

Annex 1 – Workshop agenda

International Workshop on the Sustainable Use and Management of Sea Cucumber Fisheries

Puerto Ayora, Galapagos Islands, Ecuador, 19–23 November 2007

WORKSHOP AGENDA

Monday, 19 November 2007

Morning

08h30	Arrival and registration
09h00	Welcome note by: Graham Watkins – Executive Director of the Charles Darwin Foundation Raquel Molina – Galápagos National Park Director Marcelo Vasconcellos – Fishery Resources Officer, FAO Introduction of participants
09h30	Scope of the Workshop
10h00	Adoption of Agenda
11h00	<i>Coffee break</i>
11h20	Presentation of RR: Asia (HTP Philippines) ¹ – Poh Sze CHOO
11h40	Presentation of RR: Western Central Pacific (HTP Papua New Guinea) – Jeff KINCH
12h00	Presentation of RR: North America (HTP <i>C. frondosa</i> fishery in Newfoundland, Canada), Jean-François HAMEL/Annie MERCIER
12h20	Presentation of RR: Latin America and the Caribbean (HTP Galápagos Islands) – Verónica TORAL-GRANDA
12h40	<i>Lunch break</i>

Afternoon

14h00	Presentation of RR: Africa and Indian Ocean (HTP Seychelles) – Chantal CONAND
14h20	Plenary discussions: Brainstorming on Table of Contents of the Technical Guidelines and Setting up of working groups
16h00	<i>Coffee break</i>
16h30	Working groups discussion and drafting
18h00	<i>Adjourn for the day</i>

[18h00-18h45 Internal meeting between the Scientific Committee and FAO]

¹ RR: Regional Review; HTP: Hotspot.

Tuesday, 20 November 2007

Morning

08h30	Working groups discussions and drafting
12h30	<i>Lunch break</i>

Afternoon

14h00	Plenary presentations and discussions
18h00	<i>Adjourn for the day</i>

[18h00-18h45 Internal meeting between the Scientific Committee and FAO]

Wednesday, 21 November 2007

Morning

08h30	Working groups discussions and drafting
12h30	Bus trip to Rancho Aquelarre for lunch
13h00	<i>Lunch break</i>

Afternoon

15h00	Hike to "El Chato" (Galapagos giant tortoise reserve), Gemelos Craters, Scalesia Forest, Lava tunnels
17h00	Informal meeting with the fishing sector of Santa Cruz (Charles Darwin Station)
18h00	<i>Adjourn for the day</i>

[18h00-18h45 Internal meeting between the Scientific Committee and FAO]

Thursday, 22 November 2007

Morning

08h30	Working groups discussions and drafting
12h30	<i>Lunch break</i>

Afternoon

14h00	Plenary presentations and discussions
18h15	<i>Adjourn for the day</i>

[18h00-18h45 Internal meeting between the Scientific Committee and FAO]

Friday, 23 November 2007

Morning

08h30	Working groups discussions and drafting
12h30	<i>Lunch break</i>

Afternoon

14h00	Plenary discussions on draft Technical Guidelines
16h00	Identification of future steps
17h30	Closing remarks
18h00	<i>End of Workshop</i>

[18h00-18h45 Internal meeting between the Scientific Committee and FAO]

20h00	<i>Closing dinner at Red Mangrove Inn Hotel</i>
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Annex 2 – List of participants

EXPERTS

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Annex 3 – Participant profiles

AKAMINE, Jun – Dr Akamine currently teaches Southeast Asian Studies and Maritime Ethnology at the School of Humanities and Social Sciences, Nagoya City University. His academic career started as a descriptive linguist and anthropologist in the Philippines. One of his major fieldwork activity was conducted in southern Palawan and Sulu Archipelago where the majority of the people have been dependent on sea cucumber fisheries. This is the reason for which he has become interested in the “sea cucumber food system”, which covers the historical development of fishery, trade and consumption in the world. Resource management is also of great concern to him. His research has extended to the fisheries communities, both in eastern Indonesia and Japan. He is interested in collaborative resource management between traders and fishermen. He attended several international workshops on holothurian resource management: Advances in Sea Cucumber Aquaculture and Management (ASCAM) in Dalian, China (2003); Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Expert meeting in Kuala Lumpur, Malaysia (2004); and CITES Conference of the Parties (CoP) 14, the Hague, The Netherlands (2007). Dr Akamine has published over 50 research papers on both peer-reviewed and non peer-reviewed journals and books.

CHOO, Poh Sze – Before joining The WorldFish Center as a Science and Policy Specialist in 2002, Ms Choo worked for more than 30 years in several capacities in the Fisheries Research Institute, Penang, Malaysia. Her last appointment being Head of the Aquatic Ecology Branch, a position she held from 1991–2002. In the early 1990s she collaborated with scientists from the Heriot-Watt University on a sea cucumber research project, “The Taxonomy, Life History and Conservation of Malaysian Holothurians” supported by the Darwin Initiative for the Survival of Species, United Kingdom. Her interest in sea cucumber research is mainly in fishery and trade. In her new position at the WorldFish Center, she maintains an active interest in sea cucumber research and conservation issues. Ms Choo holds a MSc in nutritional sciences from the University of Guelph, Canada and a BSc (Hons) in Ecology from the University of Malaya, Malaysia. Her professional interest is in aquaculture, marine conservation research, and gender research in the fisheries sector.

CONAND, Chantal – Since 1964, Prof Conand has been a lecturer and subsequently professor in several French Universities (Marseille, Brest, Réunion) and Senegal (Dakar) and detached (4 years) in the research agency IRD (New Caledonia). Her research was initially on fish biology, followed by Echinoderms, mostly sea cucumbers, in 1978,. From 1994–2003 she was Director of the Marine Ecology Laboratory in Réunion. Her very long and constant investment in sea cucumber fisheries has made her an international expert (with reports and meeting for SPC, FAO, CITES, WIOMSA). She is the scientific editor of the *bêche-de-mer* Information Bulletin published by SPC. Prof Conand is presently co-responsible of a three years Western Indian Ocean (WIO) programme on sea cucumber fisheries granted by WIOMSA involving five countries. She holds a first French thesis on the reproduction of a commercial migratory fish from Senegal and a French State Doctorate on the fishery biology of sea cucumbers from New Caledonia (partly translated in English by SPC). She has directed several PhDs in reef ecology and has many scientific publications, many of them on echinoderms mostly sea cucumbers.

ESPINOZA, Eduardo – Mr Espinoza is the Acting Head of Marine Resources Management and Conservation Officer to the Galapagos Marine Reserve, Galapagos National Park Service. Mr Espinoza has been involved in both research and management of the Galapagos sea cucumber *Isostichopus fuscus*, first as a fisheries biologist at the Charles Darwin Foundation for five years and then as Marine Conservation Officer in the Galapagos National Park Service. He has a thorough knowledge of the different managerial, technical and law processes that have taken place in Galapagos over the past years, which are what, have forged the current status of the GMR and its sea cucumber fishery. Mr Espinoza holds an MSc from the Fisheries University in Tokyo, Japan. His professional interest are fisheries management and the development of alternatives to the local fishers, patrolling and enforcement and the sound management of the GMR based on technical and scientific information.

FRIEDMAN, Kim – For the last five years Dr Friedman has been responsible for invertebrate resource assessments within SPC's Reef Fisheries Observatory. In this role, he and a small team of researchers have surveyed both commercial and subsistence fisheries within 17 Pacific Island countries and territories. These inshore assessments will provide comparative information on the state of coastal fisheries for a major inshore fisheries study that is due to be completed by late 2008. Dr Friedman was born in South Africa, but completed most of his tertiary education, including his Masters degree (Fisheries and Aquaculture) in the United Kingdom. He holds a doctorate awarded from James Cook University in Australia. Dr Friedman's working past includes salmon farming in Scotland, and a short spell with the New South Wales Fisheries Department in Sydney. He also led pearl oyster research for WorldFish Center in the Western Pacific for over four years (Solomon Islands and Fiji) before joining the Western Australian Fisheries Department in Perth, where he was the senior research scientist for abalone, pearl oyster and sea cucumber fisheries. These fishery assessments spanned the state, from temperate abalone waters near South Australia up to the pearl grounds and sea cucumber fisheries near the tropical Northern Territory.

GAMBOA, Ruth – Dr Gamboa has been with the University of Philippines (UP) at Mindanao for the past 11 years. After finishing her PhD at Hokkaido University, Japan, she went on a 1-year training in hatchery production of sea cucumbers. Together with the sea cucumber team of Dr Annette Menez at the Bolinao Marine Laboratory, UP Marine Science Institute, she pioneered the successful hatchery production of sandfish in the Philippines in 2002. At present, this team is significantly involved in drawing up a national research and development programme for sustainable fisheries of sea cucumbers. She has established good working relations with relevant national government agencies as well as state universities in the Davao Region and also with civil society groups such as NGOs and People's Organizations involved in coastal resource management. Dr Gamboa has experience in writing technical reports and publications and has close contacts with researchers overseas.

HAMEL, Jean-François – Dr Hamel has been studying holothurians since 1986. He has conducted his BSc, MSc and PhD work on the boreal species *Cucumaria frondosa* and *Psolus fabricii* (Laval University, UQAR, Canada). His expertise later sent him travelling around the globe (Marshall Islands, Solomon Islands, Ecuador) to collaborate with academic institutions and private industries as part of internationally and locally funded projects. He has developed expert knowledge of many tropical species (i.e. *Holothuria scabra*, *H. atra*, *H. leucospilota*, *Bobadschia argus*, *B. marmorata*, *Isostichopus fuscus*, *Thelenota ananas*, *T. anax*). Since 2000, he has been overseeing a study of *I. fuscus* which has enabled the onset of an aquaculture industry in Ecuador. While at the College of the Marshall Islands in 2001, he co-designed and helped build the Marshall Islands Science

Station (MISS). In 2003, he was session chair and editor at the FAO sea cucumber workshop (Dalian, China). Over the years, he has been a member of various scientific and managing committees, and has published dozens of peer-reviewed papers under the affiliation of the SEVE (which he co-founded in 1995). He has also co-authored five books and over 400 articles in popular magazines worldwide. Now back in Canada, Dr Hamel remains active internationally and continues to study holothurians and other echinoderms. His research focuses on the control of gametogenesis/spawning, the chemical ecology and the general biology of coastal and deep-sea invertebrates. He is currently involved in projects related to the emerging fishery of *Cucumaria frondosa* in eastern Canada.

HEARN, Alex – Dr Hearn has worked at the Charles Darwin Foundation for five years as coordinator of fisheries research. His team of researchers have studied aspects of fisheries in the Galapagos Marine Reserve (GMR) with a view to providing technical advice on sustainable management practices to the stakeholders and authorities in the GMR. They have also studied aspects of population dynamics of key exploited species, such as the slipper lobster, spiny lobster, and two species of sea cucumber: *Isostichopus fuscus* and *Stichopus horrens*. Dr Hearn and his team are currently studying the spatial dynamics of spiny lobsters and hammerhead sharks. They are also applying ecological risk assessment techniques to fisheries, and are leading the development of a Fisheries Management Plan for the GMR. He has published several articles and reports on sea cucumber population dynamics and fisheries, including the use of stock depletion models to predict changes in populations under different fishing scenarios. He currently advises the National Park Service and Ecuadorian Government on issues related to sea cucumbers and other fisheries in the GMR. He holds a PhD in Fisheries Biology (2001) from Heriot-Watt University in the Orkney Islands, United Kingdom. His areas of interest include population dynamics, spatial dynamics, small-scale fisheries management and management of marine protected areas (MPAs).

HERRERO-PÉREZRUL, María Dinorah – Since 2002, Ms Herrero-Pérezrul has been working as an Assistant Researcher at the Centro Interdisciplinario de Ciencias Marinas (Interdisciplinary Center of Marine Sciences). She is a fisheries biologist working on marine invertebrates (holothurians, echinoids, bivalves, gastropods) under current exploitation. Her work involves reproductive biology, population dynamics, fisheries management and echinoderm ecology. She is a scientific advisor for the Natural Protected Areas in the monitoring plan for invertebrates. She is also technical advisor to the Mexican Government and has helped establish the first Technical Committee for *Isostichopus fuscus* management in Baja California Sur, where she acts as spokeswoman. In her free time, she is the scientific advisor for fishery groups (stakeholders) who exploit echinoderms. She has published some important papers on the reproductive biology and population dynamics of *I. fuscus* and addressed the problem of variability in size measurement. She attended the CITES International Technical Workshop for the Conservation in the Families Holothuridae and Stichopodidae. Ms Herrero-Pérezrul holds a PhD in Marine Sciences (2004) from the Instituto Politécnico Nacional (National Polytechnic Institute). Her professional interests are conservation biology, participatory management in fisheries (including biological and population dynamics aspects), and monitoring of reef invertebrates.

KINCH, Jeff – Since completing his Anthropology PhD fieldwork in the Milne Bay Province, Papua New Guinea in 1999 on marine resource management regimes and livelihood strategies, Mr Kinch has worked on numerous marine resource and fisheries conservation, development and management programmes and projects throughout Melanesia for governments, NGOs and regional organizations. Mr Kinch was formerly

the Coastal Fisheries Advisor at the University of Papua New Guinea, and currently works as a private consultant for the FAO on this sea cucumber project, and also served as an expert on the “CITES Workshop on the Conservation of Sea Cucumbers”. In the last ten years he has lead several abundance surveys, socio-economic studies and management reviews of the bêche-de-mer fisheries in PNG and the Solomon Islands. Mr Kinch’s professional interests include artisanal fisheries development and management, coral reef conservation, integrated coastal zone management and sustainable livelihoods.

MARTÍNEZ, Priscilla – Ms Martínez has been involved with marine biology research in the Galapagos Islands since 1978. Her studies with sea cucumbers began in Guam, Micronesia in 1990, where she worked as a research assistant at the Guam Marine Laboratory on reproductive and larval biology of *Holothuria nobilis*, *Thelenota ananas* and *Actinopyga mauritiana*. In 1993, she formed part of a team of consultants for IUCN in order to conduct the first biological assessment on the impact of sea cucumber fisheries in Galapagos. From 1994–2000, she joined the Marine Biology Department of the Charles Darwin Foundation (CDF), where she started studies of population and reproductive biology of *Isostichopus fuscus*. During this period, she also worked as representative of the scientific sector on the revisions of the Management Plan for the Galapagos Marine Reserve (GMR) and as a representative of the Participatory Management Board for the GMR. Ms Martínez is presently a PhD student from the University of Melbourne, Australia. Her dissertation focuses on *I. fuscus* growth and reproductive biology; preferences of habitat for juveniles and adults, and changes in the density and population structure of the species through the years of exploitation. She has participated as a field leader of the sea cucumber population surveys of 1999, 2001 and 2002 fishing season. Ms Priscilla Martínez and Manfred Altamirano proposed the inclusion of the sea cucumber *I. fuscus* to Appendix III of CITES in 2002. In 2006, she joined Cathy Hair and her team of researchers from the Aquaculture and Stock Enhancement Facility at the Northern Fisheries Centre, Cairns, Queensland (Australia), to collaborate on the culture and restocking project of *Holothuria scabra*.

MERCIER, Annie – Since completing her PhD in oceanography in 1997 (UQAR, Canada), Dr Mercier has worked on several projects related to sea cucumbers in Canada and abroad. She was a research associate at WorldFish Center for three years, studying the ecology of *Holothuria scabra* in the Solomon Islands through a CIDA grant. She was later hired at the College of the Marshall Islands where she led two USDA-funded projects and co-designed and supervised the construction of the marine laboratories at the Marshall Islands Science Station (MISS). Since 2000, she has been a consultant for several sea cucumber aquaculture firms, including one in Ecuador, where she helped develop techniques to reproduce and grow the Galapagos sea cucumber *Isostichopus fuscus*. She was a guest speaker and session editor during the sea cucumber workshop organized by FAO in 2003. For the past three years, she has been a professor at Memorial University (Canada), where she is leading a multi-disciplinary integrative research programme focusing on the reproduction and chemical ecology of coastal and deep-sea invertebrates. Her current projects include the study of the local commercial sea cucumber, *Cucumaria frondosa*. Over the past 15 years, Dr Mercier has published dozens of primary research articles on sea cucumbers and other echinoderms in peer-reviewed journals. She also co-authored five books and over 400 popular articles on wildlife and environmental issues, including the biology and exploitation of sea cucumbers.

PURCELL, Steven – Dr Purcell is an Australian working as an Ecologist with the WorldFish Center in New Caledonia. He is a trained Marine Biologist, with a PhD in quantitative marine ecology from James Cook University (1998). Dr Purcell has

worked with WorldFish Center and the SPC since 2001, leading research projects on sea cucumber restocking and aquaculture. His previous work dealt with *Trochus* fisheries enhancement and management, and reef ecosystem dynamics. His published studies on sea cucumbers have spanned topics such as restocking, survival and growth, marking methods, movement, genetic stock structure, pond culture and disease. He currently leads a sea cucumber population assessment and management project in New Caledonia, and is technical specialist for a Philippines-based project on sandfish sea ranching and restocking. Dr Purcell was involved in an ACIAR workshop and preparation of a guidebook “Sea Cucumber Fisheries Management: A Manager’s Toolbox”, and is the SPC’s nominated specialist for contact about sea cucumbers aquaculture.

TORAL-GRANDA, Verónica – Ms Toral-Granda worked at the Charles Darwin Foundation for over 10 years as a fisheries biologist on marine species (i.e. sea cucumbers, spiny lobsters, finfish) subjected to artisanal fisheries. Her research focused on the reproductive biology, natural history, population assessment, and impact evaluation of such fisheries at the single species level. During this time, Ms Toral-Granda also served as a technical advisor to the Galapagos National Park Service and the Ecuadorian Government on marine conservation matters, fisheries management and development of new fishing activities within the Galapagos Marine Reserve. She has been involved in different aspects of the listing of *Isostichopus fuscus* in Appendix III of CITES, the only sea cucumber species to have been included in a CITES appendix, and in 2005 and 2006, she authored the discussion document on sea cucumbers which served as a base in the twenty-second Animal Committee of CITES and in the fourteenth Conference of the Parties respectively to further the analysis of the inclusion of sea cucumbers taxa on a CITES Appendix. She attended the CITES CoP 14 in The Hague as the Ecuadorian marine species specialist with special focus on the sea cucumber item of the agenda. Ms Toral-Granda has published research papers on both peer-reviewed and non peer-reviewed journals on sea cucumber biology and fisheries. Currently she is working as a consultant for FAO on this sea cucumber project, and also served as an expert on the FAO expert consultation “Implementation Issues Related to Listing Commercially-Exploited Aquatic Species on CITES Appendices”. Ms Toral-Granda holds a MSc in Conservation Biology (1998) from the University of Cape Town. Her areas of professional interest are marine conservation, participatory fisheries management, specifically small-scale fisheries management and development, and coastal zone management.

UTHICKE, Sven – For the last 14 years Dr Uthicke has worked on the ecology and population genetics of commercially used holothurians. He has completed an honours thesis on the population dynamics of two species and a PhD thesis investigating the importance of these animals in the ecosystem of coral reefs. Since then, he has conducted numerous studies on the population genetics of holothurians, testing how widely populations are interconnected, i.e. whether local or regional management strategies are more important. Other studies were concerned with the recovery of holothurian stocks after over fishing and using genetic methods to clarify the taxonomy of several important holothurian species. In addition to a wide research experience, Dr Uthicke has worked in environmental management and also as a private consultant. He worked for approximately one year each at the German Environmental Protection agency on general water quality related issues, and at the Great Barrier Reef Marine Park Authority (Australia) as project manager Research and Monitoring. In addition to consultancy work for several state agencies and the fisheries industry, Dr Uthicke has also worked as a consultant for the FAO since the Advances in Sea Cucumber Aquaculture and Management workshop in 2003. Dr Uthicke currently works at the Australian Institute of Marine Science on biofilms as indicators for water quality on coral reefs, however, he also keeps a keen interest in sea cucumber ecology, genetics and management.

WOLFF, Matthias – Dr Wolff graduated at Kiel University, Germany in 1981, where he also completed his PhD in 1985, on population dynamics of the Peruvian scallop under the impact of El Niño 1982/83. In 1986 he moved to Chile to engage as a lecturer in Fisheries Science at the University of Coquimbo sponsored by the German Agency for Academic Interchange (DAAD). In 1991 he returned to Germany to work at the Centre for Tropical Marine Ecology (ZMT), Bremen, as a researcher. In 2000 he was appointed Director of research cooperation in marine sciences between the Centre for Tropical Marine Ecology (Bremen) and several Cuban research institutions (Instituto de Oceanología, Universidad de Habana, Centro de Investigaciones Pesqueras) and leader of a first joint cooperative research project on the sustainable management of the Batabanó Gulf, southern Cuba. Since 2004, he has been leader of a working group on data integration and modelling under an EU funded project (SENSOR) on assessing climate variability impacts on the resources and resource users of the Humboldt Current System. In 2007 he has been engaged as Head of the Department of Marine Research and Conservation at the Charles Darwin Research Station in Puerto Ayora, Galapagos. Dr Wolff has eight years of working experience in Latin America (mainly in Peru and Chile). He has several years experience as a referee for several international journals of marine research and is a permanent member of editorial board of the *Revista de Biología Tropical*. He has published numerous scientific papers.

LOVATELLI, Alessandro – Mr Lovatelli, a trained marine biologist and aquaculturist, obtained his Bachelor (BSc) and Master of Science (MSc) degrees at the universities of Southampton and Plymouth (United Kingdom), respectively. His first experience with FAO dates back to 1987 working as the bivalve expert attached to an FAO/UNDP regional seafarming development project. His next FAO assignment took him to Mexico working on a regional aquaculture development project which was funded by the Italian Government. From 1993 to 1997 Mr Lovatelli worked in Viet Nam, Somalia and then again in Southeast Asia. In Viet Nam he headed the aquaculture and fisheries component of a large EU project developing, among other activities, 10 regional aquaculture demonstration, training and extension centres. Following this he moved to Somalia working as the lead aquaculture and fisheries consultant for the European Commission. During the 1-year consultancy he provided the Commission technical advice towards assisting the fisheries sector through the EC Rehabilitation Programme for Somalia. Following an additional year in Viet Nam as one of the Team Leaders under the Danish-funded Fisheries Master Plan Project, he was recruited by FAO as the Aquaculture Advisor attached to the FAO-EASTFISH project based in Denmark. In October 2001 Mr Lovatelli once again joined the FAO and took up the post of Fishery Resources Officer (Aquaculture). The main activities currently focused on are marine aquaculture development, transfer of farming technologies, coastal resources management and development of human resources. In October 2003 he organized an international FAO Workshop on the Advances in Sea Cucumber Aquaculture and Management which produced recommendations on sea cucumber fisheries and management as well as aquaculture.

VASCONCELLOS, Marcelo – Dr Vasconcellos is a Fishery Resources Officer at the Food and Agriculture Organization of the United Nations (FAO). Dr Vasconcellos is trained in biological oceanography and holds a PhD in resource management and environmental studies from the University of British Columbia, Canada. Before working for FAO, he worked as a Research Associate at the Department of Oceanography, University of Rio Grande, Brazil, and at the Fisheries Centre, University of British Columbia. One of the central themes of his research has been the development of ecosystem approaches to fisheries assessment and management. At FAO, he is currently responsible for the implementation of trust fund projects related to “Capacity building for an ecosystem approach to fisheries” and to “CITES and commercially-exploited aquatic species”.

Annex 4 – Experts group photograph



Standing (left to right):

Sven Uthicke, Alex Hearn, Kim Friedman, Ruth Gamboa, Choo Poh-Sze, Jeff Kinch, Matthias Wolff, Annie Mercier, María Dinorah Herrero-Pérezrul, Steven Purcell, Chantal Conand, Marcelo Vasconcellos, Priscilla Martínez.

Seated (left to right):

Jean-François Hamel, Alessandro Lovatelli, Verónica Toral-Granda, Jun Akamine, Eduardo Espinoza.

This paper reviews the worldwide population status, fishery and trade of sea cucumbers through the collection and analysis of the available information from five regions, covering known sea cucumber fishing grounds: temperate areas of the Northern Hemisphere; Latin America and the Caribbean; Africa and the Indian Ocean; Asia; and the Western Central Pacific. In each region a case study of a "hotspot" country or fishery is presented to highlight critical problems and opportunities for the sustainable management of sea cucumber fisheries. The hotspots are Papua New Guinea, the Philippines, Seychelles, the Galapagos Islands and the fishery for *Cucumaria frondosa* of Newfoundland in Canada. Together they provide a comprehensive and up-to-date evaluation of the global status of sea cucumber populations, fisheries, trade and management, constituting an important information source for researchers, managers, policy-makers and regional/international organizations interested in sea cucumber conservation and exploitation.

