



# “Less planning, more action”

A New Approach to Pacific Island *Bêche-de-mer* (BdM) Fisheries

**Outcomes of a Regional Technical *Bêche-de-mer* (BdM) Meeting**

Nuku'alofa, Tonga

29 September – 1 October 2015





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# Regional Technical *Bêche-de-mer* (BdM) Meeting

Loumaile Lodge, Nuku'alofa, Kingdom of Tonga  
29th September – 1st October 2015

## Meeting Report

By Prof. Colin Shelley

### Background

Sea cucumbers throughout the Pacific are harvested, often by local communities, then dried and finally sold as *Bêche-de-mer* (BdM) to largely Asian markets at very good prices (US\$6-90 per kg ex-fishers). This fishery can, and has been, the second most important fishery in the Pacific after the tuna fishery. At its peak, it brought in US\$24m worth of value to Pacific Islanders. For many local communities, it is an extremely important source of income in locations where there are few other options to earn money. Now, the fishery has collapsed in many countries and there are moratoria in place in many countries with the aim of trying to revive stocks.

Despite two decades of investment in education and awareness, development of guidelines on harvesting sizes, research into the ecology of these animals and their potential for aquaculture, stocks have continued to decline, with many locations suffering through 'boom and bust' cycles. The sharp decline in *Bêche-de-mer* (BdM) stocks is aggravated by the long period of time it takes to reproduce and recover.

Indications are that this pressure on *Bêche-de-mer* (BdM) is likely to have flow-on effects to the coral reef ecosystem as a whole where sea cucumbers play an important role in terms of removing detritus from the system. The consequences of removing this ecosystem function are unknown.

Smaller sea cucumbers attract a fraction of the price that the adults would; for example, *Holothuna scabra* at 8cm sells for less than US\$165/kg, at 12cm it sells for US\$840/kg. Over the last 10 years, prices for *Bêche-de-mer* (BdM) have increased about 6 - 11 times and are likely to continue to increase at this rate. And there is a two to four-fold increase from export to market prices – the more of this market value that communities can capture, the greater the benefit of the fishery to them.

Various studies have demonstrated that a well managed sea cucumber fishery, that doesn't go through the boom and bust, typical of the industry in recent decades, will have a far higher value over time. As such it has been determined that the economic benefit of sustainably managing sea cucumber stocks significantly outweighs the management costs.

### Building momentum *Bêche-de-mer* (BdM)

On 6-8 August 2014 a summit was held in Nadi, Fiji on "The Future of Pacific Coastal Fisheries and *Bêche-de-mer* (BdM)". This meeting was co-hosted by the Republic of Fiji, the Kingdom of Tonga and the Republic of Marshall Islands, with support from the Government of New Zealand and the Marine and Coastal Biodiversity Management in Pacific Island Countries (MACBIO-GIZ), Secretariat of the Pacific Community (SPC), University of the South Pacific (USP), WWF Pacific (WWF Pacific), Wildlife Conservation Society (WCS), Parties to the Nauru Agreement (PAN), Melanesian Spearhead Group (MSG) and Pacific Islands Development Forum (PIDF).

This meeting was the first of its kind and helped to raise the profile of the Pacific's very important coastal



**Sun drying *Bêche-de-mer* (BdM) in Tonga.**

fisheries, including *Bêche-de-mer* (BdM), with government and non-government players. Ministers and senior officials attended from Cook Islands, Fiji, Papua New Guinea, Republic of Marshall Islands, Samoa, Tonga and Vanuatu. Partner organisations assisting in the summit included the International Union for the Conservation of Nature (IUCN), the University of the South Pacific (USP), the Secretariat of the Pacific Community (SPC), the Pacific Islands Development Forum (PIDF), the World Wildlife Fund for Nature (WWF), the Wildlife Conservation Society (WCS) and the Marine and Coastal Biodiversity Management in Pacific Island Countries (MACBIO-GIZ) project.

**A call to action from the summit included specifics regarding *Bêche-de-mer* (BdM) as follows:**

- Immediate action on *Bêche-de-mer* (BdM) management including:
  - » Improved structures and processes for sharing data and information on buyers, markets and best practices at a regional level, with SPC and interested parties;
  - » Targeted research on opportunities and market mechanisms that improve the value of *Bêche-de-mer* (BdM) to Pacific Island Nations and other areas to improve knowledge and management of *Bêche-de-mer* (BdM), and
  - » A ‘special meeting’ in early 2015 of interested Pacific Island Governments, respective private sector organisations and the civil society, to progress *Bêche-de-mer* (BdM) management and investigate opportunities for a “Parties to the Nauru Agreement-like initiative for *Bêche-de-mer* (BdM)”.

The ‘special meeting’ referred to, in the outcomes above, was held in Nuku’alofa, Kingdom of Tonga in 2015. This is the report of the meeting.

## **Meeting purpose and issues addressed**

To provide structure and rigour to the proceedings, three key issues: conservation, industry development and organisational structure were addressed sequentially.

### **1. Strategies for future conservation of *Bêche-de-mer* (BdM) in the region**

- » *Bêche-de-mer* (BdM) management regimes.
- » Coastal zone planning.
- » Regulation and enforcement, both regional and in-country.
- » Strategies to empower sea cucumber fishers / farmers and ensure equity in the supply chain.

### **2. Industry development planning**

- » A 10 year forward planning exercise.
- » Sea cucumber aquaculture including stock enhancement and sea ranching.
- » Research and capacity building needs

### 3. Establishment of a 'PNA-like' organisation

- » To drive sea cucumber conservation on a regional scale.
- » *Bêche-de-mer* (BdM) industry development and management.
- » Development of a knowledge base to include buyers, market information, best practice management, processing, value adding and scientific knowledge.
- » Brand development linked to sustainability.
- » 'Coalition of the willing' to support the establishment of the organisation.

### Speakers and meeting process



*Dr. Hampus Eriksson of WorldFish during his presentation.*

Specialists were invited to make presentations and to discuss the three key issues. These included representatives from industry, research, Government and international fisheries organisations. In addition, there were participants from fisheries agencies from a number of Pacific Island nations, other public service organisations and civil society.

### Report Structure

This report includes a Meeting Summary, Outcomes and Notes summarising presentations and discussions and appendices with the agenda and lists of presentations and participants.

The 'Outcomes' document were distributed to participants immediately after the meeting highlighting the important next steps for both regional governments and organisations to improve the future management of sea cucumbers, development of the *Bêche-de-mer* (BdM) industry and to address the need for more regional collaboration. It provides focus for a 'coalition of the willing' to address regional challenges facing the *Bêche-de-mer* (BdM) sector.

Copies of presentations can be found on the IUCN website and further information on the meeting can be obtained from Dr. Leanne Fernandes, [Leanne.Fernandes@iucn.org](mailto:Leanne.Fernandes@iucn.org)

# Meeting Summary



*Guests and delegates after the opening ceremony.*

The overall objective of this meeting was to consider how to sustainably use and maximise benefits from the sea cucumber and *Bêche-de-mer* (BdM) industry for Pacific Island Governments and their communities.

The meeting concluded with a call for extraordinary action to address the serious problems facing both sea cucumber fisheries management and the *Bêche-de-mer* (BdM) industry that is dependent on it. There was also a call to action for a 'coalition of the willing' that is prepared to tackle the challenges faced by this sector.

Presentations demonstrated that there are now tools available to assist countries in better managing their sea cucumber resources and that many now have or are developing modern management plans to address them (see presentations located at [www.iucn.org](http://www.iucn.org)). And also resources identified as Attachment 3: *Bêche-de-mer* (BdM) Resources). In the future, these management plans and tools will hopefully address the boom and bust nature that this fishery is renowned for. A new focus on coastal fisheries management, now known as the new 'song' for coastal fisheries, should assist in improving management.

Currently, communities and Governments do not have adequate equity in the *Bêche-de-mer* (BdM) supply chains and are not maximising the value of these resources. There are a variety of methods that can be implemented to address this including improvements in processing, proper valuation of quota for sea cucumber resources, improved border controls, size regulation, permit or license fees and value-adding.

In discussions and presentations, the global nature of the *Bêche-de-mer* (BdM) industry was documented (see presentations located at [www.iucn.org](http://www.iucn.org)). To address this, national, regional and global approaches need to be better developed to improve conservation of sea cucumber resources and improve returns to resource owners. The 'lootable' nature of sea cucumbers, which has for years attracted criminal elements to the industry, must be addressed. They are "lootable" because they are easily harvested with little effort or cost. Better tools and more resources for improved monitoring, control and surveillance (MCS) are required, as is better intelligence on international players in the industry.

A number of examples of resource managers' advice being ignored by politicians were provided. In future, management plans should be robust with inbuilt safeguards, including governance to mitigate



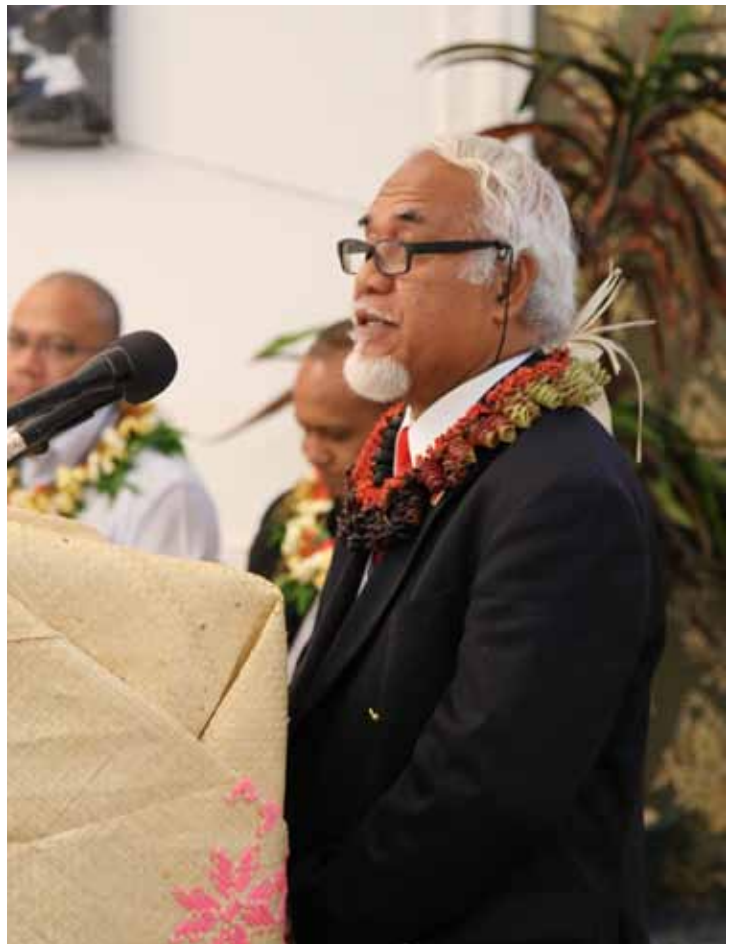
in favour of conservation of resources in the face of political pressure. In the short term, closures of sea cucumber fisheries has put severe economic pressures on communities, despite the fish stock in crisis. Such events can be minimised with better management, and alternate income streams need to be developed where possible.

There was strong consensus that taking a regional approach to many of the issues facing sea cucumbers and *Bêche-de-mer* (BdM) was the best way forward. Sharing of information, the development of a knowledge base to cover market intelligence, MCS, management regimes and the monitoring of stock could all be consolidated regionally. Discussions included the potential to brand national or regional produce to optimise returns to the region.

Representatives from the private sector demonstrated that public private partnerships could be successfully developed to assist fisheries management through co-management of wild resources and business development involving training and capacity building of communities. Long-term investment in hatcheries for sea cucumber restocking, stock enhancement or farming was seen as one tool to assist the sector, although technology is only available for a few species at this time. It was agreed that future success of the sector needs participation and improved communication between all sectors of the industry.

It was agreed that, like tuna and the PNA, which has greatly improved returns to resource owners in that sector, the *Bêche-de-mer* (BdM) industry could benefit from a regional approach to dealing with its management problems and improving economic returns. It was recognised that any regional approach would need to be tailored to the specifics of the sea cucumber fishery.

The meeting concluded with a call to seriously consider arrangements to manage the interests of the *Bêche-de-mer* (BdM) industry regionally and for a coalition of the willing to take this forward. In addition, a range of actions for both countries and regional organizations were listed for implementation; actions that could transform the future of the *Bêche-de-mer* (BdM) industry .



***Tonga's MAFFF Minister, Hon. Semisi Fakahau during his opening address.***

# Outcomes Document

## Background

Pacific Island Fisheries Ministers, public servants (Cook Islands, Fiji, Samoa, Solomon Islands, Tonga), civil society, private sector, regional organisations and non-government organisations met in Nuku'alofa from 29 September to 1 October 2015 to discuss sea cucumber (*Bêche-de-mer* (BdM)) fishery management and exports from the Pacific region. Participants expressed their intent and willingness to collaborate to optimise the socio-economic value of *Bêche-de-mer* (BdM) resources to communities and national governments. It was recognised that a paradigm shift in the management and development of the *Bêche-de-mer* (BdM) industry is required if real progress is to be made to sustain a profitable fishery.

Partner agencies including IUCN, FAO, SPC, USP, WorldFish and PNA provided support and expertise for the meeting.

### **Participants called for immediate and decisive action aligned to key regional policies including:**

1. Pacific Island Leaders' recognition of the importance of coastal fisheries through the Vava'u Declaration in 2007.
2. New Song for Coastal Fisheries – Pathways to Change: The Noumea Strategy, which calls for an enhanced focus on coastal fisheries management and related development activities in the Pacific region, is designed to provide direction and encourage coordination, cooperation and an effective use of regional and other support services in the development of coastal fisheries management.
3. Regional Roadmap for Sustainable Pacific Fisheries endorsed by Pacific Island Leaders at the 2015 Forum meeting in PNG.

As in the “New Song for Coastal Fisheries – Pathways to Change”, the meeting supported the development of new and innovative approaches to deal with declines in stocks of *Bêche-de-mer* (BdM) and the ecosystems upon which they rely.

The meeting followed the Regional Coastal Fisheries and *Bêche-de-mer* (BdM) Summit hosted by Fiji, Tonga and RMI in 2014 in Nadi, Fiji, and further assist in the on-going implementation of declared commitments made there.

## Current status

Sea cucumber is the second most important harvest fishery in the Pacific Ocean, after tuna resources. However, it has not received the attention and resources required to ensure that the values it brings to communities are maximised and sustainable. Combined with this lack of attention, their biology and life history makes them very vulnerable to overfishing; being long lived, having a relatively low reproductive rate, sedentary in nature and the fact that many species live in shallow water make it easily available to fishers.

The region's sea cucumber fisheries operate under different realities. Some countries have large productive coastal areas that are good fishing grounds for sea cucumbers, whilst others have different coastal systems that are less productive for sea cucumbers. Whilst some governments are strong in regulating fisheries, others have historically had limited capacity to develop sustainable management. All nations have had difficulties in regulating sea cucumber export. Currently countries are at different points in developing and implementing management plans for their sea cucumbers. Production of *Bêche-de-mer* (BdM) peaked 20 years ago in the region, but now eight countries currently have moratoria on exports as their fisheries have collapsed. The region has gone from supplying almost half of all imports to Hong Kong in the late 1990s to about 15% of the wild harvest sea cucumbers marketed.

Despite over a hundred years of exploitation and management, the management of *Bêche-de-mer* (BdM) within the region has failed to produce sustainable fisheries, in part due to external and global influences and in part a result of ineffective management regimes.



**Left-Right: Dr. Leanne Fernandes, IUCN; Mr. Francis Chopin, FAO; Mr. Moses Amos, SPC and Prof. Colin Shelly, Consultant.**

Whilst moratoria have negative impacts upon communities, impacting local livelihoods, they have been put in place to rebuild the stock of sea cucumbers and the wealth it represents. Moratoria also create opportunities to re-evaluate past practices and put improved management plans in place before reopening a fishery.

Discussions at the meeting examined what are best practices for management of sea cucumbers and what that might entail both within countries and across the region. It was recognised that there is a genuine opportunity to increase the wealth derived from these resources and to overcome the boom and bust nature of the *Bêche-de-mer* (BdM) fisheries that have plagued the industry.

It was also recognised that better management of the sea cucumber (*Bêche-de-mer* (BdM)) fisheries will be a big step forward in the overall management of our coastal fisheries at a national level.

## Country commitments

Many countries are already committed to building, reviewing or implementing tailored *Bêche-de-mer* (BdM) fisheries management plans within the broader context of coastal fisheries management or even coastal zone management, aligned to the 'New Song' that has been adopted for coastal fisheries in the region.

It is understood that management includes different kinds of spatial management (e.g. Locally Managed Marine Areas, Special Management Areas) as well as input and output controls. This management aims to be cooperative, community-based, precautionary and adaptive.

Where moratoria are put in place, or specified no-take zones implemented that reduce community income, alternative livelihoods need to be part of the management planning mix. Countries can explore possibilities where restocking may be a component of their long term stock sustainability, taking into account potential risks, benefits, costs and limitations.

Building capacity in coastal fisheries monitoring, control and surveillance was also identified as an important next step, together with building partnerships within government, to maximize efficiencies in compliance activities across agencies working in remote areas.

The importance of dedicated coastal fisheries unit within national fisheries institutions was acknowledged, which many countries have decided to adopt to support the new focus on coastal fisheries management. The entire focus of all these efforts is to maximize the socio-economic benefits of the *Bêche-de-mer* (BdM) fishery to communities.

## The next level – *Bêche-de-mer* (BdM) industry development

Communities will have a central role in the future management and adding value to the *Bêche-de-mer* (BdM) fisheries, so that they can improve their share of the value of *Bêche-de-mer* (BdM) in the value chain. The knowledge to add value to the *Bêche-de-mer* (BdM) through better processing exists, but training has yet to reach all communities.

Strategies that build on existing expertise can provide tailored and place-specific training to communities so they can conduct more and better processing locally and sell their product at higher prices. Financing for local and provincial level processing facilities and additional management capacity is also necessary to ensure quality control to improve the value of *Bêche-de-mer* (BdM) at market.

There is significant potential for quality-assured, branded *Bêche-de-mer* (BdM) products from the Pacific to be sold at higher prices, if value-adding activities can be adopted and products better marketed. This branding innovation will require quality control and product traceability. The products can be sold at a higher price with a larger share of the value remaining with both local communities and Pacific Island governments. The Parties to the Nauru Agreement is a sub-regional example from which much can be learnt and adapted to improve the value of the *Bêche-de-mer* (BdM) industry.

### A coalition of the willing

Country delegates expressed interest in working together, forming a regional coalition and inviting other countries that have the political will to do so to join them.

Such a coalition could in the future look to build a collective brand, set quality standards, establish minimum prices, build a database to share market and *Bêche-de-mer* (BdM) industry intelligence, mechanisms to share best practices in management, monitoring, control and surveillance.

Building on commitments previously made at the meeting in Nadi, willing countries will need to have the political will to make *Bêche-de-mer* (BdM) a priority for their fisheries management as part of their broader coastal zone fisheries management. This will likely require a whole of government approach that would include engagement with all stakeholders.

Regional and international agencies such as SPC, IUCN, FAO, Worldfish, USP and others will all have a role to play in supporting these efforts.

### Next steps for countries

- a. Establish effective regional communication networks accessible by all stakeholders for purposes of information sharing and gathering and provide materials to raise stakeholder awareness, particularly amongst communities to enable greater understanding of status, biology, habitats, processing, value adding, and marketing.
- b. Ensure national sea cucumber management plans, strategies and policies are a prominent part of the national coastal fisheries priorities.
- c. Explore alternate livelihood and revenue earning opportunities for coastal communities impacted by closure of sea cucumber fisheries.
- d. Ensure effective regulatory frameworks for management, monitoring, control and surveillance and enforcement are put in place.
- e. Engage a “whole of Government” and multi-sector approach for planning and implementation to include private sector and civil society.
- f. Where sea cucumber fisheries are closed, monitoring to establish baselines should be instituted so that the re-building of stocks can be effectively managed.
- g. Further consider organisational arrangements for a regional approach to take forward a coalition of the willing to develop the region’s sea cucumber and *Bêche-de-mer* (BdM) resources.

## Next steps for regional organisations (taking advice from countries)

- h. Establish effective regional communication networks accessible by all stakeholders for purposes of information sharing and gathering and provide materials to raise stakeholder awareness, particularly amongst communities to enable greater understanding of status, biology, habitats, processing, value adding, and marketing.
- i. Establish an email mailing list between champions at regional organizations and key country participants to move forward on actions.
- j. Provide relevant technical assistance and support to Pacific island countries and territories to develop and implement effective national sea cucumber management plans; and set up mechanisms to monitor and evaluate the impact of the management plans.
- k. Convene partnerships to assist countries in developing national standards and processes for the development of local / national industry.
- l. Investigate and explore “branding” and marketing opportunities to maximise value in global *Bêche-de-mer* (BdM) markets.
- m. Work with countries to improve and build necessary capacity.
- n. Investigate the practical, technical, biosecurity and other issues for aquaculture to support stock enhancement and farming of sea cucumber (*Bêche-de-mer* (BdM)) resources.

All this work will need to be in partnership with relevant civil society, non-government organisations and the private sector.



**Mr. Richard Storey, Cook Islands Research Officer.**



**Ms. Margaret Vakalalabure, Fisheries Fiji.**

# Meeting Notes

## Day 1 Theme: Informing Future Regional Management of *Bêche-de-mer* (BdM) Fisheries

### Opening statements

**Taholo Kami, Regional Director, IUCN Oceania** called for ‘extraordinary action’ to address the concerns over the management of the region’s *Bêche-de-mer* (BdM) resources. In addition he highlighted the needs for communities and countries to obtain an equitable share of the value of these resources. He likened the future management of sea cucumbers to the ‘canary down the coal mine’, in that if they can be successfully managed, it could provide an indicator that effective coastal fisheries management more generally, in Pacific Island nations, was possible.

**Francis Chopin, FAO** challenged the meeting to consider the time frame needed to reach a condition where the coastal fisheries could be considered as “well-managed”. He noted that the boom and bust management phenomena of *Bêche-de-mer* (BdM) resources is not a new, with several developed and developing countries having experienced collapses. He encouraged all to recognize that there are now genuine opportunities now to develop more robust management regimes. Such approaches could include a code of conduct for the industry and a regional framework on management of wild resources and developing a robust evidence base upon which aquaculture of *Bêche-de-mer* (BdM) species might be viable. Francis also noted that with respect to managing *Bêche-de-mer* (BdM) resources, consideration needed to be given to the potential for effort to shift from one Pacific country to another. In this regard, a regional framework for monitoring and controlling effort in coastal fisheries could help prevent illegal and unreported *Bêche-de-mer* (BdM) landings from occurring. Summing up, Francis noted that whatever steps are taken to improve the management of *Bêche-de-mer* (BdM) resources, they need to be done within the broader coastal fisheries context and that actions taken should be closely monitored to determine the progress made towards agreed management milestones. FAO, at the request of countries in the Pacific region could assist in the provision of technical assistance.

### Resilience and the Governing of Pacific Islands Sea Cucumber Fisheries

#### Hampus Eriksson, WorldFish

This presentation put the contribution of Pacific Island *Bêche-de-mer* (BdM) resources in a global context. In recent years industry has spread around the world, tapping into sea cucumbers in an ever increasing number of countries, on average 3 new countries per year, even whilst overall supply has stagnated. In addition the market is changing, in addition to traditional dried *Bêche-de-mer* (BdM), sea cucumbers are now sold frozen, blanched, wet and freeze-dried. He introduced the term ‘Lootable resources’ to describe how easily sea cucumber resources can be harvested, or almost stolen from resource owners.

The Pacific Islands used to supply 50% of the dried *Bêche-de-mer* (BdM) market, which is now reduced to 15%. His research has clearly shown that management solutions need to be tailored to suit individual countries or even areas within countries, there is no one size fits all approach that is particularly useful. Management should be adaptive and precautionary and suggested maintaining 5% of virgin biomass of sea cucumber resources as a target. In addition it was indicated that it should be possible to upgrade value chains within the *Bêche-de-mer* (BdM) industry to extract more wealth and influence trading networks. The increasing emphasis on community-based management was seen to be a positive move, as was the potential for a regional body to assist with regional management issues and industry development of *Bêche-de-mer* (BdM) resources. Management tools including TACs (total allowable catch) for species and area management regimes could be very useful.



## The New “Song” for Coastal Fisheries – Pathways to Change

**Moses Amos, SPC**

The new approach to coastal fisheries management agreed to on a regional basis provides a new focus for coordinated efforts, which can benefit *Bêche-de-mer* (BdM) management. This new vision, which focuses on a community based approach to fisheries management and maximising socio-economic benefits ticks the boxes of what is required for *Bêche-de-mer* (BdM). *Bêche-de-mer* (BdM) management may benefit from New Zealand funding support of NZ\$7m for improved MCS, policy and legislation for coastal fisheries as well as NZ\$4.5m for sustainable aquaculture.

### Panel Discussion

- The need to develop viable alternatives to *Bêche-de-mer* (BdM) fishing in communities during fisheries closures was highlighted; as such events can have a dramatic effect on their socio-economics.
- Community involvement in *Bêche-de-mer* (BdM) management and industry development is vital if sustainable harvesting is to be obtained. This fits well with the approach suggested in the new “song” of coastal management recently adopted by the region.
- To assist communities and governments better manage the challenge of coastal fisheries management, focus on education and capacity building is required.
- Revenues, both to communities and to governments from the industry have been very poor. Most governments have failed to ensure appropriate income streams from harvesting, processing or exporting, whilst communities’ income from harvest has varied significantly between countries.
- A paradigm shift in coastal fisheries management is required and it needs to take into account other income opportunities such as tourism and aquaculture.
- Fiji highlighted forthcoming changes to its management of *Bêche-de-mer* (BdM) that included new licensing procedures linked to a new management plan. In Fiji the cost of health programs linked to diving problems has been successfully raised which is likely to lead to a ban of SCUBA diving as a method to collect *Bêche-de-mer* (BdM). In addition, monitoring of *Bêche-de-mer* (BdM) warehouse and storage facilities are to be used more effectively to manage the fishery.
- It was suggested that countries need to more effectively partner with the markets if they are to achieve better returns for their *Bêche-de-mer* (BdM) resources.

## Status of Sea Cucumbers (*Bêche-de-mer* (BdM)) Fisheries in the Region

### Moses Amos, SPC

An overview of the region's *Bêche-de-mer* (BdM) industry demonstrated that many of the region's fisheries are closed as a result of overfishing. Whilst SPC has been involved in the development of a number of new management plans for *Bêche-de-mer* (BdM), the success of their implementation is, as yet, uncertain. With some fisheries closed for periods of years, this will be a slow process. It was demonstrated that well-managed, sustainable *Bêche-de-mer* (BdM) fisheries would produce significantly higher economic benefit to communities, countries and the region, than the current boom and bust cycle of fisheries.

## Lessons Learnt from Sea Cucumber Fisheries in the Indian Ocean

### Hampus Erikson, WorldFish

The 'lootable' nature of *Bêche-de-mer* (BdM) resources in the Indian Ocean was highlighted. Even though many areas have been officially closed, harvesting continues with product being marketed through locations where harvesting is still permitted e.g. Zanzibar, Tanzania. As such, this industry has a history of major problems with poaching and criminality. The supply chains from the Indian Ocean to Hong Kong and mainland China are long, often involving many middlemen. Such a situation tends to lead to resource owners receiving a very small component of the total value of the *Bêche-de-mer* (BdM) they harvest and process. Other high value natural marine resources have had similar issues with criminality e.g. abalone. As such, successful management will necessarily involve not just management plans and codes of conduct for the industry, but assistance from appropriate legal structures and enforcement agencies e.g. police.

## Coastal Fisheries in Tonga: Lessons Learnt from *Bêche-de-mer* (BdM) Management in Tonga including Use of SMAs

### Poasi Fale, Tongan Fisheries Department

Whilst attempts were made to manage the Tongan *Bêche-de-mer* (BdM) fishery by using quotas, they were rapidly overfished and it was argued that political support for action had not been forthcoming to deal with the issues. Fishing in remote areas and SCUBA use resulted in very high exploitation rates. Prices paid to fishers varied throughout the country. The issue of alternate income streams during closure of fisheries was raised, one potential occupation being seaweed farming.

Discussion included the use of Total Allowable Catches (TAC), which could be owned by communities and purchased from them. The limited number of buyers in some countries was used to control prices. The potential to tender or auction resources was also raised. Another issue is that during closure of Coastal Fisheries in Tonga: Lessons Learnt from *Bêche-de-mer* (BdM) Management in Tonga including Use of SMAs fisheries, processing and other skills can be lost. If fisheries can be sustainably fished then continuity of supply and ongoing nature of fishing and processing can provide a steady income stream.

Special Management Areas (SMA) in Tonga are seen as a tool to assist in community-based fisheries management.

## Maximising the Value of *Bêche-de-mer* (BdM)

### Poasi Fale (for Steven Purcell)

Species, size, condition and quality of processing determine the value of *Bêche-de-mer* (BdM). An ACIAR funded project in Kiribati, Tonga and Fiji to improve the quality of post-harvest processing of sea cucumbers is being undertaken. A manual has been developed in a range of languages. Declining stocks in countries are primarily linked to too many fishers. Prices for species vary considerably between countries, demonstrating how communities could increase prices if there was better sharing of information on markets between countries. Poor processing could result in prices 2-4 times lower



than well processed product. There was also a reported difference in prices provided to women and men collecting the same sea cucumbers. Distribution of information on processing and training can assist in improving returns to fishers.

### **What are the options for the future best practice management of *Bêche-de-mer* (BdM)? Open forum**

- Companies operating in countries can be vetted by Government Ministries.
- Companies can be limited by government.
- Companies could request to provide information on their export supply chains.
- Little is known about the basic biology of many species currently fished. Much of this could be addressed by student projects.
- Buyers of *Bêche-de-mer* (BdM) could be shared between countries in the region and information on their activities shared.
- Better market intelligence could assist countries to get better prices for their communities.
- Considered that declared export values are substantially below actual, income to governments in taxes or fees is minimized.
- In Australia AQIS sets standards for *Bêche-de-mer* (BdM) exports. Similar standards could be established for the region.
- Prices vary considerably in wholesale and retail, spiky and smooth sea cucumbers – with spiky being more valuable in general.
- Pacific dried *Bêche-de-mer* (BdM) market is predominately in Southern China.
- ACIAR has developed a toolbox of techniques to improve *Bêche-de-mer* (BdM)/sea cucumber management. Such are being used by SPC and regional governments in development of their management plans for *Bêche-de-mer* (BdM).
- Improved sharing of information could be of great value to under-funded/under-resourced national fisheries agencies in the region.
- Better resource management needs to be combined with good business management to improve the value of the industry to countries.
- Banning fishing, closing fisheries is very political and political will is often out of sink with best practice management. If trigger points can be built into management plans, then some decisions can be taken out of the political arena and made by fisheries agencies.
- In some countries there have been no charge or fees for *Bêche-de-mer* (BdM) export licenses, discouraging industry investment.
- Marine protected areas can be one tool to assist in invertebrate management.
- Education and awareness needs to accompany fishery agency plans and actions.
- There are options to limit the export of certain species and enforce this through border control.
- There may be options to rotate fishing areas over time, or even which species can be harvested over time.
- Need to learn and share information from both successes and failures in coastal fisheries management e.g. trochus in Cook Islands used a plan where a resource survey is followed by release of quota to individuals.
- Countries need a plan and enforcement to implement it, together with appropriate resource allocations.
- Management plans can involve civil society such as church groups to assist in stakeholder engagement and community level understanding of fisheries management.

- Property rights and resource rights need to be clearly understood.
- Industry players need to be involved in both fisheries management and industry development plans to ensure they are workable and practical.
- It is the Canton Chinese that consume *Bêche-de-mer* (BdM).
- The balance in power can be changed if countries better share information regarding all aspects of the *Bêche-de-mer* (BdM) industry including legal, MCS, community planning, the use of various management tools and market intelligence regarding prices and company activities.
- A new approach will require political will to succeed.
- The new 'song' for coastal fisheries can assist in *Bêche-de-mer* (BdM) management and perhaps it can be one of the first sectors to benefit from the new approach taken by SPC and countries.

**Day 2 Theme: R&D, Aquaculture, Innovation and Forward Planning. A summary of day 1 was provided, focusing on key points as a lead into day 2.**

## Managing the Profitability of the East Coast Queensland Sea Cucumber Fishery

### Fisheries Consultant

It explained how the industry in Australia applied co-management to sea cucumbers. Examples included the closure of the black teat sea cucumber fishery on industry advice. In addition, industry assisted in the design and operation of a rotational harvesting strategy for sea cucumbers within the Great Barrier Reef Marine Park. Industry has also undertaken surveys of sea cucumber assemblages to better understand populations. Such biomass surveys assist in estimates of MSY for particular species of sea cucumbers. Sea cucumbers can be considered similarly to 'cows in paddocks' when planning for their harvest, i.e. a farming or even selective logging approach is used, rather than a traditional 'hunting' approach as is the norm in wild fishing. Property rights and licensing arrangements in Australia are clear and the fishing regulations are enforced. Such a situation tends to result in increasing value in fishery 'property rights'. One of the most effective compliance tools used is monitoring of unloads from catches. The harvest strategy for the burrowing blackfish was provided an example of industry involvement in the co-management of sea cucumbers.

## Beche-de-Mer Hatchery Development to Support Farmers and Restocking

### Prof. Colin Shelley (for Beni Giraspy, Sea Cucumber Consultancy)

A presentation of the potential of hatchery production of sea cucumbers. Such a hatchery can be focused on production to support sea cucumber production for food, medicinal or pharmaceutical purposes, conservation or bioremediation, stock enhancement or farming. At present hatchery produced temperature water sea cucumbers is a huge business. The production of tropical sea cucumbers is still relatively small, however technology is now well established for a few high value species including *Holothuria scabra* (sandfish). There are or have been hatcheries for this species in a number of countries including the Maldives, Madagascar, India, Australia, New Caledonia and Vietnam. The hatchery production of larvae is done in land-based tanks, whilst the nursery stages span land based tanks, ponds and the open ocean, depending on size and location. It was recommended that full commercial scale facilities are more productive and cost efficient than small, pilot scale facilities.

## Adventures of a Modern Day Trepang Fisher: The Recent History of the Sea Cucumber Fishery in Australia

### Grant Leeworthy, Fisheries Consultant

A history of the *Bêche-de-mer* (BdM) industry in the Northern Territory was provided. The region has been a rich fishing ground for *Bêche-de-mer* (BdM) and is currently the focus of new collaboration

between a fishing company and aboriginal communities involved in investigations into both re-seeding/stock improvement and sea ranching. A hatchery to produce juvenile sea cucumber (*Holothuria scabra*) has been established in Darwin. This work will assist in assessing the cost-benefit of establishing and operating a hatchery. Sea cucumber hatcheries should be seen as a long-term investment. The benefits of the private sector operating hatcheries was emphasised, where commercial benefits to workers and a company can accrue from better production, whereas public servants, on fixed salaries and with no commercial involvement in a project, have little incentive to optimise output. Examples of experimental sea ranching enclosures were provided as well as old stone/coral enclosures in shallow inshore areas, probably used by fishers a couple of centuries ago to store sea cucumbers in, prior to collection.

## Talanoa: Discussion session around management issues and industry development

- Discussions around SMAs in Tonga included concerns over the cost and time to develop them, as well as the role of communities in monitoring them and how to manage poaching. In addition the issue of closing areas when overfished was discussed in relation to advice from fisheries agencies and political oversight.
- In Vanuatu an innovative approach to *Bêche-de-mer* (BdM) management includes TACs for individual species by zone and a rotational harvesting approach. Areas of the fishery would be opened for harvest on a limited basis so that catches could be easily monitored.
- The concept of customs agencies taking a role in monitoring *Bêche-de-mer* (BdM) harvests was raised. Such an approach could assist both in providing better information on harvests and also ensure Government's received appropriate fees and taxes from the sector. Monitoring catches before export would also provide information on species, sizes and catch which could be used to check harvest against management plans and regulations.
- The issue of how to distribute quota was discussed to ensure equitable distribution of the value of the stock.
- Discussion around the development of a *Bêche-de-mer* (BdM) brand included the need to include traceability and examples of recent success with coconut oil and vanilla in the region.
- To successfully develop a brand market research and intelligence required.
- In Samoa sea cucumber production can only be from aquaculture under their management plan.
- Whilst discussion that communities must have a better share of the value of the sea cucumber resource, it was noted that business entities based on family groups, or small businesses, more likely to succeed financially than large community groups.
- Whilst the value of organic commodities is usually much higher than non-organic it is considered unlikely for organic *Bêche-de-mer* (BdM) to gain higher market prices.
- The aim of sea cucumber fishers should be self sufficiency, based on sustainable resources.
- Poor quality control in *Bêche-de-mer* (BdM) processing can lose a lot of the products value and lead to dissatisfaction with prices received, even though this reflects market values.
- Could a national marketing authority assist in obtaining better prices for fishers?
- In Vanuatu, TACs can be bought from communities. Also it was mentioned that certain sea cucumber fishing areas could be opened on a permit basis.
- It was considered there was a need for capacity building, in both processing and business / financial skills generally.
- It was noted that there were different markets for different species and that a thorough understanding of the market was required to maximise income.
- Need to share information regarding industry and industry players e.g. knowledge base.

- How to maximise the value of the catch – could tenders or auctions be used?
- Optimism – ‘New Song’ and new approaches to *Bêche-de-mer* (BdM) management, regional agreement to increase resources to coastal fisheries and improve community benefits.
- Need a regional focus to address a global industry.
- Could GEF funding for biodiversity be used to support *Bêche-de-mer* (BdM) management initiatives?
- For fishing or farming operations, the value of having appropriate business and financial models was noted.
- In discussions regarding Aboriginal involvement in *Bêche-de-mer* (BdM) industry development it was highlighted that women dominated processing of *Bêche-de-mer* (BdM) and that their private-indigenous partnership was such that those individuals that undertook work were those that were financially compensated for their efforts.

### **Day 3 Theme: A regional approach to *Bêche-de-mer* (BdM) management**

#### ***Bêche-de-mer* (BdM)**

##### **Taholo Kami for Maurice Brownjohn, PNA**

PNA provided a range of excellent suggestions as to how the *Bêche-de-mer* (BdM) industry could develop in coming years. This included:

- Establish community-based management with limited TAC and sizes per species.
- Buy live/fresh/iced/salted *Bêche-de-mer* (BdM) for centralised processing.
- Establish factory production line processing for a standard quality product.
- Use industrial driers for top quality dried *Bêche-de-mer* (BdM).
- Develop a local/regional brand to promote geographic indicators and traceability.
- Register trademarks, branding and co-branding in the region and target markets.
- Invest in eco-label endorsements e.g. MSC, Fairtrade.
- Look to niche marketing and innovative options e.g. canned chopped *Bêche-de-mer* (BdM), on line sales, freeze dried as in New Zealand, individual packs, traceability, vacuum packing, new niche markets e.g. Chinese communities rather than China, etc.
- Market “fish with a story”.
- Discussion after the presentation included:
  - » Health is a key focus in the marketing of *Bêche-de-mer* (BdM)
  - » A work plan for the next few years is required for regional development
  - » If the profile of the product can be improved, so can the prices
  - » Capacity building to support this new plan will be required
  - » Food technology needs to become an integral part of this industry’s development
  - » The better commercial outcomes, the better community engagement there will be in the industry
  - » Get regional players involved in value added *Bêche-de-mer* (BdM) products e.g. soups
  - » Ensure management is appropriately legislated and enforced
  - » Hopefully SPC, FAO and USP can assist

## Nukualofa Approach: *Bêche-de-mer* (BdM) Summary

### Taholo Kami, IUCN Oceania

The objective of this meeting was to think about how to maximise the benefits of *Bêche-de-mer* (BdM) resources for Pacific Island Governments and communities and to come up with some practical ways forward. This can be done using the best tools available e.g. TACs, minimum sizes, area management, coastal zone planning. Whilst internationally *Bêche-de-mer* (BdM) can be considered to be in an aquaculture driven market (with reference to temperate species in China), there is potential for niche marketing around good management and branding. This can be undertaken on a regional approach if there is the political will and commitment required. A way forward for the future conservation and sustainable management of sea cucumbers is now considered feasible, which together with industry development planning, can form the basis for a PNA-like approach to *Bêche-de-mer* (BdM). A PNA-like organisation can develop strategies to empower sea cucumber fishers and improve equity in the supply chain and so improve socio-economic benefits to communities. To achieve this, a 5-10 year forward planning exercise is required. This would include ways forward in terms of improving quality control in processing, the utilisation of aquaculture to assist in stock enhancement and sea ranching, appropriate R&D and capacity building. Such an organisation would drive sea cucumber conservation on a regional basis, support industry development and management, develop a knowledge base to support stakeholders manage all aspects of the industry and support brand and product development. Such an organisation would need an initial coalition of the willing to kick it off. How would it be funded, how can the private sector be encouraged to support it, how will different organisations contribute to or benefit from it?

### Final considerations

#### From attendees

**FAO:** What's missing, what is needed to have a sustainable industry of value to the region? FAO may be able to assist in technical support.

**WorldFish:** Sees significant value in improved regional statistics, data and development of a knowledge base. It supports industry development activities aligned to its mandate and can encourage other countries involvement in both a regional and global context.

**SPC:** Identifies the need for innovation to move the industry forward. Its role will be to review or help in the development of sea cucumber fishery management plans and supporting legislation, improve links to communities, assist in improving MCS arrangements, provide advice to politicians and decision makers. This work will be incorporated in the 'new song' for coastal fisheries. SPC will continue to respond to requests from member nations for assistance with *Bêche-de-mer* (BdM) management.

**Fiji Fisheries:** Wants action. Fiji has adopted the MSG road map for coastal fisheries, a Green Growth Framework for development, the 'new song' and importantly is providing new resources to support coastal fisheries management. Communities are actively pushing Government to improve / lift its game. Very interested in improving prices and getting a greater share of the value chain to fishers. The development of a regional knowledge base for the sector is seen as an important tool. Smarter MCS arrangements to deter poaching and controlling illegal or under-reporting of exports will be crucial. Technical assistance will be required in setting quotas; understanding the reproduction and biology of the lesser known species and putting in place closed seasons where appropriate.

**Samoa Fisheries:** With this meeting, we are better prepared to commence our *Bêche-de-mer* (BdM) industry development. We support the development of a marketing strategy and are interested in the potential for value added products and see a regional approach as an excellent approach. We are keen to share regional expertise and resources. We strongly recommend a systematic regional approach to address the problems and potential of *Bêche-de-mer* (BdM).

**Cook Islands Fisheries:** Cook Islands recognises the need to take action now to push for a better *Bêche-de-mer* (BdM) future. It is critical to ensure our fishery resources are not over-harvested. We support to develop platforms to share regional information on this industry and to have an active

discussion forum to keep abreast of key issues and opportunities. Information from each country should be collated and shared. We need to continue to take a cautious approach to this fishery, particularly with regard to opening and closing fisheries and ensure that conservation underpins our actions.

**Solomon Islands Fisheries:** The priority is for improved management of sea cucumber resources, however we support and encourage close collaboration on this sector between countries in the region.

**Tonga civil society:** The holistic approach being promoted at this meeting is encouraging and it supports our needs in terms of improved management for coastal fisheries.

**Tonga Fisheries:** The suggested action toward a regional approach to *Bêche-de-mer* (BdM) fisheries management and industry development is supported. This approach should link to and complement existing regional agreements. Tonga is very interested in hatchery development and is supportive of investigations to see if this is best undertaken on a regional basis or within countries. A good understanding of the genetics of key *Bêche-de-mer* (BdM) species will be required to ensure any regional approach is sensible.

## Final General Discussion

- Improve management of *Bêche-de-mer* (BdM) needs to recognise the current status and take practical steps to improve it.
- More focus on improving the value of product through improved processing of *Bêche-de-mer* (BdM) is required.
- There is an agreement that returns to communities and fishers for their resources needs to be improved.
- We need to collaborate on knowledge gathering and sharing to address information gaps in this industry and its development.
- Governments need to be able to be more responsive to both the private sector and communities with regard to *Bêche-de-mer* (BdM) industry development.

## An Action Plan

- A technical meeting is required to share regional information on *Bêche-de-mer* (BdM) management – to kick-start a regional collaboration.
- A roadmap for development of the *Bêche-de-mer* (BdM) industry needs to be developed by ‘willing partners’.
- Niche market opportunities should be investigated.
- Issues such as traceability and consistency and quality of products need to be tackled.
- National priorities for *Bêche-de-mer* (BdM) should be clearly articulated and then monitored as plans and strategies are implemented.
- A business case for a PNA-like entity should be developed.
- A communications strategy needs to be developed.

## Attachment 1. Meeting agenda

Note that agenda items with (\*) are accompanied with speech notes or presentations available at: [www.iucn.org](http://www.iucn.org)



### Regional Technical *Bêche-de-mer* (BdM) Meeting Loumaile Lodge, Nuku'alofa, Kingdom of Tonga

29 September – 1 October, 2015

#### AGENDA

##### DAY 1 Theme: Informing future regional management of *Bêche-de-mer* (BdM) fisheries

08.00- 08.50	Registration
09:00 – 9:30	Opening Overview of the Meeting
<b>10:00 - 10:30</b>	<b>Break and Official Group Photo</b>
10.30 – 11.00	Resilience and the Governing of Pacific Islands Sea Cucumber Fisheries - WorldFish*
11: 00 – 11.30	The New “Song” for Coastal Fisheries – Pathways to Change (MJ Amos, FAME, SPC)*
11.30 – 12.30	Morning Panel – Open Forum (Country rep to co-chair)
<b>12:30 – 13:30</b>	<b>Lunch</b>
13:45 – 14.15	Status of Sea Cucumbers ( <i>Bêche-de-mer</i> (BdM)) Fisheries in the Region (Moses Amos)*
14.15 – 14.45	Lessons Learnt from Sea Cucumber Fisheries in the Indian Ocean (Eriksson)*
14.45 – 15.15	Coastal Fisheries in Tonga: Lessons Learnt from <i>Bêche-de-mer</i> (BdM) Management in Tonga including Use of SMAs*
<b>15:15 – 15.30</b>	<b>Break</b>
15.30 – 16.00	Maximising the Value of <i>Bêche-de-mer</i> (BdM) (Poasi Fale)*
16:00 – 17:30	What are the options for the future best practice management of <i>Bêche-de-mer</i> (BdM)? Open Forum (Country rep to co-chair)
18.30 – 20.30	Opening Cocktail



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## DAY 2 Theme: R&D, Aquaculture, Innovation and Forward Planning

- 09.00 – 09.15 Summary of Day 1
- 09.15 – 9.45 The current status and future requirements of R&D to support the *Bêche-de-mer* (BdM) industry
- 09.45 – 10.15 Managing the Profitability of the East Coast Qld Sea Cucumber Fishery\*
- 10:15 – 10:30 Break**
- 10:30 – 11:00 *Bêche-de-mer* (BdM) Hatchery Development to Support Farmers and Restocking (Sea Cucumber Consultancy)\*
- 11.00-11.30 Adventures of a Modern Day Trepang Fisher: The Recent History of the Sea Cucumber Fishery in Australia (Grant Leeworthy, Deakin University)\*
- 11.30-12.30 Panel discussion morning's presentations (Country rep to co-chair)
- 12.30-1.30 Lunch**
- 13:30 – 15:30 Forward planning session (Breakout groups)
- 16:00 – 16:30 Break**
- 16:30 – 17:00 Report back from planning session







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### DAY 3 Theme: A regional approach to *Bêche-de-mer* (BdM) management

- 09.00 – 09.30 Summary of discussions and key outcomes
- 09.30 – 10.00 Nukualofa Approach: *Bêche-de-mer* (BdM) Summary (IUCN)\*
- 10.00 – 10.30 *Bêche-de-mer* (BdM) (Maurice Brownjon, PNA)\*
- 10.30 – 11.00 Morning tea**
- 11.00 – 12.30 A regional approach to *Bêche-de-mer* (BdM) management? (Workshop – IUCN to facilitate)
- 12.30 – 1.30 Lunch**
- 13.30 – 14.30 The way forward for management of *Bêche-de-mer* (BdM) in the western Pacific: open forum (Country rep to co-chair)
- 14:30 – 15:30 Closing statements on forward commitments from country Representatives
- 15.30 Word of Thanks and close of meeting**
- 18.00 – 20.30 Reception – Vakaloa Beach Resort

Meeting hosted by the Government of the Kingdom of Tonga, Fisheries Division and co-sponsored by the PNG National Fisheries Authority, FAO and the International Union for the Conservation of Nature (IUCN), Oceania Regional Office. Support was also provided by the Secretariat of the Pacific Community (SPC), the University of the South Pacific (USP) and WorldFish.



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*Left - Right: Ms. Nanise Tukili, Research Officer, Fiji; Ms. Margeret Vakalalabure, Fisheries Fiji; Ms. Rosalie Masu, Solomon Islands Fisheries and Ms. 'Eva Liava'a, Labour Commerce & Industries Tonga.*



*Representatives from the Tonga's Ministry of Finance & National Planning and Department of Environment.*

### Attachment 3. *Bêche-de-mer* (BdM) resources

Below are some links to resources that could assist in *Bêche-de-mer* (BdM) fishery management and development. This is not a comprehensive nor prioritised list.

The **International Union for the Conservation of Nature** has resources relevant to the management of coastal fisheries, including *Bêche-de-mer* (BdM), for example, on:

Compliance:

[http://www.iucn.org/about/union/secretariat/offices/oceania/oceania\\_resources\\_and\\_publications/?6916/Compliance-and-Enforcement-for-Coastal-Fisheries-Management--in-Fiji](http://www.iucn.org/about/union/secretariat/offices/oceania/oceania_resources_and_publications/?6916/Compliance-and-Enforcement-for-Coastal-Fisheries-Management--in-Fiji)

Addressing Corruption in Pacific Island Fisheries Management:

<http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1229&context=lhapapers>

The **Secretariat to the Pacific Community (SPC)** has numerous useful publications to inform sustainable coastal fisheries efforts in general and *Bêche-de-mer* (BdM) management in particular. Search the publications library at:

<http://www.spc.int/coastfish/en/publications.html>

See, especially, the dedicated *Bêche-de-mer* (BdM) bulletins:

<http://www.spc.int/coastfish/en/publications/bulletins/beche-de-mer.html>

The **Australian Centre for International Agricultural Research (ACIAR)** is also working on improving aspects of the *Bêche-de-mer* (BdM) industry (see <http://aciarc.gov.au/>). Examples of publications they have available include topics such as:

Improved sea cucumber processing:

<http://aciarc.gov.au/publication/cop026>

Sea cucumber aquaculture:

<http://aciarc.gov.au/publication/pr136>

Community-based sea cucumber management:

<http://aciarc.gov.au/publication/fr2009-12>

A manager's toolbox for sea cucumber:

<http://aciarc.gov.au/publication/mn135>

The **United Nations Food and Agriculture Organisation (FAO)** has resources for the sea cucumber industry and Managers:

Advances in sea cucumber aquaculture and management:

Lovatelli, A. (comp./ed.); Conand, C.; Purcell, S.; Uthicke, S.; Hamel, J.-F.; Mercier, A. (eds), FAO Fisheries Technical Paper. No. 463. Rome, FAO. 2004. 425 pp.

<http://www.fao.org/docrep/007/y5501e/y5501e00.htm>

Sea cucumbers A global review of fisheries and trade:

Toral-Granda, V.; Lovatelli, A.; Vasconcellos, M. (eds). Sea cucumbers. A global review of fisheries and trade. FAO Fisheries and Aquaculture Technical Paper. No. 516. Rome, FAO. 2008. 317 pp.

<http://www.fao.org/docrep/011/i0375e/i0375e00.htm>

Managing Sea Cucumber Fisheries With An Ecosystem Approach Purcell, S.W. Managing Sea Cucumber Fisheries With An Ecosystem Approach.

Edited/compiled by Lovatelli, A.; M. Vasconcellos and Y. Yimin. FAO Fisheries and Aquaculture Technical Paper. No. 520. Rome, FAO. 2010. 157 pp.

<http://www.fao.org/docrep/012/i1384e/i1384e00.htm>

Putting into practice an ecosystem approach to managing sea cucumber fisheries FAO. 2010. Putting into practice an ecosystem approach to managing sea cucumber fisheries. Rome, FAO. 2010. 81 pp. This document is an abridged version of the FAO Fisheries and Aquaculture Technical Paper No. 520, entitled “Managing sea cucumber fisheries with an ecosystem approach”. It is intended to provide a more concise and less technical outline of processes and principles to implement an ecosystem approach in the management of sea cucumber fisheries.

<http://www.fao.org/docrep/013/i1780e/i1780e.pdf>

Commercially important sea cucumbers of the world Purcell, S.W., Samyn, Y. & Conand, C. Commercially important sea cucumbers of the world. FAO Species Catalogue for Fishery Purposes. No. 6. Rome, FAO. 2012. 150 pp. 30 colour plates.

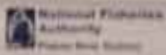
<http://www.fao.org/docrep/017/i1918e/i1918e.pdf>

An Ecosystem Approach to Management in the Pacific Ocean FAO. 2012. Report on the FAO Workshop on Sea Cucumber Fisheries: An Ecosystem Approach to Management in the Pacific (SCEAM Pacific), Nadi, Fiji, 15- 18 November 2011. FAO Fisheries and Aquaculture Report. No. 1003. Rome. 44 pp.

<http://www.fao.org/docrep/015/i2658e/i2658e.pdf>

## Note:

**For more information or hard copies of the publications, please contact: Alessandro Lovatelli, Aquaculture Officer, FAO Fisheries and Aquaculture Department, Rome, Italy at: [Alessandro.Lovatelli@fao.org](mailto:Alessandro.Lovatelli@fao.org)**



# Regional Technical *Bêche-de-mer* Meeting

29 September - 1 October 2015

Nuku'alofa, Kingdom of Tonga