

Locally Managed Marine Areas (LMMAs) in Kenya: a detailed history of their development and establishment

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March 2015

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Acknowledgements

We would like to thank the UNDP-GEF Small Grants Programme who funded this work. Our gratitude goes to leaders of respective Beach Management Units (Kibuyuni, Shimoni, Nyari-Kikadini, Vanga, Jimbo, Bureni, Kuruwitu, Mradi, Mkwiro, Wasini and Pate), Dr. Nina Wambiji of the Kenya Marine and Fisheries Research Institute, Des Bowden of Kuruwitu Conservation and Welfare Association and James Mbugua of CORDIO EA, for their contributions to this report. George Maina's time was made possible through a grant from Ann Ray Charitable Trust (ARCT) to The Nature Conservancy (TNC). It is our hope that this document will be of value for all Locally Managed Marine Area practitioners in this era of communities actively engaged in marine conservation.

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Acronyms

ANO	Africa Nature Organisation
BMU	Beach Management Unit
CoMMs	Conservancy Management Monitoring System
COMRED	Coastal and Marine Resources Development
CORDIO	Coastal Oceans Research and Development in the Indian Ocean
CRDO	Coastal Rural Development Organisation
EAWLS	East African Wildlife Society
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
FFI	Flora and Fauna International
GoK	Government of Kenya
IOWB	Indian Ocean Water Body Network
KCWA	Kuruwitu Conservation and Welfare Association
KMFRI	Kenya Marine and Fisheries Research Institute
KWC	Kenya Wildlife Service
LamCOT	Lamu Marine Conservation Trust
LAPPSET	Lamu Port South Sudan Ethiopia Transport Corridor Project
LMMA	Locally Managed Marine Area
NGO	Non governmental organisation
NRT-Coast	Northern Rangeland Trust – Coast
Pact-Ke	Pact-Kenya
PMCC	Pate Marine Community Conservancy
SDF	State Department of Fisheries
TNC	The Nature Conservancy
WCS	Wildlife Conservation Society
WWF	Worldwide Fund for Nature

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Executive Summary

Coastal communities in Kenya have adopted the use of Locally Managed Marine Areas (LMMAs) to conserve fisheries and marine resources and as a way of securing alternative livelihood activities. However, these LMMAs have been established in a somewhat *ad hoc* manner due to a lack of guidelines for their development and implementation. In this review we sought to determine if there are generic approaches and methods that LMMAs in Kenya have adopted that can be used for developing national guidelines. We also examined challenges and lessons learnt from the various LMMAs on the Kenyan coast. This review seeks to make recommendations for the establishment of LMMAs based on approaches that appear to have been successful in the LMMAs in Kenya.

LMMAs in Kenya go through five phases to reach a fully established and operating LMMA. These phases are: i) Conceptualisation, ii) Inception, iii) Implementation, iv) Monitoring and management; and v) Ongoing adaptive management. The final phase is when a LMMA exists sustainably in a continuous learning process. Each stage is defined by the activities that are taking place which determine how far an LMMA has reached in its development. This assessment revealed that only four LMMAs (Wasini, Kanamai-Mradi, Kuruwitu and Kibuyuni) had reached the fifth phase. Interestingly, the Kenyan model differs from the widely know Pacific model of only four phases. The difference is due to an initial Conceptualisation phase in Kenya. Our results illustrated the need for full acceptance of the LMMA concept by stakeholders before progressing to the second Inception phase. When this step was missed many LMMAs stalled during the Inception or Implementation phase.

Across all LMMAs there was a distinct lack of strategies for education and awareness, marketing, financing and monitoring. Management structures were also generally fairly weak. The findings also revealed confusion over the legal basis of LMMAs. Legislative guidelines are a vital component of the national guidelines on LMMAs currently under development in Kenya. Most LMMAs tackled this issue late in the establishment process.

The five phases in the development and establishment of LMMAs described here provide a useful guide for communities and other stakeholders to follow when developing LMMAs, or for those that are established and need guidance on their operations.

1. Introduction

1.1 An overview of LMMAs in Kenya

Marine conservation in Kenya has moved strongly towards co-management in recent years in contrast to the top-down approach to natural resource management applied in the past (Cinner et al., 2012; Rocliffe et al., 2014). This move was first seen in marine conservation in the Pacific in the 1990s (Govan 2009) and builds on recognition of the power and rights of local fishing communities to manage their marine resources especially through Locally Managed Marine Areas (LMMAs) (Rocliffe et al. 2014).

LMMAs have been created separately from Kenyan government marine parks, which are no-take zones that are fully protected with no extraction or fishing allowed, and are managed by the Kenya Wildlife Service (KWS). These government marine parks are perceived by some resource users to have provided little economic benefits to local communities whose lives are directly linked to marine resources (Malleret-King 2001; Wanyonyi et al., 2008). Up to 89% of fishers have been found to perceive no benefits to themselves or to their communities from the existence of marine parks in Kenya (Davies, 2002). It is therefore perhaps not surprising that communities have created LMMAs to be able to engage in the management of marine resources and in turn improve their livelihoods.

LMMA is a generic term used globally for community or locally managed areas in the marine environment which have some form of protection or regulation. Many names are used in Kenya to refer to these areas, including community conservation area (CCA), *tengefu* (Kiswahili for 'set aside') and community conservancies, often relating to the legislation used to declare them or to the various actors who have promoted them (Odote et al. 2015). These names and those used in Kenya's legislation are listed in Annex I.

The first coral reef based LMMA established in Kenya was Kuruwitu, just north of Mombasa. During the early stages of its establishment, the East African Wildlife Society (EAWLS) arranged an exchange visit for Kuruwitu fishers to Tanga in Northern Tanzania, to see the coastal Collaborative Management Areas that had been set up by the Tanga Coastal Zone Conservation and Development Programme (TCZCDP) (Wells et al. 2007). The objective of the visit was to give Kuruwitu fishers who had expressed interest in establishing a LMMA a first hand experience of LMMAs in operation and to discuss with the Tanzanian fishers their experiences. This exchange visit culminated in Kuruwitu becoming the first coral reef based LMMA in Kenya, in 2006.

Ongoing coral reef research by different supporting civil society partners such as the Wildlife Conservation Society (WCS) revealed the conditions of reefs and the degraded fishing areas of coastal communities outside the national marine parks and reserves. Fishers have also experienced dwindling stocks as a result of increasing pressure from rising number of fishers and the use of poor fishing methods, which have been exasperated by the negative effects of climate change and limited fishing controls, conditions that are widespread globally (Allison et al. 2009; Gutierrez et al. 2011; Cinner et al., 2012). Against this background, Flora and Fauna International (FFI), with the East African Wildlife Society (EAWLS) as the local partner, have played a key role in facilitating the establishment of LMMAs on the south coast of Kenya.

The current fisheries co-management structure commonly used in Kenya is the Beach Management Unit (BMU) through which community rights over resources have been legally established (GoK 2007; Ogada, 2013). However, there are many pieces of legislation that govern the management of the coastal and marine environment in Kenya (Samoilys et al., 2011) making a legal anchor for LMMAs complex. In addition, there are no national guidelines and there has been a lack of clarity on the legal basis for LMMAs despite the rapidly increasing number of LMMAs that are being established. In response to this, a task force has proposed legal guidelines for LMMAs in Kenya in a companion study (Odote et al. 2015). The lack of legal clarity and limited management and financial supporting mechanisms for LMMAs in Kenya are likely to be reasons for why some LMMAs have been established only to stall within a short time.

The number of LMMAs in Kenya has grown rapidly since 2010 as more BMUs express interest in setting aside fishing zones as marine conservation areas for the purpose of self-governance, conservation and future economic gains. The first LMMAs were declared in the 1990s and were mangrove board walks, often in association with mangrove re-planting schemes, with three of these established by 2000. By 2008 a further two mangrove board walks and two coral reef based LMMAs were established bringing the total to seven. By 2011 there were 13 coral reef and five mangrove LMMAs (Abunge 2011; Maina et al. 2011a). However, not all of these are fully functional and others face significant challenges. For example, Kiweni LMMA lies in the path of the proposed Lamu Port South Sudan Ethiopia Transport Corridor Project (LAPPSET) and will be dredged to give way for the upcoming port (Maina et al. 2011b). Some proposed LMMA sites lie within National Marine Reserves (Maina et al., 2011a), which are under the authority of the Kenya Wildlife Service (KWS), and there is limited experience in operating a community conservation area within an existing national MPA. Such LMMAs need full support by the government and the local community, as well as sufficient financial resources to support the process (Cinner et al., 2012).

It is under such uncertainties around LMMAs that Coastal Oceans Research and Development in the Indian Ocean (CORDIO EA), together with its partners, recommended that national guidelines for LMMA establishment be developed (Maina et al., 2011). This review is designed to provide the background to developing such guidelines. Such guidelines will support and strengthen community conservation efforts and allow for the long-term conservation and sustainable use of marine areas, notably those that have been overfished or poorly managed in the past.

2. Method

In this study we were only interested in coral reef based LMMAs, because the mangrove board walks have very different objectives. The review was carried out using two methods. First a desktop literature review was conducted which examined published and grey literature including draft management plans of well established LMMAs (e.g. Kuruwitu, Kanamai-Mradi, Kibuyuni, Vanga), proceedings of the Darwin Initiative Final workshop held by EAWLS/FFI in 2012, student theses, other relevant studies in the areas where LMMA exist and government legislation, particularly the Fisheries Act and the Environmental Management and Coordination Act (Harrison and Laizer, 2009; Karisa et al., 2010; Kuruwitu, 2011; Maina et al. ,2011a; Yusuf, 2011; Murage, 2012; Lamprey et al., 2012; Mwaura, 2013; Ogada, 2013). There was limited published information on the history of the different LMMAs in Kenya.

From our initial findings in the literature review we determined that LMMAs were generally established through five phases (Figure 1): Conceptualisation, b) Inception, c) Implementation, d) Monitoring and management, and e) Ongoing adaptive management. Typically, as documented from the Pacific, LMMA establishment goes through four phases. However, due to the ambiguity of ownership, commitment, and sometimes purpose of LMMAs with the various stakeholders in Kenya, it was clear that an additional early phase the “Conceptualisation phase”, was also present. We used these five phases to analyse information from the literature review and to analyse information from each of the LMMAs for which documentation was available.

The second method used key informant interviews via a structured interview questionnaire (Table 1). We used the five LMMA establishment phases to structure the interview questions. Individuals interviewed were selected based on their presence during establishment and/or operations of LMMAs. Key informant interviews were done with informants from the following 10 LMMAs: Kuruwitu, Bureni, Kiweni, Kibuyuni, Wasini, Jimbo, Vanga, Kanamai-Mradi, Shimoni, Nyari-Kikadini.

Table 1. Criteria used to assess LMMAs through key informant interviews and for interrogating the documentation on each LMMA.

PHASE 1 - CONCEPTUALISATION
<p><i>Did the community and key stakeholders understand the LMMA process?</i></p> <p><i>Were champions for the LMMA process during this phase identified?</i></p> <p><i>Was the general area for the LMMA identified?</i></p> <p><i>What was the origin of the initial interest for the LMMA?</i></p> <p><i>Who were the stakeholders?</i></p> <p><i>Did the stakeholders endorse the LMMA idea with a signed agreement?</i></p> <p><i>What was the time frame to reach this stage?</i></p> <p><i>Who financed this stage?</i></p> <p><i>What were the challenges and successes faced?</i></p>
PHASE 2 – INCEPTION
<p><i>Was the specific LMMA area identified agreed on by stakeholders?</i></p> <p><i>Did preparation of a management plan by key stakeholders begin?</i></p> <p><i>Was an EIA undertaken?</i></p> <p><i>Was an education and awareness plan prepared?</i></p> <p><i>Was a needs assessment for training and resources undertaken?</i></p> <p><i>Was there an understanding of the institutional framework and legal requirements of the LMMA?</i></p> <p><i>Was the process participatory?</i></p> <p><i>Were the goals and objectives of the LMMA defined and understood by all?</i></p> <p><i>Were roles and responsibilities of stakeholders defined, and understood by all?</i></p> <p><i>Was the exact location of the LMMA, size and boundaries known to stakeholders before implementation?</i></p> <p><i>Was a financial plan to manage the LMMA put in place?</i></p>

PHASE 3 - IMPLEMENTATION

Was the LMMA established with buoys, patrol and management plans?
Was there a signed agreement by community on establishment of the LMMA, ready for management and monitoring?
Was the draft management plan completed and adopted?
Which management interventions were adopted by the LMMA?
What enforcement and compliance methods used?
Were there challenges of land ownership?
Were members trained on how to manage the LMMA?
Was a monitoring plan put in place and adopted?
What was the estimated timeframe for adoption, implementation of the management plan?
What was the estimated cost of implementing this phase?

PHASE 4 - MONITORING AND MANAGEMENT

Has the community endorsed the monitoring plan?
Is a biological, socio-economic, and livelihood assessment undertaken annually in a participatory manner?
Is a quarterly review of the finances/budget reviewed?
Is a marketing/awareness strategy reviewed quarterly/biannually?
Is there a management structure/organogram in place?
Have the communities' skills been improved?
Are the ecological resources/fisheries/habitats in a better condition?
Are the boundaries maintained?
Are available equipment used efficiently for management?
Is the LMMA self-sustaining?
What is the estimated cost of implementing this phase?

PHASE 5 - ONGOING ADAPTIVE MANAGEMENT

Has the LMMA management plan been reviewed?
Is the information garnered from the monitoring plan used to improve management?
Is training and capacity building reviewed to ensure management is improved?
Is the financial/sustainable plan reviewed regularly to guide management/income?
Are lessons learned documented and shared?
Have new/neighbouring LMMAs been developed as a result of this LMMA?
What organisations/individuals help ongoing adaptive management?
What is the estimated cost of implementing this phase?
What does it cost to run the LMMA per annum/month?

2.1 Five phases of LMMA establishment and development in Kenya

The five phases of LMMA establishment (Figure 1) are categorised by the activities that were occurring and can be defined into the period of 'establishing an LMMA' (Phase 1-3) and the period of 'managing an LMMA' once it is in operation (Phase 4-5).

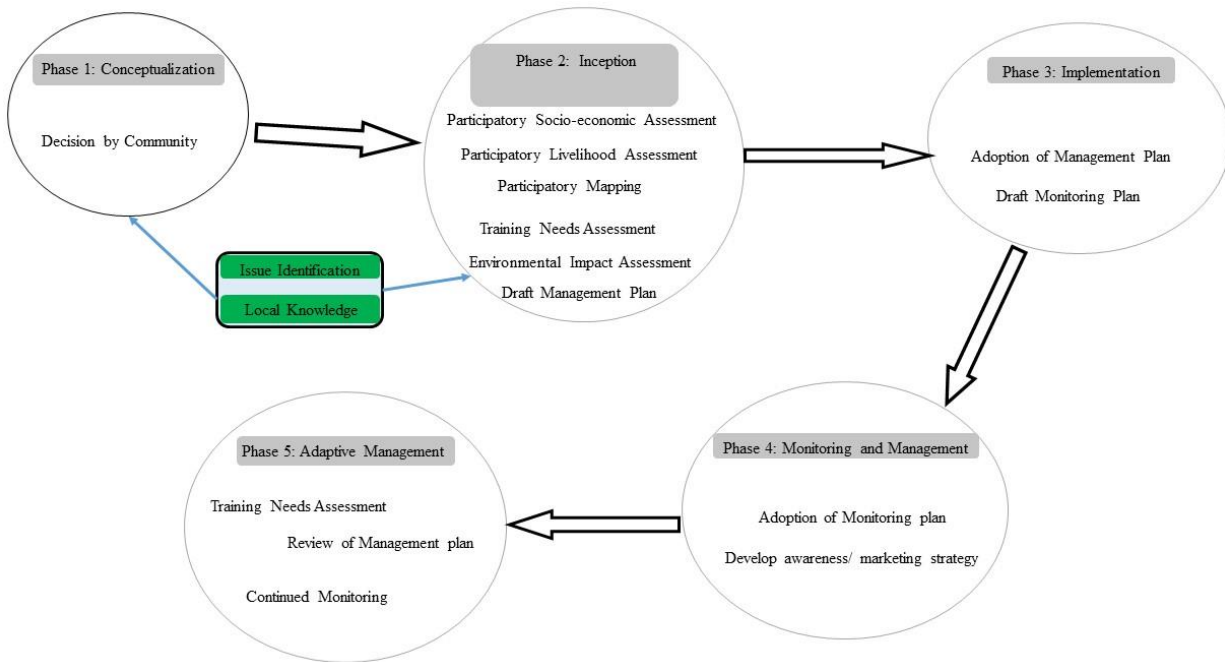


Figure 1. Diagrammatic representation of the five phases of LMMA establishment and development.

Phase 1: Conceptualisation

This phase involves exploring the main idea, root cause and origin of the proposition for establishing a LMMA. The phase articulates awareness of LMMA benefits and the process, whilst integrating local indigenous knowledge, scientific knowledge and potential issues. It further identifies ownership of the process (community, government, NGO), as well as who are the champions (motivator, lobbyist) of the idea. Before moving onto phase 2, there is endorsement by the community that an LMMA is desirable.

Phase 2: Inception

The phase explores whether the community and other key stakeholders understand the LMMA concept, benefits and process. The phase notes avenues for institutionalisation of the LMMA. This phase also begins drafting a management plan, training, awareness, consultation and identification of sources of financing. A completed draft management plan often marks the beginning of the next Implementation phase.

Phase 3 Implementation

This phase involves adopting the management plan and developing a monitoring plan. Here steps are taken to realise the LMMA through demarcation (placing of buoys), participatory

research (biophysical, socio-economics), and training of members in LMMA management. Challenges of land ownership that may affect implementation are identified. The highlight of this phase is the agreement by key stakeholders and readiness for management and monitoring.

Phase 4: Monitoring and Management

This phase focuses on management effectiveness, efficiency and adoption of the monitoring plan. It emphasises governance structure and an evaluation strategy entrenched in the monitoring plan, and begins implementing the monitoring plan. It emphasises lessons learnt in phases 1, 2, 3 and disseminates information in varying formats for stakeholders. This phase involves endorsement and implementation of good management structures with clear terms, roles and responsibilities between key stakeholders.

Phase 5: Ongoing Adaptive Management

This is a dynamic phase that focuses on the sustainability of the LMMA, continuous implementation of the strategies mentioned above and further expansion and review of the LMMA functioning for the purpose of improvement. It is informed by the earlier phases, is continuous and involves learning by doing.

3. Findings

We found documentation on 18 LMMAs, though a further six were declared early in 2015 – three in Lamu County around Pate Island and three on the south coast near Msambweni giving a total of 24 LMMAs (Figure 2, Table 2). The recent ones are listed here but not reviewed further because they are so new. Most of the LMMAs were located in Kwale County on the south coast and all were at different stages of establishment and development (Figure 2, Table 2). Here we detail the findings from the 18 LMMAs with documentation within the structure of the five development and implementation phases described above. Detailed information on when the LMMA was formed, the management intervention selected, partners involved and the legislation under which it was established were examined. Integrated into these findings are the results from the key informant interviews at 10 of the 18 LMMAs.

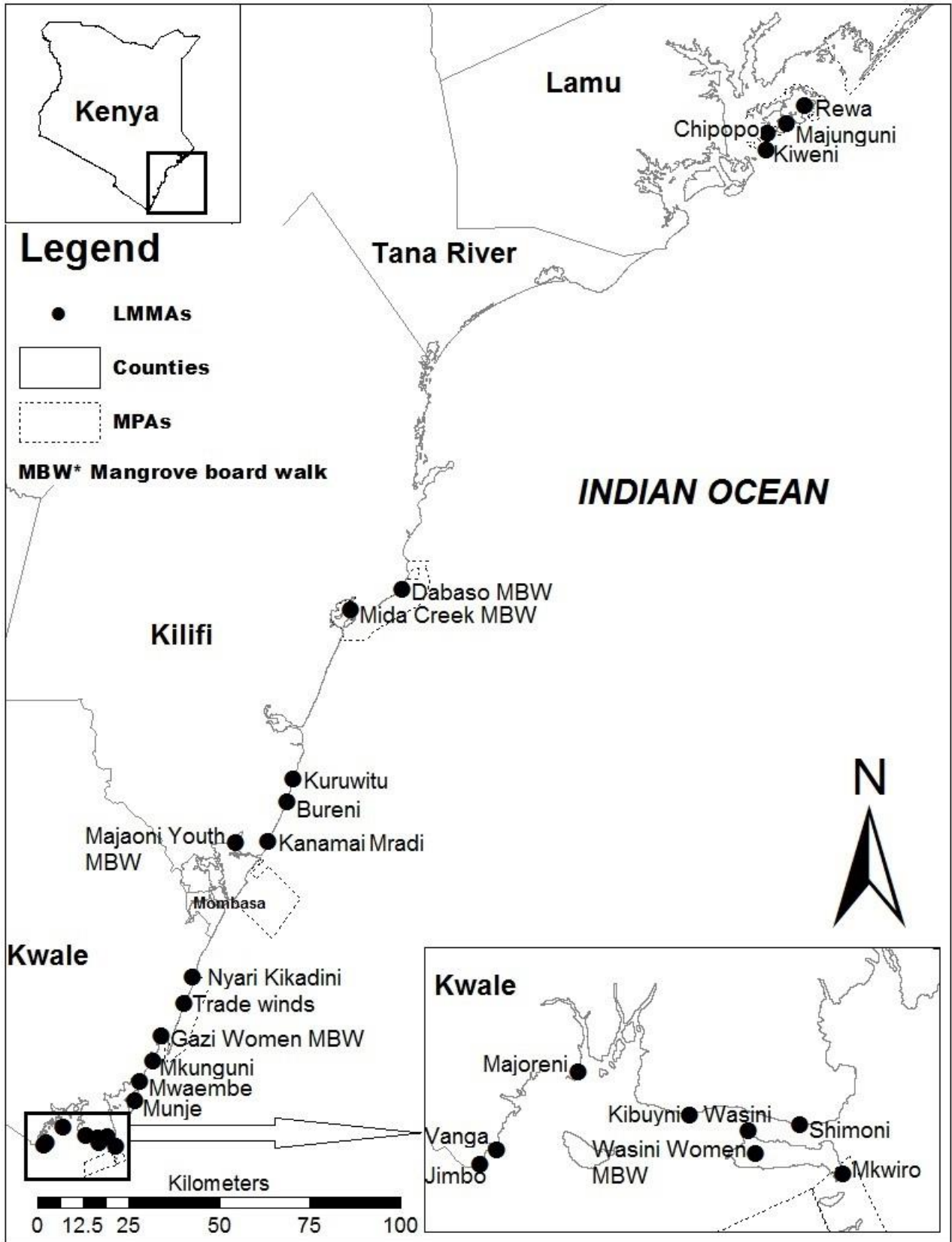


Figure 2. Locations of 24 LMMAs along the coast of Kenya.

Table 2: A list of 24 Kenyan LMMAs (updated and modified from Abunge, 2011 and Maina et al., 2011a). The table includes community conservation areas in mangroves often around mangrove re-planting activities and 6 newly established LMMAs in 2015. MBW = Mangrove board walk.

LMMA	Year formed	Size km ²	Intervention	Status	Lead group/ agency	Other partners	Legislation
Mida Creek MBW	1995	-	Mangrove restoration	Active	A-Rocha Kenya	KEFRI	Forest Act
Gazi Women MBW	1999	-	Mangrove restoration	Active	Gazi Women group	KMFRI, KEFRI	Forest Act
Wasini Women MBW	2000	-	Mangrove restoration	Active	Wasini Women group	KWS, KEFRI	Forest Act
Majaoni Youth MBW	2003	-	Mangrove restoration	Active	Majaoni Youth group	Kwetu Training Centre, KEFRI	Forest Act
Dabaso MBW	2006	-	Mangrove restoration	Active	Mida creek Community Conservation	KEFRI	Forest Act
Kuruwitu	2006	0.29	No take zone	Active	Local residents & fishers, KCWA	EAWLS, WCS, SDF, KWS, IUCN, AFEW, Safaricom, WWF	Fisheries Act
Wasini	2008	0.31	No take zone	Active	EAWLS/FFI	WCS, ANO, SDF, KWS, KMFRI	Fisheries Act
Kibuyuni	2010	0.275	No take zone	Active	EAWLS	WCS, SDF, KWS, KMFRI, Pact – Ke	Fisheries Act
Kanamai-Mradi	2011	0.22	No take zone	Active	WCS	SDF	Fisheries Act
Mkwiro	2013	0.155	Gear restriction	Active	EAWLS/FFI	WCS, SDF, KWS, KMFRI	Fisheries Act
Bureni	2013	0.52	No take zone	Active	Bureni Turtle Watch	WCS, SDF, KWS	Fisheries Act
Nyari-Kikadini	2009	0.125	No take zone	Inactive	WCS	SDF	Fisheries Act
Jimbo	2009	-	Gear restriction	Inactive	EAWLS/FFI	EAWLS, SDF, KWS	Fisheries Act
Tradewinds	2009	0.118	Gear restriction	Inactive	WCS	WCS, SDF.	Fisheries Act
Vanga	2010	-	Gear restriction	Inactive	EAWLS/FFI	SDF, EAWLS	Fisheries Act

Shimoni	2010	-	Gear restriction	Inactive	EAWLS/FFI	WCS, SDF.KWS WCS, SDF.KWS	Fisheries Act
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LMMA	Year formed	Size km ²	Intervention	Status	Lead group/ agency	Other partners	Legislation
Kiweni	2010	3	No take zone	Inactive	LamCOT	SDF, Peponi hotel, Manda Bay Resort Lamu, BMUs, WWF, TNC, NRT-Coast, PMCC	Fisheries Act
Majoreni	2010	-	Gear restriction	Inactive	EAWLS/FFI	WCS, SDF. KWS, KMFRI	Fisheries Act
Munje	2015	0.7	No take zone	Newly established	COMRED	SDF, County government	Fisheries Act
Mkunguni	2015	0.27	No take zone	Newly established	CORDIO EA	SDF, County government	Fisheries Act
Mwaembe	2015	0.46	No take zone	Newly established	WCS	SDF, County government	Fisheries Act
Rewa	2015	9.69	Gear restriction	Newly established	TNC/ NRT-Coast	PMCC, SDF, FFI	Fisheries Act
Majunguni	2015	10.66	Gear restriction	Newly established	TNC/ NRT-Coast	PMCC, SDF, FFI	Fisheries Act
Chipopo	2015	17.3	Gear restriction	Newly established	TNC/ NRT-Coast	PMCC, SDF, FFI	Fisheries Act

3.1 Conceptualisation

Marine LMMAs have seen government institutions (SDF, KWS, NEMA), NGOs (EAWLS, FFI, WCS, Coastal Rural Development Organization (CRDO), Coastal and Marine Resources Development (COMRED), CORDIO, LamCOT and others (community groups, beach residents, local fishers, private investors, research institutions) work in collaboration to establish LMMAs. We found that during the conceptualisation phase, the community and key stakeholders did not completely understand the LMMA process in all 10 LMMAs. However, areas that would be set aside for LMMA establishment had been suggested. Each of the LMMAs had groups or institutions and/or individuals who championed the LMMA process and lobbied for support for the rest of the stakeholders (Table 2). The formation of LMMAs was inspired by local needs to create alternative livelihoods activities, conserve fishing areas that were degraded by overfishing and control the use of destructive fishing methods. Various catalysts were reported to have contributed to the desire for BMUs to have LMMAs. These were: participatory research, education and awareness training in marine conservation by NGOs, availability of funds, existing local

knowledge on protection of marine resources, and general appreciation for local religion and culture which was linked to conservation of natural resources. In some cases fishers from more than one landing site and BMU came together to form a LMMA, such as at Kanamai-Mradi and Nyari-Kikadini (Table 3).

Table 3. Landing sites and/or BMUs that came together in agreement to form a marine community conservation area.

LMMA	Landing sites and/or BMUs
Kuruwitu	Mwanamia, Kijangwani, Kuruwitu, Kinuni, Vipingo, Bureni
Nyari-Kikadini	Nyari, Kikadini
Kanamai-Mradi	Jumba, Kazungu wa Shungu, Mwando wa Panya
Kiweni	Pate, Shanga Rubu, Shanga Ishakani, Shela and Lamu BMUs

The timeframe for the Conceptualisation phase was between 2 to 4 years, involving deliberations and sensitisation about the LMMA concept and the process. One of the key elements to the success of this phase appeared to be the level of sensitization. In order to seal agreements after a BMU assembly meeting, generally minutes were written and signed by the BMU executive committee. Once signed, total acceptance by all members was often assumed and that the larger community was now fully aware of the LMMA. However, this was not always the case. Kuruwitu held very large community awareness meetings which also included those who were non members of KCWA, and therefore awareness was probably wide across the BMU and community. In contrast, in Shimoni, up to 50% of BMU members would fail to attend BMU assembly meetings to deliberate on LMMAs. This led to an incomplete understanding of LMMAs by the key stakeholders, the fishers. Most fishers, therefore, considered LMMAs as a project of only a few people, notably the BMU leadership.

During this first phase, many fishers were not in agreement on LMMAs. There was a general fear that the government would take over LMMAs and turn them into government MPAs at a later stage (Table 4). Financing during this stage was by NGOs (Table 2) and with technical support from the SDF, and often research institutions and individuals. The progress of this phase was attributed to community support, private partners, NGOs and the SDF, but more important was the existence of individuals who lobbied the community to accept the concept.

Table 4. Challenges during each phase of LMMA establishment and the LMMA which reported these challenges.

Phase of LMMA	Challenges	LMMA
Conceptualisation	Gaining the trust in the vision by all those that were to be affected and overcoming suspicion, incomplete consent concerning closure, insufficient funds, limited partnerships, low attendance during meetings, inadequate awareness for BMU members, lack of understanding of LMMA processes.	Bureni, Kuruwitu, Nyari-Kikadini, Wasini, Kibuyuni, Shimoni, Jimbo, Kiweni, Vanga
Inception	Incomplete understanding of the existence and benefits of LMMAs by fishers, lack of training on LMMA management, lack of management structures, vague understanding of institutional framework and legislation relevant to LMMAs, existing draft management plans often prepared in a non participatory manner, lack of management plans, lack of education and awareness plan, lack of financial plan, lack of training and resource needs assessment, mistrust due to experiences from the historical top-down process of MPA establishment.	Bureni, Kuruwitu, Nyari-Kikadini, Wasini, Kibuyuni, Shimoni, Jimbo, Kiweni, Vanga
Implementation	Limited training on LMMA management, availability of land to expand eco-tourism activities, inadequate funds, poaching, revenue sharing between BMUs, donor turnover, lack of management structures. Lack of proper BMU leadership, poaching, PORT politics, low tourism, ratification of LMMAs management plans, lack of a marketing strategy, lack of security	Kuruwitu, Nyari-Kikadini, Wasini, Kibuyuni, Shimoni, Kiweni, Vanga
Monitoring and Management	Inadequate funds, limited training on LMMA management, lack of monitoring plan.	Kuruwitu, Wasini, Kibuyuni, Kanamai-Mradi
Ongoing Adaptive Management	Inadequate funds, limited training on LMMA management, management plans not reviewed, lack of marketing, awareness and plans on training and capacity building to improve management, Lack of knowledge on costs of establishing a LMMA	Kuruwitu, Wasini, Kibuyuni, Kanamai-Mradi

3.2 Inception

The process of establishing an LMMA is one that involves extensive consultations and steps taken to establish proper governance structures through firm and focused agreements between concerned parties. In this second phase, Inception, all LMMAs had identified a potential LMMA area in the midst of arguments for and against establishment. In addition, for many of the south coast LMMAs, an Environmental Impact Assessment was also undertaken during this phase. Institutionalising the LMMA was done through management plans and legislation.

Management plans

Six out of the 10 LMMAs had draft management plans with goals, objectives, roles and responsibility of stakeholders defined. All the management plans of the LMMAs were drafted after the LMMA had been established.

Kuruwitu had its initial management plan prepared by the KCWA committee. It was improved four years later by EAWLS. Kibuyuni LMMA drafted its co-management plan in 2011, which was a year after its establishment while Wasini's was drafted in 2013 five years after its establishment. Some LMMAs did not develop draft management plans and this may be linked to them becoming inactive (Kiweni, Bureni, Tradewinds). Preparation of management plans was intended to be participatory. However, some draft management plans were prepared within a very short time, and inadequate financing did not allow exhaustive participation and representation by the rest of the community.

In this phase all LMMAs had not yet prepared plans for carrying out education and awareness, or financing plans. A training and resource needs assessment was also lacking.

Legalisation

All respondents believed that both the institutional framework and the legal basis for LMMAs were poorly understood by the larger community. Legal documents showed that LMMA establishment and governance is supported by the Fisheries Act. This enables BMUs to make and enforce their own by-laws and through this establish a LMMA. The Fisheries (Beach Management Unit) Regulations, 2007 states;

'The authorised fisheries officer shall, following a consultative process, designate at respect of each beach management unit a co-management area which shall be an area in which the beach management unit shall undertake fisheries management activities jointly with the Director.'

Following the designation of a co-management area the authorised fisheries officer shall, in consultation with relevant beach management units, develop a draft co-management plan for that co-management area, specifying fisheries management measures that are to be taken to ensure the sustainable utilization of fisheries in that area, including, but not limited to..... the designation of closed areas in which all fishing activities or specified fishing activities are prohibited; the designation of closed seasons either throughout the co-management area or in respect of specified areas;..... restrictions on the type of nets or other fishing gears that may be used.....

The BMU legislation has been used by the majority of LMMAs (Table 2). However, the KCWA's LMMA at Kuruwitu was established in 2006 before the BMU Regulations came into

force. At the time Kuruwitu explored the Environment Management and Coordination Act (EMCA, 1999), through sections 54 and 55 which provide for the declaration of an area as a protected area including in the marine environment. However, for this legislation to apply to LMMAs, it would require that the communities liaise with the Minister before the declaration is undertaken or that regulations be developed under Section 55(6) which would provide clear procedures for community involvement in establishment of LMMAs, to ensure the conserved area is community-led and not government-led (Odote et al. 2015). This approach proved difficult and was never concluded and instead KCWA members had to join the BMU to gain legal recognition by SDF.

3.3 Implementation

By this third phase more stakeholders were informed about LMMAs. However, there was still some skepticism about establishment. Area closures and gear restriction were generally adopted as management approaches. Activities carried out during this phase were participatory resource mapping, demarcation, placement of buoys and baseline surveys on biophysical and socio-economics status. BMUs with draft management plans (Kuruwitu, Vanga, Kibuyuni, Mradi and Nyari-Kikadini, Wasini) had these adopted during this phase. Challenges during this phase revolved around limited training in LMMA management and leadership, lack of management structures, lack of access to land, poor marketing and inadequate funding (Table 4). These are discussed further below.

Marketing

None of the LMMAs had a structured marketing strategy except for Kuruwitu. However, some had plans to work with relevant institutions on marketing their LMMAs and tourism related products. Vanga planned to market itself as an historical site to raise the profile of the area and increase its visibility to a national and international audience. Wasini planned to set a website to showcase its marine resources and unique attractions. BMUs affiliated to Kiweni worked in collaboration with Lamu and Shela BMUs which are tourist centres which played a key role in bringing tourists to the LMMA. Plans are underway by TNC and partners to introduce a business approach to marine conservation areas that would see critical habitats identified and more LMMAs established in Pate Island given that Kiweni faces an uncertain future due to the LAPSET project. Kuruwitu had a marketing strategy in its original master and management plan consisting of production of brochures, signboard, t-shirts, an educational video, website, articles and newsletters.

Availability of funds

Funding was a major challenge facing all LMMAs and no financial plan was found with any of the LMMAs. Activities were in high gear when funding was available but dropped off dramatically when funding ceased. For instance, between 2009-2012 during FFI/EAWLS' Darwin Initiative project, which aimed to promote conservation of biodiversity and reduce poverty, most of the Shimoni to Vanga LMMAs were established, and co-management plans, biophysical and socio-economic surveys were completed rapidly presumably to complete activities within the lifespan of the project and/or due to availability of funds and expertise. The same applied for Kuruwitu between 2008-2010 when there was funding from the Community Development Trust Fund. There were exceptions: Kanamai-Mradi received minimal external support compared to other LMMAs but went on with activities equally successfully, raising revenue from visitor entry, BMU fish landing charges and membership fees. Nyari-Kikadini began raising revenue from visitor entry fees. However, the LMMA stalled following internal wrangles with neighbouring BMUs concerning the site. Kiweni

raised some revenue by charging access to snorkelers who visited the reef. This was done through collaboration of five BMUs and hotel operators notably Manda Bay Resort and Peponi Hotel. However, lack of ongoing donor support, lack of monitoring, and infighting between the key community groups led the LMMA to collapse.

Availability of land

Land ownership or lack of access to land appeared to hinder LMMA activities. For example, Jimbo, Kanamai-Mradi, Kuruwitu and Wasini BMU owned no land and have minimal beach access. Wasini BMU overcame this problem by operating in harmony with existing neighbouring investors whom they encouraged to provide land access to support the LMMA. Kuruwitu was offered land by the local administration to construct an office. They later maximised use of their beach access, constructing a locally made office and resting sheds and installing sanitation facilities. Plans are underway to construct a temporary eatery and a marine resource training center.

Training in LMMA management

Training to improve LMMA management skills was carried out at several LMMAs but there was usually little coordination between government and NGOs and among the various NGOs. BMU leaders have attended training on LMMA related issues (by-laws, leadership, group and financial management, monitoring), which were carried out by SDF, KWS and civil society organisations. Systems to strengthen governance and capacity of LMMA, managers, boards, and a fisheries data collection programme are currently being established in Pate Island. Some BMU leaders raised concern over selection of individuals for training opportunities. They argued that those targeted were mostly BMU leaders, which was potentially counterproductive to respective LMMAs. They proposed that BMU training should target officials and non-officials to avoid a vacuum being formed when leaders who have been trained relinquish their positions.

3.4 Monitoring and management

This fourth phase marked the beginning of managing a LMMA once it is in operation. Four LMMAs had been through this phase (Kuruwitu, Wasini, Kibuyuni, Kanamai-Mradi) and in these management structures were established and were generally contained within the BMU management structure, for example, in the BMU committee and sub-committees, depending on the number of activities. The phase was marked by attempts to implement a monitoring plan, though this was often not yet well developed, and the maintenance of the marker buoys. The latter was only observed at Kuruwitu where the environment sub-committee implemented the monitoring plan. Similar challenges to those seen in Phase 3 were observed in this phase: inadequate funds, limited training in LMMA management, and lack of a monitoring plan. The latter is discussed further below.

Monitoring plans and patrol activities

Monitoring strategies were evident in three areas (a) Patrolling for compliance of the LMMA regulations; (b) Biophysical monitoring of the environment; and (c) Socio-economic monitoring to measure impacts on the environment and the local people respectively. Kuruwitu, Wasini, Kanamai-Mradi and Kibuyuni had on-going collaborative patrol activities with research institutions. Shimoni and Jimbo reported a one off patrol carried out in early 2013 by SDF officers. Regular surveillance and patrol activities at Kiweni LMMA were evident but this only lasted when there was external support from donors and hoteliers who also benefited from the conservation actions. At Pate Island there is now an initiative to

strengthen monitoring and patrol activities through support from TNC and partners who are working on establishing a Marine - Conservancy Management Monitoring System (Marine-CoMMs), to be implemented by the local community in collaboration with relevant government agencies. In many sites fishers were reported to poach fish and steal buoys providing evidence that patrols were not always successful. Monitoring of some LMMAs (Kuruwitu, Wasini, Kibuyuni, Kanamai-Mradi and Kiweni) revealed improved coral cover and fish biomass (Maina et al. 2011b; McClanahan, 2014).

3.5 On-going adaptive management

This final fifth phase, if operating successfully, indicates successful long-term implementation of a LMMA. The phase is identified by whether management plans have been reviewed, if there are marketing, awareness, and expansion plans and what the LMMA management group are planning for capacity building and information sharing for members of the broader community.

Out of the six LMMAs with management plans, two (Vanga and Kibuyuni) had reviewed their management plans. However the LMMAs in this phase did have strategies on marketing, awareness, and capacity building to improve the management and operation of their LMMA. LMMA boundaries and financial costs are two key issues found in LMMAs operating in this fifth phase and are discussed below. With regard to information sharing, the Annual Fishers Forum coordinated by WCS with SDF, and the Indian Ocean Water Body Network (IOWB) create an opportunity for BMUs to share results from monitoring activities with each other. The Forum involves dissemination of research findings on coral reef monitoring and fishers are informed of the biodiversity status of individual LMMAs. At the same time good fisheries management methods are recommended and discussed by bringing together BMUs along the coast of Kenya to deliberate on natural resource management issues facing BMUs.

Boundary extension and expansion of LMMAs

There are plans to review some existing LMMA boundaries for the purpose of extending them (Kuruwitu), or relocating to newer LMMA sites (Nyari-Kikadini), or to support the creation of neighbouring LMMAs (Kanamai-Mradi). The Pate Marine Community Conservancy (PMCC) is keen to revive Kiweni LMMA and establish other LMMAs around Pate Island whose sites have already been identified.

Costs of LMMA establishment

Estimating the cost of establishing most LMMAs was not possible except for Kuruwitu because LMMA leaders were unable to estimate the costs incurred. This was because the costs were borne by a donor, a research institution or other organisations that worked in the LMMA site, and details of these costs were not shared with the BMU or LMMA management group. In this situation the BMUs simply made themselves available for planned activities. This has left community members unable to understand the magnitude of investments needed for developing LMMAs. However, records of Kuruwitu LMMA showed that they had spent an overall cost of 25 million Kenya Shillings (approximately USD 250,000) establishing their LMMA, of which 18 million was used during the Implementation phase (phases 4 and 5). These costs are inclusive of construction and land development projects.

4. Discussion and recommendations

From the detailed findings we synthesised three groups of reasons as to why LMMAs have become recognised and popular on the Kenyan coast: Strategic, Funding and Government support.

Strategic

- The need to create alternative livelihoods activities and to conserve fishing areas that have been degraded by overfishing and/or destructive fishing methods.
- The potential for thriving corals and other marine life in fishing areas close to shore.
- LMMAs incorporate traditional fishing values when protecting fishing areas.
- Commitment and cohesion by the BMU executive committee as well as the existence of focused leaders.
- A more enlightened and empowered fishing community as a result of several education and awareness training seminars, and regular dissemination of research results on the status of the fishing areas and the general coral reef community.

Funding

- Donors and supporting institutions available to finance and facilitate LMMA establishment.
- LMMAs provide a means for BMUs to present themselves to attract donor funding to enable them expand into alternative income generating activities.

Government support

- Availability of a legal framework provided through SDF's BMU Regulations supported LMMA formal recognition and establishment.
- Support by SDF to BMUs in training on governance and management.

The results also revealed challenges that were experienced by LMMAs (Table 4 above). We grouped these challenges into training needs, participation by stakeholders, availability of resources, and management and operational structures. They will need to be solved if LMMAs are to develop strong roots in Kenya.

Training needs

- Education and awareness training especially during the initial three phases of conceptualisation, inception and implementation in which the foundations of the LMMA are established was often inadequate.
- Adequate training for all BMU members was often not available as most training opportunities targeted the BMU executive committee only.

Participation

- Not all members of the fishing community are BMU members, which made it more difficult to agree on setting aside a common fishing area as a LMMA. Non-members did not understand how they would benefit from the process.
- Low turn out during BMU meetings when important decisions needed to be passed by the BMU assembly.
- Disharmony among local partners, especially when funding begins to run low.

Availability of resources

- Lack of full understanding of the cost of establishing (i.e. 3 initial phases – conceptualisation, inception and implementation) and managing (last 2 phases –

management and monitoring and ongoing adaptive management) of LMMAs. Often there have been some funds to establish a LMMA, but inadequate funds to maintain it.

- Inadequate funds to make the process of developing co-management plans more participatory.
- Lack of resources (land, boats) to expand eco-tourism and patrol activities.
- Vandalism of LMMA resources and assets that were purchased.

Management and operational structures

- Lack of good management structures, partnership agreements and systems to absorb changes, such as when donors exit and when there is low revenue from low visitor turn out.
- BMUs were not well prepared to continue with activities on their own. Rapid exit and entry of donors further interrupted the flow of activities.
- Lack of a patrol strategy to increase compliance to agreements made for LMMAs.
- Fishers' preference to fishing in the LMMAs because of closeness to the shoreline.

Recommendations for the development of national guidelines on LMMAs

Having identified the processes, challenges and opportunities experienced by LMMAs along the Kenyan coast, we make the following recommendations for developing and establishing LMMAs, and hope these can be incorporated into national guidelines.

1. Commitment to the LMMA process by key stakeholders (government, community, advisers) is paramount to the success of the LMMA. Therefore, LMMAs should incorporate a simple and focused education and awareness plan, to help secure stakeholders buy-in of the LMMA concept, and help anchor the acceptance and ownership of the LMMA process during the Conceptualisation and Inception phases.
2. The five phases of development and establishment need to be recognised – there are no short cuts. Therefore LMMAs should plan to secure sufficient funds for each phase. This is critical as it enables the time required to garner full commitment from a broad community of stakeholders likely to be affected by a LMMA. Currently an estimated cost (time and money) per phase is unknown, and further work is needed to unravel this.
3. LMMAs should develop a marketing strategy between the second and fifth phases, alongside a benefit sharing mechanism. This will enable them to function as a business, and therefore be sustainable and not dependent on donor funding.
4. LMMAs should develop clear management structures, partnership agreements, roles and responsibilities of key stakeholders. This will allow fast decision-making and strategic thinking.
5. LMMAs should understand the financial, technical and human resource inputs required to implement a successful and sustainable LMMA. In this way, donors, community members and other key players, can better plan for the LMMA process.

6. LMMAs should develop a comprehensive participatory monitoring strategy, building on success stories in East Africa such as the Tanga Coastal Zone Conservation and Development (TCZCD), which has had a consistent monitoring programme for their six LMMAs since 1999, and enforcement patrolling is done jointly between government (Fisheries Department) and community representatives. Monitoring involves marine environment, social and economic benefits and patrolling of the LMMA area.

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Annex I. Generic and legal names used for LMMAs in Kenya

(after Odote et al. 2015)

Generic terms	Legal Names	Legislation	Agency
Locally Managed Marine Area (LMMA)	Co-management area	Fisheries Act Cap 378; Fisheries (Beach Management Unit) regulations 2007	State Department of Fisheries (SDF)
Community Conservation Area (CCA)			
<i>Tengefu</i> Kiswahili <i>vilindo vya wenyej</i> (Kiswahili)	Sanctuary Marine Protected Area Wildlife Conservancy	Wildlife Management and Conservation Act 2013	Kenya Wildlife Service (KWS)
Community reserves	Protected coastal zone	Environmental Management and Coordination Act 1999	National Environment Management Authority (NEMA)
Community conservancies			
Indigenous Protected Areas			
Biocultural heritage sites			