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Front page: An octopus fisher lands his catch, Stone Town, Zanzibar; photo: Steve Rocliffe.

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List of abbreviations and acronyms

| | |
|--------|---|
| BV | Blue Ventures |
| CMT | Customary Marine Tenure |
| CPUE | Catch Per Unit Effort |
| FAO | Food and Aquaculture Organisation |
| FIP | Fishery Improvement Plan |
| IUU | Illegal, Unregulated and Unreported |
| LMMA | Locally Managed Marine Area |
| MSC | Marine Stewardship Council |
| NGO | Non-governmental organisation |
| ODK | Open Data Kit |
| PECCA | Pemba Channel Conservation Area |
| REPAO | Réseau des Politiques de la Pêche en Afrique de l'Ouest (Fisheries Policy Network in West Africa) |
| WIO | Western Indian Ocean |
| WIOMSA | Western Indian Ocean Marine Science Association |
| WWF | World Wide Fund for Nature |

1. Summary

The past decade has seen a proliferation of management efforts targeting small-scale fisheries in the Western Indian Ocean (WIO). Many measures have focused on building local capacity for management of reef octopus (*Octopus cyanea*) and several fisheries have undergone pre-assessment against the Marine Stewardship Council's (MSC) environmental standard. Recent years have seen a growing interest in fisheries improvement projects (FIPs) for invertebrate fisheries across the region, including some octopus fisheries moving towards MSC certification.

As part of this effort, the *Scaling success in octopus fisheries management in the Western Indian Ocean workshop* was held from 03-05 December 2014 in Stone Town, Zanzibar. The meeting brought together 66 delegates representing governments, NGOs, fishing communities, regional organisations, academic institutions and the seafood industry to share experiences and lessons learned from efforts undertaken across the Western Indian Ocean to improve fisheries sustainability.

The meeting was structured around five sessions over three days: i) Status and trends of WIO octopus fisheries and markets; ii) Local and national management approaches; iii) Overcoming data and capacity gaps for monitoring octopus fisheries; iv) Management challenges for attaining the MSC standard; and v) Towards certification – developing and implementing octopus fisheries improvement action plans.

Several key findings emerged from the workshop, including

- Improving the management of Africa's small-scale fisheries can deliver sustained benefits throughout the seafood supply chain, benefiting coastal communities while rebuilding dwindling fish stocks and supporting parallel conservation efforts.
- Collaborative efforts between NGOs, governments, funding bodies and supply chain stakeholders have been very effective in delivering targeted outcomes in some FIPs.
- Successful FIP projects require partnerships with clear allocation of roles, sustained commitment from partners, and strong leadership.
- An increasing number of FIPs use MSC pre-assessment to guide the development of action plans.
- There is an urgent need to develop regional and national expertise within Africa and the Indian Ocean in fisheries stock assessment in order to reduce the costs of FIPs and the MSC certification process in the WIO.
- Approaches to small-scale fisheries management in the region are diverse but largely bottom-up. Given this, there is a need for greater support for local dialogue and community exchanges, and enhanced networking among small-scale fisheries management efforts around the region.
- Many small-scale fisheries management efforts are based on informal local governance systems that remain vulnerable to outside influences such as migrant and industrial fishers. Such efforts would benefit from increased support for decentralised, rights-based fisheries management from central fisheries authorities.
- African fisheries currently engaged in the FIPs process are early adopters. The world is watching and listening.

2. Introduction

Approximately 60 million people live in the western Indian Ocean (WIO)'s coastal zone, and this number is expected to double by 2030. Many are directly dependent upon marine resources for their survival and livelihoods. A recent estimate of the economic value of the coastal ecosystems of the western Indian Ocean returned a value of roughly 25 billion US\$ per year, with fisheries and tourism contributing the most in terms of direct financial benefits. However, the coastal ecosystems and services they provide are already under significant pressure from human activities that are causing habitat degradation, pollution and over-exploitation of resources.

Octopus fisheries are an important resource for coastal communities throughout much the WIO region. In many coastal zones with coral reefs, octopus fishing dominates small-scale fishing effort and is a particularly important economic activity for women as well as men. In addition to being an important food for coastal communities, the majority of catches are exported to overseas markets, predominantly in Europe.

The past decade has seen growing signs of overexploitation of WIO octopus fisheries, as evidenced by reduced landings and smaller sizes and weights. In response, there has been a rapid growth in interest in efforts to improve the sustainability of octopus fishing, particularly through the establishment of seasonal closures of fishing grounds to enable stocks to recover.

Short-term closures: fisheries benefits

First piloted in southern Madagascar in 2003, the short-term octopus fishery closure 'model' has since been replicated more than two hundred times. These spatially-discrete fishing closures, typically comprising 25% of a community's overall octopus fishing grounds and closed for 3-7 months at various times of year, have now been established along the country's south, west and north coasts.

Adoption of this locally-led fisheries management model continues to grow each year in Madagascar, and the approach has more recently been adapted to other small-scale invertebrate fisheries including mangrove crabs *Scylla serrata* in western Madagascar and spiny lobster *Panulirus spp.* on the east coast.

In a number of cases these closures have provided the catalyst for encouraging stakeholder buy-in to broader marine resource management efforts, including the creation of permanent marine protected areas, now established at several sites by communities in parallel with temporary fisheries closures. Over the last seven years, 38 LMMAs have been established in Madagascar alone, collectively covering 6.9% of the country's seabed; some 6,635 km². Over half of these LMMAs incorporate management efforts specifically targeting octopus fisheries, illustrating the key role that small-scale fisheries management is playing in building community support for marine conservation nationally.

Having witnessed the effectiveness of this approach in improving octopus production, the government of Madagascar passed new fisheries legislation in 2004 to close the fishery for 6 weeks from mid-December each year, a national management measure that continues in tandem with the more *ad hoc* locally-led closures. This national closure model has since been adopted by the neighbouring Mauritian island of Rodrigues, with island-wide two-month fishery closures established annually since 2012.

Recent bio-economic analyses of approximately 36 temporary fishery closures established over seven years in Madagascar show that the benefits obtained by fishers after short-term closures more than outweigh the foregone catch and income sacrificed during them, giving a compelling economic incentive to continue this approach to octopus fisheries management. Following the success of fisheries management experiences from Madagascar and Mauritius over the past decade, there is now growing interest from communities, NGOs and fisheries sector partners in other regional states, including Tanzania, Kenya, Mozambique and Seychelles to replicate these experiences further.

Towards eco-certification

To further increase the sustainability of this fishery, as well as the economic benefits brought to fishing communities and the broader supply chain from sustainable fisheries management, pre-assessments for the Marine Stewardship Council's ecolabel have been undertaken on reef octopus (*O. cyanea*) fisheries in Tanzania and southern Madagascar. In both cases the clients were non-governmental organisations working to promote more sustainable management of these fisheries. These pre-assessments have made recommendations for fisheries improvement plans, which are now being developed by fishery stakeholders in both countries.

Information gaps

Despite the critical importance of octopus fisheries to coastal communities across the WIO region, and the encouraging progress made in managing this fishery in Madagascar and Mauritius, current understanding of status and trends in *O. cyanea* stocks and markets remains poor, and there has been limited sharing of management experiences between countries. In many WIO coastal states, monitoring of this small-scale fishery is intermittent at best, and data are on the whole scarce and rarely shared across the region.

Given the diversity of local and nationally-led approaches now underway for managing octopus stocks across the region, as well as the proven benefits that have already been seen from management, and the high potential for eco-certification of this fishery within the MSC framework, there is now an urgent need to overcome existing information and knowledge gaps and to strengthen and support new fisheries management efforts by bringing together regional octopus fishery stakeholders to share lessons learned and best practice. To this end, the *Scaling success in octopus fisheries management in the Western Indian Ocean workshop* was held from 03-05 December 2014 in Stone Town, Zanzibar. This report summarises and compiles outputs, recommendations and insights arising from the workshop.

3. Workshop Objectives

This three-day workshop was held to convene octopus fishery stakeholders from across coastal east African and island states to share experiences in octopus fisheries management in the region. The workshop brought together 66 stakeholders from 14 countries, including national and regional government representatives, NGOs, research institutions, commercial seafood exporters and processors, and the Marine Stewardship Council. The broad agenda for proceedings is detailed below.

| Theme | DAY 1 Octopus fisheries and their management | DAY 2 Addressing data deficiency in octopus fisheries | DAY 3 Towards eco-certification |
|-------|---|---|--|
| AM | <ul style="list-style-type: none"> Status and trends of WIO octopus fisheries and markets. Market opportunities for eco-certification of WIO <i>O. cyanea</i>. | <ul style="list-style-type: none"> Overcoming data and capacity gaps for monitoring octopus fisheries. | <ul style="list-style-type: none"> Towards certification: developing and implementing octopus Fisheries Improvement Action Plans. |
| PM | <ul style="list-style-type: none"> Local and national management approaches – experiences from the WIO and globally. | <ul style="list-style-type: none"> Management challenges for attaining the MSC standard | |

Table 1. Summary workshop agenda

A more detailed agenda can be found in Appendix 1. A full list of attendees is provided in Appendix 2

4. Day Summaries

Day 1 | Wednesday 03 December 2014

Session I | Status and trends of WIO octopus fisheries and markets

After opening speeches from Martin Purves (Southern Africa Programme Manager, Marine Stewardship Council), Dr Tim Andrew (Director of Outreach and Resource Mobilisation, WIOMSA) and Dr Alasdair Harris (Executive Director, Blue Ventures), the data sessions began with an overview of octopus fisheries in the western Indian Ocean, presented by Steve Rocliffe (University of York, Blue Ventures). The talk was split into three parts, with the first part reviewing trends in catches, imports and exports at the global level, the second focusing on the regional picture, both in the Western Indian Ocean and in Africa more broadly, and the final part examining the structure of the fisheries in 8 WIO states: Madagascar, Rodrigues, Comoros, Tanzania, Zanzibar, The Seychelles, Kenya and Mozambique.

Key findings from the research included:

- Global octopus catch peaked at almost 380,000 tonnes in 2007, and has since declined by a tenth to 335,865 tonnes in 2012.
- China, Morocco, Mauritania, Spain and Vietnam are the main exporters of octopus.
- Imports of octopus totalled an average of US\$ 1.6 billion dollars per year between 2009 and 2013. Major markets are centred in Asia and Europe, particularly Japan, South Korea, Italy and Spain.
- The growth in octopus catches since 1990 has not occurred evenly. Africa was the primary region for octopus capture in 1990, but has since seen its share of the global total halved from 35% in 1990 to 18% in 2012.
- Artisanal fishing for octopus has been practiced for centuries in the western Indian Ocean and is an important economic and subsistence activity for many coastal communities, especially in Tanzania, Madagascar, Rodrigues and Mozambique.
- Tanzania, Madagascar and Kenya are the largest exporters of octopus in the western Indian Ocean and target EU markets primarily, particularly Portugal, Italy, France and Spain.
- Data from the global trade and fisheries datasets used in the analysis are unreliable for several reasons, so the catch figures presented should be treated as conservative underestimates.

Following this overview, Yann Yvergnaux (Smartfish, Mauritius) presented a summary of key findings from the Smartfish Regional Symposium on Octopus Fisheries Management, which was held in Mauritius in February 2014. The aim of this symposium was to document regional octopus fisheries management initiatives and to compare results in a participative manner by allowing stakeholders to share their own experiences. The key finding from this symposium was that octopus fisheries serve as a practical entry point for broader fisheries management and conservation initiatives, and that benefits to communities can accrue rapidly.

COUNTRY OVERVIEWS

The two summary presentations were complemented by a series of talks from regional researchers, government officials and NGOs, who documented experiences of octopus fisheries management at national or island scales in Zanzibar, Madagascar,

Tanzania, Kenya, Rodrigues, Seychelles and Mozambique. Several insights emerged from the country-specific presentations, including:

- The primary species caught by the artisanal fishery in the Western Indian Ocean is *Octopus cyanea*, but *Octopus vulgaris* is also taken, especially in the Seychelles, but also in smaller quantities in Rodrigues and Zanzibar.
- Several management measures are in place for octopus across the region. These include closed seasons, temporary closures, minimum size limits and gear restrictions, but these vary considerably from country to country. For example, minimum size limits for *O. cyanea* are 350g in Madagascar, 500g in Tanzania and Zanzibar, and 1kg in Comoros. In some countries (Kenya, Seychelles, Mozambique) management measures such as seasonal closures have been proposed but not yet adopted.
- Reef octopus stocks are suspected to be locally overfished or fully exploited in several areas, including parts of Kenya, Seychelles, Tanzania and Zanzibar. Minimum size limits are difficult to enforce because the favoured method of capture in this region (spearing octopus located in holes in shallow reef flats) means that fishers are unable to see the octopus's size before it is killed.
- Other issues highlighted included: the need for buy-in for temporary closures, not only from fishing communities, but also from buyers and other private stakeholders, as well as public institutions; the importance of pre- and post-closure catch monitoring; and the potential need to formalise local informal closures through the use of by-laws.



Figure 1 Participants of the octopus workshop on Stone Town beach

Session II | Local and national management approaches

OCTOPUS FISHERIES CLOSURES IN MADAGASCAR

After lunch, biologist Dr Tom Oliver (University of Hawaii, Blue Ventures) presented an analysis of eight years of octopus landings data from the Velondriake LMMA, the first area of Madagascar to pioneer the temporary closure-based approach to octopus stock management. Dr Oliver's analysis is considered crucial to understanding the effectiveness of both western Madagascar's annual, regional six-week (15 December – 31 January) fishery closure and the temporary, spatially discrete ('reserve') closure system, since until now no empirical evidence has been available to support the perceived success of either management approach. Results of this research are currently being prepared for publication in PLOS ONE (*Oliver et al.* in prep). Key findings are as follows:

- Impacts on fishery catches, village fishery income, and net economic benefits from 36 periodic closures were significantly positive. These closures covered ~20% of a village's fished area and lasted for 2-7 months.
- Octopus landings and catch per unit effort (CPUE) increased significantly in the 30 days following a closure's reopening, relative to the 30 days before a closure.
- Results in open-access control sites depended on whether the focal closure occurred independently of other management ("no ban") or the focal closure extended a seasonal fishery shutdown affecting all sites during the closures' first six weeks ("ban"). Control sites showed no before/after change during "no ban" closures, but showed modest increases during "ban" closures.
- In villages implementing a closure, octopus fishery income doubled in the 30 days after a closure, relative to 30 days before. Control villages not implementing a closure showed no increase in income after "no ban" closures and modest increases after "ban" closures. Villages did not show a significant decline in income during closure events.
- Landings in closure sites rapidly generated more revenue than simulated landings assuming continued open-access fishing at that site. Benefits accrued faster than local fishers' time preferences during 17-27 of the 36 closures. High reported rates of illegal fishing (poaching) during closures correlated with poor economic performance.
- Over 69 periodic closures occurred in Velondriake between 2004 and 2011. Since this closure regime preceded the rapid growth of broader co-management in this region (in particular the establishment of locally managed marine areas in many of the same fishing areas), it is conceivable that narrowly targeted management interventions can serve as a "catalyst" for broader management actions.

Dr Oliver fielded several questions from the audience during his session. He was asked about the extent to which Blue Ventures was involved in Velondriake, why he thought that local villagers respected the closures, and whether alternative livelihood programmes were established to help fishers during closures. He responded that: i) Blue Ventures remains closely involved in supporting the fishery and broader conservation efforts in Velondriake, but has been taking steps to ensure that the funding remains sustainable, transitioning towards a "lighter-touch approach", with some villages outside Velondriake managing closures without direct support; ii) Fishers recognised that if they left an area even for a small period then there would be a personal economic benefit; and iii) That part of the design of the approach was that fishers could continue to fish, since only a portion (approx. 20%) of the fishing grounds are closed at any given period.

OCTOPUS FISHERIES CLOSURES IN RODRIGUES

Following Dr Oliver's session, Reshad Jhangeer-Khan (Economic Planning & Monitoring Unit, Rodrigues Regional Assembly) shared some lessons learned from octopus fisheries management in Rodrigues, with a particular focus on the recent introduction of a closed season for octopus. Rodrigues is a semi-autonomous island of the Republic of Mauritius lying approximately 600km east of Mauritius. In the early 1970s, around 1,800 tonnes of octopus was landed each year, but by the early to mid 2000s, annual catches had decreased to around 250 tonnes a year, and spearfishing of octopus by snorkelers started to become increasingly popular as catch yields from traditional gleaning declined.

In 2012, with octopus catches at around 20% of their historic highs, the government of Rodrigues enacted legislation to implement an annual two-month closed season for octopus fishing. Inspired by the short-term closures pioneered in Madagascar in 2004, the first closure took place between August and October 2012 and has since been repeated in 2013 and 2014. Following the first closure, annual catches jumped to 571 tonnes, the highest level for 9 years and an increase of 50% over 2011 figures. Local authorities in Rodrigues have also established an alternative livelihoods scheme to provide fishers with income generating activities during the two-month closures, but there are concerns about its financial viability.

The experiences of the Rodrigues octopus fishery are documented in detail in a report produced in preparation for the symposium by Reshad Jhangeer-Khan and colleagues.

TEMPORARY CLOSURES IN OTHER (NON-OCTOPUS) FISHERIES

After the afternoon break, Steve Rocliffe (University of York, Blue Ventures) returned to present an introduction to periodic fisheries closures for species other than octopus, including the origins of the approach and its contemporary use in artisanal invertebrate species across the Indo-Pacific. Some of the key insights covered included:

- In a Western management context, periodic closures have mainly been proposed and tested as a management strategy for benthic invertebrates like trochus, scallops, urchins, lobster, coral and abalone. In this context, evidence about effectiveness is mixed, ranging from studies reporting only marginal gains from periodic closures to those finding increases in yield and population size.
- Modelling of periodic closures suggests that the longer-lived, slower-growing species will need longer periods of closure for benefits to accrue than faster-growing, shorter-lived species.
- Periodic closures are a commonly used management tool in locally managed marine areas in many parts of the Pacific, especially countries with a tradition of customary marine tenure (CMT) – the right to control access to fishing grounds at the local level.
- These closures often protect an entire species assemblage on a reef, but may also be employed to protect a single invertebrate species such as trochus (*Tectus niloticus*), mud clams (*Polymesoda spp*), mud crabs (*Scylla serrata*) lobster (*Panulirus spp*), or blood cockles (*Anadara granosa*).
- Approaches to periodic closures are highly varied, with differing periods of opening and closing, even between closures aiming to manage the same species.
- Although closure frequency and duration is dependent on the life histories, habitats and ecosystem conditions of the targeted species, as well as the goals and objectives of the closure, periodic closures are generally better suited to short-lived, fast-growing species.

The final presentation of the day, by Emma Quilligan of Azafady, an environmental conservation and community development organisation based in the Anosy region of southeast Madagascar, explored in more detail a periodic closure targeting spiny lobster (*Panulirus spp*) in the fishery around Ste Luce, Madagascar.

The lobster fisheries in this region provide 10% of the island's annual catch of spiny lobster. Despite increasing numbers of fishers and traps, lobster catch has been falling for several years, suggesting that the industry is unsustainable. The pilot phase of Azafady's Project Oratsimba ran from June 2013 to March 2014 and aimed to encourage sustainable practices in lobster management and to explore alternative livelihood options for the fishers of the Ste Luce area. Using a *dina*, or traditional rule, the project established a periodic closure in Ste Luce, with a committee of local fishers responsible for patrolling the area and enforcing the new *dina*. While community support for the closure remains strong, several challenges were encountered during the pilot phase of the project, notably a lack of monitoring or baseline data and information, and insufficient communication and educational materials for distribution to the community. Project Oratsimba will work to address these challenges through 2015, thanks to financial support from the EU-funded Smartfish initiative.

Day 2 | Thursday 04 December 2014

Session II | Local and national management approaches

Session II concluded on the morning of Day 2 with presentations on strategies for upgrading the octopus value chain in Senegal and piloting of temporary closures for octopus on Pemba Island, Zanzibar.

The Senegal talk was delivered by Papa Gora Ndiaye (REPAO, Senegal). Senegal has the highest catch of octopus in Africa after Mauritania and Morocco, but its catch varies significantly each year and there are concerns that the resource is overfished. Almost all the octopus (*Octopus vulgaris*) caught in Senegal is flash frozen and exported to Italy (60% by weight), Japan (15%), Spain (9%) and Greece (6%) by large processing companies based in country. The REPAO octopus project aims to promote sustainable management, improve the quality of management and increase returns for fishers. The octopus project was implemented in two locations (Nianing and Pointe Sarene) in the Department of Mbour, about 150km south of the Senegalese capital, Dakar. Over the longer-term, there is appetite for the fishery to move to certification, with a fishery improvement plan in progress.

The Pemba island talk was given by Yann Yvergnaux of Smartfish, Mauritius. Inspired by the success of Madagascar's temporary octopus fishery closures, Smartfish is working with Fauna and Flora International and local NGO Mwambao Coastal Community Network to set up a collaborative fisheries management pilot project in the Pemba Channel Conservation Area (PECCA) that uses octopus as an entry point for broader management and conservation efforts. The chosen site for the pilot initiative, the southern island of Kisiwa Panza, has approximately 7,000 inhabitants, of whom 80-85% are fishers. The octopus fishery is the most important fishery for the islanders. The project is at an early stage; next steps will see governance structures established and baseline data collected, community consultations and participatory planning and training initiated, and community exchanges conducted, ahead of the first closure.

Session III | Overcoming data and capacity gaps for monitoring octopus fisheries

MONITORING AND ASSESSMENT OF OCTOPUS FISHERIES

The third session consisted of two presentations looking at monitoring and assessment of octopus fisheries. Charlie Gough, Monitoring and Evaluation Manager for Blue Ventures, spoke first, with colleague Tinah Martin. The presentation provided an overview of tools and approaches for participatory assessment, explaining how locally trained data collectors in Madagascar are working with fishermen to monitor catch rates and sexual maturity, and to map fishing sites in the south of the country. She described some of the safeguards used by Blue Ventures to ensure the integrity of the collected data, including the use of macros to speed up data entry and checking processes, and dashboards to facilitate presentation of data to key stakeholders.

Responding to a question from the audience about whether fishers always give honest answers about the location of their fishing sites during participatory mapping sessions, Ms Gough said that there is little secrecy regarding sites as the fishery is open access. Fishing data is collected daily and overall monitoring costs are low.

Fisheries scientist Dr Paul Medley spoke next, presenting an accessible overview of how the Marine Stewardship Council conducts fisheries assessments. Dr Medley underscored the importance of clearly linking management to MSC requirements, and of focusing on the harvest control rule; a set of well-defined rules or actions used to determine management actions in response to changes in indicators of stock status. In the Q&A that followed his talk, Dr Medley was asked whether MSC certification could be achieved in the stock-rebuilding phase. He responded that assessment took approximately one year, so technically an octopus stock could be in the process of rebuilding when it received certification. However because *O. cyanea* is such a fast growing species, it would reach healthy levels very quickly and so this was not an issue.

Session IV | Management challenges for attaining the MSC standard

The fourth session began with an introduction to the Marine Stewardship Council (MSC) by the organisation's southern Africa representative, Martin Purves. The MSC is the world's largest ecolabel for wild-caught seafood. It certifies the ecological performance of a fishery against set standards and promotes certified products. The organisation aims to reduce levels of overfishing worldwide by working with fishers, public institutions and local NGOs to promote sustainable fishing practises. The presentation detailed the history of MSC and the benefits for fisheries that achieve certification successfully.

The MSC certification standards are based on the FAO Code of Conduct for Responsible Fisheries, and assessment is conducted by independent third-party assessors. Three key principles form the core of MSC's assessment strategy and are supported by 31 environmental performance indicators:

1. The state of the stock of the target species
2. Ecosystem impacts of the fishery
3. Current fisheries management

An estimated 11% of global marine capture fisheries are currently engaged in some level of the MSC process, and the number of MSC-labelled products available on worldwide markets has consistently doubled every year from 2003 to 2010. Full assessment involves the delineation of the fishery and a certification unit, followed by an independent evaluation of the fishery to assess its status in line with the three principles listed above.

Several aspects of the MSC process were discussed in the Q&A that followed the presentation. The main exchanges were as follows:

- Q – Can data deficient fisheries be certified?
 - A – There is a risk-based framework in the MSC standard that can be used to allow data deficient fisheries to be certified. There are also tools available to assist with this process. The entire catch is assessed through the MSC methodology: the main stock is under Principle 1 (stock status) and the remainder under Principle 2 (ecosystem impacts).
- Q – Is there any guarantee that a certified octopus fishery will have financial gains? How can the costs of certification audits be met going forwards?
 - A – There is no guarantee that the fishery will see financial benefits, however evidence from other certified small-scale fisheries shows clear benefits from certification. There is also evidence of development of new markets for certified fisheries, though this is dependent on the fishery.
- Q – Is there a way to integrate the costs?
 - A – (from Dr Medley) The best way to reduce costs is for different regions to be certified under the same certificate, thereby sharing the costs between them. In addition, web-based communication methods can be used to relay information about the fishery, which saves on auditor costs.
 - A – (from Martin Purves) This issue is under scrutiny by the MSC at the moment to see if developments/changes can be made to make this process more affordable.
- Q – If you are certified, how long before you are checked by an assessment body?
 - A – The fishery is audited yearly as part of the conditions of certification and then reassessed every 5 years.

Following this Q&A, Dr Sloans Chimatiro (WorldFish, Zambia), gave an introduction to the Fish Trade programme, a European Commission-funded initiative to improve food security and reduce poverty by expanding trade opportunities for small-scale fishers in sub-Saharan Africa. Dr Chimatiro called for greater use of partnerships to help the project to achieve its objectives.

The morning's final presentation focussed on traceability in the Kenyan octopus trade and was given Benrick Ogutu (Fisheries Department, Kenya). The recently introduced EU illegal, unreported and unregulated fishing (IUU) regulation has established a system to prevent, deter and eliminate IUU fishing within the European Community through the use of a catch certification scheme for fish and fishery products. In response to this, Kenya has introduced Fishtrace, a fish management information system. Fishtrace is a web- and mobile-based system designed to capture information along the fisheries value chain from initial capture to point of export. The system, which is used at landing sites and by processors and government officers, also allows the Government, fishers and exporters to follow patterns in the sales of the fish.

After lunch, and in an addition to the schedule, Andrea Carrassi of Johns Hopkins University presented findings from a recent assessment of *Octopus cyanea* populations in Misali Island, Pemba. Preliminary results are that, although the no-take zone at Mpapaini Beach is working well, overall stock is decreasing. In addition, there is a need to explore the potential to establish an additional no-take-zone at Kijiwebendera and to continue to embrace community-based management on Misali.

MSC AND DEVELOPING WORLD FISHERIES

Following this talk, Martin Purves returned for the final two talks of the day. In the first of these two longer sessions, an overview of Fisheries Improvement Projects was presented. Participants learnt that, for fisheries that do not yet meet the MSC standard, a FIP offers a stepwise approach towards achieving more sustainable practices. It brings together multiple fishery stakeholders—including fishers, the private sector, fishery managers, researchers, and NGOs—who collaborate to improve fishing practices and management. The involvement of multiple stakeholders with varying perspectives and backgrounds ensures that the FIP activities are appropriate for the socio-political context of the fishery. Fishery improvement projects are typically multi-year projects that increase levels of sustainability until a fishery is ready to enter MSC full assessment.

In the final session of the day, Martin Purves presented an overview of MSC and developing world fisheries. The number of developing world fisheries participating in the MSC process is increasing. At present, there are 17 with MSC certification and a further 11 in full assessment. Although Africa only has 3 MSC certified fisheries, several fisheries in the region are engaged in the process, namely:

- South African hake
- South African pole & line tuna
- Mozambique deep water shrimp
- Mozambique shallow water shrimp
- Tanzanian octopus
- Kenyan rock lobster
- Madagascar octopus
- Namibian hake
- Nigerian shrimp
- Morocco small pelagics
- Indian Ocean tuna
- Gambia sole
- Senegal shrimp
- Madagascar shrimp

There are currently no certified octopus (or cephalopod) fisheries, although, like southwest Madagascar's octopus fishery, the Tanzanian octopus fishery has undergone a pre-assessment and is instigating a Fisheries Improvement Plan with a view to entering full assessment in the next few years.

Side Event | Octopus sampling for fisheries assessments and tools for participatory assessment

At the conclusion of Day 2, delegates were split into three groups for a series of practical demonstrations focusing on methods discussed in the morning session. Participants were shown how to i) determine the sex of an octopus and remove its stylet; ii) examine the stylet under a light microscope to age the octopus; and iii) use free Android Open Data Kit (ODK)

software on smartphones to improve participatory fisheries monitoring. The ODK demonstration introduced delegates to some of the benefits of form-based mobile data collection, including capturing geo-tagged data with accompanying photos in real time. Each group spent approximately 10 minutes at each station before rotating on to the next demonstration.



Figure 3 Charlotte Gough demonstrates how to sex and age adult octopuses

Day 3 | Friday 05 December 2014

Session V | Towards certification – developing and implementing octopus fisheries improvement action plans.

In the opening talks for Day 3, delegates from WWF, Blue Ventures, Capfish, the Kenya fisheries department and the Tanzania Fisheries Research Institute presented experiences with FIPs for octopus in Tanzania (*O. cyanea*), rock lobster in Kenya (*Panulirus spp*), as well as shrimp (*Fenneropenaeus indicus*, *Metapenaeus monoceros* and *Penaeus spp*) and octopus (*O. cyanea*) in Madagascar. Several key themes emerged from the presentations, including:

- The high cost of certification and the importance of donor involvement. FIPs for rock lobster in Kenya, shrimp in Madagascar and octopus in Tanzania are supported by WWF; the FIP for Madagascar octopus is funded by Blue Ventures.
- The length and slow pace of the certification process. FIPs are typically multi-year projects, and it can be challenging to sustain stakeholder interest and participation throughout this time. Informal Octopus FIPs in Madagascar and Tanzania have already been in development for a decade.
- The difficulty in implementing a robust harvest strategy and control rules. This challenge is exacerbated by limited knowledge of stock status and by-catch, and weak capacity by fishing authorities.

The focus for the final talk was the development and implementation of an octopus FIP. As part of this session, which was presented by Martin Purves, delegates split into groups to consider the role of FIPs in addressing the data and management capacity challenges that often hinder progress towards sustainable management in small-scale and developing world fisheries, before reporting back to the workshop. Delegates were asked to prioritise two actions under each of the principles for octopus fisheries in the region that are enshrined in the MSC's FIP Action Plan guidance document. Responses were as follows:

- Improve minimum size regulations
- Build staff capacity and invest in monitoring, control and surveillance capacity and equipment, especially mobile technology
- Increase public consultations
- Designate, regulate and incentivise landing sites and expand the role of beach management units (BMUs)
- Run pilot tests with data collectors

The closing speech was made by Dr Alasdair Harris (Executive Director, Blue Ventures). He presented an overview of the key findings of the workshop, expressing his hope that the momentum and consensus created by this meeting should be taken forward, allowing fishery stakeholders from all over the Western Indian Ocean to continue to participate in discussions regarding the sustainable management of the fishery. In his conclusion, he emphasised the enormous value of promoting dialogue between fisheries actors from different countries of the WIO region, highlighting the importance of continuing the stimulating discussions initiated by the workshop, and encouraging participants to continue these conversations in their work supporting improved small-scale fisheries management across the region. Dr Harris set out and encouraged progress on several action points, which are the subject of the next section.

5. Conclusions and next steps

The following conclusions were drawn from the workshop.

Benefits of improved management

Improving the management of Africa's small-scale fisheries can deliver sustained benefits throughout the seafood supply chain, benefiting coastal communities while rebuilding dwindling fish stocks.

Diversity of management approaches leading to sustained gains

Several examples of small-scale fisheries management were presented during the workshop, though the diverse nature of approaches suggests that there is no one-size-fits-all approach. The examples presented are overwhelmingly bottom-up in nature and targeted not only at octopus, but other invertebrates as well. There is now compelling evidence, from Madagascar and elsewhere, that temporary closures can rapidly create both ecological and economic benefits.

Challenges of applying the MSC standard to developing world fisheries

Engagement in the MSC certification process in developing countries is increasing, though key questions surrounding the applicability of the standard in this context remain unresolved. However, there is scope for modification, and the MSC is listening to early adopting fisheries going through the process. The funding model in particular is fundamentally different: MSC's client is no longer a buyer or an exporter, but an environmental NGO like WWF or Blue Ventures.

Lengthy certification process

FIPs are typically multi-year projects, and can take over a decade to implement. Given the long timeframe and the slow pace of the process, it can be challenging to sustain stakeholder interest and participation throughout. There is significant risk and uncertainty in the process, but the donor community is shouldering much of this at present.

Need for regional expertise in stock assessment

There is an urgent need to develop regional and national expertise in fisheries stock assessment and MSC assessment in order to reduce the costs of FIPs and the MSC certification process to developing world fisheries. A possible solution would be to establish a not-for-profit conformity assessment body (CAB) specifically for advising and auditing small-scale fisheries.

Essential nature of partnerships

Collaborative efforts between NGOs, governments, funding bodies and supply chain stakeholders have been fundamental and highly effective in delivering targeted outcomes in some FIPs.

Value of community exchanges

Peer learning and community exchanges have been critical to the growth in octopus fisheries management seen in Madagascar over the past decade, and a number of high profile regional exchanges have highlighted the enormous potential of facilitating conversations between small-scale fishing communities with different experiences and perspectives. Given that many of the success stories presented at the workshop are bottom up in nature, there is a need to expand support for local dialogue and community exchanges. Here too, partnerships are essential.

Appendix 1: Workshop Agenda

WEDNESDAY 3RD DECEMBER

08.30 Registration opens

09.00 Welcome and opening address

Martin Purves (Marine Stewardship Council (MSC)), Tim Andrew (WIOMSA) and Alasdair Harris (Blue Ventures)

SESSION I: STATUS AND TRENDS OF WIO OCTOPUS FISHERIES AND MARKETS

Chair: Martin Purves, Marine Stewardship Council, South Africa

09.30 Status and importance of octopus fisheries in the WIO

Stephen Rocliffe, University of York, UK

10.00 Overview of key findings of Smartfish Mauritius workshop, February 2014

Yann Yvergniaux, Smartfish, Mauritius

10.15 Q&A for speakers

10.30 TEA/COFFEE BREAK

11.00 Country overview: Experiences from Zanzibar

Dr Narriman Jiddawi, Institute of Marine Sciences, University of Dar es Salaam

11.15 Country overview: Experiences from Madagascar

Gilbert François, Regional Directorate of Fishing and Marine Resources

11.30 Country overview: Experiences from Tanzania

Mwanaidi Mlolwa, Fisheries Development Department

11.45 Country overview: Experiences from Kenya

Gladys Okemwa, Kenya Marine and Fisheries Research Institute (KMFRI)

12.00 Country overview: Experiences from Rodrigues

Jovani Raffin, Shoals Rodrigues

12.15 Country overview: Experiences from Seychelles

Vincent Lucas, Seychelles Fishing Authority

12.30 Country overview: Experiences from Mozambique

Ercilio Chaque,

12.45 Q&A for speakers

13.30 LUNCH

SESSION II: LOCAL AND NATIONAL MANAGEMENT APPROACHES

Chair: Alasdair Harris, Blue Ventures Conservation, Madagascar

14.30 Periodic octopus fishery closures as a management model: What Velondriake taught us, and how it can help you

Dr Tom Oliver, University of Hawai'i, USA

15.15 Q&A

15.30 TEA/COFFEE BREAK

15.45 Lessons learned from the management of the octopus fisher of Rodrigues Island, Mauritius

Reshad Jhangeer-Khan, Economic Planning & Monitoring Unit, Rodrigues Regional Assembly, Rodrigues

16.15 Q&A

- 16.30 Experiences of periodic fisheries closures for other (non-octopus) fisheries**
Stephen Rocliffe, University of York, UK
- 17.00 Experiences of lobster fisheries closures in Madagascar**
Emma Quilligan, Azafady, Madagascar
- 17.15 Q&A**
- 17.30 Review of the day and day close**
- 18.00 Informal networking event at Mercury's Bar**

THURSDAY 4th DECEMBER

SESSION III: OVERCOMING DATA AND CAPACITY GAPS FOR MONITORING OCTOPUS FISHERIES

Chair: Sloans Chimatiro, WorldFish

- 08.30 Octopus value chain and upgrading strategy in Senegal**
Papa Gora Ndiaye, REPAO, Senegal
- 08.45 Octopus Fishery Management Pilot Project Pemba Island, Zanzibar**
Yann Yvergniaux, Smartfish, Mauritius
- 09.00 Assessing octopus fisheries: tools and approaches for participatory assessment**
Charlotte Gough, Blue Ventures, Madagascar
- 09.45 Q&A**
- 10.00 Simple Science-based management options for octopus fisheries**
Paul Medley, Fisheries Consultant, UK
- 10.45 Q&A**
- 11.00 TEA/COFFEE BREAK**

SESSION IV: MANAGEMENT CHALLENGES FOR ATTAINING THE MSC STANDARD

Chair: Stephen Rocliffe, University of York, UK

- 11.30 Ecolabelling and MSC certification - An introduction to the Marine Stewardship Council**
Martin Purves, Marine Stewardship Council, Southern Africa Programme
- 12.00 Regional Fish Trade: Options for Alignment with Sustainable Fisheries**
Dr Sloans Chimatiro, WorldFish, Zambia
- 12.15 Traceability – A market tracking tool for octopus trade in Kenya**
Benrick Ogutu, Fisheries Department, Kenya
- 12.30 Q&A**
- 13.00 LUNCH**
- 14.00 Assessment of octopus (*Octopus cyanea*) populations in Misali Island, Pemba**
Andrea Carrassi, Johns Hopkins University, USA
- 14.15 Fishery Improvement Projects (FIPs) – An overview**
Martin Purves, Marine Stewardship Council, Southern Africa Programme
- 15.15 Q&A**
- 15.30 TEA/COFFEE BREAK**
- 16.00 The MSC and developing world fisheries**
Martin Purves, Marine Stewardship Council, Southern Africa Programme

- 16.45 Q&A**
- 17.00 Review of the session and close**
- 17.30 SIDE EVENT: Octopus sampling for fishery assessments**
Charlotte Gough and Tinah Martin, Blue Ventures, Madagascar

FRIDAY 5TH DECEMBER

SESSION V: TOWARDS CERTIFICATION - DEVELOPING AND IMPLEMENTING OCTOPUS FISHERIES IMPROVEMENT ACTION PLANS (FIP)

Chair: Dr Alasdair Harris, Blue Ventures, Madagascar

- 09.00 Fisheries Improvement Projects (FIPs) in Mainland Tanzania**
Dr Benjamin Ngatunga, Tanzania Fisheries Research Institute, Tanzania
- 09:20 Octopus FIPs in Madagascar**
Xavier Vincke, Blue Ventures, Madagascar
- 09.40 Rock lobster FIPs in Kenya**
Elizabeth Mueni, Fisheries Department, Kenya
- 10.00 Madagascar shrimp – developing a FIP**
Didier Fourgon, WWF - Madagascar & Western Indian Ocean, Madagascar
- 10.20 WWF engagement in promoting sustainable management of Octopus fisheries in the Coastal East Africa**
Lydia Mwakanema, WWF - Coastal East Africa, Kenya
- 10:40 EAF technical report: Madagascar octopus as a case study**
Dave Japp, Capfish, South Africa
- 11.00 Q&A**
- 11.15 TEA/COFFEE BREAK**
- 11.30 Developing and implementing an octopus FIP**
Martin Purves, Marine Stewardship Council, Southern Africa Programme
- 11.45 Discussion and network creation**
- 12.30 Review of the workshop and close**
- END OF WORKSHOP**

Appendix 2: Workshop Participant List

| First name | Surname | Email | Organisation | Location of Fishery |
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