



Aquaculture and Marine Conservation

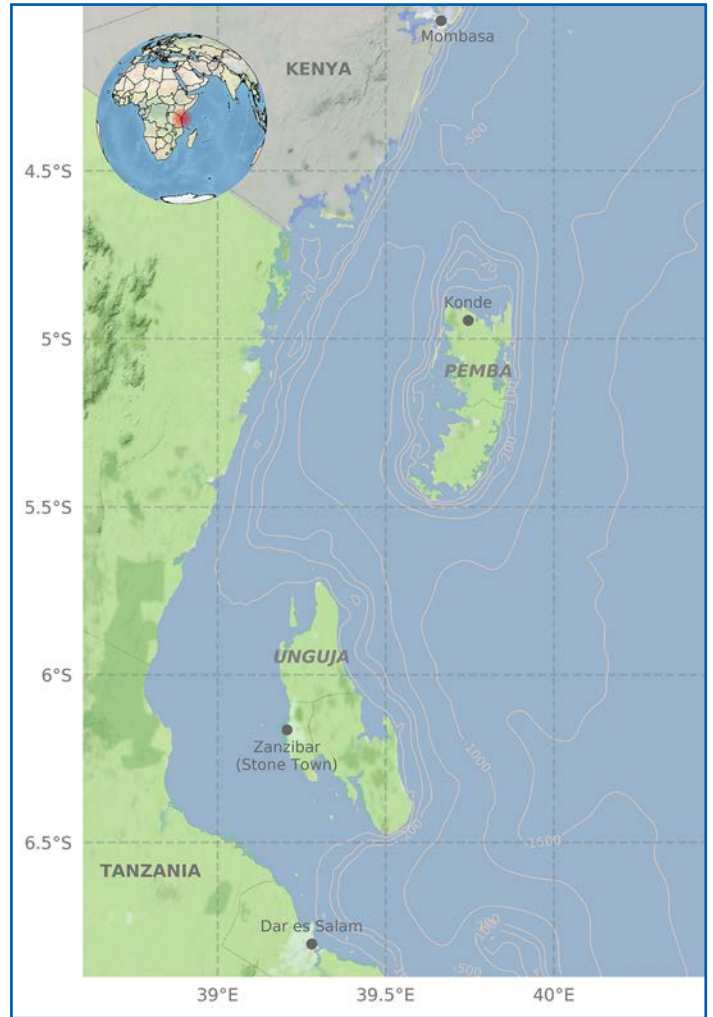
ZANZIBAR CASE STUDY



Seaweed drying in a village in Zanzibar © F. Simard

“In order to meet the Convention on Biological Diversity’s Aichi Targets as well as the Sustainable Development Goals (SDG) by 2030, there is an urgent need to reconcile nature conservation and sustainable development. The creation of Marine Protected Areas (MPAs) is a key tool for achieving Aichi targets in coastal and marine ecosystems. It is also widely recognized that aquaculture is an important activity in terms of sustainable development for coastal communities, playing a role in contributing to food security, poverty alleviation, economic resilience, and providing services to marine ecosystems in some cases. This document is the first of a worldwide collection of case studies which provide concrete illustrations on how aquaculture can be part of an MPA and share conservation objectives with the community, while outlining some of the critical issues that should be explored on a case by case basis.”

F. Simard



Location map of the main islands of Zanzibar Archipelago. Map courtesy of M. Leclair (ETH Zürich).

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Coral reefs in Zanzibar © A. Jumba

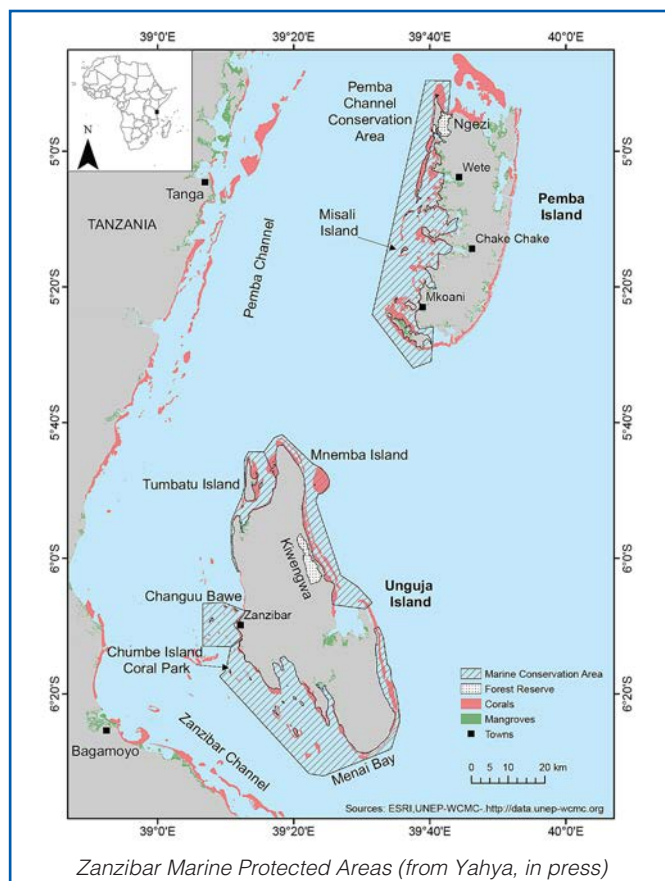


Coral reefs in Zanzibar © A. Jumbe

MPA short description

The terms MPA and MCA in Zanzibar are interchangeable and are used to describe what is generally known as Marine Conservation Areas (MCAs). These are multiple use marine management areas that are run through "co-management" approaches between the Government and the local communities. The Government's efforts to promote a sustainable use of these multiple-use marine zones began in the early 1980s with formulation of policy and legislative directions that are now embedded in environmental, fisheries, tourism and forestry acts and their associated regulations.

The current Marine Conservation Unit Regulations which form the basis of Marine Conservation Areas in Zanzibar, were established in 2014 under the Zanzibar Fisheries Act No.7 of 2010. All MCAs and privately-managed marine areas in Zanzibar are therefore under the direct jurisdiction of the Department of Fisheries Development. All existing MCAs have been defined and delineated under the Regulations (RGoZ, 2014a). Levine (2010) highlights that MCAs in Zanzibar also benefited from the support



Zanzibar Marine Protected Areas (from Yahya, in press)

of external organizations. Since 2005, Zanzibar's MCAs have received major support from the World Bank's financed implementation of the Marine and Coastal Environment Project ([MACEMP](#)), as well as from the EU - Indian Ocean Commission's [RECOMAP ISLANDS](#), [SMARTFISH](#) and [BIODIVERSITY](#). Projects between 2009 and 2016, respectively, strengthened sustainable coastal and marine harvesting practices, as well as monitoring and management systems in MCAs through Integrated Coastal Zone Management (ICZM) approaches. Moreover, the current World Bank SWIOFISH project also seeks to enhance planning, monitoring, management and enforcement of MCAs in Zanzibar while improving sustainable livelihoods of the local communities in fisheries and mariculture activities in these areas.

Table 1: List of established Marine Conservation Areas in Zanzibar

Name of the MCA	Declaration date	Area covered in km ²	Status	Management plan
Menai Bay Conservation Area (MBCA)	1997	717.5	Public	GMP developed in 2010, reviewed in 2012 and due for update in 2018-2019
Mnemba-Chwaka Bay (MIMCA)	2002	337.3	Private	GMP established in 2005 and finalized in 2010
Pemba Channel Conservation Area (PECCA)	2005	825.8	Public	Developed in 2010 and was due for review in 2018-2019
Chumbe Island Coral Park Sanctuary (CHICOP)	1994	0.55	Private	CHICOP has a current management plan 2017-2027
Tumbatu Marine Conservation Area (TUMCA)	2015	162.9	Public	First MMP was due to be developed in 2018 - 2019
Changuu-Bawe Islands Marine Conservation Area (CHABAMCA)	2015	118.2	Public	Due for first development (in 2018-2019)
Total		Approx. 2100		

Legend: Marine Management Plans (MMPs) or General Management Plans (GMPs)

Table 2: Main MPA and aquaculture facts

MPA (See Table 1 for details)	Type	Menai Bay Conservation Area (MBCA), Mnemba Island, Chwaka Bay Conservation Area (MIMCA), and Pemba Channel Conservation Area (PECCA) can be classified as part of category VI in most cases. Chumbe Island Coral Park/Sanctuary (CHICOP) is part of category III – designated as <i>No-Take Zone</i> leased to and managed by a private not-for-profit organization. Recent designation of Tumbatu Marine Conservation Area (TUMCA) in the North, and Changuu and Bawe Islands Marine Conservation Area (CHABAMCA) adjacent to Stone Town, are intended to expand multiple use marine control zones specific for sustainable fishing and tourism activities.
	Surface area	It should be noted that Kojani Marine Conservation Area (KOMCA) is not yet categorized as a formal MCA, but as a marine enclosure and management zone. Recently, the significance of its ecological connectivity with other adjacent coastal protected areas on land has been increasingly acknowledged. Jozani Forest - Chwaka Bay Conservation Area (JCBCA) has a surface area of 56 km ² with a buffer zone of 86 km ² . Ngezi - Vumawimbi Nature Forest Reserve on the northern fringes of Pemba Island has a surface area of 29.9 km ² , while the surface area of Kiwengwa Controlled Area Forest Reserve is of 34.1 km ² , in Pemba, Zanzibar.
	Creation date	Adjacent coastal protected areas: Jozani-Chwaka Bay National Park (Est. 1960 as Forest Reserve. As National Park in 2004. As Man and Biosphere Reserve in 2016). Ngezi - Vumawimbi Nature Reserve (Est. 1959. Attained Nature Forest Reserve Status in 2005). Kiwengwa Controlled Area (Est. 2002).
	National status and management	All MCAs are public and two (CHICOP and Mnemba Atoll) are leased to private management entities.
Aquaculture	Type	Seaweed cultivation (and diversification attempts)
	Surface	80% in MCAs
	Creation date	1984-1990
	Organization type Investors, ownership, capital, shareholders	Fishermen Community management. Family scale enterprises, private capital. >16,000 farms (Lange&Jiddawi, 2009). Public license. 80% of producers are women. Mostly exported through buyers.
	Production quantity per year	10,424.9 tons (in dry product), equivalent to 4.358 billions in Tanzanian shillings (approx. US\$ 1.9 million) - (RGoZ, 2019). 119,000 t in 2016 in Tanzania (mostly in Zanzibar) total live weight according to FAO (FAO, 2018).

IUCN Protected Area Category and International Name	Management Objectives
Ia – Strict Nature Reserve	Managed mainly for science
Ib – Wilderness Area	Managed mainly to protect wilderness qualities
II – National Park	Managed mainly for ecosystem protection and recreation
III – Natural Monument	Managed mainly for conservation of specific natural/cultural features
IV – Habitat/ Species Management Area	Managed mainly for conservation through management intervention
V – Protected Landscape/Seascape	Managed mainly for landscape/seascape conservation and recreation
VI – Managed Resource Protected Area	Managed mainly the sustainable use of natural ecosystem

Women working in seaweed farms in Pemba, Zanzibar © R. le Gouvello

Marine conservation initiatives are essential in protecting critical habitats in the MCAs such as mangrove ecosystem lagoons, seagrasses and coral reefs, while enhancing sustainable artisanal fisheries and mariculture practices. Mostly created to provide fishery resources, the MCAs in Zanzibar are not intended as 'no take zones'. Indeed, this would not be realistic given the heavy reliance of a large number of fishing families on marine resources as their primary source of income and survival. Rather, their focus is on promoting sustainable resource utilization in large areas, using a variety of techniques and methodologies (including core zones that can function as 'fish refugia') (EcoAfrica 2012).

However, the objectives of these MCAs also include the following conservation focus areas, which are recognized as essential to preserve the richness of marine biodiversity in Zanzibar and to mitigate the numerous threats it faces (various anthropogenic pressures, and climate change):

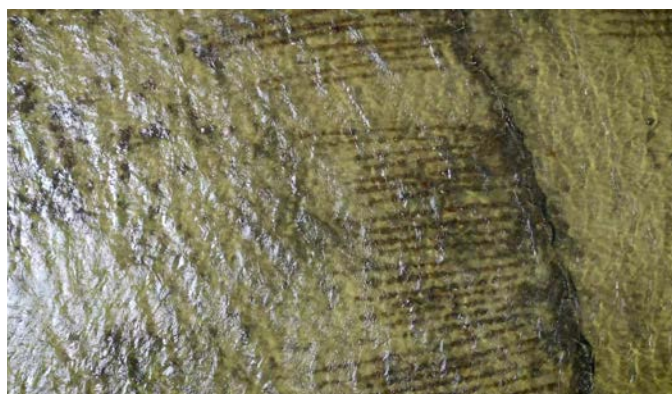
- **Coral reefs:** Much of Zanzibar's coastline (370 km) is flanked by fringing reefs that form a natural barrier and provide important coastal habitats in the area for reef fish, as well as small and large pelagic species (Yahya, in press). However, some of these reefs are endangered, as a result of destructive fishing techniques, tourist activities, pollution and bleaching (temperature rise due to climate change).



Coral reefs in Zanzibar © A. Jumbe

- **Seagrass beds:** Seagrass grows in the shallow and intertidal mud and sand flats all around Zanzibar, forming important nursery areas for juvenile fish. They also are foraging areas for herbivorous fish such as Rabbitfish (Siganidae), Parrotfish (Scaridae) and Surgeon fish (Acanthuridae) (Yahya, in press).

Aerial view of seaweed farms in Zanzibar © F. d'Amato



Mangrove forests in Zanzibar © F. Simard

- **Remarkable fish species:** In MIMCA, rare fish species include the Napoleon wrasse (*Cheilinus undulatus*) and the Coelacanth (*Latimeria chalumnae*). MEMBA is known for spawning aggregations of the Giant Grouper *Epinephelus lanceolatus*. CHICOP includes ten species of groupers, including the Black-saddle grouper *Plectropomus laevis* classified as Vulnerable (IUCN Red-List) (Yahya, in press).

- **Marine aquatic macrofauna:** Pemba Island and Misali Island provide important nesting sites for turtles. Green and Hawksbill turtles are known to nest on the sandy beaches of Menai Bay. In PECCA, area of great ecological interest, populations of dolphins, whales (principally Humpback whales *Megaptera novaeangliae*) and dugongs (latest report in 2017, just outside the southern boundary of PECCA) are reported. In MBCA, Kizimkazi is home to resident populations of Indo-Pacific Bottlenose (*Tursiops aduncus*) and Humpback (*Sousa chinensis*) dolphins (Yahya, in press).

- **Seabirds:** Seabird populations are abundant in Zanzibar. In particular, the JCBCA is an Important Bird Area (IBA, no. TZ057) and was declared a UNESCO Man and Biosphere Reserve in 2016 (Yahya, in press).

- **Mangroves:** Ten mangrove species are found in Zanzibar. They are estimated to cover approximately 60 km² in Unguja and over 120 km² in Pemba. Yet, these are under pressure from exploitation, mostly due to over-harvesting for building poles and firewood or charcoal (Yahya, in press).

The dugong, a remarkable sea mammal present in Zanzibar © Julien Willem



MPA management

Zanzibar's MPAs are placed under the jurisdiction of the Department of Fisheries, under the Ministry of Agriculture, Natural Resources, Livestock and Fisheries. The Marine Conservation Unit (MCU), working with the Department of Environment and Zanzibar Environmental Management Authority, and managed with officers of the Marine Conservation Unit, employs local MCA managers and a few rangers (Brugère et al., 2019). Local management is discussed with the local village committees (VPC). The authority of the Forestry department is also consulted for the management of mangroves and the conservation of coral rag forest on the islets within the MCAs.



Seaweed farms at low tide in Zanzibar © A. Jumba



AquaCoCo workshop introduction, Stone Town, July 2019, Zanzibar © R. le Gouvello

Moreover, the Draft Fisheries Policy (RGoZ, 2014b) has underpinned the challenges of poor compliance with the few existing regulatory measures aimed at preserving the integrity of Marine Conservation Areas (MCAs). This situation has been exacerbated by the lack of effectiveness of public initiatives seeking to preserve the integrity of coastal ecosystems, particularly regarding the promotion of Integrated Coastal Zone Management (ICZM) and the control of water pollution. Developing MPAs in co-management and compliance approaches in Zanzibar is critical for achieving the objectives of sustainable inshore fisheries and ICZM.

The lack of financial resources and inadequate level of cross-sectoral collaboration in MCAs make the actual management of these MCAs quite ineffective in meeting conservation objectives. In 2019, only two MCAs have edited their management plans: MBCA and PECCA. Two MCAs are private and managed by NGOs: Chumbe Island Coral Park (CHICOP) and Mnemba Island, resulting in an active management with more means. CHICOP was established in 1994 (Bush et al., 2016) and has developed an ecotourism activity, giving them financial autonomy, and includes a various range of actions focusing on research, monitoring, education, surveillance, etc.

Considering the difficulties surrounding adequate management of the MCAs in Zanzibar and the general issues behind marine ecosystem preservation, the immediate future initiatives aim at proposing ways to improve the monitoring of inshore fisheries and the surveillance programs within the MCAs in Zanzibar. Meyer (undated) emphasized the lack of financial means to manage Zanzibar's MPAs, pointing out the difficulties in prioritizing budget if MCAs are managed under strict fisheries objectives with low priorities on environmental conservation and protection.

However, the Government also recognizes the importance of protecting marine ecosystems for sustainable marine tourism. As Zanzibar's rapid growth in beach tourism continues, with over 520,000 tourist arrivals reported in 2018 (RGoZ, 2019), tourism revenues - through tourist entrance fees - will contribute to a significant part of the management cost of MCAs. There is a need to strengthen the institutional core and management capability of the fisheries, mariculture, environment and tourism sectors in view of the operationalization of the MCAs. This includes resources and capacity to fulfill mandates and responsibilities in the coordinated conservation of all MCAs in Zanzibar (RGoZ, 2014c).

Traditional fishing vessel, the dhow, in Zanzibar © F. d'Amato



Activities and resource use in the MPAs

Fishing activities:

Fishing is the main socio-economic activity in most coastal villages of Zanzibar, providing 98% of animal protein diet. The sector employs more than 28% of the total coastal populations. The nature of Zanzibar's fishery is artisanal, which is characterized by non selective fishing and the use of traditional implements such as wooden boats, canoes, traps and nets of various kinds (reported in Georgia 2019; Lange and Jiddawi, 2009). Some of the common fish groups caught in Zanzibar are emperors, groupers, kingfish, tuna, octopus, squid, parrot fish, sharks and rays, with an average annual fish catch of 23,000 metric tons.



Fish landing and direct sales on the beach in Zanzibar © R. le Gouvello



Tourism:

Zanzibar started developing its tourism industry in 1984, moving towards economic diversification after years of dependency on cloves as a mainstay of the national economy. Since then, the country has been experiencing linear increase in the number of visitors from 42,141 tourists in 1990 to 128,440 in the year 2008 (Hugé et al., 2018; Lange, 2015; Lange and Jiddawi, 2009; RGoZ, 2009). Currently, the tourism sector contributes to 35% of the GDP. This new focus on tourism has a range of consequences on the economy of rural and urban coastal communities.

Tourist activities, such as diving and nautical sports (e.g. kite surfing), are practiced within MCAs. Usage conflict may arise and are reported between tourist activities, fisheries and seaweed activities. In addition, tourism may induce additional pressures on resources, waste management, coastal lands, and sanitation issues competing with coastal population needs. For example, dolphin tourism in Menay Bay is impacting the animal populations (Yahya, in press). A higher attractiveness for jobs in tourism can be perceived, whereas primary sector activities, such as agriculture, marine cultures and fisheries tend to be less attractive to local populations (Brugère et al., 2019).

On the other hand, tourism and MCAs in Zanzibar are resulting in interesting synergies for the generation of potential income from the tourism industry as demonstrated in the establishment of the Zanzibar Tourism Regulations of 2016. Section 28 of the Regulations underscores the importance of all tourism activities to protect the environment and cultural heritage of Zanzibar. Part four of the Regulations is also dedicated to acceptable and sustainable practices of marine tourism and recreational water activities, many of which are taking place within the MCAs such as in MBCA, MIMCA, TUMCA, and PECCA conservation areas (RGoZ, 2016).

Aquaculture activities within the MPAs

Seaweed farming was first introduced in 1984 by the University of Dar es Salaam and seaweed has been produced commercially since 1990. The cultivation of seaweed is practiced in the intertidal zone. 80% of the cultivation of seaweed take place within MCAs (Jumbe, oral comm., July 2019 in Brugère et al. 2020). Two types of seaweed (*Euचेuma cottonii* and *Euचेuma spinosum*) are cultured on the Islands. Women account for 88% of seaweed farmers. Consequently, the sector elevated the economic status of many rural women and generally has had favourable effects on the life of coastal villagers (EcoAfrica, 2012; Lange, 2015; Lange and Jiddawi, 2009; RGoZ, 2009; Valderrama et al., 2013). However, this has been disputed (Bryceson, 2002), most notably in relation to the negative impacts seaweed farming had on women's health (Fröcklin et al., 2012). Seaweed farming contributed to 7.6% of Zanzibar GDP, second after cloves (47%) among cash crops in 2009 (National Bureau of Statistics 2011, in Mochi 2017).

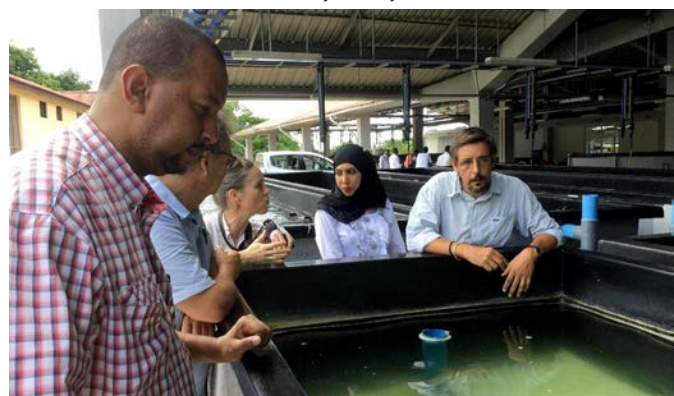
However, the production of seaweed has been declining over the past years and does not look as attractive to local communities as it did in the past. A few reasons may explain this trend. 90% of the production of seaweed farming in Zanzibar depends on the export market. The international market is very competitive and difficulties to access it are compounded by the lack of organisation of women seaweed producers and the high bargaining power of seaweed buyers. The higher-valued species (*Euचेuma cottonii*) have been suffering from the impact of climate change (higher water temperature and variations in salinity), while the production of the lower-value species (*Euचेuma spinosum*), which now constitutes the bulk of production and exports, is bringing little income to farmers. It is also a very time consuming activity (Brugère et al., 2019).

Efforts are currently underway to diversify the mariculture sector

Sea cucumber farm in Zanzibar © R. le Gouvello



Visit of the new national hatchery facility in Zanzibar © R. le Gouvello



Sun drying of harvested seaweeds in Zanzibar © R. le Gouvello

and promote new species, such as the production of mud crab, sea cucumber and milkfish, under Zanzibar governmental control (fisheries department). This is further complemented by ongoing small-scale initiatives around Unguja, such as sponge farming and pearl farming promoted by NGOs. Similarly, attempts are taken to cultivate seaweed in deeper coastal waters, in the water column, using suspended lines of seaweed (technique of tubular nets, made under the project [SEAPOWERO](#)) and thus, to adapt to temperature rise. Yet, this technique not only requires more equipment, it also need women to be trained in diving and boat engineering.

To support diversification of the aquaculture sector away from seaweed, and capitalise on the suitability of the environment of Zanzibar, the Government, with support from FAO and the Government of Korea (KOICA), has established a hatchery and training programme for the farming of milkfish, mud crab and sea cucumber (*Holothuria*). Whilst this infrastructure is in its early stages of operationalization, it offers promising support for individual farmers and entrepreneurs and denotes the strong will of the Government to promote the sector through the production of high-valued commodities destined to both international and domestic (high-end) markets (Brugère et al., 2019). However, as the proposed Zanzibar fisheries governance draft report points out, these emerging and promising aquaculture activities are still in their infancy (RGoZ, 2014c). Aquaculture mostly involves small entrepreneurs and women and cannot necessarily be considered as an alternative economic activity for fishers who should be reducing fishing pressure from inshore waters.

Aerial view of the seaweed farms in Zanzibar © Yves Barthelemy



Interactions between the aquaculture activities, the MPAs and local communities

Negative interactions

• Impact of seaweed culture on natural seagrass beds:

When talking about the Zanzibar situation, an antagonism has often been mentioned by authors regarding seaweed farming and seagrass beds. Indeed, seaweed farming is believed to contribute to beach erosion since seaweed replaces seagrass beds which are more efficient to resist to water erosion (RGoZ, 2014c). Seaweed farmers are deliberately selecting intertidal areas with high seagrass coverage to farm, which can reduce seagrass biomass and therefore reduce diversity of macrofauna, as reported by Georgia (2019) and others (Hedberg et al., 2018; Lyimo et al., 2008).

• **Interactions between tourism and seaweed culture:** In coastal areas, competition between tourist and mariculture activities are not only a question of spatial distribution and appropriation of space in the intertidal zone (conflicts between hotel resorts, aquaculture entrepreneurs and fishers have been reported), but also a question of employment attractiveness, as young people may be more tempted by jobs in the tourism sector, than in mariculture (Brugère et al., 2019).



Kitesurfer tourist in Zanzibar © F. d'Amato

• **Conflicts between tourism and fisheries activities:** Tourists are looking for beautiful live coral reefs to dive and snorkel, whereas fishermen see them as productive fishing grounds for coral reef fish species (RGoZ, 2009).



Kitesurfing in Zanzibar © F. Simard

• **Conflicts between seaweed farmers and fishers:** There are also some conflicts between seaweed farmers and fishers as the areas used as landing sites for local fishing boats are the same as the ones used for seaweed farming. This results in the destruction of seaweed products by accidentally knocking down the pegs holding the seaweed ropes.

• **Impacts of tourism development on seaweed culture:** Due to investment developments in coastal areas, the tourism industry has been having an impact on the seaweed industry. Several community members (seaweed farmers and coir makers) in different coastal villages have been chased out from their seaweed working or coir processing areas due to prospective tourism-oriented investments. In many villages of Zanzibar, coastal thickets and mangrove forests are being completely wiped off, leading the villagers to turn to illegal cutting in neighbouring villages. This has created conflicts between adjacent villages (RGoZ, 2009).

• **Conflicts between nautical sports and seaweed culture:** Kite surfing, which is practiced in the same area as seaweed intertidal cultivation, may also induce some conflicts over the use of common space.

Seaweed farming (left) and kite surfing tourism (right) are two conflicting uses of the coastal intertidal zone of Zanzibar © Yves Barthelemy



Positive interactions

- **Socio-economic role of seaweed mariculture:** As previously said, mariculture is recognized as essential to provide a direct income for the local communities. It plays a significant gender social role as the activity is mainly conducted by women.

- **Role of MCAs for maintaining economic activities:** Positive interactions between conservation objectives and mariculture are not fully investigated. Yet, the recent workshop conducted in Stone Town in 2019 showed that all participants recognized a common interest between mariculture and MCAs (and associated activities such as tourism, fisheries): all require well-managed and healthy marine ecosystems (Brugère et al., 2020).



Woman preparing artisanal soap with seaweeds in Zanzibar © F. Simard



Fish market in Zanzibar © F. Simard



Women showing the tubular net method for seaweed farming in Zanzibar © R. le Gouvello

- **Positive interactions between mariculture and tourism:** Artisanal soaps made from seaweeds, sponge and pearl cultivations and tourism are explored through the implementation of local value chains, local markets and direct sales into resorts (Brugère et al., 2019). The fact that most seaweed farming sites are located within MCAs may also constitute a valid basis to provide more value to Zanzibar seaweed. Similarly, attempts are made to propose visits of mariculture sites to tourists.

- **Positive interactions between seaweed farming and capture fisheries:** Positive interactions may indeed exist between seaweed farming and capture fisheries as the former may serve as a refuge or source of food for fish. However, this result needs to be further investigated (Hehre and Meeuwig, 2016).

- **Interactions at the institutional level:** Although aquaculture and marine conservation competencies are under the same department (Department of Fisheries), the aquaculture staff does not seem to be fully collaborating with the conservation staff (Brugère et al., 2019). The level of knowledge and exchanges between these institutional stakeholders could be improved.



Women involved in sea cucumber farming in Zanzibar © R. le Gouvello

Conclusion: SWOT matrix

This SWOT analysis as below shows that there are many synergies and opportunities between seaweed culture and marine conservation. Seaweed culture is highly dependent on the quality of the environment. The marine conservation strategy of Zanzibar is taking into consideration the sustainable development of seaweed culture as a key economic activity for local communities.

P R E S E N T	STRENGTHS	WEAKNESSES
	<ul style="list-style-type: none"> - relatively healthy state of the ecosystem, - the involvement and interest of fishers, - extensive aquaculture in the MCA, resulting in the abandonment of destructive fishing techniques. This aquaculture, whose environmental impact is low, is essential for local communities, - village community organisations and their representatives, - women involvement in aquaculture, - mutual recognition of marine protection needs (in IUCN workshop report in Brugère et al. 2020), - MCA under the Department of Fisheries and Marine resources. 	<ul style="list-style-type: none"> - coastal zones at stake (demography, pollution, various urban pressures, climate change...), - unclear cross-sectoral marine environment management framework and conservation objectives, - no financial support for active MCA management, - seaweed industry poorly organized, monitored and regulated, - no connections and collaborations between coastal stakeholders, lack of Marine Spatial Planning, - poor management of pollution and wastes, - MCA under the Department of Fisheries and Marine resources, not all MCAs are gazetted, - poorly-regulated inshore fisheries, overexploitation.
F U T U R E	OPPORTUNITIES	THREATS
	<ul style="list-style-type: none"> - synergies with tourism: local markets for soap and other seaweed products, visit of farms, diversification of products for tourists (sponges, pearls), - numerous ongoing independent initiatives promoting sustainable aquaculture production in the MPAs (e.g. Sea PoWer, mariculture.org), - involvement of marine conservation NGOs, - new evaluation consultancy work on Zanzibar MCA network with SWIOFish project, - ongoing or existing strategic documents and approach : <ul style="list-style-type: none"> • overall Integrated Coastal Zone Management (ICZM) Strategy for Zanzibar, • ongoing elaboration of Aquaculture Masterplan for Zanzibar, • the forthcoming formulation of the Blue Economy Strategy for Zanzibar. - thrust to improve new technology and management of the seaweed industry, good practices, - strong will to promote sustainable mariculture industry other than seaweed farming to increase coastal communities' income with adequate support. 	<ul style="list-style-type: none"> - climate change, heatwaves as a threat for seaweed intertidal fields, - slow progress in the formulation and/or updating of existing MCA management, - degradation of the ecosystems, - oil exploration and exploitation, - uncontrolled high tourism pressures.

Ref. SWOT: Osita, C.; Onyebuchi, I.; Justina, N. (2014). "Organization's stability and productivity: the role of SWOT analysis" 2 (9). International Journal of Innovative and Applied Research (2014): 23-32



Snapshots during the stakeholder workshop in Zanzibar, July 2019 © C. Brugère

Main references

Reports or strategic files

- Brugère, C., Le Gouvello, R., and F. Simard. 2019. Identifying synergies between sustainable development of coastal communities, aquaculture, and marine and coastal conservation. Background notes in preparation for the first mission to Zanzibar, 3-8 December 2018. AquaCoCo project, Unpublished report, IUCN-AFD.
- Brugère, C., Le Gouvello, R., and F. Simard. 2020. Identifying synergies between sustainable development of coastal communities, aquaculture, and marine and coastal conservation. Report of the AquaCoCo Stakeholder Workshop, held in Stonetown, 17 & 18 July 2019. AquaCoCo project, Unpublished report, IUCN-AFD.
- EcoAfrica Environmental Consultants. 2012. An Assessment of Legal and Institutional Framework for Effective Management of Marine Managed Areas in Tanzania. Zanzibar Report. Marine Conservation Unit, Zanzibar, Tanzania.
- Meyers, D. (no date) Report: Technical support to project preparation: Assessment of potential role of marine protected areas in SWIOFISH Tanzania project. Available at: <http://www.swiofishznz.go.tz/uploads/report2.pdf> (Accessed: 12 March 2019).
- Mmochi, A. 2017. Mariculture. In: UNEP-Nairobi Convention and WIOMSA (2015). The Regional State of the Coast Report: Western Indian Ocean. UNEP and WIOMSA, Nairobi, Kenya, pp 289-304.
- Revolutionary Government of Zanzibar (2009). National Integrated Coastal Zone Management Strategies and Action Plans. Draft Prepared by National Integrated Coastal Zone Management Committee. pp 50.
- Revolutionary Government of Zanzibar (2014a). Marine Conservation Unit Regulations. (in) Legal Supplement (Part II) to the Zanzibar Government Gazette Vol. CXXIII No. 6528 dated 10th October 2013.
- Revolutionary Government of Zanzibar (2014b). Zanzibar Fisheries Policy (Draft). Prepared with the Support of Smartfish Project.
- Revolutionary Government of Zanzibar (2014c). Strategies for Improvement of Fisheries Governance and Management in Zanzibar. Draft Prepared with the Support of EU-Indian Ocean Commission Smartfish Project. pp 1-34.
- Revolutionary Government of Zanzibar (2016). Zanzibar Tourism Regulations. (in) Legal Supplement (Part II) to the Zanzibar Government Gazette VII. CXXV No. 6624 of 26th August 2016.
- Revolutionary Government of Zanzibar (2019). Zanzibar in Figures 2018. Office of the Chief Government's Statistician. pp 1-53. <http://ocgs.go.tz/publication.php>
- Revolutionary Government of Zanzibar (2019). Zanzibar in Figures 2018. Office of the Chief Government's Statistician. pp 1-53. <http://ocgs.go.tz/publication.php>
- Yahya, S. (in press). Chapter: United Republic of Tanzania: Zanzibar. In: WIO MARINE PROTECTED AREAS OUTLOOK: Towards achievement of the Sustainable Development Goals. Marine and Coastal Areas Under Protection, 2018 Nairobi Convention. Western Indian Ocean Marine Science Association (WIOMSA), pp163-174.

Scientific publications

- Bryceson, I., 2002. Coastal aquaculture developments in Tanzania: sustainable and non-sustainable experiences.
- Bush, S.R., Bottema, M., Midavaine, J.J., 2016. Sustainability entrepreneurship in marine protected areas. Sustainable entrepreneurship and social innovation. Routledge, pp. 144-160.
- FAO, 2018. The State of World Fisheries and Aquaculture 2018 - Meeting the sustainable development goals. FAO, Rome.
- Fröcklin, S., de la Torre-Castro, M., Lindström, L., Jiddawi, N.S., Msuya, F.E., 2012. Seaweed mariculture as a development project in Zanzibar, East Africa: A price too high to pay? *Aquaculture* 356, 30-39.
- Hedberg, N., von Schreeb, K., Charisiadou, S., Jiddawi, N.S., Tedengren, M., Nordlund, L.M., 2018. Habitat preference for seaweed farming—A case study from Zanzibar, Tanzania. *Ocean & coastal management* 154, 186-195.
- Hehre, E.J., Meeuwig, J.J., 2016. A global analysis of the relationship between farmed seaweed production and herbivorous fish catch. *PloS one* 11, e0148250.
- Hugé, J., Van Puyvelde, K., Munga, C., Dahdouh-Guebas, F., Koedam, N., 2018. Exploring coastal development scenarios for Zanzibar: A local microcosm-inspired Delphi survey. *Ocean & Coastal Management* 158, 83-92.
- Lange, G.-M., 2015. Tourism in Zanzibar: Incentives for sustainable management of the coastal environment. *Ecosystem Services* 11, 5-11.
- Lange, G.-M., Jiddawi, N., 2009. Economic value of marine ecosystem services in Zanzibar: Implications for marine conservation and sustainable development. *Ocean & Coastal Management* 52, 521-532.
- Levine, A., 2010. Local responses to marine conservation in Zanzibar, Tanzania. *Journal of International Wildlife Law and Policy* 7, 183-202.
- Lyimo, T.J., Mvungi, E.F., Mgaya, Y.D., 2008. Abundance and diversity of seagrass and macrofauna in the intertidal areas with and without seaweed farming activities in the east coast of Zanzibar. *Tanzania Journal of Science* 34.
- Valderrama, D., Cai, J., Hishamunda, N., Ridler, N., 2013. Social and economic dimensions of carrageenan seaweed farming, Fisheries and Aquaculture Technical paper. FAO, Rome.






“By 2030, Zanzibar will restore its natural capital and will enhance sustainable development that stays within its social ecological carrying capacity, with communities fully engaged.”

Verbatim of Group N°1, AquaCoCo workshop, Stone Town, Zanzibar, July 2019 (Brugère et al. 2020)

Beach and mangrove in Zanzibar © F. Simard

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