanzibar and most importantly, the tourist revenue in terms of entrance fees. Concerns over fees and operations budgets are a main management issue (see Item 8 in the following section) and approaches to address this are presented in Section 9.2.

As an example, the MBCA GMP (2010) described inadequate financial and management capacity, stating that the financial capacity of the MBCA to fulfil its mandate was not there, and that due to inadequate government budget allocation, the human resources development as well as service delivery to the general public has been insufficient. The inadequacy and uncertainty of funds have impacted negatively on management operations ranging from recruitment of staff, training, research and monitoring activities. By 2019, there was no apparent improvement in the situation. An urgent priority for the RGZ is to develop a strategy for achieving financial sustainability for the MCAs, as it is unlikely that tourist visits and individual visitor fees will be able alone to finance operating costs on a permanent basis. This situation is directly relevant to future development of a management operation at TUMCA.

## Operation costs

According to Meyers et al. (2012) the operational cost of running the PECCA between 2005 and 2011 ranged from the lowest in 2007/08 of USD 9,021 to USD 20,601 in 2008/09. The average over that period was approximately USD 13,600. From the tourism income figures shown above, it would appear that operational costs could be met, however, there are no data on how much of tourism fees are actually used for park management, what current operations cost, or how much would remain for the community development portion. The latter is critical for generating trust and commitment by local communities inside MCAs.

It is (widely) acknowledged that additional funds are required to fully manage the MCA. Additional funds, generated through fees or other means are needed for the management of MCS, including costs for SMC meetings, patrols and administration activities, implementing agreed management actions, and for various development activities within the MCA communities. An annual workplan with operating budget will be prepared by the MCA manager in collaboration with the SMC, the agreed annual workplan and budget is then submitted to the Co-management Unit for approval by the Principal Secretary of the Ministry. There is much to be learnt from the other MCAs of Zanzibar when structuring the operational costs and revenue streams for PECCA.

### 1.8 Key Management Issues of Concern

Management of the marine and coastal environment within the PECCA considers the key management issues of concern and attempts to develop strategies and actions to address each of them. The summary of the most recent GMP (RGZ, 2010) stated that overall, the PECCA system is showing clear signs of stress on some ecological systems. It has been degraded, there is still pressure on it, and that without systematic and significant intervention, the system will continue to degrade further with far-reaching effects for tourism and the livelihood of the fisher population. The consultations, research and site visits conducted during the preparation of this GMP have confirmed that the situation has degraded further since that study, over 5 years ago, and that urgent measures are needed to rectify the situation.

The 12 management issues described in the sections that follow, were defined based on the views of resource users, evidence from studies and field observations. These management issues form the basis of the recommended actions, presented under the five principal programmes and one strategy that follow, namely:

- Ecological Management Programme
- Tourism Development and Management Programme
- Fisheries Resource Management Programme
- Aquaculture Resource Management Programme
- Community Support Programme
- Monitoring, Control and Surveillance (MCS) Strategy

The MCS Strategy is proposed to support the implementation of the above programmes.

The key management issues identified from the previous GMPs and verified by stakeholders consulted to date, are described in the following sections:

### **1. Illegal activities in the PECCA (mainly fishing gear)**

Illegal and destructive fishing practices were the main justification for the initial recommendation to establish the Misali Island conservation area in the early 1990s. Enforcement of fisheries patrols since the enlarged PECCA became established has not been fully effective, for several reasons, including shortage of personnel and funding of operations. As a result, illegal fishing activities have been increased, including the usage of undersize mesh size, illegal gears, and of chemicals. Ring-net usage around coral reef areas in daytime is considered the greatest threat with implications for the integrity of coral communities.

There are concerns that the current fishing effort is unsustainable and is expected to grow in the future under ever-increasing local market demand, including from the tourism sector. Gear can be used to catch undersized fish before they reach the age of maturity and spawn at least once before capture. In addition, certain gears (i.e., spear-guns) may be utilised to overfish mature spawning individuals, thus reducing the likelihood of spawning within the population. Therefore, increased fishing effort and destructive fishing practices have resulted in decline in the local fish catches which in turn impacts negatively on individual fisher's income and living standards of the coastal communities in the area. Local institutions are unable to or chose not to regulate the resulting fishing pressure. If patrols are conducted regularly, the use of illegal fishing gears and methods in the PECCA would be significantly controlled.

### **2. Coral reef and small island habitat degradation**

As indicated in previous versions of the GMP, studies indicate that destructive fishing gears and over-fishing at PECCA has altered the coral reef community structure from a community dominated by corals and herbivorous fishes to shallow communities dominated by sea urchins. Use of fishing gear, such as dragging gill nets inshore, is known to substantially impact the structure and health of coral reef communities, through the physical breakage of coral colonies.

The coral reefs are also being threatened by breakage by certain tourism activities, especially boat anchoring caused by sandbank picnic and SCUBA operations, and in some cases by the tourist themselves through physically tramping over coral. Internationally, the carrying capacity of coral reefs has been determined to be about 5,000 divers per site per year (Harriott, 2002). Because tourism is an important activity on the PECCA, it requires careful management by PECCA management. Thus, there is strong motivation to protect and conserve reefs that are the subject of tourism interest. Tourism should be managed by a combination of zoning plans, plans of management of intensively used sites, code of practice and permits.

Coral themselves are also susceptible to bleaching from natural events associated with elevated sea water temperatures, with documented reduction in living coral cover after the 1998 coral bleaching event.

The forested islands that support a unique assemblage of plants and animals have not been surveyed, other than that at Misali. Pressure from visiting fisheries (firewood and possible charcoal production), ad hoc tourism facilities (kiosks, toilets, dumpsites) and introduction of pests threaten the integrity and uniqueness of these coastal forest areas.

### **3. Threat to marine mammals (dolphins and whales) sea turtles and elasmobranchs (sharks and rays)**

Threatened and nationally protected marine animals (turtles, dolphins and whales) are killed during fishing operations. For example, Amir et al. (2002, 2005) reported that bycatch of dolphins in gill-net fisheries is the most serious threat throughout Zanzibar. The bycatch of dolphins occurs year-round and all recorded catches of dolphins have been in drift and bottom set gill-nets and for whales gill-nets and lines for fish traps. The annual by-catch of dolphins in gill-net fisheries in Zanzibar is not considered sustainable (Amir, 2010).

Every year, several humpback whales swim into fishing gear and get entangled in drift and bottom set gill-nets in PECCA (and other parts of Tanzania), especially from July to September when most abundant in this region. At the first Zanzibar humpback whale bycatch mitigation and disentanglement workshop conducted in 2010, fishers reported that for the year 2009 alone 13 incidents of humpback whale entanglement in fishing gear took place off the PECCA.

As indicated in previous GMPs for PECCA, poaching and destruction of turtle nests has often been reported, and given that the area has very few uninhabited and non-disturbed nesting beaches, the pressure on sea turtles is very high. It has also been reported that turtles are hunted purposely for meat, with collection of turtle eggs common practice. The threat is particularly acute for turtles and dolphins because of their slow life histories and limited potential rates of increase.

#### **4. Low volume but unregulated dolphin tourism**

The potential financial benefit of dolphin watching tourism to the local communities of PECCA, and to the conservation of resources through visitor fees is undeniable, as demonstrated by the development of the activity on Zanzibar, especially around Kizimkazi (in the MBCA), since the mid-1990s. Suggested guidelines (Berggren et al., 2007) for appropriate behaviour were developed for MBCA but are currently not followed or enforced, and there are no penalties for violation of the guidelines, although the Zanzibar Tourism Act (2009) states that operators should be licensed. Further the 2009 Act prescribes that there should be a maximum of five vessels at the area where the activity is undertaken, with only one dolphin watching vessel within 50 meters of a group of dolphins and that a vessel shall reside in a watching area no more than one hour to allow other vessels to watch. For the MBCA in southern Unguja, concerns have been raised for many years about the effects on dolphin boat trips on the dolphins, their feeding and foraging activities and social family interactions. It seems that dolphins respond negatively to the presence of marine vessels, by increasing their swimming speed and moving away from the source of noise, such as when boats approach dolphin pods at high speed or move over feeding/resting areas or locations where mothers are present with young calves (Stensland and Berggren, 2007; Christiansen et al., 2010). Such disturbances may have negative effects on the long-term health and residency of the dolphins, with the potential for the dolphins to abandon an area altogether (Corkeron, 1990). The inadequate, absence or non-compliance with proposed guidelines (and Tourism Regulation, 2009) is widely concluded to be impacting negatively on resident dolphin populations, which in turn would impact on the number of visiting tourist and the associated revenue.

While the situation in PECCA does not exist at present, with the increase in tourist volume forecast, and the presence of one endangered species, the Indian Ocean humpback dolphins, and the dugong that is classified globally on the IUCN Red List as vulnerable to extinction, it is prudent that this potential threat be addressed before it becomes prevalent.

#### **5. Inadequate administration and management infrastructure**

Infrastructure to assist visitors to explore and appreciate the marine resources inside the PECCA, such as mooring buoys, are lacking. These facilities, among others (to be defined following a detailed assessment), need to be provided and existing ones maintained to ensure that visitor experience and satisfaction are enhanced. For example, absence of any information at all at tourist launching point (e.g. Wesha) reflects badly to tourists and local communities alike. As suggested for the MBCA, one way of addressing the problem was to build an interpretation centre where visitors can get information, visit basic amenities (toilets that are cleaned and serviced regularly, and perhaps even a place to change clothes), have access to an arts and crafts outlet, and where tourists can interact with knowledgeable and friendly rangers.

The current main office block and utilities at Wesha are adequate to serve the current and future office space requirements proposed in this GMP, with storage facilities for stores and equipment also adequate. However, along the entire north and northwestern side of the PECCA, along the Makan-gale Peninsula, which is becoming the hub of beach and SCUBA tourism, there is no infrastructure

at all. If a ranger station would be deemed necessary, a detailed assessment would need to be conducted to determine the need, type and function of such a facility.

Effective communication both within and outside the PECCA is essential for efficient management, and key to improving PECCA management's response to urgent issues. While the PECCA office staff have personal mobile phones of the basic models, these have a limited range and application for work. Operational VHF radios and smart phone on which MCS apps can be operated are not in use.

There is need to improve administrative and management infrastructure to ensure effective and efficient management of the PECCA.

## **6. Poor stakeholder participation**

From the start of conservation efforts around Misali, there has, unfortunately, been very little stakeholder participation in PECCA management. While PECCA management authorities must play a primary role in enforcing legislation, compliance is greatly improved when stakeholders actively take part in PECCA management activities. A multi-stakeholder strategy is needed that focuses on the different resource use stakeholders to ensure management and utilization of the fishery resource, dolphin tourism, coral reefs for tourism recreation, shoreline protection, seaweed farming and others is undertaken in a way that permits both derivation of socio-economic benefits and conservation of the same.

## **7. Lack of zonation and clear demarcation of PECCA Boundaries**

Stakeholders and PECCA management have indicated that effective enforcement of rules and regulations will benefit from clearly marked PECCA zones for specific activities and overall boundaries. Continued expansion of the fishing pressure over recent years, including the illegal use of destructive gears as well new entrants (being new generations of visiting *dago* fishers and local resident fishers) accessing the PECCA fishery resources, accompanied by increasing tourism activities in overlapping areas, such as sandbank picnics and snorkeling, dolphin viewing and SCUBA operations require clearly marked specific use zones, and overall protected area boundaries.

## **8. Inadequate financial and management capacity**

Financial capacity of the PECCA to fulfil its mandate is not there. Since the end of the CARE International supported period, there has been inadequate government budget allocation. In addition, the human resources development as well as service delivery to the general public has been insufficient. The inadequacy and uncertainty of funding have impacted negatively on management operations ranging from recruitment of staff, training, research and monitoring and enforcement activities.

It is important to note that local communities' perceptions of impacts and progress within protected areas are most positive in those programs that have had the longest and greatest investment of time and resources (Tobey and Torell, 2006). This management issues is addressed in more detail in Section 9.2.

## **9. Low levels of education, awareness and training**

Within almost all resource-use stakeholder groups, there are low levels of education, awareness, understanding and appreciation of and value given to many of the natural resources that are important for the overall integrity of the PECCA, and to the tourism sector on which so much of the income of the area and local livelihoods depend. Related specifically to fisheries, the Fisheries Management Plans also documented that there was low understanding of essential fish habitat for reef fishery species, and similarly low level of understanding by fishers that non-targeted taxa can be caught with legal gear types.

On the means to develop alternative livelihoods, again there are low levels of entrepreneurship knowledge and skills among local communities, without which sustainability through relieving pressure on the existing resources cannot be achieved.

Within the portion of the local community engaging directly with the tourism sector, a communication gap was identified in the previous GMP, whereby many local tour operators cannot communicate effectively with tourists. This related especially to what is and is not permitted during the tour operations, be it dolphin viewing, coral reef snorkeling or simply beach walks. Consequently, tourists are not always educated before or during the excursions.

Also related to the tourism sector, there is no formal requirement for captains and/or guides to be trained in boat safety, boat operations and maneuvers around dolphins, on anchoring and use of moorings, vessel and engine maintenance, and first aid.

### **10. Insufficient and erratic research and monitoring**

This GMP has been devised based on current understanding of the functioning of the area and its economic value. There are gaps in this understanding and there will be an ongoing need to improve understanding through research focused on the priority uncertainties. Numerous studies have been conducted, but not all have not been for conservation or management purposes, some more focused on academic purposes. As a result, there is limited information available on livelihoods and resource use trends. Increasing use by visitors, surrounding development and climate and sea level change can impact on the health and ecological functioning of the area, as well as its value at different spatial scale. Such topics are current priority areas for research.

Structured and targeted monitoring is needed of resource use, of human demography and livelihoods, utilization needs and trends, on carrying capacity of the different activities in the PECCA, including fishing grounds, tourist areas. Focal areas for research associated with the PECCA include visitor numbers and behaviour, biodiversity and populations of target species. Findings from such research and monitoring will enable the respective institutions responsible for management of the resources in the area to adapt management plans.

Currently, there is a lack of a framework to guide and use monitoring data. An effective management information system (MIS) requires performance indicators, data and information and capacity to monitor and review with the objective of identifying constraints and the adoption of remedial measures to remove the constraints. The development of an appropriate MIS is a separate output that supports all MCAs on Zanzibar.

### **11. Impacts of climate change**

The widely recognised impacts of climate change and global warming include some unpredictable shifts, for example, in monsoonal winds, rainfall, temperature and sea level rise could all take their toll in fishing and tourism activities in the PECCA area. Some of the mitigating measure against damage to coral (bleaching) weakened by warming waters, are improved reef monitoring, use of MPAs, transplanting healthy coral to degraded reefs and use of coastal and fishing management schemes.

### **12. Emerging coastal development issues**

Both the local population and the tourism volume are increasing on Zanzibar, with many undesirable impacts. Managing land-based wastes (including sewage from tourism sector and the local populations) and especially the rising volume of pollution from plastic, have impacts that directly and indirectly affect the marine environment including the MCAs. Consequences of the introduction of fruit wastes to the marine environment by tourists is not understood. These and others are proposed in

the management strategies of this GMP.

## 2. PECCA ZONATION SCHEME

### 2.1 Introduction

Most MPAs around the world use a system of zoning to protect the natural resources within a protected area, as well as reduce the user conflicts to ensure that the various user groups can sustainably benefit from the resources. It is the primary management tool of multiple use marine protected areas such as PECCA. Specific geographic areas are designated based on their conservation requirements and ability to support certain activities. The GMP provides guidance on what can and cannot occur within the zones. Zoning provides all users with a greater clarity and predictability, but zoning schemes can only be implemented through a full public consultative process.

The aims of the zoning scheme proposed for PECCA are to protect sensitive and threatened species and habitats, marine resources and the fishery stocks on which local communities and the tourism sector depend. It also aims to reduce user conflicts, while allowing all users to sustainably enjoy the benefits of the PECCA.

Recognizing that there is the need to have eventually, 15 % to 25% of the marine habitat areas included under a form of 'no touch' conservation zones that are strategically located to help the recovery of the PECCA, this GMP proposes a much smaller proportion, from which to build upon over future reviews and adjustments, so that target can be reached within 10 years. The now well-documented Chumbe Island experience has shown that even damaged and over-fished coral reefs can recover when pressure on them is reduced.

This proposed zoning scheme for PECCA has been developed based on the characteristics and uses of the area and the recommendations of PECCA stakeholders including current user groups, such as the PECCA management, local fishers and tourism facilities owners and operators. The proposed zoning provides the framework for the management of uses within the PECCA over a 10-year period (2022-2032), during which it should be periodically revised (as described under the 'roadmap' approach) based on recommendations arising from new research, monitoring and evaluation activities. It is therefore important that all stakeholders are aware that the initial zonation scheme that is agreed under this GMP represents a minimal first attempt, and that over future reviews, the overall goal will be to increase the number, area, and variety of zones to improve the overall success at reaching the overall goal and objectives of the PECCA.

Implementation of the proposed zoning scheme requires an effective enforcement framework, as described in the MCS Strategy. It also needs the constructive engagement of all relevant stakeholders, which may in turn require a public education effort to strengthen understanding and encourage compliance among respective resource user groups.

### 2.2 Prohibited practices and activities within all zones

To restore, conserve and protect the habitat and marine resources of the PECCA, specific activities will be prohibited. Following implementation of this GMP, regulations will be drawn up and legislated by the order under the Fisheries Act, 2010 and its subsequent amendments. All activities prohibited under the existing national legislation shall be prohibited in all zones within the conservation area boundaries.

Specifically, the following activities are prohibited:

### Fishing practices

- Any activity involving mechanical damage to, or breakage of, coral and other benthic habitats or organisms, whether by hand, use of poles or other implements
- Killing of turtles, whether accidental or deliberate, including removal of eggs [note 1]
- Killing of dolphin and whales, and dugong, whether accidental or deliberate [note 1]
- Trawling or any form of dragging of nets on the seabed
- Use of propelled spear-guns and harpoons for commercial fishing
- Use of dynamite or other explosives for fishing
- Use of chemicals and poisons for fishing
- Use of SCUBA gear to collect any marine organism, other than for research purposes and subject to prior authorization
- Use of mesh size for *madema* smaller than 2 inches
- Use of wire *madema*
- Use of metal spears
- Use of beach seine-nets
- Use of monofilament gill-nets
- Use of pull nets with stretched-mesh size of less than 2.5 inches
- Use of mosquito nets, other than by women for catching small shrimps (*uduvi*)
- Use of all large-meshed set gill-nets of mesh size exceeding 4 inches, on bottom mid or surface, including drifting [note 2]
- Other fishing gears may be introduced to this list to reflect new legislation.

Note. 1. The feasibility of enforcing the regulation banning killing of turtles, dugong, dolphins or whales caught by accident will be a challenge to enforce. This is addressed in more detail in the MCS Strategy, and a phased or separate zonation approach may be required.

Note 2. The exclusion of all large-mesh (>4 inches) gill-nets used as bottom-set and drifting surface nets, within this relatively large area, is aimed specifically at reducing the mortality of the resident dolphin populations. Seasonal migrating Humpback whales and endangered sea turtles will also benefit from this ban, though their movements extend well beyond the boundaries of this specific zone. Therefore, this net will be permitted outside the MCAs, and its use within the MCAs will need to be agreed with the fishers and the MCA Manager who will be guided by experts, the SMC and other stakeholders. It is noted also that seasonal bans may be appropriate in certain locations, and that the complete ban may need to be achieved over time.

Of relevance to illegal nets, *Mtando* is use of any surrounding purse-seine type net, referring to ring-

nets that are used in shallow waters so that the bottom of the net is in contact with the substrate which is disturbed when the net is drawn shut. On mainland Tanzania it also includes beach or boat seines (also called *Juya Kigumi* or *Kavogo*) for surrounding net with a float line fitted with floaters and bottom line with sinkers or any other modification, used in shallow water targeting fish living in coral reefs and other shallow water fish and when operated the bottom line touches the seabed causing damage to the environment. A key feature of *kigumi* is the use of sticks to drive fish into the net.

All other ongoing use of most recreational and artisanal fishing activities that are ecologically sustainable and consistent with the overall objectives of PECCA are permitted. These include basket traps (*madema*), handlines, other nets between 2.5 inches and 4 inches, in specific netting zones (to be defined).

### Shore-based and seabed-extractive activities

- Mangrove cutting (unless with permit from Forestry Division)
- Mining of live coral
- Mining of dead coral
- Sand mining from beaches and sandbanks
- Any form of seabed mining
- Production of salt by heating seawater using fuel wood or hydrocarbons
- Sale and buying of marine curios inside the PECCA (with the aim to develop a Zanzibar-wide ban, especially of critical species e.g. Triton, Bulmouth Helmet, shark teeth and jaws)

### Other activities

- Anchorage in coral reef areas
- Introduction of alien species of flora and fauna for mariculture (unless specifically permitted by the relevant authorities)
- Jet skis
- Port development and/or dredging (marina development and permanent docking facilities – including wood jetties - will require submission of an ESIA and prior approval of the Manager)
- Hydrocarbon exploration and drilling (where exploitation will be subject to comprehensive ESIA and review by the Manager and other relevant authorities)

## 2.3 Fishing and tourism operational regulations inside MCAs

All fishing and tourism activities will require that operators be licensed, both individuals and vessels, as per fisheries, tourism and maritime regulations. In particular, the following will be required:

- All artisanal fishers in will be issued a fishing license and will provide all required information on the type of vessel/gear they use.
- All tourism dolphin boat operators will be issued a dolphin license and will provide all required information on the type of vessel they use.

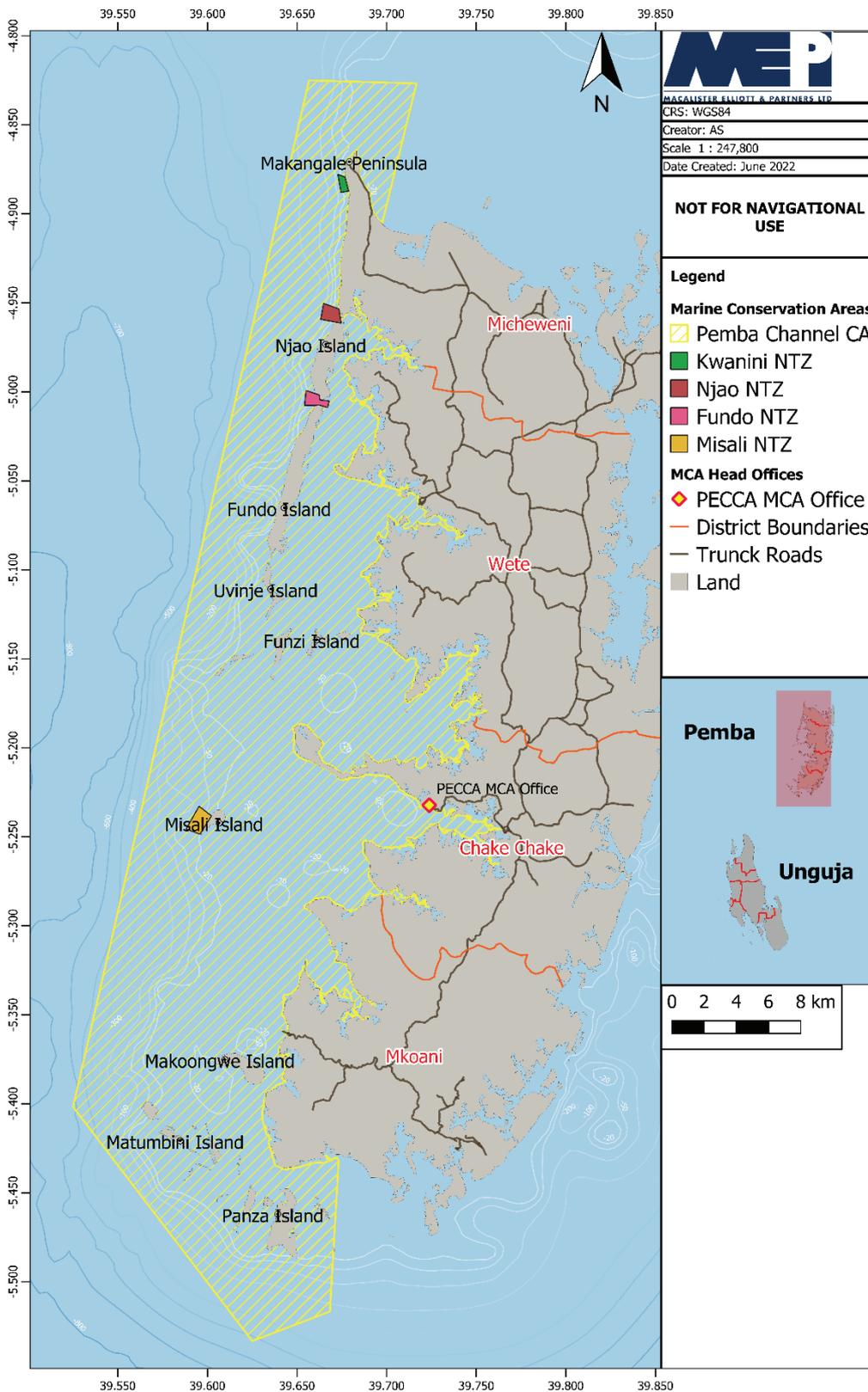
- All tourism sandbank, snorkelling and picnic boat operators will be issued a dolphin license and will provide all required information on the type of vessel they use.
- All tourism-related boat operators (dolphins, sandbank and snorkelling and SCUBA) will be required to undertake a training course on boat operations within PECCA, related boat manoeuvres around marine mammals, close to coral, anchoring, basic first aid, and explanations on permitted behaviour within MCAs to passengers (clients). The certificate will last for a year with yearly refresher renewals. If in contravention of the PECCA boat Code of Practice, then the licence can be revoked. Employment for trainers will be one additional benefit of this intervention.
- Sport fishing (including use of spearguns) will be restricted to designated areas within the PECCA, will be subject to prior issuance of sports fishing license and payment of the appropriate fees, may be bound by minimum and maximum size restrictions. Furthermore, the fishing of some species, to be determined by the Manager may be restricted to catch and release only.
- Sport fishers (including use of spearguns) will show permits and provide catch information to any duly authorized PECCA staff.

PECCA zonation proposed in this initial phase of the implementation of the PECCA GMP is very simple and comprises only one type of user zone, as follows (see Figure 9):

- Replenishment Zones (RZ) or Core Protection Zone

The following sections provide further details on the rationale for each zone.

Figure 9. Proposed zonation map for PECCA.



## 2.4 Proposed Zones for the PECCA

### Replenishment Zones

The Replenishment Zones (RZ) are designed to protect and conserve biologically significant habitats that have or are being restored to their near pristine conditions (locally referred to as *tengefu*) and offer sites to be undisturbed for scientific research. Some of the key objectives of this zone are to:

- Protect areas to allow them to be restored
- Protect spawning areas and nursery grounds
- Minimise damage to important habitats
- Provide refuge for protected species, such as dolphins and turtles
- Boost species numbers, which helps the food web as a whole
- Increase the abundance of fish and become an integral part of the resource management (mangroves, coral reef, fisheries); and
- Provide restored undisturbed environments for research and other educational activities.

As such, all types of fishing activities will be prohibited in these zones, but a range of recreational activities, such as boating, SCUBA diving and snorkelling, that have minimal impact on the marine environment will be allowed but regulated and monitored.

Although these recreational activities will be promoted, the primary objective of the RZs remains maintaining ecological integrity. Therefore, this zone will act as a sanctuary for fish and other marine life.

In the first phase of implementation, the PECCA RZs are designed to be small and numerous, at locations which are important from an ecological perspective. These include areas of high coral cover, including Misali, Njao and Fundo coral gardens, and breeding and feeding sites for important species such as grouper and octopus which will enable them to be true RZs and also have a greater conservation impact. This is the best information that exists at present. Additional surveys will need to be undertaken to identify other areas of high ecological value. It is also important that the RZs are attractive, accessible and known to the tourism/SCUBA sector. By visiting these RZ sites, these stakeholders will be contributing to financing the PECCA as well as participating in the surveillance and sharing of information for management, as described in the MCS Strategy (Chapter 8). Periodic reviews on the RZ are a mandatory feature of the MCA that would require collaboration from conservation and research partners. The proposed RZs of the PECCA encompass the following:

#### *Misali*

This proposed RZ aims to restore the condition of the marine life around Misali, and is based on the previous protected area, covering the western 'core zone' (see Figure 10). The northwest-facing beach on Misali Island has been an important shallow SCUBA and snorkeling site for over 25 years and was an integral part of the original MICA. This is another justification for continuing to select Misali as a RZ, as it is well-established and well-known among fishers and other coral reef users.

The precise boundaries of this RZ will require comprehensive discussion with the fishing community, including local resident fishers from nearby SFCs as well as *dago* fishers, before boundaries are formally agreed.

Once agreed, it is recommended that mooring buoys be placed in the area adjacent to favorite anchorage, snorkeling and SCUBA sites, as this area is a popular area for visitors.

Mooring buoy will help alleviate potential anchor damage to the habitats in this area. The far north-east shallow zone of Misali is also an ideal site for the installation of an artificial reef or wreck to be considered in future, and potentially provide additional attractions to tourists.

### ***Makangale, Mkia Ng'ombe or Njao Gap and Fundo Gap***

This area borders the hub of new tourism development in PECCA, and comprises a fringing reef and lagoon complex, with an extensive shallow reef flat that probably partially dries, with a shallow lagoon-channel running parallel to the beach for the length of the proposed three small RZs. These are located along the northern tip of PECCA and includes the small Kwanini MPA that is currently defined under a bye-law, the Mkia Ng'ombe or Njau Gap passage (*mlango*) and Fundo Gap passage (*mlango*) (see Figure 11). This area supports diverse coral communities and has become a popular tourist zone.

## **2.5 Finalization of the Proposed Zonation Scheme**

The precise boundaries of three of these four relatively small RZs will require comprehensive discussion with the local SFC and fishing community and the tourist stakeholders before they are formally agreed. The Kwanini MPA is already gazetted in bylaws hence the area is formally recognized. Once the boundaries of the other three are agreed, it is recommended that mooring buoys be considered in the area adjacent to favorite anchorage, snorkelling and SCUBA sites, as this area is a popular area for visitors staying at the nearby hotels. Mooring buoy will help alleviate potential anchor damage to the habitats in this area. The area around the Misali Island, is potentially also ideal for the installation of an artificial reef or wreck to provide additional attractions to tourists.

Also of relevance to many RZs is the consideration of extending the depth to beyond the depth limit of the MCA, potentially to 30 m where many species of coral and associated marine life exist and their protection is needed to ensure the RZs fulfil their roles recovery and replenishment of other shallows areas to which they are functionally linked.

Figure 10. Proposed Misali Island no-take zone.

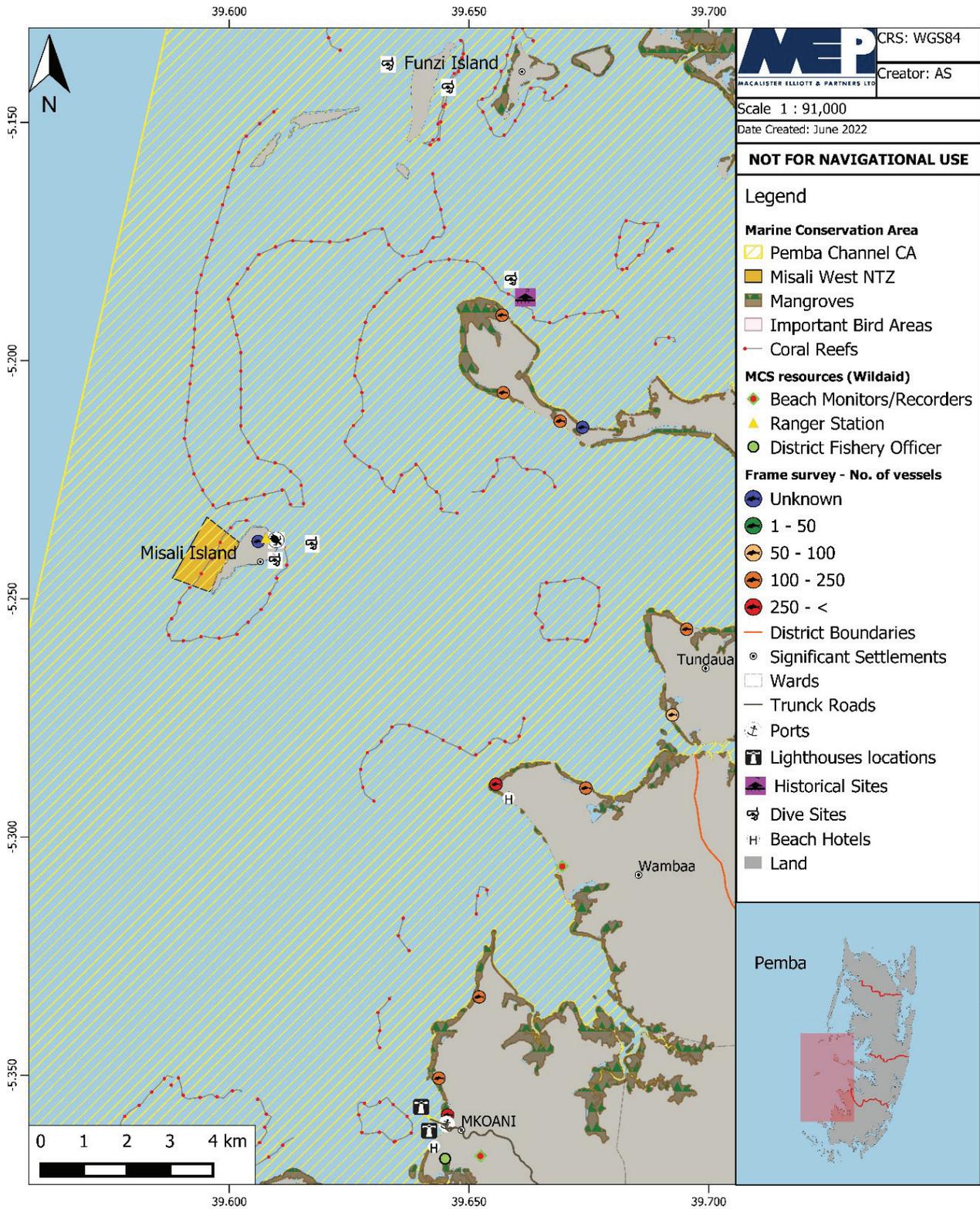
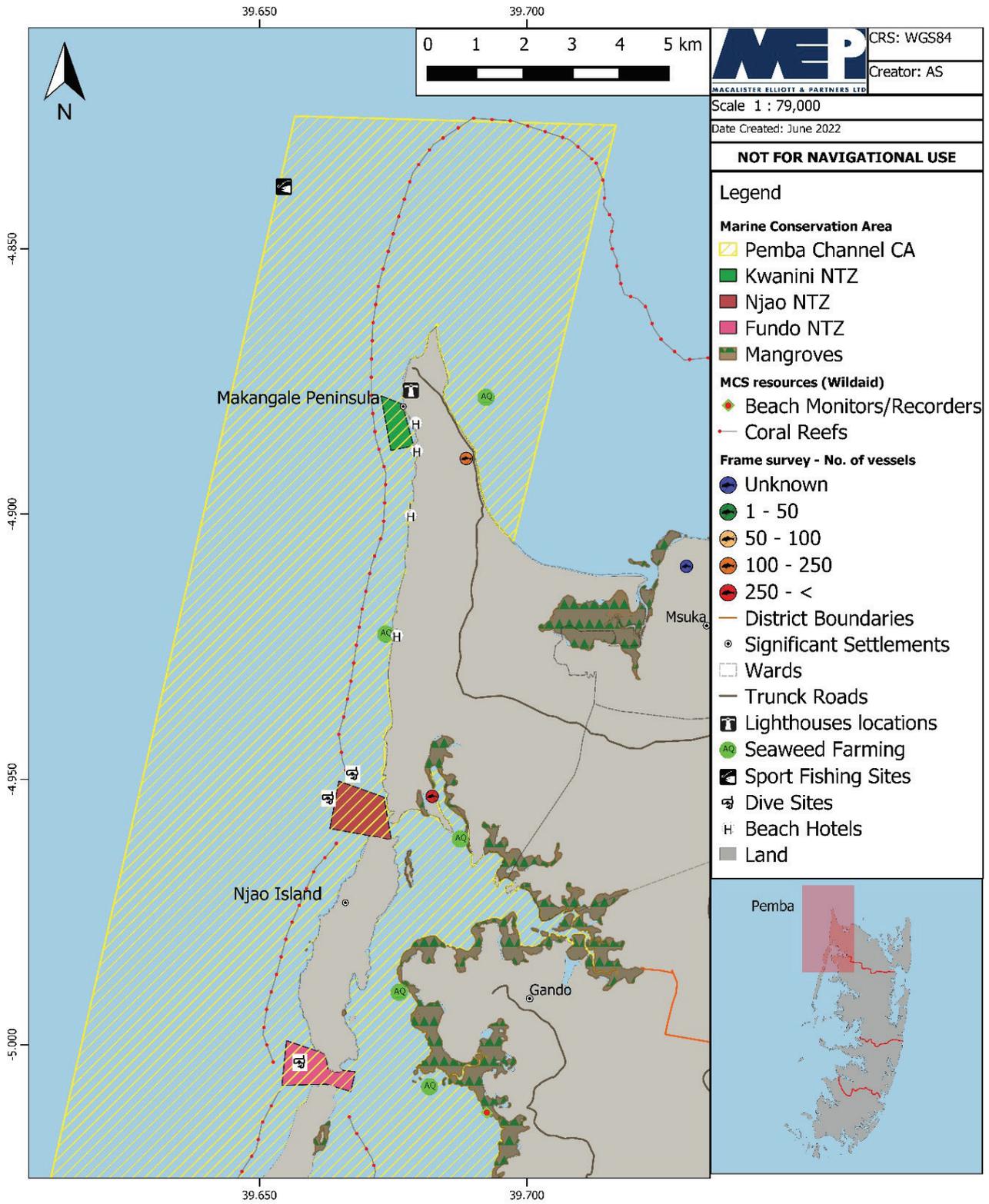


Figure 11. Proposed Makangale, Njao Gap and Fundo Gap no-take zone.



## 3. ECOLOGICAL MANAGEMENT PROGRAMME

### 3.1 Programme Purpose and Strategy

The purpose of the Ecological Management Programme is to:

***Restore and maintain PECCA's ecological integrity through integrated strategic adaptive management.***

The PECCA ecological management programme (EMP) aims at enhancing biodiversity conservation and ecological integrity of the key ecosystems that include mangrove forests, coral reefs, seagrass beds, sandy beaches, islands and their associated resources. These ecosystems serve as vital habitats for diverse flora and fauna that are important for local livelihoods and constitute an essential element for sustainable development and tourism.

As described in the preceding sections, these ecosystems are exposed to numerous and diverse anthropogenic and natural pressures that have led to degradation, often with loss of biodiversity and reduced productivity. The main pressure from humans is unsustainable exploitation to meet the needs and demands of local communities. This can result in conflict between utilization and conservation objectives. Other local pressures include vessel anchoring, use of illegal and destructive fishing gears, and a range of pollution types (including localized domestic waste/sewage discharge as well as diverse solid waste, especially plastics). Finally, the impacts of climate change and global warming (sea level rise, rise in temperatures and acidification) are already being felt in PECCA.

These local and global threats are intensified by the high levels of poverty within local coastal communities, the absence of many alternative livelihood options, and the generally low education and awareness among local communities, resulting in little appreciation of the true economic values of these ecosystems. Increasing awareness among the local stakeholders, resource users and tourism entities of coral reefs and the role they play in delivering ecosystem services is critical.

The PECCA's EMP is based on management actions and activities that aim to address and reduce and eliminate the above-mentioned threats, thereby protecting the ecological integrity and values of the ecosystems of PECCA. The five guiding principles explain key factors considered in the development of the PECCA EMP. These will influence the implementation of the EMP, and are described below:

#### Guiding principles

While implementing the EMP, the PECCA management, with participation of stakeholders, will endeavor to ensure that:

**Coastal and marine ecosystem resilience is strengthened and safeguarded through maintenance of ecological linkages and connectivity**

Strong ecological linkages and connectivity that maintains exchange of larvae and growth stages and other materials are crucial to the health of the PECCA coastal and marine ecosystems. Strengthening and maintaining connectivity ensures the structure and function of these ecosystems is safeguarded, promoting resilience and inherent recovery capacity from current and future levels of disturbances.

**Human livelihoods are diversified, strengthened and wellbeing ensured**

Ecosystem goods and services play a critical role in sustaining livelihoods and the wellbeing of local communities. Managing this human dimension and the interaction with the coastal and marine ecosystems is crucial and represents the core of management and conservation actions.

### □ **Conservation of coastal and marine species is strengthened and enhanced**

The rich biodiversity of PECCA includes notable species such as sharks and rays, dolphins, dugong, sea turtles, and whales that are considered threatened or endangered locally and globally. Through this EMP, efforts will be made to ensure that threats to these special status species are minimized and recovery of their populations enhanced and monitored.

### □ **Strategic linkages and exchange of information between research and conservation partners and PECCA management managers are enhanced**

Over the past twenty years, different national and regional institutions and research groups have undertaken studies under different disciplines in the PECCA. However, information sharing among these institutions and with local institutions is weak. This principle seeks to avoid duplication of research, to promote priority research, enhance sharing, and boost the application of research findings in management decisions that contribute towards PECCA objectives.

### □ **Effective research and monitoring programmes developed to guide management developed**

The development of an effective planning and management approach for PECCA requires understanding the ecosystem dynamics and influences of both natural and local and global anthropogenic influences. This understanding in turn requires information on trends in ecosystem and species dynamics over long periods. Only by identifying the appropriate ecosystem indicators and implementing the right monitoring tools can information and data be generated that will guide the effective management of the PECCA.

## **3.2 Targeting Ecological Management Actions**

With limited human and financial resources available for management of the PECCA, it is vital that there is prioritisation of interventions to safeguard the ecological integrity of the ecosystems. The CAP methodology provides a tested mechanism for targeting ecological management, followed by identifying and developing accurate definitions and understanding of the protected areas' key ecological features, their management needs, and the major threats.

The three main stages in applying the CAP methodology are:

- 1) selection of *Conservation Targets*;
- 2) identification and ranking of *Threats to the Conservation Targets*; and
- 3) Development of *Management Objectives and Actions* to address the threats and enhance the *Conservation Targets*.

These key stages and their application in the PECCA planning process are developed further in the following sections.

### **Conservation Targets**

The first step is the definition of a small number of (usually 7 to 10) Conservation Targets, that represent a limited suite of species, communities, and ecological systems that encompass the biodiversity in the PECCA and its ecosystem. They are the basis for setting goals, carrying out conservation actions, and measuring conservation effectiveness.

In this GMP, ten PECCA Conservation Targets were defined (Table 6), each based on their own rationale, important subsidiary targets (i.e. other ecosystem components that share Key Ecological Attributes (KEAs) and threats with the Conservation Target concerned), and the KEAs for each target.

These Conservation Targets represent the unique ecological and biodiversity features of the PECCA that are the focus of restoration and conservation efforts within the GMP and that may require specific management actions.

**Table 6. PECCA Conservation Targets, subsidiary targets, and Key Ecological Attributes (KEAs). Modified from KWS (2015).**

Conservation Target	Rationale for selection	Important subsidiary targets	Key Ecological Attributes
<ul style="list-style-type: none"> <li>• Mangrove ecosystem</li> </ul>	<ul style="list-style-type: none"> <li>• Fisheries benefit</li> <li>• Nursery grounds</li> <li>• Bird community habitat</li> <li>• Shoreline protection</li> <li>• Buffer to wave energy</li> <li>• Excellent carbon capture and sink</li> <li>• Entrapment of sediment</li> <li>• High productivity value</li> <li>• High subsistence value</li> <li>• Slightly degraded</li> <li>• Economic value (potential for alternative livelihoods)</li> </ul>	<ul style="list-style-type: none"> <li>• Diverse fish species</li> <li>• Bird species</li> </ul>	<ul style="list-style-type: none"> <li>• Biomass value</li> <li>• Forest cover</li> <li>• Complexity index (measures of stand height, composition, density, etc)</li> <li>• Importance value index (frequency of occurrence of a particular species)</li> <li>• Water quality</li> <li>• Nutrient levels</li> <li>• Sedimentation</li> <li>• Bird community composition</li> </ul>
<ul style="list-style-type: none"> <li>• Coral reef</li> </ul>	<ul style="list-style-type: none"> <li>• Shoreline protection</li> <li>• Spawning ground</li> <li>• Turtle habitat</li> <li>• Nursery and breeding ground for reef fish</li> <li>• High biodiversity value</li> <li>• High productivity value</li> <li>• Highly sensitive habitat</li> <li>• High economic value (livelihood support, tourism)</li> </ul>	<ul style="list-style-type: none"> <li>• Reef fish</li> <li>• Reef invertebrates</li> <li>• Turtles</li> <li>• Dolphins</li> </ul>	<ul style="list-style-type: none"> <li>• Fish and invertebrate density, diversity, and biomass</li> <li>• Bleaching extent and severity</li> <li>• Coral diseases</li> <li>• Sea urchin density</li> <li>• Coral recruitment</li> <li>• Coral diversity and cover</li> <li>• Water quality</li> <li>• Predation and herbivory</li> <li>• Benthic composition (including live coral cover)</li> <li>• Reef rugosity</li> <li>• Seawater temperature</li> <li>• Turbidity (light attenuation)</li> <li>• Sedimentation rates</li> </ul>
<ul style="list-style-type: none"> <li>• Seagrass beds</li> </ul>	<ul style="list-style-type: none"> <li>• Turtles and dolphin feeding grounds</li> <li>• Nursery ground for fish and invertebrates</li> <li>• Sediment trap/nutrient recycling</li> <li>• Carbon capture and sink</li> <li>• High biodiversity value</li> <li>• High productivity value</li> <li>• High economic value (livelihood support)</li> <li>• Highly resilient</li> </ul>	<ul style="list-style-type: none"> <li>• Diverse fish species</li> <li>• Turtles</li> <li>• Gleaning livelihoods</li> </ul>	<ul style="list-style-type: none"> <li>• Abundance of fish and invertebrates</li> <li>• Seagrass cover, diversity and shoot density</li> <li>• Herbivorous density</li> <li>• Nutrient levels</li> <li>• Primary productivity</li> <li>• Sedimentation</li> <li>• Water quality</li> </ul>

Intertidal habitats	<ul style="list-style-type: none"> <li>• Biodiversity value</li> <li>• High productivity value</li> <li>• Economic value (livelihood support)</li> <li>• Shoreline protection</li> </ul>	<ul style="list-style-type: none"> <li>• Octopus</li> <li>• Bird species</li> <li>• Sea cucumbers</li> <li>• Cleaning livelihoods</li> </ul>	<ul style="list-style-type: none"> <li>• Biodiversity value</li> <li>• High productivity value</li> <li>• Economic value (livelihood support)</li> <li>• Shoreline protection</li> </ul>
Conservation Target	Rationale for selection	Important subsidiary targets	Key Ecological Attributes
Coastal forest	<ul style="list-style-type: none"> <li>• Encroachment</li> <li>• High level of endemism</li> <li>• High cultural value</li> <li>• High subsistence value</li> </ul>	<ul style="list-style-type: none"> <li>• Colobus monkey</li> <li>• Elephant shrew</li> <li>• Flying foxes (fruit bats)</li> </ul>	<ul style="list-style-type: none"> <li>• Canopy cover</li> <li>• Forest area · Complexity index (measure of stand height)</li> </ul>
Islands	<ul style="list-style-type: none"> <li>• Unique Islands · Nesting grounds of migratory birds</li> <li>• Roosting sites for various bird species</li> </ul>	<ul style="list-style-type: none"> <li>• Fairy tern</li> <li>• Mangroves</li> <li>• Sandy beaches</li> </ul>	<ul style="list-style-type: none"> <li>• Abundance and diversity of birds</li> <li>• Vegetation cover</li> <li>• Sea level</li> </ul>
Sandbanks	<ul style="list-style-type: none"> <li>• High economic value (tourism)</li> <li>• Roosting sites for various bird species</li> </ul>	<ul style="list-style-type: none"> <li>• Diverse bird species</li> </ul>	<ul style="list-style-type: none"> <li>• Abundance and diversity of birds</li> <li>• Sea level</li> </ul>
Reef fish stocks	<ul style="list-style-type: none"> <li>• High biodiversity value</li> <li>• Highly sensitive habitat</li> <li>• High productivity value</li> <li>• High economic value (livelihood support, tourism)</li> </ul>	<ul style="list-style-type: none"> <li>• Non-commercial</li> <li>• finfish</li> </ul>	<ul style="list-style-type: none"> <li>• Level of demersal resource exploitation,</li> <li>• Status of fish resources (abundance, biomass, diversity)</li> <li>• Trophic levels structure (herbivorous, predatory)</li> <li>• Species aggregations</li> </ul>
Threatened marine mammals	<ul style="list-style-type: none"> <li>• Biodiversity value</li> <li>• Tourist attraction</li> <li>• Indicator of ecosystem health</li> <li>• Humpback dolphin (endangered)</li> <li>• Dugong (vulnerable)</li> </ul>	<ul style="list-style-type: none"> <li>• Prey species</li> <li>• Seagrass</li> </ul>	<ul style="list-style-type: none"> <li>• Water quality</li> <li>• Population size and structure</li> <li>• Genetic diversity</li> <li>• Habitat quality and utilization</li> <li>• Availability of prey species</li> <li>• Human disturbance</li> </ul>
Sea turtles	<ul style="list-style-type: none"> <li>• Biodiversity value</li> <li>• Endangered and critically endangered species</li> </ul>	<ul style="list-style-type: none"> <li>• Reef invertebrates</li> <li>• Seagrass beds</li> </ul>	<ul style="list-style-type: none"> <li>• Water quality</li> <li>• Population size and structure</li> <li>• Genetic diversity</li> <li>• Habitat quality and utilization</li> </ul>

## Threats to Conservation Targets

A “threat” is defined as combination of a stress and the source of the stress that have a negative impact on Conservation Targets. The comprehensive definition of Conservation Targets and their KEAs enables the identification of the “threats” to these targets and attributes and the subsequent prioritisation of these threats according to their significance to Conservation Targets during the 10-year lifespan of the PECCA GMP.

Table 7 below details the priority threats that currently impact or are likely to impact on the PECCA Conservation Targets and their KEAs. The analysis presents the threats with an indicator of whether the threat is stable, increasing or decreasing, and the resulting importance or priority of each threat. The ranking of the threats helps to define the priority management objectives and subsequent actions that define the ecological management programme, as well as the other five management programmes presented in this GMP.

**Table 7. Threats to Conservation Targets of PECCA.**

Threats	Conservation Targets										Priority ranking
	Mangrove	Coral reef	Seagrass	Intertidal habitat incl. beaches	Coastal forest	Islands	Sandbanks	Reef fish stocks	Sea turtles	Marine mammals whales, dolphins	
<i>Over exploitation of resources</i>	↑	↑	↑	↑↑	↑	↑	↑	↑↑	↑↑	↑	***
<i>Destructive exploitation (destructive gears &amp; methods)</i>	↑	↑↑	↑	↑	↑	↑	↑	↑↑	↑	↑	***
<i>Invasive species (actual and risk)</i>	≈	≈	≈	≈	↑	↑	≈	↑	≈	≈	*
<i>Climate change (sea level/temperature rise, etc)</i>	↑↑	↑↑	↑	↑		↑	↑	↑	↑	≈	**
<i>Pollution (debris from land and sea sources)</i>	↑↑	↑↑	↑	↑		↑↑	↑↑	↑	↑↑	↑↑	***
<i>Wastewater/poor waste disposal</i>	↑	↑		↑		↑	↑				**
<i>Land erosion/ sediment</i>		↑	↑			↑					*
<i>Tourism pressure on marine environment</i>	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	**
<i>Removal of keystone species</i>		↑↑	↑↑		↑	↑		↑↑			***
<i>Poor water quality</i>		↑	≈					≈			*
<i>Seaweed farms seabed/ecology impact</i>	↑		↑↑	↑↑							*
<i>Boat anchoring damage</i>		↑	↑↑					↑↑			**
<i>Charcoal production</i>	↑				↑	↑					*
<i>Coastal development</i>				↑	↑	↑↑					**
<i>Overfishing predatory fish that feed on sea urchins</i>		↑↑	↑↑	↑				↑			***
<i>Entanglement in fishing gears</i>									↑↑	↑↑	***
<i>Impact from oil and gas exploration</i>		?						?	↑	↑	*
<b>Threat level</b>	Not applicable	NA	Very high	High	Medium	Low		None			
<b>Trend</b>	Significantly increasing		↑↑	Increasing	↑	Stable	≈	Decreasing	↓	Uncertain	?

### 3.3 Management Objectives and Actions

The identification of threats to the Conservation Targets and their KEAs (Table 6) and the ranking (Table 7) provided the basis for the development of the EMP's Management Objectives (MOs) and Actions. The following sections describe these MOs and provides an outline of the management actions needed to achieve them. For each of the following three MOs a brief description of the relevant management issues and opportunities is given, which provide the specific context and justification for the actions:

**MO 1.** Populations of rare, endemic, endangered, threatened or protected species restored and protected

**MO 2.** Marine ecosystems are restored and maintained in a healthy functioning state

**MO 3.** Marine biodiversity information is shared, understood and appreciated

#### **Objective 1: Populations of rare, endemic, endangered, threatened or protected species restored and protected**

The Pemba coast is endowed with diverse terrestrial and marine habitats that host a wide array of flora and fauna species some of which are of special conservation concern. In the PECCA's wider ecosystem, the adjacent coastal forest ecosystem is home to an array of wildlife, including the Zanzibar Red Colobus monkey (the flagship species for the Jozani forest and now the Ngezi forest as well), the rare and threatened small mammals and birds and local bat species, some of which are considered endangered. These may all, at times, move into the fringing and creek mangroves of the PECCA.

The strictly marine habitats include coral reefs, seagrass beds, mangroves, sandy beaches and sandbanks and intertidal habitats. These habitats are home to a variety of marine flora and fauna such as the endangered sea turtles, dolphins, whales, and diverse species of fishes and invertebrates. The diverse species cover a range of trophic levels, from top predators to prey, and serve as important indicators of the health of the environment. Extreme pressure from artisanal fishing and recreational tourist activities in the PECCA inevitably impacts on certain species in a variety of ways. This MO has therefore been formulated to better understand the population ecology, key habitat requirements and threats to these species and their habitats. An important management role is to restore and effectively protect the rich biodiversity of the PECCA and mitigate against any recreational and commercial fisheries-related impacts and other adverse effects of tourism and other uses. Seven management actions that will be implemented to realize this objective are described in the following sections.

#### **Action 1.1: Conduct surveys on status of turtle nesting beaches and habitat usage**

PECCA sea turtles are threatened by direct harvesting/fishing, trapping as by-catch in various fishing gear and by the destruction of foraging and nesting grounds due to poor shoreline management. In the PECCA, poaching and destruction of turtle nests has often been reported. As the area has very few nesting beaches, pressure on sea turtles could be extremely high. Hence, to address these threats, under this management action, PECCA management will undertake a revision of the mapping and assessment of the turtle habitat including nesting, foraging and migratory habitats to provide information to update the status of the sea turtle populations within PECCA. Surveys will include establishing historic nesting sites and foraging locations as well as current ones. Further, turtle nesting sites will be secured and monitored, and strategies to protect turtles when in important foraging grounds will need to be developed with the fishing community, especially those using nets. The details of the number of sites to be secured and monitored will be informed by the precise baseline surveys conducted.

### **Action 1.2: Disseminate information and increase public awareness on sea turtle conservation and management**

Sea turtles are flagship species and were one of the most publicized species within Zanzibar in the 1990s and 2000s. This is attributed to the high number of stakeholders within the WIO region conducting research, education and awareness and lobbying for conservation and protection of sea turtles (and dolphins). For example, the critically endangered Hawksbill turtle was known to nest regularly on Misali Island. In Zanzibar, sea turtle conservation groups are involved in monitoring and conservation efforts, comprising sea turtle conservationists in different capacities, including individuals, hoteliers, local community groups, NGOs and government institutions. While there is no oversight or coordinating entity, information generated by these groups is vital for the conservation of sea turtles. The consumption of turtle meat in Pemba is common and has led to many deaths as a result of chelonitoxism (at least two occasions recorded in last 25 years, most recent November 2021). The reasons for this should be included in any education package. Guidelines for safe extraction of turtles from nets also need to be produced. PECCA will therefore scale up its linkages with these groups and develop programmes for education and awareness. Developing and implementing a sea turtle conservation and education programme in collaboration with national and international education and awareness initiatives like the *International Year of the Turtles* will enhance support for conservation among stakeholders. This action will also be informed by results from Action 1.1.

### **Action 1.3: Conduct inventories of key species**

Many studies have been conducted in the PECCA, though most were focused originally on turtles, then more so on dolphins, whales, coral reefs and mangrove forests, with seagrasses, for example, receiving less attention. Inventories of species of fish, coral, invertebrates (e.g. sea urchins and sea cucumbers, gastropods and marine molluscs), birds, marine mammals, and some vertebrates in the coastal forests can be collated from current publications, but much of this information is many years old and needs to be updated. This action requires a thorough assessment of biodiversity in the area in collaboration with other research and conservation partners. The timing of such work will depend on the funding and priorities determined by the MCA Manager and SMC. A monitoring strategy that takes into consideration the key species, habitats and processes will also be developed to update and monitor habitat status and species movements. Note that species of conservation importance are addressed in Actions 1.1 (turtles) and 1.5 (marine mammals, sharks and rays).

### **Action 1.4: Lobby for and contribute to the development of a Zanzibar Marine Mammal Conservation Strategy**

Several systematic studies on marine mammals have been carried out along Zanzibar's coast, and 34 of the estimated 89 species of cetaceans (dolphins and whales) worldwide are known to occur in the region with 19 species recorded off Zanzibar (Amir et al., 2012; Braulik et al., 2017). To improve conservation and management of these marine mammals a Zanzibar Marine Mammal Conservation Strategy will be developed, in collaboration with other government agencies, stakeholders and conservation partners, to adequately identify and address challenges facing them.

Considering that the marine mammals are trans-boundary species, there will be need for concerted efforts by all the stakeholders to come up with an action plan for the strategy which can be implemented by multiple stakeholders. This will elevate the status of the sea mammals to a national level hence provide a link to the regional and international initiatives on marine mammal conservation. Through this management action, PECCA will initiate the process of developing the strategy that will incorporate all stakeholders. MCA Manager will need to work with specialist marine mammal research partners.

### **Action 1.5: Develop a research and monitoring programme on species of conservation importance**

Given the strategic importance of dolphins to the PECCA and Zanzibar as a whole, and potentially of the dugong for PECCA, there is a need to develop a long-term national cetacean (whale and dolphin), dugong, elasmobranch and seahorse research programme. Elasmobranchs (sharks and rays) are declining at an alarming rate in around Zanzibar, including PECCA, and this balance needs to be redressed for a healthy ecosystem to restore. Endangered seahorses are harvested in south PECCA for sale, including the Giraffe seahorse (*Hippocampus camelopardalis*) and smooth seahorse (*H. kuda*), identified from Makongwe area.

The research should address key aspects of the endangered, threatened or protected species within these groups and ecology, such as their life cycle, migration patterns and routes, population structure and distribution are known, to understand potential threats and challenges and develop mechanism to mitigate them. Close collaboration with conservation-minded stakeholders and conservation partners outside the PECCA will be necessary to achieve ultimate conservation goals. Targets will need to be set as to what and when should be developed to address this action. Information generated will contribute to mapping the area to determine the geographic boundaries of the populations of these marine groups of conservation importance, identify hotspots, prime habitat requirements and possible threats to the survival of populations.

### **Action 1.6: Raise awareness about current and potential threats through training, education and implement a code of conduct**

Tourism has rapidly expanded in the PECCA area, which potentially increases conflict with conservation goals. A code of conduct on whale and dolphin watching introduced by the MCU in 2007, and originally focused primarily on the dolphin tourism activities of the MBCA on Unguja, was expected to address some of the issues. However, there is still need for sensitization and research required to effectively manage this activity, as well as formalization of the code of conduct in a regulation that is enforced. As such, a review of the level of interactions between people and marine mammals and their impacts will generate information for review of the existing code of conduct and develop education and awareness materials. Since many of these interactions are directly related to the boat owners and operators, these industry players will be trained and sensitized on the conservation and wise management of whale-dolphin watching activities, as this is one of the tourism products for the PECCA area. A further step to encourage compliance with codes of conduct, that needs to be assessed with the stakeholders, would be to include adherence to codes of conduct as conditions for licencing boat operators.

Work will require precise baseline results (see Action 1.5) and targets agreed with the participating institutions, under the guidance of the MCA Manager and SMC. Training targets, including numbers and communities involved need to be established.

### **Action 1.7: Manage harvesting of endangered sea cucumbers**

Endangered sea cucumbers are some of the highest value products harvested from coral reefs. *Holothuria nobilis*, *H. lessona*, *H. scabra* and *Thelanota ananas* are now classified as Endangered on the IUCN Red List. In PECCA, this trade is artisanal and concentrated in the Mkoani Bay area, as well as other sites. All the Endangered species are currently being fished. There is now concern about this fishery due to heavy extraction over recent decades, showing significant reductions in stocks of the most endangered species, and uncertainties over impacts on marine ecology due to removal of these sediment grazers.

Sea cucumbers harvest is a very lucrative business, supporting many livelihoods in PECCA. To be able to make management decisions regarding the fishery, an assessment will be done to gauge the level and extent of the trade, the percentage of fishers involved impacts on the habitat. An assessment of impact on targeted species needs to be conducted, with participation of relevant conservation,

fisheries and academic partners, to determine sustainability, building on any previous analysis conducted to date in the area. For example, Mwambao-MCCC has conducted some research on sea cucumbers in Kisiwa Panza area. The assessment should conduct a mapping exercise to identify possible areas for sustainable development of the fishery. The law currently allows sale of farmed sea cucumber but is silent on where juveniles can be sourced. *Holothuria scabra* is the preferred farmed species. The overall goal will be to discourage wild harvest and promote sea cucumber farming and help the marketing to allow wild resilience in these 10 years. The focus on community-based sea cucumber programmes should be encouraged.

Marketing of sea cucumbers not from farmed stock is currently not legal however the definition of farmed stock appears to include those collected from the wild but stocked in pens. The PECCA management will liaise with the fisheries department to revise the law if necessary, to ensure sustainability of the fishery.

## **Objective 2: Marine ecosystems restored and maintained in a healthy condition**

A wide range of species from large marine mammals like the whales and dolphins, to various fish species, sea turtles and seabirds are present in the PECCA, which also provides important livelihood opportunities for local communities. The major ecosystems in the PECCA (coral reefs, seagrass, and mangrove) have been altered due to human use and more recently to climate change. A notable climate change related effect on the critical ecosystems for PECCA is coral bleaching. The seagrass ecosystem is threatened by destructive fishing techniques, while coral reefs are also threatened by similar destructive fishing gears and certain fishing practices (that include ring net fishing, spearfishing and fishers anchoring on the reef flat and the huge numbers of foot-fishers that trample the reef flats on low tides), and to a far lesser extent by tourism activities such as boat anchoring and breakage caused by SCUBA divers and snorkelers. The mangroves of PECCA are in places also threatened by over exploitation.

The following three actions are designed to ensure restoration and protection of critical marine ecosystems for PECCA and their long-term viability ensured. The focus is on addressing the effects of human activities that are detrimental to these ecosystems.

### **Action 2.1: Implement measures to reduce coral reef damage**

In Zanzibar, coral reefs play extremely important ecological, economic and cultural roles. They also support high biodiversity, and protect coastal areas from storm surges, thus contributing to prevent coastal erosion.

The health of the PECCA's coral reefs has continued to decline, in part, due to destructive fishing gears and overfishing, with a community structure now dominated by sea urchins and herbivorous fish. Breakage of corals by novice snorkelers is also major threat to specific and accessible mall parts of the ecosystem within the PECCA. The installation of permanent moorings is proposed (See Action 1.3 in the Tourism Development and Management Programme). Similarly, numerous proposed Actions in the Fisheries Resource Management Programme (Section 5) are directly relevant to reducing destruction of coral reefs (e.g. Actions 1.1, 2.3 and 4.1),

To understand coral damage, an assessment to identify, map and zone coral reef ecosystems and their condition within PECCA should be undertaken, ideally with conservation and research partners to support the MCA Manager. Key indicators of coral reef condition and benchmarks against which change will be assessed will be developed, and research and monitoring information will be communicated to the community and other stakeholders to enhance coral reef recovery and conservation awareness and promote wise use of the resource. Involvement of the local community in biodiversity monitoring has been demonstrated by Mwambao-MCCC. Such an approach would also strengthen

information sharing with local communities. An implementation plan and clearly defined objectives to guide implementation need to be established. It should be considered a high priority, but the development of this action will depend on priorities and funding. **Action 2.2: Control access to selected critical habitats (coral reefs, mangroves and seagrass).** Uncontrolled human activities and natural occurring events (overharvesting, El Nino, use of destructive harvesting practices) have led to the partial destruction of coral reefs, seagrass and mangrove ecosystems within the PECCA. Among the efforts required to reduce the level of destruction will be the development of resource extraction plans for coral reef-related resources, reforestation of degraded mangrove areas and raising awareness about the need for healthy ecosystems in the protected area. Deforestation trends should be identified first, and reforestation should target mainly areas of degradation.

The seagrass bed is threatened by localized uncontrolled sewage seepage into the sea from villages and tourism establishments as well as from destructive fishing practices using beach-seine nets. Seaweed farming is the most recent threat, especially in the intertidal and shallow lagoonal areas, in PECCA taking place along much of the northwest coast of Makangale Peninsula as well as around Chokocho. Key stakeholders in these critical habitats will be sensitized on the impacts of human activities on these ecosystems and they will be assisted in developing and implementing mitigation measures. Zoning of areas for gear restrictions especially use of nets, needs to be considered along such measures.

### **Action 2.3: Conduct restoration and rehabilitation of critical habitats**

The compromised species and habitats of PECCA require restoration and rehabilitation strategies and/or implementation of measures that will ensure recovery of the ecosystem's structure and functioning. Hence, in partnership with other research agencies operating in the area, PECCA management will conduct pilot studies on restoration and rehabilitation of critical habitats. Scientists and PECCA managers will identify and make use of available manuals used for restoration or rehabilitation of critical habitats such as mangrove restoration, artificial coral transplantation, sea urchins and crown of thorns control manuals. Pilot studies on restoration and rehabilitation strategies will be conducted where no such manuals exist, with a strong involvement of local community stakeholders. Training of MCA Managers and/or communities should be conducted with the assistance of conservation partners and relevant academic institutions. Farmer field schools could be used for community training, and study tours for community to witness best practices in other sites should be considered. Prioritization of this proposed Action needs to be evaluated as cost effective, in light of potential high costs for coral reef restoration (and to a lesser degree seagrasses and mangroves) per unit of surface. A restoration planning exercise should be undertaken and depending on funds and conservation partner support, efforts should be allocated to protect those remaining intact critical habitats, rather than restoration. The overall approach is a candidate for marine spatial planning and zoning exercise to make sure all critical habitat and other zones are taken into consideration.

### **Objective 3: Marine biodiversity information is shared, understood and appreciated**

For effective management of protected areas research and monitoring information is critical. MCA Managers require information to enable them to assess the status of key species and habitats, information related to operations such as the behaviour of visitors and communities living adjacent to the MCA, and information to adapt to changes and hence improve management. Currently, there is very little formally agreed research and monitoring work carried out at the PECCA. However, numerous scientific reports and journal articles do relate to the PECCA, with most are on dolphins, and some on coral reef ecology, fisheries and a few are on management related topics such as local communities and resources management. Furthermore, research information is not always made readily available to the management authorities, and the management structure currently has none or little storage and retrieval systems for this type of information. The purpose of this objective is to streamline PECCA research and dissemination of research outputs to relevant stakeholders.

The nine proposed management actions that will be implemented to achieve this objective focus on integrating long-term and short-term surveys of all critical habitats and species; developing and

mainstreaming implementation of an environmental awareness programme; liaising with school authorities, wildlife clubs (and other groups) to develop a marketing strategy targeting schools and citizens; reviewing existing information and research on climate change, and raising awareness on climate change impacts, mitigation and adaptation measures; promoting central (DMC) research collaboration and dissemination of information; developing a central (DMC) research data management system; developing an ecological monitoring programme and build capacity to implement the programme; and, reviewing and revising management practices effectiveness with managers. These actions are described in the following sections.

### **Action 3.1: Integrate long-term and short-term surveys of all critical habitats and species**

PECCA requires short-term and long-term monitoring of critical habitats and species of special concern to detect changes in their status. Species of conservation importance are addressed in Actions 1.1 (turtles), 1.5 (marine mammals, elasmobranchs and seahorses) and 1.7 (sea cucumbers), while critical habitats (coral reefs, mangroves and seagrass) are addressed in Action 2.2. Of significant importance is linking these data with a GIS database to visualize changes over temporal and spatial perspectives, and to include investigating connectivity and movement between different areas. Surveys on these species and their habitats will be carried out regularly to determine trends. Local community stakeholders should be trained and heavily involved, as well as relevant conservation and development partners. The main outputs from this integration of the results of different surveys and monitoring efforts will be used to communicate findings and trends with local stakeholders, feeding into the environmental awareness programme (Action 2.3, below).

### **Action 3.2: Develop and mainstream the implementation of an environmental awareness programme**

Excessive human pressure coupled with the effects of climate change have diminished both the productivity and species richness and diversity of PECCA's coral reef habitats. Moreover, there is inadequate awareness on the importance of these habitats and poor enforcement of relevant regulations to protect these ecosystems. A critical step in developing effective conservation and management strategies for coral reefs in PECCA is the provision of information on the distribution, abundance, composition and health of these ecosystems. However, the existing information on coral reefs in PECCA is not promoted.

Increasing awareness among the local stakeholders, resource users and tourism entities of coral reefs and the role they play in delivering ecosystem services is critical. At the local community level, there is need to engage with stakeholder groups and define the needs for general environmental education as it relates to management of the PECCA's natural resources, from school age to older citizens. From such a survey, priority actions will be developed to guide the development of an environmental awareness programme focused on the resource users and resource managers involved in the PECCA. Experience from previous initiatives (and other relevant proposed Actions) will be garnered to help guide future environmental awareness programmes. Focusing on school level education, emphasis is needed on incorporation of endangered species information into the school curriculum, particularly on elasmobranchs, turtles and marine mammals. Awareness should also include local communities through co-management and participatory process that extend outside the scope of ecological monitoring, and more focused on resource use. PECCA management should facilitate inter-sectoral forum for information sharing and learning exchange.

PECCA management will collaborate with other government agencies and NGO partners in organizing and actively participating in conservation events such as annual marine environment day, *Mazingira* competition, species specific awareness activities for example *Year of the Dolphin* and *Year of the Turtle* as well as forming community and school-based wildlife or environmental clubs.

Conducting a broad Knowledge, Attitude and Practice (KAP) survey at the start of this intervention will greatly help to inform the details, content and approach of eventual environmental education,

awareness and training programme. One of the main goals of this Action is to develop a change in behaviour among resource users so that impacts on the natural environment are reduced. There are many resources and expertise available that are focused on behavioural change (e.g. RARE's "social marketing" campaign which describes strategies to help change behavior – <https://rare.org>). MCA Mangers should work with conservation partners, especially those experienced with social sciences and people centered approaches that strives to make environment- and climate-friendly changes in behaviour easier to adopt with more long-lasting impact.

**Action 3.3: Liaise with school authorities, wildlife clubs (and other groups) to develop a marketing strategy targeting schools and citizens**

Currently, students in large groups are unable to visit the MCA mainly because of the high cost associated with transport and entry fees. In liaison with DMC, affordable packages will be developed and extended to the wildlife clubs (and other groups) to be promoted in schools. Moreover, the local business community will be invited to invest in this initiative. As described for Action 3.2, one of the over-riding the goals is to encourage and develop behavioural change among resource users so that impacts on the natural environment are reduced. Expertise and techniques are available for this, and involvement of local communities is critical for the success of such interventions. For example, the Chumbe Environmental Education programme has taught over 11,000 local students; noting that issues of safety at sea are critical whenever promoting environmental education initiatives, as this is often overlooked and is vital to consider if groups are planning to take students on or in the water.

There is a need to engage with stakeholder groups and define the needs for general environmental education as it relates to management of the PECCA's natural resources, from school age to older citizens. Stakeholder analysis is crucial to identify stakeholders. The Department of Environment should be involved to help the action. The PECCA has unique conservation values which the community is not aware of. Thus, there is a need to raise general awareness on the importance of PECCA. Consequently, PECCA management will collaborate with other government agencies and NGOs in organising conservation events such as annual marine environment day, *Mazingira* Competition, species specific awareness activities like year of the dolphin and year of the turtle as well as forming community and school-based wildlife or environmental clubs.

PECCA ranks among the protected areas highly visited by organised groups. However, it still has potential to accommodate considerably more groups if education events and resources envisaged under this programme are implemented. Currently, the only organisation actively promoting and implementing marine conservation activities for schools is CHICOP. Their experience is valuable, and their model can be replicated through all of Zanzibar's MCAs, with dedicated tours to relevant parts of the PECCA organised. Other conservation education work in community areas may be underway, possibly involving school groups, and should be encouraged. To further enhance PECCA visitation by local organised groups, PECCA management will boost the conservation education activities targeting local schools, including through offering transportation.

National educational events will be targeted to capture a larger turnout of domestic tourists and visitors, including schools, as well as meetings and conferences such as annual head teachers' meetings, where promotion materials on PECCA will be distributed.

**Action 3.4: Conduct a review of existing information and research on climate change**

PECCA's major ecosystems include coral reefs, seagrass beds, mangroves and coastal forests, all potentially threatened by impacts of climate change. The ecological data available from various independent research initiatives provides some baseline information for certain features e.g. coral reefs, dolphins, birds. Information on how climate change will impact other habitats and species of the area is scant, and potential mitigation measures not known. Opportunities for carbon credit rights need to be clarified (i.e. to further encourage and promote mangrove and potentially seagrass conservation), and climate change vulnerable areas highlighted.

There is a need to review existing information on climate change with targeted research on climate change indicators and potential mitigation and restoration measures (e.g. reforestation, pilot coral growth studies, reefs connectivity studies to identify resilient reefs, pilot carbon capture project). Zanzibar has a Climate Change Strategy (launched in 2014) and climate change is incorporated in the 2050 Zanzibar Development Vision. PECCA management will partner with research institutions in synthesizing information on climate change and developing relevant intervention measures. One avenue of investigation might include using adapted methodologies of Climate Vulnerability Assessments at community level (see Care International, or Conservation International, FFI-Mwambao-MCCC BAF project), to integrate the socio-economic parameters into the risks and later mitigation strategies to respond to climate change impacts in PECCA.

### **Action 3.5: Raise awareness on climate change impacts, mitigation and adaptation measures**

PECCA stakeholders need to become aware of current global issues affecting ecological systems within their area, and how their livelihoods might be impacted. PECCA will therefore collaborate with relevant research stakeholders and partners to develop awareness on the results and recommendations of climate change studies in PECCA, building on the findings of Action 3.4 (above). This information needs to be available and disseminated in an easy-to-understand format to relevant stakeholders.

Following from the research findings from Action 3.4 (above) focus should include building knowledge at SFC level on expected climate change impacts and how to adapt/plan e.g. in selection of RZ. It is also important to assess the vulnerability of different SFCs within PECCA, that will help with prioritization. Outputs could consider also to facilitate the establishment, implementation and dissemination of the Zanzibar Disaster Communication Strategy (2011), particularly the procedures to disseminate timely and accurate warnings to the general public and government officials in the event of an impending emergency situation, to include early warning systems associated with climatic events.

### **Action 3.6: Promote central (DMC) research collaboration and dissemination of information**

All the MCAs of Zanzibar, including the PECCA provide study opportunities for research and educational institutions, but this needs to be conducted in a coordinated way to encourage formal mechanisms for information exchange and networking. To minimize duplication of studies a coordination mechanism coordinated through the DMC would help inform the development of research proposals. One possible way to achieve that is for research and conservation partners, MCA managers and the local communities to gather at a forum where experiences on research and management can be shared. In addition, existing regional mailing lists (e.g. WIOMSA mailing lists) may provide a good starting point for establishing collaboration links. A Zanzibar MCA annual research forum could be initiated, with regular updates of key stakeholders of PECCA and other MCAs on Zanzibar. During such meetings, research gaps will be identified, and important research themes prioritized. Note that research specific to fisheries and its dissemination are captured under Actions

2.2 and 2.1, respectively, in Chapter 5 Fisheries Resource Management Programme.

To ensure that priority areas are targeted, and research solutions identified collaborative effort between scientists and MCA managers in developing research proposals is important. This creates ownership regarding the purpose of research and sources of research funding, as well as ensures coordination and implementation of recommendations by MCA managers. Collaboratively identified targets and indicators to evaluate management effectiveness enhances and improves management and planning, as well as providing opportunities for participation of local community stakeholders.

An important outcome of the Action will be to make PECCA visible in the region and globally. This can be achieved by sharing more information and research findings, case studies and other scientific and social research outputs online and with appropriate data portals (e.g. Protected Planet, WDPA).

### **Action 3.7: Develop a central (DMC) research data management system**

The purpose for developing a central research data management system is to gather information that can be used for monitoring and assessment of threats and to evaluate and adapt management interventions where necessary. Many research partners have conducted research in the PECCA, but few of the outputs are centrally archived. An annotated bibliography of Zanzibar's MCAs can easily be compiled and made widely available, but the individual articles or reports are more difficult to obtain. Such findings are also crucial for sharing to promote PECCA (See Action 3.6, above).

Thus, a comprehensive information management system will be developed at the DMC Office to ensure all relevant data and information is analysed and disseminated regularly and made readily available through appropriate media (e.g. reports, pamphlets and scientific papers). Data collection protocols and platforms should be agreed on and training and equipment provided where needed, with easy access and contribution options (including "citizen science" with tourist divers' sightings for instance). The system should be comprehensive, and also include fisheries information, though access rights need not be the same for all users. Such a dissemination system will promote public appreciation of conservation efforts that should translate to increased support for the MCAs of Zanzibar.

### **Action 3.8: Develop an ecological monitoring programme and build capacity to implement the programme**

For effective protected area management research, monitoring and evaluation are essential. MCA Managers require information to enable them to assess the status of key species and habitats, information related to operations such as the behaviour of visitors and communities living adjacent to the MCA, and information to adapt to changes and hence improve management strategies. Hence, an ecological monitoring programme will be implemented to establish baseline data, record changes in resources and contribute to evaluate management effectiveness of the PECCA.

MCA Managers should work with conservation and research partners to develop such a programme, and NGOs and other stakeholders currently collecting data in the field, could be asked to share their data in a shared database. The activities should capacitate local talent and educated local stakeholders to participate in data collection and analysis. For example, Mwambao-MCCC has at least six trained octopus catch recorders in place in TUMCA (with the aim to encourage local level feedback into management practices). Such local experiences are very valuable and, where successful, need replicating.

The principal elements and indicators of the monitoring programme are incorporate in the more comprehensive Management Information System (MIS) that is presented as a standalone document. Local stakeholders will be involved. The ecological monitoring programme is distinct from the survey and monitoring programme of key species (Action 1.1), the monitoring programme of species of conservation importance (Action 1.5) and the surveys of critical habitats and species to determine trends and to visualize using GIS for stakeholder sensitization (Action 3.1). The focus is more on monitoring (and training) to determine whether management interventions are being successful. There are however synergies with the three aforementioned actions and the MCA Manger with research and conservation partners need to ensure that the four activities are not duplicating efforts but complimenting each other.

### **Action 3.9: Review and revise management effectiveness with managers**

This is a critical activity that will provide an opportunity for managers to analyse data (for example from the findings of Action 3.8, above) and determine whether modifications to management practices are necessary. The principal indicators related to management effectiveness are included in the comprehensive Management Information System (MIS) that is presented as a stand-alone document. Relevant elements specific to PECCA will contribute to management effectiveness assessment, to help to find out if the MCA is meeting its objectives in the most efficient and effective way. MCA Managers should seek assistance from experts within appropriate NGOs to undertake the

evaluations. Co-management approaches and community roles in local management need always to be respected and acknowledged.

Management actions should be designed around the concept of SMART objectives to ensure adaptive management, and once management actions are more firmly in place/effective, the monitoring approach will benefit from standardized surveys like those developed by METT/iMET and/or the Natural Resources Governance Tool (NRGT) developed by WCS. It will determine whether the MCA is designed, planned and managed appropriately, and whether it is having positive results, such as protecting biodiversity, promoting tourism and improving livelihoods of local people. Annual reviews of the METT or other tool tracking management effectiveness should produce results that can be published on global databases (e.g. protected planet) or WIO networks (e.g. WIOMPAN).

## **Monitoring Framework**

The monitoring framework presented in the Table 8 is designed to provide guidance for the assessment of the potential impacts resulting from the implementation of the EMP. The framework sets out the potential positive as well as negative impacts that may possibly occur during the implementation of each programme. The framework also includes easily measurable and quantifiable indicators for assessing these impacts, and potential sources of the information needed. Monitoring the impacts of the plan implementation will ensure that timely changes to management approach are made when the situation demands.

**Table 8. Ecological Management Programme Monitoring Framework (modified from KWS, 2015).**

Objective	Potential Impacts (positive and negative)	Verifiable Indicator	Sources and means of verification
Objective 1: Populations of rare, endemic, endangered, threatened or protected species restored and protected	Turtle population in PECCA increasing and breeding sites protected	Population size; Turtle nests	Population assessment report; Turtle nesting monitoring reports
	Endangered sea cucumber species population increasing	Population size	Population assessment report
Objective 2: Marine ecosystems are restored and maintained in a healthy functioning state	Coral reef damage in PECCA reduced	Population size of coral fishes	Coral reef fisheries monitoring report
	Threats to seagrass ecosystem reduced	Area coverage and shoot density	Seagrass bed monitoring reports
	Pollution reduced and clean-up programmes conducted regularly	Water quality	Water quality reports
Objective 3: Marine biodiversity information is shared, understood and appreciated	Marine biodiversity is being conserved	Species diversity; Population size	Population assessment report

### 3.4 Implementation Schedule

The following pages set out the proposed first six-years of the ten-year implementation and schedule for the PECCA GMP (see Table 9). The activity plan details the activities, responsibilities, timeframe and milestones necessary for the delivery of each management action, starting in 2022, which need to be finalized by the MCA Manager and SMC.

Table 9. Ecological Management Programme Implementation Schedule (first six years).

Management Action and Activities	Persons responsible	Timeframe												Proposed milestones
		2022		2023		2024		2025		2026		2027		
		1	2	3	4	1	2	3	4	1	2	3	4	
<b>Objective 1 Populations of rare, endemic, endangered, threatened or protected species restored and protected</b>														
<b>Action 1.1: Conduct surveys on status of turtle nesting beaches and habitat usage</b>														
1.1.1 Map and assess turtle habitats including nesting, foraging and migratory habitats														Turtle nesting sites monitored regularly
1.1.2 Update the status of the sea turtle populations	TBC													
1.1.3 Secure and monitor turtle nesting sites														
<b>Action 1.2: Disseminate information and increase public awareness on sea turtle conservation and management</b>														
1.2.1 Scale up linkages with the sea turtle conservation groups in Zanzibar and mainland Tanzania														
1.2.2 Develop programmes for education and awareness on sea turtles														
1.2.3 Implement a sea turtle conservation and education programme	TBC													
1.2.4 Enhance support for conservation among stakeholders														
<b>Action 1.3: Conduct inventories of key species</b>														
1.3.1 Undertake a thorough assessment of biodiversity in the area in collaboration with other researchers														
1.3.2 Develop a monitoring strategy that takes into consideration the key species, habitats and processes	TBC													
1.3.3 Update and monitor habitats status and species movements														
<b>Action 1.4: Lobby for and contribute to the development of a Zanzibar Marine Mammal Conservation Strategy</b>														
1.4.1 Lead the process of consulting local and international dolphin research experts on the development of a Zanzibar Marine Mammal Conservation Strategy	TBC													Proceedings of consultative meetings available by .....
1.4.2 Lobby relevant government agencies formalize the Strategy														
<b>Action 1.5: Develop a research and monitoring programme on species of conservation importance</b>														
1.5.1 Create close collaborations with conservation minded stakeholders outside the PECCA														
1.5.2 Map the area to determine the geographic boundaries of sharks, rays, dolphin, whales, dugong, etc														
1.5.3 Identify hotspots, prime habitat requirements and possible threats to survival of populations	TBC													
1.5.4 Develop mechanisms to mitigate against identified threats														
<b>Action 1.6: Raise awareness about current and potential threats through training, education and implement a code of conduct</b>														
1.6.1 Review the level of interactions between humans and marine mammals and their impacts														
1.6.2 Generate information for review of the current code of conduct	TBC													Negative dolphin-human interactions reduced by 50% by .....

Management Action and Activities	Persons re-sponsible	Timeframe												Proposed milestones
		2022		2023		2024		2025		2026		2027		
		1	2	3	4	1	2	3	4	1	2	3	4	
1.6.3 Develop education and awareness programmes on human-marine mammal interactions														
1.6.4 Train and sensitize boat owners and operators on appropriate whale-dolphin watching activities														
1.6.5 Maintain a PECCA dolphin, whales and dugong incident recording database and map conflict hot spots														
1.6.6 To encourage compliance with codes of conduct, assessed with stakeholders to include adherence to codes of conduct as conditions for licensing boat operators														
1.6.7 Support development and implementation of community-based action plans to address conflicts														
<b>Action 1.7: Manage harvesting of endangered sea cucumbers</b>														
1.7.1 Assess and gauge the level and extent of sea cucumber trading, the percentage of fishers involved and the impacts on the habitat														Endangered sea cucumber species population double in size by .....
1.7.2 Conduct an assessment on the impact of harvesting sea cucumber to determine its sustainability	TBC													
1.7.3 Liaise with the fisheries department to review the Fisheries Act and other policies that govern the trade to ensure sustainability of the fishery														
<b>Objective 2: Marine ecosystems are restored maintained in a healthy condition</b>														
<b>Action 2.1: Implement measures to reduce coral reef damage</b>														
2.1.1 Undertake an assessment to identify, map and zone coral reef ecosystems within PECCA														Coral reefs of PECCA mapped by .....
2.1.2 Develop key indicators of coral reef condition and benchmarks against which change will be assessed														
2.1.3 Communicate research and monitoring information to the community and other resource users to enhance coral reef conservation awareness	TBC													
2.1.4 Promote wise use of the resource														
<b>Action 2.2: Control access to selected critical habitats (coral reefs and seagrass)</b>														
2.2.1 Raise awareness on the impacts of human activities on critical habitats to key resource users														Rules on access to critical habitats available by .....
2.2.2 Assist key stakeholders in developing and implementing mitigation measures														
2.2.3 Restrict access to critical habitats which have been zoned as protection zone through implementation of the prescription provided in the zoning scheme	TBC													
<b>Action 2.3: Conduct restoration and rehabilitation of critical habitats</b>														
2.3.1 Conduct pilot studies on restoration and rehabilitation of critical habitats														Pilot studies on restoration of critical habitats conducted by .....
2.3.2 Use available manuals for restoration or rehabilitation of critical habitats (e.g. mangrove restoration, artificial coral transplantation, sea urchins and crown of thorns control manuals) in the pilot projects	TBC													

Management Action and Activities	Persons responsible	Timeframe												Proposed milestones
		2022		2023		2024		2025		2026		2027		
		1	2	3	4	1	2	3	4	1	2	3	4	
<b>Objective 3: Marine biodiversity information shared, understood and appreciated</b>														
<b>Action 3.1: Integrating long-term and short-term surveys of all critical habitats and species</b>														
3.1.1 Carry out surveys on critical species and their habitats regularly to determine trends	TBC													Monitoring of critical species done regularly
3.1.2 Link data from the survey with a GIS database to visualize changes over temporal and spatial perspectives														
<b>Action 3.2: Develop and mainstream the implementation of an environmental awareness programme</b>														
3.2.1 Develop effective conservation and awareness strategies for fragile habitats (especially coral reefs) and endangered species in PECCA and provide information on their distribution, abundance, composition and status	TBC													Environmental awareness programme developed by ..... and implemented by ..... with annual events thereafter
3.2.2 Actively participate in the annual marine environmental day														
3.2.3 Participate in <i>mazingira</i> competition														
3.2.4 Organize dolphin and turtle awareness events														
3.2.5 Give talks and disseminate promotion materials during conferences/meetings held														
<b>Action 3.3: Liaise with school authorities, wildlife clubs (and other groups) to develop a marketing strategy targeting schools and citizens</b>														
3.3.1 Work with school authorities and wildlife clubs (and other groups) to develop strategy to reach more schools	TBC													Strategy to reach more schools developed by ..... and implemented by .....
3.3.2 Learn from CHICOP experience and develop marine educational tours for local schools														
3.3.3 Provide transport to school groups to facilitate visits to PECCA for organized educational trips														
<b>Action 3.4: Promote relevant research on climate change</b>														
3.4.1 Review existing information on climate change, targeted research on climate change indicators and potential climate change mitigation and restoration measures	TBC													Climate change study reports available by .....
3.4.2 Conduct regular surveys and research activities to identify degraded or threatened marine resources														
3.4.3 Develop consensus and prioritize research aimed at reducing, minimizing/halting resource damage														
3.4.4 Partner with institutions involved in research to synthesize information on climate change														
3.4.5 Develop and design potential mitigation and restoration measures and monitor implementation														
<b>Action 3.5: Raise awareness on climate change impacts, mitigation and adaptation measures</b>														
3.5.1 Partner with research institutions to raise awareness on results and recommendations of climate change studies in PECCA	TBC													Information from the climate change study disseminated by .....
3.5.2 Synthesize and package awareness information in an easy to understand format														

**Action 3.6: Promote research collaboration and dissemination of information**

Management Action and Activities	Persons responsible	Timeframe												Proposed milestones		
		2022		2023		2024		2025		2026		2027				
		1	2	3	4	1	2	3	4	1	2	3	4			
3.6.1 Form a forum between researchers, managers and the PECCA community	TBC														Stakeholders are made aware of activities regularly	
3.6.2 Enhance existing regional mailing lists																
3.6.3 Initiate an annual research forum																
3.6.4 Update key stakeholders of relevant activities going on in PECCA																
<b>Action 3.7: Develop a central (DMC) data and information management system</b>																
3.7.1 Develop a monitoring and assessment system to get information that can be used to respond to threats and to tailor management interventions to the changing environment	TBC															A database management system for research and management information developed by .....
3.7.2 Collate, analyse, interpret and make available information that is collected																
3.7.3 Develop a database which will be upgraded into comprehensive information and an archiving system with linkages to national and international data systems																
3.7.4 Train managers and stakeholders on usage information retrieval systems																
<b>Action 3.8: Develop an ecological monitoring programme and build capacity to implement the programme</b>																
3.8.1 Review applicable elements of the Management Information System (MIS) and expand as appropriate to cover the needs of the ecological monitoring programme specific to PECCA	TBC															An ecological monitoring system developed by .....
3.8.2 Establish baseline data, record changes in resources and evaluate effectiveness of the PECCA																
<b>Action 3.9: Review and revise management effectiveness with managers</b>																
3.9.1 Review applicable elements of the Management Information System (MIS) and expand as appropriate to cover the needs of the management effectiveness elements specific to PECCA	TBC															Management effectiveness report produced annually
3.9.2 Analyzed data and determine whether modifications to management practices are necessary																

## 4. TOURISM DEVELOPMENT AND MANAGEMENT PROGRAMME

### 4.1 Programme Purpose and Strategy

The purpose of the Tourism Development and Management Programme is:

***To develop a unique tourism product, based on the special marine biodiversity, scenery and local culture at PECCA, that offers a memorable visitor experience***

Of the five government-run protected areas in Zanzibar, the PECCA has been one of the lowest visited, but has the potential to generate greater revenues, primarily based on SCUBA, low volume but high-end hotel bed-nights and diverse activities. The PECCA undoubtedly has significant tourism potential, more so given its newly expanded northwest coast component, the well-established Ngezi Forest through which many of the visitors to the northwestern portion of the PECCA will pass and stop at some point. The main offshore tourism attractions that PECCA offers are centred around Misali Island and further north, accessible from Weshu and Makangale, and a few other sites further south, accessed from Mkoani.

The 2019 Tourism for All Policy identifies the lack of prioritised initiatives to monitor overvisitation and allow for coastal and environmental habitat conservation, and prioritises environmental in the first set of measures, followed by improved environmental sustainability moving forward to 2030, and that by 2050, tourism is self-sustaining, so carrying capacity has been reached and Zanzibar is globally recognized as an island destination of choice. The Zanzibar Development Vision 2050 aspires to sustainable exploitation of marine-related resources and products within an operational blue economy framework guided by marine spatial planning, environmental preservation and clear investment procedures; and continued adherence to and support for regional and international blue economy institutions and initiatives in order to preserve the marine environment and promote economic cooperation. Meanwhile, the 2020 Blue Economy Policy recognizes that the diversity, productivity and core functions of marine ecosystems must be maintained and protected to preserve and conserve marine biodiversity. To align with the Vision and these two policies, there is strong need for improvement of the management, ecological condition and integration of users in the MCAs of Zanzibar, including the PECCA.

With implementation of actions outlined in this plan (e.g. construction of two boardwalks), and increased collaboration between local tourism stakeholders and the DMC that are creating a conducive environment for tourism to thrive, the PECCA is bound to attract more visitors. The Ministry of Tourism and Heritage are a key partner for the actions that are proposed in this programme. The three guiding principles described below underpin the development and implementation of the Tourism Development and Management Programme.

### Guiding Principles

While implementing the Tourism Development and Management Programme, PECCA Management, with participation of stakeholders and partners, will endeavour to ensure that:

**□ Tourism is appropriately developed to not impact on the marine and coastal ecosystems and authenticity of the local culture**

In the PECCA tourism has the potential to be a strong and sustainable source of support for management and conservation. However, experiences from MIMCA and MBCA have shown that uncontrolled tourism development can destroy the ecological and cultural values for which the MCA was established. These values, the mainstay of the tourism sector, are the reason that attract most visitors to the PECCA – wishing to experience the quality of marine life on the west coast, and the rich and unique local culture.

Currently on Zanzibar, there are a few isolated successes of local coastal communities and tourism enterprises interacting positively towards marine conservation with shared benefits. One such example in PECCA is at Manta Reef Hotel and the associated Kwanini Foundation, at Makangale in the NW of PECCA. In 2018, a byelaw designated the KMPA a no-take zone, within which all extractive and cultivation activities are prohibited. The KMPA is a small area (< 0.5 km<sup>2</sup>), with sand and seagrass, lagoon, reef flat and fringing reef slopes. Social and economic benefits/outcomes for current/future generations are associated with improved livelihoods (income, food security) and access to financial/scientific expertise from their role as partners in the KMPA and through improved and sustainable fish and marine resource harvest in buffer zones. This is an example where the right kind of tourism can promote the right type of investment in biodiversity conservation. It is clear that degraded and impoverished marine biodiversity will lead to decreased tourism interest.

Under the Tourism Development and Management Programme, PECCA management will endeavour to ensure that tourism activities do not impact the ecological integrity of its ecosystems and the authenticity of its local culture. This will be achieved through implementation of management actions outlined under the five programmes of this GMP that include the proposed zonation scheme. To ensure that any new activities or projects also do not impact negatively on the ecosystem's integrity and social fabric, new proposed developments will be subjected to an ESIA prior to approval and construction. The ESIA's will consider size of projects with respect to the carrying capacity of the MCA, traditional beach access by local resource users, waste disposal and sewage systems.

### **Tourism support infrastructure is developed and maintained**

Based on tourist numbers and overall income, the tourism potential in the PECCA is presently under-developed, with tourist numbers unlikely to be reaching the carrying capacity (pending findings from the Action 2.4, below). The DMC and relevant stakeholders need to explore ways and means of ensuring that appropriate infrastructure proposed in this GMP is developed to enhance visitor satisfaction and experience while safeguarding marine biodiversity and community livelihoods. Thus, under this management programme, an enabling environment will be created for investors to facilitate development and operation of diverse tourism facilities.

### **Tourism products are diversified**

Currently the mainstay of tourism at the PECCA is the marine biodiversity, the cleanliness of the lagoons and inshore waters, the scenic shores and mangrove-fringed inlets, the few white beaches, occasional dolphin encounters and, the relaxed and safe atmosphere associated with the communities living within and around PECCA with their rich and unique cultural and historical features. The latter can be used to further promote cultural tourism if appropriately developed in close collaboration with the relevant local communities, potentially adding further to the tourist attractions of the area. This programme aims to encourage and support the development of diverse cultural tourism attractions in the PECCA and adjacent areas on Pemba.

## **4.2 Targeting Tourism Development and Management Actions**

As summarized in Table 7, the threats that currently impact or are likely to impact on the PECCA conservation targets and their KEAs include pollution, tourism pressure on the marine environment, plus wastewater/poor waste disposal, boat anchoring and coastal development associated with the tourism sector. Mindful of the over-riding tourism objectives of diversifying the tourism 'product', developing the sector in a sustainable fashion and increasing revenue from the sector, the priority threats are addressed in the management actions proposed in the following sections.

## **4.3 Management Objectives and Actions**

In implementing the Tourism Development and Management Programme, the PECCA management, with participation of development and conservation partners and stakeholders, will endeavor to ensure that the above guiding principles are followed. These three principles are intended to guide the implementation of the Programmer's four MOs. For each of the following MOs a brief description of the relevant management issues and opportunities is given, which provide the specific context

and justification for the actions.

**MO 1.** Adequate tourism support infrastructure and equipment provided

**MO 2.** Tourism activities and attractions diversified and managed

**MO 3.** PECCA's tourism marketing improved

**MO 4.** Visitor management systems improved and updated

## **Objective 1: Adequate tourism support infrastructure and equipment provided**

Currently, it is not known if accommodation facilities in the PECCA are adequate to support the increasing number of visitors expected in coming years. Further, infrastructure to assist visitors to explore marine resources, such as moorings, are lacking. This objective has been designed to ensure that adequate and quality tourism infrastructure and facilities are provided and maintained in the PECCA and adjacent areas to support the envisaged increased tourism growth whilst ensuring that visitor experience is improved. Existing and future tourism enterprises have a leading role to play in this regard, in collaboration with the MCA Manger and SMC. The three management actions that will be implemented to achieve this objective are elaborated in the following sections.

### **Action 1.1: Develop and maintain two new boardwalks**

Learning from the experience of Unguja Island, where an existing 1 km-long mangrove boardwalk at Jozani Forest National Park is operated by the Jozani village that offers scenic views of the mangrove forest and allows visitors to enjoy the scenery through interpretation that is provided by a local guide. There is high potential for establishment of a similar boardwalk at the southwestern portion of Ngezi Forest, into Njao Bay (also known as Mkia Ng'ombe), and also in the south of PECCA at Kisiwa Panza. Consequently, through this action, the PECCA will support two local communities, to be identified, in constructing two separate boardwalks. Eventual boardwalk managers and officials will be trained in project management to help ensure that the community managed boardwalks projects do not fail.

### **Action 1.2: Liaise with the Department of Archives, Museums and Antiquities (DAMA) to develop and maintain historical and cultural resources in the MIMCA**

The shores adjacent to the PECCA have many sites of cultural and historical importance. Two of the prominent sites of cultural tourism importance include the sites around Ras Mkumbuu, Mtambwe Mkuu and Kwata. Most are managed by the local community with technical assistance from the DAMA. There is room for community guides to be trained on provision of interpretation at these sites and as such should also benefit from provision of guiding. Tourism revenue accruing from entry charges is not current used locally, but confirmation is needed on this and the possibility of income to support diverse community projects. Cultural norms at these sites need to be respected. Several caves and sink holes also exist, many with spiritual significance. A number of cultural festivalw take place annually that also could also be improved in terms of tourism volume and facilities. Cultural considerations need to be considered, as there may be considerable sensitivities regarding tourism on certain locations. Any initiatives must be carried out with full consultation and agreement, especially with the relevant council of elders.

Under this management action, PECCA management will liaise with the DAMA and the local community to improve visitor experience at selected sites, noting that some sites require improved visitor access and safety, as well as toilet facilities. In addition, to further promote cultural tourism, if deemed appropriate, the local community will be supported to establish a cultural Centre at one of the historical buildings such as at Ras Mkumbuu.

### **Action 1.3: Tourist boat mooring buoys**

Tourist boats on snorkeling and SCUBA excursions, and in some cases fishing vessels, occasionally drop their anchors in areas where they drag and damage coral and seagrass beds. This damage can become extensive in heavily used areas. To mitigate such damage, the installation of mooring (or pick-up) buoys is used. The most appropriate design and positioning of the mooring buoys will need to be investigated and materials purchased, assembled, and installed. Depending on the site-specific condition and exposure to sea condition during the two monsoon periods, moorings may need to be seasonally re-located. Where moorings are installed, tourist boats will be obliged to use them. The recommendation would benefit from inputs from conservation and boat operator partners on PECCA so that design and installation are correctly achieved. It will also be important to balance the need and number with actual tourism numbers. One conservative approach would be to install boat moorings gradually (starting small) and monitor the use before scaling up.

Improving facilities (and safety) for SCUBA operators to anchor may also increase the volume of SCUBA diving. SCUBA and snorkeling can be low impact activities, but only when these are well-regulated. Many examples exist, for example in MIMCA, SCUBA dive sites that have been extensively damaged by tourist divers and their boats. In some areas, expanding the SCUBA and snorkeling tourist volume on existing sites should not be considered, but rather, new SCUBA and snorkeling sites should be created (e.g. through sinking wrecks or purpose-built reefs) and more terrestrial options should be developed.

## **Objective 2: Tourism activities and attractions diversified and managed**

The future desired state at the PECCA is where visitor experience is enhanced through visitor participation in a wide range of activities. Among Zanzibar's MCAs, PECCA is currently expected to contribute more in terms of visitation and revenue generation. Despite this, PECCA is believed to still have the potential to support more visitors if activities and attractions are diversified. Increasing the diversity of the tourist products and providing essential information on these products will increase understanding and appreciation of the exceptional resources in the protected area thereby enhancing visitor experience and satisfaction.

In addition to the actions above on cultural tourism options being diversified and improved, the focus here is on developing and maintaining nature trails and promoting ornithological safaris and promoting canoe safaris. To ensure that this objective is realised, the five proposed actions are presented in the following sections.

### **Action 2.1: Develop and maintain nature trails**

To improve the experience and allow better appreciation of the rich biodiversity and scenic values offered by the mix of terrestrial and marine ecosystems in the PECCA and adjacent areas, nature trails are needed that can be used by visitors to explore the local forests such as those of the Misali and other popular island destinations. Chumbe Island (in the MBCA) has such a trail from which lessons can be learnt. The MCA Manager should work with conservation and research partners to conduct a study to identify the key ecotourism sites and to inform development of eco-tourism plans. From such a study, sites can be developed to community led mangrove parks, nature trails and species conservation spots. See comment above (Action 1.2) regarding cultural sensitivities regards tourism. New nature trails will thereafter be designed and constructed guided by best practices in trail construction. Once established, appropriate maps showing trail routes and interpretation locations will be produced and disseminated to visitors at PECCA offices. Concurrently, to further increase the enjoyment of the marine ecosystems by visitors as well as provide a marine education tool for local schools, an underwater nature trail representing the diverse marine ecosystems in the area will be developed, potentially within the sheltered inshore portion close to Misali's RZ.

### **Action 2.2: Promote ornithological guided tours**

The PECCA and adjacent central and eastern portions of Pemba are all enclosed in the IBA TZ076, reflecting the presence of a rich resident and migratory bird population. Mangroves and seagrass beds are important feeding areas for migrating bird species, such as crab plovers and other waders, various herons, egrets and kingfishers with mangroves and sandbanks important roosting sites. Many of the smaller islands and islets especially are important roosting habitats for migratory birds that visit between January to March and July to September. These islands also serve as breeding grounds to some resident birds. Based on these ornithological values, PECCA could be marketed as a prime bird-watching destination, especially of migratory and some endemic birds. Research will need to be conducted on migratory species and their migration routes and timings. For this action to be successful, a network of bird-watching sites and trails will be defined, and local bird guides trained, to offer birdwatching visitors a unique experience. Conservation and research partners with experience in ornithology will be vital to develop this action. Integrating such birding routes with the three IBAs on Unguja (East Coast, Jozani and South Coast) will add value to product and benefit the other sites as well.

A flying animal, but mammal not bird, the Pemba Flying Fox (a large golden headed bat), has the potential to attract small numbers of tourist and serve to diversify visitor experiences (See Ngezi Forest description, page 20). There are some coastal areas where they roost at night. Developing a site visit or short tour that involves the Pemba Flying Fox or combines this species with the bird watching tours proposed above, should only be done with the involvement of qualified small mammal experts to avoid any unforeseen impacts on this rare and unique bat.

### **Action 2.3: Promote canoe safaris**

Dugout wooden canoes used by local fishers (or modern fibre glass or plastic versions) are an attraction to visitors who seek to be ferried across creeks and inlets close to many of the main towns and villages in PECCA, for example, in this mode of transport. Canoes permit visitors to explore some of the many accessible mangrove and inshore reef areas. To enhance and improve any potential canoe *safari* enterprise, the PECCA management and relevant stakeholders will identify and support operators of seaworthy canoes to offer canoe *safaris* across sheltered and biodiversity-rich portions of the PECCA. Further, to ensure a safe and conflict-free canoe *safaris* venture, regulations will need to be developed, in collaboration with canoe and boat operator associations and tour operators.

### **Action 2.4: Conduct a visitor impact and carry capacity study**

The rich biodiversity values in the PECCA attract significant numbers of visitors annually. Preserving these biodiversity values requires ensuring visitor pressure (among many other pressures) does not exceed thresholds that, if surpassed, will lead to degradation of these values. Data on the precise numbers of visitors that the PECCA receives is not available nor is the number of boat trips taking visitors on snorkelling or SCUBA diving, or even recreational fishing trips. Careless anchoring in shallow water among corals and novice snorkelers and SCUBA divers who occasionally cause damage to corals, are examples of degradation. Consequently, the extent of damage caused by inappropriate boating, recreational visitors and fishing activities will be assessed to quantify their impact on conservation targets.

So far, observations show that the SCUBA diving industry is relatively unsaturated in the PECCA. However, snorkelling and SCUBA are extremely popular activities that are mostly concentrated around Misali Island and along the western reefs and islands up to an including Makangale Peninsula reef slope. It is therefore important that limits of visitors allowed to participate in various activities at a time are determined to ensure that visitor satisfaction is enhanced. Towards this, the visitor carrying capacity of the PECCA will be determined through a study to assess environmental, physical, social and economic visitor carrying capacities of specific sites within the MCA that are of interest to visitors. For example, the physical carrying capacity for SCUBA/snorkelling over a particular reef needs to consider the availability of boats which ferry visitors to the reefs, the number of mooring buoys available,

the physical space, size and shape of the reef, as well as the composition of the coral communities and sandy areas. The selections of sites should include the most popular ones, namely Misali, Ngao Gap, Fungu Gap, and Makangale, but the final selection should be made with the MCA Manager, SMC and relevant stakeholders (namely SCUBA and snorkelling operators and hotels). The evaluation itself (to cover pressure/damage, habitat sensitivity and resilience) will require assistance for research and conservation partners.

A less obvious aspect is the social carrying capacity, which needs to consider the limit to visual contact between SCUBA divers/snorkelers beyond which they become dissatisfied. The carrying capacities defined from the studies for various tourist activities and facilities will inform tourism development and management strategies in the PECCA. Equally, studies on tourism trends, dive operations, boat use and commercial and recreational fishing will provide useful information that will ultimately lead to both increase in tourism and improved conservation of critical habitats.

As a parallel activity, to be agreed with the MCA Manager and SMC, a carrying capacity study of local community activities (mostly related to impacts associated with fishing, shellfish harvest and seaweed farming) should be considered. Thus the monitoring and verification metrics should extend to the local communities who also leave solid wastes on the beaches and at sea.

### **Action 2.5: Develop community-based tourism activities**

In order to contribute to diversifying the tourism product, and involving local community members, a focused study guided by appropriate skilled experts is proposed to develop activities that can be guided and led by local community members. Suggestions include underwater trails, community tourism (“a day in the life of”) and community-guided fishing trips.

Developing and implementing this action will likely take some time and require many prior activities to build upon (technical trainings and language/hosting training, development of ‘products’, quality, etc.). Assistance from development and research partners will be very important for this action once it has been prioritized. Added to that, a scenario where community-based tourism activities, supported by a legally agreed mechanism, whereby communities can benefit from their own tourism initiatives (for example, snorkel tours to permanent closed areas) would serve to boost local economies and add value to the conservation tool which is the RZs.

## **Objective 3: Improved marketing of PECCA's tourism**

Increased visitation and enhanced visitor satisfaction, combined with sustainable visitor activities and footprint are the future vision for the PECCA. The increase in visitors can potentially contribute to the costs for protecting the marine resources of PECCA. This can be achieved through design and implementation of a vigorous marketing strategy that combines ecological, social and partnership marketing approaches. Under this MO, PECCA management will seek to work with stakeholders in the Zanzibar tourism sector such as tour operators, hoteliers and boat operators, as well as development partners, to implement marketing strategies that aim at maintaining and attracting increasing visitor numbers, of the right type of visitor, at the same time as increasing public support for the PECCA. For this objective, the Ministry of Tourism and Heritage is a key entity and it needs to be involved in the activities and actions that directly involve the tourism sector. Activities targeting the local community are described under Chapter 7 Community Support Programme, with this section focused more on the implementation of proposed actions directed specifically towards the tourism sector, as outlined below.

### **Action 3.1: Conduct market research**

To develop an effective tourism marketing strategy for PECCA it is important to understand the tourism market segments that are and could in future visit and experience PECCA. To obtain information on the various visitor markets and their needs and to design messages and programmes to deliver to

each market segment, tourism market research is vital. Under this action, the PECCA management in collaboration with DMC (with the same for the other four MCAs of Zanzibar) and development partners, ideally with the lead taken by the Ministry of Tourism and Heritage, carry out market research to develop profiles of customers' needs, behaviour and characteristics. The study should also include cultural norms and acceptable behaviours. The findings will be used to develop and target marketing materials for sites within and PECCA as a whole. Consideration should be made of the option to adopt the Mwambao-MCCC participatory market system development (PMSD) package where all market chain actors are involved.

### **Action 3.2: Design, upgrade and regularly update the DMC website to improve marketing**

For the last fifteen years, the Internet has become a vital tool for pre-visit research by potential visitors. There is therefore the need to have a website with comprehensive and accurate information on the MCAs of Zanzibar, to assist visitors to plan their trips in detail. The DMC does not maintain a website that provides detailed information and facts about the PECCA, and its unique values and attractions. Most of the PECCA tourism marketing is done by private companies and hoteliers that often do not cover aspects of the PECCA on their own websites.

Therefore, to promote the PECCA through the Internet, the information on the DMC website will be expanded to cover the PECCA and its adjacent areas (as well as the other MCAs in Zanzibar). Through this action, the DMC website will be enriched with high quality images showing details of the variety of wildlife present in the PECCA. A video clip will also be uploaded to provide detailed information on the PECCA, its attractions and uniqueness. Collaboration on this action could be obtained from research and development partners.

### **Action 3.3: Develop and update a tourist map, guidebook and awareness brochures**

Information materials are used to educate visitors on the PECCA and its resources, to enhance visitor experience and satisfaction, and as marketing tools. Such materials are essential and standard formats include maps, guidebooks, brochures or leaflets, that are provided to visitors through the Internet or at the visitor information centre. Currently, there is scant information materials on the site, and it is outdated.

It is especially important to keep awareness and educational materials up-to-date to reflect the changing dynamics in the PECCA and raise interests of stakeholders. To increase awareness on marine issues and enhance public understanding, it is essential that education and outreach tools are upgraded. These can be linked to the DMC website (Action 3.2, above). Material will be designed to correctly portray information specific to the PECCA, targeted at various social strata, from international tourists to local schools, seaweed farmers and elder fishers. Underwater films on the PECCA, prepared by professional diver, with support from local PECCA staff should be produced to reflect the unique marine life of the PECCA. Marine videos should be regularly updated.

Thus, there is a need to update information to cover the new key components of the PECCA ecosystem and its extent and coverage, including tourism resources in the terrestrial part of the area. Consequently, under this action, a tourist map of the PECCA ecosystem with summary information on various biodiversity, scenic and cultural resources of touristic importance will be developed. This action should be developed in collaboration with DMC (with the same for the other four MCAs of Zanzibar) and development partners, ideally with the lead taken by the Ministry of Tourism and Heritage.

### **Action 3.4: Establish and maintain information materials distribution at strategic locations**

Opportunities exist for educating visitors about the tourist attractions in the PECCA and thereby influencing their behaviour. Examples include provision of information at the point of entry to the PECCA (e.g. airport and ports), or at strategic locations along various routes followed by visitors on their way to the MCAs or at specific sites within it. It is important that information that is made available to

PECCA customers is up to date, hence materials need to be reviewed and updated accordingly.

To further increase information on tourism products and attractions in Zanzibar's MCAs, appropriately sized and placed billboards could be installed at strategic points (e.g. Zanzibar International Airport), as well as other strategic places deemed appropriate by PECCA management and stakeholders. This action should be developed in collaboration with DMC (with the same for the other four MCAs of Zanzibar) and development partners, ideally with the lead taken by the Ministry of Tourism and Heritage. Concurrently, measures to increase the use of research information for marketing the PECCA and other MCAs will be explored and a stronger liaison between marketing specialists and MCA managers developed.

### **Action 3.5: Review existing community projects and encourage tour companies to include them in their tour packages**

Most of the MCAs and other MCAs of Zanzibar include a range of community eco-tourism projects, such as the Jozani Forest mangrove board walk, Jozani butterfly farm, ecological spice farms, and others that generate income for the local community. A review of all such similar projects within the boundaries of the PECCA will be conducted from which selected projects will be supported through the PECCA and introduced to tourism stakeholders. The PECCA management will thus liaise with tour companies to promote community-based ecotourism projects in their tour packages. Development and conservation partners may also have a role to play in the activity, mindful that visits to community projects by tourists are not always appropriate and any cultural sensitivity issues must be addressed through consultation with stakeholders. Information on these projects will be posted in the tour companies' websites, PECCA's Facebook page, website and brochures.

### **Action 3.6: Disseminate tourism information through working with tourism stakeholders**

Related to proposed Action 3.3, tourists rely on tour operators, travel agents and the media, to obtain information on sites to be visits. As such, updated information dissemination is important and must be consistent and correct across all outlets, to avoid misinformation. The PECCA management will work with tourism stakeholders to share dedicated brochures and other site information. This action should be developed in collaboration with DMC (with the same for the other four MCAs of Zanzibar) and development partners, ideally with the lead taken by the Ministry of Tourism and Heritage. Where appropriate, the PECCA management will further liaise with the local media to provide coverage of the PECCA in other platforms.

### **Action 3.7: Organize and market local events that promote PECCA goals and objectives**

In many marine protected areas around the world, organizing local level events, such as boating, cycling, sailing or marathon running races, has become commonplace, to raise awareness of the site and maybe raise funds. This action should be developed in collaboration with DMC (with the same for the other four MCAs of Zanzibar) and development and conservation partners, ideally with the lead taken by the Ministry of Tourism and Heritage. Potential events include annual seafood festivals to promote local fish and seaweed products, or an annual *Wesha Dolphin Cup* canoe or outrigger race. Once suitable events have been identified and agreed upon by relevant stakeholders, they will be advertised nationally and internationally. The sustainability of seafood festivals needs to be examined before promotion, to ensure that no ETP species are implicated.

## **Objective 4: Visitor management systems improved and updated**

After successful implementation of the above actions under MOs 1, 2 and 3 an increase in visitor numbers is anticipated. Numbers may increase even without implementation of the above actions. In any case, strengthening of PECCA's tourism management and administration systems will be required. The purpose of this MO is to ensure that the management of tourism in the PECCA is strengthened, so that the desired tourism product can be provided – thus meeting obligations to tourism investors –

but with minimal impacts on the area's natural environment. To achieve this objective, five proposed management actions have been developed, as described below.

#### **Action 4.1: Review and update the visitor code of conduct**

All marine tourism activities need to be properly regulated, to avoid and minimise undesired social and ecological impacts. It is known, for example, that coral reefs are increasingly being impacted by anchors of fishers as well as tourist boats. Many examples exist around Mnemba Island (MIMCA) and in Menai Bay (MBCA). To minimize these impacts, following a detailed review of the impacts and sources, a set of PECCA specific code of conduct for each marine recreational activity will be prepared, to ensure appropriate tourist behaviour and protection of marine biodiversity and scenic values.

The code will include wildlife interaction protocols, in addition to interactions between resource users from different sectors, for example SCBUA divers and fishers, to avoid conflicts. Any existing codes will be reviewed and adapted for PECCA as appropriate. In addition, the developed codes will be published in brochures and leaflets and made available at the PECCA office and other sub-offices, as well as main tourist facilities. This action would benefit from involvement of conservation and development partners.

#### **Action 4.2: Develop and implement dolphin watching guidelines**

Dolphins are one of the many flagship species of the PECCA and other MCAs of Zanzibar, and some visitors come with the aim of watching or swimming with them. Dolphin tourism, though useful in awareness raising, has sadly led to harassment of dolphins through increased human traffic around dolphin pods, especially in the MBCA. In some instances, boat operators chase dolphins when they sight them to please their customers. Research on dolphins have revealed that dolphin tourism negatively affects the behaviour of dolphins by disturbing their activities and reducing the time dolphins spend foraging, nursing and resting which may have both short- and long-term effects on population health (Stensland and Berggren, 2007; Christiansen et al., 2010).

A reduction of bycatch (from gill-nets) and regulation of dolphin-watching tourism is urgently needed to prevent long-term decrease in survival and reproductive success that could result in a decline in population size and/or dolphins around Zanzibar. This would lead to a reduction in the tourism potential which would have serious socio-economic implications in the MBCA area. Therefore, to attempt to reduce the pressure from dolphin watching tourism on the dolphins off the south coast of Zanzibar, particularly in MBCA, an assessment of the viability of a targeted activity in parts of PECCA will be undertaken to potentially shift some of the pressure from the MBCA by providing tourists with different options of locations that offer the same experience.

To safeguard this tourism value, therefore, PECCA management in liaison with dolphin researchers and boat operators will develop appropriate regulations to guide dolphin watching, re-visiting those in the Tourism Regulations of 2009. Once the regulations are developed, awareness creation campaign on these regulations will be extended to all residents of PECCA, and particularly the boat operators and fishers. Large, updated posters will be placed at tourism embarkation points to inform visitors on the regulations of watching dolphins. All boats ferrying tourists to the PECCA will have the code of conduct and park regulations placed strategically in the boats, accessible to all visitors.

#### **Action 4.3: Liaise with Commission of Tourism to organize regular workshops for boat/beach operators**

As in many excursions, boat operators at Weshi, Mkoani and other sites have a tendency to crowd and scramble around tourist minibuses to solicit customers. The situation in PECCA is mild compared to MIMCA and MBCA. Nevertheless, this potentially gives a poor impression of the organization inside the PECCA and it is therefore important that boat /beach operators are informed on the negative impacts of such behaviour to ensure this problem is reduced. PECCA management will work with the

Commission of Tourism to organise awareness raising workshops for boat/beach operators, that can also be used as a forum for the operators to air any grievances related to the protected area and the management, and to develop strategies to overcome tourism harassment.

In the 1990s there was a KIDOTOA at Kizimkazi in the MBCA, focused such issues, including boat operations around dolphins. Attempts will be made to re-organise this association, and to equip beach and boat operators with tools to form an organisation that will regulate members' behaviour. Operators will also benefit from training in health and safety handling, necessary in case of emergencies, through support from PECCA management. Support to boat operators to establish a community-based tourism operator's forum, registered by the Commission for Tourism will contribute to visitor safety standards and resolve conflicts among members.

#### **Action 4.4: Reduce waste generated by visitors and improve tourism embarkation facilities**

Solid waste management in Pemba and Unguja islands (including the MCAs of PECCA and other MCAs on Zanzibar) is a major problem that has not been resolved, though progress has been made on banning single use plastic bags. Plastic bottles used by tourists end up either dropped on the streets, or in the forests from where they end up in the ocean due to surface run-off, or are abandoned on beaches or sandbanks, or dropped directly in the ocean. To improve the management of solid waste, local boat operators should be encouraged to stress to visitors the need to use re-fillable bottles, and not transport single use plastic bottles on their boats. With correct health and sanitary conditions, large volume plastic water containers can be used by tour operators to fill the bottles of visitors.

At PECCA, tourist embarkation points exist at Weshu, Mkoani and other sites. From these points visitors usually spend 3-5 hours at key attraction sites that are located some distance from the main island, often in coral reef areas. To enhance the comfort of visitors before and after boat rides and to minimize pollution from poor waste disposal, the construction of restrooms/changing rooms within the environs of embarkation points should be considered after consultations with operators and tourists alike. Concurrently, publicity material will be designed and developed in appropriate languages to encourage responsible waste management of visitors and local communities. PECCA management will also work with the tourism sector in seeking effective ways for getting waste management messages to visitors. Regular monitoring will be needed to document marine litter, visitor satisfaction and visitor behaviour and determine whether waste is being reduced.

#### **Action 4.5: Establish a PECCA tourism forum**

A common forum for tourism sector participants is not in existence for the PECCA. The creation of one would improve coordination with this important stakeholder and aid overseeing activities of tourism entities in the PECCA as well as assist in resolving tourism related conflicts. Potential members include DMC and associated units, boat operators, hoteliers, ZATI and ZATO, development partners, among others. Once established, such a forum could hold bi-annual meetings. In 2019, Mwambao-MCCC organized a meeting including communities to explore potential for coordinated community support which could be interesting to re-visit and potentially repeat.

### **Monitoring Framework**

The monitoring framework presented in the Table 10 has been designed to provide guidance for the assessment of the potential impacts resulting from the implementation of this programme. The framework presents potential positive and negative impacts that may possibly occur during implementation of activities for each objective. The framework also includes easily measurable and quantifiable indicators for assessing impacts, and potential sources of information needed. Monitoring impacts of the plan implementation ensures that timely changes to management approaches are made when the situation demands.

Table 10. Tourism Development and Management Programme Monitoring Plan (modified from KWS, 2015).

Objective	Potential Impacts (positive and negative)	Verifiable Indicator	Sources and means of verification
Objective 1: Adequate tourism support infrastructure and equipment provided	Increased number of visitors to the PECCA; Increased tourism revenue	Annual visitor numbers; Revenue data	PECCA visitor and revenue database <sup>1</sup>
	Environmental degradation from increased tourist use	Evidence of pollution/litter or habitat degradation at sites where infrastructure located or at tourist attractions	Targeted inspections by PECCA staff
Objective 2: Tourism activities and attractions diversified and managed	Increased number of visitors to the PECCA	Annual visitor numbers	PECCA visitor database
	Increased length of stay in the PECCA	Average number of nights spent in the PECCA per visitor	Bed occupancy reports of hotel facilities in the PECCA-adjacent areas
	Increased revenue	PECCA revenue data	Revenue database
	Enhanced visitor satisfaction	Visitor satisfaction data	Visitor satisfaction survey reports
	Environmental degradation from new tourist activities and/or supporting infrastructure	Evidence of pollution/litter or habitat degradation at sites where activities or infrastructure are located	Targeted inspections by PECCA staff
Objective 3: Improved marketing of PECCA's tourism	Increased number of visitors to the PECCA	Annual visitor numbers	PECCA visitor database
	Increased visitor satisfaction	visitor satisfaction data	Visitor satisfaction survey reports
	Increased public support for PECCA	Increased public awareness and domestic tourism	PECCA visitor database
Objective 4: Visitor management systems improved and updated	Increased collaboration between DMC, tour operators and PECCA investors	Number and participation at tourism stakeholder and PECCA management meetings	PECCA meeting minutes
	Improved visitor handling standards	Visitor satisfaction data	Visitor satisfaction survey reports

Notes. 1. The institution that will carry this out exercise of establishing and running the database needs to be determined through agreement between MCA Manager, SMC and conservation and research partners.

## 4.4 Implementation Schedule

The following pages set out the proposed first six-years of the ten-year implementation schedule for the PECCA GMP (see Table 11). The activity plan details the activities, responsibilities, timeframe and milestones necessary for the delivery of each management action, starting in 2022, which need to be finalized by the MCA Manager and SMC.

Table 11. Tourism Development and Management Programme Implementation Schedule (first six years).

Management Action and Activities	Persons responsible	Timeframe												Proposed milestones
		2021		2022		2023		2024		2025		2026		
		1	2	3	4	1	2	3	4	1	2	3	4	
<b>Objective 1: Adequate tourism infrastructure and equipment provided</b>														
<b>Action 1.1: Develop and maintain two new boardwalks</b>														
1.1.1 Conduct feasibility study to select a site for a mangrove boardwalk e.g. southeast Ngezi Forest – Njao														One new boardwalk operating by .....
1.1.2 Support local community in constructing boardwalks at designated sites, learning from Jozani village														.....and a
1.1.3 Train boardwalk managers and officials in project management	TBC													second by .....
<b>Action 1.2: Liaise with Department of Archives, Museums and Antiquities to develop and maintain historical and cultural resources in the MIMCA</b>														
1.2.1 Liaise with the DAMA and the local community in improving visitor experience at Ras Mkumbuu														PECCA historical and
1.2.2 Explore opportunities to promote visits to local caves and including needs for access														cultural sites developed and improved by .....
1.2.3 Support the local community to establish a cultural centre at one of the historical sites														.....
<b>Action 1.3: Tourist boat mooring buoys</b>														
1.3.1 Conduct site studies in PECCA for mooring buoys mindful of possible need for seasonal re-location														Tourism mooring study completed by .....
1.3.2 Conduct a study of the appropriate design and positioning of the mooring buoys														.....and
1.3.3 Purchase materials, assembled, and install mooring buoys	TBC													first installations by .....
1.3.4 Inform and train tourist boat operators on how to use mooring buoys														.....
<b>Objective 2: Tourism activities and attractions diversified and managed</b>														
<b>Action 2.1: Develop and maintain nature trails</b>														
2.1.1 Conduct a feasibility study to select a site for an island and a underwater nature trails														Nature trail established by .....
2.1.2 Develop at least one nature trail at the selected forest site at Misali														.....
2.1.3 Produce maps showing trail routes and interpretation locations and market them	TBC													
2.1.4 Initiate guided safari walk, birding, mangrove walks, and self-walk safaris														
<b>Action 2.2: Promote ornithological guided tours</b>														
2.2.1 Develop a local bird watching marketing strategy														Bird watching sites and trails identified and developed by .....
2.2.2 Conduct more research on migratory bird species to inform management and tourists														
2.2.3 Establish bird watching sites and trails	TBC													
2.2.4 Develop guidebooks for local birders														

Management Action and Activities	Persons responsible	Timeframe												Proposed milestones			
		2021		2022		2023		2024		2025		2026					
		1	2	3	4	1	2	3	4	1	2	3	4				
2.2.5 Train community naturalists in local bird watching and guiding skills																	
<b>Action 2.3: Promote canoe safaris</b>																	
2.3.1 Conduct a feasibility study to select a site for canoe safaris in Chwaka Bay																	At least one canoe safari operation active by .....
2.3.2 Train local canoe and boat operators in managing canoe safari operations for tourists																	
<b>Action 2.4: Conduct a visitor impact and carry capacity study</b>																	
2.4.1 Assess extent of damage caused by inappropriate boating, recreational visitors and fishing activities																	Study on carry capacity completed by .....
2.4.2 Estimate the visitor carrying capacity for reef tourism to determine optimal levels of use, avoid overuse or crowding, and maintain visitor satisfaction	TBC																
2.4.3 Carry out studies on tourism trends, dive operations, boat use and recreational fishing																	
<b>Action 2.5 Develop community-based tourism activities</b>																	
2.5.1 Identify and contract study guide/appropriate skilled experts to diversify the tourism products	TBC																New communitybased tourism activities operational by .....
2.5.2 Identify community members interested in participating in learning new skills to work with tourists																	
2.5.3 Consider underwater trails, community tourism ("a day in the life of") and community-guided fishing trips, and others depending on feedback from study																	
2.5.4 Operationalize the activity with support from the MPA Fund and MCA Manager																	
<b>Objective 3: Improved marketing of PECCA's tourism</b>																	
<b>Action 3.1: Conduct market research</b>																	
3.1.1 Develop profiles of customers' needs, behaviour and characteristics																	Marketing materials available by .....
3.1.2 Design and develop marketing materials	TBC																
<b>Action 3.2: Design, upgrade and regularly update the DMC website to improve marketing</b>																	
3.2.1 Update PECCA website and set up a link to local stakeholders' web pages																	DMC website displaying PECCA information and updated regularly
3.2.2 Expand DMC website to cover the PECCA and its adjacent areas	TBC																
3.2.3 Upload a video clip to provide detailed information on the PECCA, its attractions and uniqueness																	
<b>Action 3.3: Develop and update a tourist map, guidebook and awareness brochures</b>																	
3.3.1. Develop content for the information materials																	PECCA information materials available by .....
3.3.2 Update the guidebook and brochure to cover both marine and terrestrial tourism resources	TBC																
3.3.3 Partner with local SCUBA professionals to produce an underwater promotional video of PECCA																	
<b>Action 3.4: Establish and maintain information materials distribution at strategic locations</b>																	

Management Action and Activities	Persons responsible	Timeframe												Proposed milestones	
		2021		2022		2023		2024		2025		2026			
		1	2	3	4	1	2	3	4	1	2	3	4		
3.4.1 Install billboards at strategic open places															Signboards and billboards installed
3.4.2 Renovate, add information and install signboards at locations close to tourist facilities	TBC														by .....
<b>Action 3.5: Review existing community projects and encourage tour companies to include them in their tour packages</b>															
3.5.1 Liaise with tour companies to sell community-based ecotourism projects in their tour packages and post information on these projects on their social networks	TBC														Visits to community projects increased by 20% by .....
3.5.2 Encourage and motivate tour companies so their tour drivers take visitors to community projects															
<b>Action 3.6: Disseminate tourism information through working with tourism stakeholders</b>															
3.6.1 Work with tourism stakeholders to develop and share tourism information on PECCA	TBC														At least two articles published on PECCA annually
3.6.2 Work with Journalists to write accurate stories on the PECCA															
<b>Action 3.7: Organize and market local events that promote PECCA goals and objectives</b>															
3.7.1 Hold a consultative meeting with DMC to initiate a unique local promotional event based on the resources and theme of the PECCA	TBC														At least one promotional event held annually
3.7.2 Advertise the annual event locally, nationally and internationally															
<b>Objective 4: Visitor management systems improved and updated</b>															
<b>Action 4.1: Review and update the visitor code of conduct</b>															
4.1.1 Develop new regulations and review and implement PECCA specific codes of conduct for each marine recreation activity	TBC														Revised code of conduct published by .....
4.1.2 Publish brochures and leaflets to be availed at DMC offices and tourist accommodation facilities															
<b>Action 4.2: Develop and implement dolphin watching guidelines</b>															
4.2.1 Liaise with dolphin researchers and boat operators to develop regulations for dolphin watching															Awareness of dolphin watching guidelines increased among visitors by 20% by .....
4.2.2 Install a poster at tourism embarkation points to inform visitors on dolphin watching guidelines															
4.2.3 Place code of conduct and park regulations strategically in all boats ferrying tourists to the PECCA	TBC														
4.2.4 Assess the viability of dolphin tourism sites in PECCA to ease pressure on MBCA populations															
<b>Action 4.3: Liaise with Commission of Tourism to organize regular workshops for boat/beach operators</b>															
4.3.1 Familiarize operators on PECCA specific codes of conduct for each marine recreation activity and increase their overall awareness of the PECCA's values, rules, and the various visitor codes															Boat operator workshops held each year, starting by .....
4.3.2 Support tour guides to form an association which will help regulate their conduct	TBC														
4.3.3 Conduct awareness campaign on regulations to all residents of PECCA, boat operators and fishers															

Management Action and Activities	Persons responsible	Timeframe												Proposed milestones	
		2021		2022		2023		2024		2025		2026			
		1	2	3	4	1	2	3	4	1	2	3	4		
<b>Action 4.4: Reduce waste generated by visitors and improve tourism embarkation facilities</b>															
4.4.1 Build toilets and changing rooms within the environs of the embarkation points															Tourist toilets installed at PECCA
4.4.2 Encourage local boat owners to allow only visitors with their own re-fillable bottle on their boats instead of single-use water bottles to improve solid waste management	TBC														HQ by ..... with sub-stations equipped by .....
4.4.4 Develop publicity material to encourage responsible waste management															
<b>Action 4.5: Establish a PECCA tourism forum</b>															
4.5.1 Establish a tourism forum to oversee the activities of tourism players in and around the PECCA including all key tourism player	TBC														Tourism form formed by .....
4.5.2 Hold bi-annual meetings with the tourism forum															

## 5. FISHERIES RESOURCE MANAGEMENT PROGRAMME

### 5.1 Programme Purpose and Strategy

The purpose of the Fisheries Resource Management Programme is to:

***Ensure that PECCA's fisheries resources are restored and sustainably managed in collaboration with all stakeholders***

The PECCA includes a fringing coral reef system along its western seaboard and a complex of islands, mangrove creeks and inlets throughout its coastal waters. Seagrass beds, live coral and coral rubble areas provide important habitats for various reef and inshore fish species, while mangroves provide important nursery grounds and deeper waters support larger pelagic species, including tuna and billfish.

Most of the fish catch originates from the shallow coastal waters, almost exclusively by local fishers using artisanal gears. A fleet of drifting large-meshed gill-net fishers is based at Mkoani throughout most of the year. The approximately 11,000 fishers within PECCA use a variety of fishing gears, including traps (*dema*), hook and line, gill-nets, and spears (see Table 3). There are also 20 purse seine and 42 ring-nets, most probably used to catch small pelagic fish such as Indian mackerel, sardine and anchovies, some using light attraction at night, other during the days in shallow reef areas.

Fisheries resources have provided a vital source of livelihood for Zanzibar coastal communities including those within and adjacent to PECCA. Since the 1990s, these same fisheries resources have also served as basis for water-based tourism activities including snorkelling, SCUBA diving and recreational or sport fishing. The later operate off the reefs and in deeper waters, also often on a seasonal basis. Local fish stocks also contribute a vital resource to the resident dolphin population of PECCA.

Due to the growing human population and increased tourism requirements for fish, there has been a large increase in fishing effort, with increased pressure on fish stocks, resulting in reduced sizes and weight of fish landed. In addition, the use of illegal and unsustainable fishing methods such as ring-nets and spear guns (and even use of dynamite and other explosives) in coral areas, and beach seine-nets over seagrass beds has increased considerably over the last ten years. As a result, there has been widespread habitat degradation. There is now an urgent need to implement measures to allow re-building of fish stocks in PECCA, and protect sensitive habitats such as coral reefs, to enable recovery of degraded areas and to allow the continued support primarily to local fisher livelihoods and water based-tourism activities.

The Fisheries Resource Management Programme measures proposed in this GMP are consistent with those in the Priority FMPs and Fisheries Master Plan. There are 14 actions proposed, for implementation within the next ten years. Through these actions, the aim is to realize conservation and sustainable utilization of fisheries resources to support both local livelihoods and the wider economy (specifically the tourism sector), while concurrently promoting fish stock and environmental recovery. Three principles will guide PECCA management in implementing this programme and in achieving its purpose.

#### Guiding principles

While implementing the Fisheries Resource Management Programme, the PECCA management, with participation of stakeholders, will endeavor to ensure that:

**Restore viable fish stocks and healthy habitats, protect and maintain them**

Only through restoring, then maintaining the integrity of marine habitats while at the same time controlling fishing pressure can the balance between conservation and sustainable utilization of fish-

eries resources be achieved. In achieving this, the over-riding goal of the PECCA will be met, being “to restore and conserve the diversity, abundance and ecological integrity of all physical and biological resources in the PECCA”. This requires protecting all the resources, particular the resource base – mangroves, corals, seagrasses, water column. Because of the way components in the marine environment are inextricably linked, through a complex web of direct and indirect relationships and interactions, management of all coastal and marine habitats is vital. Visible manifestation of this interlinkage are predator-prey relationships, with a notable local example being the mass outbreaks of sea urchins in the absence of trigger fish and other inshore fish that feed on them, while less obvious ones are nutrient exchange and species migration.

#### □ Fisheries ecological components in PECCA are conserved and monitored

Under various international agreements, the RGZ has obligations to protect and manage several biological features (e.g. threatened species and critical habitats). Thus, to ensure biodiversity conservation and productivity are maintained, and conservation targets met, it is necessary to monitor the status of keystone species (e.g. their distribution and abundance).

To determine the impact of fishing on stock (or populations), on yields and thus on livelihoods of local communities, as well as on other species and biodiversity within the MCA it is essential that there be fisheries monitoring in and around PECCA. If new election procedures are adopted by the SFCs, these groups will represent the local fishers, as well as those involved in mariculture. While the various fisheries within the PECCA may continue provide for local needs, though data are scant, a number of local anthropogenic threats to the ecological basis of the fisheries are known and include:

- Significant increase in overall number of local fishers in the PECCA waters
- More wide-spread use of illegal and destructive gears e.g. ring-net, spear guns and beach seine nets and explosives inside MCAs
- Increasing fishing pressure from visiting *dago* fishers, from other parts of Pemba, Unguja and mainland Tanzania

The resulting data from monitoring is important for confirming management measures, identifying emerging issues and where necessary adjusting management interventions.

#### □ Strengthened collaboration with fisheries resource stakeholders

A wide pool of fisheries stakeholders is involved in the management of the PECCA fishery resource, from local communities to state and non-state sectors. At the local community level, stakeholders include local fishers based within PECCA and their respective SFCs, local *dago* fishers from other parts of Pemba, fish traders and CBOs. Government agencies include local government or Districts authorities, and central government, represented by the MBEF (and the DFDMR and DMC within it), Zanzibar Maritime Authority (ZMA), and Zanzibar Environmental Management Authority (ZEMA). Relevant national research entities are the State University of Zanzibar (SUZA) and the IMS of University of Dar es Salaam, among others. Non-state agents presently include the following NGOs: MwambaoMCCC, Sazani Associates, the Society for Environmental Research and Conservation Zanzibar, WWF, WildAid, Wildlife Conservation Society (WCS), The Nature Conservation (TNC), among others.

Many of these stakeholders have engaged in fishery monitoring, research and conservation efforts for many years. Of note however, is the absence of a coordination of efforts between these activities and outputs. The MBEF for example has been licensing fishing activities in Zanzibar, including to fishers inside the PECCA without necessarily consulting the PECCA which manages the overall fishing activities under its jurisdiction. Similarly, District officers have been accepting and managing migrant *dago* fishers (e.g. ring-netters, drifting gillnetters) to fish in and around PECCA without seeking input and approval from local fishers. Such un-coordinated decision-making process has led over

many years to multiple tensions among fishers (for example, of those in support versus those against ring-net fishers), and between environmentalists, tourist operators and the PECCA authorities.

Promoting and enhancing wider stakeholder collaboration is needed to ensure that the activities of the different institutions and organizations are coordinated and integrated towards achieving the Fisheries Resource Management Programme's purpose. Only then can there be achievement within PECCA waters of both conservation and sustainable fisheries. To facilitate collaboration, effective and sustainable coordination mechanisms in this regard is also important.

A pre-condition to any collaboration is that all stakeholders adhere to the relevant fisheries and environmental legislation applicable to fishery management. One of the main roles of the PECCA management authorities is in enforcing legislation. Compliance will greatly be enhanced if all stakeholders actively participate. And to achieve that, there is a need for a common strategy and focus among all stakeholders to ensure that the utilization of the fishery resource can continue, but in ways that permit fish catches and socio-economic benefits while at the same time ensuring sustainable conservation of the resource itself.

## 5.2 Targeting Fisheries Development and Management Actions

As summarized in Table 7 the threats that currently impact or are likely to impact on the PECCA conservation targets and their KEAs include over-exploitation of resources, destructive exploitation (use of destructive gears and methods), removal of keystone species (such as trigger fish), boat anchoring, overfishing predatory fish that feed on urchins and entanglement of turtles, dolphins and whales in fishing gears. These are identified as threats associated with the artisanal fisheries sector. Mindful of the over-riding fisheries development objectives of diversifying fisheries, developing the sector in a sustainable fashion, and increasing landings, the priority threats are addressed in the management actions proposed below.

## 5.3 Management Objectives and Actions

When implementing the Fisheries Resource Management Programme, the PECCA management, with participation of development and conservation partners and stakeholders, will endeavour to ensure the above guiding principles are followed. These three principles are intended to guide the implementation of the Programme's five MOs:

- MO 1.** Enforcement and surveillance of fishing activities strengthened
- MO 2.** Improved research on fishery management
- MO 3.** Effective stakeholder participation in fishery management
- MO 4.** Fishing pressure within MCAs at sustainable levels
- MO 5.** Impacts on emerging issues in fisheries resources assessed and addressed

The sections that follow describe these five MOs with a brief description of the relevant management issues and opportunities, and the specific context and justification for the proposed actions.

### Objective 1: Enforcement and surveillance of fishing activities strengthened

For several decades, and for many reasons, there has been inadequate enforcement of fisheries laws in Zanzibar, including in and around MCAs. There is misalignment between licencing, enforcement and conservation of the fisheries resources, which needs to be resolved. The Fisheries Act, 2010 and

the MCU Regulations 2014 of Zanzibar are the key legal instrument used by the now DMC to manage MCAs including their fishery resource. The licensing of fishing activities and enforcement of fishing regulations in Zanzibar is the responsibility of the DFDMR thereby performing fisheries management whilst promoting marine resource conservation lies with the DMC. Yet both are part of the same institution. This arrangement is increasingly perceived to lead to conflict of interest in that sustainable fisheries management needs to recognise the need for marine resource conservation.

In addition, SFCs which mainly consist of local fishers, are well placed to be watchmen, providing the 'eyes on the ocean', yet these entities have not been empowered to deal with fisheries issues within their fishing areas. The role of the fisher community, most probably through the SFCs, to co-manage marine areas within the MCAs needs to be addressed. It is not possible to include co-management zoning within the GMPs at this stage, but it is important to begin to develop a vision and outline strategy as to how co-management area zoning can/should be developed over the period of the GMP (i.e. 5-10 years). Co-management zoning of MCAs is something which is being included in the on-going revision of the MCU Regulations in the near future, to give co-management areas within MCAs a foothold in legislation/governance framework. Future revisions of the GMPs will certainly be looking to formally include co-management related to zoning of the MCAs. The concept needs to be explicitly focused on local management of shared fishing grounds, and there might be local institutional arrangements (i.e. co-ordination between SFCs) to consider.

The absence of any form of on-site enforcement of fisheries regulations has contributed an increase of illegal fishing practices in all MCAs of Zanzibar. This objective seeks to enhance collaboration between state and non-state actors, to reduce conflicting mandates, establish coordination, and pool resources and efforts to facilitate and improve effective enforcement of fisheries legal provisions.

### **Action 1.1: Enhance capacity to facilitate effective law enforcement and increase awareness**

When faced with infringement of fisheries regulations, the absence of response and action from enforcement entities associated with the PECCA, or of agents failing to perform their duties and demonstrating favouritism or other unethical practices, illegal fishing practices in MCAs have continued unabated. The situation is worsened by the scarcity of appropriate patrol boats and trained personnel, and availability of fuel and serviceable engines. In order to counter this, adequate resources will need to be provided to facilitate fishery monitoring, control and surveillance (MCS) which includes among other approaches, to ensure adequate surveillance, at times with joint patrols (involving all relevant stakeholders), supported by appropriate land-based surveillance and communication. The multiple needs to address action include training, acquisition of equipment, development of increased awareness of regulations, offences and their punishments, monitoring, licencing, vessel registration, prosecution, sanctions and other features. These are described fully under the various objectives and proposed actions in the **MCS Strategy** (Chapter 8).

One of the main goals of this action is the elimination of unsustainable fishing practices, which includes working with the authorities to ensure that illegal fishing gears and species that are illegal to catch and trade are not sold locally. It is vitally important that the fisheries restrictions that are currently laid down and supported by the PECCA GMP are enforced within the whole area, notwithstanding any specific management prescriptions targeting RZs. This action also should be clearly identified and shared with stakeholders to coordinate possible future projects and ideally involve communities in monitoring.

### **Action 1.2: Review existing and development of more effective MCA regulations**

The existing fisheries and environmental legal mandates need updating and alignment to better promote conservation and sustainable utilization of fisheries resources of Zanzibar. Various entities have commented on the inadequacies of the existing framework laws e.g. ZATI (2005), and especially EcoAfrica's legislative review commissioned by the MANRLF, McLean et al (2012) that identified 13 key needs to strengthen the policy, legal and regulatory framework for marine conservation in Zan-

zibar. Important elements that need to be addressed include the need for improved transparency, multilateral dialogue between ministries and departments (notably entities managing environment, fisheries, forestry, and tourism), participatory involvement by non-state actors, and establishment of oversight bodies to promote intersectoral coordination and accountability. Alignment between government sectors is almost non-existent and has no legal basis that transcends existing Acts (Fisheries Act No.7 of 2010, Forestry Resources Management and

Conservation Act No. 10 of 1996, and Environmental Management Act No 3 of 2015). While attempts have been made to work together under the Integrated Coastal Zone Management (ICZM) Committees, lack of resources, lowered conservation and protection interests and other divergent priorities from the sectors have not fully exploited the utilization of the ICZM Committee. Significant improvement to this situation can be achieved through a professional revision of the MCU Regulations and applicable legislation to resolve inconsistencies in the interest of improved and sustainable marine and coastal resource management. This proposed action applies to all MCAs on Zanzibar and is aligned with the **MCS Strategy** (Chapter 8).

To support the implementation of this action, training on regulations should be organized for MCA Managers, including review of ICZM provisions and to ensure it is aligned to make fisheries management better integrated.

### **Action 1.3: Create awareness on fisheries resource management issues to the judiciary**

On Zanzibar, arrests of fishers engaged in illegal practices rarely lead to eventual conviction of perpetrators, and usually, very low penalties are accorded even when convictions are issued, thus failing to serve as effective deterrents to discourage repeat offences. There is need to create awareness and transparency among the judiciary for it to better understand the magnitude of the impacts that illegal activities have within protected areas. Without the support of the judiciary, deterring over-exploitation of fishery resource and/or related crimes will always be a challenge.

The weak knowledge among court prosecutors who draft charges and the magistrates who convict offenders needs to be addressed and strengthened. The DMC management will endeavour to increase awareness and sensitize the police and the judiciary officials on the consequences and implications of unsustainable fishing on both fish stock and conservation and the resulting socio-economic setting, leading to eventual loss of earnings to the RGZ. Exposure trips, field tours or exchange programmes will be organised to deliver the training. The activities that address this action and related needs are one the focus areas of **MCS Strategy** (Chapter 8), notably under Objective 9, and proposed actions therein.

### **Action 1.4: Empower SFCs to execute their mandate**

At present, the operation of the SFCs have not met the standards envisaged, as defined on the MCU Regulations, consequently they are not delivering the performance and resulting benefits. Factors responsible for this situation include lack of appropriate training and capacity building on the roles of SFCs in fisheries management, as well as internal conflicts and incompatible agendas. The provision of skills and support to SFC members is a much-needed step towards improving this critical component of the fishing fraternity, leading to improved management of fisheries resources in the MCAs - one of their main goals. This section is critical to a co-management approach and is very high priority. The new Fisheries Bill is expected to address many of these issues and enhance fisheries involvement in marine resource management.

Since 2019, the old MANRLF (now MBEF) has been offering relevant training to SFC leaders at selected SFCs within the PECCA, notably training on SFC roles and responsibilities, governance and fisheries management (including enforcement of regulations), training that would be beneficial if it extended to all the relevant SFCs inside and beyond MCA boundaries (e.g. Kukuu in South Pemba, a very proactive community adjacent to PECCA boundary at Kangani).

Protocols and strategies should be developed to be shared with the fisheries and research partners involved in the PECCA to ensure common approaches. There needs to be support of enforcement authorities to community-led patrols (follow-up arrests but also engage in joint patrols), including reactive community networks (e.g. regular and participatory FEC meetings, maybe also at district level “DEC” to address neighbouring SFCs conflicts and management questions). MCA Managers should engage with NGOs that have developed community-based resource management initiatives and strategize the approach so that all SFCs covered.

Finally, SFCs should also be assisted in having stronger legally binding arrangements, formalised, signed and gazetted by-laws, that provide them with greater influence and authority, especially over non-compliant fishers operating within their areas of jurisdiction. This change could be brought about through the review of MCU Regulations (see Action 1.2, above). The process for approval of by-laws needs to be prioritised and streamlined. Proposed activities to address that, as well as MCS-specific training, SOPs, sustainable financing and co-management agreements are one of the focus areas of the **MCS Strategy** (Chapter 8), notably under Objectives 2 and 4 and the proposed actions therein.

### **Action 1.5: Manage access of migrant fishers to PECCA’s fishery**

While there currently are not that many migrant fishers reportedly operating inside the PECCA, the PECCA management needs to be aware of the potential threat, because migrant fishers may not be aware of the PECCA rules and conditions or may object to their gears being excluded from use in the PECCA and choose to use destructive fishing gears. Experience from elsewhere suggests these fishers are more experienced in fishing, and some of their boats are owned by influential businesspeople, hence most of the time they are ‘permitted’ to fish in Zanzibar’s waters. Since many of these fishers use more efficient gears, such as ring-nets, they can land more fish than the local fishers, sometimes creating tension and conflict at the local scale.

There is a need to review the existing migrant fisher permission procedure to give MCA and local management (SFCs) a say in the process. To ensure that conflict between local and non-resident fishers is minimised, PECCA management will be guided by the DFDMR and District authorities to ensure that there is vigilance and transparency in the permitting system. This will also include monitoring whether both local and non-resident fishers have paid the requisite fishing licensing fees and enforcement of the law regarding illegal fishing methods and PECCA regulations with respect to gears and zonation.

The fishing effort of visiting fishers will be subjected to annual review to determine whether it is impinging on the carry capacity for each fishery, based on outputs from Action 2.2 on focused fishery research. Assigned camp sites will also be periodically visited with the intention to ensure hygiene and environmental conditions are maintained and other wildlife or forestry or biodiversity features are not harmed.

A separate action, under the **MCS Strategy**, plans for a centralized fishing licensing system with identification of the numbers for canoes, *ngalawa* and other boats and an associated surveillance system. SFCs should have an incentive to participate and be the first port of call for itinerant fishers arriving. Provisions to deal with *dago* fishers in SFC SOPs may be needed (if not already there). The carrying capacity of the *dago* needs to be established and translated into permitting agreements, and education of migrant fishers as to the details of local by-laws and PECCA regulation is needed. ‘Dago’ surveys need to be carried out and the involvement of SFCs would be appropriate to gather this information. For monitoring of fishing effort of migrant fishers, see **MCS Strategy** Objective 10.

### **Objective 2: Research for fishery management improved**

Fisheries monitoring and research, on biological and socio-economic issues, is essential for effective MCA management, including of fishery resources. Natural environment data are also vital to under-

stand ecosystem function and change, especially how it responds to management interventions, such as those proposed in this GMP. For similar reasons, socioeconomic data is needed to identifying changes in livelihoods and well-being.

The MBEF has performed the essential fisheries monitoring functions for many years, usually summarised in fisheries frame surveys (FFSs). Typically, the data that are routinely collected every ten years or so includes location of fishing operations (based on landing sites) and fishing effort (based on number and type of boats, of gear types and fishers). Some catch data are also collected at selected landing sites and dates. The DFDMR also maintains a dedicated database on fisheries statistics, the status of which is not known.

As described under the Guiding Principles, despite the many years of fishery monitoring and research, there has been inadequate dissemination of research information to MCA managers and planners; hence science-driven management has been minimal. Currently, data and information generated from DFDMR is not easily available for use by MCA managers.

This objective aims to streamline dissemination of monitoring and research findings and/or outputs among relevant stakeholders and research partners. It also aims to develop and operationalize the fisheries research database, establish information exchange and advocate for a focus on priority research in each MCA including exploration of the impacts of new fishing gears on fish stocks and the environment. Implementation of the FMPs for the priority fisheries are also a mechanism for streamlining monitoring and research findings. These interventions are elaborated under the following three proposed actions.

### **Action 2.1: Improve fisheries information sharing within MCAs and stakeholders**

Existing fisheries information and data that is relevant to Zanzibar's MCAs, including the PECCA, may at times be available but not always be accessible to MCA managers. These data are needed for input to management approaches that they might present to the FMCAC or SMC, for example. Such data is most likely in one of the sections of the DFDMR, thus what is needed is a more efficient means of sharing information that is de-centralised to the various MCAs. In addition, some information relevant to specific MCAs might become linked to individual staff hence in the event of staff transfers or loss, information is also lost.

An accessible research database that includes past and on-going research outputs will be established, for access to DMC staff including MCA managers. As a first step, an annotated bibliography of all fisheries-related research conducted in Zanzibar will be prepared, with efforts made to solicit research outputs (reports, publications, documents and data) that are currently not readily available.

Of benefit to all MCAs and respective managers will be the establishment of an annual forum where MCA managers gather and share information regarding their respective MCAs. Quarterly fora for MCA managers and selected staff, as well as the SMC and participation of SFC members, might be appropriate over time, thereby providing an opportunity to share issues for discussion and discuss appropriate management interventions.

The website for PECCA and/or other MCAs (described in Action 3.2 in the Tourism Development and Management Programme) should include relevant information and data to be shared with partners and stakeholders, with access restricted. Events and workshops could be advertised on the website and associated newsletters. It is critical to have a more reactive and dynamic management momentum. Communities, NGOs, even private sector, should be able to input to the site.

### **Action 2.2: Prioritize PECCA research focused on addressing pertinent fisheries issues**

Most fisheries issues are generally of a similar nature throughout Zanzibar, though areaspecific issues do exist. Research that allows more detailed understanding of the fishery in the PECCA will be

guided to focus on the following key areas:

- Catch (weight) and catch composition: for species and/or higher taxa harvested.
- Fish lengths: important for standard specific fisheries stock assessments.
- Fishing effort: including type, duration, and location of fishing operations.
- Costs and revenues: these cover fish prices, fuel, gear costs and wages.
- Efforts survey: number of fishers, fishing gears and vessels operating.
- Fishing grounds: mapping of the physical and seasonal distribution of fisheries.
- Contribution to livelihoods: determining fisheries contributions to food security and poverty alleviation, through analysis of fish catches, marketing, and distribution of catch and the number using the MCA resources regularly.
- Collaborating with SFCs: working with SFC members in research data collection will develop trust and transparency and facilitate adoption and implementation decisions based on the joint findings.
- Monitoring indicator and keystone species: understanding changes to populations and other features of indicator and keystone fish species of economic and biological importance in the PECCA (e.g. triggerfish) is important to understand consequences of management interventions.
- Keystone species should include elasmobranchs: monitoring these fisheries has been an eye-opener in terms of the threatened species caught. Include seagrass fishes. Monitoring of alternative livelihoods.
- Emerging gear analysis: working with fishers to understand and research the impacts and possible need for management interventions with respect to new or emerging fishing gears versus customary and legal ones is needed to reduce the evolution of new and more destructive fishing methods.
- Consideration of alternative gears: alternative gear or techniques should be researched and where appropriate encouraged. Examples could include use of Fish Aggregation Devices (FADs) at offshore sites, gear exchanges, and brushwood enclosures or artificial modules ('casitas') designed for lobsters. Mwambao-MCCC is currently researching gear modifications in PECCA with regard to traps (*dema*) and line fishing. This is local level research and could be repeated for other gears. Mwambao-MCCC has also trained an in-water biodiversity monitoring team using the CORDIO methodology. This team carried out annual survey in selected sites but can be used to monitor other areas of interest. This is an example of more sustainable way of detecting changes both in habitats and fish populations.
- Development and adoption and monitoring of alternative livelihoods. Studies on alternative livelihoods and improved value chains should be conducted on specific fisheries.

Over the long term, periodic assessments of fisheries research will ensure it contributes to MCA management effectiveness with minimum duplication of efforts, and that new data and information builds on the results of previous work. Implementation of the FMPs for the priority fisheries are reviewed and produced on an annual basis. As such these serve as mechanisms for periodic assessments.

A catch data collection system should be developed and deployed and management measures should be considered given the results of these studies and the ecological surveys of the area. Several open-source data collection solutions that exist can be used to help facilitate collection, analysis and reporting. Protocols to map fishing grounds have been developed by WCS and others and some of this work has been started in target communities in Zone 3 of PECCA. The methods are applicable in other MCAs as well. The MCA Manager should work with the fisheries scientists and research partners to avoid duplication of efforts and ensure that efforts are guided to maximize credibility and scientific rigour.

This approach will contribute to decision-making, planning and management processes. For MCA Managers to understand the implications and limitations of research results, regular discussions and feedback sessions with fisheries scientists and research partners will be organised. Of note is that the **MCS Strategy** (Chapter 8) includes actions for specific training programs for SFCs, MCA staff, District based Fisheries Officers and beach recorders (*bwana diko*) with additional actions on review of the catch data collection system.

### **Action 2.3: Conduct studies on fishing vessels, gear use, and their catch levels**

Fishing vessels, gear type and technology used by fishers are regulated and licensed by the DFDMR. With limited enforcement of regulations on use of inappropriate and illegal gears, due to financial constraints, lack of awareness and vested interests, fishers are at liberty to use fishing methods such as beach seines, ring-nets and spear guns that are not appropriate and potentially destructive. Unfortunately, these methods are being adopted by local fishers in the PECCA. The level of damage caused by both illegal and legal fishing gears has not been measured. Studies on catch trends, benthic substrates and fishing patterns have been conducted by WCS in Zone 3 to support zoning and management of community fisheries. The methods are applicable in other MCAs as well. Participatory mapping of fishing grounds and fishing calendar is highly recommended.

A study involving local fishers will thus be conducted to generate information on gear use and impacts of individual gears to understand the level of damage caused by each, to inform management decisions, and be used to work with local fishers as information to improve their awareness of fishing impacts. The principal elements of the catch and gear monitoring programme are incorporate in the **Management Information System** (MIS).

### **Objective 3: Effective community participation in fishery management**

The successful management of Zanzibar's MCAs depends on the active participation of stakeholders, particularly fishers. Most of the challenges related to fisheries in the PECCA require concerted efforts and a close working relationship between fishers and marine conservation entities (including CBOs, NGOs) and government entities (e.g. DMC). The present situation is one with virtually no coordination among these stakeholders, except for a few examples of private sector entities or NGOs working with SFCs to effectively manage small areas.

The MBEF has prioritised collaboration with fishers in fisheries management. Of highest priority in the present and on the wider scale, it is important that working relations between fisheries stakeholders are strengthened and coordinated to generate synergy and strengthen unity of purpose. One of the proposed actions to meet this objective is to rerevitalise the MCA oversight committees, the other to be an active participant at District authority meetings. Increasing participation of the fishers themselves in fisheries management is the focus of Objective 4 (see Action 4.1 below). Further support for resource users is described in Chapter 7 Community Support Programme, with support for mariculture described in Chapter 6 Mariculture Development Programme.

### **Action 3.1: Establish vibrant and effective MCA committees**

This action is relevant to all MCAs on Zanzibar, and includes operationalization of the SMC and the MCTAG which embraces representatives of most of the relevant stakeholders as well as the FMCAC

(as outlined in Section 1.6). Such recommendations mirror those proposed in the legislative review by McLean et al (2012), as described in the background to Action 1.2, above. The above committee, group and council have yet to be recognized and thus have never met to fulfil their obligations. This must be rectified as soon as possible, so that all relevant entities are able to formally contribute to decisions regarding the management of the MCAs of Zanzibar. As a first step, the new mandates, prescribed members, roles and functions of the above committee, group and council will need to be aligned with the requirements of the actions proposed in the GMP. The goal being to produce a transparent, effective and participatory management framework that embraces all stakeholders. Through successful implementation of this action, there will be improved oversight and participation in the management of all MCAs on Zanzibar.

The MCA Manager should consider including reactive community networks e.g. regular and participatory FEC meetings, maybe also at district level to address neighbouring SFCs conflicts and management questions, and/or District level PECCA sub-committees for resolving local issues and management decisions. This will be more cost and time effective. Stakeholders should be able to contribute to define the agenda of committee meetings. All such meetings included FEC meetings need to be minuted and FEC members need to be actively responsible for disseminating decisions made.

### **Action 3.2: Participate in District administrative meetings**

PECCA management need to be active participants in District administrative meetings with a recognised role/function. By being present increases visibility, generates awareness of marine resource management issues and provides opportunities for the PECCA to lobby for support from appropriate government agencies, and, where relevant to argue for support with fishery related interests. Another advantage includes when conflicts arise, for example, over access to landing sites and beach access routes. Successful outcomes of such engagement will strengthen relations between the fisher community and MCA management. Other aspects likely to be influenced to the advantage of PECCA include control of visiting fishers, whose permits to reside inside MCAs are obtained from the District authorities.

There previously were District Fishery Committees and perhaps it is worth investigating whether it is possible (appropriate) to have District level PECCA committees (as described for Action 3.1, above), which might allow for more targeted actions on fisheries issues.

### **Objective 4: Fishing pressure within MCAs at sustainable levels**

The continued fall in productivity of nearshore fishing grounds around Zanzibar, including within the five MCAs, necessitates the development of alternative sources of livelihood, known also as alternative income generating activities (IGAs). Over recent years, the tourism sector has provided much needed employment opportunities, but for many reasons, it cannot accommodate all school-leavers and inevitably, fishing remains a major option for young men, especially in Pemba where tourism development is very low. This is the main point of intervention for alternative livelihoods and as such it will require a longer term approach, aimed at slowing growth of fisheries sector,

It is always a challenge to define, and get fishers to adopt, alternative livelihood opportunities in the context of rural, tropical landscapes such as that of Zanzibar, with general low levels of education, few manufacturing industries, little area to increase agricultural activities and growing populations. Despite the small range of obvious options, IGAs for fishers need to be explored. This objective explores two areas: establishment of collaborative management groups (CMGs) to manage specific areas, and support for fishers to access devolved funds for other livelihoods, both of which are described further below. Mariculture options such as seaweed farming, fish farming and ranching of sea cucumbers are elaborate on in Chapter 6 Mariculture Development Programme. Ideally, such alternative IGAs encourage participation of existing fishers from the fishery, but in practice they may also intercept those that would go into the fishery or have nothing to do with the fishery. Outputs from the focused

research described above in Action 2.2 of this chapter may, in time, deliver additional opportunities to consider, such as for example, trial of lobster 'casitas' and brushwood parks in creeks.

#### **Action 4.1: Support the establishment of empowered community managed fishery areas**

In support for the objective of devolving management of fisheries resources to local communities, including and beyond simply supporting SFCs, the PECCA management will support establishment of collaborative management groups (CMGs) to manage specific areas. By supporting SFCs to govern more of the fishing grounds, the PECCA authorities are also instilling trust and ownership on the local fisher community, and the reduce costs associated with patrols. The MCS Strategy elaborates further on specifics such as by-laws, assigning resources to SFCs and formalising agreements.

For over five years, CMGs have been developed in many of the existing MCAs on Zanzibar, usually with technical and some financial support from NGOs or the private sector, for example hotels. From the experience to date, numerous challenges persist, including, but not limited to limited enforcement and institutional capacity, a general lack of awareness of fishing licenses, encroachment into season closures and use of illegal gear (SCUBA, seines and spearfishing), limited in area size and lack of clear demarcation.

As described above (under Action 1.4), the need to empower SFCs to be able to enforce fisheries regulations is an essential requirement to effective CMFAs. As described earlier, the means to achieve that is by having formally agreed by-laws. A model that has developed for effective CMGs includes each SFC having a resource management plan for the fishing grounds under its responsibility, with the management (and zonation) of these areas subject to the details in the gazetted by-laws (this includes areas that are not 'closed' but are subject to gear restrictions for example). Experience has shown that all closures, whether temporary or permanent, require by-laws and that areas will change over time and with experience of the local SFC. Examples include temporary closures for octopus and other species, as well as Replenishment Zones where all extractive activities are banned.

Additionally, through CMG agreements, for example with tourist companies, local communities derive associated benefits, namely tourism related income, but also other forms of assistance such as for community projects. The SFC standard operating procedures (SOPs) currently being developed, have mechanisms by which this can be operationalised in CMGs. Such arrangements when successful, may persuade community members that conservation of small portions of traditional fishing grounds can be a source of tourism-based livelihood more profitable in the long-run than traditional methods of fishing. Further, the build-up of fish stocks in small, closed areas, will serve to re-populate other fishing grounds that continue to be fished. Operations and procedures are described fully in the **MCS Strategy**. Final boundaries need to be agreed but should not depend on the fishery or the users (as fishers travel considerably from one area to another) but rather on local area of jurisdiction (responsibility) based on proximity. Visiting fishers will have to abide by local by-laws.

In the above scenarios, there is a clear role for the private sector and NGOs to play in contributing to the overall goals of the MCAs, working in partnerships with local communities inside the MCAs.

#### **Action 4.2: Establishment of sustainable credit schemes**

To contribute to empowering the fisher community to improve their livelihoods, the establishment of credit schemes is one strategy that has been successfully tried in other parts of the world. Lessons also exist from the Kwanini Foundation and from MwambaoMCCC on eco-compliance loans (MKUBA). This is an appropriate management-compliance based scheme. Additional livelihood options might include gear replacement schemes, through provision of appropriate fishing gears in exchange for surrendered destructive fishing gears (e.g. large-meshed gill-net or straight shanked hooks for circle hook long lines), or assistance with improve fish preservation techniques (e.g. introducing the use of the Chorkor kiln for more efficient fish smoking).

The action requires identifying and contracting appropriate skilled expert(s) to lead sustainable credit scheme analysis, and to identify fisher community members/SFCs interested in participating in credit schemes trial. Development and research partners may have a role here. Once initiated with selected groups, the process will be monitored for an agreed period and evaluated for success and challenges. Learning from the feedback and experiences the scheme can be rolled-out to wider fisher community. Credit schemes should come with clear conditions and safeguards to avoid leading to additional fishing pressure (by funding new harmful fishing gears for instance). Related value chain addition should be evaluated in the context of management actions. The risk is to increase pressure on the resource by increasing profits on value chains. Value addition needs to be developed as an access restriction mitigation measure and not in isolation.

### **Objective 5: Impacts on emerging issues in fisheries assessed and addressed**

Emerging issues can occur at village, district, national, regional and even global scales. Of relevance to MCAs, some issues directly or indirectly effect fishery resource management and general conservation initiatives. Accepting that most emerging issues are beyond the scope of MCA management, planning for such events is important since it lays the ground for coping with their implications when they actually do occur. Examples of emerging issues of a global scale include climate change impacts on seawater conditions and resulting impact on fishery resources management, and the Covid-19 pandemic that resulted in a significant drop on tourism activity and associated employment, income and markets.

On national and district levels, under new legislation (Local Government Authority Act, 2014 and Regional Administration Act, 2014), natural resources are to be managed by Districts, including resources and activities within existing MCAs. This change in governance is likely to necessitate a change in strategy to address fisheries and other resources in the MCAs. This an example of an emerging issue, as is new coastal infrastructure development, whether in the form of large tourism projects, luxury housing and marina construction, port expansion or oil and gas exploration.

The on-going oil and gas exploration that has recently started with seismic surveys through inshore waters, and plans for the expansion of Zanzibar Port are developments that might affect coastal waters and impinge on the integrity of MCAs including by affecting local stakeholder and resource users. At present, the detailed implications for these activities on fish stocks and sensitive marine habitats within the MCAs is not yet known.

To address these concerns, one proposed action is described to guide the MCA Manager in order to become aware of future emerging issues and thus be in a position to define possible impacts of these (and other) emerging issues, and report to the SMC (and MCTAG) to develop appropriate responses.

#### **Action 5.1: Participate in elaboration and review of local district development plans, including private sector and government initiatives**

It is vital that management of all MCAs be aware of, be represented and formally participate in all potential development plans that may affect the areas under their jurisdiction. Only through prior knowledge of such plans will managers be in a position to consider impacts on the fisheries resources and environmental sensitivities. Establishing and presenting development plans for coastal communities is the type of work that should ideally be based on a marine spatial plan (MSP) which that should identify critical habitats and threats to ecosystems. Support to develop this type of action is typically provided by NGOs that re development partners.

At District levels, through participating in elaboration and reviews of development plans, MCA managers are better placed to influence the formulation of by-laws on utilization of fishery resource in the districts that are important for MCAs. Participation in such fora can also be used to raise concerns against specific resolutions that may jeopardize conservation initiatives, for example on per-

mits to visiting fishers during certain seasons in conflict with conservation goals for selected species, or politicisation of conservation initiatives that relate to fisheries issues.

Finally, proposed activities include participating in all Environmental and Social Impact Assessments and Audits (ESIA and EA) related to private sector, oil and gas or government development projects in or close to MCAs. This will require frequent collaboration with ZEMA, to be updated on up-coming ESIA's, and to participate as part of the general public during scoping stages, in other public feedback phases of the ESIA process, and in monitoring during project implementation. The PECCA representative should be able to present accurate and current baseline data for any proposed project impact areas, particularly on biological, socio-economic status, ecosystem functioning and bio-physical aspects. By having such data at hand will contribute to defining potential consequences from project implementation and form the basis for decision making on project impacts.

### **Action 5.2: Development of guidelines and management systems and responses for addressing emerging issues**

Initiate a fora or meeting mechanism for PECCA Manager and staff to engage with community representatives, scientific advisory bodies and NGO partners to discuss emerging issues. Initiate a fora or meeting mechanism for MCA technical and scientific advisory bodies to discuss emerging issues identified at the PECCA level and from other MCAs. Develop guidelines, management systems and responses to priority emerging issues and implement at PECCA level.

### **Monitoring Framework**

The monitoring framework set out in the Table 12 has been designed to provide guidance for the assessment of the potential impacts resulting from implementation of the Fisheries Resource Management Programme, highlighting potential positive as well as negative impacts. The framework also includes easily measurable and quantifiable indicators for assessing these impacts, and potential sources of the information needed. Monitoring the impacts of the plan implementation will ensure that timely changes to management approach are made when the situation demands.

**Table 12. Fisheries Resource Management Programme Monitoring Plan  
(modified from KWS, 2015).**

Objective	Potential Impacts (positive and negative)	Verifiable Indicator	Sources and means of verification
Objective 1: Enforcement and surveillance of fishing activities strengthened	State and non-state actors collaborate to facilitate effective enforcement of legal fisheries provisions	No. and nature of management and enforcement collaborations	PECCA management and enforcement records
	Reduced illegal natural resource use in the PECCA	No. of illegal natural resource use incidents in the PECCA	PECCA enforcement records
	Sustainable utilisation of fisheries resources	Adherence to zoning scheme and permitted fishing methods	Fisheries utilisation records and PECCA enforcement record
	Increased un-employment, reduced catches (short-term), political interference	No. of fishers actively fishing and village population data	PECCA enforcement records and village data
Objective 2: Improved research on fishery management	Marine research wellcoordinated and findings disseminated to stakeholders to support decision making	No. of research dissemination meetings held; Use of research in identifying and implementing mitigation measures	PECCA management and research reports
	Increased community awareness of and importance of the PECCA and willingness to adhere to regulations	No. of local community members arrested for illegal activities in PECCA; Use of incidence of illegal fishing as a proxy for importance of PECCA	PECCA enforcement Records
Objective 3: Effective community participation in fishery management	Working relations between stakeholders strengthened and coordinated to generate synergy and strengthen unity of purpose	Number of functional collaborative agreements between PECCA stakeholders	PECCA records
	Increased value and importance of the PECCA to surrounding communities	Income from diverse activities linked to conservation of PECCA	PECCA records

Objective	Potential Impacts (positive and negative)	Verifiable Indicator	Sources and means of verification
Objective 4: Fishing pressure within MCAs at sustainable levels	Communities have alternative sources of livelihood that reduce pressure on fisheries	No. of non-fishing IGAs initiated and successful; No. of fishers (potential or former) as participants in  IGAs	PECCA records
Objective 5: Impacts on emerging issues in fisheries assessed and addressed	Negative environmental impacts of marine activities understood and mitigated	No. of ESIA's and audits; Mitigation actions included in appropriate plans and implemented	ESIA's and Audit reports

## 5.4 Implementation Schedule

The following pages set out the proposed first six-years of the ten-year implementation schedule for the PECCA GMP (see Table 13). The activity plan details the activities, responsibilities, timeframe and milestones necessary for the delivery of each management action, starting in 2022, which need to be finalized by the MCA Manager and SMC.

Table 13. Fisheries Resource Management Programme Implementation Schedule (first six years).

Management Action and Activities	Persons responsible	Timeframe												Proposed milestones
		2022		2023		2024		2025		2026		2027		
		1	2	3	4	1	2	3	4	1	2	3	4	
<b>Objective 1: Enforcement and surveillance of fishing activities strengthened</b>														
<b>Action 1.1: Enhance capacity to facilitate effective law enforcement and increase awareness</b>														
														[see MCS Strategy]
<b>Action 1.2: Review existing and development of more effective MCA regulations</b> [to align with MCS Strategy]														
1.2.1	Constitute a task force (or consultant) to audit existing legislation and regulations and their efficacy													Revised MCA regulations gazetted by .....
1.2.2	Organize stakeholder workshop to revise MCA regulations in support of fishery resource													
1.2.3	Prepare workshop proceeding and submit to MBEF for adoption and gazettelement of suggested regulations and changes to legislation													
<b>Action 1.3: Create awareness on fisheries resource management issues to the judiciary</b>														
														[see MCS Strategy]
<b>Action 1.4: Empower SFCs to execute their mandate</b>														
														[see MCS Strategy]
<b>Action 1.5: Manage access of migrant fishers to PECCA's fishery</b>														
1.5.1	Evaluate and formalize visiting fisher priorities and procedures with District authorities													Procedures and condition for visiting fishers agreed by .....
1.5.2	Ensure visiting fishers are aware of fishing regulation and restriction applicable in the MCA													
1.5.3	Provide and maintain hygiene and sanitation facilities at camp sites													
1.5.4	Periodically inspect camp sites to verify hygiene, sanitation and environmental standards													
<b>Objective 2: Research for fishery management improved</b>														
<b>Action 2.1: Improve fisheries information sharing within MCAs and stakeholders</b>														
2.1.1	Develop and populate information sharing infrastructure for simple access by MCA staff													Information sharing platform available by .....
2.1.2	Organize annual fisheries information sharing meetings with staff/stakeholders													
2.1.3	Update strategy of information sharing as dictated by prevailing conditions/circumstances													
2.1.4	Support MCA staff participation in conferences (national/regional/international) to enhance information gathering and learning from experiences in other MPAs													
<b>Action 2.2: Prioritize PECCA research focused on addressing pertinent fisheries issues</b>														
2.2.1	Profile fisheries issues of concern for PECCA													Research on fisheries is conducted by .....
2.2.2	Seek funding to actualize research for identified research priorities													

Management Action and Activities	Persons responsible	Timeframe												Proposed milestones			
		2022		2023		2024		2025		2026		2027					
		1	2	3	4	1	2	3	4	1	2	3	4				
2.2.3 Liaise with local and/or other relevant research entities for targeted fisheries research																	
2.2.4 Organize a forum/workshop to facilitate research feedback to all MCA staff and other parties																	
2.2.5 Organize a meeting with stakeholders to assess the impacts of emerging gears versus customary ones																	
2.2.6 Implement research recommendations and evaluate their validity from subsequent results after some specified period e.g. one year																	
2.2.7 Conduct annual meeting between MCA staff, fishers, District official and fisheries researcher to review findings and agree on future interventions																	
<b>Action 2.3: Conduct studies on fishing vessels, gear use, and their catch levels [see Management Information System (MIS)]</b>																	
2.3.1 Conduct a study to generate information on gear use and impacts of individual gears, to understand the level of damage caused, involving local fishers																	Study on gear use and damage conducted by .....
2.3.2 Assess the gears used and catches realized	TBC																
2.3.3 Use findings to generate awareness among PECCA fishers of impacts of gears on the environment																	
<b>Objective 3: Effective community participation in fishery management</b>																	
<b>Action 3.1: Establish vibrant and effective MCA committees</b>																	
3.1.1 Review members of MTCAG and SMC and contact representatives of each category																	DMC and PECCA oversight committed
3.1.2 Organize an MCA-wide meeting to publicize the need for management committees to become active																	functional by
3.1.3 Agree schedule for first meeting of the PECCA MCTAG and SMC	TBC																.....
3.1.4 Develop a coordination mechanism for future meetings and reporting																	
<b>Action 3.2: Participate in District administrative meetings</b>																	
3.2.1 Introduce PECCA staff to relevant districts and participate in District level meetings																	PECCA staff attending District meetings by
3.2.2 Organize a meeting for District officials to sensitize them on role played by fishery and other aquatic resource in supporting livelihoods, conservation and tourism																	.....
3.2.3 Submit fishery and other fauna related reports to District administration on regular basis and seek feedback where appropriate	TBC																
<b>Objective 4: Fishing pressure within MCAs at sustainable levels</b>																	
<b>Action 4.1: Support establishment of empowered community managed fishery areas</b>																	
4.1.1 Consult with and visit existing CMFAs to learn of their strengths, weaknesses, opportunities and threats																	Meetings held with
4.1.1.2 Carry out an outreach program to encourage fishers to embrace CMFAs in and outside MCAs																	SFCs on CMFAs by
4.1.1.3 Provide technical support to SFCs intending to embrace CMFAs and seek funding and support	TBC																.....1



## 6. MARICULTURE DEVELOPMENT PROGRAMME

### 6.1 Programme Purpose and Strategy

The purpose of the Mariculture Development Programme is to:

***Empower and encourage local community to develop and benefit from sustainable forms of mariculture***

As stipulated in the 2011 National Fisheries Policy (Draft), the goal for aquaculture is “To increase the production of seaweed, cultured finfish, crustacean and mollusc species to complement the declining production from capture fisheries.” With most of the coastline on Unguja and about half of that of Pemba now included in one of the five MCAs, promoting aquaculture, or as termed here, mariculture, will inevitably be considered as alternative livelihood options. Since this activity is thematically distinct from other forms of near shore or land-based activities, in this GMP, it has been allocated this small but important chapter.

Despite keen interest in mariculture to develop potential alternative IGAs, there is also incomplete knowledge on several aspects of each form of mariculture, from environmental impacts to socio-economic benefits and security issues. To fill these gaps, a series of investigations and interventions are needed, whether it be related to seaweed farming, fish, shellfish and bath sponge farming, or sea cucumber ranching. For example, while the seaweed sector has good potential for growth, there is a need to confirm the absence of negative impacts from the activity, such as use of mangrove poles and plastic littering, and investigate value-adding at local level to increase the value of the sector and break buyer monopoly (i.e. low prices fetched for dried unprocessed product), and to address health complications associated tending to the seaweed lines (DHI/SAMAKI, 2014). The following two guiding principles underpin the Mariculture Development Programme.

#### Guiding principles

When implementing the Mariculture Development Programme, the PECCA management, with participation of stakeholders, will endeavor to ensure that:

**Mariculture and related activities are practiced in sustainable ways with minimum negative impacts**

In general, there are no obvious threats or impacts on MCAs from mariculture activities. Most take place in intertidal zones, in sandy areas for sea cucumber and in rock shores for oysters. Tidal currents facilitate cleaning and water replacement. So far there has been no attempt any monitoring of aquaculture, though it is prudent that appropriate indicators are monitored to verify that environmental, socio-economic and security issues do not develop.

**Mariculture is conducted in ways that contribute to local livelihood options**

Seaweed farming has contributed to local livelihoods of Zanzibar for many decades, including parts of the PECCA. One of the functions of the PECCA is to raise awareness on sustainable livelihood options. As such, management actions are designed to ensure that appropriately guided mariculture opportunities are explored and trialed by local community groups. The PECCA management, in collaboration with DFDMR mariculture experts and those from academia, will strive work with community groups so that they can exploit mariculture opportunities available in the PECCA and adjacent areas.

### 6.2 Targeting Mariculture Development Actions

As summarized in Table 7 the threats that currently impact or are likely to impact on the PECCA conservation targets and their KEAs include invasive species, pollution (debris), land erosion/sedi-

mentation, and seabed ecology impact from seaweed farms. These are identified as threats to the marine and coastal environment associated with mariculture. Mindful of the over-riding mariculture development objectives of diversifying marine resource, developing the sector in a sustainable fashion, and increasing production, these priority threats are addressed in the management actions proposed in the following sections.

### 6.3 Management Objectives and Actions

In implementing the Mariculture Development Programme, the PECCA management, with participation of development and conservation partners and stakeholders, will endeavour to ensure that the above guiding principles are followed. These two principles are intended to guide the implementation of the Programme's two Mos. For each of the MOs a brief description of the relevant management issues and opportunities is given, which provide the specific context and justification for the actions.

**MO 1.** Seaweed farming production maintained or expanded sustainably

**MO 2.** Alternative mariculture options developed and implemented

The following sections present brief description of the relevant management issues and opportunities, and the specific context and justification for the proposed actions.

#### Objective 1: Seaweed farming production maintained or expanded sustainably

Production of seaweed from the villages surrounding the MCA has suffered in recent years from disease and profitability as only the *E. spinosum* species is currently yielding sufficient growth. Various issues surround the problems of price and yields. This objective seeks to strengthen collaboration with the seaweed farming communities, to understand their challenges and opportunities and through working together, find ways to ensure production is maintained or expanded sustainably. Through improved income security, especially among women, opportunities for socio-economic development will be explored, without compromising sustainable natural resources and environmental management. The indirect or long-term beneficiaries will be the coastal populations at large.

##### Action 1.1: Evaluate the potential for expanding seaweed production

Seaweed farming is being practiced in over twenty villages that border the PECCA. The purpose of this action is to evaluate the potential for greater production and activities under this action include developing a relationship of trust between the farming communities and the PECCA, from which the PECCA management can develop means to support the communities. A pre-requisite is to conduct a SWOT analysis, to understand more precisely the strengths, weaknesses and opportunities (including economic benefits) and threats associated with the current activity, as practiced in different parts of the PECCA. The second task is to determine that there are areas of seabed that are available for the activity, that don't conflict with other users. Mapping of seaweed activity within MCAs enables spatial planning and contributes to zoning. Through use of PMSD techniques the importance of seaweed stakeholders within MCAs can be better understood. There is a then a need to establish that pollution (e.g. from plastic string or floats), environmental damage (e.g. to seagrass beds or other benthic communities, use of mangrove poles), conflicts (e.g. with other water and space users such as tourism water sports) and other potential issues are resolvable. The impact of seaweed farming on reef flats (not lagoons) through nutrient flushes, trampling to gain access and shading requires better assessment (at least in the Pemba context) before the activity is more widely promoted. If this activity (as well as walking fishers) is to be promoted, then the appropriate exclusion zones need to be established before the practice is allowed to increase. Thus, techniques, options and means need to be made available to reduce impacts in the PECCA. Other areas to explore include the market system's issues/bottlenecks that prevent development expansion, determining the maximum extent

of seaweed farming depending on technique used, and how to emphasise climate-resilient mariculture practices e.g. tube-grown seaweed.

Further, it has been reported that the seaweed farms contribute to increased availability of fish in the farmed area, compared to non-farmed areas. Whether it is a perception or fact that seaweed farming can indirectly maximize fish production needs to be determined through scientific investigation.

Once the above are documented, through collaboration with the aquaculture unit at DFDMR, the Zanzibar Seaweed Cluster and other groups and researchers, PECCA management will develop a Seaweed Management Plan for PECCA be able to assist communities through targeted interventions (Action 1.2. below), mindful that any value addition activities need careful market research.

For any expansion of seaweed farming or other mariculture activity it would be appropriate for the MCA Manager to consider possible specific zoning to prevent conflict between users but also to protect biodiversity.

### **Action 1.2: Support existing seaweed production areas and activities to expand**

Pending the study on potential for expansion of seaweed farming, and appropriate areas, and once the PECCA management are convinced there are areas for further development into which to expand that do not conflict with conservation objectives (Action 1.1, above), and potential for improvement of growth performance, it will assist local communities to participate. To support those currently practicing seaweed farming, PECCA management will encourage local groups to establish co-operatives to streamline marketing of seaweed and related products (jelly, soup and sauce, etc.), and help formalize PECCA support. Encouraging the creation of seaweed farmers network and union to be able to advocate their matters also be considered. By working with the aquaculture unit at DFDMR, the Zanzibar Seaweed Cluster and other groups, the PECCA management will encourage more fishers to try a hand in seaweed farming thereby decreasing fishing pressure for wild fish stocks. Funding from the MPA Fund may be allocated based on merit and in accordance with the MPA Fund guidelines (see Action 2.3, Chapter 7), while other means of funding will be investigated.

### **Action 1.3: Research and management of stress related physiological changes, diseases and epiphytes**

For some years there have been growth issues with seaweeds farmed, especially on Unguja, with physiological changes, epiphytes and disease affecting the plants. The first steps is to identify and contract appropriate skilled expert(s) to lead the study and analysis, and to identify seaweed farmers in PECCA (and TUMCA, MIMCA and MBCA) who are interested in participating in the study and potential trial of techniques to address these deterrents to growth. Once trials are underway, the process will be monitored for an agreed period and evaluated for success and challenges. Learning from the feedback and experiences the approaches to manage these stress related changes, diseases and epiphytes can be rolled-out to wider farming community. This should involve the appropriate local seaweed farming associations and advisory entities and be conducted to cover all MCAs except CHABAMCA where there is no seaweed farming.

## **Objective 2: Alternative mariculture options developed and implemented**

Fish and shellfish farming are considered appropriate alternative source of income for coastal artisanal fishers, especially when faced with declining wild fish stocks. Three types of mariculture that can be undertaken include pond culture landward of mangroves, suspension culture (cage and raft) in sheltered inlets of sufficient depth, and rack culture in the shallow areas. Within the PECCA, very little mariculture other than seaweed farming has been practiced. Yet bivalve farming examples, mud crab farming and fish farming trials are being conducted on Unguja, as well as sponge farming and sea cucumber ranching.

### **Action 2.1: Evaluate the potential for expanding non-seaweed mariculture production**

An analysis of potential non-seaweed mariculture options is needed to objectively ascertain available options. The pre-requisite is a SWOT analysis, to understand more precisely strengths, weaknesses, opportunities (including economic benefits) and threats associated with potential alternatives for fish, shellfish and sponge farming, by building on these activities as currently practiced in different parts of the PECCA, and other parts of Zanzibar and the wider region. The second task is to determine that there are suitable areas available for the activity, that don't conflict with other users. There is also the need to establish that pollution (e.g. from plastic associated with the activities), environmental damage (e.g. to seagrass beds or other benthic communities), conflicts (e.g. with other water and space users such as tourism water sports) and other potential issues are resolvable. Whether the potential activities contribute to increased availability of fish in farmed areas, compared to non-farmed areas, can also be investigated.

Once the above are documented, through collaboration with the aquaculture unit at DFDMR, the Zanzibar Seaweed Cluster and other groups and researchers, PECCA management will develop a Non-seaweed Management Plan for PECCA be able to assist communities through targeted interventions (Action 2.2. below), mindful that any value addition activities need careful market research as well as an understanding of the market system's issues/bottlenecks that prevent development expansion.

### **Action 2.2: Support implementation for non-seaweed mariculture activities**

The local community in the PECCA-adjacent areas will be assisted to start non-seaweed mariculture (fish, shellfish and sponge) farming as alternative sources of livelihood. Examples of candidate species for culture include milkfish, mullet, shrimps, oysters, mud crabs and bath sponges. Production of cultured fish is hoped to sustain the increasing demand for fish protein among human population adjacent to PECCA and beyond.

Once the PECCA management are convinced there are areas for development of non-seaweed mariculture (Action 2.1, above), and there is potential for development at least on trial basis, it will assist local communities to participate. To support interested local community members, PECCA management will encourage local groups to establish cooperatives to streamline marketing of their products and help formalize PECCA support. By working with the aquaculture unit at DFDMR, those working on existing activities, researchers, and other groups, the PECCA management will encourage more fishers to non-seaweed mariculture thereby decreasing fishing pressure for wild fish stocks. Funding from the MPA Fund may be allocated based on merit and in accordance with the MPA Fund guidelines (see Action 2.3, Chapter 7), while other means of funding will be investigated. **Action 2.3: Develop guidelines on introduction of new mariculture techniques and species** The promotion of sustainable aquaculture needs to be balanced with the potential introduction of alien species. To guide the sector, a set of guidelines outlining the process and risks and necessary checks associated with introductions of non-native species. This action requires leadership from qualified mariculture and marine invasive species professionals to consider candidate species for farming and approaches to verify introductions of invasive is avoided. The action is applicable to all MCAs and the country.

## **Monitoring Framework**

The monitoring framework set out in Table 14 has been designed to provide guidance for the assessment of the potential impacts resulting from the implementation of the programme. It sets out the potential positive and negative impacts that may possibly occur during implementation of the programmer's proposed activities and includes easily measurable and quantifiable indicators for assessing these impacts, and potential sources of the information needed. Monitoring the impacts of the plan implementation will ensure that timely changes to management approach are made when the situation demands.

**Table 14. Mariculture Development Programme Monitoring Plan (modified from KWS, 2015).**

<b>Objective</b>	<b>Potential Impacts</b> (positive and negative)	<b>Verifiable Indicator</b>	<b>Sources and means of verification</b>
Objective 1: Seaweed farming production maintained or expanded sustainably	Marine research well-coordinated with findings disseminated to stakeholders to support decision making	No. of research information dissemination meetings held	Community Support records at PECCA
	Working relations with stakeholders strengthened and coordinated to generate synergy and strengthen unity of purpose	No. of functional collaborative agreements between PECCA stakeholders	Community Support records at PECCA
	Communities have alternative sources of livelihood reducing pressure on fisheries	No. of non-fishing IGAs initiated and successful	Community Support records at PECCA
Objective 2: Alternative mariculture options developed and implemented	Marine research well-coordinated with findings disseminated to stakeholders to support decision making	No. of research information dissemination meetings held	Community Support records at PECCA
	Working relations with stakeholders strengthened and coordinated to generate synergy and strengthen unity of purpose	No. of functional collaborative agreements between PECCA stakeholders	Community Support records at PECCA
	Communities have alternative sources of livelihood reducing pressure on fisheries	No. of non-seaweed farming IGAs initiated and successful	Community Support records at PECCA

## 6.4 Implementation Schedule

The following pages set out the proposed first six-years of the ten-year implementation schedule for the PECCA GMP (see Table 15). The activity plan details the activities, responsibilities, timeframe and milestones necessary for the delivery of each management action starting in 2022, which need to be finalized by the MCA Manager and SMC.

Table 15. Mariculture Development and Management Programme Implementation Schedule (first six years).

Management Action and Activities	Persons responsible	Timeframe												Proposed milestones
		2022		2023		2024		2025		2026		2027		
		1	2	3	4	1	2	3	4	1	2	3	4	
<b>Objective 1: Seaweed farming production maintained or expanded sustainably</b>														
<b>Action 1.1: Evaluate the potential for expanding seaweed production</b>														
1.1.1 Liaise with individuals/institutions that study seaweed farming in/around PECCA														Seaweed Management Plan drafted by .....
1.1.2 Undertake SWOT analysis, study environmental and other impacts and markets for seaweed products including through value-adding (also part of income diversification)	TBC													
1.1.3 Develop a Seaweed Management Plan for PECCA														
<b>Action 1.2: Support existing seaweed production areas and activities to expand</b>														
1.2.1 Encourage local groups to establish co-operatives in order to streamline marketing of their products														A new seaweed farming project initiated by .....
1.2.2 Support groups to access funding, including through applications to the MCA Fund	TBC													
1.2.3 Ensure follow-up and reporting is undertaken to learn from experiences and monitor progress														
<b>Action 1.3: Research and management of stress related physiological changes, diseases and epiphytes [to cover all MCAs except CHABAMICA]</b>														
1.3.1 Identify and contract appropriate skilled expert(s) to lead the study supported by local seaweed farming associations and advisory entities														Farmed seaweed physiological changes, diseases and epiphytes reduced by 50% .....
1.3.2 Identify seaweed farmers in PECCA (and TUMCA, MIMCA and MBICA) who are interested in participating in the study and potential trial of techniques														
1.3.3 Once trials are underway, monitor process for agreed period and evaluated for success and challenges.														
1.3.4 Learning from the feedback and experiences the approaches to manage these stress related changes, diseases and epiphytes and roll-out finding and guidance to the wider farming community.														
<b>Objective 2: Alternative mariculture options developed and implemented</b>														
<b>Action 2.1: Evaluate the potential for expanding non-seaweed mariculture production</b>														
2.1.1 Liaise with individuals/institutions that study and work with non-seaweed farming in/around PECCA														Non-seaweed Management Plan drafted by .....
2.1.2 Undertake SWOT analysis, study environmental and other impacts and markets for products from nonseaweed mariculture including through value-adding	TBC													
2.1.3 Develop a Non-Seaweed Management Plan for PECCA														
<b>Action 2.2: Support implementation for non-seaweed mariculture activities</b>														
2.2.1 Encourage local groups to establish co-operatives to streamline product marketing and help formalize PECCA support														A new non-seaweed farming project initiated by .....
2.2.2 Support groups to access funding, including through applications to the MCA Fund	TBC													

## 7. COMMUNITY SUPPORT PROGRAMME

### 7.1 Programme Purpose and Strategy

The purpose of the Community Support Programme is:

**To empower and encourage local communities within PECCA to actively participate in sustainable conservation and management of marine resources**

Over the least twenty years, local communities from the 32 main coastal wards that border the PECCA have witnessed a doubling of the resident population and an exponential increase in tourism development. Both the communities and the tourism sector rely heavily on local marine resources for their livelihood and existence, key among them being fisheries resources and areas for tourism related activities as well as seaweed farming. Arable farming and livestock husbandry also occupy a proportion of the local community, with a marked seasonal pattern of activity, being greater during the wetter months of the year. Firewood collection and manufacture of charcoal are also important land-based activities that occupy small numbers of community members from coastal villages.

The increase in population and tourism activity has raised demand for resources and space, leading to over-exploitation and use of illegal or destructive gears in some places. The Community Support Programme will work towards mitigating these adverse impacts through improving awareness of the PECCA's values among local communities and other resource users, and by nurturing a constructive and supportive relationship between these entities and the PECCA management. Four guiding principles underpin the Programme.

#### Guiding Principles

When implementing the PECCA's Community Support Programme, PECCA Management, with participation of stakeholders, will endeavor to ensure:

##### **Effective communication with communities enhanced**

Communities will only participate in conservation measures if they are informed and understand their importance. Therefore, communication between MCA management and all resource users, be they local communities or other sectors, is a pre-requisite for effective stakeholder participation. Addressing this principle, of engaging with the tourism sector, is described in the Chapter 4. Local communities refers to resident individuals and family that border the PECCA. Effective communication has been lacking from the start of the PECCA initiative. A revised, bottom-up approach to marine resources planning and management is needed, and to achieve that, communication mechanisms need to be enhanced between the PECCA management, local communities and District au-

Management Action and Activities	Persons responsible	Timeframe												Proposed milestones
		2022		2023		2024		2025		2026		2027		
		1	2	3	4	1	2	3	4	1	2	3	4	
2.2.3 Ensure follow-up and reporting is undertaken to learn from experiences and monitor progress		1	2	3	4	1	2	3	4	1	2	3	4	
<b>Action 2.3: Develop guidelines on introduction of new mariculture techniques and species</b> [Action is applicable to all MCAs and the country at large]														
2.3.1 Identify study leader experienced and qualified in mariculture and marine invasive species.	TBC													
2.3.2 Consider candidate species for farming and approaches to verify introductions of invasive species is avoided.														
2.3.3 Work with Department of Mariculture, Mainland Fisheries Department and prepare draft Guidelines														
2.3.4 Circulate for review and finalize Guidelines														

Guidelines on  
Avoiding Marine  
Invasive Species in  
Mariculture drafted by  
.....

thorities.

### ***Strengthened collaboration by local stakeholder in resource management***

Most of the significant threats to the sustainable use of the marine resources in the PECCA derive from destructive practices by the local community (including visiting fishers), tourism activities and over-exploitation. As described elsewhere in this GMP, the scale and intensity of these impacts is increasing and need to be urgently addressed. The pursuit of partnerships and collaborations with local institutions, including District authorities, focused on the resident local communities is critical to this principle.

### ***Communities receive tangible benefits from marine resource conservation***

One of the stated functions of MCAs on Zanzibar is to ensure shared benefits to local communities. PECCA management will endeavor to ensure that benefits to communities from MCA Fund support are aligned with benefit sharing guidelines being developed (presented below). Collaboration with District authorities and support from development and conservation partners, is needed to build capacity of community groups so that they can exploit diverse tourism opportunities in the PECCA and surrounding areas.

### ***Local communities and Zanzibar's public are aware of the conservation significance of the PECCA***

To gain support for marine conservation locally and nationally PECCA need to provide conservation education and raise awareness on the importance of protected areas. Educating different targets within the local community on the significance of the PECCA and its importance to the wider community and socio-economic setting needs to be addressed, so that conservation and sustainability messages reach different social strata, from school children to fishers and farmer and government.

## **7.2 Targeting Community Support Actions**

As presented in Table 7, the threats that currently impact or are likely to impact on the PECCA conservation targets and their KEAs include overexploitation of resources (mangroves), pollution (debris), wastewater/poor waste disposal and charcoal production that are associated with local communities. Mindful of the over-riding community development objectives for improvements in economic growth to be accompanied by higher overall standard of living as well as the attainment of near-zero extreme poverty (Zanzibar Vision 2050), and that the improvement of local livelihoods be in a sustainable fashion, these priority threats are addressed in the two MOs proposed below.

## **7.3 Management Objectives and Actions**

When implementing the Community Support Programme, the PECCA management, with participation of development and research partners and stakeholders, will endeavor to ensure the above guiding principles are followed. These principles are intended to guide the implementation of the Programmer's two MOs, as described in the following sections, with an outline of the management actions needed to achieve them.

MO 1. Community environmental education and outreach programmes enhanced

MO 2. Community participation in natural resource management enhanced

### **Objective 1: Awareness of importance to conserve marine resources improved**

To promote public understanding, appreciation and enjoyment of the natural resources through interpretation/education is part of the first major objectives of the PECCA. Environmental education to create awareness among various stakeholders and resource user groups on the importance and urgency of conserving the PECCA is critical, as described in other sections in this GMP. This objective is designed to increase awareness, understanding and participation of the public in the MCA and

thereby promote behavioural change towards reducing the over dependency and pressure on natural resources. For example, school children will be reached through school events and environmental clubs; while adults will be educated through conservation seminars and workshops organised by PECCA management, and through stands and events held locally.

Because of the over-arching importance and relevance of improved awareness of the environment, sustainable resource use, and of the role and functions of the PECCA, many chapters in this GMP include actions that address this objective. The main actions proposed in previous chapters that focus on boosting awareness among stakeholders include:

### **Chapter 3 Ecological Management Programme**

Action 1.2: Disseminate information and increase public awareness on sea turtle conservation and management

Action 3.2: Develop and mainstream the implementation of an environmental awareness programme

Action 3.3: Liaise with school authorities, wildlife clubs (and other groups) to develop a marketing strategy targeting schools and citizens

Action 3.5: Raise awareness on climate change impacts, mitigation and adaptation measures

Action 3.6: Promote central (DMC) research collaboration and dissemination of information

### **Chapter 4 Tourism Development and Management Programme**

Action 3.3: Develop and update a tourist map, guidebook and awareness brochures

Action 3.7: Organize and market local events that promote PECCA goals and objectives

### **Chapter 5 Fisheries Resource Management Programme**

Action 2.1: Improve fisheries information sharing within MCAs and stakeholders

Accepting that the above eight actions have captured much of the engagement with the range of stakeholder than need to be aware of the PECCA, its marine environment and the approaches needed to conserve it, the two actions proposed here focus first on the staff who will be responsible for coordinating the delivery of these important actions. The second action focuses on the facilities at the main PECCA HQ in Weshia and at the one other proposed station(s) (e.g. Makangale Peninsula).

#### **Action 1.1: Strengthen PECCA staff capacity on education and community awareness**

The PECCA has none (or very few) staff deployed to engage in conservation education and outreach. Given the importance of biodiversity and the recreational significance of PECCA and the many associated threats facing it, there is need to have a coordinated approach for implementing the conservation and education programme. PECCA management will strive to engage at least one conservation education officer, who will be responsible for developing a robust conservation education programme that when implemented, will lead to increased community support for conservation. Assistants may be needed as the activities develop. To initiate this action, conservation partners will be needed for training of PECCA staff and other involved, and the participation of District based Fisheries Officers may need to be considered. Over time there is likely to be a need to increase education staffing to cover the large area of work.

### **Action 1.2: Construct and equip resource centres at PECCA offices and sub-stations**

The entire MCA is served by current education centre at the PECCA Head Office. Yet the facility is small and lacks requisite education tools to effectively convey conservation messages to large, organized groups. Under this action, a robust resource centre will be constructed at the HQ, but also at a new sub-station proposed for Makangale. All two facilities will provide a lecture hall, library and associated facilities that present informative posters of marine biodiversity and PECCA's exceptional resources attractively displayed and maintained. These sites will foster education and awareness-raising activities. In addition, modern education and outreach equipment will be procured and deployed to the centres. Support from education and conservation partners will be needed to develop the information and educational material which should also include traditional knowledge. Assistant officers may be needed as the activities develop. To initiate this action, conservation partners will be needed for training of PECCA staff other others involved, and the possible participation of DFOs may need to be considered to boost numbers. The selection of staff should prioritize local community educated people.

Coordination with the Makangale research and education centre currently being refurbished will be a further positive initiative to support this action. Experience from previous initiatives, for example from Unguja's *Sustainable Dolphin Tourism Workshop* and plans for a visitor's centre and delivery of dolphin-awareness information, managed by KIDOTOA, all in MBCA, will be garnered to help guide future centres.

### **Objective 2: Communities actively involved in resource management**

For many local communities, economic social and environmental factors limit the development of livelihoods. These factors include poverty, low levels of education, subsistence-based lifestyles, climatic variability and seasonality, lack of access to finance and technology, restricted access to assets, and weak land tenure. For many local communities along the coast, there has been an over-dependency on fishing accompanied by the unsustainable increase in fishing effort. Lack of conservation awareness is a factor contributing to use of destructive practices and to permitting others from doing the same, especially when enforcement is weak, as was the case after the CARE International supported period came to an end. Identifying potential alternative livelihood options is a challenge (as described under Objective 4 of the Fisheries Programme, Chapter 5).

Realisation of this objective involves a range of community stakeholders e.g. fishers (including mariculture), mangrove users and those engaged in tourism livelihoods. It is realised that fishers (including mariculture) participation in management will be greatly enhanced through implementation of the roles and responsibilities of SFCs as being developed by the co-management component and suggested by the MCS strategy.

It should be noted that the proposed actions that follow are focused on wider local community groups other than SFCs. Also, that the emphasis of the actions proposed in this chapter emphasize the groups themselves rather than actual development opportunities. The latter are described under other chapters, namely in:

#### **Chapter 4 Tourism Development and Management Programme**

Action 1.1: Develop and maintain of two new boardwalks

Action 2.1: Develop and maintain nature trails

Action 2.2: Promote ornithological guided tours

Action 2.3: Promote canoe safaris

Action 2.5: Develop community-based tourism activities

The above actions focus on creating opportunities for local businesses associated with developing new tourism experiences, while the following actions specifically target SFCs:

### **Chapter 5 Fisheries Resource Management Programme**

Action 1.4: Empower SFCs to execute their mandate

Action 4.1: Support the establishment of empowered community managed fishery areas This management objective has been designed to strengthen local communities into groups that can be better placed to exploit opportunities presented by natural and cultural resources in the area, and as groups, also be more effective recipients of support, with the assistance of the PECCA management in collaboration with District efforts. **Action 2.1: Evaluate previous and on-going community projects**

The PECCA management will conduct a critical evaluation of current and previous projects carried out in the context of the PECCA to discern any constraints to project implementation or characteristics that have ensured past successes. One example is the experience of the KIDOTOA described above (section on Marine Megafauna, page 10). It is important that the lessons learned from this evaluation will be used to support the design of future community projects that will deliver intended outcomes, improve community livelihoods and enhance marine conservation. One of the goals of this action is to end up diversifying livelihood activities to help conservation and forgo illegal activities, and to promote coastal and fisheries integrated management to cover forest and other land use management.

It is also important to appreciate that “community projects” may not have a direct relevance to management (e.g. local school, mosque, etc.) but these activities often build buy-in for management. There can be a lot of diversity: cooperatives, youth clubs, religious groups, etc. The purpose/mission of these groups could be profit or non-profit and therefore the nature of their needs and the support offered should also be diverse too. This evaluation will be carried out by the PECCA Community Officer in collaboration with relevant District Development Officer, community members through a Participatory Rural Appraisal (PRA) approach. Focus areas will be organisation structures, financial capability, skills and training needs, with findings used to help define community groups for future support (Action 2.2). Inputs from development partners might be needed. **Action 2.2: Strengthen local community groups and select groups for funding**

Following the outcomes of the Action 2.1 (above), the PECCA management will have an updated evaluation of programmes and projects of selected community groups that PECCA will consider partnering with and supporting. Once the gaps in the capacity of the community groups have been identified, PECCA management will be in apposition to support training of community group officials in line with the identified training needs. The training will mainly focus on project design, implementation and maintenance and will be carried out through short training workshops. Training to rationalize their institutions and enhance management of the resources is important, as is to facilitate planning and implementation of their management plans. As with most local development groups, entrepreneurship knowledge and skills among local communities need to be boosted to enable them to develop alternative means for livelihood where appropriate, as sustainability can only be achieved through relieving pressure on the existing resources. It will be important that here too the relevant District development officers and NGOs active in the area are involved through an open and transparent process.

Once a group is registered, they will be supported in developing a business plan which will outline the activities that will be implemented to achieve the defined group mission. The PECCA management and its partners will support implementation of the participatory business plan with priority being given to activities that will enhance environmental conservation. One obvious example would be assisting local applicants to prepare funding proposals, such as for ecotourism initiatives (ornithological safaris, canoe trips, or simply organizing regular workshops for boat/beach operators training

as tour guides – see Actions 2.2, 2.3 and 4.3 in the Tourism Development chapter).

Funding from the MPA Fund may be allocated based on merit and in accordance with the MPA Fund guidelines (see Action 2.3, below), while other means of funding will be investigated. Numerous devolved funds exist at community level, with common generic examples being district government funds, youth and women empowerment funds, economic stimulus funds, etc. However, communities dependent on MCA resources are often unaware of the existence of such funds. Some may not appreciate the opportunity or not be confident in applying for the same. Any eventual fund systems must be fully transparent and should emphasize gender balance and equity throughout all management levels.

The PECCA management view these funds as a valuable prospect for local MCA resource users and will actively support local user groups, guided by the Community Development Officer, to access funds to support livelihood projects. When successful, the beneficiaries will reduce fishing pressure on MCA resources.

#### **Action 2.3: Develop guidelines for disbursement from the MPA Fund**

Following the prescription as per the MCU Regulations, of 70% for management and 30% for community development, the DMC will contract a specialist to consult with all interested parties, the FMCAC, MCTAG and SMC, including the Principal Secretary, to design a transparent and un-biased procedure, aimed at equitable sharing of resources from the MPA Fund (or equivalent) to eligible applicants and projects, with appropriate follow up and monitoring. Consideration should be made for adoption of the Jozani Chwaka Bay funding and sharing system for efficiency. Either way, it is recommended that any community costs for resource management are part of the 70% budget allocation.

Before engaging in sharing scarce funds, an annual review of expenditures would be prudent, as would defining eligibility for community project funding, which shouldn't necessarily include covering local management costs, with these costs preferably directly supported by other funding and in-kind support mechanisms.

#### **Action 2.4: Nominate and recommend gazettement of a PECCA Honorary Warden**

Addressing emerging community concerns more promptly can be achieved by nominating and formally involving a responsible and respected member of the local community who is passionate about conservation to work closely with PECCA management on conservation issues. An example would be someone from one of the SFCs. Once nominated and gazetted, the Honorary Warden (or "community champion") will be assigned tasks by the PECCA Manager, primarily of a marine conservation awareness nature as well as responding to emerging issues within the local SFCs and fisher groups. He/she will regularly report on progress and update PECCA management. There may be a need to manage the potential (likely) jealousy that can be generated, and the selected individual should be a representative but have really a collaborative/collective approach, as self-less as possible.

## **Monitoring Framework**

The monitoring framework presented in Table 16 was designed to provide guidance for the assessment of the potential impacts resulting from the implementation of the programme. The framework sets out the potential positive as well as negative impacts that may possibly occur during the implementation, includes easily measurable and quantifiable indicators for assessing these impacts, and potential sources of the information needed. Monitoring the impacts of the plan implementation will ensure that timely changes to management approach are made when the situation demands.

**Table 16. Community Support and Management Programme Monitoring Plan (modified from KWS, 2015).**

Objective	Potential Impacts (positive and negative)	Verifiable Indicator	Sources and means of verification
Objective 1: Awareness of importance to conserve marine resources improved	Improved understanding of the PECCA's conservation importance	No. of local community members involved in conservation projects in the PECCA	Community Support records at PECCA
	Increased community awareness of and respect for PECCA rules and regulations	Number of local community members arrested for illegal activities in the PECCA	PECCA enforcement records
Objective 2: Communities actively involved in resource management	Reduced illegal natural resource use in the PECCA	No. of illegal natural resource use incidents in the PECCA	PECCA enforcement records
	Sustainable utilisation of fisheries resources	Adherence to the zoning scheme as well as recommended fishing methods	Fisheries utilisation records and PECCA enforcement records

## 7.4 Implementation Schedule

The following pages set out the proposed first six-years of the ten-year implementation schedule for the PECCA GMP (see Table 17). The activity plan details the activities, responsibilities, timeframe and milestones necessary for the delivery of each management action, starting in 2022, which need to be finalized by the MCA Manager and SMC.



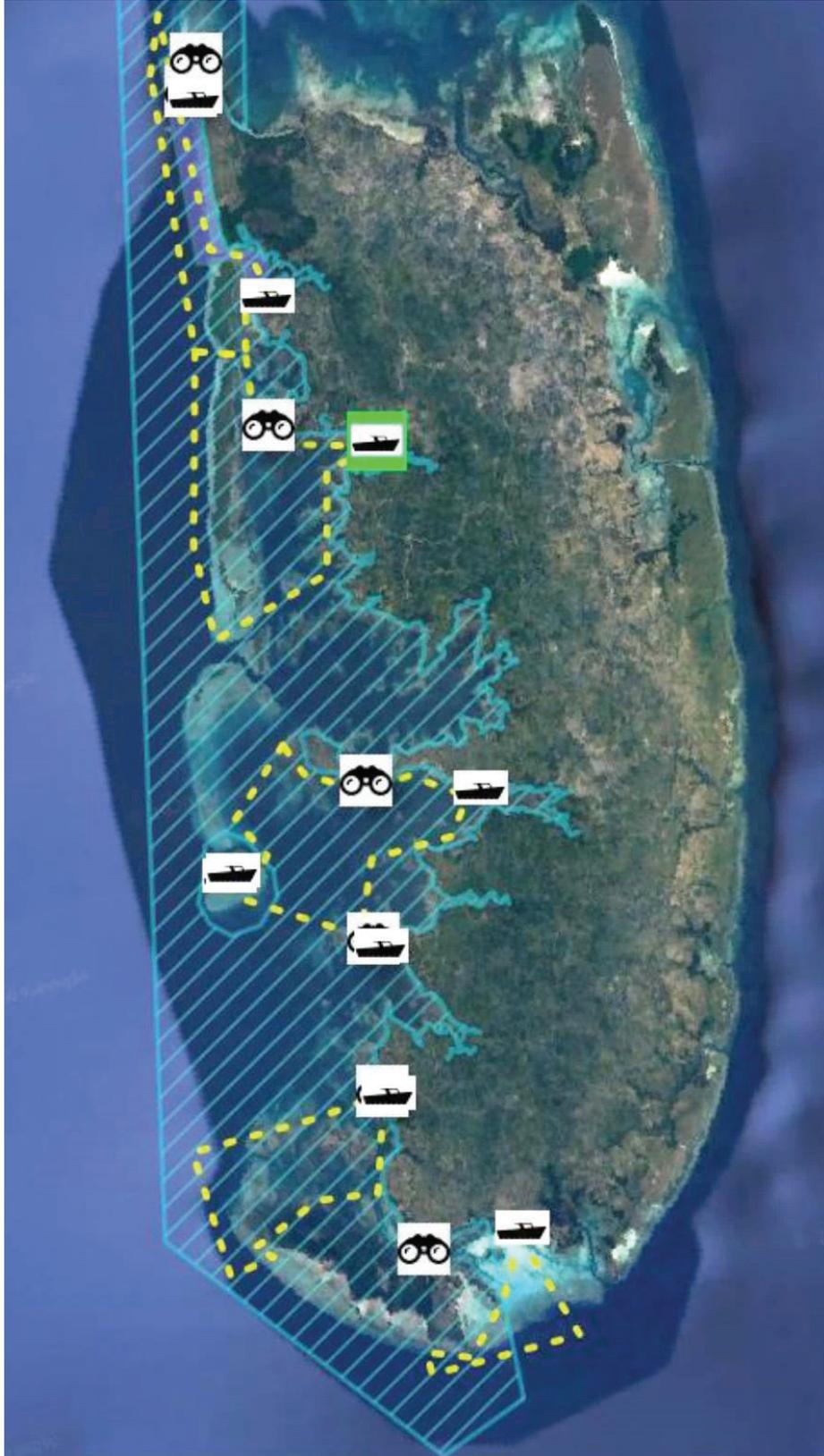


As well as pro-active enforcement, this MCS Strategy considers measures to improve voluntary compliance through education and outreach and incentives to fishers. Where available, best practice guidelines and case studies in enforcement and surveillance of MPAs have been utilised to suggest the most practical and impactful interventions. The application of alternative modern technologies for both surveillance and monitoring have also been included.

## 8.2 MCS Strategy Objectives and Associated Actions

This MCS Strategy has ten Objectives and associated Actions which are summarised in Table 18. The details are provided in the full MCS Strategy document, with monitoring indicators included in Annex 1 of the same. Under **Objective 4, a detailed surveillance programme** has been proposed including patrol routes and the distribution of MCS personnel around the MCA. An indicative illustration of the routes is given in Figure 12.

Figure 12. Indicative patrol routes to support the MCS Strategy.



**Table 18. Definition of the ten MCS objectives and associated actions.**

Objective 1. Define and formalise the MCS responsibilities of relevant entities
Action 1.1. Re-define the MCS focus and responsibility for each entity
Action 1.2. Make informal/formal partnership agreements with other government agencies, NGOs or private entities to facilitate outsourcing and coordinated MCS of the MCA
Action 1.3. Produce and regularly update an MCS Guidance Document for MCA
Objective 2. Strengthen human resource capacity
Action 2.1 Improve staff skills in MCS
Action 2.3. Set up MCS SFC sub-committees
Objective 3. Improve communications within the MCA
Action 3.1. Establish a Marine VHF radio network
Action 3.2. Set up a surveillance co-ordination centre and define lines of communication
Objective 4. Strengthen the enforcement of MCA user activities via a decentralised and risk-based surveillance programme
Action 4.1. Increase fisheries surveillance responsibility and resources to SFCs
Action 4.2. MCA surveillance team take on a more reactive role in surveillance complemented by targeted patrols of known violation hot-spots
Action 4.3. DFOs to focus on land-based MCS, specifically verification of fishing licences camping permits
Action 4.4. Increase land-based surveillance coverage using rangers on foot or lookouts at strategic posts
Action 4.5. Increase the number of joint patrols as part of a co-ordinated joint patrol plan
Action 4.6. Utilise the tourist boat sector as a surveillance platform
Action 4.7 Increase surveillance and enforcement of tourist and tourist operator activities
Action 4.8. Apply best practice patrolling principles
Action 4.9. Implement the detailed surveillance plan
Action 4.10. Deploy key staff to implement the surveillance programme
Action 4.11 Review compliance on a regular basis to ensure risk-based planning
Action 4.12 Consider implementing alternative technologies for surveillance
Objective 5. Promote voluntary compliance and prioritise a 'soft' approach to enforcement where possible
Action 5.1. Incorporate 'soft' enforcement into training
Action 5.2 Develop and launch a Zanzibar wide regulations awareness campaign

Action 5.3. Provide incentives to fishers that will improve respect for MCA management
Objective 6. Phase out the most damaging fishing gears
Action 6.1 Set up task forces to control the most destructive fisheries in the MCA
Objective 7. Equipment to support implementation of MCS is provided and maintained
Action 7.1. Procure equipment needs for MCS in the MCA
Action 7.2 Maintain equipment
Objective 8. Infrastructure to support implementation of MCS is developed and maintained
Action 8.1. Install and maintain demarcation for identified priority areas
Action 8.2 Review the state of MCA building and upgrade if necessary, according to needs and best practice
Action 8.3 Review the need for SFC offices/resource centres
Action 8.4 Review the state of fisheries landing sites and upgrade priority sites
Action 8.5 Install basic infrastructure for surveillance posts at key locations
Objective 9. Develop more enforceable prosecution and sanction systems
Action 9.1 Develop more meaningful sanctions related to MCA user activities
Action 9.2 Establish a simple reporting tool and practical database that allows for case monitoring and recording repeat offenders
Action 9.3 Define a clear process for the implementation of by-laws for management at the local level
Action 9.4. Carry out training for judges, prosecutors, local police, and other enforcement/legal authorities
Objective 10. Modernise current fisheries catch and effort monitoring systems to phase out the current open access regime
10.1 Pilot modernised licensing and registrations systems in the migrant fishery
10.2 Pilot electronic catch data collection systems

## 9. IMPLEMENTATION APPROACHES AND PRINCIPLES

### 9.1 Overview

This section describes the suggested overarching process by which the GMPs could be implemented. This GMP includes 101 proposed actions (36 MCS Strategy + 65 from the GMP itself).

As prescribed in the CAP approach (Figure 1), once the objectives and actions (and activities, or measures) have been reviewed, these need to be prioritized and implementation timeframes reviewed. This should be done by the MCA Manager working with the SMC and community level organisations e.g. SFCs/FEC. The prioritised actions need to be costed and form the basis of the budget request (from the MCA Fund, RGZ and other sources – see below). Only then will it be possible to decide which action should begin in the first year and those that can be developed in the coming years. The precise work plans needed to implement these actions should then be developed by the MCA Manager and management team.

Work plans to be developed need to be clear on the activities to be undertaken, which includes the identification of those individuals and entities responsible for each activity/task, and the associated budget. The plans also need to include measures defined to monitor progress. Monitoring of progress is a key part of activity implementation that produces the information required to evaluate the efficacy of those activities. As per the guidance of the CAP approach, the evaluation sequence for monitoring should be based on analyse (or test), learn, adapt and share. These are the last steps in the CAP approach, requiring that the MCA Manager and management team systematically take the time to evaluate the actions they have implemented, to update and refine their knowledge of the MCA objectives, and to review the results available from the monitoring data collected. This reflection provides insight on how the GMP actions are working, what may need to change, and what to emphasize in the following phases. This step then asks the MCA Manager to document what has been learned and to share it with other stakeholders so they can benefit from the successes and failures.

Three critical elements are needed to carry out the implementation of the GMP: adequate funding, stakeholder involvement and their roles and responsibilities, and fisheries comanagement systems. These are described below with proposed approaches outlined.

### 9.2 Funding for implementation of GMPs and MCS Strategy

The existing GMPs, e.g. MBCA GMP (2010) described inadequate financial and management capacity, stating that the financial capacity of the MCA to fulfil its mandate was not there, and that due to inadequate government budget allocation, the human resources development as well as service delivery to the general public has been insufficient. The inadequacy and uncertainty of funds have impacted negatively on management operations ranging from recruit of staff, training, research and monitoring activities. By 2019, there was no apparent improvement in the situation.

The three principal issues related to funding are explored below.

#### (a) Current MCA Funding Sources

##### *Tourism*

By the end of 2019, the collected visitor entrance fees made a significant contribution to the overall MPA Fund. However, due to uncertainties over the stability of the tourism industry on Zanzibar, revenue generation from MCA visitor fees and tourism activities is not always guaranteed. Realistic contingency plans will be required for periodic downturns (such as the downturn observed during the Covid-19 pandemic).

A strengthening of the relationship between the tourism sector and the MCAs is required as it is cur-

rently very weak. For example, having 2-3 tourism representatives on each MCTAG and/or SMC, and ensuring that this committee has a clear and empowered role in MCA management would better allow the sector to become more involved and more invested in the management of MCAs. If there is an eventually look to increase tourism fees, or charge bed night levies on accommodation (see (c) below), being actively involved in the MCAs will improve the possibilities to agree on revised format of revenue generation. *Government*

An increase in government budget allocation to MCAs is one of the most efficient ways of ensuring adequate funding, both to supplement periodic downturns in tourism-related funding or as a more long-term financing strategy.

#### *Existing MPA and Environment funds*

Under the Environmental Management Act 2015, a Zanzibar Environment Fund is recommended. Both the MPA Fund and the former fund appear to have very similar overall objectives, yet are held under different institutions, each with its own management detail.

### **(b) Support for SFCs**

SFCs will be assigned greater fisheries MCS responsibility under the new MCS Strategy. Funding of their activities and active involvement in MCA management are critical to the successful implementation of the MCS Strategy and GMP. Therefore, costs incurred by SFCs to help the MCA staff implement management measures are management costs, not community development costs. A review is needed of the current system whereby 30% tourism entrances and associated fees are allocated to community development activities. Part of that review would include understanding the differences between 'community development' and 'management' in this context.

Similarly, co-management work is planned to involve having groups of SFCs prepare agreements/action plans for their co-management fishing areas. This would allow SFCs to contribute to MCA management, and MCA Managers to support and manage the input of SFCs. The CAP cycle could be run sequentially in SFC fishing areas and the MCA to allow prioritisation based on local and national priorities and to ensure good communication throughout the MCA. This would act as a major incentive for communities to respect MCA rules and regulations.

Furthermore, as the 30% allocation is currently arbitrary and not based on number of fishers/SFC members, even at full hotel occupancy, in some MCAs there will be very little generated for community development. It is suggested that these funds are distributed on a per-capita basis, still drawn from the main community development funding source (e.g. the MPA Fund) but distributed evenly to match the number of members and recipients in the MCA.

### **(c) Specialist study on funding mechanisms for marine conservation on Zanzibar**

An urgent priority for the RGZ is to develop a strategy for achieving financial sustainability for the MCAs, as it is unlikely that tourist visits and individual visitor fees will be able alone to finance operating costs on a permanent basis. Given the above, it is thus recommended that a financial specialist be contracted by the DMC to undertake a dedicated study on sustainable financing for marine conservation on Zanzibar. The study should consider the following main elements:

#### **(i) MCA Funding requirements**

Work with MCA managers to determine realistic and pragmatic operational budgets and the most appropriate means of developing matching funding.

**(ii) Allocations from existing MPA/Environment funds**

Conduct an analysis and harmonization over which fund is the most appropriate and applicable to MCAs to contribute to the current uncertainty over financial sustainability. Design a transparent and un-biased procedure, aimed at equitable sharing of resources from the MPA Fund (or equivalent) to eligible applicants and projects, with appropriate follow up and monitoring. Funding from the MPA Fund may need to be allocated based on merit and in accordance with special MPA Fund guidelines. Another possible financing option in the longer term, would be to set up some form of MCA Legacy Fund into which donors, a percentage of tourism revenue, other private sector sources (e.g. energy sector) could channel capital funds.

As an eco-tourism focused economy, it is essential that Zanzibar incorporates carbon offsets into its strategy to ensure that it remains competitive in the tourism market which will increasingly demand carbon credit options. 'Blue carbon' habitats (mangrove forests, seagrass beds and salt marshes) sequester and store carbon at significantly higher rates than terrestrial habitats. Zanzibar has extensive blue carbon habitats that could be leveraged through innovative community-led projects to conserve these habitats, support sustainable tourism and grow the local Blue Economy.

**(iii) Alternative sources of funds**

If an increase in government allocation is not available, and allocations from existing MPA/Environment funds are insufficient, other interventions are needed. Options for revenue streams will need to function regardless of the outcome of restructuring, including decentralisation. Alternative revenue streams and funding-related interventions need to be investigated and might include some of the following:

- Continued use and systematic collection of the MCA entry fee charged to all resident and non-resident visitors, potentially strengthened to improve efficiency and transparency, by implementing an electronic/telecoms-based payment system.
- Fees collected from visitors at ports (air or sea) before receiving entry stamps.
- At-source collection of revenue via a very small (e.g. 0.5) percentage of taxes (such as hotel levies or airport taxes from foreign/national flights/ferry tickets/restaurants/etc) that are channelled directly into the MPA Fund.
- A bed-night levy on all accommodation within MCA areas, for accommodation located within 1 km of the high tide mark, on the assumption that visitors at such facilities are directly enjoying/benefiting from the MCA environment.

**(iv) Supporting SFCs**

There is a need to investigate suitable alternative revenue generating mechanisms for SFCs. One option might be to consider proposals made by SFCs to the Government to include landing site levies/catch levies and fines (already taking place in closed seasons). Linked to this, formalizing procedures for SFCs to set up and manage bank accounts would assist in management of their funds. Any increase in allocations to SFCs from existing sources should consider individual SFCs demonstrating MCS performance and functionality and adequate financial management capacity and auditing at SFC level. Also relevant would be to clearly define methods for SFCs to generate their own revenue in the next Regulations to be issued.

**9.3 Stakeholder Involvement and Roles and Responsibilities**

Throughout the GMP reference has been made of the need to involve local communities, the SFCs (see also Section 9.4), the tourism sector, NGOs, academics and technical experts, among others. This

range of participants reflects the diversity of issues and proposed actions that are associated with the sustainable management of MCAs on Zanzibar today. The failure to involve at least some representatives from these sectors will weaken the effectiveness of the MCA and most likely prevent many of the objectives from being met.

Reviewing, agreeing and finalizing the proposed RZs for example, will require MCA Managers to work with SFCs in the MCA and the working groups within the four priority fisheries, together with scientists to provide technical knowledge and inputs that are vital to the evidence-based decision-making process.

One of the main roles of the MCA Manager is to development an open and transparent enabling framework, within which the activities and actions can be reviewed, adjusted where necessary, implemented and monitored. This system will also have to cope with implementation of activities from other sectors not currently included in MCTAG. For example, how would an MCA implementation plan be impacted by a wind farm project? For these many stakeholders to be effectively involved there needs to be in place a management system with clearly defined roles and responsibilities.

The lack of management systems with clear roles and responsibilities from the DMC to SFC was a weakness in the past, preventing a clear process of participation from this vital stakeholder group. Though some roles are specified in the 2014 MCU Regulations (see Section 1.6), in practice, the roles and responsibilities, including those of the MCTAG and SMC need to be revised periodically so that management systems reflect the requirements of effective activity implementation. This should also be an intrinsic part of the CAP cycle for MCAs in Zanzibar.

Whereas the CAP cycle provides a logical approach to MCA management, its success and that of other adaptive management processes depend on effective monitoring and evaluation of implementation. Limited resources will invariably mean prioritisation of expenditures (as discussed above, Section 9.2) and this may mean that certain activities may not be implemented. This often results in funds not being available for monitoring and/or research if they are separate activities to be funded by the MCA. Separate funding for research often leads to delays in results/findings being made available. Both these issues would compromise the CAP planning cycle as well and the ability to demonstrate that management interventions have begun to deliver results.

Participatory approaches to research and monitoring could be undertaken alongside activity implementation as an approach to be considered to safeguard the CAP planning cycle: defining the project - developing strategies and measures – implementing strategies and measures – using results to adapt and improve.

## 9.4 Fisheries Co-management Systems

It has become widely accepted that fisheries co-management has the potential to proactively engage fishing communities in managing the marine resources on which their livelihoods depend, within defined areas of shared fishing activity. Consequently there is much in common with the goals and objectives of marine protected areas such as the MCAs of Zanzibar – there is a shared common interest. This form of local management has been gaining traction in Tanzania Mainland, Kenya and Mozambique.

Four of the key benefits of the fisheries co-management approach include:

- It supports and strengthens implementation of government policies including blue economy development, national fisheries management plans (FMPs), and other development plans such as for aquaculture or other sectoral plans.
- Specifically within MCAs, fisheries co-management areas can be treated as focal areas within which NGO and tourism sector partners can work with authorities and fishing communities

to improve fisheries management and production.

- It provides the means to harmonise national and local priorities thereby incentivising local ownership and action and catalysing local blue economy development.
- It provides for cost-effective co-management and potentially reduces conflicts.

On mainland Tanzania, collaborative fisheries management areas (CFMAs) have been under development since 2007, building on earlier work in Tanga, while 12 new CFMAs are being established under the SWIOFish project in six coastal districts. By the end of 2021 there will be 31 CFMAs in total, covering 11 of the 17 coastal districts and ~ 80% of the mainland coastline. Mainland CFMAs typically contain between 2-7 fishing communities / beach management units (BMUs).

On Zanzibar, informal pilot trials of fisheries co-management already exist in the form of local temporary closed areas, for example of octopus fisheries, as documented by the NGO Mwambao-MCCC on Pemba and also around parts of Unguja. More formal piloting of comanagement zoning in Zanzibar MCAs under SWIOFish has been underway since 2018, through the DFDMR with NGO partners. Provisionally six co-management areas were identified in PECCA, five in MBCA with two in each of MIMCA and TUMCA (included in the relevant GMPs). These areas might be further divided subject to consultations and mapping of fishing patterns. Each co-management area contains 6-10 SFCs and forms the basis of a collaborative management group (CMG) between the SFCs within each area.

A CMG management plan format and planning process has been developed and endorsed and is ready for implementation in both Pemba and Unguja. The latest development is defining standard operating procedures (SOPs) for SFCs and CMGs, produced by the DFDMR-District co-management teams in Unguja and Pemba in consultation with NGOs, FECs and SFCs. The management areas and SOPs have been welcomed and endorsed by SFCs, FECs, Districts and NGOs and are now awaiting approval of DFDMR.

It is clear at this stage in the evolution of the concept of fisheries co-management in Zanzibar that it is not possible to include co-management procedures and zoning within the GMPs at this moment in time. However, at the time of preparation of this GMP, comanagement procedures and zoning within MCAs is in the process of being adopted into revision of the legislative and governance framework for fisheries management in Zanzibar. Therefore a process of identification and establishment of co-management areas within MCAs is an intrinsic part of the vision and strategy for spatial zoning, to be developed over the period of the GMP (i.e. 5-10 years) as part of its implementation.

One of the future steps is for the co-management procedures and zoning within MCAs to be incorporated into the draft revised GMPs for each MCAs, including how to incorporate them into the MCA institutional structures. The elaboration of the necessary stepwise process, management structures (SFC co-ordination) and instruments (subsidiary comanagement plans) should be part of the focus areas for the MCA Managers in the coming years.

Within each MCAs, defining the overall coordination of activities, including fisheries comanagement, will require the collective participation of the relevant stakeholders, principally the local community, the SFCs, the tourism sector and relevant government agencies, overseen and guided by the MCA Manager and the management team. The precise structure and representations will need to be developed as the GMP begins to be understood by all parties. This is a process that inevitably will take some time and require much patience.

## 9.5 Summary of immediate priorities for the MCA Manager

Once the GMPs have been formally approved by Government, the work of the MCA Manager will begin. In addition to the many internal tasks related to staffing, infrastructure and administration, there are the following three sets of important tasks that relate specifically to GMP implementation.

### **Involve research, conservation development partners**

- Identify and meet with representatives of stakeholder groups that are relevant to the implementation of the GMP (at a minimum, these will include local fisheries (SFCs), local seaweed farmers, Fisheries Dept, Marine Conservation Dept, NGO-SFC Collaboration representatives, local hoteliers, local SCUBA operators, local sandbank or fishing trip operators, local tour operators, other investors, school and social or community groups, port authorities, etc)
- Keep stakeholders, partners and the new oversight committee, the Stakeholder Management Committee (SMC), informed on details of the final management framework as it become legally binding.
- Identify potential development and conservation partners for some of this work in the GMPs. Most of the narrative of the proposed actions indicate where partners have a role.
- Remind stakeholders regularly that the GMP and MCS Strategy are guiding documents and that their implementation is based on adaptive management, learning from doing, adapting and progressing. This recognises that periodic reviews of action implementation are needed.

### **Finalize the Replenishment Zones**

- Revise all Replenishment Zones proposed in the GMPs, with the SMC and agree on the boundaries and regulations for each site. Site visits will be required. Zoning has to be defined only through collective agreement among all stakeholder groups, led by the MCA Manager.
- Once RZs are agreed, convene a meeting with the MCS, Co-Management and Conservation and Marine Resources units within the DMC to define the markers and zoning tools and markers and beacons that will be installed and the timeframe.
- Work with the relevant entities to re-draw any maps requires that accurately reflect the final decision on the RZ and ensure that RZ maps are distributed in appropriate languages and format for the understanding of those entities and stakeholders to whom the RZ will affect.

### **Revise and prioritize proposed actions for the five GMP programmes and the MCS Strategy**

- There are 65 proposed actions under the five thematic areas (ecology, tourism, fisheries, mariculture and community development), plus 36 actions related to MCS. The MCA Manager and SMC need to review each action and prioritize them with respect to the available budget, research, development and conservation partners, government priorities and other driving factors.
- Once prioritized, the timeframe for each proposed actions needs to be set and agreed with the persons responsible and participating entities.

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## ANNEXES

### Annex 1. Conservation Action Planning outline

## Conservation Action Planning



**Conservation Action Planning (CAP)** is a powerful process to guide conservation teams to develop focused strategies and measures of success. CAP is The Nature Conservancy's version of the "Open Standards for Conservation". It has been utilized with hundreds of diverse projects at multiple scales from different parts of the world and is supported by a network of trained professionals that make up the Conservation Coaches Network.

The CAP process guides project teams to identify effective conservation strategies. It provides an objective, consistent and transparent accounting of conservation actions and the intended and actual outcomes of conservation projects. It enables project staff to responsively adapt their actions to improve strategy effectiveness and achieve greater conservation impact.

A brief summary of the CAP Process is provided below. For a full set of CAP and Open Standards information, visit [http://conserveonline.org/workspaces/cbdgateway/cap/index\\_html](http://conserveonline.org/workspaces/cbdgateway/cap/index_html).

### THE 10 STEPS OF THE CAP PROCESS

#### 1. Identify People Involved In Your Project

This step asks you to identify your most valuable resource – the people who will be involved in designing and implementing your project. Addresses questions like: ♦ "Who will design our project?" ♦ "Who will be responsible for ensuring the plan goes forward?" ♦ "Who can give us advice?" ♦ "Who will help us through this process?"

#### 2. Define Project Scope & Focal Conservation Targets

With this step you define the extent of your project and select the specific species and natural systems that your project will focus on as being representative of the overall biodiversity of the project area. This step helps your project team come to consensus on the overall goal and scale of the project and your ultimate measures of success. Addresses questions like: ♦ "Where is our project?" ♦ "What are we trying to conserve or restore?"

#### 3. Assess Viability of Focal Conservation Targets

This step asks you to look at each of your focal targets carefully to determine how to measure its "health" over time. And then to identify how the target is doing today and what a "healthy state" might look like. This step is the key to knowing which of your targets are most in need of immediate attention, and to measuring success over time. Addresses questions like: ♦ "How do we define 'health' (viability) for each of our targets?" ♦ "What is the current status of each of our targets?" ♦ "What is our desired status for each of our targets?"



#### ***4. Identify Critical Threats***

This step helps you to identify the various factors that immediately affect your project's focal targets and then rank them so that you can concentrate your conservation actions where they are most needed.

Addresses questions like: ♦ *“What threats are affecting our targets?”* ♦ *“Which threats are more of a problem?”*

#### ***5. Conduct Situation Analysis***

This step asks you to describe your current understanding of your project situation – both the biological issues and the human context in which your project occurs. This step is not meant to be an unbounded analysis, but instead probes more deeply into the conditions surrounding your critical threats and degraded targets to bring explicit attention/consideration to causal factors, key actors, and opportunities for successful action.

Addresses questions like: ♦ *“What factors positively & negatively affect our targets?”* ♦ *“Who are the key stakeholders linked to each of these factors?”*

#### ***6. Develop Strategies: Objectives and Actions***

This step asks you to specifically and measurably describe what success looks like and to develop practical and *strategic* actions you and your partners will undertake to achieve it. In particular, you want to try to find the actions that will enable you to get the most impact for the resources you have.

Addresses questions like: ♦ *“What do we need to accomplish?”* ♦ *“What is the most effective way to achieve these results?”*

#### ***7. Establish Measures***

This step involves deciding how your project team will measure your results. This step is needed to help your team see whether its strategies are working as planned and thus whether adjustments will be needed.

It is also needed to keep an eye on those targets and threats that you are not acting on at the moment, but may need to consider in the future. Addresses questions like: ♦ *“What do we need to measure to see if we are making progress towards our objectives and whether our actions are making a difference?”* ♦ *“Are there other targets or threats that we need to pay attention to?”*

#### ***8. Develop Work Plans***

This step asks you to take your strategic actions and measures and develop specific plans for doing this work as your project goes forward.

Addresses questions like: ♦ *“What do we specifically need to do?”* ♦ *“Who will be responsible for each task?”* ♦ *“What resources do we need?”*

#### ***9. Implement***

Action and monitoring plans won't do any good sitting on the shelf – your challenge here is to trust the hard work you have done and implement your plans to the best of your ability. Implementation is the most important step in this entire process; however, given the diversity of project needs and situations, the only requirement is: ♦ *Put your plans into action*

#### ***10. Analyze, Learn, Adapt, & Share***

This step first asks you to systematically take the time to evaluate the actions you have implemented, to update and refine your knowledge of your targets, and to review the results available from your monitoring data. This reflection provides insight on how your actions are working, what may need to change, and what to emphasize next.

This step then asks you to document what you have learned and to share it with other people so they can benefit from your successes and failures. Addresses questions like: ♦ *“What are our monitoring data telling us about our project?”* ♦ *“What should we be doing differently?”* ♦ *“How will we capture what we have learned?”* ♦ *“How can we make sure other people benefit from what we have learned?”*

## Annex 2. PECCA Stakeholders Contacted

Name	Affiliation
<b>Resource Users</b>	
Mike	Swahili Divers & Gecko Nature Lodge Pemba
Gregg	WildAid (working with Mwambao-MCCC in PECCA)
Paul Harrison	Kwanini Foundation (working with Manta Reef Hotel, Pemba) Partnerships Director
Matthew Saus	MANTA REEF HOTEL, PEMBA
Dr Gill Braulik	SEA MAMMALS RESEARCH UNIT PECCA St Andrews Uni, Scotland
Jay Udelhoven	WildAid partnered with Mwambao-MCCC Independent Contractor PECCA
Eric Allard	Extreme Blue Water Spearfishing Director
Makame Salum Nassor	C-weed corporation (retired DFD Director)
Gary Greig	MD One Ocean
Lena Horlin	Emerson Foundation
Tonino Garou	Coastal Aviation
Julia Bishop	VC ZATI
Helen Peeks	Director ZATI
Juma Bakar	General Manager Manta Resort
Rashid Omar Juma	Uvuvi A/U/W/Wete
Mohd Massoud Omar	Uvuvi A/U/W/Chake
Ali Juma Ali	Uvuvi A/U/W/Mkoan
Habib Hamad Oth	Diver S
<b>Governance: management and regulatory entities</b>	
Hon. Mahmoud Thabit Kombo	Minister for Information, Tourism and Heritage
Maryam J. Abdulla	MANRLF Principle Secretary
Dr. Omar Amir	Vice Principle Secretary
Musa Jumbe	DFD Director
Mohammed Chum	DFD
Abdulaziz Mussa	DFD

Nassor A. Nassor	DFD
Jaala Simba Khamis	DFD
Haji Shomari Haji	DFD- ZNZ
Mkubwa S. Khamis	DFD
Jaala Simba Khamis	DFD
Mohamed Chum Juma	DFD
Daudi H. Pandu	DFD SWIOFISH
Mchanga S. Khamis	DFD-Planning
Mwanakhamis M. Ali	DFD-Value Addition
Nafla Saleh	DFD-F/OFFICER
Makame Haji	DFD-MCS
Haji Shomari Haji	DFD-MCS Coord.
Mgeni Mohammed Faki	DFD- Statistics
Mgeni Nassor Mohammed	Fisheries Officer DFD – PBA
Hidaya KH Hammad	Fisheries Officer DFD – PBA
Machamo Ali Machamo	Legal Officer MBEF – PEMBA
Mariam Abeid Hamad	Fisheries Officer DFD – PBA
Mayasa H Ali	F/Officer Wete

Abdalmalih Bakari	PP /Officer Wete
Halima R Mkarouk	Afisa Mipango PECCA Wesha Hifari
Aisha B Massoud	F/Officer Wete – DFD
Abass Hamad Oth	PECCA WESHA
Maulid M Omar	PECCA WESHA
Zainab Ali Malugu	K/Dara Wete Office
Mwaka H. Abdalla	MCU
Haji Shomari Haji	MCS
Mwajuma Ali Makame	MCU

Khalfan Amour Juma	Menega PECCA Idara Yahifadh
Anas Masound Othman	MBCA Manager (retired)
Ali Said Mkarafu	MIMCA Manager (retired)
Hashim Muumin	MANRLF-SWIOFISH
Semeni Moh'd Salum	Dev. Comm SWIOFISH
Khamis Hamad Said	Head of patrol Pemba
Sharif Hamad Said	Fisheries DFD- Officer
Mgeni Mohammed Faki	DFD- Statistics
Khamis Sharif Haji	Secretary Exec
Ali Kassim Mohammed	PECCA Manager
Khamis Hamad Said	Head of patrol Pemba
Khamis Ussi Juma	SUZA
Nassor Seif Juma	SUZA
About S. Jumbe	DOE
Farhat A. Mbarouk	DOE
Subira W. Mzee	ZEMA
Sheha Mjaja Juma	ZEMA
CDR Hussein Ali Makame	KMKM COPO
LCDR Idrissa Khamis Hamdan	KMKM
LT Abdi Simm Haji	KMKM
M/CPO Abeidi Ali Abeidi	KMKM
M/CPOI Saleh Moh'd Mahmoud	KMKM
PO Khalid Hassan Jecha	KMKM
Eng. Khalfan Hamad	Zanzibar Maritime Authority ZMA
Capt. Muslim Idd	Zanzibar Maritime Authority ZMA
Capt. Usi	Zanzibar Maritime Authority ZMA
Omar Zuberi Ismail	Oil and Gas ZPRA
Hassan Ameir Vuai	Zanzibar Commission for Tourism

Khamis Hamad Said	Head of patrol Pemba
Sharif Hamad Said	DFD Fisheries Officer
Khamis Sharif Haji	Secretary EX:Co
Ali Mmanga Khamis	Planning Officer Micheweni District Office
Khadija Mwadini Haji	DPLO WETE DG Off Wete
Kassim Ali Omar	DPLO – CHAKE DIST COMM Office
Mohammed A Juma	Tourism Officer Commission for Tourism
Mchanga Said Khamis	P/Officer DMC
Omar Juma Suleman	DMC Officer
Asha Omar Khamis	Planning Officer DC Mkoani
Nassor M Nassor	Research Officer ZAFIRI
Bi. Maryam Keis	Section head Ofisi ya raisi Tawala za Mikoa na vikosi vya SMZ (PORAG)
Bi. Masika Rajabu	Afisa Mipango Ofisi ya raisi Tawala za Mikoa na vikosi vya SMZ (PORAG)
Bw. Ali Shauri	Afisa Rasilimali watu katika mamlaka ya serikali za mitaa
Dr Chrill Horrill	SWIOFISH
Sharah Jaffar	Ass A/C SWIOFISH
<b>Key informants: specialist skills and expertise</b>	
Dr Per Berggren	Marine MEGAfauna Lab, Newcastle University Marine mammal expert
Dr Gill Braulik	St Andrews University, Scotland Sea Mammals Research Unit
Lorna Slade	Mwambao-MCCC
Tanguy Nicolas	Programme Manager (Marine), Africa Fauna and Flora International
Fatma A. Khamis	Mwambao-MCCC
Danielle Stem	Mwambao-MCCC
Ali Said Hamad	Mwambao-MCCC
Ali Thani	CEO Mwambao-MCCC
Omar Hafnou Ishail	Field Officer MCCC Ltd
Abdalla Said Abdalla	WCS Research Asst WCS
Michael Markovina	WCS

Bakari Asseid	Retired Principal Secretary
Graham Stewart Leslie	CEO- Heritage Tourism Conservation Regeneration
David Meyers	Conservation Finance Alliance Exec Dir CF Alliance
Prof Kevin Mearns	UNISA, South Africa
Ali Khatib Ali	Ofisa Uvuvi DFD PEMBA
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# PECCA GMP

**PEMBA CHANNEL CONSERVATION AREA  
GENERAL MANAGEMENT PLAN 2022-2032**

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