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**REPORT ON STATUS, SCOPE AND TRENDS OF THE LEGAL AND ILLEGAL
INTERNATIONAL TRADE IN MARINE TURTLES, ITS CONSERVATION IMPACTS,
MANAGEMENT OPTIONS AND MITIGATION PRIORITIES**

(Prepared by the Secretariat)

Summary:

CMS Decisions 12.17 *Marine Turtles* refers to CITES Decision 17.222, which mandates an assessment on marine turtle trade. This CITES assessment was published in June 2019 and is contained in this Information Document. It includes annexed country reports on Madagascar (Inf.7/Annex I), Mozambique (Inf.7/Annex II), Colombia, Panama and Nicaragua (Inf.7/Annex III) and Indonesia, Malaysia and Viet Nam (Inf.7/Annex IV).

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CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA



Eighteenth meeting of the Conference of the Parties
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STATUS, SCOPE AND TRENDS OF THE LEGAL AND ILLEGAL INTERNATIONAL TRADE
IN MARINE TURTLES, ITS CONSERVATION IMPACTS,
MANAGEMENT OPTIONS AND MITIGATION PRIORITIES

This document has been submitted by the Secretariat in relation to agenda item 70 on *Hawksbill turtle* (*Eretmochelys imbricata*) and other marine turtles (*Cheloniidae* and *Dermochelyidae*).^{*}

^{*} The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat or the United Nations Environment Programme concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.



Status, scope and trends of the legal and illegal international trade in marine turtles, its conservation impacts, management options and mitigation priorities

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Status, scope and trends of the legal and illegal international trade in marine turtles, its conservation impacts, management options and mitigation priorities

Front cover photo: *Caretta caretta* hatchling heading to the Mediterranean Sea (©Lauren Lopes).

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List of acronyms and terms

ACP - African, Caribbean and Pacific Group of States
ASEAN - Association of Southeast Asian Nations
ASEAN-WEN – Association of Southeast Asian Nations Wildlife Enforcement Network
BKSDA - Balai Konservasi Sumber Daya Alam (Nature Conservation Agency, Indonesia)
Carib-WEN – Caribbean Wildlife Enforcement Network
CA-WEN – Central America Wildlife Enforcement Network
CCL - Curved Carapace Length
CCP – Conselho Comunitário de Pesca (Community Fishing Council, Mozambique)
CITES – Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS – Convention on the Conservation of Migratory Species of Wild Animals
CSO – Civil Society Organisation
CSP – Centre de Surveillance des Pêches de Madagascar (Fisheries Monitoring Center of Madagascar)
CTI-CFF – Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security
EEZ – Exclusive Economic Zone
FAO - Food and Agriculture Organization of the United Nations
IAC – Inter-American Convention for the Protection and Conservation of Sea Turtles
ICCWC – International Consortium on Combating Wildlife Crime
IDPPE - Instituto Nacional de Desenvolvimento da Pesca de Pequena Escala (National Institute for the Development of Small Scale Fisheries, Mozambique)
IDR – Indonesian Rupiah (currency)
IFAD - International Fund for Agricultural Development
IGO – Inter-Governmental Organisation
INDERENA - Instituto Nacional de los Recursos Naturales Renovables y del Ambiente (National Institute of Renewable Natural Resources and Environment, Colombia)
INPA – Instituto Nacional de Pesca y Acuicultura (National Institute of Fisheries and Aquaculture, Colombia)
INPESCA – Instituto Nicaraguense de Pesca y Acuicultura (Nicaraguan Institute of Fisheries and Aquaculture)
INTERPOL – International Criminal Police Organization
IOSEA – Indian Ocean and South-East Asia
IOSEA Marine Turtle MoU - Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (concluded under the auspices of CMS)
IOTC – Indian Ocean Tuna Commission
IUCN – International Union for Conservation of Nature
IUU – Illegal, Unreported and Unregulated (fishing)
MARD – Ministry of Agriculture and Rural Development (Viet Nam)
MARENA – Ministerio del Ambiente y los Recursos Naturales (Ministry of Environment and Natural Resources, Nicaragua)
MGA – Malagasy Ariary (currency)
MIPE - Ministério das Pescas (Ministry of Fisheries, Mozambique)
MOMS - Management-Oriented Monitoring System
MONRE - Ministry of Natural Resources and Environment (Viet Nam)
MoU – Memorandum of Understanding
MRF - Marine Research Foundation
MZN – Mozambican Metical (currency)
NGO – Non-Governmental Organisation
NOAA - National Oceanic and Atmospheric Administration
POPMPR - Ponta do Ouro Marine Partial Reserve (Mozambique)
QR Code – Quick Response Code
RAAN – Región Autónoma de la Costa Caribe Norte (North Atlantic Autonomous Region, Nicaragua)
RAAS – Región Autónoma de la Costa Caribe Sul (South Atlantic Autonomous Region, Nicaragua)
Ramsar Convention – Convention on Wetlands of International Importance especially as Waterfowl Habitat
RCA – Central American Marine Turtle Conservation Network
RMU – Regional Management Unit
SPAW Protocol - Protocol concerning Specially Protected Areas and Wildlife (concluded under the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region)

TED – Turtle Excluder Device

TEV - Total Economic Value

THPA MoA - Memorandum of Agreement between the Government of the Republic of the Philippines and the Government of Malaysia on the Establishment of the Turtle Islands Heritage Protected Area

TRAFFIC -The Wildlife Trade Monitoring Network

UNODC - United Nations Office on Drugs and Crime

USD – United States Dollar (currency)

WIDECAST - Wider Caribbean Sea Turtle Conservation Network (a Regional Activity Network of the SPAW Protocol)

WWF - World Wide Fund for Nature

Executive summary

This study stems from the implementation of CITES Decision 17.222, by which the CITES Secretariat was directed to collaborate closely with the IAC, CMS and the IOSEA Marine Turtle MoU to undertake a study on the legal and illegal international trade in marine turtles. Supported by funding from Australia, the European Union, and the United States of America, the CITES Secretariat contracted three agencies (the World Wildlife Fund, Inc., the Marine Research Foundation and TRAFFIC) to undertake an *in-situ* assessment of the status, scope and trends of the legal and illegal international trade in CITES-listed species of marine turtle in eight countries within three subregions: Madagascar and Mozambique (in the East African subregion); Colombia, Nicaragua, and Panama (in the Inter-American subregion); and Indonesia, Malaysia and Viet Nam (in the Southeast Asia/Coral Triangle subregion). These countries were selected for assessing based on evidence (collected from recent literature and consultations with researchers and other experts) that indicated that they were significantly implicated in illegal trade markets for marine turtle specimens. In addition to the *in-situ* country assessments, which took place during 2018, this study analysed CITES Trade data on marine turtles and previous findings from available literature.

There are seven extant species of marine turtle - loggerhead turtle (*Caretta caretta*), green turtle (*Chelonia mydas*), leatherback turtle (*Dermochelys coriacea*), hawksbill turtle (*Eretmochelys imbricata*), Kemp's ridley turtle (*Lepidochelys kempii*), olive ridley turtle (*Lepidochelys olivacea*), and the flatback turtle (*Natator depressus*). All species are included in CITES Appendix I, which includes species that are threatened with extinction that are, or may be, affected by trade. As such, international trade for commercial purposes is strictly prohibited for these species. Except for *N. depressus* (included only in CMS Appendix II), all six other species are included in CMS Appendices I and II. CMS Appendix II recognizes the unfavorable conservation status of species and requires CMS Parties to enhance them. CMS Appendix I includes species facing a very high risk of extinction and requires CMS Parties to strictly protect the species, among others, by prohibiting take and controlling other factors that might endanger them. IAC promotes the protection, conservation and recovery of the populations of six marine turtle species (all but *N. depressus*) in the Western Hemisphere, as well as of the habitats on which they depend.

The take and use of, and trade in marine turtles are prohibited in Madagascar, Mozambique, Colombia, Indonesia, and Viet Nam. In Malaysia, Nicaragua, and Panama, exceptions to these prohibitions exist: egg collection is possible through a licensing system in most states of Peninsular Malaysia; there is a legal green turtle fishery in Nicaragua along its Caribbean coast; and subsistence take and use of olive ridley eggs are permitted in Isla Cañas Wildlife Refuge in Panama.

Findings revealed that, despite regulatory frameworks which either prohibit or restrict the exploitation of marine turtles, illegal take and trade in these species and their specimens are present in the eight countries assessed. Physical market characteristics were found to vary among the countries studied. Online trade was found to be more abundant in the Southeast Asia/Coral Triangle subregion, followed by the Inter-American subregion. In the countries assessed in the East African subregion, illegal online trade in marine turtle specimens appears not to be a source of concern, at least at present, and possibly due to the lack of internet connectivity in many areas. Based on the present research, the following overall characteristics were found for illegal trade in the three subregions visited:

East African subregion (Madagascar and Mozambique): Illegal trade seems to be largely for domestic consumption. No online trade was found. Evidence of international trade was quite limited, came from anecdotal reports, and referred only to exports from Mozambique to Tanzania. Findings suggest that the domestic trade in these countries exceeds the magnitude and impact of their international trade.

- **Madagascar:** Take is largely conducted by locals. Artisanal fisheries were found to be a significant source of take in national waters. Domestic trade appears to be a well-organised activity that supports the supply of specimens to areas that are hundreds of kilometers apart, with illegal domestic distribution networks operating via land and sea. No robust evidence was found to support that illegal international trade in marine turtles sourced from Madagascar is an ongoing, well-organised activity. No online trade in marine turtles was detected during the present assessment.
- **Mozambique:** Marine turtles were found to be taken both as targeted and non-targeted catch. Illegal take is largely perpetrated by local artisanal fishers, who capture specimens for consumption and its related trade. In comparison to Madagascar, domestic trade appears to be more localised. Some anecdotal evidence collected through reports suggested that there may be some international trade with Tanzania. However, the scale at which

this type of trade may be taking place is currently unknown. No evidence of online trade sourced from Mozambique was found during the present assessment.

Inter-American subregion (Colombia, Nicaragua and Panama): Illegal trade seems to be largely for domestic consumption and for the production of hawksbill handicraft items. Cock fighting spurs are sought-after commodities in trade, and their demand may be rising. Some online trade in cock fighting spurs was found. Evidence from anecdotal reports suggests that international trade exists between the three countries studied and others in the region (e.g. Costa Rica, Ecuador, El Salvador, Guyana, Honduras, Mexico, Suriname, Venezuela). Anecdotal reports also suggest that international trade focuses largely on hawksbill carapace and its byproducts.

- **Colombia:** The two main markets for marine turtle specimens identified are that for meat and hawksbill carapace. Meat appears to be mainly for domestic consumption, and carapace to potentially serve an international demand. Among other handicrafts, carapace is used to produce cock fighting spurs. Some respondents suggested that the demand for this product was increasing. Evidence of international trade came from anecdotal reports, which suggested that carapaces are imported from countries such as Nicaragua, Panama, and Venezuela to be worked into valuable cock fighting spurs that are then exported to countries such as Guyana, Suriname and Ecuador. Online trade in cock fighting spurs was found to be present.
- **Nicaragua:** It appears that marine turtle meat is transported from the Caribbean coast (where there is a legal green turtle fishery) for retailing along the Pacific coast (where such legal fishery does not exist). Carapace was openly offered at some locations, and some respondents confirmed the existence of domestic artisans who work this material. Evidence of international trade from reports suggests that eggs are exported to El Salvador and Honduras; and that carapaces are exported to Colombia. Recent literature suggests that hawksbill handicrafts are exported to Costa Rica, and that the level and type of international tourism greatly influence the market of hawksbill items along the Caribbean, with vendors switching between selling locally or acting as distributors to inland areas or those along the Pacific. No online trade was found in Nicaragua.
- **Panama:** It appears that meat and eggs are mainly consumed locally, but findings reveal that there is also some intercity and interprovincial trade in these specimens. Turtle carapace is also a commodity in trade, which appears to be mainly sourced in the provinces of Bocas del Toro and Comarca Kuna Yala. Information collected through respondents and from the literature suggests that there is international trade in turtle carapace involving Colombia, Costa Rica and Mexico. Carapace is reportedly exported for processing into cock fighting spurs which are later re-imported. Three individuals dedicated to this processing were identified in the country. Two online advertisements for cock fighting spurs originating from Panama were found.

Southeast Asian/ Coral Triangle subregion (Indonesia, Malaysia and Viet Nam): Illegal trade seems to be largely for domestic consumption, but also for the production of handicrafts. Online trade was found to be commonly present, particularly for handicrafts and eggs. Evidence of international trade came from anecdotal reports and from seizure records, suggesting that it occurs between the countries assessed and others in the subregion (e.g. China and the Philippines). Findings suggest a shift from open market availability to more covert forms of trade; open trade in physical markets was found to be particularly limited in Indonesia and Malaysia.

- **Indonesia:** Take, use and trade are prevalent across the archipelago, which appears to continue to have an important role as a source and consumer country, supplying eggs, meat, and processed and unprocessed forms of turtle carapace. Based on seizure data, the demand from East Asian countries has not yet ceased, as specimens continue to be destined to Malaysia, China, and Viet Nam. Findings revealed a significant shift of trade to online platforms, where 213 trade advertisements were recorded in the span of a month. This number contrasts with the seven sites (out of 61 physically visited) that had marine turtle products for sale.
- **Malaysia:** An active local egg demand was found in Sabah and Terengganu. The open availability of products, as well as online trade were found to be limited. Online trade appears to be conducted largely on an opportunistic basis (only one advertisement was found over the period of a month). Trade appears to have shifted to more underground avenues in recent years, with traders using code gestures to signal buyers, and being suspicious of inquiries, particularly by foreigners. Based on seizure data, trade occurs between Malaysian states, but also internationally with countries such as China, the Philippines and Viet Nam. An interviewee stated that it is an “open secret” that large volumes of eggs are exported out of Sabah (where take and trade are illegal) to be sold in Terengganu (where take and trade are legal).

- **Viet Nam:** Marine turtle specimens were observed for sale in 39 out of 436 outlets physically surveyed, confirming that demand persists. Online trade in marine turtle specimens was found to be present in the country, with 45 advertisements having been recorded over a 14-hour period. As observed for physical trade, most online adverts comprised handicrafts and taxidermied turtles. Findings in the literature and present market observations indicate that trade has become less conspicuous over recent years.

Information available in the literature compiled during the present study provides insights into the scope of marine turtle trade in two additional subregions, which were not assessed *in-situ*: the **Mediterranean** and **West Africa**. Egypt (specifically Alexandria) may potentially hold the last major illegal marine turtle market in the Mediterranean basin, given that, overall, exploitation in the subregion is considered to have largely ceased. Existing literature on **West Africa** indicates that despite some protective legislation being in place, illegal take and use of, and trade in marine turtles occur. To a large extent, these activities appear to be mainly for domestic consumption and livelihood needs. It appears also that some trade within the subregion may occur, particularly between neighbouring countries. The scale of these practices, as well as the threat posed by them remain to be assessed.

Concerning legal take, the present study found that there is often confusion regarding what activities are legal, for who, and under what restrictions in countries where a legal take for marine turtle specimens exists (e.g. in Malaysia and Nicaragua). It can be inferred that, where people are unclear about applicable legal frameworks, they are also more likely to inadvertently engage in illegal activities. This reiterates the importance of promoting education and awareness efforts in countries where there is legal take, and of ensuring that those countries' legal frameworks are robust and non-conflicting among different administration levels.

While the present findings render clear that illegal take and use of, and trade in marine turtles are present in the eight countries assessed, it has not been possible to conclude robustly on the trends of illegal (national and international) trade. This results largely from a general shortage of long-term, consistent monitoring data for marine turtle trade in the countries assessed. Even when people's perceptions and/or data from the literature were available, this information was often conflicting. In the present study, the best trade trend proxies, therefore, generally came from the apparent prevalence of particular trade characteristics over time, rather than from quantified levels of trade.

Past literature concerning Madagascar had highlighted the presence, back in 2003 and then in 2012, of complex supply networks, involving fishers, their communities, dealers and traders. The present study also found a complex trade network to be operating between north and south of **Madagascar**, along its western coast, suggesting that the *modus operandi* of the trade has likely not changed significantly.

In **Mozambique**, some respondents reported that domestic trade has drastically declined since 1992. Still, in line with a report from 2014, the present study found marine turtle take in the waters of Mozambique to continue to be largely perpetrated by locals. Also, the illegal killing of marine turtles near fishing camps was thought to be of significant concern in 2012, and a more recent (2017) report in the literature has confirmed that this issue prevails.

Respondents in Colombia, Nicaragua and Panama generally perceived illegal trade to have reduced in the last 10 years. However, in **Colombia** these perceptions contrast with existing literature, whereby an expansion of trade in hawksbill items into neighbouring tourist locations from 2012 onwards has been reported.

In **Nicaragua**, respondents reported that they no longer worked carapace as they used to because it can no longer be easily sold. Still, respondents generally perceived an increase in the demand for hawksbill products by other countries in the subregion in recent years. Prior work in Nicaragua in 2011 found trade in certain locations to be three times superior to that documented in 2002; but found also the level of demand for hawksbill items to be lower than in 2002. Additional research in 2017 identified Nicaragua as having the most widespread availability of hawksbill products among countries assessed in Latin America and the Caribbean; the research also found some vendors to report that they did not intend to purchase further products once stocks got sold.

While respondents generally perceived trade to be declining in **Panama**, some respondents also perceived consumption to have increased in certain areas. Previous research in 2017 reported that the sale of hawksbill carapace items may have declined in Panama, although it is not clear to what extent. In contrast, the sustained volume of eggs seized in Panama from 2012 to 2018 (identified during the present study), does not suggest a decreasing trend in illegal trade (at least in this product) during the referred period.

In **Indonesia**, the open sale of turtle carapace specimens was found to be limited in physical markets when compared to previous work in 2009. It seems that the trade has been driven largely underground, with the availability of

specimens now being more apparent in online markets than in physical ones. Illustrating how demand has not ceased, is the reported sale of freshwater softshell turtle (Trionichidae) meat as marine turtle meat in the country.

The present study estimated some 365,000 eggs/year to be sold in Pasar Payang in Kuala Terengganu (Malaysia). This value generally correlates to a 422,000 eggs/year that had been estimated in 2009, suggesting that trade may have not decreased during this period. Moreover, a demand for marine turtle specimens in China and Viet Nam that had previously been reported in 2012 and in 2018, has not yet ceased as recent (2015-2018) seizure incidents confirm.

In **Viet Nam**, a study in 2009 found the number of outlets and turtle items in trade in Ho Chi Minh City and Hanoi to have decreased considerably in relation to 2002. However, trade was found by that study to have increased in other places, including Ha Long, Phu Quoc, and Ha Tien, where marine turtle products were openly purchased. The present assessment found trade to have become less conspicuous.

The analysis of CITES Trade data revealed a declining trend in the number of legal trade transactions reported by CITES Parties as “confiscated or seized specimens” from 2008 to 2013, as well as a somewhat stabilizing trend from 2013 to present. Despite poor reporting compliance by CITES Parties being a well-known, ongoing issue, it is possible that this overall decrease may reflect a global decrease in the volume of specimens traded illegally at the international level. Taking into account this consideration, as well as the information reported above concerning proxies for trends in the different countries assessed, it is only possible to state with confidence in the present study that illegal trade is prevalent in the countries assessed; it was not possible to conclude with certainty on the trend of illegal international trade.

The findings of the present study found illegal take, use and trade to prevail along the Pacific and Caribbean coasts of the Inter-American subregion; along the Eastern coast of Africa; and in the waters and beaches of Southeast Asia and, particularly, its Coral Triangle subregion. While the present study has not included a thorough assessment of the source rookeries from which the marine turtles that are taken in these subregions come from, it is probable that, at least, some of them originate from stocks that have been considered threatened in the literature, particularly given that marine turtles are highly migratory species, and that different Regional Management Units (RMUs) mix in foraging grounds. Further research is needed to better understand how take and trade impact the conservation status of marine turtle RMUs.

It is important to acknowledge that the present *in-situ* assessments were accompanied by challenges which may have influenced estimates of take, interviewees’ responses, and generalizations thereof. The rapid nature of the present research prevented a more comprehensive quantification of trade levels, and of the impact of take and trade on marine turtle populations, as only a limited number of locations could be visited, and researchers may not have gained full trust by interviewees.

The status, scope and trends of the illegal trade vary among the subregions studied, making it challenging to prioritize the allocation of efforts in one subregion over another. Instead, it is more reasonable to discuss the type of activities that must be prioritized within the subregions themselves. Based on the present findings, these are as follows:

East African subregion (Madagascar and Mozambique):

- Collecting baseline information on artisanal, semi-industrial and industrial fisheries (including IUU) operating in national waters to understand the impacts of these fisheries on marine turtles and their linkage to illegal trade
- Working with communities and their traditional leadership/management approaches to identify effective alternatives to the exploitation of marine turtles
- Improving the enforcement of legislation and regulations that apply to marine turtles at coastal areas and transaction points
- Building awareness at the community and government levels on marine turtles and respective applicable legal frameworks
- Exposing to the public cases of illness/death associated to the consumption of marine turtle specimens

Inter-American subregion (Colombia, Nicaragua and Panama):

- Working with communities to identify effective alternatives to the exploitation of marine turtles
- Improving the enforcement of legislation and regulations that apply to marine turtles at coastal areas and transaction points
- Countering illegal online trade
- Building awareness at the community and government levels on marine turtles and respective applicable legal frameworks

- Improving cooperation among different domestic governance levels, and also among other countries in the subregion (including Colombia, Costa Rica, Ecuador, El Salvador, Guyana, Honduras, Mexico, Nicaragua, Panama, Suriname, and Venezuela)

Southeast Asian/ Coral Triangle subregion (Indonesia, Malaysia and Viet Nam):

- Addressing gaps, overlaps and inconsistencies in national legal frameworks applicable to marine turtles
- Working with communities to identify effective alternatives to the exploitation of marine turtles
- Improving the enforcement of legislation and regulations that apply to marine turtles at coastal areas and transaction points
- Countering illegal online trade
- Building awareness at the community and government levels on marine turtles and respective applicable legal frameworks
- Improving cooperation among different domestic governance levels, and also among other countries in the subregion (including China, Indonesia, Japan, Malaysia, the Philippines, and Viet Nam)

A comprehensive list of recommendations stemming from the present assessment, and which address these priority types of activities is included in the “Recommendations” section at the end of the study. These recommendations have been divided into two main work streams: “CITES-focused recommendations” and “Overarching recommendations”. The former recommendations comprise activities that are most directly relevant to the CITES community; the latter target a wider range of stakeholders and include measures that go beyond the scope of CITES, referring to conservation and management, research, enforcement, and awareness measures.

The present study therefore contributes to enhancing regional and global conservation, management and sustainable use of marine turtles through improved knowledge on the legal and illegal international trade in these species, as well as through stronger coordination among relevant intergovernmental instruments dealing with marine turtles.

Preamble

In 2014, the Secretariat *Pro Tempore* of the Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC) published a study co-financed by the Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) on the “Conservation Status of Hawksbill Turtles in the Wider Caribbean, Western Atlantic and Eastern Pacific Regions”¹. Several recommendations arose from that study, highlighting the need for an updated assessment to determine the actual extent of the (international) trade in hawksbill turtle products.

In January 2016, the IAC and the Secretariat of the Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA Marine Turtle MoU) submitted an information document entitled “A report on illegal take of and trade in marine turtles”² to the CITES Standing Committee at its 66th meeting, expressing concern about the levels of illegal trade in marine turtles around the globe.

The information brought forward by these documents identified a need for robust scientific research to help determine the current status, scope and trends of the international trade in marine turtles. Thus, aiming to address knowledge gaps, the CITES Conference of the Parties adopted at its 17th meeting (CoP17; October 2016) the interrelated CITES Decisions 17.222 and 17.223 on *Hawksbill turtle* (*Eretmochelys imbricata*) and other marine turtles (*Cheloniidae* and *Dermochelyidae*).

The present study stems directly from the implementation of CITES Decision 17.222, by which the CITES Secretariat was directed, in collaboration with the IAC, CMS³ and the IOSEA Marine Turtle MoU⁴, to undertake a study on the legal and illegal international trade in marine turtles⁵. The implementation of this work was facilitated through generous funding from Australia, the European Union (through African, Caribbean and Pacific Group of States [ACP] funds), and the United States of America (through National Oceanic and Atmospheric Administration [NOAA] funds).

Objective

The present study aims to (a) provide a global overview of the status, scope and trends of the legal and illegal international trade in CITES-listed species of marine turtles; (b) achieve a better understanding of the current and potential conservation impacts associated with current trade levels; (c) identify management options; and (d) identify (geographical and operational) areas where immediate mitigation efforts may be needed.

The study shall contribute to the enhancement of regional and global conservation, management and sustainable use of marine turtles through improved knowledge on the legal⁶ and illegal international trade in these species, as well as through stronger coordination among relevant intergovernmental instruments dealing with marine turtles. Importantly, the information collected through this work will generate recommendations on actions needed to address take, use and trade in marine turtles with a view to ensure the long-term conservation of these species.

Preparation of this study

This study was prepared in close collaboration with CMS, its IOSEA Marine Turtle MoU, and IAC. It results from the assemblage of the findings from three work streams:

I. *In-situ* country assessments

The Secretariat contracted the World Wildlife Fund, Inc., the Marine Research Foundation (hereinafter referred to as “MRF”) and TRAFFIC, the wildlife trade monitoring network (hereinafter referred to as “TRAFFIC”) to undertake an *in-situ* assessment of the status, scope and trends of the legal and illegal international trade in CITES-listed species of marine turtle in eight countries within three subregions. These countries and subregions are as

¹ The study was referred to in CITES [Decision 16.127](#) (2013).

² CITES Document [SC66 Inf.7](#).

³ www.cms.int.

⁴ www.cms.int/iosea-turtles.

⁵ The full text of CITES Decisions 17.222 and 17.223 is available at <https://cites.org/sites/default/files/eng/dec/valid16/E16-Dec.pdf>.

⁶ Clarification note: *Legal international trade* in specimens of CITES-listed marine turtles is limited to non-commercial transactions conducted in accordance with Article III of the Convention.

follows: Madagascar and Mozambique (in the East African subregion); Colombia, Nicaragua, and Panama (in the Inter-American subregion); and Indonesia, Malaysia and Viet Nam (in the Southeast Asia/Coral Triangle subregion). These countries were selected for assessing based on evidence that indicated that they were significantly implicated in illegal trade markets for marine turtle specimens. This evidence was collected through a review of recently published literature addressing take and use of, and trade in marine turtles, as well as through advice provided to the CITES Secretariat via consultations with researchers and other experts on marine turtles and their trade. The three above-mentioned agencies initiated their assessments as early as January 2018 and finalized them by December 2018. The present study describes the methods used by these agencies and summarizes their main findings. The original reports produced by the three agencies, and which are brought together in the present study, are available for consultation on the CITES webpage as information documents to the 18th meeting of the CITES Conference of the Parties (CITES CoP18; Geneva, 17th to 28th August 2019; see documents CoP18 Inf. 18 Annex 1⁷, Annex 2⁸, Annex 3⁹ and Annex 4¹⁰).

II. Analysis of CITES Trade data on marine turtles

The CITES Secretariat analysed data in the CITES Trade Database on global legal trade and seizures involving marine turtle specimens. This data referred to the period from 2000 to 2017 (data extracted on 9 May 2019) and the results of the analysis are presented in this study.

III. Literature review

To complement the *in-situ* assessments mentioned above, as well as to ensure a broader overview of the status of the trade in marine turtles in other subregions that were not assessed through *in-situ* work, the CITES Secretariat also includes in this study findings from a literature review that it conducted focusing on the most recent publications available on take, use and trade in marine turtles in the subregions of the Mediterranean and West Africa. Additional information from the literature on the conservation status of marine turtles and on threats to these species was also included in the present study where relevant, as to provide either contextual information or enable relevant conclusions to be drawn against the findings of the *in-situ* work.

Relevant definitions and distinctions

| | |
|------------------------------------|---|
| Illegal international trade | <i>Illegal international trade</i> in specimens of CITES-listed marine turtles refers to any export, re-export, import or introduction from the sea conducted in contravention of the CITES Convention Text (see CITES, 1983), whereby international trade for commercial purposes is prohibited for specimens listed in CITES Appendix I, as is the case of all seven extant marine turtle species. |
| Legal international trade | <i>Legal international trade</i> in specimens of CITES-listed marine turtles is limited to non-commercial transactions conducted in accordance with Article III of the CITES Convention Text (see CITES, 1983). |
| Domestic trade | For the purposes of this study, <i>domestic trade</i> in specimens of CITES-listed marine turtles refers to sales and exchange of these specimens conducted within national borders. |
| Specimen | Marine turtle <i>specimen</i> refers to any individual of these species, live or dead, or to any readily recognizable part or derivative thereof (e.g. meat, eggs, carapace pieces, items made of carapace, etc.). |
| Take (including sources of) | For the purposes of this study, <i>take</i> in specimens of CITES-listed marine turtles refers to the removal of marine turtles or their specimens (e.g. eggs) from wild populations. <i>Take</i> can therefore refer to specimens removed on beaches or at sea. <i>Take</i> can follow either targeted capture (e.g. targeted fisheries or targeted egg collection) or accidental capture (fisheries bycatch that is retained). Because |

⁷ Madagascar.

⁸ Mozambique.

⁹ Colombia, Nicaragua and Panama.

¹⁰ Indonesia, Malaysia and Viet Nam.

in some places fishermen retain both targeted and non-targeted captures, understanding marine turtle take levels can be particularly challenging.

Use

For the purposes of this study, *use* refers to the usage of marine turtles or their specimens. Uses may include consumption, decoration, self-adornment, medicinal applications, or others.

Marine turtles, CITES, CMS and IAC

There are seven extant species of marine turtle: the loggerhead turtle (*Caretta caretta*), the green turtle (*Chelonia mydas*), the leatherback turtle (*Dermochelys coriacea*), the hawksbill turtle (*Eretmochelys imbricata*), the Kemp's ridley turtle (*Lepidochelys kempii*), the olive ridley turtle (*Lepidochelys olivacea*), and the flatback turtle (*Natator depressus*). Despite marine turtles being the least diverse chelonian group in species number (Segniagbeto *et al.*, 2016), they are circumglobally distributed (Wallace *et al.*, 2011) across tropical and temperate seas (Segniagbeto *et al.*, 2016; and references therein). They are highly migratory species, crossing multiple national boundaries during their lifetimes, and exhibit intra-specific variation in population sizes, trends and reproduction (Wallace *et al.*, 2011; and references therein).

All seven species are included in CITES Appendix I. CITES Appendix I includes species that are threatened with extinction, which are, or may be, affected by trade. These species are therefore subject to particularly strict trade regulations, with trade only being authorized in exceptional circumstances and being prohibited for commercial purposes. *D. coriacea* (family Dermochelyidae) was included in CITES Appendix I in 1977 (a reservation currently applies to Suriname [1981]) and all Cheloniidae species (i.e. the remainder six species) became included as of 1981 [reservations apply to Cuba [1990], Palau [2004] and Suriname, excluding the Australian population [1981] for *C. mydas*; and to Cuba [1990], Palau [2004], and Saint Vincent and the Grenadines [1989] for *E. imbricata*].

Except for *N. depressus* (which is included only in CMS Appendix II), all six other species are included in both CMS Appendix I and Appendix II. CMS Appendix II recognizes the unfavorable conservation status of species and requires Parties to enhance international cooperation to conserve them by concluding international agreements (see CMS, 1979). CMS Appendix I includes species facing a very high risk of extinction in the near future ([UNEP/CMS/Resolution 11.33](#), paragraph 1). Inclusion of species in CMS Appendix I requires that Parties to CMS strictly protect the species by: prohibiting take, except for under very restricted circumstances; conserving and, where appropriate, restoring their habitats; preventing, removing or mitigating obstacles to their migration; and controlling other factors that might endanger them (see CMS, 1979). All seven marine turtle species were included in CMS Appendix II in 1979. *C. mydas*, *D. coriacea* and *L. kempii* were included in CMS Appendix I also in 1979. *C. caretta*, *E. imbricata* and *L. olivacea* were included in the latter in 1985.

Under the auspices of CMS, the Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA Marine Turtle MoU) came into effect in 2001 and covers all marine turtle species that occur in the region.

The IAC promotes the protection, conservation and recovery of the populations of six marine turtle species (*C. caretta*, *C. mydas*, *D. coriacea*, *E. imbricata*, *L. kempii*, and *L. olivacea*; IAC, 2001) in the Western Hemisphere, as well as of the habitats on which they depend. This is undertaken based on the best available scientific evidence, and taking into account the environmental, socioeconomic and cultural characteristics of the IAC contracting Parties (i.e. Argentina, Belize, Brazil, Chile, Costa Rica, the Dominican Republic, Ecuador, Guatemala, Honduras, Mexico, the Caribbean Netherlands, Panama, Peru, the United States of America, Uruguay, and Venezuela).

Findings in Madagascar and Mozambique (East Africa)

Madagascar

This section includes a summary of the findings by MRF (see CITES document CoP18 Inf. 18, Annex 1), as well as additional information from the literature compiled by the Secretariat.

Assessment methods

The following methods were applied by MRF to assess the status, scope and trends of the trade in marine turtles in Madagascar, as well as its conservation impacts, management options and mitigation priorities:

A **literature review** was conducted to identify quantitative reports of illegal take of marine turtles within Madagascar which could be associated to artisanal fishing, targeted hunting, reported bycatch from fishing fleets (artisanal or commercial), records of illegal take that may suggest illegal export, and records of illness or mortality from the consumption of turtle meat.

A **rapid electronic survey** was conducted in May 2018 to search for evidence of online trade in marine turtle specimens originating from Madagascar. The key words used in the search were “turtle”, “sea turtle”, “Madagascar”, “sale”, “product”, and their combinations.

Interviews were undertaken with 153 artisanal fishers and four conservation management practitioners across six coastal regions of Madagascar (Atsimo Andrefana, Androy, Anosy, Boeny, Diana and Sofia; see fig. 1) in September 2018. Two types of questionnaires (tailored to the different stakeholders) were developed to solicit information on illegal take and export of marine turtles. Four additional interviews were also conducted with anonymous key informants identified through snowball sampling. Opportunistic **market surveys** were undertaken to document the availability of turtle carapace products on sale.

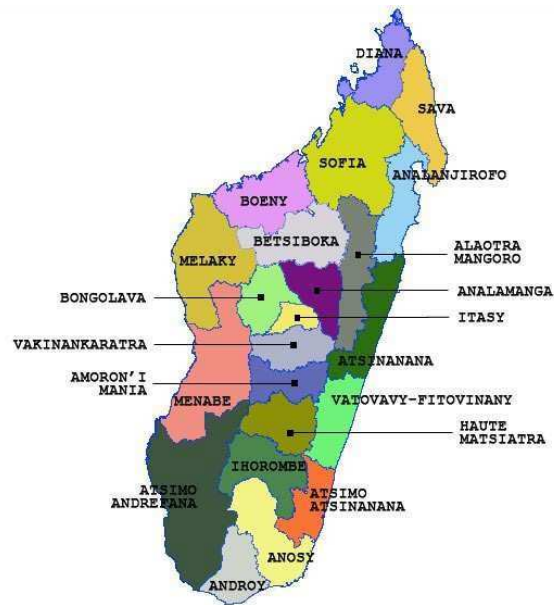


Figure 1 – Regions of Madagascar. Source: Rakatosamimanana, 2014.

Legislation and regulations relevant to marine turtles

Five species of marine turtle occur in Madagascar: loggerhead turtle, green turtle, leatherback turtle, hawksbill turtle, and olive ridley turtle. Marine turtles in Madagascar are protected by different legislation and regulations, but there are currently no government initiatives to manage the species' capture and use (Humber *et al.*, 2011b). Among others, relevant legislation and regulations prohibit killing, injuring and catching any endangered species (Ordinance no. 93-022 of 4th May 1993); prohibit trade activities involving CITES Appendix I-listed species (Law no. 2005-018 of 17th October 2005); prohibit the hunting, capture and detention of marine turtles (Decree no. 2006-400 of 13th June 2006); describe obligations for fishers interacting with marine turtles during fishing events, require boats to have appropriate tools for quick handling and release of bycaught turtles, and require the recording of all incidents involving marine turtles during fishing operations (Order no. 12.666/2014 of 28th March 2014); and shall prohibit the fishing, sale, take, or detention of all kinds of protected species including marine turtles (Draft fishery code of 27th November 2014, under adoption). Alongside these, marine turtles are also indirectly addressed via other domestic regulations (National Constitution of Madagascar 2010; Decree no. 2010-137 of 23rd March 2010; and Decree no. 2016-128 of 23rd February 2016, which adopts the National Biodiversity Strategy and Action Plans for Madagascar 2015 to 2025).

Adding to national regulations, Madagascar is a party to several international conventions and agreements that address marine turtles and their habitats. These include CITES, CMS and its IOSEA Marine Turtle MoU, the Nairobi Convention, the African Convention on the Conservation of Nature and Natural Resources, and the Convention on Biological Diversity.

Overview of artisanal fisheries and their (marine turtle) take in Madagascar, dina and fady

Small-scale fisheries are widespread throughout Madagascar, with most of the fishing effort focusing along the western and southern coasts. Traditional fisheries typically use dugout canoes resorting to oars and sails, and exploit

marine mammals, marine turtles, fish, sharks and rays, echinoderms, molluscs, crustaceans and some sea weeds. In addition, non-edible resources such as aquarium fish, corals and sponges are also periodically collected. The collection of sea cucumbers from deeper waters is also a growing industry (Kasprzyk, 2008).

Dina is a pre-colonial concept based on the notion of a social contract (McClanahan *et al.*, 2014). It refers to a community-level agreement that guides behaviour among those that have agreed to it, permitting or prohibiting activities. It has been integrated into the country's legal framework, and used to develop local and customary regulations for natural resource use. Dina can be used as a way to communicate national legislation or enhance it, or validate local customs. Officially, it should not contradict existing national legislation. Punishment for breaking dina is variable and is set by each implementing community (it can include monetary or material fines). Typically, dina relating to the marine turtle fishery impose a size limit, closed seasons for targeted hunting, or prohibit egg harvesting. A summary table of the dina in place relating to marine turtles was presented in Humber *et al.* (2015). Golding *et al.* (2017) also described the dina used by 13 communities in the Bay of Ranobe (southwest Madagascar) to prohibit the catch of turtles smaller than 70cm in curved carapace length (CCL). Marine turtle dina have had mixed results, and some directly contradict and undermine national legislation (e.g. through allowing the selective harvest of marine turtles, which are protected species). The existence of multiple management systems has been noted as a challenge to natural resource management, as it requires merging modern legislation with traditional legislation and emerging customs, such as dina (Rakotoson *et al.*, 2006). Humber *et al.* (2015) suggested that the success of dina relating to turtles was due to the strong cultural value placed upon turtles, especially by the Vezo ethnic group, which are based in Toliara, southwest Madagascar.

Historically, the sale of marine turtles and their products in Madagascar was considered a taboo known locally as fady (Lilette, 2006). While selling turtle meat was taboo, gifting turtle meat was socially acceptable and the consumption of turtle meat was regarded as a gift. Numerous justifications for fady exist, including the death of ancestors following the consumption of turtle meat, and other ethnic groups describing it a custom not to eat any type of seafood because it can be lethal (Jones, 2012). Growing interest in acquiring purchasing power for building property, obtaining better fishing gears, and acquiring symbols of wealth for celebrations has recently eroded respect for fady (Lilette, 2006). Particularly among the younger generations and those close to cities, traditional beliefs regarding marine turtles are today largely ignored (Rakotonirina *et al.*, 1994; Jones, 2012).

Sources of marine turtle take in Madagascar

The present study revealed that the artisanal fishery in Madagascar is mostly non-selective, and generally all catch is retained, irrespective of whether it was targeted or not. Marine turtles are therefore taken both as targeted and non-targeted catch in Madagascar (e.g. Lilette, 2006; Humber *et al.*, 2011b; Jones, 2012; present study). Jarifa nets (large mesh gillnets; also used in Mozambique) are usually used to catch marine turtles in Madagascar (e.g. Humber *et al.*, 2011a). The present findings also confirmed that marine turtles and their eggs are collected on beaches. The present study therefore found local fishers and communities to be implicated in the take of, and trade in marine turtles in Madagascar, confirming existing reports (IOSEA, 2014) whereby take in Malagasy waters is perpetrated largely by locals.

Fate of marine turtle bycatch

Only 13% of 148 respondents in the present study indicated that they released bycaught turtles, and in virtually every instance they indicated this was because turtles were protected via fady.

Rough estimates of targeted and non-targeted take

More than half of the 148 artisanal fishers interviewed indicated that they had caught turtles accidentally in their nets. Many respondents (77) also indicated that they targeted turtles directly. Nine of 153 fishers (~6%) indicated that they each caught four to six turtles/month, while overall amongst all respondents there was an average 32 turtles taken each year. It is problematic to distinguish between targeted take and accidental take because turtles that are caught accidentally are typically retained.

Extrapolating on trade magnitude at the national level from a rapid assessment is problematic on various fronts. Turtle trade and take likely occur along the entire coast, and MRF's surveys covered only a small extent of it. Similarly, published literature generally reflects small, localized studies rather than national assessments. Also, the turtle take reported during surveys is unlikely to be of the same magnitude across all fishing areas and years. Some fishers provided estimates for turtle take over the last 12 months, while others provided this for multiple years.

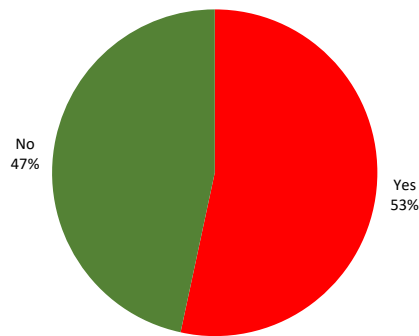


Figure 2 - Proportion of survey respondents who indicated they purposefully targeted marine turtles (n=148).

Finally, fishers did not indicate the total number of fishing days with clarity, so if they reported catching turtles “weekly” this might not mean that they caught one every week of the year.

Findings suggest that direct take of marine turtles is rampant along the coast, with over half of all respondents indicating they purposefully target these species (fig. 2). The number of **targeted** turtles (taken) among only survey respondents (n=148) in approximately 12 months was found to be 2,500. The estimated number of **bycaught** turtles among these respondents over this period was found to be 2,543 turtles. Given the challenge in distinguishing between targeted take and bycatch, it could be realistic to assume that some 3,500 turtles may be taken as both targeted and non-targeted catch. Many respondents indicated that the turtle captures were historic and on-going, meaning that thousands of turtles have been extracted over the years.



Figure 3 – Provinces of Madagascar. Source: Jomo, at https://upload.wikimedia.org/wikipedia/commons/4/44/Madagascar%2C_administrative_divisions_%28old_provinces%29_-_de_-_colored.svg.

It has been estimated (Le Manach *et al.*, 2012) that there were some 100,000 fishers engaged in artisanal fishing in Madagascar in 2008. Statistics by the World Bank (presented in Le Manach *et al.*, 2013) suggested that the two key provinces in which turtles are particularly targeted (Antsiranana and Toliara; with Mahajanga being more of a trading centre; see fig. 3) are home to 45,000 fishers. However, as local customs and marine turtle distribution vary along the coast, it seems probable that not all of these fishers are involved in the take of marine turtles. Given the prevalence of reports on trade in marine turtles in the southwest and northwest of Madagascar (e.g. Humber *et al.*, 2011b; Jones, 2012), and also reports collected during the present study, it appears likely that these are key areas where turtles are taken. Humber *et al.* (2011b) indicated that some 6 to 7% of fishers targeted turtles more frequently and with greater effort than other fishers in their study. Extrapolating conservatively from that study to the regions investigated in the present study, would suggest that some 3,068 fishers could be involved in targeted turtle take in both Antsiranana and Toliara provinces. It is however likely that this figure is far higher because approximately 52% of respondents in the present study indicated that they targeted turtles in the six regions investigated.

The present survey found that of the 118 fishers who indicated that they targeted turtles, an average of 32 turtles/fisher were taken in a year (this number is derived from an average of the numbers reported by each fisher in interviews, extrapolated to a one year period; e.g. when a fisher said he caught one turtle per week, this was extrapolated to 52 turtles in a year; or when a fisher indicated one turtle per month, this was extrapolated to 12 turtles per year). This figure is somewhat higher, but still comparable to the average capture rate of 20 to 25 animals per fisher reported by

Frontier-Madagascar (2003), suggesting that findings are consistent with previous work. A direct extrapolation (notwithstanding the caveats mentioned above) from the take of 32 turtles/fisher per year means that the directed take of marine turtles in the artisanal fishery in Madagascar (restricted to Antsiranana and Toliara provinces as identified above) has the potential to take close to 100,000 turtles per year (32 turtles x 3,068 fishers). While this figure likely underestimates grossly the total number of fishers involved in the take, it nevertheless provides an indication of the magnitude of this activity.

Concerning other fisheries, the two key commercial fishing industries in Madagascar are shrimp trawling and tuna fishing. The shrimp fishing fleet is small (50 vessels) and all vessels are required to use Turtle Excluder Devices (TEDs). One study indicated that the change to using TEDs resulted in a drop from 120 turtles caught to just two turtles caught across the entire fishery (Razafindrainibe, 2010). However, it is also believed that many of the shrimp boats wire up the TEDs shortly after their single annual inspection, with the possible exception of the 30% of vessels that carry onboard observers (pers. comm. to MRF, Fisheries Monitoring Center [CSP], September 2018). The shrimp fishery's impact on marine turtles, while of note, is potentially insignificant in comparison to the direct take and bycatch of turtles in the artisanal fishery.

Domestic use and trade

Marine turtle take in Madagascar appears to be primarily for consumption and trade in local markets. However, these markets are often many hundreds of kilometers away from the coast, where marine turtles are sourced from. Based on responses to interviews, there appear to be active transport networks that move turtles and their specimens north and south along the west coast of the country, but also to the capital city of Antananarivo. Forty five percent of 153 respondents indicated that they were aware of, or participated in the trade in marine turtles and/or their specimens. Trade in carapace and plastron ligaments was documented during surveys to occur at a total of 10 source/request locations. Incidents of illegal take were observed on six occasions during the present study, all in Atsimo-Andrefana.

During the present study, marine turtle carapace products (either full carapaces or handicrafts) were observed in three locations across three regions: in the village of Ambohibola (Antsimo-Andrefana), Nosy Be (Diana) and Mahajanga (Boeny). These locations comprised the home of a fisher woman, a shop at an airport, and a bazar in a tourist market. Turtle carapaces were found to be in use for making jewelry, but also often repurposed for animal sheltering or to store animal feed or scraps in villages.

During the present assessment, a few case studies were collated through interviews and help illustrate the complexity and extent of the domestic trade in marine turtles in Madagascar:

- **Case study 1: Trade across 180km from Analalava to Mahajanga** - A source who requested anonymity provided a case study of an investigation conducted in 2013 in Analalava. The report highlighted the existence of a group that targeted marine turtles in the northwest of Madagascar between Mahajanga and the Radama Archipelago. This illegal take was conducted by a team involving more than 30 migrant fishers from Mahajanga and Ampasibe. The poachers reportedly set up temporary fishing camps and built fenced areas to hold live specimens until there was a sufficient number to transport to Mahajanga by boat. One of these camps was detected on 26th May 2013 near Komadzara, on a beach in a mangrove area at a place called Belalandana. More than 70 green turtles were found in holding pens (fig.4).



Figure 4 - Green turtles waiting to be transported from Belalandana, Komadzara, Analalava to Arantsa, Mahajanga.

- Case study 2: Trade from Analalava** - A second investigation in June 2013 involved local authorities in Analalava, who released 20 marine turtles from fenced enclosures at Ambolobo, in Narindra Bay. Authorities arrested some of the fishers, destroyed their camps and confiscated the nets used for turtle fishing (although these nets were reportedly later resold in Analalava). Investigations revealed that a village chief was also found to be involved, being later dismissed by authorities. Investigations revealed also that some of the fishers involved were operating further south, where authorities found a fishing camp with five carapaces and three holding pens. According to local villagers, the offenders used several nets in nearby areas, and in waters extending offshore to Nosy Lava Island. They reportedly fished over four- to five-day campaigns, catching 20-25 turtles per day. At the end of the campaign they would sail to Mahajanga to sell the turtles. Villagers reported that during the last trip by the turtle fishers to Mahajanga their canoe sank with more than 40 turtles aboard. Further details from a shrimp/fish collector confirmed that the group had been operating in the area for over a year, based out of Nosy Lava but using several temporary camps in the area. They sent the turtles to Mahajanga and unloaded in the fishing district of Arantsa. Some of the turtle meat was consumed in Mahajanga and part of it was sent to Antananarivo. Two key informants during the current surveys suggested that these activities still continued as of 2018.
- Case study 3: Moramba Bay, Marovasa Be and Anjajavy** - In Moramba Bay, Marovasa Be and Anjajavy areas, local newspapers reported arrests related to targeted hunting and widespread illegal marine turtle exploitation. Being remote, this area is only accessible by boat/canoe. Respondents indicated that directed poaching has been increasing since 2012 in Moramba Bay and continued as of 2018, with fishers collecting live turtles at the request of a dealer based in Mahajanga. Turtles are held in pens until transported by speedboat to the city. Fishers use a 500m long net in the bay area to catch 10-40 turtles per week. A middleman located in Mahajanga collects the turtles, but the final destination is unknown. The turtles are reportedly sold at 5000 MGA/kg once they arrive in Mahajanga. An investigation led by the NGO Cétamada reported that marine turtle hunting and collection have been increasing in scale over the last few years. Cétamada (2012) reported that fishers were active between February and November 2012 and estimated that they caught 180-300 turtles (with an average catch of 20 turtles/net deployment), which were sent to Mahajanga every second week. Another case of intensive turtle fishing destined for Mahajanga was recorded in a village further south of Anjajavy, where three people were arrested and taken to Mahajanga in December, 2012 according to local villagers. The owner of a hotel in Marovasa reported intensive turtle fishing to local authorities, and in November 2012, the gendarmerie and fishery officials caught fishers in the act of poaching during a raid on the village of Marokibay. Five people were arrested and taken to Antsohihy, and 20 live turtles were released.
- Case study 4: Turtle meat vendors of Mahavatse, Toliara** – The two main buyers and resellers of turtles in Toliara were interviewed. The women had a small market at their homes in Mahavatse, Toliara. Generally, they purchased only live turtles to ensure that the meat is fresh. Both estimated buying at least one turtle daily, averaging about 20 turtles/month. One of the buyers reported that fishers generally do not collect turtles during the nesting season (November to December) but estimated that one in every 20 turtles purchased is a gravid female. In these cases, the eggs are extracted and sold. She also reported that when a turtle laid eggs onboard, fishers would sell them to her. Both women indicated they sourced turtles from fishers outside of Toliara city (one sourcing northwards, the other southwards). To illustrate the extent of the trade, one of the women was referred to by name as the buyer in two different interviews with fishers in Ambohibola (200km away), highlighting the vast coverage of trade routes. According to fishers, one of the buyers pays a worker to keep a lookout for their pirogue coming from the south, and if it has turtles the worker will use a zebu cart to transport them from the boat to the buyer's house. The other buyer sourced turtles from fishers based in Salary (100km away), and fishers called ahead to land the turtles during the night. Both buyers had multiple fishers (3-30) supplying them. Both buyers had experienced encounters with local authorities, but neither had been fined or accused. Both had offered turtle meat as a bribe. One of the buyers suggested that the arrest of fishers from Ambohibola has deterred fishers from supplying her and stated that recently she was only receiving three to four turtles per month. *“No one is scared to eat turtle meat if its available to buy, it is only the fishers that are scared to catch turtles”* she remarked.

Information collected from interviews supports that domestic trade routes cover vast areas with distances in the hundreds of kilometers apart, and depending on the region, trade routes may follow the same paths of trade in

radiated tortoises. Manjoazy *et al.* (2017) documented that Mahavaste was the main arrival point for tortoise-laden pirogues at night. Present interviews with turtle meat vendors in Mahavaste suggest the same occurs for marine turtles that arrive into Mahavaste. Trade routes identified through interviews are illustrated in figure 5.

No online trade in marine turtle products sourced from Madagascar was found in the present study. Informants at the management level suggested that international trade is unlikely to be substantial given the high local demand for turtle meat and products. There was no evidence found in the present study to indicate that international trade in marine turtles is substantial or an organised, on-going activity in Madagascar.

Domestic drivers of trade

Findings point to marine turtle take in Madagascar supporting local trade and consumption rather than international trade. Surveys found that both turtle meat and turtle eggs are consumed. Over 90% of turtles taken are either consumed at home, or traded to be consumed at other homes in Madagascar (fig. 6). Very few respondents (2 out of 86) indicated that turtles might be shipped overseas or used for traditional purposes (medicine, handicrafts).

Species and specimens in trade, including by region

Hawksbill turtles were rare in catch records, and this aligns with the findings of Humber *et al.* (2011b), suggesting a minor role of handicraft products in the trade (only 19 of 153 [12%] respondents indicated that carapace products were traded, and 14 of these indicated the trade was minimal or decreasing). During the present survey, only green turtles were encountered as meat for sale, but a small number of carapace handicrafts were also recorded. Still, a substantial number of respondents indicated a preference for hawksbill turtle over green turtle despite existing records of illness from consuming hawksbill turtle meat. Specimens in trade therefore include live turtles, meat, eggs, and plastron/ligaments (fig. 7).

Prices

Based on reports in one area, two turtle sellers purchase live green turtles at MGA 50,000 to 200,000 (approximately USD 14 to 57). Both buyers butcher and cook the turtles, selling them in portions from MGA 100 to 2,000

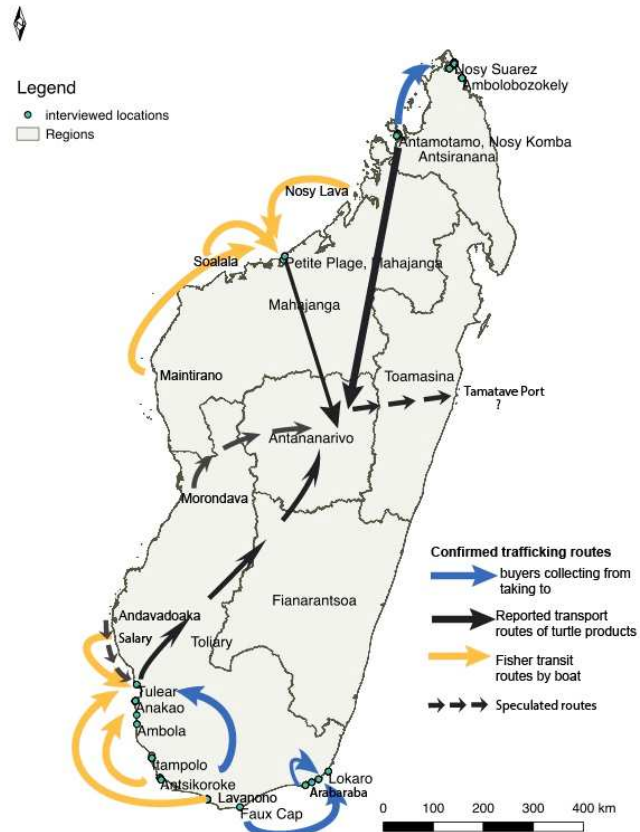


Figure 5 – Trade routes for marine turtle products in Madagascar, based on information collected through interviews.

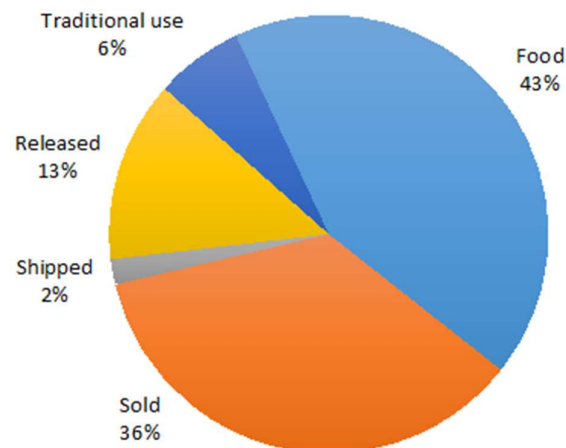


Figure 6 - Figure 16: Reported fate of marine turtles in artisanal fisheries (n=216 responses among 148 respondents).

(approximately USD 0.02 to 0.57).



Figure 7 – Top left: marine turtle caught with a spear gun in Atsimo Andrefana being kept alive for slaughter on the following day. Top right: freshly cooked green turtle meat being cut into smaller portions in Atsimo Andrefana. Bottom left: marine turtle flippers, capture method unknown. Bottom right: green and hawksbill turtle carapaces on sale at a tourist market in Boeny.

Illegal international trade

Little is known about international trade in marine turtles from Madagascar, and surveys were unable to identify robust evidence documenting international trade routes and magnitudes. A recent report by the Global Initiative Against Transnational Organized Crime did not cite any records of online sale of marine turtles from Madagascar (Rumhove, 2018), and Sung *et al.* (2018) did not record cases of marine turtles being transshipped via Hong Kong from Madagascar. WildAid's report on marine turtle trade (Yifan, 2018) similarly does not report on any international trade sourced from Madagascar. A recent note by the World Conservation Society on its website suggested that demand for oil and meat from Southeast Asia was fueling the increased demand for turtles in Madagascar (WCS, 2016), but the present study found no evidence pointing to this occurring. There have been cases documenting trade in tortoises from Madagascar to China (e.g. Kiester *et al.*, 2013; Runhovde, 2018), and it is possible that these trade routes enable the trade in marine turtles, but no robust evidence was found during the present study to support this. Feedback from an artisanal maritime transporter and ex-fisher revealed that vessels leaving for the south of the country transport building supplies to villages on the outward journey, and on their return to Mahajanga are filled with dried fish, semi-precious stones, or domestic belongings. The vessels also transport often shark fins and sea cucumbers. The respondent speculated that it is possible that the vessels transport marine turtle products too.

Trends

The number of artisanal fishers in Madagascar has steadily increased over the last two decades (Le Manach *et al.*, 2013), and it is likely that with this, so has the pressure on marine turtles, since over 90% of marine turtles caught by the fishers interviewed in the present study were found to be destined for local consumption or local trade.

The local sale of turtle meat for consumption was thought to be common in Madagascar in 2003 as part of an integrated market involving a chain of fishermen, dealers and traders (IOSEA, 2014; and references therein). By

2011, marine turtles were thought to constitute only a negligible proportion of the curio trade in the country, possibly due to increasingly educated tourists (IOSEA, 2014; and references therein).

According to a 2014 report (IOSEA, 2014), in 2012, supply networks for marine turtle specimens were uncovered in Madagascar, whereby fishing villages were supplying traders established in Toliara and Mahajanga. In 2014, it was reported (IOSEA, 2014) that there was a prolific directed take of marine turtles in Southwest Madagascar, and that illegal take was intensifying in other areas of the country. While the present study cannot ascertain whether an intensification of turtle take has taken place in Madagascar, the information collected via surveys reveals that take and trade are rampant in the country, and points to the existence of complex marine turtle trade networks operating along the western coast of the country, between north and south.

Also according to the above-mentioned report (IOSEA, 2014), a moderate level of egg consumption was reported in 2014 to occur in Madagascar, and the present study confirms that egg consumption prevails in the country. The scale at which this occurs is, however, unclear.

The information reported in the “Insights into conservation impacts” section below relating to marine turtle nesting numbers in Madagascar offer further insight into the marine turtle trade trend in the country, given that a systematic collection of eggs and nesting females has been reported to have led to significant declines in nesting activity in the country (Rakatonirina *et al.*, 1994; Walker *et al.*, 2005; Humber *et al.*, 2016).

Insights into conservation impacts

The number of artisanal fishers in Madagascar has steadily increased over the last two decades (Le Manach *et al.* 2013), likely increasing the pressure on marine turtles. The trajectory of fishing pressure on turtle populations in Malagasy waters, both in magnitude and method, has been reported as of concern (Humber *et al.*, 2011b).

The systematic collection of eggs and nesting females has led to significant declines in nesting activity on the mainland of Madagascar (Rakatonirina *et al.*, 1994; Walker *et al.*, 2005; Humber *et al.*, 2016). It is thought that there is a minimum of approximately 1,200 nests deposited per year in this country (mostly green turtles ~75% and hawksbill turtles ~24%), with the largest recorded nesting aggregation (approximately 1,000 nests per year) found on islands off the west and northern coasts (Humber *et al.* 2016). Humber *et al.* (2016) report more than 40 sites where nesting has not been recorded since 2000. In the present study, approximately half of all respondents believed that marine turtle stocks were declining, with only approximately 10% believing that numbers were increasing. In a follow-up question, however, all respondents believed that turtles were decreasing due to trade.

The most frequent responses for the cause of turtle population declines were the increased use of jarifa nets, increased fisheries pressure, changes in seagrass coverage, and increased demand for turtle meat. Those who suggested that populations were increasing attributed this event to the legal protection status of marine turtles, and to a decrease in the number of hunters. However, given the widespread trade in marine turtles observed during the present study, these two scenarios appear unrealistic.

Interviews with fishermen revealed that most marine turtles caught are green turtles, and either juveniles (18%) or sub-adults (53%). Many respondents indicated that they used to catch much larger turtles in the past. The fact that fishers are taking smaller animals could support the idea that the marine turtle populations in Madagascar are decreasing.

To better understand the impacts of take in Madagascar, there is a need to better comprehend the origin of marine turtles taken in Malagasy waters, and to determine the overall productivity of those source rookeries while taking into account other regional impact areas (such as Mozambique).

Applied management options that may be considered for other areas

A promising partnership between WWF, TRAFFIC and the Ministry of Justice, with support from the United States Fish and Wildlife Service, aims to oversee the training of 50 magistrates, police officers, gendarmerie, border police, customs officers, and environmental officers to provide increased capacity and awareness to ensure the systematic prosecution of traffickers at all levels¹¹. Further partnerships such as these should be encouraged to support marine turtle conservation efforts in Madagascar.

¹¹ WWF (2018). *Magistrates commit against tortoises trafficking*. Available at: http://www.wwf.mg/en/our_news/latest_news/?uNewsID=336890.

One potential management solution that could be used to reduce demand for bushmeat would be to use taboos to increase community compliance (Westerman *et al.*, 2013). This could be a compelling strategy for reducing trade in turtles, given the (occasionally effective) fady against turtle meat sales.

Further relevant action that could be taken in Madagascar includes developing comprehensive legislation, such as a fisheries act, to address artisanal and commercial fisheries in compliance with existing international agreements and other requirements; conducting experimental trials on turtle bycatch mitigation options for the longline fishery; collecting baseline information on IUU fishing; assessing whether there are significant linkages between shark and sea cucumber fisheries in Madagascar and illegal trade in marine turtles; and publicly exposing incidents of caught perpetrators, as well as of illness/death cases related to the consumption of turtle meat.

Conclusions - Madagascar

Marine turtles are protected in Madagascar, where legislation and regulations prohibit the killing, capture and trade of any specimens. Adding to these types of legal framework that are in place, other management approaches (i.e. dina and fady) exist in Madagascar and can communicate national legislation, enhance it, or validate local customs, therefore influencing the compliance with national legislation and regulations pertaining to marine turtles. For example, marine turtle dina have reportedly (previous work) had mixed results, contradicting national legislation at times, even though this should not happen.

Despite the legal frameworks in place to safeguard marine turtles in Madagascar, these species are commonly illegally taken. The artisanal fishery in Madagascar is mostly non-selective, with all catch being retained. Marine turtles are a target species (~52% of 148 interviewed fishers indicated that they targeted marine turtles), and will generally be retained if bycaught (only 13% of 148 interviewed fishers indicated that they would release bycaught turtles). Nine out of 153 fishers (~6%) indicated that they each caught four to six turtles/month, while overall amongst all respondents there was an average of 32 turtles/year caught per fisher.

Findings suggest that take (both targeted and retained bycatch) is rampant along the coast, and indicate that it could be up to 100,000 turtles/year (very likely mainly green turtles) among fishers in Toliara and Antsiranana alone, which are believed to be key areas for turtle take in Madagascar based on interviews undertaken during the present assessment, and on information in the literature.

It appears that marine turtle take in Madagascar is primarily for local consumption and domestic trade. Forty-five percent (45%) of 153 fishers interviewed were either aware of, or participated in the trade in marine turtle specimens. From the interviews conducted, it is evident that village chiefs and enforcement officials are sometimes involved in the illegal trade. Domestic trade was found to cover distances in the order of hundreds of kilometers apart. Based on information collected through interviews to key stakeholders, there are active transport networks that trade marine turtle specimens between the northern and southern parts of Madagascar, but also the capital of Antananarivo. Means of transportation used involve land and sea.

The present study did not detect any online trade in marine turtle specimens sourced from Madagascar. Likewise, no evidence of an active international trade involving Madagascar was found to exist. Informants at the conservation management level suggested that international trade is unlikely to be substantial given the high local demand for marine turtle products. Based on findings, it thus appears that international marine turtle trade originating in Madagascar is not a substantial, ongoing and/or organized activity. If undertaken, it is perhaps rather on an opportunistic basis. However, it could also be that the present research efforts have failed to detect it. Rather than providing for international trade, the present findings therefore support that marine turtle take in Madagascar essentially provides for local consumption and trade.

It is not clear how the prevalence of take and trade in Madagascar has evolved over the last years. The present study found take to be mainly perpetrated by locals. As the number of fishers in the country is said to have increased steadily over the last two decades, it seems likely that so has the pressure on marine turtles.

Domestic trade networks involving marine turtle specimens were uncovered in 2012, and it was found at the time that fishing villages were supplying traders in Toliara and Mahajanga. While it is not clear whether illegal trade in Madagascar has intensified over the last years as has been suggested in the literature, it is clear that well-organised domestic trade networks exist and involve different members of communities that are far apart.

Commercial fisheries of concern in Madagascar include the shrimp trawl and the tuna longline fishery, both of which are known to impact turtles in the absence of bycatch reduction measures. In addition, there is widespread IUU

fishing in Madagascar, which likely also impacts marine turtles. While these additional sources of take pose some concern to marine turtle populations, the present findings suggest that the collection of marine turtles for domestic consumption and trade by the artisanal fishery may be of greater concern.

Effective measures to address the illegal take and use of, and trade in marine turtles in Madagascar are likely to include strengthening local traditional management approaches such as *dina* and *fady*, and providing opportunities for local communities to support enforcement of national legislation.

If future trade assessment efforts are pursued in Madagascar, it would be relevant for these to visit locations that were not possible to visit during the present study due to time constraints. A comprehensive list of these locations is available in section 7.3 (“Additional priority survey areas”) of CITES document CoP18 Inf. 18, Annex 1.

Mozambique

This section includes a summary of the findings by MRF (see CITES document CoP18 Inf. 18, Annex 2), as well as additional information from the literature compiled by the Secretariat.

Assessment methods

Research efforts focused on the targeted and non-targeted take of marine turtles associated with the artisanal fisheries sector in Mozambique. The following methods were applied by MRF to assess the status, scope and trends of the trade in marine turtles in Mozambique, as well as its conservation impacts, management options and mitigation priorities:

A **literature review** was conducted to identify quantitative reports of illegal take of marine turtles within Mozambique which could be associated to artisanal fishing or targeted hunting, rather than to bycatch from fishing fleets (artisanal or commercial).



Figure 8– Provinces of Mozambique. Source: <https://clubofmozambique.com/news/population-and-housing-census-material-being-allocated-to-the-provinces/>.

A **rapid electronic survey** was conducted in May 2018 to search for evidence of online sale of marine turtle products originating from Mozambique. Key words used for the search were “turtle”, “sea turtle”, “Mozambique”, “sale”, “product”, and their combinations.

Interviews were undertaken with 77 artisanal fishers and 11 conservation management practitioners across three coastal provinces of Mozambique (Cabo Delgado, Inhambane and Nampula; see fig. 8) during May and June 2018. Two types of questionnaires (tailored to the different stakeholders) were developed to solicit information on illegal take and export of marine turtles. **Market surveys** were also conducted in outdoor markets and touristic handicraft market areas to check for the availability of turtle meat and carapace products.

Legislation and regulations relevant to marine turtles

Five species of marine turtle are found in Mozambique: loggerhead turtle, green turtle, leatherback turtle, hawksbill turtle, and olive ridley turtle (Louro *et al.*, 2006). The five species are protected at the national level through domestic regulations which prohibit hunting of the species (Forests and Wildlife Regulation, Decree 12/2002); prohibit recreational fishing of marine turtles (Recreational and Sports Fishing Regulation, Decree 51/1999); require trawl fisher vessels to use Turtle Excluder Devices (TEDs; General Regulation of Maritime Fishing, Decree 43/2003); prohibit imports/exports of marine turtle specimens without appropriate CITES permits (Conservation and Biodiversity Law, Law 5/2017). Alongside these, marine turtles are also indirectly addressed via other domestic regulations (National Constitution Article 37; Environmental Law [Law 20/1997]; Environmental Impact

Assessment Regulation [Decree 45/2004]; Tourism Law [4/2004]; and the Strategy and Action Plan for the for the Biological Diversity of Mozambique [2015-2035]).

In addition to national regulations, Mozambique is also a party to several international conventions and agreements that are relevant to marine turtles and their habitats. These include CITES, CMS and its IOSEA Marine Turtle MoU, the African Convention on the Conservation of Nature and Natural Resources, the Convention on Biological Diversity, the Nairobi Convention, and the International Union for Conservation of Nature.

Overview of artisanal fisheries and their (marine turtle) take in Mozambique

Artisanal fisheries are an important sector both socially and economically in Mozambique (Pereira *et al.*, 2014), and are widespread along the entire coast. Artisanal fisheries production has increased three-fold from 2005 to 2012 (Pereira *et al.*, 2014). The use of non-selective nets – a widespread practice among artisanal fishers, and which includes the use of gillnets, known for high marine turtle bycatch levels - is increasing in the country, with more than 43,000 nets thought to be in use in 2010 (IFAD, 2011; IDPPE, 2013; MIPE, 2013). Semi-industrial and industrial fisheries are also present in Mozambique, and the shrimp trawl fishery has been identified as a major source of turtle bycatch in this country (Gove *et al.*, 2001; Brito *et al.*, 2012).

In Mozambique, the artisanal fishery is mostly non-selective. Because all catch is generally retained - including marine turtles (Williams, 2017) -, there is some difficulty in objectively differentiating between marine turtles that are bycaught and retained and those that are intentionally targeted.

Sources of marine turtle take in Mozambique

Findings from interviews indicate that marine turtles in Mozambique are taken both as targeted catch and non-targeted catch (i.e. bycatch) in artisanal fisheries (42% of 64 respondents indicated that marine turtles were intentionally targeted; fig. 9). Although the semi-industrial and industrial fisheries are known to bycatch marine turtles in Mozambique (e.g. Gove *et al.*, 2001; Brito *et al.*, 2012), since the present assessment did not interview fishers from these sectors, it is unclear whether bycaught marine turtles are retained.

Evidence from interviews indicates that specialist turtle hunters operate in Mozambique. The existence of these was reported by fishers in Mecufi, Murubue, Mefunvo in Cabo Delgado; and Nacala, Mucoroge, Sangange, and Moma in Nampula. Results suggest that intentional fishing for turtles occurs in sporadic campaigns a few times per year, and that an event may capture up to 30 to 40 turtles. Fishers estimated that 80 to 100 turtles could be removed per specialist turtle hunter per year. The number of turtle hunters that operate in Mozambique is unknown.

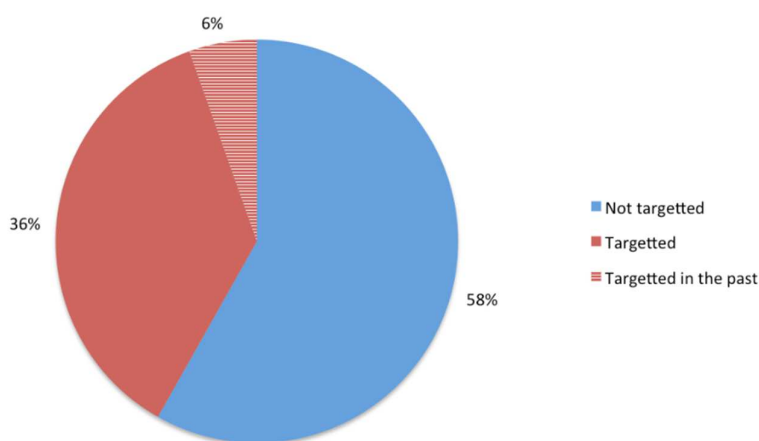


Figure 9 - Proportion of interview respondents who indicated that marine turtles were intentionally targeted (n=64).

Fate of marine turtle bycatch

Most fishers interviewed (approximately 70%, 81 responses among 77 fishers) indicated that bycaught turtles were released, and approximately 30% of them indicated that bycaught specimens were retained for consumption (including trade thereof). These numbers should, however, be interpreted with caution as there was some confusion among respondents between intentional and unintentional capture (e.g. over 20% of respondents indicated that targeted catch would be released). National estimates of marine turtle bycatch for artisanal fisheries in Mozambique appear to not exist.

Rough estimates of targeted and non-targeted take

Results indicate that there is a regional variance in the levels of marine turtle take. Fishers in Cabo Delgado reported slightly over double the levels of non-targeted turtle captures (average=2,784 turtles/year) than in Nampula (average=815 turtles/year), and fishers in Inhambane reported captures somewhere in the middle of the two extremes (average=1,485/year; fig. 10). Considering that approximately 30% of bycatch is reportedly taken, then at least 1,496 marine turtles could be removed yearly only among the respondents of the survey in Cabo Delgado, Inhambane and Nampula.

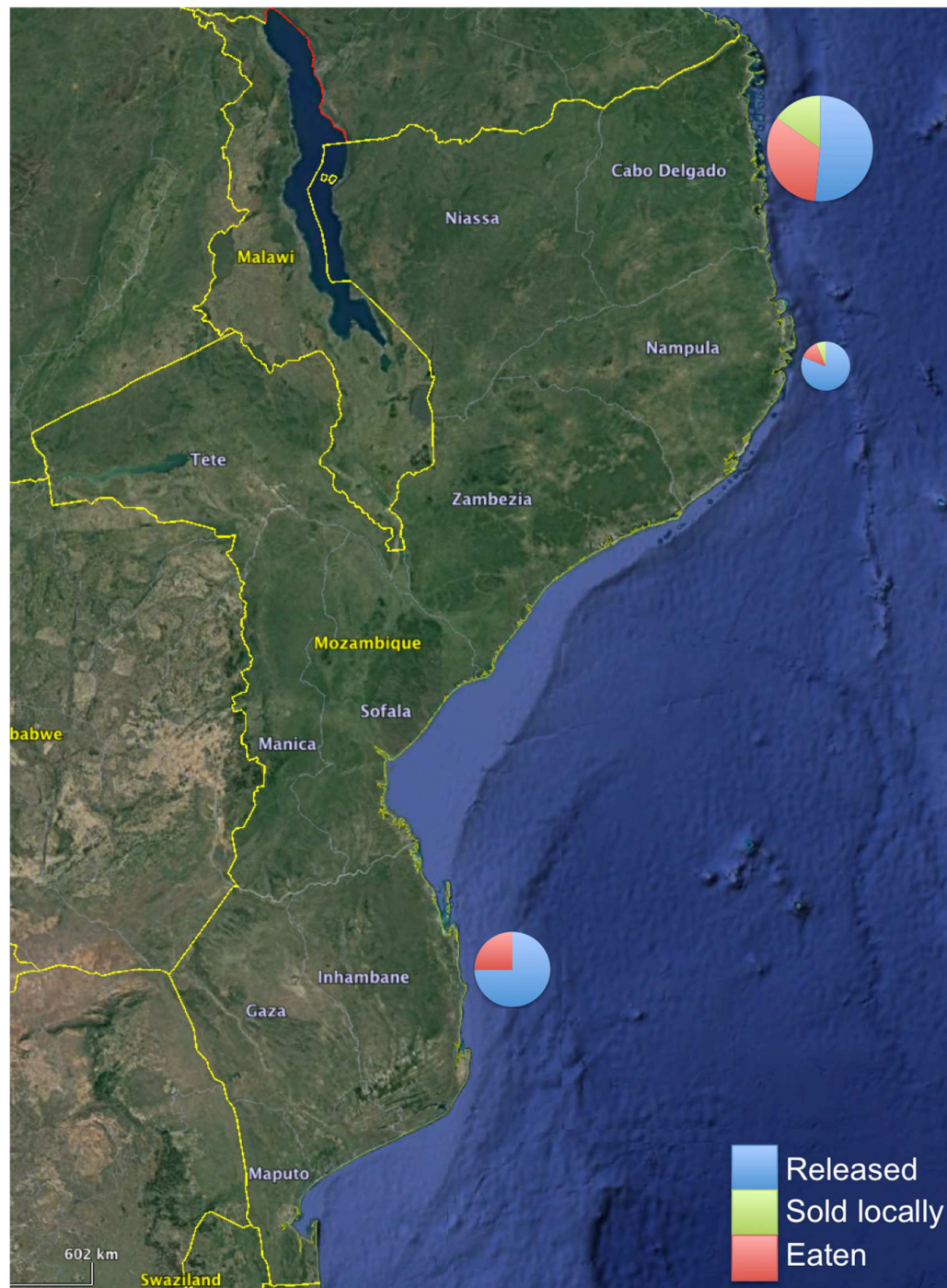


Figure 10 –Proportional incidental marine turtle catch and its fate in the provinces of Cabo Delgado, Nampula and Inhambane, as reported by interview respondents. The recorded release rate was 52% in Cabo Delgado, 80% in Nampula, and 75% in Inhambane.

Among the fishers interviewed in the three provinces surveyed (Cabo Delgado, Inhambane and Nampula), the reported annual bycatch and targeted take of marine turtles averaged 4,985 turtles. This number does not include other coastal areas which were not surveyed due to time constraints (Zambezia, Sofala and Maputo), nor all the areas in between the survey locations. Taking a conservative approach whereby fishing is restricted to only half of the year to account for inclement weather, and where take levels are conservatively estimated, the surveys indicate that there could be a potential targeted take and bycatch of over 800,000 turtles/year across all species and all gears in artisanal fisheries in the three provinces (this number is derived from a linear extrapolation of responses during the interview process; table 1). If these levels of catch are indeed realistic, they would most likely increase when expanded to the entire coast, and when adding the (apparently negligible in comparison) bycatch levels from semi-industrial and industrial fleets, which have been estimated by Gove *et al.* (2001) at approximately 4,000 to 6,000 turtles/year. (Of noteworthy concern regarding the latter, is that a 2016 report from Mozambique to the Indian Ocean Tuna Commission (IOTC) suggested that no interactions with marine turtles had been reported in the mandatory logbooks or through the observer scheme programme of 2015 [IOTC, 2016].)

It is problematic to estimate the total annual targeted and non-targeted catch for the national level due to several reasons, including: it is unreasonable to extrapolate from such a small sample of fishers to the entire coastline; it is impractical to access the entire coastline and all fishers; fishers understand the illegality of turtle captures and are likely to underreport them when questioned; seasonal variances exist which preclude straight line extrapolations; and species distribution differences mean that impacts vary by region. Extrapolating from the bycatch estimates derived from the present study is also problematic because of the uncertainties about fishing effort over an entire year, and along the entire coastline. Nevertheless, the results suggest that the magnitude of annual take of marine turtles in Mozambique by artisanal fishers could be in the order of some 800,000 turtles/year in three provinces assessed alone (Cabo Delgado, Inhambane and Nampula).

Table 1 – Potential bycatch of marine turtles in artisanal fisheries in three provinces of Mozambique (Cabo Delgado, Inhambane and Nampula) derived from a linear extrapolation of responses to interviews. While a linear extrapolation can be problematic on different fronts, it can provide a guide to potential impacts. Notes: “†” depicts take estimates adjusted by seasonal fishing effort; “” depicts the number of gears provided by the Mozambique Census of Fisheries 2012.*

| Province | Gear type | Estimate of turtles taken per year† | Number of respondents | Number of gears* | Potential bycatch levels |
|--------------|-------------|-------------------------------------|-----------------------|------------------|--------------------------|
| Cabo Delgado | Beach Seine | 174 | 3 | 684 | 39,672 |
| Cabo Delgado | Gamboa | 111 | 2 | 440 | 24,310 |
| Cabo Delgado | Gillnets | 680 | 4 | 1358 | 230,860 |
| Cabo Delgado | Hook & line | 207 | 3 | 3017 | 208,173 |
| Cabo Delgado | Purse seine | 345 | 4 | 108 | 9,315 |
| Cabo Delgado | Spear | 71 | 2 | 0 | 142 |
| Inhambane | Beach seine | 348 | 3 | 516 | 59,856 |
| Inhambane | Hook & line | 378 | 3 | 1012 | 127,343 |
| Nampula | Beach seine | 661 | 21 | 3699 | 116,430 |
| Nampula | Gamboa | 2 | 1 | 208 | 416 |
| Nampula | Gillnet | 1 | 1 | 2115 | 2,115 |
| Nampula | Purse seine | 4 | 1 | 139 | 556 |
| Total | | | | | 819,189 |

Domestic use and trade

Evidence of substantial domestic use of, and trade in marine turtles in Mozambique was documented in the present study, building on evidence of these practices reported in the past (Guissamulo, 1993; Gove *et al.*, 1996; Gove *et al.*, 2001; Louro *et al.*, 2006; Williams *et al.*, 2016; Williams, 2017). Results indicate that targeted take is mainly for local consumption (fig. 11). A small proportion of fishers (approximately 3% of 77 fishers) indicated that they used turtle meat as bait in traps for more valuable species.

Fishers indicated that turtle meat is sold in a secretive manner, in private homes or by mobile street vendors who yell code words. Fishers’ responses suggest that they are generally aware of the illegality and risk involved in selling marine turtle meat in local markets. Findings also suggest that turtle products are sold by fishers to middlemen who then take turtle products to cities further inland.

While no first-hand evidence of turtle meat being sold in local markets was found, three such recent events were reported during interviews. They concern incidents in 2017-2018 of portions of marine turtle meat available on the main road to Pemba (Cabo Delgado province), in Ilha de Moçambique (Nampula province), and in Pilivi village (Nampula province). Anecdotal information exists of turtle meat on sale in Inhambane province. Despite these reports, actual trade was not observed during field efforts.

Turtle shell products were detected in craft markets in Pemba (Cabo Delgado) and Vilankulo (Inhambane). In Pemba, over 200 pieces of hawksbill shell products were found in an artisanal crafts store (earrings, rings, bracelets, glasses frames, and an ashtray). Artisanal

fishers report not having the skills for making these products, but the Makonde (an ethnic bantu group present in northwestern Mozambique) are known for these kinds of handicrafts (Rich, 2012). This suggests that there is intercity trade.

The present research into online trade was unable to identify the sale of marine turtle products. It is possible that this type of trade is not of concern in Mozambique, as there is a lack of internet access throughout many areas where marine turtles are landed.

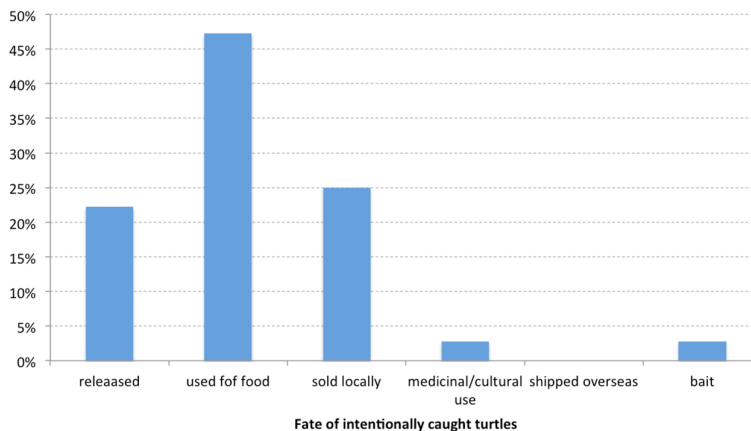


Figure 11 – Reported uses of intentionally targeted marine turtles in Mozambique (n=36).

Domestic drivers of trade

The prevalence of illegal take and use of marine turtles in Mozambique has been linked to large-scale socio-economic drivers, such as food security and poverty (Williams, 2017), particularly given that marine turtles can offer a relatively more accessible commodity. According to the present findings, domestic trade mostly involves artisanal fishers (either local resident or migrant, including from Tanzania). It is unclear whether foreign migrant fishers from Tanzania, who were found to set up temporary fishing camps on Mecufi, parts of the Quirimbas, Palma and Macomia districts (all in Cabo Delgado), influence or contribute to illegal trade or domestic use, as these were not interviewed during this study.

Species and specimens in trade, including by region

Surveys suggest that small-scale fishers most frequently interact (intentionally and opportunistically) with green turtles, and that this is the most abundant species in the areas surveyed. Green, hawksbill and loggerhead turtles are all frequently traded at the domestic level. Reports of olive ridley and leatherback encounters were low. While illegal take of leatherbacks has been documented previously (Williams *et al.*, 2016), low encounter rates with fishers in this study suggest that availability is the limiting factor for use. While there appears to be a preference for hawksbill meat due to its similar taste to goat meat, no evidence was found supporting that marine turtles are actively targeted according to species. No such evidence has been documented for southern Mozambique either (Williams, 2017).

Results suggest differences in trade between northern and southern Mozambique. Amongst the locations surveyed, domestic sales were more evident from interviews in Cabo Delgado, but they could be equally as high in Nampula (both in the north). The sale of turtle meat and eggs was only found in the north and it is likely that the lack of reported trade in the south is linked to its greater exposure to tourism and enforcement agencies. Shell products were found in tourist craft markets in both north and south of the country (fig. 12).



Figure 12 – Turtle carapace products for sale in Pemba, Cabo Delgado province.

Prices

Surveys indicate that the price of turtle meat varies according to location and the availability of marine turtles. Generally, the price is not high (approximately MZN 50/kg [USD 0.77/kg]) and is equivalent to low priced meat or ray meat. Game fish, crayfish, shark fin and holothurians all sell at significantly higher prices, which make them financially more appealing.

Illegal international trade

Evidence of international trade was documented during conversations with fishers and fishery management officers. Almost 40% of the 77 interview respondents indicated that they knew of foreign buyers, and 28% indicated knowing of active international trade. The majority of these respondents, however, was not sure about the destination of this international trade. It appears that there is not a large number of foreign buyers, given that not many management or fisher respondents were aware of more than two buyers in their area (fig. 13). It is therefore possible that respondents referred to the same the individuals. The limited number of respondents who were aware of foreign trade or foreign buyers does not allow to draw conclusions on the numbers of turtles traded internationally from the artisanal fishery.

Interestingly, while the reported national average (based on interviews in three provinces) of released bycatch is approximately 70%, this drops substantially to 52% in Cabo Delgado, the most northern coastal province of Mozambique. It is possible that the slightly higher proportion (15%) of turtles reported as “sold locally” in this area may be destined for international trade, given that further south, away from the border with Tanzania, the proportion of specimens reported as sold locally is lower (6% in Nampula and 0% in Inhambane).

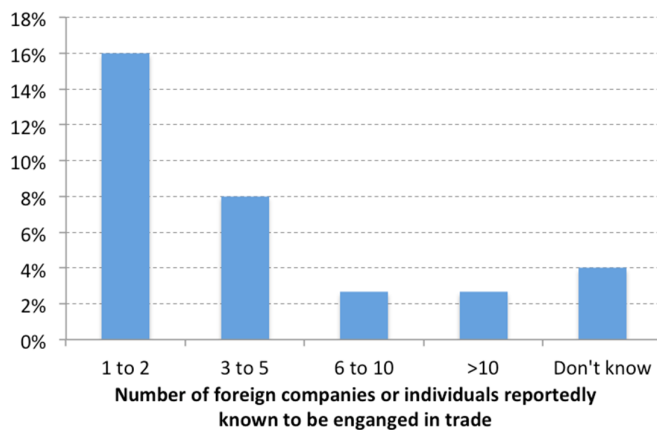


Figure 13 – Responses to the question on the number of companies or individuals involved in international trade known by respondents (n=75).

Other evidence of international trade from Mozambique was described on three occasions during interviews with fishers. Interviews with fishermen in Cabo Delgado confirmed that illegal international trade in live specimens from Mozambique to Tanzania occurs. According to an elderly respondent, Tanzanians would place an order with Mozambican fishers, who would use *jarifa* nets at night, catching up to 50 turtles. Turtles would then be sent to Mtwara (the closest Tanzanian city across the border), where they would reportedly sell for greater value than in Mozambique.

In March 2018, more than 20 Tanzanian fishers were arrested for turtle poaching¹². Evidence (Zafra-Calvo *et al.*, 2018; Haysom, 2018) suggests that several trade pathways exist in Mozambique for high profile wildlife crime of terrestrial species (e.g. elephant, rhinoceros, lion, pangolin), and marine products (e.g. sea cucumber; fish; shark fin [Pierce *et al.*, 2008]). Of relevance, are recent events of terrorism and radicalized attacks in Cabo Delgado which have been suggested¹³ to be a method used to distract authorities in order to secure illegal trade routes in the northern part of the country. It is unclear whether the illegal take and export of marine turtles are part of the illicit activities linked to such recent events.

No evidence of trade for export originating from southern Mozambique was documented during the present *in-situ* assessment, or found in the literature. Although there are indications that illegal trade in marine turtles into Tanzania is taking place, it is unclear at what frequency this is occurring, and also whether any specimens traded are destined to Tanzania's domestic market, or if Tanzania is part of a larger trade route.

Trends

There is insufficient data available on trade in marine turtles in Mozambique to enable an understanding of trade patterns over time. Through interviews, fishers reported that domestic trade has declined drastically since the end of the civil war in 1992. It appears that its magnitude today in Cabo Delgado is likely to be lower than it was prior to 2006-2008 due to the presence of a marine protected area and increased enforcement efforts.

It is possible that trends in markets for other marine products may influence the local use and take of, and trade in marine turtles. These are as follows, and merit further research:

- Evidence reported by Pierce *et al.* (2008) and Williams (2017) suggests that illegal take of turtles and **shark finning** in Mozambique may be interconnected. Shark finning is widespread in southern Mozambique and has been present for more than 10 years (Pierce *et al.*, 2008). Williams (2017) has documented marine turtle mortality at shark fishing camps, and it is suspected that the meat of bycaught marine turtles sustains fishers while they target sharks and rays.
- An emerging **fishery for crayfish** sold exclusively to Asians buyers was documented in Ilha de Moçambique (Nampula province) and, based on rumors, it may also exist in Pemba (Cabo Delgado province). Reportedly, this fishery resorts to artificial respiratory means that use air compressors made from modified truck engines. While this practice is illegal, the vessels that are used can easily hide illegal catches (such as marine turtles) in the compartment that houses the air compressor.
- Fishers in Quirambo Island, in Quirimbas National Park (Cabo Delgado province), reported that Chinese and Tanzanian demand for **live crabs** since the early 2000s has led to switching from fishing nets to cages. Fishers indicated that they use turtle meat sourced from turtles bycaught in gamboas (large traditional fishing fence traps) as effective bait in the cages. A gamboa can catch up to 50 turtles in a single tidal cycle. Only one gamboa exists near Quirambo Island and, while it is frequently inspected by the Park's authorities who release bycaught turtles, when the trap is unsupervised, opportunistic fishers are reported to take turtles to use for baiting and consumption. Turtle meat being used as bait was also reported in interviews in Quionga (Cabo Delgado) and Pomene (Inhambane).
- There appears to be an emerging market for **dried sea horses** throughout Mozambique¹⁴. Artisanal fishers reportedly sell to Mozambican middlemen, and these directly to Chinese buyers. This was reported by respondents in Inhassoro (Inhambane) and has also been previously observed on a larger scale in Cabo Delgado (pers. observ. by J. Williams, September 2017). Fisheries management officials in Cabo Delgado reported that the Mozambican Customs Authority had recorded large movements of sea horses to Hong Kong from Mozambique potentially suggesting an established trade network that could facilitate marine turtle trade.

¹² IPPMedia (2018). *Tanzanian fishermen arrested in Mozambique for turtle poaching*. Available at :

<https://www.ippmmedia.com/en/news/tanzanian-fishermen-arrested-mozambique-turtle-poaching>.

¹³ Club of Mozambique (2018). *Groups with terrorist links in Mozambique protect illegal trade routes to the north – study*. Available at:

<https://clubofmozambique.com/news/groups-with-terrorist-links-in-mozambique-protect-illegal-trade-routes-to-the-north-study/>.

¹⁴ Coconuts Hong Kong (2014). *67 Kg of dried seahorses seized from container ship arriving from Mozambique*. Available at :

<https://coconuts.co/hongkong/news/67-kg-dried-seahorses-seized-container-ship-arriving-mozambique/>.

A comparison between findings in the literature and those during the present study provides some further insights into how trade in marine turtles has evolved in Mozambique. In line with what has been previously reported by IOSEA (2014), the present study found marine turtle take in the waters of Mozambique to continue to be largely perpetrated by locals.

In 2012, the killing of marine turtles near fishing camps was thought to be of significant concern (IOSEA, 2014; and references therein). More recently, the work by Williams (2017), mentioned above, confirms that the illegal use of marine turtles in fishing camps prevails in Mozambique, and that this continues to be a source of concern for the species impacted.

The information collected during the present assessment, however, is not sufficient to draw conclusions on the level of marine turtle egg take in Mozambique. For this, reports by IOSEA (2014) indicating that a high level of egg consumption was taking place in the country in 2014 cannot be confirmed for the present time.

Insights into conservation impacts

Measuring the effort and impact that small-scale artisanal fisheries have on non-target species in a standardised manner has been a longstanding challenge. Of the 70 fishers who indicated that they had seen marine turtles, 42% indicated that they saw varied species daily. These results suggest a high potential for intentional and unintentional interaction when considering the widespread distribution of artisanal fisheries and marine turtles throughout Mozambique's coast.

Of 77 fishers, approximately 40% perceived marine turtle populations to be increasing (20% suggested the opposite trend). It is unknown whether these perceptions reflected actual population increases, or simply an increase in sightings associated with an increased fishing effort and a greater awareness of the protected status of marine turtles.

Although robust data on population size estimates for marine turtles in Mozambique is lacking, available data suggests that nesting numbers would not be able to support the current level of take by fishers. For example, Fernandes *et al.* (2017) recorded 2,308 tracks and 1,160 nests along the Mozambican coast during the 2016/2017 nesting season (this included loggerhead, green, leatherback, hawksbill turtles, and unidentified species; of note, is that the monitoring coverage was only ~5% of the total coastline). These numbers contrast significantly with the estimated 4,985 turtles potentially being taken only by 48 of the 77 fishers interviewed, and in three provinces studied (Cabo Delgado, Inhambane and Nampula). It appears likely that marine turtles in Mozambican waters originate from other regional rookeries (e.g. Europa, Mayotte and Seychelles), which are likely also seeding beaches in Madagascar, where marine turtles are also taken. The sustainability of the current levels of take in Mozambique is therefore unknown, as is the origin of the relevant marine turtle stocks. Increasing coastal populations in Mozambique and a heavy national reliance on fish for consumption could lead to increased levels of illegal take (Williams, 2017).

In addition to illegal wildlife trade, emerging threats to marine turtles within national waters (and throughout the SWIO) include illegal, unreported and unregulated fishing (IUU), as well as large-scale industrial developments in northern Mozambique (Obura *et al.*, 2019). Reports of IUU were evident from statements by artisanal fishers in Inhambane. The present assessment did not look deeply into IUU fishing in Mozambique, but resulted nevertheless in the confirmation of two such vessels operating in Mozambican waters, in 2016 and 2018. Data deficiencies render the scale of this threat unknown.

Applied management options that may be considered for other areas

Conservation management examples exist which could be considered for informing other conservation activities in Mozambique:

- According to management respondents, the effective enforcement and protection of marine turtles in Ponta do Ouro Marine Partial Reserve (POPMR) has led to major reductions in poaching cases, with these being down to approximately one event per year.
- Garnier *et al.* (2012) described successful examples of community-based management in Vamizi Island (Quirimbas archipelago).
- The WWF Management-Oriented Monitoring System (MOMS) implemented in the Quirimbas National Park also appears to be having an initial success in supplementing national enforcement.

Findings suggest that it is key that management options for the conservation of marine turtles in Mozambique take into account the rule-setting role that community leaders and traditional chiefs have regarding the use of marine turtles. Furthermore, findings point to the need for revising legislation that describes community fishing councils (CCPs; Ministério do Mar, Águas Interiores e Pesca, 2003), as to provide these bodies with the jurisdiction to legally enforce sustainable fishing measures other than those described within general marine fisheries regulations.

With a view to inform management options, consideration should also be given to additional work that can help understand better the trade in marine turtles, such as assessing the scale and impact that the shark and ray, crayfish, live crab, and dried sea horse fisheries have on marine turtles in **Mozambique**, as well as understanding whether there are relevant linkages between marine turtle trade and larger criminal networks operating in northern Mozambique.

Conclusions – Mozambique

Marine turtles are protected in Mozambique under national legislation and regulations which prohibit the capture of, and trade in these species. The artisanal fishery in Mozambique is mostly non-selective, and all catch is generally retained. This includes marine turtles, irrespective of whether they were targeted (approximately 30% of 77 fishers interviewed indicated that they would take bycaught turtles).

Among 48 fishers interviewed, there was a reported average annual bycatch and targeted take of marine turtles of 4,985 specimens in the provinces of Cabo Delgado, Inhambane and Nampula. A linear extrapolation from these responses to all artisanal fishing gears indicates that a potential 800,000 turtles are removed as targeted and non-targeted catch per year only in the three provinces assessed. If these catch levels are indeed realistic, they would certainly increase when considering the entire coast of the country, as well as the (seemingly negligible in comparison, according to estimates by Gove *et al.* [2001]) bycatch levels in the semi-industrial and industrial fleets operating in Mozambique. While marine turtles are known (from literature) to be bycaught by the semi-industrial and industrial fisheries sectors in Mozambique, further work is necessary to understand whether those specimens are retained for consumption and trade.

Marine turtle take in Mozambique was found to be mainly for local use (e.g. consumption or as fishing bait) and domestic trade. Domestic take and trade were found to largely involve local artisanal fishers, although it is not clear whether foreign migrant fishers (particularly those from Tanzania) contribute to, or influence these activities. Being generally low-priced, marine turtle meat appears to offer a relatively accessible food resource for poor communities.

Amongst the locations surveyed, domestic sales were more evident from interviews undertaken in the northern part of the country, in Cabo Delgado. The sale of turtle meat and eggs was found to take place in the north, and there may be clandestine sale of meat in the south – although this was undetected in the present study. The sale of turtle carapace products was found to take place in tourist craft markets in both the north and south of the country. Given that artisanal fishers do not have the skills for crafting products made of turtle carapace, it is believed that some intercity trade may exist so that carapaces can be worked by artisans (e.g. the Makonde in northwestern Mozambique are known for these skills).

Evidence of international trade was documented during conversations with fishers and fishery management officers. While some respondents indicated knowing of foreign buyers and of active international trade, not many were aware of more than two international buyers in their area, or of destinations of international trade. Although some reports indicate that illegal trade in marine turtles occurs across the northern border of Mozambique into Tanzania, it is unclear at what frequency this happens, and whether any specimens traded are destined to Tanzania's domestic market, or if this country is part of a larger trade route. No such reports of international trade were documented for southern Mozambique. Based on the present findings, it appears that domestic trade exceeds the magnitude and impact of international trade in marine turtles. No evidence of online trade in marine turtles sourced from Mozambique was found during this assessment. Given the lack of internet connection in many areas where marine turtles are landed, online trade appears to not be of concern at present.

During interviews, some fishers reported that domestic trade has drastically declined since the end of the civil war in 1992. While there is insufficient data available to understand how trade has evolved, a comparison between present findings and those in the literature offers some insight. For example, it had already been reported in 2012 (IOSEA, 2014; and references therein) that marine turtles were consumed by fishermen at temporary fishing camps in Mozambique. More recent works (Williams, 2017) have confirmed the prevalence of this practice. Also, as

previously reported by IOSEA (2014; and references therein), locals appear to continue being the main perpetrators of illegal take in Mozambique.

Given the widespread distribution of artisanal fisheries in Mozambique and the heavy national reliance on marine products for consumption, the present findings point to a high potential for intentional and unintentional interaction with marine turtles. Although robust data on marine turtle population sizes is lacking for Mozambique, available data suggests that nesting numbers in the country would not be able to support the current estimated level of take by fishers. National stocks may be seeded from other rookeries, but further research is needed to better understand this, as well as the sustainability of any take levels.

Findings suggest that it is key that management options for the conservation of marine turtles take into account the rule-setting role that community leaders and traditional chiefs have regarding the use of marine turtles. A revision of the national legislation that describes community fishing councils (CCPs; Ministério do Mar, Águas Interiores e Pesca, 2003) is also necessary, and this should be undertaken with a view to provide these bodies with the jurisdiction to legally enforce sustainable fishing measures other than those described within general marine fisheries regulations. It is also important to assess the degree to which other fisheries in the country contribute to, or influence marine turtle take and trade.

If future trade assessment efforts are pursued in Mozambique, it would be relevant for these to visit locations that were not possible to visit during the present study due to time constraints. A comprehensive list of these locations is available in section 7.3 (“Additional priority survey areas”) of CITES document CoP18 Inf. 18, Annex 2.

Findings in Colombia, Nicaragua and Panama (Inter-Americas)

Colombia

This section includes a summary of the findings by World Wildlife Fund, Inc. (see CITES document CoP18 Inf. 18, Annex 3), as well as additional information from the literature compiled by the Secretariat.

Assessment methods

The following methods were applied by World Wildlife Fund, Inc. to assess the status, scope and trends of the trade in marine turtles in Colombia, as well as its conservation impacts, management options and mitigation priorities:

Interviews were undertaken with 53 inhabitants of local communities on the Pacific and Caribbean coasts of the country (fig. 14). These interviews were conducted in the departments of Valle del Cauca (Buenaventura), Chocó (Bahía Solano), Sucre (Tolu; San Bernardo Islands; Coveñas), Bolívar (Cartagena; Barú; Rosario Islands; San Bernardo Islands), Magdalena (Santa Marta), La Guajira (El Cabo de la Vela; Riohacha; Uribí; Palomino), and in the insular department of San Andrés, Providencia and Santa Catalina



Figure 14 – Departments of Colombia that were assessed during the present study.

(San Andrés Island; Providence). **Local market and touristic sites** at these locations were also surveyed between 1 and 31 May 2018 to determine the availability of turtle meat and of hawksbill handicrafts.

A **rapid electronic survey** was conducted for three hours per day during seven days in May 2018 to search for the online availability of marine turtle products. Facebook, Instagram and OLX were searched for these products.

An **analysis of seizure records** from 2000 to 2018 was undertaken for the department of La Guajira (data held by Corpoguajira, the Regional Environmental Authority), and from 2000 to 2017 for the national level (data held by the Environmental Crime Research Group of the National Police). Seizure data for Cartagena was requested to the relevant authorities, but this request was unsuccessful.

A **literature review** was conducted to complement findings on the ground.

Legislation and regulations relevant to marine turtles

Five species of marine turtle are distributed in Colombia: loggerhead turtle, green turtle, leatherback turtle, hawksbill turtle, and olive ridley turtle. In Colombia, marine turtles are protected along the Pacific and Caribbean coasts through national regulations, legislation and agreements. Amongst others, these regulate the operation of trawl fisheries (Resolution 167 of 1966 byINDERENA); prohibit poaching of nests and neonates, disturbing nesting females, and destroying or deteriorating breeding areas (Decree 1608 Regulation of the Code of Natural Resources in 1978, based on Decree 2811 of 1974); ban the capture of hawksbills (Resolution 1032 of 1977 byINDERENA); establish protection norms for all marine turtle species, their nesting beaches and foraging areas (Agreement 021 of 1991 byINDERENA); prohibit the use of marine turtles bycaught in the shrimp fishery (Resolution 108 of 1992 byINPA); require the use of Turtle Excluder Devices (TEDs) in the trawl fleet of the Colombian Caribbean and Pacific (Resolutions 157 of 1993 and 107 of 1996 byINPA); prohibit trawling in marine turtle concentration areas (Resolutions 726 of 1974, and 709 of 1981, and Agreements 24 of 1983 and 54 of 1988 byINDERENA); and establish a regional ban on the use of marine turtles in La Guajira and Magdalena departments (Resolution 2879 of 1995 by Corpoguajira, and Res. 1644 of 1998 by Corpomagdalena).

In addition to national regulations, legislation and agreements, Colombia is also part of several international conventions and agreements that are relevant to marine turtles. These include CITES, the Convention for the Protection of Flora, Fauna and Scenic Natural Beauties of the Countries of America, the Convention on Biological Diversity, the Convention on the Continental Shelf, the Universal Declaration of Animal Rights, and the United Nations Convention on the Law of the Sea.

The implementation of a new Penal Code in 2000, which includes a section on crimes related to natural resources and the environment (Penal Code, Article 328), provides national authorities with tools to protect biodiversity in Colombia, including marine turtles and their habitats.

Overview of the use of marine turtles in Colombia

The communities inhabiting Colombia's Caribbean coast have always used marine turtles as a source of protein (Bräutigam *et al.*, 2006; and references therein). Exploitation in the San Andrés Archipelago dates at least as far back as the colonization by English settlers in the 17th century (Bräutigam *et al.*, 2006). Marine turtles have played an important traditional and economical role for the indigenous Wayúu people. It was estimated by Instituto Humbolt in 2000 (Bräutigam *et al.*, 2006) that more than 2000 turtles/year were taken by these people from foraging areas off the coast. Cordoba and Lopez (1997, cited in Bräutigam *et al.*, 2006) had estimated the total annual capture of hawksbill, green and loggerhead turtles in the San Andrés Archipelago at approximately 1000 turtles/year in the artisanal fishery. At the national level, marine turtle exploitation has focused on eggs, meat, viscera and oil, and carapace for the production of handicrafts (Bräutigam *et al.*, 2006).

Sources of marine turtle take in Colombia

Results indicate that illegal take and trade in marine turtles takes place along both the Pacific and Caribbean coasts of Colombia. Findings indicate that marine turtles are taken at least in the departments of Sucre, Valle del Cauca, Bolivar, San Andrés, Providencia and Santa Catalina, and La Guajira. Egg poaching was also found to be present, being undertaken, at least, in the department of Chocó. Some of the main findings concerning products traded and identified trade locations are described below.

Domestic use and trade

A well-established market for marine turtle **meat** was found to exist in Buenaventura (the main port in Colombia's Pacific coast, located in Valle del Cauca department), and in the departments of San Andrés, Providencia and Santa Catalina and La Guajira. Marine turtle meat is also consumed in Tolu (Sucre). In La Guajira department, the local community in El Cabo de la Vela (mainly Wayuú indigenous) has special nets for catching marine turtles. At the time that this site was visited, at least seven nets were deployed at sea.

Twelve restaurants selling marine turtle **meat** dishes daily were found in a market place in Buenaventura (Valle del Cauca), two in San Andrés Island, and four in La Guajira (although locals in Riohacha [La Guajira] suggest this number may be 15). In Riohacha, it was found to be relatively easy to find marine turtle meat sale points. A fisherman in the fish market of San Andrés Island was found selling marine turtle meat, and he demonstrated interest in selling the whole turtle to known buyers, rather than portions of it, because the former would fetch a higher price. As fishermen often process marine turtles on board to evade detection at port controls, by the time that specimens reach restaurants, the species being commercialized are typically unknown. Based on the information obtained from interviews involving restaurants in Riohacha where marine turtle meat is sold, it seems possible that at least four green turtles are sold in this city per week.

Marine turtle **penis** was found to be a sought-after product for its alleged aphrodisiac properties in Buenaventura (Valle del Cauca), where bottled penis beverages were found on sale.

Egg consumption was found to take place along the Pacific coast of Colombia. A small coastal community in Bahía Solano (Chocó) was found to consume eggs (meat appears to not be consumed here due to efforts by local associations that depend on marine turtle ecotourism).

It was found that the sale of raw marine turtle **carapaces** exists in Colombia in the departments of Bolivar, Valle del Cauca, La Guajira, San Andrés, Providencia and Santa Catalina and Sucre. A fisherman in Tolu (Sucre) was found to sell marine turtle carapaces to people from the cities of Bogotá, Medellín, Monteria and Cali. When visited, at least six carapaces were in his possession (five belonged to green turtles and one to loggerhead turtle; but he also seemed to sell hawksbill carapaces; fig. 15). Findings suggest that carapaces sourced from the San Andrés, Providencia and Santa Catalina Archipelago are sent to Cartagena to be worked and sold as handicrafts.

The sale of **handicrafts** made of hawksbill carapace was found to exist in Cartagena (Bolívar department), in Tolu (Sucre department), in Santa Marta (Magdalena department) and in Baru (Bolívar department). In Cartagena, products are commonly offered in street sales in main touristic places. At some locations, handicraft products are openly offered (fig. 15) and at others they are not displayed and will only be shown if requested. In Magdalena department, two souvenir markets were found to sell hawksbill handicrafts, and one seller indicated that the products came from Cartagena.

There appears to be an increasing demand for **cock fighting spurs** made of hawksbill carapace (fig. 15) in the Colombian Caribbean. These spurs were found for sale in Baru (Bolívar), where it is easy to identify retailers and cock fighting locations through taxi drivers. The sale of cock fighting spurs is made discretely. In addition to being offered in physical markets, five offers of cock fighting spurs made of hawksbill shell were found online (fig. 16). Some of these advertisements indicated that they would ship the products to any place within the country upon demand. It seems possible that these products could also be shipped to destinations outside the country. Anecdotal evidence suggests that these products may be reaching abroad destinations such as Ecuador, Guyana, Suriname, and Venezuela.

There is no estimate available for the number of marine turtle specimens that may be in trade in Colombia since community members did not easily share such information. Additionally, a significant part of the specimens observed in trade were in processed form, challenging potential quantifications of traded volumes.



Figure 15 – Left: local fisherman from Tolu selling marine turtle carapaces. Right: handcraft items (jewelry) made of hawksbill carapace being offered in Cartagena.



Figure 16 – Cock fighting spurs originating in Colombia being retailed on Facebook.

Analysis of seizure data

The analysis of seizure records (2000-2018) for La Guajira (database held by CorpoGuajira, Regional Environmental Authority) indicates that 250 seizures by the Cartagena Police involving marine turtles of at least four species took place during this period.

The analysis of seizure records (2000 to 2017) for the national level (database held by the Environmental Crime Research Group of the National Police) indicates that a total of 3,373 wildlife crimes have been reported by the National Police between 2000 and 2017. Of these, 92 were crimes related to marine turtles and involved hawksbill, green and leatherback turtles. Data for 2018 for this database was not available.

These analyses show that the number of marine turtle seizures recorded in La Guajira department from 2000 and 2018 (250) was considerably higher than the number of cases recorded at the national level for the period 2000 to 2017 (92). In Colombia, the department-level data is required to be communicated and fed into the national level database by the relevant authorities. Although it is possible that there is a delay in the data being communicated from the department level to the national level (e.g. for the period of 2018), it is also possible that the observed discrepancy between seizure reports reflects a lack of cooperation between regional and national level environmental authorities.

Domestic drivers of trade

Findings suggest that fishermen catch marine turtles along both the Pacific and Caribbean coasts. In the Caribbean region, there is an additional pressure from the indigenous Wayúu people who target marine turtles resorting to special nets for this purpose. When landed, specimens (often meat that has already been processed onboard to evade controls) are sold directly to restaurants, or to intermediaries who then sell the meat to restaurants. Findings suggest that intermediaries are also involved in taking carapace and penis to artisans and curio sellers.

The sale of marine turtle meat and carapace provides extra income to local fishermen, handicraft artisans and local divers. For example, in La Guajira, where marine turtle meat is consumed and where the Wayuú use special nets to target these species, poverty levels almost double national ones (52,6% and 26,9%, respectively, in 2017; Gobierno de Colombia, 2018). In this area, a live turtle can be sold for over USD 300.

In addition to economic and consumptive motivations, the use of marine turtles in Colombia has a social/traditional component. For example, in Buenaventura (Valle del Cauca) people believe that consuming turtle penis confers aphrodisiac properties; in La Guajira, marine turtle meat is traditionally consumed by the Wayuú in early morning hours because it is believed that it reduces the effects of alcohol intake.

Generally, those involved in the use and trade in marine turtles are aware of its illegality. Because of this, it is common for product sales to take place in a secretive manner.

Species and specimens in trade, including by region

Findings suggest that all marine turtles present in Colombia continue to be targeted for domestic use and trade, as had previously been reported by Bräutigam *et al.* (2006). Based on observations, specimens traded include meat (sold as raw portions and as traditional dishes), penis (sold as prepared beverages), whole carapaces, and handicrafts made of hawksbill carapace (including cock fighting spurs, which appear to be a relatively novel product in trade; fig. 15 and 16). In Colombia, meat consumption and hawksbill carapace trade are the two main markets for marine turtle products.

The domestic trade in marine turtles in Colombia has been observed along both the Pacific and the Caribbean coasts. Findings suggest that along the Colombian Pacific, the market for marine turtle products is particularly oriented to meat consumption, with other uses (such as the consumption of turtle penis) being supported by mythical beliefs. While meat consumption is also prevalent along the Colombian Caribbean, there is also a market focused on hawksbill carapace which is used for the production of cock fighting spurs and other handicrafts.

Prices

The observed prices for marine turtle products found on sale in the different Colombian departments are as follows:

- Whole turtle: USD 230.00-500.00 (estimated)
- Pound of meat: USD 2.50-5.00
- Meat dish: USD 5.00–10.00
- Egg: USD 0.15
- Bottled penis beverage: up to USD 40.00
- Carapace: USD 20.00 -120.00
- Handicrafts made of hawksbill carapace: USD 1.50-10.00
- Pair of cock fighting spurs made of hawksbill carapace: USD 7.00-10.00

Illegal international trade

Evidence of international trade in marine turtle products collected during the present work was obtained through interviews and, to some extent, through observations. Reports during the present work in Panama indicated that carapaces sourced from Comarca Kuna Yala (Panama) were sold to incoming ships from the cities of Cartagena and Turbo (Colombia). It is suggested that raw carapace is sold from Panama to Colombia for processing, being later imported back into Panama as valuable cock fighting spurs. Through interviews in Nicaragua it was also reported that a part of marine turtle carapaces sourced along the Caribbean coast of Nicaragua were exported to Colombia. Anecdotal evidence from interviews in Colombia further suggests that cock fighting spurs made of hawksbill carapace may be reaching abroad destinations such as Ecuador, Guyana, Suriname and Venezuela.

The availability of many hawksbill items offered at markets and street sales in touristic places in Colombia indicates a potential for some international export through tourists purchasing these products.

In addition, Barrios-Garrido *et al.* (2017) found that marine turtles originating from the southwestern coast along the Gulf of Venezuela are moved across the border into Colombia. These authors found that, according to 33 respondents, the most common destinations in Colombia were the cities of Riohacha and Maicao (Guajira Colombian Peninsula), although some respondents also indicated Valledupar, Santa Marta, Barranquilla, Cartagena

de Indias, Rosario Islands, and even Panama. There was not much clarity concerning the products that are exported. Some responses obtained by those authors indicated that this trade comprised only hawksbill carapace.

Trends

Among those interviewed, nine inhabitants on the Pacific coast and nine on the Caribbean coast indicated that the illegal trade in marine turtle products had decreased in the last 10 years. They argued that this had been a result of a decline in wild populations, and of stronger enforcement efforts focusing on tackling national security and drug trafficking.

These perceptions from respondents contrast with the findings of Harrison *et al.* (2017). Harrison *et al.* (2017) indicated that information on marine turtle trade in Colombia has been collected since 2008 by Fundación Tortugas del Mar. As part of the work of this organisation, each year 60–65 street vendors in the city of Cartagena de Indias (Caribbean coast) were interviewed; a further 32 souvenir shops and retail stores were also visited. Harrison *et al.* (2017) reported that prior to 2012 none of the permanent locations visited had any products for sale, but since then carapace items had been recorded at these stores. An extrapolation of the product numbers in trade based on observations between 2008 and 2012 suggests that (at a maximum) around 2,593 products would have been on offer annually amongst approximately 18 stores in the town surveyed. Of interest is that surveyors reported an observed expansion of the trade in these items into neighbouring tourist locations.

While the data collected in the present study has not enabled a quantification of specimens in trade, and the results are not clear on the trend of illegal trade, it is clear that this illegal activity prevails along both the Pacific and Caribbean coasts of Colombia. Based on the interviews in Colombia, Nicaragua and Panama during the present study, it seems possible that there be a rising demand for cock fighting spurs made of hawksbill carapace in this subregion, which have been observed for sale not only physically, but also online. Given that specimens are advertised online, trade in these products has the potential for reaching international destinations.

Insights into conservation impacts

Inhabitants in La Guajira department include the Wayuú indigenous. It has been reported that these people traditionally catch adult marine turtles during their migratory movement from Tortuguero (Costa Rica) to Aves Island (Venezuela) and Florida (United States of America), and subadults migrating from Bermuda and Turks and Caicos (pers. comm. to World Wildlife Fund, Inc., marine turtle researcher, May 2018). Many of these breeding females are illegally taken while feeding on grounds near shore waters of La Guajira Peninsula, between Colombia and Venezuela (Barrios-Garrido, 2018).

The present study has not been able to robustly quantify the volume of marine turtles taken in Colombian waters, but has revealed that illegal take, use and trade prevail in the country. It is unclear whether take levels are sustainable.

Applied management options that may be considered for other areas

WWF has been working with law enforcement authorities in Cartagena to tackle illegal trade in marine turtles. As part of this project, 50 police officers and environmental authorities have been trained to identify products made of hawksbill carapace that are traded. In April 2018, 250 hawksbill handicraft items were seized by the environmental and ecological police in Cartagena. Such a model, whereby the government/department-level governance collaborates with non-governmental organisations (NGOs) to build capacity for enforcement could be expanded to other areas of the country.

In 2002, the Colombian Environment Ministry developed the “National Programme for the Conservation of Marine and Continental Turtles in Colombia” (Ministerio del Medio Ambiente, 2002). The programme identifies several action lines, goals and activities that aim to achieve the conservation and sustainable management of marine turtles by 2022. Some of the goals address unsustainable use, and can guide future management efforts.

Conclusions – Colombia

The capture and use of, and trade in marine turtles are prohibited in Colombia. Findings indicate that there is illegal use of, and trade in marine turtles along both the Pacific and Caribbean coasts of Colombia. The present study found the presence of a market for marine turtle meat in many parts of the country, namely in the departments of Valle del Cauca (Pacific coast), San Andrés, Providencia and Santa Catalina, Sucre and La Guajira (Caribbean coast). In these departments, restaurants were found to be selling marine turtle meat as traditional dishes. Other products were also found to be illegally traded in Colombia: marine turtle penis is a commodity in demand, at least in Valle del Cauca; and egg consumption was found to take place along the Pacific coast of Colombia in the department of Chocó.

Additionally, interviews and observations revealed the presence of a market for hawksbill carapace and products made of it, such as cock fighting spurs. A demand for cock fighting spurs was encountered in the department of Bolívar and also through online advertisements. Findings suggest that marine turtles in Colombia are largely taken for domestic use and trade.

Marine turtles are captured by fishermen along the two coasts of Colombia. In the Caribbean region, the indigenous Wayúu are known to target marine turtles using special nets. Processed meat is sold to restaurants, and it is believed that intermediaries take their carapaces and penises to artisans and curio sellers.

Generally, those involved in the trade are aware of its illegality. However, the use of, and trade in marine turtles provide a valuable food and income source for many poor communities. For example, in La Guajira, where marine turtle meat is consumed, poverty levels almost double national level ones. Because people are generally aware of the illegality involved in the use of, and trade in marine turtles, it is common for trade to be undertaken secretly.

Evidence of international trade in marine turtles was identified through some anecdotal reports suggesting that Colombia may be a source of cock fighting spurs made of hawksbill carapace that are found for sale in other countries in the region. It seems that carapaces may be imported from Panama and Nicaragua for processing in Colombia, and later exported to Panama as valuable cock fighting spurs. Further reports collected during interviews suggested that cockfighting spurs exported from Colombia may reach abroad destinations such as Venezuela, Guyana, Suriname and Ecuador. It appears likely that illegal export is also occurring through tourists purchasing handicrafts made of turtle carapace offered in tourist areas. In addition, Barrios-Garrido *et al.* (2017) found that marine turtles originating from the southwestern coast along the Gulf of Venezuela are moved across the border into Colombia. While there was not much clarity concerning the products that are exported, some respondents indicated that this cross-border trade comprised only hawksbill carapace.

The data collected does not enable a comparison of trends in trade over time. Some respondents perceived the illegal trade in marine turtles to have decreased in the past 10 years as a result of a decreasing wild populations and of stronger enforcement efforts. Still, it was found to be relatively easy to find meat and handicraft (particularly cock fighting spurs) sales points in the country. Contrasting with the views of the mentioned respondents, Harrison *et al.* (2017) reported that annual market surveys for hawksbill handicrafts since 2008 in one city alone (Cartagena de Indias) revealed a gradual expansion of trade into novel parts of town. They also reported that, prior to 2012, none of the permanent locations surveyed had any hawksbill products for sale, but since then carapace items had been recorded at those stores. Some anecdotal evidence collected through the present work also suggests that there may be a rising demand for cock fighting spurs made of hawksbill carapace.

While the exact trend, levels and conservation impacts of marine turtle trade in Colombia are not clear, the present findings confirm that illegal take, use and trade are present in the country. The information collected on the geographical prevalence of these activities, and the types of products traded provide relevant data that can be used in future temporal comparisons.

Relevant efforts to improve the conservation of marine turtles in Colombia shall include engaging with different community members, including fishers, curio sellers and restaurant owners to identify viable alternatives to the use of marine turtles. It is also important to improve enforcement controls at sites where marine turtles are known to be taken, used and traded.

Nicaragua

This section includes a summary of the findings by World Wildlife Fund, Inc. (see CITES document CoP18 Inf. 18, Annex 3), as well as additional information from the literature compiled by the Secretariat.

Assessment methods

The following methods were applied by World Wildlife Fund, Inc. to assess the status, scope and trends of the trade in marine turtles in Nicaragua, as well as its conservation impacts, management options and mitigation priorities:

Interviews were undertaken with 80 people, including fishermen, merchants, turtle carapace artisans, tour operators, government officials, and community members. These interviews took place between 20 June and 9 July 2018 and were conducted in locations of five departments along the Nicaraguan Pacific - Carazo (Chacocente), Chinandega (Aserradores, Puerto Corinto, El Viejo, Padre Ramos), León (El Tránsito), Managua (Masachapa), Rivas (La Flor, Pie de Gigante, San Juan del Sur); and two departments along the Nicaraguan Caribbean – North Atlantic

Autonomous Region (RAAN; specifically in Bilwi), and South Atlantic Autonomous Region (RAAS; specifically in Bluefields and Corn Island; see fig. 17). **Local markets and street sales sites** at these locations were also surveyed to determine the availability of turtle products. These surveys were undertaken between 1 and 31 May 2018.

A rapid electronic survey was conducted for three hours per day during seven days in May 2018 to search for evidence of online sale of marine turtle products. Facebook, Instagram and OLX were searched for these products.

A literature review was conducted to complement findings on the ground.



Figure 17 – Departments of Nicaragua. Source: <https://www.bizbilla.com/country-maps/nicaragua.html>.

Legislation and regulations relevant to marine turtles

Nicaragua is divided into 15 departments and two autonomous regions. There are five species of marine turtle in Nicaragua: loggerhead turtle, green turtle, leatherback turtle, hawksbill turtle, and olive ridley turtle. All species are directly and indirectly addressed through national legislation and regulations. Amongst others, these prohibit permanently the catch of hawksbill turtle (MARENA Executive Decree No. 07-99 1999); provide for stronger national political cooperation for the protection of hawksbills (Regional Council Resolution No. 192-02-04-00 2000); establish an indefinite ban on the capture of, and trade in all marine turtles since 2005 (MARENA Ministerial Resolution No. 043-2005, see paragraph below); and prohibit the commercialization of certain marine resources whose provenance cannot be proven, of species in Nicaragua and Central American countries with closures, and of species prohibited through international agreements (Fisheries and Aquaculture Law, INPESCA 2004, reformed in 2014, Section 49). This latter law prohibits the capture, killing or exploitation of marine turtles and the use, commercialization and transportation of their specimens, except for scientific purposes in accordance with the provisions of CITES.

The Ministry of Environment and Natural Resources, MARENA, established an indefinite closure and prohibition on harvesting and marketing marine turtle eggs and other marine turtle specimens in all of Nicaragua since 2005 (Madrigal-Ballesterio *et al.*, 2017). However, the constitution of Nicaragua recognizes special natural resource use rights. Under the Fisheries and Agriculture Law No. 489 of 2004, the communities of the Atlantic coastal regions can use marine turtles for subsistence. Take other than for subsistence is prohibited, as is the sale of turtle meat beyond those communities. This is only allowed on the Atlantic coast and fishermen must comply with closing seasons and regulations, risking penalization otherwise (Garland *et al.*, 2010). However, likely unintentionally (Lagueux *et al.*, 2014), the Fisheries and Agriculture Law No. 489 of 2004 did not refer to specific marine turtle species, and therefore allowed subsistence use of all marine turtles.

Through Ministerial Resolution No. 02.01.2013, MARENA protects all marine turtles in Nicaragua through a year-round closed season (Lagueux *et al.*, 2014). The exception to this applies to green turtles that can be used for subsistence by the Caribbean indigenous communities, with regional regulations limiting harvest numbers (Garland *et al.*, 2010). The Government of the RAAN determined (14 July 2016) that for the period 2016-2017 the annual quota for hunting green turtle would be 2,500 specimens (minimum sizes were specified for females and males); for

the RAAS it was been determined that for the period 2015-2018 the annual capture quota would be 2,541 specimens (sizes also specified by sex; Resolution of the Board of Directors of the Autonomous Regional Council of the South Caribbean Coast No. 863-10-09-2015). While harvest quotas exist, the lack of enforcement efforts (Bräutigam *et al.*, 2006; Lagueux *et al.*, 2014), and the fact that the quotas frequently change without explanation (Garland *et al.*, 2010) challenge the implementation of regulations that limit harvest.

In addition to national legislation and regulations, Nicaragua is also a signatory to several international conventions and agreements which are relevant to marine turtles. These include CITES, the Ramsar Convention, the Cartagena Convention, the Convention on Biological Diversity, the Convention for the Conservation of Biodiversity and Protection of Priority Wilderness Areas in Central America, and the Cooperation Agreement for the Conservation of Sea Turtles on the Caribbean Coast of Panama, Costa Rica, and Nicaragua. Nicaragua is a signatory to IAC but has not yet ratified this agreement.

Historic note on the use of marine turtles in Nicaragua

Nicaragua has a long and well-documented history of marine turtle exploitation for both subsistence and commercial purposes (Bräutigam *et al.*, 2006). Marine turtles and their eggs have been exploited by indigenous inhabitants, and by foreign fleets for at least 500 years (Lagueux *et al.*, 2014; and references therein), having played an important role in providing nourishment, maintaining social relationships and economies based on sharing and exchange, and providing the means for coastal indigenous groups to acquire income and material goods (Parsons 1956, cited in Garland *et al.*, 2010).

During the 20th century, the green turtle fishery in Nicaragua represented an important international market, with three green turtle packing facilities having been established along the Caribbean coast during the 1960s and 1970s with financial support from the U.S. Agency for International Development for the sole purpose of export (Lagueux *et al.*, 2014). While these plants were closed by 1977, 4,000 to 10,000 turtles were believed to have been taken annually between 1968 and 1971 to supply local and international demand (Lagueux *et al.*, 2014; and references therein). Later, during the Contra/Sandinista civil war, at least 2,783 green turtles were thought to have been captured in the Miskito Cays area and sold in the local market (Lagueux *et al.*, 2014; and references therein). Lagueux *et al.* (2014) describes the historical aspect of the Nicaraguan green turtle fishery in detail.

Sources of marine turtle take in Nicaragua

Marine turtles and their eggs are taken by coastal communities at sea and on beaches. The olive ridley arribada beaches in Nicaragua provide ample opportunity for egg take of these species, and subsequent trade. Along the Caribbean coast of Nicaragua, turtles can be taken legally for subsistence purposes by indigenous coastal communities, but specimens are also taken illegally in the country along its Pacific coast.

Domestic use and trade

Findings identified that marine turtles are captured by fishing gear in the departments of Chinandega (in Puerto Corinto), León (El Tránsito), Managua (San Rafael del Sur), and RAAS (Bluefields and Corn Island). **Meat** is traded locally in Puerto Corinto. **Flippers** are also sold there in town, but also in Managua. Fishermen in the community of Masachapa (Managua department) were found to receive requests to supply turtle meat to Caribbean ethnic groups who live on the Pacific coast of the country. Meat and flippers were found to be sold in Managua city to places owned by people originating from the Caribbean coast. Interviews also confirmed the presence of meat retailers along the Caribbean coast, in Bilwi (RAAN; fig. 18) and Bluefields (RAAS). In the RAAS, most meat is marketed locally, but some is transported to the Pacific coast for food businesses.

The marine turtle **eggs** commercialized in Nicaragua are mainly collected from the Pacific coast in the departments of Chinandega (in El Viejo, Puerto Corinto), León (in El Tránsito), and Rivas. In El Viejo, eggs are partially consumed locally, and partially sent for trade in nearby cities. In Puerto Corinto, eggs are transported to, and traded in the departments of León and Managua. Eggs sourced in León are sold in the city of León and in Managua department. In Rivas, collected eggs are sold in the departments of Managua and Granada. These eggs collected illegally along the Pacific coast are traded in markets and establishments such as restaurants. According to interviews, there may be people who move them to El Salvador and Honduras. Illegal trade also takes place along the Caribbean coast (at least at Perlas Cays and Playa Cocal), but it seems that eggs collected along this coast are mostly used for domestic consumption and that the volume of trade in these products is smaller.



Figure 18 – Left: sale of green turtle meat at a market in Bilwi (Región Autónoma de la Costa Caribe Norte [RAAN] department). Right: sale of hawkbill carapace items at Managua Airport (Managua department).

Olive ridley **carapaces** were found on open sale along the Pacific coast. From interviews, it seems that hawkbill carapaces sourced from the Caribbean are either kept with local artisans, or exported preferably as raw material. It appears that the raw carapace stock along the Caribbean coast, namely in Bluefields and Corn Island (RAAS), is transported to Pearl Cays (RAAS), and from there shipped to San Andres Island in Colombia. Carapaces from Bilwi (RAAN) and Bluefields are also reportedly moved to the city of Managua, and from here to destinations abroad. Carapace was reported to also be sold in the department of Rivas (in San Juan del Sur). Interviews along the Caribbean confirmed the presence of artisans who work hawkbill carapace into handicrafts in Bilwi and Corn Island. These were reported to also exist in Managua.

Harrison *et al.* (2017) reported that the sale of hawkbill items along the Caribbean coast and the level of international tourism highly influence the market and value of items. In areas where international tourism is low (e.g. Puerto Cabezas and Bluefields), vendors often act as distributors to sites inland and on the Pacific coast. The interdepartmental trade in hawkbill carapace found to occur in the present work, particularly from Bluefields to more populated urban centers and even to abroad destinations, supports the hypothesis of Harrison *et al.* (2017).

Hawkbill **handicrafts** were observed on sale at Managua international airport (fig.18), and in Roberto Huembes market in the department of Managua. At the latter, various hawkbill items were found on display.

The present findings indicate that awareness amongst community members about the legislation and regulations that apply to marine turtles, as well as who is responsible for enforcing them, differ between regions (see section “Domestic drivers of trade” below for further details).

According to Humber *et al.* (2014), Nicaragua had the second largest legal marine turtle fishery in the world. Lagueux *et al.* (2014) found that at least $8,169 \pm 2,182$ green turtles have been taken per year in Nicaragua from 1991 to 2011.

Domestic drivers of trade

The use and trade in marine turtles in Nicaragua are driven by nutritional, cultural, and economic motivations. Along the Caribbean coast, where there is a legal take of marine turtles, 62% of 40 respondents indicated that they engaged in this practice only for domestic consumption. Thirty two percent (32%) indicated other uses (such as trade in meat, using viscera as bait, or carapaces as decoration). Through the interviews undertaken, sellers reported an income of USD 220-570/month from trading green turtle meat and fins; and of USD 320-400/month from the sale of hawkbill handicrafts.

According to Garland *et al.* (2010), the role of turtles in Nicaragua has changed to one of commodities that are traded for income, as fishermen catch turtles for personal consumption but also target additional individuals to sell to butchers. Madrigal-Ballesterro *et al.* (2017) had noted that economic factors may be the most important drivers motivating local villagers to violate government regulations that prohibit the harvest and trade in marine turtle

products. Still, economic returns do not appear to be the major source of income for those who engage in the trade (Bräutigam *et al.*, 2006; Harrison *et al.*, 2017).

While the consumption and trade in marine turtle meat, eggs, and carapace provide important economic, cultural and consumptive benefits to Nicaragua's coastal communities, unawareness about national legislation and regulations applicable to marine turtles contribute to the undertaking of illegal activities. Findings indicate that awareness amongst community members about the legislation and regulations that apply to marine turtles, as well as who is responsible for enforcing them, differ according to the region considered. People along the Pacific coast understood that it is partially legal to kill marine turtles throughout the year. Along the Caribbean, some sellers believed that the sale of raw carapace is illegal, but that the sale of finished products is legal. A similar confusion had also been reported by Harrison *et al.* (2017), who observed that while people were generally aware that killing turtles is illegal, some vendors along the Pacific coast understood that this was legal during a part of the year, seemingly confusing the legal green turtle fishery with what is applicable to hawksbill turtles.

Species and specimens in trade, including by region

According to interviews, olive ridley is the species which is most commonly caught in nets along the Pacific coast, and green and hawksbill turtles the ones most commonly caught along the Caribbean. Green turtle is the most demanded species by locals (fig. 18), who argue that hawksbill's meat is not very tasty. Bräutigam *et al.* (2006) had also noted that hawksbill was the most sought-after species (for its carapace, meat and eggs) after green turtle.

With olive ridley arribada beaches, eggs in Nicaragua are readily available for take and entering trade. Illegal take and trade of turtles and eggs were found on both coasts of the country. Turtle meat appears to be mainly consumed and traded locally, but some interdepartmental trade was reported to exist, particularly to supply food business. Eggs are consumed and traded locally, but according to interviews they are also marketed between departments and with abroad destinations, such as El Salvador and Honduras (trade with these two countries had also been reported by Chacón [2002], cited in Bräutigam *et al.*, 2006).

Illegal trade in turtle carapace was found to be more persistent along the Caribbean coast. Information collected from interviews indicates also that a part of the turtle carapace stock sourced in Nicaragua is kept with local artisans, but it also crosses national borders (after passing through urban centers), at least into Colombia.

Prices

Based on interviews and site surveys, the following average prices were observed for marine turtle products in trade in Nicaragua (prices vary according to species, geographical region, and seasonal demand):

- Whole turtle: USD 47.00-114.00
- Pound of meat: USD 1.00-1.30
- Pair of flippers: USD 2.50-4.75
- Whole carapace: USD 10.00-20.00
- Pound of raw carapace (old stock): USD 12.00-13.00
- Handicrafts: USD 1.20-35.00 (higher prices for items with gold embedded)

Illegal international trade

Evidence of illegal international trade in marine turtles implicating Nicaragua was collected via interviews conducted in different departments in Nicaragua. This trade was reported for eggs and carapace, and evidence suggests that handicraft items could also be traded across borders. This is explained below.

Information collected through interviews suggests that there is international trade in marine turtle eggs sourced along Nicaragua's coastal areas, and that these are potentially exported to El Salvador and Honduras. Hawksbill carapaces are sourced along the Caribbean coast, where they are either left with local artisans, or exported preferably as raw material. It appears that raw carapace stock along the Caribbean coast, namely in Bluefields and Corn Island (RAAS), is transported to Pearl Cays (RAAS), and from there shipped to San Andrés Island in Colombia. Carapaces from Bilwi (RAAN) and Bluefields are also reportedly moved to the city of Managua, and from there to destinations abroad.

Handicrafts made of hawksbill carapace were found for sale at locations which are visited daily by large numbers of people, namely at Managua international airport and Roberto Huembes market (a large handicraft retailer in the

department of Managua). It can be inferred that products at these locations are often sold to tourists, who may then carry them back to their places of origin.

Information in the literature provides additional evidence of international trade. Harrison *et al.* (2017) reported that along the Pacific coast, at Corinto, vendors of hawksbill items relied on international tourists from docking cruise ships. According to these authors, vendors from inland locations, including Masaya, Nicaragua and León reportedly sold their merchandise mainly to Nicaraguan nationals, and those from other Central American countries. Harrison *et al.* (2017) recorded statements by several vendors along the Pacific coast of Nicaragua who indicated that there was a hawksbill handicraft export market for Costa Rica (these statements were subsequently corroborated by surveys undertaken also by Harrison *et al.* [2017] in Costa Rica).

Trends

Despite the ban on turtle egg harvesting established in 2005 by the government, consumption and trade are very common in Nicaragua (Madrigal-Ballesterio *et al.*, 2017). At the national level, interviews suggest that the demand for turtle carapace is decreasing because of a use of alternative materials, such as plastic. Elder artisans reported that they no longer worked hawksbill material as they used to because products could no longer be easily sold. They would rather combine alternative materials, adding insertions of carapace and gold to their creations. According to interviews, the demand for hawksbill products from neighbouring countries has been increasing in recent years, with a large part of hawksbill carapaces sourced from Nicaragua being exported to Central America, Panama and Colombia.

While the data collected in this work spans only a short time, information in the literature can contribute to understanding how trade in marine turtles has evolved in Nicaragua. Market surveys and visits between August and December 2001 by the Central American Marine Turtle Conservation Network (RCA; information reported by Chacón, 2002, cited in Bräutigam *et al.*, 2006) found hawksbill items for sale in major markets across the country and at three airports, including Managua airport (the present study also found several items on offer at this latter site). RCA documented 21 establishments and three travelling merchants selling carapace items at 11 sites.

Harrison *et al.* (2017) report on market surveys undertaken in nine countries in Latin America and the Caribbean, and found Nicaragua to be the one with the most widespread availability of hawksbill products. Of the 165 stores surveyed across 16 coastal and inland locations, 114 stores in 14 of the locations had hawksbill items. Shops had as many as 385 items for sale (vendors also noted that they would not display all their stock to avoid issues with authorities). The largest availability of items was recorded in Managua and Masaya. Harrison *et al.* (2017) noted that a few vendors reported that the hawksbill items that they had for sale were old stock, and that they would not purchase further stock once all of it was sold. According to Bräutigam *et al.* (2006), in 2002 the CITES Management Authority, reporting on a national inventory undertaken by MARENA, identified 41 merchants of hawksbill items across the country, mainly in the departments of Masaya and Managua. The information reported by Bräutigam *et al.* (2006) and Harrison *et al.* (2017) indicates that the departments of Masaya and Managua were, and continue to be, important hubs for the trade in marine turtle handicrafts.

In 2011, Fauna & Flora International undertook 2,224 interviews in 17 locations across seven departments along the Pacific coast of Nicaragua (Abarca *et al.*, 2011). Based on responses, it was estimated that 50,000 to 100,000 marine turtle eggs were sold annually in those areas. A rapid stock assessment by this organization also identified around 16,000 hawksbill handicraft items at 139 of 153 surveyed along the Nicaraguan Pacific. This trade volume was found to be three times higher in relation to that documented by Chacón (2002). However, the level of demand for hawksbill items was found by Fauna & Flora International to be lower in 2011 than in 2002. The results of these 2002 and 2011 studies suggested that while stocks of turtle carapace items in retail may have increased during that period, overall demand may have decreased. It is unclear whether these trends have continued to the present day.

Of further interest is an assessment of the green turtle fishery in the years from 1991 to 2011 in the RAAS and RAAN by Lagueux *et al.* (2014), which found a statistically significant decline in catch rates overall for this period (although this decline must be interpreted cautiously, as is explained in the section “Insights into conservation impacts” below). On the other hand, national demand for green turtle meat may be expanding, as it has been noted that ethnic groups which have not historically consumed green turtles are now becoming accustomed to doing so (Lagueux *et al.*, 2014).

Insights into conservation impacts

Despite its long history of marine turtle exploitation, the Caribbean Nicaragua continues to provide foraging, developmental and nesting habitats for marine turtles (Lagueux *et al.*, 2014; and references therein). Marine turtle foraging aggregations in Nicaragua are known to be of mixed stock, so take along its coasts has the potential to impact populations that occur in other countries in the wider Caribbean, including Colombia and Panama (Lagueux *et al.*, 2014; and references therein).

Responses to surveys in the present study reveal the perception that marine turtle populations are declining in Nicaragua. Some of those who trade in carapaces indicate that today it is harder to find this material for sale in local markets.

An assessment of the green turtle fishery in the years from 1991 to 2011 in the RAAS and RAAN by Lagueux *et al.* (2014) found a statistically significant decline in catch rates overall for this period. However, green turtle nesting activity at Tortuguero (Costa Rica), which is the main source rookery for Nicaraguan green turtles, has shown increases. This discrepancy could be due to: i) an increase in reproductive output; ii) insufficient time has passed to observe the impact of the fishery on the rookery due to a time lag; iii) changes in other segments of the population have not been detected since only nesting activity is monitored; iv) the expansive northern Nicaraguan foraging ground may provide a refuge for a sufficient portion of the Tortuguero rookery; and/or v) there may be a larger than expected contribution of non-Tortuguero rookeries in Nicaragua's turtle fishing areas. Therefore, despite the reported decline in overall green turtle catch rates, this fishery should still be monitored. It has previously been suggested that the green turtle fishery in Nicaragua is unsustainable (Campbel, 2003, cited in Lagueux *et al.*, 2014).

Applied management options that may be considered for other areas

Madrigal-Ballesterio *et al.* (2017) found the performance-based nest conservation payment programme that aims to protect nests in beaches next to La Flor, particularly Ostional, to be an effective option for protecting marine turtle nests on isolated beaches. People are paid for enrolling nests in the programme, and some of them are relocated to hatcheries monitored by an independently organised group of nine local women. It appears that the programme's results have been positive in terms of nest and hatchling protection in isolated nesting beaches, as these nests would have probably been harvested otherwise. Consideration could be given to expanding this model applied by Paso Pacífico in Nicaragua.

Fauna & Flora International appears also to have successfully improved nesting and hatching success of hawksbill and leatherback turtles at index sites along the Pacific coast of Nicaragua, with community-led crime prevention and incentives securing a shift from 100% nests being poached, to over 95% being protected (pers. comm. to CITES Secretariat, Fauna & Flora International, April 2019). It is believed that efforts to empower local ownership of the project and to facilitate community participation have been key to successes. Consideration should be given to implementing similar approaches at further unprotected sites.

Conclusions – Nicaragua

The capture and exploitation of marine turtles is prohibited in Nicaragua. However, the constitution of Nicaragua recognizes special natural resource use rights for the communities of the Atlantic coastal regions, which can harvest green turtles, but solely for subsistence purposes. For the period from 2016-2017, the annual quota for hunting green turtle was set at 2,500 specimens in the RAAN, and for the period from 2015-2018, the annual capture quota was set at 2,541 green turtles in the RAAS. The present study found that marine turtle meat is consumed along both coasts of Nicaragua, in Puerto Corinto, León, Managua, RAAN and RAAS. While the take of green turtles in the RAAN and RAAS is legal for subsistence purposes, the commercialization of specimens beyond the indigenous communities that inhabit these two autonomous regions is prohibited. The present results found meat retailers to be present in both these regions, and found also that some meat, at least from RAAS, is transported to the Pacific coastal areas for food businesses. It was found that eggs that are sold in Nicaragua are likely mainly sourced from the Pacific coast, in the departments of Chinandega, León and Rivas. Eggs are consumed locally, but they are also traded between cities and departments, being used in traditional dishes in restaurants. Along the Pacific, marine turtle eggs are also consumed, but trade appears less present.

Carapaces were found to be openly offered along the Pacific, and interviews confirmed the presence of artisans who work this material in the RAAS, RAAN, but also in Managua.

Evidence of international trade was found through reports. Some reports stated that eggs sourced along the Pacific coast are moved to El Salvador and Honduras. While some of the carapaces sourced in Nicaragua are kept with local artisans, interviews suggested that a part of these is exported to abroad destinations such as Colombia. It has been suggested (Harrison *et al.*, 2017) that the level and type of tourism greatly influence the market and value of hawksbill items along the Caribbean, with vendors switching between selling locally and acting as distributors to inland areas or those along the Pacific coast. This observation by Harrison *et al.* (2017) is supported by reports (this study) of trade in carapace between departments in Nicaragua. No online trade was found in Nicaragua during the present assessment.

While turtles and their specimens are traded for consumptive, cultural and economic reasons, there is some confusion among people about what activities are permitted or not according to governmental legislation and regulations, given that a legal fishery exists.

The present findings therefore confirm that trade in hawksbill carapace products is prevalent in Nicaragua. Some respondents perceived this trade to be decreasing nationally, although it has not been possible to confirm this trend. Some reports in the literature help understand the persistence of trade over time, such as market surveys by RCA in 2001 which identified hawksbill items for sale in 21 establishments and three roving merchants across 11 sites. They found several hawksbill items available at Managua airport – several such items were also found at this site during the present study. An inventory by MARENA in 2002 also identified 41 merchants of hawksbill items across the country, mainly in Masaya and Managua. A survey by Harrison *et al.* (2017), which identified hawksbill items in 114 stores surveyed in 16 coastal and inland locations, also found the largest availability of products to be recorded in Managua and Masaya.

Harrison *et al.* (2017) found Nicaragua to display the most widespread availability of hawksbill products among nine Latin American countries surveyed. Humber *et al.* (2014) found Nicaragua to have the second largest legal marine turtle fishery in the world, and Lagueux *et al.* (2014) found that, at least $8,169 \pm 2,182$ green turtles have been taken per year in Nicaragua from 1991 to 2011. Of interest is an assessment of the green turtle fishery for the years from 1991 to 2011 in the RAAS and RAAN by Lagueux *et al.* (2014), which found a statistically significant decline in catch rates overall for this period (although this decline must be interpreted cautiously, according to those authors). It has been previously suggested that the green turtle fishery in Nicaragua is unsustainable (Campbel, 2003, cited in Lagueux *et al.*, 2014) and marine turtle foraging aggregations in Nicaragua are known to be of mixed stock, depicting the potential of take to impact populations occurring in other countries in the wider Caribbean, including Colombia and Panama.

Successful conservation efforts in Nicaragua have involved the engagement of local communities in the conservation of marine turtles, reducing poaching numbers at nesting beaches. It is important that further efforts in Nicaragua take into account similar approaches, whereby community-led crime prevention and incentives are taken into consideration.

Panama

This section includes a summary of the findings by World Wildlife Fund, Inc. (see CITES document CoP18 Inf. 18, Annex 3), as well as additional information from the literature compiled by the Secretariat.

Assessment methods

The following methods were applied by World Wildlife Fund, Inc. to assess the status, scope and trends of the trade in marine turtles in Panama, as well as its conservation impacts, management options and mitigation priorities:

Interviews were undertaken with 47 people, including government officials, non-governmental organization members, ethnic group leaders, fishermen, divers, park rangers, tour operators, scientific authorities and school teachers. These interviews took place between May and June 2018 and were conducted in the following locations: in the provinces of Bocas del Toro (at nine locations), Chiriquí (at one location), Veraguas (at five locations), Los Santos (at six locations), and Panama Oeste (at two locations); and in Comarca Ngäbe Buglé (11 locations) and Comarca Kuna Yala (six locations; see fig. 19). **Local markets and touristic sites** at these locations were also surveyed to determine the availability of turtle meat and hawksbill handicrafts. These surveys were undertaken between 1 and 31 May 2018.

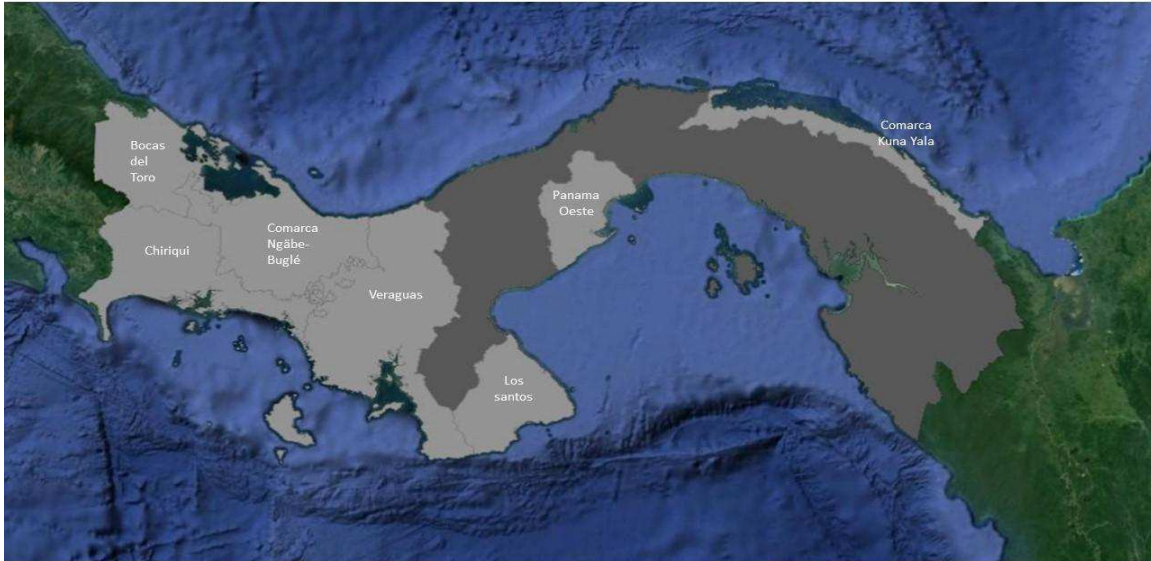


Figure 19– Map of Panama with surveyed provinces and comarcas.

A **rapid electronic survey** was conducted for three hours per day during seven days in May 2018 to search for online sales of marine turtle products. Facebook, Instagram and OLX were searched for these products.

An **analysis of marine turtle egg seizure records** for the period of 2011 to 2013 was undertaken (data held by the Aquatic Resources Authority of Panama [ARAP]). A review of news articles from 2012 to 2018 was also undertaken to identify fine and confiscation cases of marine turtle-related offenses.

A **literature review** was conducted to complement findings on the ground.

Legislation and regulations relevant to marine turtles

Panama is divided into ten provinces and five *comarcas* (regions that are primarily inhabited and administered - with a certain degree of autonomy from the central government – by indigenous people [Brautigam *et al.*, 2006]).

Five species of marine turtle are distributed in Panama. The loggerhead turtle, green turtle and olive ridley turtle are classified as Endangered under national Resolution DM-0657-2016, and the hawksbill turtle and leatherback turtle are classified as Critically Endangered. Resolution DM-0031-2017 approves a National Action Plan for the Conservation of Marine Turtles in Panama that establishes strategic actions to preserve the marine turtle populations present in national marine waters.

In Panama, marine turtles are directly and indirectly protected through national legislation and regulations. Among others, these prohibit the use and transport of wildlife and its specimens without ministerial approval (Law 41 of 1998, Section 15); sanction those hunting and fishing endangered species and those under risk of extinction (Law 24 of 1995, Section 63); sanction those collecting, destroying and harassing eggs, offspring and nests of wildlife species (Law 24 of 1995, Section 64); sanction those trafficking and trading wildlife specimens without appropriate permitting (Law 24 of 1995, Section 66); sanction those fishing, hunting, killing, capturing and retrieving resources of protected and endangered wildlife specimens without appropriate permitting (Law 14, Section 409); sanction those trafficking and trading wildlife specimens of species that are endemic, endangered, and close to extinction

(Law 14, Section 410); makes it compulsory for all national trawling vessels operating in jurisdictional waters to use Turtle Excluder Devices (TEDs; Executive Decree No. 82 of 2005).

In addition to national regulations, legislation and agreements, Panama is also part of different international conventions and agreements that are relevant to marine turtles, including CITES, CMS, and IAC.

The use, consumption or sale of meat, eggs or other specimens of marine turtles is illegal in Panama (Ministerio de Ambiente, 2017). The only exception to this is in Isla Cañas Wildlife Refuge, which is the only location in the country where there is a legal harvest of olive ridley eggs for subsistence purposes. Law 8 of 2008 approves the IAC, and this exception is provided under the Convention's Resolution IAC-COP6-2013-R1 on exceptions for economic subsistence needs of traditional communities applicable to the prohibition of capture, retention, killing, and domestic trade in marine turtles and their specimens. Resolution No. DM-0085-2017 approved the Isla Cañas Wildlife Refuge Action Plan 2017-2018.

Historical use of marine turtles in Panama

Exploitation of marine turtles in the Caribbean sector of Panama dates as far back as pre-Columbian times and continues to this day (Brautigam *et al.*, 2006; Meylan *et al.*, 2013). Meylan *et al.* (2013) provided a review of the history of marine turtle use in the provinces of Bocas del Toro and Comarca Ngäbe Buglé (Caribbean sector of Panama), and described the “velación”, a government-led scheme that facilitated the harvest of marine turtles from nesting beaches in these provinces during the 20th century to supply the market for turtle carapace.

Sources of marine turtle take in Panama

Marine turtles in Panama are taken in fisheries (including by lobster divers) and on beaches, where eggs are also targeted (Meylan *et al.*, 2013). Fishermen illegally resort to fishing nets and harpoons to capture green and hawksbill turtles. While nets are used less frequently than what they were in the past, a few are confiscated every year (Meylan *et al.*, 2013).

Domestic use and trade

Marine turtles (including nesting females) and their eggs are harvested by local fishermen at several locations in the provinces of Bocas del Toro, Veraguas, Comarca Ngäbe Buglé, Comarca Kuna Yala (here lobster divers also take part), Los Santos, Panama Oeste and Chiriquí (fig. 20, 21 and 22). Capture at sea involves the use of harpoons and artisanal fishing nets, and some fishermen specifically target marine turtle migration periods.

Findings indicate that marine turtle **meat** and **eggs** are mainly consumed locally, but are also sold to people at public events, restaurants and bars in urban centers (fig. 21 and 22). Some local communities, such as Comarca Ngäbe Buglé, use marine turtles extensively as part of their diets. Some traders visit this province to purchase marine turtle meat. Marine turtle eggs and meat are offered in local restaurants as traditional dishes in several locations in Bocas del Toro. These dishes are not only sought by locals, but also by domestic tourists. Olive ridley flippers are also consumed at some locations, such as in Los Santos and Chiriquí.

In addition to meat and eggs, there is a trade in hawksbill **carapace** and **handicrafts** made from it in Panama. The main provinces where these are sourced are the provinces of Bocas del Toro and Comarca Kuna Yala (fig. 23). According to respondents, the trade in hawksbill carapace is either destined to national urban centers or is exported. For example, evidence collected suggests that carapaces sourced from Comarca Kuna Yala and Bocas del Toro may be exported to other national provinces or even to Colombia, Costa Rica or Mexico (see section “Illegal international trade” below). Carapaces are processed into handicraft items such as cock fighting spurs. At least three people dedicated to this activity were identified during the present assessment (in Veraguas province). Cock fighting spurs made of hawksbill carapace were found for sale in agricultural stores in two cities in Veraguas, and in two online advertisements originating from two different Panamanian cities (fig. 24).

Findings also indicate that olive ridley turtle **oil** is a commodity in trade, at least, in the province of Panama Oeste.

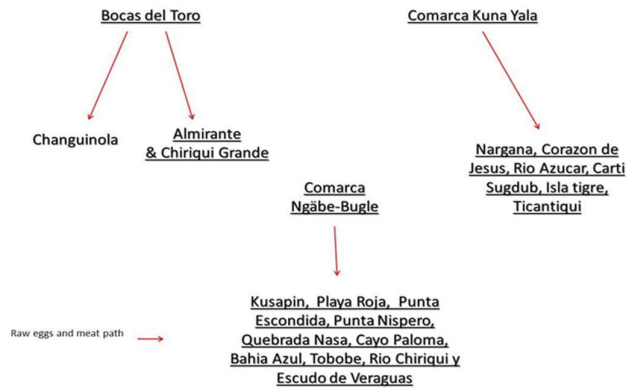


Figure 20 - Schematic representation of the trading path of green turtle meat and eggs in the Panamanian Caribbean.

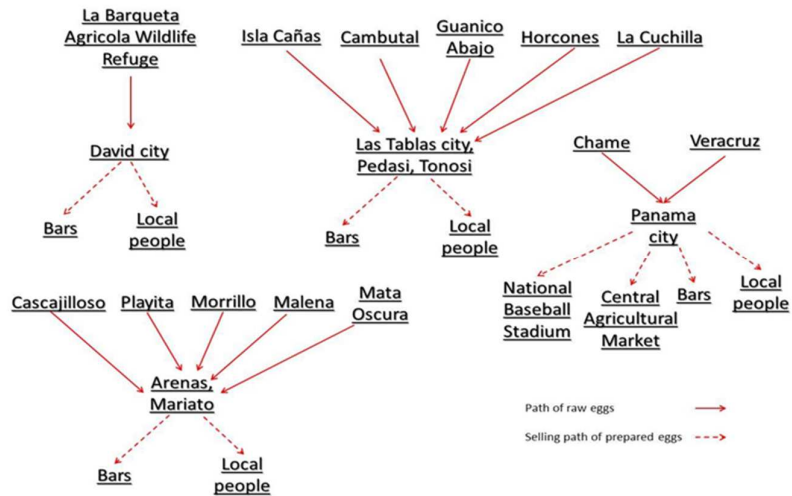


Figure 21 - Schematic representation of the trading path of olive ridley eggs in the Panamanian Pacific.

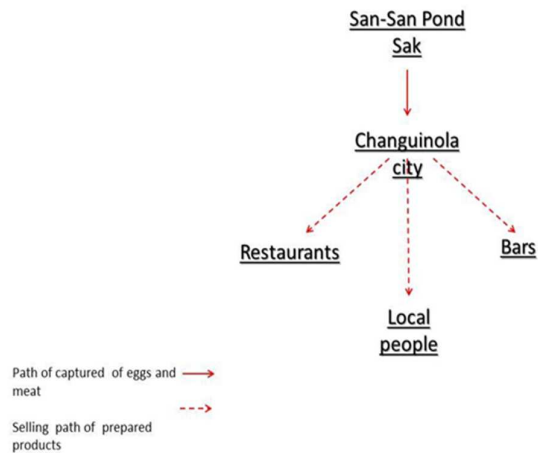


Figure 22 - Schematic representation of the trading path of leatherback meat and eggs in the Panamanian Pacific.

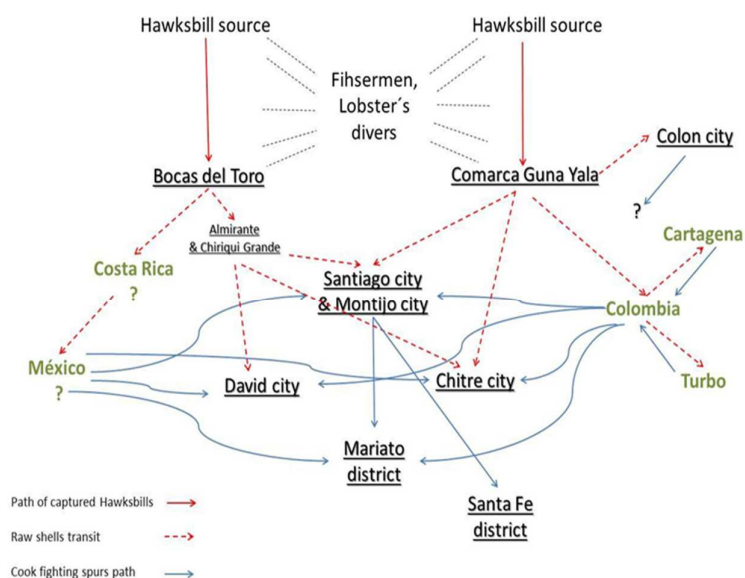


Figure 23 - Schematic representation of the trading path of hawksbill carapace in Panama.

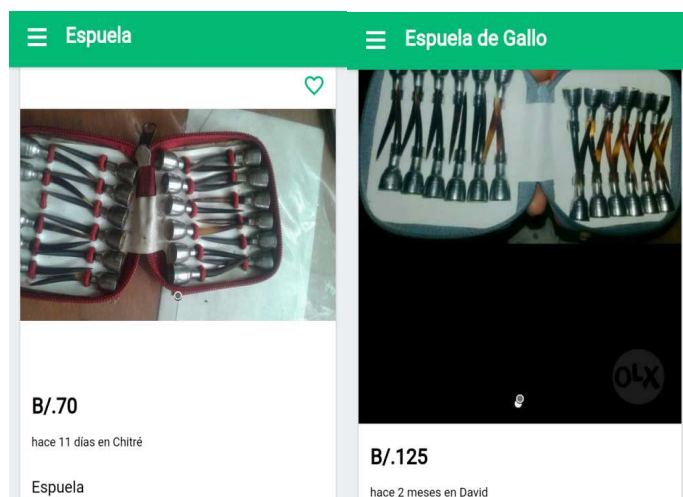


Figure 24 – Two online advertisements offering cock fighting spurs made of hawksbill carapace in Panama.

Analysis of seizure data

The analysis of data from 2011 to 2013 held by the Aquatic Resources Authority of Panama (ARAP) on marine turtle egg seizures revealed five offenses that took place in Los Santos province, and which were prosecuted. These comprise crimes for the sale or possession of eggs, meat and/or other marine turtle products (table 2).

The review of news articles from 2012 to 2018 aiming to identify cases of fines issued and confiscations implicating marine turtles revealed a few offenses that took place in the Panamanian Pacific (table 3). Most cases occurred between the months of August and November, the peak nesting season for olive ridley in the Pacific region. Seizures involved considerable numbers of eggs. Such sustained numbers from 2012 to 2018 do not suggest a decreasing trend in illegal take/trade in these products.

Table 2- Crimes for commercializing or possessing marine turtle products taking place between 2011 and 2013. Data source: National Authority for the Aquatic Resources of Panama.

| Description of the offense | Year | Fine (in USD) |
|---|------|---------------|
| Commercialization of turtle meat | 2011 | 100.00 |
| Possession of turtle eggs and other marine turtle products | 2011 | 100.00 |
| Commercialization of turtle eggs | 2012 | 2,000.00 |
| Possession of turtle eggs and other marine turtle products | 2012 | 1,000.00 |
| Commercialization of marine turtle products (repeated offender) | 2013 | 4,000.00 |

Table 3 - Cases of turtle eggs confiscated by government authorities in the Panamanian Pacific (data sourced from local news reports).

| Year/Month | Number of confiscated eggs | Province |
|----------------|--|------------|
| 2012/July | 1500 | Los Santos |
| 2013/September | 637 | Cocle |
| 2015/October | 843 | Los Santos |
| 2015/November | 3460 | Los Santos |
| 2016/August | 7319 (olive ridley); 49 (green turtle) | Los Santos |
| 2016/October | 9117 | Los Santos |
| 2016/November | 1400 | Los Santos |
| 2018/September | 13500 | Los Santos |

Domestic drivers of trade

Findings indicate that domestic consumption and trade in marine turtle products provides a source of food and revenue for those who engage in these activities. Chacón (2002) found that egg collection was for subsistence consumption and for trade. In a more recent survey, Harrison *et al.* (2017) reported that a vendor who had 48 handicraft items made of hawksbill carapace stated that he engaged in the trade to support his family, but that this was not considered his main source of income. While this vendor indicated that he was aware that it was illegal to commercialize these products, the findings of the present study indicate that there is generally a weak knowledge of how national legal frameworks apply to marine turtles, not only among civil society, but also among authorities.

In addition to economic and consumptive needs, there is a cultural component to the trade too. For example, the consumption of smoked penis is believed to offer aphrodisiac effects, and that of turtle oil to alleviate respiratory problems.

Species and specimens in trade, including by region

Of the five species that occur in Panama, hawksbill turtle, green turtle, olive ridley turtle, and leatherback turtle were found to be in use and trade. While the four species are traded, it emerged that green turtle is the most sought-after species due to the taste of its meat. Products used and traded include marine turtle meat, flippers, eggs, carapace, plastron, penis and oil. Turtle meat and eggs are used in the preparation of traditional dishes (turtles are often processed on board, impeding species' recognition at restaurants). Hawksbill carapace is used to make handicrafts, including cockfighting spurs. Smoked penis is believed to have aphrodisiac properties. Turtle oil is used for medicinal purposes. Plastron is used in the preparation of soup.

The use of these products varies among species and by region. Along the Caribbean coast of Panama, marine turtles are taken in Bocas del Toro, Comarca Kuna Yala and Comarca Ngäbe Buglé. Along the Pacific coast, trade is present on the beaches in the provinces of Veraguas, Los Santos, Panama Oeste and, to a lesser extent, in Chiriquí. The Caribbean coast of the country appears to play a considerable role as a source for hawksbill carapace that is serving a national demand for cock fighting spurs.

Prices

Based on interviews and site surveys, the following average prices were observed for marine turtle products in trade in Panama (prices vary according to species, buyer's nationality and geographical location):

- Whole turtle: USD 50.00 – 180.00
- Pound of meat: USD 0.50 – 5.00
- Egg: USD 0.05 – 0.75
- Smoked penis: USD 5.00
- Carapace: USD 10.00 – 25.00
- Pair of cock fighting spurs: USD 25.00 – 28.30

Illegal international trade

While findings indicate that meat and eggs are mainly destined to domestic consumption, the information collected from interviews indicates that Panama acts as a source of hawksbill carapace destined to other countries in the Inter-American subregion. According to information provided by the national Aquatic Resources Authority of Panama (ARAP), some of the hawksbill carapaces sourced from Bocas del Toro cross national borders into Costa Rica and Mexico. Evidence from interviews also suggests that carapaces sourced from Comarca Kuna Yala are sold to incoming ships from the province of Colón (Panama) and from the cities of Cartagena and Turbo in Colombia. Findings suggest that raw carapace is traded with these countries for processing, being later imported back into Panama as valuable cock fighting spurs.

From the literature, Chacón (2002) concluded that at least some of the hawksbill carapace used in, and exported from Panama originates in Costa Rica. Furthermore, Bräutigam *et al.* (2006) and Harrison *et al.* (2017) reported that there was some purchase of hawksbill carapace products in Panama by international tourists.

The evidence of international trade identified in the present work suggests some degree of complexity in the trade network (see also section “Domestic use and trade” above). Information on the scale at which this may be taking place is not available.

In addition, via interviews to residents from the southwestern coast along the Gulf of Venezuela, Barrios-Garrido *et al.* (2017) found some responses to suggest that hawksbill carapace (products) sourced from this area are potentially exported to Panama.

Trends

Of 32 government officials, NGO members, park rangers and tour operators interviewed, over 75% perceived the trade in marine turtles to be declining in the Panamanian Caribbean, and 47% of the respondents also perceived this trend in the Panamanian Pacific. Some responses to interviews indicated that there has been a recent rise in the consumption of leatherback turtle meat in Changinola (Bocas del Toro province) because the local people have reportedly developed new ways for cooking this species' meat.

While the data collected in the present work cannot provide a robust estimate of the volume of marine turtles that are illegally traded in Panama, some reports in the literature offer insights into what this trend may be.

Bräutigam *et al.* (2006) reported that available statistics suggested that international trade from 1986 to 2006 involving Panama was negligible in comparison to trade levels before that period. Both Chacón (2002) and the present study found evidence of some international trade to occur between Panama and Costa Rica, confirming that international trade has not ceased.

Meylan *et al.* (2013) reported that a few nets used by fishermen to capture marine turtles are confiscated every year. They reported that, while there had previously been some reduction in take levels due to conservation efforts, levels of hawksbill take on beaches in Bocas de Toro and Comarca Ngäbe Buglé became again an issue, possibly due to increased nesting levels.

Harrison *et al.* (2017) reported on a 2017 survey by Sea Turtle Conservancy in the province of Bocas del Toro. Of the nine stores surveyed at this location, only one had hawksbill items (48 pieces of jewelry) for sale. The vendor was aware that his activity was illegal, but indicated that the trade supported his family (although it was not his main source of income). This vendor indicated that artifacts were purchased by both national and international tourists, and sales to national visitors increased significantly during local celebrations. According to Sea Turtle Conservancy, one of the other stores that had been previously surveyed and had hawksbill items, no longer did, possibly due to

outreach efforts. Harrison *et al.* (2017) reported that a survey in 2002 found 16 vendors in five sites across the country, primarily in Bocas del Toro. Although the 2002 survey covered a wider area, based on the findings of the 2017 survey of Harrison *et al.*, it seems possible that the sale of hawksbill carapace items may have declined, although it is not clear to what extent.

The sustained number of eggs implicated in seizures from 2012 to 2018 in Panama found during the present research (see section “Analysis of seizure data” above) does not suggest a decreasing trend in illegal take/trade in these specimens during this period.

Insights into conservation impacts

Findings indicate that marine turtles in the Panamanian Caribbean may be under greater pressure than along the Pacific coast. This concerns particularly the Caribbean areas of Bocas del Toro, Comarca Kuna Yala and Comarca Ngäbe Buglé. The most significant impacts to marine turtles in Bocas del Toro and Comarca Ngäbe Buglé are of anthropogenic origin and come from targeted fisheries, direct take of turtles and eggs on beaches, and bycatch (Meylan *et al.*, 2013). Meylan *et al.* (2013) reported that the most serious threat to marine turtles in terrestrial environments in these areas is the take of nesting females on beaches, and added that this threat had once again become serious, even within protected areas, possibly due to increased nesting levels. Meylan *et al.* (2013) noted also that captures by local lobster divers posed a threat to marine turtles. Neither a quantification, nor a trend in these threats was provided by these authors.

Applied management options that may be considered for other areas

Marine turtle observation tourism has been present in Panama for over a decade. According to the Ministry of Environment (Ministerio de Ambiente, 2017), these activities represent an important alternative for the protection and conservation of these species along both Caribbean and Pacific coasts of the country, within and beyond protected areas. Today, most of these activities are involving local communities to generate revenue that can benefit them. Also according to the Ministry of the Environment in Panama, the creation of marine protected areas in the country has contributed to reducing the harvest of marine turtles and their eggs (Ministerio de Ambiente, 2017). Successful cases should be considered for replication in other areas along the two coasts.

In 2006, the Kuna General Congress approved a five-year ban on the hunting of marine turtles (Resolution No. 8/12/2006). Although this ban expired in 2011, the fact that communities generally adhered to it indicates that future regulations coming from this Congress have potential to succeed.

In 2017, a National Action Plan for the Conservation of Marine Turtles in Panama (Ministerio de Ambiente, 2017)¹⁵ was approved. It establishes key conservation and management actions that must be implemented in Panama to conserve marine turtles and their critical habitats. The Action Plan was developed in consultation with experts and civil society organisations, and includes activities to be implemented, their expected time frames and costs, as well as implicated actors and indicators. Concerning illegal harvest, the Action Plan calls for the development, revision and implementation of existing legislation that is relevant to marine turtles; aims to identify economic alternatives to avoid the take of marine turtles; and calls for national campaigns to raise awareness and to inform people about existing national procedures to denounce the illegal sale, purchase and consumption of marine turtle products in the country.

The non-profit organization Sea Turtle Conservancy has been able to develop a long-term monitoring and environmental education programme, and to reduce harvest in different locations and communities in Bocas del Toro province. The model applied by this organization could also be considered for expansion to other locations.

Conclusions - Panama

The take and use of, and trade in marine turtles in Panama are prohibited. An exception to this, however, applies to Isla Cañas Wildlife Refuge, where subsistence harvest of olive ridley eggs is permitted.

Findings indicate that the take and use of, and trade in marine turtles prevails in Panama. Marine turtles and their eggs are taken by local fishermen at several locations in the provinces of Bocas del Toro, Veraguas, Comarca Ngäbe Buglé, Comarca Kuna Yala, Los Santos, Panama Oeste and Chiriquí. Sought-after specimens include meat, flippers,

¹⁵ Plan de Acción Nacional para la Conservación de las Tortugas Marinas en Panamá. Edgar A., Araúz A., Pacheco L., Binder S., Ycaza R., Posada J. (Eds). Ministerio de Ambiente, Ciudad de Panamá. 32 pp. Available at: http://marviva.net/sites/default/files/documentos/pan_conservacion_tortugas_marinas_panamá_17-04.pdf.

eggs, carapace, oil, penis, and handicrafts, including cock fighting spurs. Findings revealed a difference in the price of these commodities depending on species, buyer's nationality and geographical location.

Results indicate that meat and eggs are mainly consumed locally, but that there is also some intercity and interprovincial trade in these products, which often end up as traditional dishes in restaurants, bars and public events. Findings confirmed the presence of trade in hawksbill carapace, which is used to produce handicraft items, including cock fighting spurs. Major carapace source locations appear to be the provinces of Bocas del Toro and Comarca Kuna Yala. This product is traded among provinces and evidence suggests that it is also traded internationally with Colombia, Costa Rica and Mexico. According to some respondents, raw carapaces are exported to these locations and then imported back into Panama as valuable cock fighting spurs. This processing also takes place in Panama, as three people dedicated to this activity were identified in the province of Veraguas during the present assessment.

The presence of online trade in marine turtle products was confirmed with the identification of two advertisements for cock fighting spurs made of hawksbill carapace.

Findings indicate that domestic consumption and trade in marine turtle products provide a source of nutrition and revenue for those who engage in these activities. Nevertheless, evidence suggests that trade in marine turtle products typically does not comprise the main source of income for the people involved in it.

Most respondents interviewed in the present work considered that trade in marine turtles and their eggs is generally declining in Panama. Some evidence from the literature (concerning the availability of handicraft items) could also suggest that this trade is indeed decreasing. However, some other reports in the literature state that poaching of turtles and eggs is once again emerging as a concerning threat at some beaches. Moreover, the present research efforts identified a considerable level of sustained take of eggs confiscated by Panamanian authorities across the years from 2012 to 2018. This contrasting information renders unclear the trend in take and trade in marine turtles and their specimens.

While present finds do not allow conclusions on take or trade trends, the indications that illegal domestic and international trade in marine turtles prevail deem clear the need for further conservation action. Successful efforts by non-governmental organisations in reducing poaching on nesting beaches, the recent adoption of a comprehensive National Action Plan for the Conservation of Marine Turtles in Panama (Ministerio de Ambiente, 2017), and the fact that indigenous communities have proved willingness to follow measures approved by their autonomous administrative authorities illustrate the potential to successfully address illegal take, use and trade in the country.

Findings in Indonesia, Malaysia and Viet Nam (Southeast Asia/Coral Triangle)

Indonesia

This section includes a summary of the findings by TRAFFIC (see CITES document CoP18 Inf. 18, Annex 4), as well as additional information from the literature compiled by the Secretariat.

Assessment methods

Research efforts focused on collecting (past and present) information relating to the presence and prevalence of trade activities (on online and physical markets), insights into perceived conservation impacts from trade activities, and existing management practices in Indonesia. The following methods were applied by TRAFFIC to assess the status, scope and trends of the trade in marine turtles in Indonesia, as well as its conservation impacts, management options and mitigation priorities:

Interviews and conversations were undertaken with over 30 people (among Indonesia, Malaysia and Viet Nam) including government officials, researchers, and non-governmental organisation members. When surveying markets (see paragraph below), conversations were also held opportunistically with traders to gather insights into trade sources and dynamics.

Market surveys were conducted between April and July 2018 in the provinces of East Java and West Java (eight sites), Bali (30 sites), West Sumatra (11 sites), and North Sulawesi, Central Sulawesi, West Sulawesi and Southeast Sulawesi (12 sites; fig. 25). These sites included nesting beaches, hatcheries, tourist turtle attractions, local fisheries

ports, markets, and souvenir shops (18 souvenir sites in total, all in Bali). Products on sale and their prices were recorded at these sites.

An **electronic survey** was conducted during an hour per day for one month (15 July to 15 August 2018) to search for the online availability of marine turtle products on commercial portals and social media (Facebook). A total of 13 search terms were used among the languages English, Malay/Indonesian, and Mandarin.

An **analysis of seizure records** from January 2015 to August 2018 was undertaken. This encompassed data from TRAFFIC seizure records, media reports, grey literature and records from other non-governmental organisations. Seizure incidents that occurred prior to 2015 are described where relevant.

A **literature review** was conducted to complement findings on the ground.

Legislation and regulations relevant to marine turtles

Six species of marine turtle occur in Indonesia (Hutomo *et al.*, 2004): loggerhead turtle, green turtle, leatherback turtle, hawksbill turtle, olive ridley turtle, and flatback turtle.

Indonesia is divided into 34 provinces. The most important pieces of legislation for the conservation and management of marine wildlife in Indonesia are the Conservation of Living Resources and their Ecosystems Act No. 5 (1990), the Law on the Management of Coastal Areas and Isles (2007) and the Fishery Law (2004, amended 2009). Three Government Regulations relate to the conservation of marine wildlife: No. 60/2007 on the Conservation of Fishery Resources; No. 7/1999 on Preserving Flora and Fauna Species; and No. 8/1999 on Wild Flora and Fauna Exploitation. All marine turtles are considered protected species under Government Regulation No. 7/1999 on Preserving Flora and Fauna Species. Any catch, trade, import, export, possession and transport of protected species is prohibited under Act No. 5. Anyone violating this law may be liable, upon conviction, to a fine of up to IDR 100,000 (USD 10,000) and imprisonment for up to five years.

Provincial regulations in Indonesia are sometimes not harmonized with national regulations or local practices. For example, in some areas, traditional or customary rights are perceived to be stronger than national legislation, adding to the complexity of enforcing national laws that apply to marine turtles. This is the case particularly around Padang, Sumatra, where according to reports from interviews with stakeholders, eggs are sold openly in large quantities, or in Bali where turtle specimens have been part of the local culture.

Several other laws provide relevant measures, including the Law on the Sea (2014), which makes the Indonesian government responsible for managing the marine environment, the Customs Law (1995, amended 2006), and the Penal Code (1915), which includes measures to protect animals from mistreatment. In addition, a large number of ministerial regulations provide detailed measures for the management and control of activities relating to marine wildlife. Further details (including strengths and weaknesses) on Indonesia's legislation and regulations concerning marine wildlife protection are available in CITES document CoP18 Inf. 18, Annex 4.

In addition to national legislation and regulations, Indonesia is part of different international agreements with relevance for marine turtles. These include CITES, the IOSEA Marine Turtle MoU, the Memorandum of Understanding on ASEAN Sea Turtle Conservation and Protection, and the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF).



Figure 25 – Provinces of Indonesia. Source: CartoGIS Services, College of Asia and the Pacific, The Australian National University.

Sources of marine turtle take in Indonesia

Research efforts reveal that traditional practices used to capture marine turtles and their eggs in Indonesia prevail. Marine turtles are taken at sea, or from beaches during nesting season. Reportedly, fishermen sometimes engage in targeted expeditions using different types of nets and spearing.

Based on information collected from interviews, there appears to have been an increase in marine turtle hatcheries in Indonesia over the last 15 years with the aim of addressing illegal trade. Visits to such sites during the present study revealed that some of these establishments, however, offer little conservation benefits to marine turtle populations. According to Firliansyah *et al.* (2017), such establishments may even be conduits through which meat and eggs are sold more easily.

Domestic use and trade

Out of the 61 locations visited in Indonesia, turtle specimens were found on open sale at only seven visited sites among Sulawesi and Bali. The sale of **turtle meat, body parts, eggs, and handicrafts** was found in North Sulawesi, West Sulawesi and Southeast Sulawesi among markets and one beach. Ornamental items (**taxidermied turtles** or **ornaments** made with carapace) were found in two souvenir shops in Gianyar, Bali (fig. 26 and 27). In addition, there is reportedly a strong tradition of catching and consuming turtles on the Mentawai Islands (West Sumatra) and East Nusa Tenggara (non-visited sites), with these locations reportedly being significant sources of marine turtle eggs, meat and carapace.

Over the span of a month, 607 individual items and 400g of eggs were found for offer in a total of 213 online trade advertisements. Products mostly involved handicrafts, but also dried turtle **egg powder** (reportedly used as fish bait) and **turtle oil** (advertised for its medicinal properties). At least 106 traders were involved. Only 27 advertisements included the seller's location, with Jakarta being the most frequently mentioned one (14 advertisements).



Figure 26 – Ornament made with turtle carapace and silver found in a souvenir shop in Bali.

Local consumption and trade in marine turtles, their eggs and other specimens are reported to take place at roadside stalls and small-town markets near nesting beaches and ports. It may be reasonable to assume that in most places where turtles nest or forage there is some local consumption and trade in meat and eggs. The coasts of West Sumatra, Java, Bali, Kalimantan and, perhaps to a lesser extent but still significant, Sulawesi, Maluku and Papua, have trade hubs in their bigger cities. These areas are likely being supplied (mostly by boat) by many of the smaller Indonesian islands. The following paragraphs elaborate on the findings of the present research efforts concerning the features of trade in Indonesia.

Kalimantan's (Indonesian Borneo) geographical positioning offers many opportunities for illegal trade in marine turtle products, making it an important hub for domestic and international trade. Kalimantan has been highlighted previously as a hotspot for egg collection in Southeast Asia, with significant volumes being exported to East Malaysia (Sabah and Sarawak; IOSEA, 2014). It appears that this may still be the case, as the present study found at least eight seizures recorded in Kalimantan between 2015 and May 2018 amounting to over 13,200 seized marine turtle eggs. The trade in souvenirs made of carapace is reportedly also on the rise in East Kalimantan (Profauna, 2015). Based on market observations by ProFauna in June 2015, over 700 hawksbill carapace products were observed for sale in Berau, East Kalimantan. Prior to this, in October 2014, ProFauna reported the sale of hawksbill products in the same area to the authorities with sales subsequently decreasing. In June 2016, however, marine turtle products were once again evident for sale in the area¹⁶. There were at least two seizure records in Kalimantan in 2016 comprising 135 souvenir products made of carapace and two taxidermied marine turtles.

¹⁶ ProFauna (2016). *Officials Seized Hundreds of Sea Turtle Shell-based Souvenirs from Market in Berau, East Kalimantan*. Available at: <https://www.profauna.net/en/content/officials-seized-hundreds-sea-turtle-shell-based-souvenirs-market-berau-east-kalimantan#.WzcxLaB1bV>.

According to IOSEA (2014), green turtle take at sea for consumption in **Sumatra** was still rampant as of 2011. Until relatively recently, trade from towns and cities in the north and west coasts of Sumatra towards its east and inland was mainly by road. However, with increased domestic and international flights operating from cities such as Padang (Sumatra), there has been reportedly an increased frequency of turtle products, particularly eggs, being transported to other parts of Indonesia and overseas to Malaysia. Because of the predominantly Islamic culture in Sumatra, eating turtle meat is forbidden (*haram*). However, eggs appear to be commonly collected and eaten. Consumers of turtle meat appear to be mostly non-Muslim. There were only three recent seizure records identified for Sumatra, two of which occurred in 2016 and involved the seizure of 20kg of marine turtle carapace and one taxidermied turtle. The third incident occurred in 2018 and involved the seizure of 59 green turtle eggs from a local fisherman.

Java appears to be a hotspot for take and trade in meat and eggs. In May 2018, eight turtle nesting beaches were visited to assess the local status of turtle management. Egg take was reported to be high at all sites. Based on seizure data, it seems possible that this take is to meet an egg demand in Bali. Also, some anecdotal evidence from interviews suggests that eggs are collected along the south coast of Java and then sold to traders who resell them to turtle hatcheries in Bali. Mortality during collection, holding and transport is thought to be very high. In 2016, local quarantine officers seized two live green turtles and 150kg of turtle meat in Banyuwangi while these were heading to a ferry. The turtles reportedly came from Pulau Raas (off Madura island, off the northeastern coast of Java), and were heading to Bali to be sold. In January 2018, several traders were caught in Bali selling turtle meat bought off sellers from East Java.



Figure 27 – Ornamental taxidermied turtle with silver overlay found in a souvenir shop in Bali.

Bali has long been a hub for turtle trade, particularly that of live turtles. These have been part of Hindu ceremonies (unlike Muslims, Balinese Hindus appear to not have a religious taboo against turtle meat consumption). Bali was probably the center of the largest domestic exploitation of marine turtles in the world, as well as being a leading exporter of marine turtle products (Barr, 2001; Troëng *et al.*, 2004; IOSEA, 2014). According to the present findings, Bali had the highest number of seizures recorded for Indonesia between 2015 and May 2018. These mostly involved

live marine turtles. To a lesser extent, eggs and meat were also involved. Product destinations indicate that this trade was for domestic and international markets. The present findings reveal that the trade in turtle meat in Bali has become more secretive and opportunistic, being less openly available. This is likely due to perceived stricter enforcement, greater awareness of the law, and possibly due to less turtles and eggs available for take. Locals reported that if a turtle appeared and the risk of being caught was small, the turtle would be taken for its meat. A villager in Tuban, south Bali noted that local people in Kedonganan would contact each other if turtle meat became available for sale.

During the last 15 years, several attempts have been made to address marine turtle trade in Bali by establishing turtle hatchery programmes. The present assessment identified 12 turtle hatcheries and attractions in this area. While some of these offer conservation and educational value, some others are commercial enterprises with little conservation interest (fig. 28). It is possible that such attractions be detrimental to the marine turtles they keep, and also to wild populations because of their potential for disease transfer. Furthermore, they may also be conduits through which turtle eggs and meat are sold more easily (Firliansyah *et al.*, 2017).

There is little information about **Sulawesi** concerning the trade in marine turtles. Its capital, Makassar (also known as Ujung Pandang), has a large port and airport and acts as a major communications hub for the rest of Indonesia. Information collected from locals during this research indicates that Sulawesi has an active trade in live turtles, turtle meat, eggs, taxidermied specimens, as well as handicrafts. Anecdotal evidence suggests that, after the trade to and from Bali became more closely monitored and controlled, turtle trade activities shifted to Makassar. Based on the recent (2015 to 2018) seizure data analysed, after Bali, Sulawesi had the second highest number of seizures recorded for Indonesia, involving carapace items and live and dead specimens.



Figure 28 – Marine turtle conservation centers established in Benoa, Bali, that attract tourists.

The coasts of Morowali (Central Sulawesi) and Polewali Mandar (West Sulawesi), Cangk Island (South Sulawesi), Saponda Laut Island and Bau-Bau Buton (Southeastern Sulawesi) have been described as hotspots for illegal trade in turtle eggs. Turtle meat and parts were found during the present study in the “Extreme Market” or Tomohon Market in Minahasa (West Sulawesi), while turtle carapace jewelry was found in Wameo Market and Kamali Beach. According to local authorities and non-governmental organisations in Indonesia, turtle exploitation in Sulawesi has generally been decreasing due to law enforcement efforts and awareness raising campaigns. However, illegal take and trade persist throughout the islands. Reportedly, traders communicate with buyers through mobile phones to arrange safe trading locations. They also reportedly prefer to market their products online. The present electronic survey showed a variety of products being advertised, verifying this claim.

ProFauna (2007) assessed several areas in southeast Sulawesi in 2007 and reported that four areas (P. Wanci, Moramo, Ereke and Tikep) had an active trade in turtles. They also reported trade from Padei and Masudihang Islands in Central Sulawesi. Sulawesi was thought to supply marine turtle products for trade in Bali (ProFauna, 2007). Supporting the prevalence of the use of this trade route, the present study identified a seizure that took place in 2016 whereby a shipment of 70 live turtles reportedly on route to Bali was intercepted in Central Sulawesi. In eastern Sulawesi, taxidermied turtles were observed by ProFauna for open sale in a shop in Luwuk in 2007. During the present assessment, villagers of the Banggai archipelago reported that they caught turtles with spears and eat turtle eggs.

In 1998, it was estimated that 6,000 to 8,000 green turtles were caught annually in **Maluku** province for the Balinese market (Moss *et al.*, 1998). In the southeast, indigenous Kei Islanders are known to hunt leatherbacks for food (Suarez *et al.*, 1995), a practice that dates back centuries (Compost, 1980). The Aru Islands to the west of Papua have many nesting beaches, and turtles are reported to have been caught and traded from this region for generations. There were only two seizures recorded for Maluku, both of which occurred in 2017 involving 88 live marine turtles (six of which subsequently died) of various species including hawksbill turtle, green turtle and olive ridley turtle.

Being the easternmost and most remote province of Indonesia, much of **Papua** is difficult to access. In general, the human population density is small, even along the coasts, so collection and sale of turtle eggs appears to be restricted and local. Some export of turtles and turtle products from ports in the bigger towns such as Jayapura, Merauke, Sorong and Manokwari are thought to occur. Indeed, there were at least four seizures recorded for Papua, occurring in Jayapura and Sorong between 2015 and May 2018. One of these incidents revealed the international trade of 50 dead hawksbills to Viet Nam in 2015.

Analysis of seizure data

Among data from TRAFFIC seizure records, media reports, grey literature and records from other non-governmental organisations, a total of 70 seizure records were identified as taking place in Indonesia between 2015 and 2018 (table 4; fig. 29). These included at least 14,528 eggs, 586 live animals, 63 dead animals, 18 stuffed/taxidermied animals, 526 kg of meat, 936 processed carapace items, 609 kg of unprocessed carapace, and 970 unprocessed carapace pieces. Among these 70 seizures in Indonesia, Bali was the most common seizure location (24% of incidents), mostly involving live turtles and meat. West Kalimantan, East Java, East Kalimantan, and Nusa Tenggara East were also notable in making seizures, involving a combination of all commodity types, except meat. While the species involved in the specimens seized were often not reported, for those cases where the species was indicated, green and hawksbill turtles were the most implicated.

Where route information was available for these seizures (17 cases), it revealed that, at the domestic level, Madura Islands to Bali (revealed in at least six incidents, all live turtles), followed by Riau Islands to West Kalimantan (at least three incidents, all eggs) were common trade routes (fig. 30). Among the information collected, the most common transport method was by sea, followed by air. At the international level (fig. 31), available information revealed that China was implicated as a destination country in seven shipments originating from Indonesia. In one incident involving Indonesia, marine turtle eggs were being smuggled from Riau Islands (Indonesia) to West Kalimantan (Indonesia) by sea and from there to Sarawak, Malaysia, by land.

Table 4 – Number of seizure records involving marine turtle specimens that have occurred in Indonesia, Malaysia and Viet Nam between 2015 and 2018. Data sources: TRAFFIC seizure records, media reports, grey literature and records from other non-governmental organisations.

| Country of Seizure | 2015 | 2016 | 2017 | 2018 | Total |
|--------------------|-----------|-----------|-----------|-----------|------------|
| Indonesia | 12 | 31 | 12 | 15 | 70 |
| Malaysia | 6 | 14 | 12 | 4 | 36 |
| Viet Nam | 7 | 18 | 10 | 12 | 47 |
| Total | 25 | 63 | 37 | 31 | 153 |

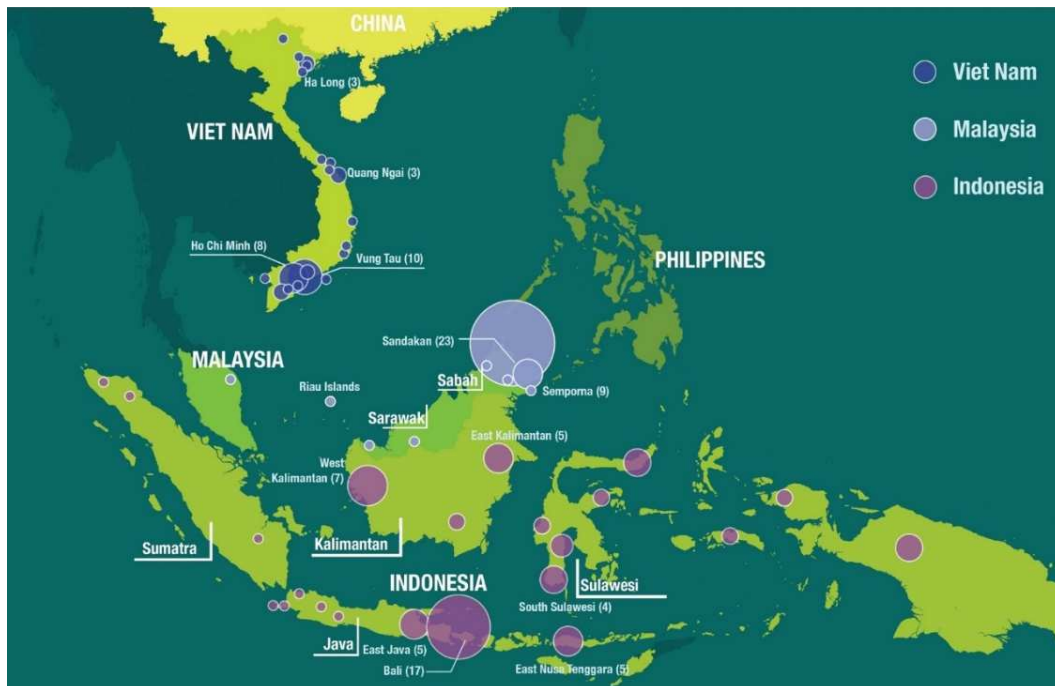


Figure 29 - Location of identified seizures for Indonesia, Malaysia and Viet Nam between 2015 and August 2018. Number of seizures in a location are shown in brackets. Where no numbers are provided, there are two or less incidents for that location. Data sources: TRAFFIC seizure records, media reports, grey literature and records from other non-governmental organisations.



Figure 30 - Domestic trade routes identified for Indonesia and Malaysia based on seizure data between 2015 and August 2018. Thicker arrows refer to that particular route being mentioned three or more times in seizure records, while thinner lines refer the route being mentioned once. Data sources: TRAFFIC seizure records, media reports, grey literature and records from other non-governmental organisations.



Figure 31 - International trade routes for Indonesia and Malaysia based on seizure data between 2015 and August 2018. Thicker arrows refer to that particular route being mentioned three or more times in seizure records, while thinner lines refer the route being mentioned once. Data sources: TRAFFIC seizure records, media reports, grey literature and records from other non-governmental organisations.

Domestic drivers of trade

Marine turtles have been traditionally used in Indonesia by ethnic groups (e.g. during Hindu ceremonies). Present findings evidence how cultural beliefs drive use. For example, turtle oil was found to be advertised online for its medicinal properties for treating skin problems such as acne, eczema, and other allergies. In addition to cultural incentives, the use and trade in marine turtles is driven by consumptive and economic motivations.

During the present assessment efforts, some fishers in Bali and Sulawesi reported that if they see a marine turtle and there is little risk of being caught, they will take it.

Species and specimens in trade, including by region

Among the 70 marine turtle seizure records identified as taking place in Indonesia between 2015 and 2018 (see section “Analysis of seizure data” above; table 4; fig. 29), for those cases where the species involved was indicated, green and hawksbill turtles were the those most commonly implicated species, suggesting that these are commonly sought after in trade.

Based on the physical and online market surveys undertaken in the present study, marine turtle specimens that are in use and trade in Indonesia include meat, eggs, body parts, handicrafts made of carapace, turtle oil, dried egg powder and taxidermied specimens.

Prices

The observed average prices for marine turtle products found on sale in physical and online market in Indonesia are as follows:

- Taxidermied turtle: USD 42.00-840.00
- Egg: USD 1.50
- Packet of dried turtle egg powder: USD 0.30-7.00
- Handicrafts: USD 0.60-120.00
- Small ornament in the shape of a turtle made with carapace: USD 355.00-380.00
- Turtle oil: USD 1.20-14.00

Illegal international trade

The analysis of recent seizures from 2015 to 2018 (see section “Analysis of seizure data” above), as well as of seizures that occurred outside that period (refer to section “Assessment methods” above) provide evidence of a potentially concerning trend in the illegal international trade in marine turtles and their parts. This section draws on these examples to illustrate the dynamics of the trade involving key countries, particularly those in the Asian region.

It has been reported that the international trade in marine turtles out of Indonesia was rising nationwide largely to meet a demand from East Asian countries (IOSEA, 2014). This demand appears to persist, as recent seizure data (2015 to 2018, see section “Analysis of seizure data” above) reveals that international trade in marine turtles from Indonesia is destined to Malaysia, China, and Viet Nam. China was implicated as a destination country in seven seizure cases identified in the present study.

In 2013, WWF Indonesia noted a rising illegal export of marine turtle eggs from West Kalimantan to the Malaysian states of Sabah and Sarawak, where they fetched a higher price¹⁷. There were at least seven seizures of turtle eggs in Kalimantan from 2010 to 2015 involving an estimated 31,500 eggs reportedly destined to Malaysia¹⁸. The most recent case was of 6,725 eggs which were seized at Sintete Port in West Kalimantan in 2015 while on route to Sarawak (Malaysia).

In January 2015, Vietnamese fishermen were caught in Indonesian waters off Papua with 50 dead hawksbills on their boat. Illegal Vietnamese fishing in waters within the Coral Triangle has been noted since at least the 2000s (IOSEA, 2014). China appears to be the main source of demand for marine turtle carapace, live and taxidermied products from Indonesia, while Malaysia appears to be the main source of demand for turtle eggs (IOSEA, 2014). These conclusions were also noted by TRAFFIC in 2011, based on seizure records and market surveys that

¹⁷ Jakarta Post (2013). *Sea turtle egg smuggling rise*. Available at <http://www.thejakartapost.com/news/2013/10/08/sea-turtle-egg-smuggling-rise.html>.

¹⁸ Mongabay (2016). *Lagi 500 telur penyu asal kepulauan Riau dijual di Pontianak*. Available at <https://www.mongabay.co.id/2016/07/31/lagi-500-telur-penyu-asal-kepulauan-riau-dijual-di-pontianak/>.

revealed a consistent illegal trade route from the Coral Triangle region (mainly Indonesia, Malaysia and the Philippines) to mainland China (Lam *et al.*, 2012). Lam *et al.* (2012) found that between 2000 and 2008, over 9,180 marine turtle products were seized in East Asian countries (i.e. mainland China; Hong Kong, Special Administrative Region; Taiwan, Province of China; and Japan). Indonesia was the country most frequently linked to seizures in these countries, with at least 14 incidents noted (Lam *et al.* 2012).

Trends

Findings indicate that the open sale of turtle carapace specimens is limited in physical markets when compared to TRAFFIC's previous surveys in 2009 (TRAFFIC, 2009; TRAFFIC Southeast Asia, 2009). It seems that this could be a result of stricter enforcement efforts and media coverage of seizures that, by leading to greater awareness among the public, would have driven the trade in live turtles, meat, eggs and carapace largely underground, challenging the identification of accurate information on trade volumes and dynamics. Still, several reports across the archipelago during this study indicate that trade in marine turtles and their specimens continue to be widespread in Indonesia, with turtle eggs, meat and carapace still in demand locally. The electronic survey undertaken revealed an active trade in marine turtle products, including handicrafts, fish bait powder made from dried turtle eggs and turtle oil.

Of additional concern is the sale of freshwater softshell turtle (Trionichidae) meat as marine turtle meat. This was reported during the present research and confirms that, while there may be generally a greater awareness among the public concerning the illegality of taking marine turtles for meat, the demand for these species has yet to cease. Overall, findings confirm the prevalence of illegal take, use and trade in marine turtles in Indonesia, and demonstrate that the open illegal availability of specimens is more apparent in online markets than in physical ones. The findings reported in the sections "Domestic use and trade" and "Illegal international trade" provide additional insights that can be relevant for understanding the marine turtle trade trend in Indonesia.

Insights into conservation impacts

Some respondents noted that the increasing public mobility, human population and tourism in Indonesia, particularly along previously isolated stretches of coastline, are leading to greater pressure on formerly undisturbed marine turtle nesting beaches.

Following the increased enforcement efforts relating to trade and consumption of marine turtles and their specimens, some communities (notably in Bali) have opened "turtle attractions" for tourists. These attractions may include hatcheries and several young and adult turtles. For their establishment, the nature conservation agency of the Indonesian Government (Balai Konservasi Sumber Daya Alam, BKSDA) must issue appropriate permitting. While many of these facilities may be established for conservation purposes, evidence collected during the present work suggests that some facilities may provide little, if any, conservation value (fig. 28). It has been suggested in the literature that such facilities may be conduits through which marine turtle meat and eggs are sold more easily (Firliansyah *et al.*, 2017).

A further concern relates to the disposal of seized live turtles or eggs that may pass through these facilities. Releases of young turtles that have been kept in captivity for long periods might lessen their chances of survival (Pilcher *et al.*, 2001), rather than increase them (this is often used as the justification by those keeping turtles in captivity for longer periods prior to release). The release of sick turtles could also lead to disease transmission into wild populations (Warwick *et al.* 2013).

Also of concern in Indonesia is the sale of meat of freshwater softshell turtles (Trionichidae) as marine turtle meat. This represents a potential for the overexploitation of these species in order to meet the market demand for marine turtle meat (pers. comm. to TRAFFIC, anonymous, April 2018). This potential is enhanced by the unprotected status and captive breeding of many softshell turtle species, the public's confusion between land turtles (*kura kura*), softshell turtles (*labi labi/bulus*) and marine turtles (*penyu*), as well as a growing public awareness regarding the prohibition of harvesting marine turtles for their meat.

Applied management options that may be considered for other areas

The findings of the present study raise some concern regarding the rising number of turtle holding establishments, particularly in Bali, that hatch eggs and keep live turtles for commercial purposes. Although all establishments that were visited displayed official licensing from the Indonesian Nature Conservation Agency (BKSDA) allowing them to operate legally, standard hatchery and release protocols were found to be largely ignored. Management efforts to address illegal trade in marine turtles in Indonesia such as the creation of marine turtle

holding establishments, should take into account an assessment of the actual benefits that such establishments can offer to marine turtle populations, and balance these with potential risks, such as that of disease transmission to wild populations (Warwick et al. 2013), or the opportunity for illegal trade (Firliansyah *et al.*, 2017).

It is furthermore important that efforts to tackle illegal trade in marine turtles in Indonesia address national and provincial legislation and regulations with a view to solve existing gaps and lack of harmonization.

Conclusions – Indonesia

Marine turtles are protected in Indonesia under national legislation and regulations which prohibit the capture of, and trade in these species. Despite this, reports during the present survey indicate an active local demand for marine turtle meat, eggs and carapace, and that trade in marine turtles and their specimens continues to be widespread in Indonesia. Local consumption and sales of marine turtles, eggs and products are reported to be taking place at roadside stalls and town markets near to nesting beaches and ports.

Based on reports during the present assessment and on the analysis of recent seizures, the coasts of West Sumatra, Java, Bali, Kalimantan, and perhaps to a lesser extent but still significant, Sulawesi, Maluku and Papua, appear to be important trade hubs for marine turtle specimens. It is possible that these areas are being supplied by many of the smaller Indonesian islands, largely by boat. During the present assessment, marine turtle meat, body parts, eggs and handicrafts were found on open sale in Sulawesi and Bali (sites in Java and Sumatra were also visited but no specimens were found for sale at these). Additionally, reports from interviews suggested that the Mentawai Islands and East Nusa Tenggara are significant sources of marine turtle meat, eggs and carapace, but time constraints did not enable surveying these locations.

In comparison to the findings of TRAFFIC in Indonesia in 2009, the limited open market availability of marine turtle specimens found during the present study suggests that the trade has been largely driven underground. Although it remains to be determined, this could be a consequence of stricter enforcement efforts and stronger media coverage of seizures.

The present study found an active online trade in marine turtle specimens to be present in Indonesia, contrasting with the limited open market availability of products. Over the span of a month, 607 individual items (including handicrafts, egg powder and turtle oil) and 400g of eggs were found for sale in a total of 213 advertisements identified on online trade platforms.

While the apparent shift of trade into more underground routes generally makes it more challenging to identify individual trade hotspots for export, cities with ports and harbours throughout Indonesia appear to provide easier trade routes than air transportation. It seems reasonable to assume that, in most places where there is turtle nesting or foraging, there will be some local consumption and/or sale of meat and eggs.

The analysis of recent seizures suggests that international trade involving Indonesia is still of concern, and offers an insight into how trade routes involving Indonesia are still operational. In 2014 it was reported that international trade leaving Indonesia was on the rise largely to meet a demand in East Asian countries (IOSEA, 2014). With seizure data from 2015 to 2018 revealing at least seven cases where China was reportedly a destination, it is clear that the demand for marine turtle products outside of Indonesia has not ceased. In 2013, WWF Indonesia noted the rising trade in marine turtle eggs from West Kalimantan to the Malaysian states of Sabah and Sarawak. More recently, there were at least seven seizures of turtle eggs in Kalimantan from 2010 to 2015 involving an estimated 31,500 eggs which were reportedly destined to Malaysia. Illegal Vietnamese take in the Coral Triangle waters has been noted since at least the 2000s (IOSEA, 2014). More recently, in January 2015, Vietnamese fishermen were caught in Indonesian waters off Papua with 50 dead hawksbill turtles on board.

The visit to marine turtle holding facilities, such as hatcheries and touristic turtle attractions revealed that some of these establishments may not be offering the conservation value to marine turtle populations that they are expected to, as per their permits for operation. It seems possible that some of these may threaten wild populations through the potential for disease transfer from captive individuals. Moreover, it has been suggested in the literature that some of these facilities may be conduits for trade in meat and eggs, although this requires further investigation. Also of concern are reports of freshwater softshell turtle (*Trionichidae*) meat being sold as marine turtle meat in Indonesia. This deems further investigation to avoid overexploitation of freshwater and land turtle species that are not protected in the country.

Additional action to address marine turtle trade in Indonesia should involve improving monitoring, detection and law enforcement in physical and online markets, and particularly in maritime areas, including fishing vessels and seaports; raising public awareness on the conservation status of marine turtles and the legislation that applies to them; and enhancing cooperation with countries in the subregion to address illegal international trade.

Malaysia

This section includes a summary of the findings by TRAFFIC (see CITES document CoP18 Inf. 18, Annex 4), as well as additional information from the literature compiled by the Secretariat.

Assessment methods

Research efforts focused on collecting (past and present) information relating to the presence and prevalence of trade activities (on online and physical markets), insights into perceived conservation impacts from the trade activities, and existing management practices in Malaysia. The following methods were applied by TRAFFIC to assess the status, scope and trends of the trade in marine turtles in Malaysia, as well as its conservation impacts, management options and mitigation priorities:

Interviews were undertaken with 30 people (among Indonesia, Malaysia and Viet Nam), including government officials, researchers, non-governmental organisation members and local community members. When surveying markets (see paragraph below), interviews were opportunistically held with traders to gather insights into trade sources and dynamics.

Market surveys were conducted between April and June 2018 in the states of Sabah (15 sites), Sarawak (5 sites), Terengganu (three sites) and Melaka (one site; see fig. 32). Surveyed sites included wet and dry markets, and souvenir shops. Products on sale and their prices were recorded at the surveyed sites.

An **electronic survey** was conducted during an hour per day for one month (15 July to 15 August 2018) to search for the online availability of marine turtle products on commercial portals and social media (Facebook). A preliminary 21-hour search was also undertaken in June 2018 over one week across 18 websites. A total of 13 search terms were used among the languages of English, Malay/Indonesian, and Mandarin.

An **analysis of seizure records** from January 2015 to August 2018 was undertaken, including data from TRAFFIC seizure records, media reports, grey literature and records from other non-governmental organisations. Seizure incidents that occurred prior to 2015 were described where relevant but not included in the overall analysis.

A **literature review** was conducted to complement findings on the ground.



Figure 32 – Malaysian states and federal territories. Source: Lewison et al. (2016).

Legislation and regulations relevant to marine turtles

Five species of marine turtle occur in Malaysia: loggerhead turtle, green turtle, leatherback turtle, hawksbill turtle, and olive ridley turtle.

Malaysia is divided into 13 states and three federal territories (fig. 32), and legislation to protect marine wildlife in the country consists of a combination of state and federal law. As per Article 75 of the Constitution of Malaysia,

where there is a conflict between federal and state legislation, federal law prevails. In general, turtle management falls under the jurisdiction of each state for areas within their territorial waters (up to 3 nautical miles off the coast). Considering this provision, turtle management which falls under the purview of the federal government (i.e. included in the Fisheries Act 1985) only applies in lieu of any state enactments pertaining to turtle management.

In **Peninsular Malaysia**, all states have marine turtle related legislation, except for Perlis and Selangor. The legislation in other states, via state enactments or under the enabling section of the Fisheries Act 1985, mainly prescribes the procedures and fees for the purposes of securing licenses to collect eggs, and operating turtle watching areas. There are penalties prescribed for offenses involving the possession and killing of turtles. In most of Peninsular Malaysia, all marine turtle eggs (except leatherback turtle eggs in Terengganu and Pahang) are freely and legally traded in the local markets, except in Perak and Melaka. The states of **Sabah** and **Sarawak** have their own wildlife protection legislation (the Wildlife Conservation Enactment [1997] and the Wildlife Protection Ordinance [1998]), which list marine turtles as totally protected animals. Both states ban all trade and consumption of marine turtles and their specimens. Federal legislation governs the import and export of wildlife through Malaysia's main CITES-implementing legislation, the International Trade in Endangered Species Act (2008), and the Customs Act (1967). While eggs can be legally harvested in some parts of Indonesia, there is no legal harvest of marine turtles in the country.

While Malaysia's wildlife protection legislation generally provides a solid framework to protect marine wildlife, many of these measures do not apply to marine species, and the combination of federal and state legislation to protect wildlife can create gaps, inconsistencies and overlaps. For example, while the states of Sabah and Sarawak afford protection to marine turtles and ban trade, the same is not applicable in the Peninsular Malaysian states:

- Five states (Melaka, Penang, Johor, Negeri Sembilan and Kelantan) have enacted Rules pursuant to the Fisheries Act 1985, i.e. simply prescribing the procedures and fees for the purposes of securing licenses to collect eggs, and operating turtle watching areas.
- The Terengganu Turtle Enactment 1951 (amended 1987) uses local Malay names to describe marine turtles (no definition at species level). It prohibits the killing and taking of turtles but regulates the collection of turtle eggs via a licensing protocol.
- The Melaka Fisheries (Turtles and Turtle Eggs) Rules 1989 and the Penang Fisheries (Turtles and Turtle Eggs) Rules 1999 list all four turtle species in Peninsular Malaysia (loggerhead turtles do not nest in this area) as protected species, and provide for a licensed egg collection system. This is permitted for licensed collectors who sell the eggs back to the Department of Fisheries as part of a 'buy-back' system for hatchery and conservation purposes.
- The Johor Fisheries (Turtles and Turtle Eggs) Rules 1984, the Negeri Sembilan (Turtles and Turtle Eggs) Rules 1976 and the Kelantan (Turtles and Turtle Eggs) Rules 1978, all mention the order *Chelonia*, together with local names, and allow for the licensing of egg collection.

For further details (including strengths and weaknesses) of Malaysia's legislation and regulations concerning marine wildlife protection see CITES document CoP18 Inf. 18, Annex 4.

In addition to national legislation and regulations, Malaysia is part of different international agreements with relevance for marine turtles. These include CITES, the IOSEA Marine Turtle MoU, the Memorandum of Understanding on ASEAN Sea Turtle Conservation and Protection, the Memorandum of Agreement between the Government of the Republic of the Philippines and the Government of Malaysia on the Establishment of the Turtle Islands Heritage Protected Area (THPA MoA), and the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF).

Sources of marine turtle take in Malaysia

Take of, and trade in marine turtle eggs is legal in most of Peninsular Malaysia, but not in Sabah and Sarawak, where these activities are prohibited. Still, marine turtles and their eggs are illegally taken from the latter states and traded with other states in the country.

Domestic use and trade

In Malaysia, turtle eggs were found on open sale in three of the four states visited (i.e. in Sabah, Sarawak and Terengganu), among 18 vendors in wet and dry markets and roving traders.

Domestic trade appears to be mainly focused on turtle eggs and meat for consumption. While eggs appear to mainly cater for locals, meat consumed locally appears to cater mainly for foreign tourists. From observations, it is estimated that the egg trade at these three state locations involved a minimum of 1,250 eggs for the period surveyed. The price for eggs appears to be lowest in Sarawak (where trade is illegal), and highest in Terengganu (where egg trade is legal). Aside from the demand for eggs for consumption, there does not appear to be much demand for taxidermied turtles or products made from carapace in Malaysia.

Anecdotal information seems to suggest that turtle meat from Malaysia is being exported to China. While live turtles were not observed for sale during market surveys, the trade in live turtles has been noted in Sabah, where specimens are hunted and sold to middlemen and then to foreign fishermen (WWF-Malaysia *et al.*, 2018).

Online trade appears to be minimal in Malaysia. Over the span of one month, from 15 July to 15 August 2018, only one advertisement was recorded in the electronic survey conducted. This consisted of a bracelet being offered by a seller located in the state of Selangor. The 21-hour research undertaken over one week in June 2018 found only turtle eggs being offered. For the most part, this trade was located in the states of Kelantan and Terengganu, but also in Sabah. Eggs were offered on the webpages of individual traders, with buyers being required to collect the eggs in-person at designated locations. The volume of eggs traded online seems small, and this type of trade appears to be conducted rather on an opportunistic basis, with typical offers ranging from 10 to 50 eggs.

The take and trade in marine turtles and their specimens is banned in Sabah and Sarawak, but the licensing of egg collection is allowed in the peninsular states of Johor, Kelantan, Penang, Melaka, Negeri Sembilan, and Terengganu. All these states were surveyed, and the following paragraphs describe the respective findings for these areas.

In the west coast of **Sabah**, Kudat, Sandakan, and Tawau are considered to be the main areas where turtle take and egg trade occur, with trading hubs appearing to be centered in the major towns of Sandakan and Semporna (east coast), coinciding with known turtle nesting sites (WWF-Malaysia *et al.*, 2018).

The open availability of turtle products in Sabah was found to be limited, as no eggs, parts or derivatives were found for sale at the sites visited. Rather, trade in **eggs** is conducted covertly by traders with no established base of sale. Sales are made predominantly to locals, and sellers typically refuse to engage with tourists. Each trader appears to have around 50 to 60 eggs at any point in time, and will reportedly replenish its stock from a central warehouse, as needed. Some interviewed traders reported that turtle eggs are sourced from freelance harvesters and, in some cases, by individuals from enforcement agencies, who deliberately under-report eggs that are collected for conservation purposes. A large but undetermined volume of eggs are reportedly exported out of Sabah for sale in Terengganu (Peninsular Malaysia), where egg consumption and trade are legal. A respondent stated that it is an “open secret” that eggs are packed in marked cargo in Sabah and airlifted to Terengganu. The present market surveys and interviews in Terengganu confirmed that eggs available at its markets are sourced from Sabah.

In Semporna (Sabah), there appears to be an increasing level of trade in turtle **meat** in exotic dishes covertly offered mainly to tourists. Restaurants do not engage directly with potential customers, but rather go through trusted third-parties. Most of the turtle meat is sourced locally in Sabah’s more remote islands or beaches (WWF-Malaysia *et al.*, 2018). As for eggs, some respondents also revealed that they periodically obtain marine turtle meat from individuals working in local enforcement agencies.

Products made of **carapace** were not observed for sale during the market surveys in Sabah. Conversations with souvenir traders revealed that they were unable to source turtle carapace products in recent years due to a significant reduction in supply, although products can still be offered by certain individuals.

Only one vendor was observed selling marine turtle eggs in **Sarawak** (at the Serikin market). It was estimated that the vendor had 50 **eggs**, which were only exposed after enquiry. As in Sabah, trade in eggs was found to be conducted covertly. Most of the vendors were suspicious when enquiries were made. Based on discussions with turtle researchers from WWF-Malaysia and the University Malaysia Terengganu in Kuching, Sarawak, the same *modus operandi* employed by poachers and traders in Sabah were prevalent in Sarawak. They also reported that the town of Semantan, which was considered an active trading location for illegal wildlife products, was also known for trade in marine turtle specimens (due to time constraints this location was not visited).

Terengganu is considered an important trading hub for marine turtle **eggs**. Based on interviews, egg trading hubs are centered within the major townships of Kuala Terengganu, Kemaman and Besut. Eggs obtained illegally from other parts of Malaysia (e.g. Sabah), as well as from neighbouring countries (e.g. Indonesia, the Philippines) are sold openly and legally in the state of Terengganu, akin to a “money laundering scheme” (IOSEA, 2014). In the present study, turtle eggs were observed for open sale as “fresh”, “cooked”, and “pickled” in markets in Terengganu (fig. 33). Eggs were reportedly sourced mainly from nesting beaches around Terengganu and Sabah. Some traders interviewed also mentioned that eggs were imported from other states in Peninsular Malaysia, such as Kelantan, Pahang, and Perak (where the trade in eggs is legal). A trader revealed that eggs that are sold in a bulk are usually sourced from Sabah or imported illegally via land, air, boat or post from neighbouring countries such as the Philippines or Thailand.



Figure 33 – Left and right: marine turtle eggs openly available in markets in Terengganu, Malaysia. Egg take in Terengganu is legal.

Trade appears to have remained constant in this state. Based on the present market survey, at least 1,000 eggs were sold daily at Pasar Payang in Kuala Terengganu (estimated at 365,000 eggs annually). Turtle eggs are often acquired in large quantities, demonstrated by seizures of up to 19,000 eggs in a single event¹⁹, and eggs are generally stocked for sale. The present estimated level of trade generally correlates with the yearly total of 422,000 eggs estimated by TRAFFIC in 2009 (TRAFFIC, 2009).

No marine turtle specimens were found on open sale in the markets in **Melaka**. An NGO representative who has been engaged in turtle conservation in this state since the 1980s, and who has collaborated with the Department of Fisheries Malaysia, indicated that there is no commercial trade in turtle specimens in Melaka, and that egg consumption by locals is mainly on an opportunistic basis.

Analysis of seizure data

Among data from TRAFFIC seizure records, media reports, grey literature and records from other non-governmental organisations, a total of 36 seizure records were identified as taking place in Malaysia between 2015 and 2018 (table 4; fig. 29). These included at least 67,962 eggs, 1,201 live animals, 225 dead animals, 153 kg of meat, 127 kg of unprocessed carapace, and 53 unprocessed carapace pieces. Among these 36 seizures, Sandakan (state of Sabah) was the most common seizure location (94% of incidents), always involving marine turtle eggs. Green and hawksbill turtles were the most implicated species among the seizures where species information was available.

Where route information was available for these seizures (only one shipment case involving 365 eggs), it revealed that at the domestic level there is an aerial route for egg trade from Kota Kinabalu (Sabah) to the state of Kelantan (Peninsular Malaysia; fig. 30).

At the international level, available information on routes revealed that Malaysia was implicated as a destination in at least 10 incidents (all eggs, totaling 52,840 eggs). Nine of these seizures took place in Sabah, most of which reportedly originating from the Philippines. In the one incident involving Indonesia, marine turtle eggs were being smuggled from Riau Islands (Indonesia) to West Kalimantan (Indonesia) by sea and from there into Sarawak (Malaysia; fig. 31) by land.

¹⁹ The Star Online (2016). *Sabah police cripple turtle egg smuggling ring*. Available at: <https://www.thestar.com.my/news/nation/2016/07/16/sabah-police-turtle-eggs/>.

Domestic drivers of trade

Based on findings, domestic trade in marine turtle products in Malaysia appears to mainly serve consumption purposes, with eggs apparently being mainly consumed by locals, and meat by visiting foreigners.

Of note, while “buy-back”²⁰ schemes exist in Terengganu and are administered by the Department of Fisheries Malaysia, the price offered for collected eggs (less than USD 0.50/egg) is significantly lower than their market value (observed egg prices ranged from USD 1.00 to 1.50/egg). This factor may be encouraging the engagement in the trade in marine turtle specimens.

Species and specimens in trade, including by region

Findings indicate that specimens in trade include, at least, marine turtle handicrafts made of carapace, eggs (fresh, boiled and pickled), meat, and whole turtles. While take and trade in marine turtle eggs is legal in most of Peninsular Malaysia, these activities are not legal in Sabah and Sarawak. Despite legislation and regulations, marine turtles and their eggs are taken and traded across Malaysia, not only where these activities are legal, but also where they are illegal.

Prices

The observed average prices for marine turtle products found on sale in physical and online markets in Malaysia are as follows (prices vary depending on region):

- Small or juvenile turtle: USD 327.00
- Kilogram of dried meat: USD 25.00
- Fresh egg: USD 0.05-1.50
- Boiled egg: USD 1.40
- Handicraft: USD 22.00

Illegal international trade

Much of the illegal international trade in marine turtles in Malaysia has largely been attributed to take by foreign fishing fleets (mostly Chinese and Vietnamese) concentrated in the waters off the western coast of Sabah, to meet market demands in China and Viet Nam (Lam *et al.*, 2012; Riskas *et al.*, 2018; WWF-Malaysia *et al.*, 2018). Previous seizures and studies (IOSEA, 2014; WWF-Malaysia *et al.*, 2018) identified that these locations host thriving turtle markets offering meat dishes, turtle-based souvenirs, and traditional turtle-based medicines. Based on recent seizure data from 2015 to 2018 (see section “Analysis of seizure data” above), such incidents still occur. From this data, at least 10 seizures implicated Indonesia, the Philippines and Viet Nam in the international trade in marine turtles with Malaysia. Most of these cases (at least 8) involved turtle eggs exported from the Philippines into Malaysia. The most recent of these cases occurred in 2017, whereby two shipments of over 3,000 eggs were seized from Filipinos in waters of Sabah. There was also an incident in 2017 in which a Filipino vessel carrying green turtle meat, organs and carapace was seized in Malaysian waters while reportedly heading back to the Philippines. Viet Nam was linked to Malaysia in at least three cases. In two of them (in 2016 and in 2017), Vietnamese vessels carrying marine turtles were seized in Malaysian waters amounting to 1,400 dead and live turtles. In the third incident (in 2015), a container loaded with dead marine life, including turtles, was seized at a port in Hai Phong, Viet Nam with origin reported as Peninsular Malaysia. Lastly, in October 2017, an Indonesian vessel carrying 97kg of marine turtle shells was seized in Sabah waters.

According to a recent study by WWF-Malaysia *et al.* (2018), marine turtle poaching has shifted in recent years to involve more local community members. These are paid to capture turtles which are then collected in centralized locations for packaging and subsequent export to foreign markets in China, Viet Nam and the Philippines (WWF-Malaysia *et al.*, 2018). This shift is thought to be related to increased maritime security that makes it harder for foreign vessels to operate in Malaysian waters (WWF-Malaysia *et al.*, 2018).

According to an interview conducted with enforcement bodies in Sandakan, a mayor of a Philippine Island stated during a meeting (temporal information unavailable) that turtle eggs are one of their major exports. Interviews with various sources suggest that certain border towns in Malaysia, such as Serikin (Sarawak), and potentially Semporna (Sabah), are used as transit points for international trade in marine turtles destined to Southeast Asia (WWF-Malaysia *et al.*, 2018; IOSEA, 2014). As reported by WWF-Malaysia *et al.* (2018), it is suspected that

²⁰ The buyback scheme refers to the government buying the eggs back from collectors, which provides an income to the collectors while the government manages the eggs in a hatchery.

turtle specimens collected in these towns are packed for shipping to overseas markets, particularly to meet a demand in China. A review of press releases²¹ of previous seizures made in Sabah's jurisdiction shows that many of the turtle specimens seized originated either from the Philippines or from Indonesia, and were destined either to Viet Nam or China.

Trends

While there is a legal consumption and trade in marine turtle eggs in some parts of Malaysia, findings clearly indicate the presence of an underlying illegal trade.

In Sabah, based on interviews with local stakeholders, there is a general perception that the open trade in turtle specimens is declining. This is attributed to perceived (by respondents) increased enforcement activities in recent years -the highest number of seizure incidents from 1999 to 2017 was recorded in 2016 and 2017 [WWF-Malaysia *et al.*, 2018]). Nevertheless, these perceptions may not accurately represent reality, given that interviews revealed also the existence of an illegal market for turtle eggs and meat (see sections "Domestic use and trade" and "Illegal international trade" above).

It is difficult to ascertain the true status of the turtle trade in Malaysia, or to determine whether behaviours have significantly changed in comparison to previous years. Furthermore, it is also challenging to gauge the effectiveness of any measures implemented to mitigate impacts from trade activities, particularly considering that there is limited information available on these activities themselves. Still, information from the literature and the findings of the present study provide insights that can inform about the trend in marine turtle trade in Malaysia. For example, in Terengganu, an 365,000 eggs/year were estimated (this study) to be sold in Pasar Payang in Kuala Terengganu. This value generally correlates with the 422,000 eggs/year that TRAFFIC had also estimated in 2009 (TRAFFIC, 2009). As indicated in the section "Illegal international trade" above, much of the illegal international trade in marine turtles in Malaysia has largely been attributed to poaching by foreign fishing fleets (mostly Chinese and Vietnamese) concentrated in the waters off Sabah to meet market demands in China and Viet Nam (Lam *et al.*, 2012; WWF-Malaysia *et al.*, 2018; Riskas *et al.*, 2018). Previous seizures and studies (IOSEA, 2014; WWF-Malaysia *et al.*, 2018) identified that these locations host thriving turtle markets offering meat dishes, turtle-based souvenirs, and traditional turtle-based medicines. Based on recent seizure data from 2015 to 2018 analysed in the present study (see section "Analysis of seizure data" above), seizure incidents involving these countries continue to occur.

Insights into conservation impacts

The impacts of trade on the conservation of marine turtle populations has been acknowledged as a conservation issue in Malaysia since the 1950s, and has been given attention since. The domestic trade is dominated by the consumption of eggs (Chan, 2006; Department of Fisheries Malaysia, 2008; TRAFFIC Southeast Asia, 2009; Liew, 2011; Salleh *et al.*, 2018; Teh *et al.*, 2018; WWF-Malaysia *et al.*, 2018), which is legal in several states, with the exception of Sabah and Sarawak. In the early 1960s, the management of turtle egg collection and nesting disturbance was formally established to address the declining leatherback turtle nesting population in Rantau Abang, Terengganu (Liew, 2011). However, actual studies on the occurrence and prevalence of trade, as well as the type and characteristics of the trade itself have been quite limited. Egg collection licenses were introduced to curb widespread turtle collection and subsequent trade, with "buyback"²² mechanisms established for conservation purposes by the Department of Fisheries Malaysia typically involving green and hawksbill turtles (Chan *et al.*, 1996;²³). The egg licensing system generally includes the following: licenses are non-transferrable, all eggs must be sent to the Department of Fisheries for incubation, and only a small number of individuals are allowed to collect on a stretch of beach or area (TRAFFIC Southeast Asia, 2009).

Applied management options that may be considered for other areas

In 1977, the establishment of the Turtle Islands Park in Malaysia was approved. The Park consists of three important islands (Selingan, Gulisan and Bakungan Kechil) where turtles and their nesting beaches are fully protected. The establishment of this Park is believed to have resulted in increased numbers of nesting, incubated

²¹ See Annex IV of document CITES CoP18 Inf. 18, Annex 4 for detailed seizure data.

²² The buyback scheme refers to the government buying the eggs back from collectors, which provides an income to the collectors while the government manages the eggs in a hatchery.

²³ WWF-Malaysia (2011). WWF urges state government to carry out investigations into origins of turtle eggs sold in Terengganu. Available at: <http://www.wwf.org.my/?12960/WWF-Urges-State-Government-To-Carry-Out-Investigation-Into-Origins-Of-Turtle-Eggs-Sold-In-Terengganu>.

eggs in hatcheries and released hatchlings. Conservation activities in this Park include daily beach patrolling, hatchery and education programmes, and research activities. Successful outcomes of this model should be considered for expansion to other areas in Malaysia.

Teh *et al.* (2018) determined the Total Economic Value (TEV) that marine turtles in the Sempora Priority Conservation Area (Sabah) could potentially generate per year if these species were fully protected. They found that the estimated non-consumptive value of marine turtles far exceeded the consumptive use value. According to Teh *et al.* (2018), the discounted TEV of marine turtles could reach up to USD 716 million over 30 years if full protection of turtles was implemented at present. The model proposed by these authors, whereby conservation would be partially funded by tourism, should be considered for the area assessed by these authors, but also for other areas throughout the Coral Triangle and Asia Pacific region.

Conclusions - Malaysia

Legal protection for marine turtles varies in Malaysia. While the consumption of, and trade in marine turtles and their specimens are prohibited in the states of Sabah and Sarawak, in most of Peninsular Malaysia marine turtle egg collection is possible through a licensed egg collection system. This collection system applies to the peninsular states of Johor, Kelantan, Penang, Melaka, Negeri Sembilan, and Terengganu.

The present study found illegal take and use of, and trade in marine turtles to prevail in Malaysia. Despite illegal in Sabah and Sarawak, these activities take place in these states. Domestic trade thus appears to be largely driven by consumptive motivations, with eggs being mainly consumed by locals, and meat by visiting foreigners.

Some egg traders were found to replenish their egg stocks from a central warehouse, upon necessity. Generally, the open availability of marine turtle products was found to be limited. It appears that trade has shifted to more underground avenues, with traders cautiously hiding their merchandise and being suspicious of foreigners' inquiries. Based on reports and on the analysis of seizure data, the trade in turtle eggs and meat occurs between states in Malaysia. One interview report suggested that large volumes of eggs are exported out of Sabah (where take is illegal) via air, for sale in Terengganu (where take is legal). This respondent stated that this was an "open secret". The existence of this trade route is supported by the seizure data that was analysed in the present study. Some respondents revealed that they periodically obtain turtle meat from individuals working in local enforcement agencies who are themselves involved in the harvesting process.

Where route information was available for the seizures analysed from 2015 to 2018, it revealed that at the international level Malaysia was implicated as a destination country for at least 10 incidents (all involving marine turtle eggs), nine of which took place in Sabah. Most incidents were reported as originating from the Philippines. Indonesia was also implicated as an origin of eggs seized that were destined to Malaysia. The Philippines and Viet Nam have also been implicated in the international trade in marine turtle products involving Malaysia. According to a recent study by WWF-Malaysia *et al.* (2018), the *modus operandi* for poaching of marine turtles has seen a shift in recent years through an increased involvement of local community members. These are paid to capture turtles which are then collected in centralized locations for packaging and export to foreign markets, such as China, Viet Nam and the Philippines (WWF-Malaysia *et al.*, 2018). Seizures and reports indicate that trade paths include air, land and maritime routes.

Similarly to the limited open sale of specimens, online trade appears to be minimal. The 21-hour online survey conducted during a week in June revealed some incidences of eggs being sold (offers ranged from 10 to 50 eggs). The other survey conducted over the span of a month from 15 July to 15 August 2018, found only one online advertisement (a handicraft item). Generally, the online trade in marine specimens in Malaysia appears to be more of opportunist nature, than that of organized networks.

In Sabah, based on observations and interviews with local stakeholders, there is a general perception that open trade in turtle specimens is decreasing. Still, it is challenging to determine the true status of this trade in Malaysia. Information from the literature and the findings of the present study provide insights into what this trend may be. In Terengganu, an estimated 365,000 eggs/year were estimated (this study) to be sold in Pasar Payang in Kuala Terengganu, and this number generally correlates to the 422,000 eggs/year that TRAFFIC had also estimated in 2009 (TRAFFIC, 2009). Much of the illegal international trade in marine turtles in Malaysia has largely been attributed to poaching by foreign fishing fleets (mostly Chinese and Vietnamese) concentrated in the waters off Sabah to meet market demands in China and Viet Nam (Lam *et al.*, 2012; WWF-Malaysia *et al.*, 2018; Riskas *et*

al., 2018), and recent seizure data analysed in the present study (2015 to May 2018) shows that incidents involving these countries still occur.

Particular needs in Malaysia include addressing gaps, inconsistencies and overlaps between state and federal legislation with relevance to marine turtles; promoting the expansion of successful marine turtle conservation models; and exploring the socio-economic potential of non-consumptive uses for these species.

Viet Nam

This section includes a summary of the findings by TRAFFIC (see CITES document CoP18 Inf. 18, Annex 4), as well as additional information from the literature compiled by the Secretariat.

Assessment methods

Research efforts focused on collecting (past and present) information relating to the presence and prevalence of trade activities (on online and physical markets), insights into perceived conservation impacts from the trade activities, and existing management practices in Viet Nam. The following methods were applied by Education for Nature Viet Nam and shared with TRAFFIC for its assessment of the status, scope and trends of the trade in marine turtles in Viet Nam, as well as its conservation impacts, management options and mitigation priorities:

Interviews were undertaken with 30 people (among Indonesia, Malaysia and Viet Nam) including government officials, non-governmental organisation members and other individuals with experience in marine turtle conservation. When surveying markets (see paragraph below), interviews were opportunistically held with traders to gather insights into trade sources and dynamics.

Market surveys were conducted between January and April 2018 in the cities of Hanoi (88 sites), Ha Tien (41 sites), Ho Chi Minh City (139 sites), Nha Trang (118 sites), and Vung Tau (50 sites; see fig. 34). These sites included markets, souvenir shops, and jewelry shops. The products on sale at these sites were recorded.

An **electronic survey** was conducted during seven hours per day on 26 and 27 March 2018 to search for the online availability of marine turtle products on commercial portals, including social media platforms. A total of four search terms were used in Vietnamese language.

An **analysis of seizure records** from January 2015 to August 2018 was undertaken (including data from TRAFFIC seizure records, media reports, grey literature and records from other non-governmental organisations). Seizure incidents that occurred prior to 2015 were described where relevant but not included in the overall analysis.

A **literature review** was conducted to complement findings on the ground.

Legislation and regulations relevant to marine turtles

Five species of marine turtle occur in Viet Nam: loggerhead turtle, green turtle, leatherback turtle, hawksbill turtle, and olive ridley turtle. The most important laws for marine wildlife protection in Viet Nam are the Law on Environmental Protection (2014), the Biodiversity Law (2008), the Law on Marine and Island Resources and Environment (2015), the Fisheries Law (2003) and the Law on Customs (2014). These provide the general framework for marine wildlife protection. The Viet Nam Maritime Code (2015) and the Law on the Vietnamese Sea (2012) also include measures relevant to marine wildlife protection. These laws are implemented by numerous regulations issued by the Government, Prime Minister and ministries. Penalties for crimes and administrative



Figure 34 – Cities of Viet Nam. Source: <http://www.vietnam-guide.com/maps/>.

violations are provided separately in Penal Code No. 100/2015/QH13 and Law 12/2017/QH14, known as the Amended Penal Code.

Prior to the implementation of Decree 48/2002/ND-CP in 2002, the international trade in marine turtles was not strictly prohibited by law in Viet Nam, despite Viet Nam having become a Party to CITES in 1994. Four species of marine turtle (loggerhead turtle, green turtle, hawksbill turtle, and olive ridley) were first protected in Viet Nam in 2002 by Decree 48/2002/ND-CP but were later removed from this list of protected species when Decree 48 was replaced by Decree 32/2006/ND-CP. However, prior to the implementation of Decree 32, the domestic exploitation of all five species (including the leatherback turtle) became prohibited in Viet Nam by way of Decree 59/2005/ND-CP. Although Decree 59 has been amended twice, first by Decree 14/2009/ND-CP and then by Decree 53/2012/ND-CP, the relevant section covering exploitation of marine resources still stands today. Decree 59 prohibits harvesting any species considered to be “threatened by extinction” by the Ministry of Fisheries. In 2007, the Ministry of Fisheries and Ministry of Agriculture were combined into Ministry of Agriculture and Rural Development (MARD). The list of species “threatened with extinction” as issued by MARD can be found in Decision 82/2008/QĐ-BNN and includes all five species of marine turtle. Decree 59 is also supplemented by guiding document Circular 02/2006/TT-BTS which lists four species of marine turtle that are “prohibited from exploitation”: green turtle, hawksbill turtle, olive ridley turtle, and leatherback turtle. Although Circular 02 was amended in part by Circular 62/2008/TT-BNN, the list of marine turtles remains the same. Thus, by way of Decree 59 and its related and incorporated documents, the five species of marine turtle are prohibited from domestic exploitation in Viet Nam. Decree 160/2013/ND-CP provides exceptions to this rule, but only for research and/or conservation purposes.

The international trade in marine turtles implicating Viet Nam is regulated by Decree 82/2006/ND-CP, Viet Nam’s CITES implementing legislation. Further details (including strengths and weaknesses) on Viet Nam’s legislation and regulations concerning marine wildlife protection are available in CITES document CoP18 Inf. 18, Annex 4.

In addition to national legislation and regulations, Viet Nam is a party to different voluntary international agreements with relevance for marine turtles. These include CITES, the IOSEA Marine Turtle MoU, and the Memorandum of Understanding on ASEAN Sea Turtle Conservation and Protection.

Sources of marine turtle take in Viet Nam

Based on TRAFFIC seizure reports taking place before 2014, people that have been arrested in the past declared that fishermen often hunt marine turtles in the waters of Viet Nam and of surrounding countries. In the past, fishermen used traditional boats and simple fishing gear which could capture a single turtle per outing. Reports during the present study indicate that today fishermen fish in groups and are equipped with large motorized boats that enable them to take a greater number of turtles. Some local people indicated that middlemen are willing to sponsor modern equipment and boats for fishermen to use to capture marine turtles. Marine turtles are processed in Viet Nam (mainly taxidermized) before export.

Domestic use and trade

Marine turtle products were observed for sale in 39 of the 436 outlets surveyed. Most of these were observed in Nha Trang (10 sites out of 118), Ha Tien (at 9 sites out of 41), and Ho Chi Minh City (9 sites out of 130). Most of the products for sale were made of hawksbill, and a small number of green turtle. No other species of marine turtle was positively identified in the market. The products observed were mostly handicraft items, except for preserved specimens. Bracelets were the most frequently observed commodity (31 sites), followed by taxidermied turtles (15 sites).

Similar findings were previously observed by TRAFFIC in 2016, 2017 and 2018 (TRAFFIC, unpubl.) during physical market monitoring in Viet Nam, where at least 199 marine turtle products were for sale in five cities at 15 different sites during this period. Notably, 11 of those sites were observed offering marine turtle products on more than one occasion. All of the products observed were made of hawksbill, and most comprised either bangles or bracelets (148).

The online survey conducted identified 25 vendor accounts selling marine turtle products in a total of 42 advertisements. As found for physical markets, most products observed for sale online comprised handicrafts, but also taxidermied turtles. Meat was observed for sale on one occasion (quantity not provided). Information concerning the total number of products on offer is not available.

Analysis of seizure data

Among data from TRAFFIC seizure records, media reports, grey literature and records from other non-governmental organisations, a total of 47 seizure records were identified as taking place in Viet Nam between 2015 and 2018 (table 4; fig. 29). These seizures included at least 1,626 eggs, 49 live animals, and 12 dead animals, 156 taxidermied animals, 8 kg of meat, and 3 kg of unprocessed shells. Among these 47 seizures in Viet Nam, Vung Tau and Ho Chi Minh were the most common seizure locations (21% and 17% of incidents, respectively), involving mostly eggs, live turtles, and taxidermied turtles. While the species involved in the specimens seized was often not reported, for those cases where it was indicated, green and hawksbill turtles were the most common.

An additional number of seizures outside of Viet Nam between 2016 and 2017 was identified as implicating this country in international trade. Where route information was available for these seizures, it revealed that China was implicated as a destination for four seized shipments originating in Viet Nam. Viet Nam was also implicated as a destination country in at least six incidents, with origins mostly reported as Malaysia (three incidents) involving illegal trade in live and dead marine turtles, followed by Haiti, Indonesia and the Philippines, with one incident each. International shipments originating from Viet Nam were mostly via land, and those destined to Viet Nam by sea, except for the one shipment from Haiti which was intercepted at an airport in France.

Domestic drivers of trade

It is apparent that the trade in marine turtles persists in Viet Nam, but it is becoming less conspicuous. Demand plays a key role in driving trade. Domestically, meat and eggs are consumed as a delicacy and as an aphrodisiac. Wealthy Vietnamese believe that burying taxidermied marine turtles in their house's basement brings luck, while wearing marine turtle products treats low blood pressure²⁴. In addition to domestic demand, demand from Chinese nationals may be emerging²⁵. According to the Chinese Embassy in Viet Nam, the number of Chinese tourists travelling to Viet Nam, especially to Nha Trang and Da Nang, has risen tremendously over the last five years. Sources find that Chinese tourists often buy wildlife products including combs and hairclips made of carapace²⁶. Prosecuted individuals have claimed that they export large amounts of processed marine turtle products to wholesalers in China for local consumption. However, further investigation is needed to identify how this trade route operates, as well as those involved in it.

Species and specimens in trade, including by region

Present market observations positively identified hawksbill turtle specimens in trade, but also some green turtle specimens. Similarly, the analysis of seizures from 2016 to 2017 (see section "Analysis of seizure data" above) revealed that hawksbill and green turtles were the species most involved in trade, at least where the species were reported. Specimens observed in trade during market surveys included handicraft items and taxidermied turtles.

Illegal international trade

The analysis of recent seizures from 2015 to 2018 (see section "Analysis of seizure data" above), as well as of seizures that occurred outside this period provide some concerning evidence regarding the illegal international trade in marine turtles involving Viet Nam. This section draws on these examples to illustrate the dynamics of the trade involving key countries, particularly those in Asia.

Prior to the implementation of Decree 48/2002/ND-CP in 2002, the international trade in marine turtles was not strictly prohibited by law in Viet Nam, despite the country having become a Party to CITES in 1994. Between 1973 and 1985, Viet Nam was known to supply marine turtle products to Hong Kong, Singapore, South Korea, and Taiwan, Province of China (TRAFFIC, 2009). In the 1980s, these were sourced domestically but by the 1990s, hawksbill turtles were being sourced from Cambodia. By the early 2000s, hawksbills originating in Malaysia and Indonesia were bought by Vietnamese fishermen off foreign fishing vessels at sea, and carapaces were imported

²⁴ CAND (2013). *It is necessary to prevent the exploitation and sale of sea turtles in Sa Ky port*. Available at: <http://cand.com.vn/Kinh-te/Can-ngan-chan-viec-khai-thac-mua-ban-rua-bien-o-cang-Sa-Ky-242443/>; VOV (2013). *Hunting sea turtles, 14 missing fishermen*. Available at: <http://vov.vn/Print.aspx?id=289462>; Baobariaungtau (2015). *Con Dao sea turtles are being illegally hunted*. Available at: <http://www.baobariaungtau.com.vn/xa-hoi/201509/rua-bien-con-dao-dang-bi-san-bat-trai-phep-637374/>; Giadinh (2013). *Danger from hunting turtles*. Available at: <http://giadinh.net.vn/xa-hoi/hicm-hoa-tu-nhung-chuyen-san-rua-bien-20131211040426777.htm>.

²⁵ Tuoitre (2014). *Stock up thousands of marine turtles to ... craft art*. Available at: <https://tuoitre.vn/tang-tru-hang-ngan-xac-rua-bien-de-che-tac-my-nghe-674781.htm>; <https://www.youtube.com/watch?v=oZ833NyhLM>; Infonet (2015). *Con Dao sea turtles are hunted and cut to make "hot" drinks*. Available at: <http://infonet.vn/rua-bien-con-dao-bi-san-bat-xe-thit-lam-mon-nhau-hot-post176839.info>.

²⁶ Gapping world (2018). *China acknowledges damage to sea turtles and coral reefs in the South China Sea*. Available at: <http://gappingworld.com/trung-quoc-thua-nhan-gay-thiet-hai-cho-rua-bien-va-cac-rang-san-ho-tai-bien-dong/>.

from Indonesia and Singapore (TRAFFIC, 2004). Research by TRAFFIC in 2002 revealed an active international trade in marine turtle carapace being exported from Viet Nam, and disclosed considerable large-scale marine turtle trading with foreign dealers. Most Vietnamese dealers stated that much of their trade was international (TRAFFIC, 2004), compared to what was previously thought to be dominated by a domestic market (CRES, 1994). Up until the early 2000s, hundreds of stuffed marine turtles were annually exported from Ha Tien and Nha Trang to China, Indonesia, the Philippines and Hong Kong (TRAFFIC, 2004).

Over the years, Sa Ky Port (Binh Chau Commune, Binh Son District, Quang Ngai Province) has reportedly²⁷ remained an active market for the illegal trade in marine turtles. Despite arrests, commercial trade in marine turtle specimens persists in this coastal location²⁸. In 2009, 117 marine turtles were seized when a Vietnamese man in the An Hai village in Binh Chau was transporting them from his vessel to his car for trading. Investigations revealed that these turtles were to be sold to wholesalers in Nha Trang and Ho Chi Minh City for Chinese tourists. In October 2013, 94 dead frozen marine turtles were seized from a vehicle.

Later, in 2014, Vietnamese authorities seized some 7,000 dead marine turtles in Nha Trang from a warehouse and a farm²⁹. According to ENV, the turtles were allegedly destined to China to be sold as taxidermied specimens. In November 2015, the customs department in Hai An Port (Hai Phong province) seized a 40 ft container with dried turtles and carapaces that were illegally imported from Malaysia. Further evidence of international trade comes from some Vietnamese fishermen from Quang Ngai and Binh Dinh who have been sentenced to prison for illegally taking marine turtles in the waters of the Philippines³⁰ and Malaysia, with the aim to sell them to buyers from China (Chu *et al.*, 2015).

Based on the recent seizure data analysed in the present study (see section “Analysis of seizure data” above), at least 10 incidents show that Viet Nam functions mainly as a destination country, or as a transit country for the illegal trade in marine turtles destined to China. According to Yifan (2018), between 2013 and 2017, there have been at least seven reported cases indicating cross-border trafficking of marine turtles between China and Viet Nam at Fangchenggang, a harbor city in the southwest of China. A total of 199 taxidermied and 153 live marine turtles, mostly hawksbills, were estimated as seized in the seven cases. Aside from China, there was at least one seizure in 2017 revealing the trade in turtle carapace reportedly from Haiti. This was on route to Viet Nam and was intercepted at an airport in France. Authorities seized almost half a ton of hawksbill carapace, estimated to amount to 380 turtles³¹. As previously mentioned, Malaysia and Indonesia are also linked as source countries in the trafficking of marine turtle products to Viet Nam.

Trends

Earlier findings in Viet Nam provide insights that can help gauge the trend in marine turtle trade over time in this country. In 2002, TRAFFIC undertook a study (TRAFFIC, 2004) on marine turtle trade in the country. At that time, domestic trade in marine turtles was still legal in Viet Nam. The study found 29,000 marine turtle products for sale in 22 provinces, most of which were for ornamental purposes. Products of four species (green, loggerhead, hawksbill, and leatherback turtles) were found, with the majority of specimens being made of hawksbill turtle (98.6%).

In 2009, after domestic exploitation of marine turtles had become illegal, another TRAFFIC study found that only two species of marine turtle were regularly in trade, hawksbill and green turtles (Stiles, 2009). Compared to the TRAFFIC 2002 survey (TRAFFIC, 2004), the numbers of outlets and items in Ho Chi Minh City and Hanoi decreased considerably. However, trade had increased in other places, including Ha Long, Phu Quoc, and Ha Tien, where marine turtle products were openly purchased regardless of the illegality. In 2016 and 2017, TRAFFIC observed (TRAFFIC, unpubl.) 163 marine turtle products on the market in Viet Nam in Hanoi, Ho Chi Minh, Nha Trang, and Ha Long. All of the products were made of hawksbill turtle and included taxidermied turtles and

²⁷ Based on in-depth interviews by TRAFFIC with a group of experts from the Ministry of Agriculture and Rural Development, Directorate of Fisheries and other NGOs, including IUCN, WWF and Asian Turtle Program. The views of these experts are their personal opinions, and therefore do not necessarily represent the views of the Ministry of Agriculture and Rural Development, Directorate of Fisheries, IUCN, WWF, Asian Turtle Program or that of other stakeholders consulted.

²⁸ See previous footnote.

²⁹ National Geographic (2018). *Turtle Trafficker Sentenced, But Suspected Mastermind Still Not Charged*. Available at: <https://news.nationalgeographic.com/2018/06/wildlife-watch-hawksbill-sea-turtle-trafficker-sentenced-vietnam/>.

³⁰ VNExpress (2013). *The Philippines caught 13 Vietnamese poachers of sea turtles*. Available at: <https://vnexpress.net/tin-tuc/the-gioi/nguoi-viet-5-chau/philippines-bat-13-nguoi-viet-san-trom-rua-bien-2898560.html>.

³¹ RT (2017). *Half a ton of endangered tortoiseshell intercepted by French customs*. Available at: <https://www.rt.com/news/396753-smuggled-tortoiseshell-intercepted-france/>.

handicraft items. In June 2018, 72 taxidermied marine turtles of various species were seized in Vung Tau after being on display at a shell-craft shop³². Overall, during TRAFFIC's market surveys in 2016, 2017 and 2018 (TRAFFIC, unpubl.), at least 199 marine turtle products were found for sale in five cities in Viet Nam. All of the products were made of hawksbill, and comprised handicrafts. Eleven of the sites visited had items for offer on more than one occasion.

During the present study, marine turtle products have continued to be observed for sale across different towns in Viet Nam (see section "Domestic use and trade" above), and handicraft items made of hawksbill carapace were still the most commonly observed commodity in trade.

Data on seizures, as well as results of market surveys conducted by conservation NGOs have demonstrated that the domestic and international trade in marine turtle specimens remains active in Viet Nam. It is nevertheless apparent that, while trade persists, it has become less conspicuous. It is challenging to determine whether the overall levels of current trade are declining, stable or increasing due to the lack of comprehensive data on seizures and reliable investigation on trade routes.

Insights into conservation impacts

Studies prior to 2002 suggested that the trade in marine turtle products in Viet Nam was threatening local populations (CRES 1994; Duc *et al.*, 1995; TRAFFIC, 2004; Van Dijk *et al.*, 2004). Since then, Viet Nam has made strong commitments to address marine turtle conservation by becoming a signatory to various global and regional conventions and treaties. For years, research and conservation activities have been ongoing coupled with awareness raising, more effective law enforcement and a national action plan, "Viet Nam's Marine Turtle Conservation Action Plan, Period 2016-2025"³³. Questions remain on how these commitments are being implemented and if they are effectively addressing the decline of marine turtle populations in Viet Nam.

Applied management options that may be considered for other areas

Based on surveys, Jin *et al.* (2010) found individuals in Ho Chi Minh/Hanoi to have a positive willingness to pay for marine turtle conservation. These authors offer practical insights into household preferences that can help achieve this. Consideration could be given to exploring their findings more deeply with a view to improving marine turtle conservation avenues in Viet Nam.

Marine turtle conservation faces many institutional challenges in Viet Nam. One of the urgent problems in terms of the management of marine turtle conservation is the lack of clearly defined and divided roles and responsibilities for the Ministry of Natural Resources and Environment (MONRE) and the Ministry of Agriculture and Rural Development (MARD). These ministries are leading authorities in implementing state management plans on conservation of protected endangered species, including marine turtles. The current lack of clarity contributes to the lack of comprehensive and effective inter-agency cooperation on the conservation of marine turtles. Additionally, marine turtle conservation requires enhanced cooperation and information sharing not only between MARD and MONRE, but also with the Ministry of Public Security, the Directorate of Customs, the marine police, the People Supreme Court, and other relevant agencies, including in other countries involved in the illegal international trade.

Conclusions - Viet Nam

International trade in marine turtles became prohibited in Viet Nam in 2002, and domestic exploitation became so in 2005. The domestic exploitation, including the harvest of marine turtles in Viet Nam is therefore currently prohibited, except for research or conservation purposes.

In Viet Nam, marine turtle meat and eggs are consumed as a delicacy, and cultural beliefs also support the exploitation. For example, some people believe that marine turtle specimens can bring good luck, or treat medical issues.

During the present assessment, marine turtle products were observed for sale at 39 of 436 outlets surveyed, with most products comprising handicraft items, but also taxidermied specimens. TRAFFIC had previously (in 2016, 2017 and 2018; TRAFFIC, unpubl.) also found all products that it had identified in trade at 15 different sites to

³² Tuoitrenews (2018). *Police seize scores of taxidermied endangered turtles in southern Vietnam*. Available at: <https://tuoitrenews.vn/news/society/20180607/police-seize-scores-of-taxidermied-endangered-turtles-in-southern-vietnam/46005.html>.

³³ Issued together with Decree no/QĐ-BNN-TCTS dated March, 2016 of the Ministry of Agriculture and Rural Development. Link for download: <https://bit.ly/2H88mzl>.

comprise handicraft items. The present findings identified 42 online trade advertisements (25 vendor accounts) selling marine turtle products. As observed in physical markets, products for sale online mostly comprised handicrafts and taxidermied turtles.

It is challenging to assess whether trade is increasing, decreasing, or remaining somewhat stable over time. Some of the present findings, as well as reports in the literature can offer insights for understanding the status of the trade. Compared to findings by TRAFFIC in 2002, Stiles (2009) found the numbers of outlets and of marine turtle items for sale in some cities in Viet Nam to have decreased considerably, while in other locations these had increased. During the present study, marine turtle products have continued to be observed for sale across different cities in Viet Nam. While illegal trade was found to persist, it has potentially become less conspicuous over recent years, based on findings in the literature and present market observations.

At the international level, Viet Nam was known to supply marine turtle products to Hong Kong, Singapore, South Korea, and Taiwan, Province of China between 1973 and 1985 (TRAFFIC, 2009). Based on the present analysis of seizures from 2015 to 2018, findings indicate that Viet Nam mainly acts as a destination country, or as a transit country for marine turtle trade destined to China. China was found to be implicated as a destination country in some incidents where specimens originated from Viet Nam. This suggests that the trade network, at least between these two countries, is still operational. Seizures also indicate that Malaysia acts as a source of products destined to Viet Nam. International trade originating from Viet Nam appears to be transported mostly via land, and that destined to Viet Nam to be mostly transported via sea.

While some marine turtle conservation efforts have been taken place in Viet Nam, further research is needed to better understand how effective commitments have been in addressing illegal take and trade in marine turtles. It is also important to clarify the roles of MARD and MONRE in implementing state conservation management plans for protected endangered species, including marine turtles.

Findings in the literature on trade in marine turtles in the Mediterranean

Mediterranean

Table 5 - Evidence of trade in marine turtles available in the recent literature concerning Mediterranean countries.

| Country and source of information | Findings in the literature relating to trade in marine turtles in the Mediterranean |
|---|---|
| Egypt (Nada <i>et al.</i> , 2011; Boura <i>et al.</i> , 2016) | <ul style="list-style-type: none"> - Alexandria is probably one of the last major illegal markets for marine turtle meat in the Mediterranean. - Specimens are illegally traded at the domestic level mainly for onboard or household consumption. Turtle consumption is driven by traditional beliefs, as well as by the low relative cost of turtle meat. Marine turtles are not considered an important source of nutrition. - As a byproduct of the consumption trade, there is some opportunistic artefact trade. Except for a few specialized fishmongers, marine turtle trade is not considered an important source of income either. - Alexandria may be a source of cross-border trade, as artefacts are sold to tourists through fishmongers and artefact shops. - Research in 2007 demonstrated that past conservation efforts had resulted in a reduction of trade, but that covert trade remained. At that time, the major threat was considered direct onboard killing by fishermen for consumption. - In 2014-2015, market assessments and 148 interviews in Alexandria suggested that public trade had largely ceased, and confirmed the persistence of a black market. Trade was observed in six markets in Alexandria, with specimens sourced from Egyptian fishermen, mostly incidentally (90% of all by-caught turtles were landed). Based on interviews, the average annual catch estimated in the area was of 4.51 turtles/vessel (or 216.5 turtles/year, as reported by 48 interviewees). - These research efforts in 2014-2015 also identified three fishmongers that were specialized in turtle trade and an additional 36 that engaged in the activity sporadically. They found that trade increased by 60-120% in comparison to 1998-1999 and 2007 (estimates indicate that 600-800 turtles are potentially traded per year), with more sellers, markets and neighbourhoods involved. - It has been suggested that marine turtle mortality from intentional killing and onboard consumption by fishermen is more important than mortality from trade. It is likely that several hundreds of turtles die every year because of capture by fishing gear along the Mediterranean coast of Egypt. <p><u>Recommendations:</u> implementing an action plan to guide marine turtle conservation; improving law enforcement; implementing tailored education and awareness campaigns; monitoring markets to characterize the trade; building capacity and engagement of relevant actors; increasing donor support; implementing bycatch monitoring surveys; mitigating fisheries interactions.</p> |
| Libya (A. Hamza in Casale <i>et al.</i> , 2010, reporting | <ul style="list-style-type: none"> - Meat and egg consumption are rare. - From 1995 to, at least 2010, egg poaching had reportedly become more intensive in certain areas, mainly because of the belief that consumption helped treating fertility disorders. The practice was first noticed in the western region (Tripoli to Tunisian border) during surveys in 1998. |

| | |
|--|---|
| on findings of Hamza <i>et al.</i> , 2006) | <ul style="list-style-type: none"> - Egg poaching and illegal trade have also been reported at three beaches in the Gulf of Sirte during 2005-2007, with over 12,5% of nests being poached in 2005. - It is possible that foreign fishers operating in Libyan waters may occasionally consume marine turtle meat onboard. |
| Morocco (M. Aksissou <i>et al.</i> in Casale <i>et al.</i> , 2010, reporting on findings of Laurent, 1990) | <ul style="list-style-type: none"> - Investigations in 2004 found some fishermen to eat turtle meat in northwest Morocco. Less than 2% of fishermen mentioned that consumption would take place especially during the winter when fishing decreased. Although no meat was found for sale in shops and markets, 18 carapaces were observed for sale in artisanal shops or displayed in restaurants. |
| Syria (A. Rees <i>et al.</i> in Casale <i>et al.</i> , 2010, reporting on findings of Jony <i>et al.</i> , 2009) | <ul style="list-style-type: none"> - Fishermen may eat marine turtles if they are caught. Turtle blood was considered by some to have medicinal properties. - Stuffed turtles and preserved carapaces, presumably of Syrian origin, were available in small quantities for purchase in larger cities such as Damascus and Latakia. |

Conclusions - Mediterranean

Data on trade in marine turtles in the Mediterranean subregion is scarce. Casale *et al.* (2010) comprehensively described the distribution, threats and conservation priorities for marine turtles in the Mediterranean countries. While they described that intentional killing of marine turtles by fishermen may be taking place in some Mediterranean countries, reports of use and/or trade in marine turtles are less evident. To a lesser extent, there are reports of some domestic use and trade in Libya, Morocco and Syria. It is, however, unclear whether these reports reflect present trends. Based on information available in the literature, it seems that Alexandria, Egypt, may be the area of most concern in this subregion. Alexandria is believed to be the last major illegal marine turtle market in the Mediterranean basin (Boura *et al.*, 2016). Here, tradition plays a significant role in the harvest and use of marine turtles, and the sale of these is generally not associated with protein or income dependency. In comparison with other subregions of the world where marine turtles are used and traded, the levels at which this takes place in Egypt appear to be negligible. It has been suggested that marine turtle mortality from intentional killing and onboard consumption by fishermen are more important than mortality from trade in Egypt. Still, although common until the 1970s, international trade is currently considered not to be a threat to marine turtles in the Mediterranean basin (Casale *et al.*, 2010). Exploitation in the Mediterranean has now largely ceased, although limited levels of consumption cannot be excluded (Casale *et al.*, 2018). Rather than trade, documented research suggests that the impacts of fisheries bycatch on marine turtle conservation are of much greater concern for turtles along Egypt's coast and the Mediterranean (Boura *et al.*, 2016). While working to extinguish the last remaining marine turtle trade/consumption hub in the Mediterranean is a relevant goal, directing efforts to mitigate the interactions between fisheries and marine turtles may have more considerable effects.

Findings in the literature on trade in marine turtles in West Africa

West Africa

Table 6 - Evidence of trade in marine turtles available in recent literature concerning West African countries.

| Country and source of information | Findings in the literature relating to trade in marine turtles in West Africa |
|---|---|
| Angola (Weir <i>et al.</i> , 2007) | <ul style="list-style-type: none"> - The distribution and status of marine turtles is poorly understood. - Despite protective legislation since at least 1972, local and commercial exploitation of marine turtles occurs and has increased since the early 1990s due to increasing poverty and post-conflict displacement. - Interviews conducted with fishing communities between 2000-2006 revealed a use of meat and eggs for local subsistence widespread along the coast, including within protected areas. - Interviews suggest large-scale hunting of juvenile green turtles for meat in Foz de Cunene, and that egg collection at Baía do Cuio destined to the Benguela market occurred only once per week, with 1-3 olive ridley nests being located daily. - Interviews also suggested a widespread marine turtle mortality associated to artisanal fisheries bycatch, with bycaught turtles often being consumed. - Nest predation, beach erosion, nest disturbance, flooding, and urban development, are also threats to the species. <p><u>Recommendations:</u> combining law enforcement and coastal communities' involvement in the development of alternative livelihoods, while accounting for the use of turtles as a local food resource; management and protection of marine turtle populations should be carried out in consultation with the coastal fishing communities and their traditional leadership.</p> |
| Cape Verde (Marco <i>et al.</i> , 2012; Hancock <i>et al.</i> , 2016) | <ul style="list-style-type: none"> - Typical products traded in Cape Verde include whole turtles, turtle meat, eggs and penis. Traditionally, turtle harvesting has not been a primary source of income on Boa Vista and Santiago islands and it appears that specimens are taken mostly opportunistically and to meet extra expenses. - Monitoring conducted between 2007-2009 across Boa Vista island demonstrated a sustained level of anthropogenic take of nesting females for local consumption, despite legislation. Minimum estimates of nesting females killed on unprotected beaches were of 36% (1253), 18% (408) and 5% (215) of the turtles in the 3 years, respectively, depicting a substantial decrease in mortality associated to take in the period studied. - 438 interviews conducted on the islands of Boa Vista and Santiago in 2011 found that most turtles are caught at sea. Harvest is typically carried out by fishers, and for both islands it has been estimated, at least, at 50-114 turtles/year. - Interviews suggest that from 2002-2011, fishers' and fish sellers' involvement in harvesting and trading marine turtles has significantly decreased on both islands. The consumption of marine turtle products also decreased by 62% in Santiago, and by 28% in Boa Vista. |

Recommendations: targeting policies and controls at key points in the trade chain; increasing legal protection and beach monitoring; preserving core nesting areas; continuing education and awareness close to local communities; demonstrating the economic income potential of alternative activities.

Information on turtle populations along the Gulf of Guinea is scarce.

Observations during 1985-1994 reported traditional take of eggs throughout the nesting season for local consumption, and active organized harvest of adults for their meat. The highest numbers were believed to be taken on Bioko island and to be traded in the island's main markets (an estimate of ~500 green turtles/year was suggested, although a rationale was not provided by the authors). In general, marine turtle commerce appeared to produce low returns for the local islanders, but was an important complementary income.

Surveys conducted on Bioko during 1996/1997 and 1998/1999 suggest that markets were mainly supplied with specimens taken from Bioko. Records suggest that about 250 green turtles, 50 leatherbacks, 6 olive ridleys, and 6 hawksbills were being transported by boat from Ureca to Luba and Malabo markets each season.

During the seasons 1996/1997 and 1997/1998, egg take by locals and dog predation on clutches were under control by the presence of a conservation project. However, when this ended, the control and supply of alternative resources in the area also ended which prompted locals to pursue direct egg take again while it is not known whether this is sustainable.

The capture of individuals by Bioko's fishermen in other countries of the Gulf of Guinea is also of concern.

The observed relatively smaller body size of green turtles on Bioko could support the concept of take over long periods³⁴.

The ongoing permitted and illegal take of adult turtles on beaches and take associated to fisheries may constitute a serious threat to breeding aggregations. It is possible that Bioko's stocks are decreasing, although a robust trend analysis was not undertaken.

Recommendations: increasing and implementing nest protection; considering the establishment of offset programmes for marine turtle conservation and ecotourism; exploring the establishment of alternative livelihood options; raising awareness.

Most information on marine turtles collected in the past 20 years has remained unpublished.

The regular presence of monitoring and research teams in Poilão has certainly reinforced the traditional protection that benefits this site. Without such presence, it is likely that temporary camps of foreign fisherman would be re-established and the illegal harvest of turtles could take place as in the past.

From 1992 to 1994, a survey of the six main beaches of the Orango Group was conducted (reported by Catry *et al.*, 2009). During the survey, 44.8% of those considered to be old green turtle nests (n=288) had suffered predation. Of these predated nests, 36.4% had been destroyed by humans.

A survey conducted in January 2008 on the six beaches revealed the presence of at least 374 green turtle shells which, according to assessments, had been killed and consumed in 2007. During the same survey, 35% of old olive ridley turtle nests (n=142) had suffered predation, with 26% of the cases being by humans.

References therein: It has been suggested that intensive capture of turtles either in the foraging areas or in the same nesting areas can result in the reduction of the nesting of the smaller size of green turtles nesting in Bioko would be a result of the continued take by humans over long periods. It is not clear why larger individuals might arrive with better swimming capabilities or body condition which could in turn be related with age and breeding experience. Concerning the size of the other species, data provided are limited. However, Bioko's leatherbacks were considered generally large. Bioko's olive ridleys are also among the largest for the species, while hawksbill show no

| | |
|---|---|
| | <ul style="list-style-type: none"> - The consumption of turtle meat and eggs seems to occur very frequently and, on most nesting beaches, few if any turtles and nests are left untouched when found by locals. Except for Poilão³⁵, there do not seem to be any general traditional rules protecting marine turtles, although at some places it appears that leatherbacks can only be killed under special circumstances. On the other hand, there is very little use of turtle shell for the manufacture of goods. Turtle meat and eggs are seldom seen at markets in the country and most take results in local consumption. - When caught alive in fisheries, turtles are generally killed and consumed. The level of this type of mortality is thought to be high, as fisherman indicate that turtles are frequently captured and that one large fishing canoe can capture several turtles per day. - There are recent reports of turtles being exported alive by foreign fishermen. Targeted capture at sea is only known to be done by nationals on a small scale, around Unhocomo and Unhocomozinho. Whether there are occasions and places where foreign fishermen specifically target turtles in the waters of Guinea-Bissau is unknown, but the authors have first-hand reports of this happening not far from the national border, in Senegalese waters, which given the mobility of fisherman across frontiers, makes it likely that it happens in Guinea-Bissau too. <p><u>Recommendations:</u> continuing monitoring and conservation projects' presence to reinforce protection; ecotourism initiatives alone are unlikely to provide sufficient incentive for conservation and innovative methods should be sought; direct payments for community involvement in conservation and monitoring may be worth considering (Ferraro <i>et al.</i>, 2002).</p> |
| The Gambia (Barnett <i>et al.</i> , 2004) | <ul style="list-style-type: none"> - The biology and conservation status of marine turtle populations are poorly documented. - Threats are mainly of human origin and include illegal harvest (of eggs, juveniles and adults), artisanal fisheries bycatch (including from trawling activity), habitat erosion and coastal development. - Illegal harvest at sea for butchering on land occurs despite protective legislation. - Illegal activities prevail due to a lack of human and financial resources devoted to law enforcement, an unwillingness to enforce environmental and wildlife legislation, and a general legislative unawareness by the public. |
| Togo (Segniagbeto <i>et al.</i> , 2016) | <ul style="list-style-type: none"> - Intentional killing by fishermen appears to be common along the coastline. - Patrols along the coast between 2012-2013 recorded 743 turtles (live and dead), of which about 13.2% (98 individuals) had been killed for household consumption while nesting or at sea. - Interactions with marine turtles, particularly fisheries interactions (bycatch and boat collision) are thought to be of conservation concern for the species occurring in Togo. - Interactions with fisheries are likely to increase in response to increasing numbers of coastal fishermen. <p><u>Recommendations:</u> monitoring local subsistence consumption; further research on marine turtle-human interactions.</p> |

Conclusions – West Africa

West Africa is considered a data-poor subregion in terms of information on marine turtle biology, conservation status, and the impact of threats, including take and fisheries interactions (e.g. Barnett *et al.*, 2004, Weir *et al.*, 2007, Castroviejo *et al.*, 1994; Tomás *et al.*, 2010). Existing data has been reported to have remained unpublished (e.g. Catry *et al.* 2009). Accessed publications indicate that despite some degree of protective legislation being in place, illegal take, use and trade in

³⁵ Considered a sacred site.

marine turtles occur in this subregion. Despite the difficulty in finding documented evidence of use and/or trade volumes, these activities appear to be largely driven by local consumptive and livelihood needs, with harvested specimens generally ending up consumed or traded at the domestic level. It appears that some trade within the subregion may occur, particularly as cross-border trade between neighbouring countries or facilitated through foreign fishing vessels landing (by)caught specimens in their countries of origin. The scale of these practices, as well as the threat posed by them remain to be assessed. Fisheries bycatch, but also targeted fisheries are reported as sources of concern for marine turtle conservation in western Africa (e.g, Tomás *et al.*, 2010; and references therein). While understanding the actual dimensions of these activities and their impacts still require further research, it seems possible that they be of significantly greater conservation concern when compared to the possible impacts of local (and potentially international) take and trade. Previous studies have extensively highlighted the importance of developing (together with coastal communities) sustainable alternative livelihoods along western Africa for those that rely on marine turtles. Increasing legal protection, continuing awareness and beach protection projects in proximity with local communities, preserving core nesting areas from urbanization, and demonstrating the economic income potential of alternative activities are necessary to safeguard marine turtle populations in the eastern Atlantic (Marco *et al.*, 2012; Hancock *et al.*, 2016).

Global trends in illegal international trade

Based on CITES Trade Data for marine turtle specimens (family Dermochelyidae and Cheloniidae; data extracted on 9th May 2019), 4,128 legal trade transactions occurred between 2000 and 2017 (or 6,649 if including pre-Convention specimens). Of these 4,128 transactions, 1,774 referred to “confiscated or seized specimens” (CITES source code I; fig. 35). The main purpose of these transactions of “confiscated or seized specimens” was “personal” use (CITES purpose code P). Despite the species traded not being identified in a considerable number of trade transactions, for those cases where this information was available, hawksbill turtle (*E. imbricata*) and green turtle (*C. mydas*) were the species most commonly identified.

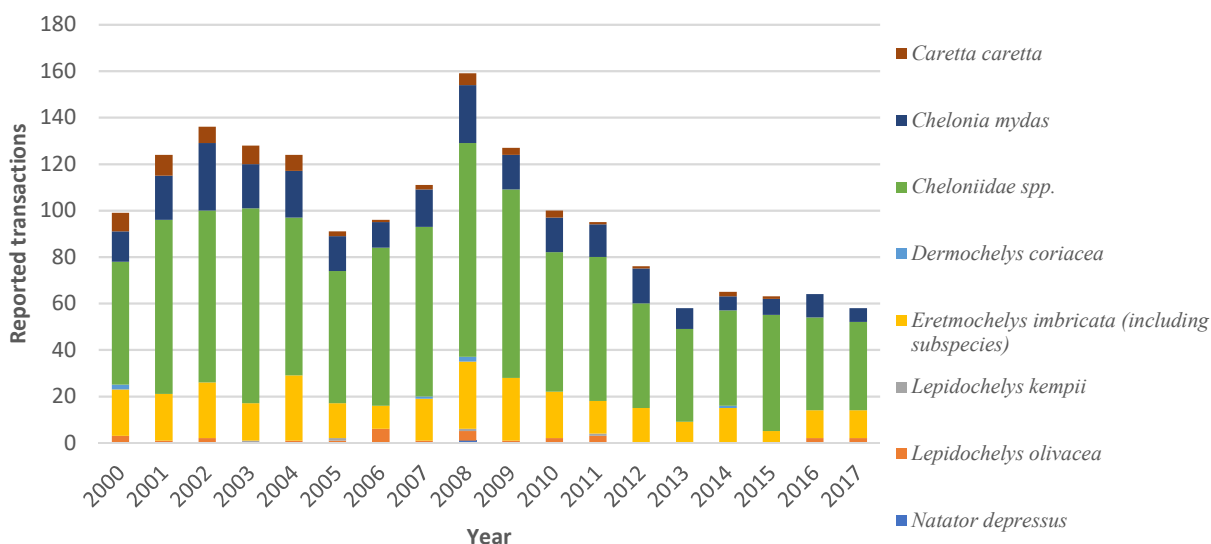


Figure 35– International legal trade transactions of marine turtle specimens (family Cheloniidae and Dermochelyidae) referring to “confiscated or seized specimens” (source code I) between 2000 and 2017, as reported by CITES Parties. The figure represents 1,774 transactions, and excludes any pre-Convention specimens. Data source: CITES Trade Database, data extracted on 9-5-2019.

The CITES Trade data presented in figure 35 indicates a declining trend in the number of legal trade transactions reported by CITES Parties as “confiscated or seized specimens” from 2008 to 2013. From 2013 to 2017, the volume of these transactions somewhat plateaued. The decline from 2008 to 2013 could reflect a decrease in the volume of specimens traded illegally at the international level. However, it could also just reflect poor enforcement and reporting efforts by CITES Parties. Poor reporting compliance by CITES Parties is a well-known, ongoing issue (D’Cruze *et al.*, 2016; and references therein) that challenges conclusions on illegal trade trends.

A large number of seizures with recorded origins among the eight countries studied, were destined to the United States of America, potentially reflecting a stronger reporting effort by this Party. Given this potential bias, an analysis of trade routes based on the CITES Trade Database was excluded from this study.

Conservation status of marine turtles and understanding the impact of take

Threats to marine turtles vary across regions and can be generally categorised as fisheries bycatch, coastal development, pollution and pathogens, climate change and direct take (Wallace *et al.*, 2011; and references therein). According to the *International Union for Conservation of Nature (IUCN) Red List of Threatened Species™* (www.iucnredlist.org), all seven marine turtle species are of conservation concern, and all but *L. kempii* and *N.*

depressus (whose classification is noted as in need of updating), are assessed as undergoing decreasing population trends globally (table 7).

Table 7 – Global conservation status of the seven species of marine turtle according to the IUCN Red List of Threatened Species™.

| Species | Global conservation status | Global population trend | Assessment |
|-------------------------------|----------------------------|-------------------------|--|
| <i>Caretta caretta</i> | Vulnerable | Decreasing | Casale <i>et al.</i> (2017) |
| <i>Chelonia mydas</i> | Endangered | Decreasing | Seminoff (2004) |
| <i>Dermochelys coriacea</i> | Vulnerable | Decreasing | Wallace <i>et al.</i> (2013) |
| <i>Eretmochelys imbricata</i> | Critically endangered | Decreasing | Mortimer <i>et al.</i> (2008) |
| <i>Lepidochelys kempii</i> | Critically endangered | Needs updating | Marine Turtle Specialist Group (1996) |
| <i>Lepidochelys olivacea</i> | Vulnerable | Decreasing | Abreu-Grobois <i>et al.</i> (2008) |
| <i>Natator depressus</i> | Data deficient | Needs updating | Red List Standards & Petitions Subcommittee (1996) |

As it has been proposed that global-level extinction risk assessments may not adequately represent the conservation status of the biologically relevant subpopulations that make up each of the species populations, marine turtle Regional Management Units (RMUs)³⁶, or subpopulations, have been suggested (Wallace *et al.*, 2010) to better capture the conservation status of spatially and biologically distinct marine turtle populations. For example, even though the global conservation status assessments by IUCN for *C. caretta* and *D. coriacea* indicate that their global population trends are decreasing, both species have RMUs classified as of Least concern (Wallace *et al.* 2013; Casale *et al.*, 2017). Recent research by Mazaris *et al.* (2017) identified more RMUs displaying an upward trend (12), than those displaying a downward one (5).

This information contrasts with the global-level assessments referred to in table 1 above. While global-level conservation status assessments provide informative averaged trends across species' subpopulations, to understand how a threat, such as anthropogenic take, may impact the conservation status of a particular marine turtle species it is relevant to consider the conservation status of that species at its subpopulation level, noting that for this one must know what the source rookery of the taken specimens is. Wallace *et al.* (2011) determined that, among the 58 existing marine turtle RMUs, 11 are the most endangered based on a combination of risk and threats³⁷ (table 8). The subregional findings of the present study found illegal take, use and trade to prevail along the Pacific and Caribbean coasts of the Inter-American subregion; in the Eastern coast of Africa; and in the waters and beaches of Southeast Asia and, particularly, its Coral Triangle subregion. While the present study has not included a thorough assessment of the source rookeries implicated, marine turtles are highly migratory and internationally-shared species, with animals from various RMUs mixing in foraging habitats of other RMUs, therefore it is probable that some of the marine turtles taken in the areas assessed in the present study may originate from, at least, some of the stocks that Wallace *et al.* (2011) assessed as the world's most endangered (table 8). This could indicate that pressure from exploitation on such stocks could be of concern, and is therefore worthy of conservation efforts attention.

³⁶ RMUs were developed by Wallace *et al.* (2010) and refer to spatially explicit population segments defined by biogeographical data of marine turtle species (Wallace *et al.*, 2011). Wallace *et al.* (2010) identified a total of 58 global marine turtle RMUs. These have been recommended as the unit for population management (Mazaris *et al.*, 2017).

³⁷ Wallace *et al.* (2011) categorized risk and threats for all global marine turtle RMUs (n=58). Risk evaluated the criteria population size, recent trend, long-term trend, rookery vulnerability and genetic diversity according to relative conservation risk to each RMU. A "low-risk" score was attributed to large, increasing, genetically diverse RMUs; and a "high-risk" score to small, decreasing, and low diversity RMUs. Similarly, threats evaluated the criteria fisheries bycatch, take, coastal development, pollution and pathogens and climate change according to their relative impact to each RMU. Threat criteria was classified as low, medium or high according to their relative impact to each RMU.

Table 8 – The world's 11 most endangered marine turtle Regional Management Units (RMUs, or subpopulations; grouped by ocean basin) based on highest risk and threats scores, according to Wallace *et al.* (2011).

| Regional Management Unit (RMU) |
|---|
| <i>Lepidochelys olivacea</i> , West Indian Ocean |
| <i>Caretta caretta</i> , Northeast Indian Ocean |
| <i>Lepidochelys olivacea</i> , Northeast Indian Ocean |
| <i>Lepidochelys olivacea</i> , Northeast Indian Ocean (arribadas) |
| <i>Eretmochelys imbricata</i> , Northeast Indian Ocean |
| <i>Eretmochelys imbricata</i> , East Atlantic Ocean |
| <i>Caretta caretta</i> , Northeast Atlantic Ocean (Cape Verde) |
| <i>Eretmochelys imbricata</i> , East Pacific Ocean |
| <i>Dermochelys coriacea</i> , East Pacific Ocean |
| <i>Caretta caretta</i> , North Pacific Ocean |
| <i>Eretmochelys imbricata</i> , West Pacific Ocean |

Discussion and overarching conclusions

Legislation and protection measures for marine turtles vary among the eight countries assessed in this study. In **Madagascar** and **Mozambique** the killing, capture and trade of any specimens are prohibited; in **Colombia**, the take and use of, and trade in marine turtles and their specimens are also prohibited; in **Nicaragua**, capture and trade have been banned since 2005, except for in the RAAS and the RAAS, where there are legal green turtle fisheries regulated by quota systems (specimens cannot be traded beyond the benefitting communities though); in **Panama**, the take and use of, and trade in marine turtles and their specimens are illegal, except for in Isla Cañas Wildlife Refuge, where subsistence harvest of olive ridley eggs is permitted; in **Indonesia**, the capture of, and trade in marine turtles and their specimens is prohibited, though some lack of harmonization in regulations may challenge enforcement efforts; in **Malaysia**, the consumption of, and trade in marine turtles and their specimens are prohibited in the states of Sabah and Sarawak, but egg collection is possible through a licensing system in most states of Peninsular Malaysia (conflicting regulations also challenge enforcement efforts in this country); and lastly, in **Viet Nam**, the capture and exploitation of marine turtles are prohibited.

Legal take

In Malaysia, Nicaragua, and Panama, where the legal take of marine turtle specimens is possible, the present study found illegal take, use and trade to be widespread. Concerning Malaysia, findings in the literature (IOSEA, 2014) point to organised trading schemes whereby specimens are taken in areas where this practice is illegal (e.g. in Sabah, Malaysia; or in Indonesia) and are sold in areas where trade is legal (e.g. Terengganu, Malaysia), akin to a “money laundering scheme”. It has been reported in the literature (Humber *et al.*, 2014; and references therein) that legal take schemes for marine turtle specimens may facilitate illegal take and trade. Although the global impact of legal take on mortality has been suggested to be likely low when compared to the combined threats of bycatch and illegal take (Humber *et al.*, 2014), information from the literature and the present findings highlight the importance of countries closely monitoring domestic take and trade levels where these are legal.

The present study found that there is often confusion regarding what activities are legal, for who, and under what restrictions in countries where there is a legal take for marine turtle specimens (e.g. Malaysia, Nicaragua). It can be inferred that where people are unclear about the legislation and regulations that apply to these species, they are also more likely to inadvertently engage in illegal activities. This reiterates the importance of promoting education and awareness efforts in countries where there is a legal take, and of ensuring that those countries’ legal frameworks are robust and non-conflicting among different administration levels.

Status and scope of the illegal trade

The present findings have revealed that, despite regulatory frameworks which either prohibit or restrict the exploitation of marine turtles, illegal trade in these species and their specimens are present in the eight countries assessed – Colombia, Indonesia, Madagascar, Malaysia, Mozambique, Nicaragua, Panama, and Viet Nam – with online trade being more available in some countries than in others. Illegal online trade in marine turtle specimens was found to be more abundant in the Southeast Asia/Coral Triangle subregion, followed by the Inter-American subregion's countries assessed. In the countries assessed in the East African subregion, illegal online trade in turtle products appears not to be a source of concern, possibly due to the lack of internet connectivity in many areas.

Physical market characteristics were found to vary among the countries assessed. Based on *in-situ* findings, the following overall patterns can be drawn on illegal trade in the three subregions visited:

East African subregion (Madagascar and Mozambique): illegal trade seems to be largely for domestic consumption; no online trade was found; evidence of international trade was quite limited, came from anecdotal reports, and referred only to exports from Mozambique to Tanzania.

Inter-American subregion (Colombia, Nicaragua and Panama): illegal trade seems to be largely for domestic consumption and for the production of hawksbill handicraft items; cock fighting spurs revealed to be a sought-after commodity in trade, with demand potentially rising; some online trade in cock fighting spurs was found to be present; evidence of international trade came from anecdotal reports that suggested that trade exists among the three countries and others in the region (e.g. Costa Rica, Ecuador, El Salvador, Guyana, Honduras, Mexico, Suriname, Venezuela); based on those reports, international trade seems to focus largely on hawksbill carapace and its byproducts.

Southeast Asian/ Coral Triangle subregion (Indonesia, Malaysia and Viet Nam): illegal trade seems to be largely for domestic consumption, but also for the production of handicrafts; online trade was found to be commonly present, particularly for handicrafts and eggs; evidence of international trade came from anecdotal reports and from seizure records, suggesting that international trade occurs among the countries assessed and with others in the subregion (e.g. China and the Philippines).

Generalizing findings on illegal trade at the subregional level neglects the characteristics of the trade that were found for the different countries assessed. These characteristics were found to not only vary among the countries in each subregion, but also within those countries themselves.

Within the East African subregion, illegal take of marine turtles was found to be widespread in **Madagascar**. Findings indicate that take is largely conducted by locals. Domestic trade appears to be a well-organised activity that involves the supply of specimens between areas that are hundreds of kilometers apart. Illegal distribution networks operate via land and sea. Artisanal fisheries were found to be a significant source of take of marine turtles in Malagasy waters. As no robust evidence was found supporting that illegal international trade in marine turtles sourced from Madagascar is an ongoing, well-organised activity, rather than providing for international trade, marine turtle take in Madagascar seems to primarily provide for local consumption and domestic trade. No online trade in marine turtles was detected in the present assessment. Reports from different stakeholders revealed that corruption at different levels appears to be playing a role in permitting illegal activities to take place, as it was suggested that village chiefs and enforcement officials were involved in the illegal trade. In addition to addressing this, conservation efforts in Madagascar should need to account for the important role that traditional management approaches such as *dina* and *fady* have.

In **Mozambique**, marine turtles were found to be taken both as targeted and non-targeted catch. Illegal take is largely perpetrated by local artisanal fishers, who capture specimens for consumption and its related trade. Domestic trade appears to be more localised than in Madagascar, as reports of trade across large distances within the country were not evident. Some (anecdotal) reports of cross-border trade with Tanzania indicate that Mozambique is involved in international trade in marine turtles. However, the scale at which this type of trade takes place is currently unknown. No evidence of online trade sourced from Mozambique was found. The present findings suggest that the domestic trade in this country exceeds the magnitude and impact of its international trade. There is potential for Mozambique's semi-industrial, industrial and IUU fisheries to contribute to the trade, but this remains to be assessed, as does the degree to which shark finning, crayfish, live crab, and dried sea horse fisheries in the country contribute to, or influence

marine turtle take and trade. As in Madagascar, accounting for traditional leadership structures when determining management approaches for marine turtle conservation is important in Mozambique.

In **Colombia**, findings revealed the presence of a market for marine turtle meat in different departments of the country, along both its Caribbean and Pacific coasts. This market for marine turtle meat appears to serve mainly a domestic demand. On the other hand, a market for marine turtle carapace was found to be present and to potentially serve international demands. Information obtained from interviews suggests that there is an increasing demand for cock fighting spurs that are made from hawksbill carapace. Some anecdotal evidence from reports suggested that carapaces may be imported from countries such as Nicaragua, Panama, and Venezuela to be worked into valuable cock fighting spurs. Through interviews it was also suggested that these - then worked and more valuable - products may then be exported back to those countries and to others such as Ecuador, Guyana, and Suriname. An online trade in cock fighting spurs made of hawksbill carapace was also found to be present in Colombia. Other sought-after marine turtle commodities observed in trade included turtle penis and eggs. Efforts to improve the conservation of marine turtles should include engaging with different community members, including fishers, curio sellers and restaurant owners, to identify viable alternatives to the use of marine turtles.

In **Nicaragua**, marine turtle products were found to be consumed along both of the country's coasts, even though a legal fishery for green turtles only exists along its Atlantic coast. It appears that turtle meat may be transported from the Caribbean coast for retailing along the Pacific. In addition to meat, other products found to be illegally used and traded include eggs and carapace. The latter was found to be openly offered at some locations, and interviews confirmed the presence of artisans who work this material. Evidence of international trade was found through reports, and suggested that eggs may be exported to El Salvador and Honduras. Some of the carapaces sourced in Nicaragua are also thought to be exported to Colombia, and Harrison *et al.* (2017) recorded statements by several vendors along the Pacific coast of Nicaragua who indicated that there was a hawksbill handicraft export market to Costa Rica. It has been suggested (Harrison *et al.*, 2017) that the level and type of international tourism greatly influence the market and value of hawksbill items along the Caribbean, with vendors switching between selling locally and acting as distributors to inland areas or those along the Pacific. No online trade in marine turtles was found to be present during the present assessment. Past marine turtle conservation efforts in Nicaragua which have proven to be successful in reducing poaching of eggs and adults on nesting beaches have involved community-led crime prevention and incentives. Further efforts in Nicaragua should consider similar approaches.

In **Panama**, as for Colombia and Nicaragua, marine turtles were found to be illegally used and traded across the different provinces assessed. It appears that meat and eggs are mainly consumed locally, but findings reveal also that there is some intercity and interprovincial trade in these specimens, which are often served as traditional dishes. Turtle carapace is also a commodity in trade, and it appears to be mainly sourced in the provinces of Bocas del Toro and Comarca Kuna Yala. Based on information reported during interviews, but also on information available in the literature, it appears that there is international trade in turtle carapace involving Colombia, Costa Rica and Mexico. Some respondents suggested that raw carapace is exported from Panama for processing abroad, being later imported into the country as valuable cock fighting spurs. During the present assessment, three people dedicated to the processing of carapace were identified in Panama, indicating that this activity is not necessarily outsourced. Two online advertisements for cock fighting spurs originating from Panama were found. Available literature suggests that marine turtles do not comprise the main source of income for those involved in the trade. Concerning future efforts in the country, the fact that communities have in the past proven willingness to adhere measures set by their regional administrative authorities illustrates the potential for success that future measures that are adopted for marine turtle conservation can have.

In the Southeast Asia/Coral Triangle subregion, findings suggest a shift from open market availability to more covert forms of trade. Open trade in physical markets was found to be particularly limited in Indonesia and Malaysia. Still, it is clear that take, use and trade in **Indonesia** are prevalent across the archipelago, including in Kalimantan, Java, Bali, Sulawesi, Maluku and Papua. Indonesia appears to continue to have an important role as a source and consumer country, supplying eggs, meat, and processed and unprocessed forms of turtle carapace. It was reported in 2014 that the international trade in marine turtles out of Indonesia was rising nationwide largely to meet a demand from East Asian countries. While it has not been possible to conclude on the evolution of the volume of trade over time, the

analysis of recent seizures in the present study indicates that the demand from East Asian countries has not ceased, as specimens continue to be destined to China, Malaysia, and Viet Nam. Findings reveal a significant shift of trade in marine turtle products to online platforms, as 213 online trade advertisements were recorded in the span of a month. This number contrasts with the seven sites (out of 61 visited) that had marine turtle products for sale.

In **Malaysia**, illegal trade in marine turtles was found to be present, with an active local demand for eggs in Sabah and Terengganu. The open availability of products, as well as online trade were found to be limited. The latter, in particular, appears to be conducted rather on an opportunistic basis, as only one advertisement was found over the period of one month. It appears that trade has shifted to more underground avenues in recent years, with traders being suspicious of inquiries, particularly by foreigners. In Sabah, traders now roam around town covertly approaching potential buyers with code signals. Reports during interviews and the analysis of seizure data, revealed that trade occurs domestically between Malaysian states, and internationally with countries such as China, the Philippines, and Viet Nam. An interviewee stated that it is an “open secret” that large volumes of eggs are exported out of Sabah (where take and trade are illegal) to be sold in Terengganu (where take and trade are legal). Some respondents indicated also that they often obtain meat from enforcement officials, suggesting that corruption plays a role in trade, as reported for Madagascar. Although it could not be confirmed in this study, WWF-Malaysia *et al.* (2018) suggested that marine turtle poaching had seen an increased involvement of local community members in recent years, with these being payed to capture turtles which are then collected in centralized locations for packaging and exporting to foreign markets.

In **Viet Nam**, local demand for marine turtle meat still exists and marine turtle products were observed for sale in 39 out of 436 outlets surveyed. The majority of specimens in trade comprised handicraft items and taxidermied specimens. The predominance of handicraft items in trade had previously been identified during surveys by TRAFFIC from 2016 to 2018 in Viet Nam (TRAFFIC, unpubl.). Online trade in marine turtle specimens was also found to be present in Viet Nam: 45 advertisements were recorded over a 14-hour period. As with the physical trade observed, most online adverts comprised handicrafts and taxidermied turtles. While it is unclear how trade has evolved over the past years, findings in the literature and present market observations indicate that trade has become less conspicuous over recent years.

The analysis of seizure data from 2015–2018 involving Indonesia, Malaysia and Viet Nam revealed that the three countries play an active role in the international trade in marine turtle products in the Asian region, with China emerging as a key destination on several occasions. Viet Nam appears to act mostly as a destination market and as a transit route in the trade of products into China. Indonesia appears to function mostly as a source country, with seized shipments destined to China, Malaysia and Viet Nam. Malaysia appears to act both as a destination country for turtle eggs from Indonesia and the Philippines, and as a source of turtle products to Viet Nam.

Despite not assessed *in-situ*, information available in the literature and compiled during this study provides insights into the scope of the trade in marine turtles in two additional subregions: the Mediterranean and West Africa. In the **Mediterranean**, to a small extent, some reports of domestic use and trade exist for Libya, Morocco and Syria. It is, however, unclear whether these reports remain valid. It seems that Egypt may be the country of most concern in this subregion, with Alexandria potentially being the last major illegal marine turtle market in the Mediterranean basin. Still, in comparison with other subregions where marine turtles are used and traded, such as the Inter-Americas, East Africa, and Southeast Asia/Coral Triangle, the levels at which these illegal activities take place in Egypt appear to be negligible. Exploitation in the Mediterranean subregion is reported in the literature to have ceased for the most part, although limited levels of consumption cannot be excluded.

Concerning **West Africa**, existing literature indicates that despite some protective legislation being in place, illegal take and use of, and trade in marine turtles occur in this subregion. To a large extent, these activities appear to provide for local nutritional and livelihood needs, with harvested specimens generally being consumed locally or traded domestically. It appears that some trade within the subregion may occur between neighbouring countries, and be facilitated through foreign fishing vessels landing (by)caught specimens in their countries of origin. The scale of these practices, as well as the threat posed by them remain to be assessed.

Trends in illegal trade

While the present findings render clear that illegal take and use of, and trade in marine turtles are present in the eight countries assessed, it is not possible to conclude robustly on whether trade is increasing, decreasing, or plateauing in any of the countries assessed. This is because there is generally a shortage of consistent, long-term monitoring data for marine turtle trade in the countries assessed.

In **Madagascar**, the local sale of turtle meat for consumption was thought to be common in 2003 as part of a market involving a chain of fishermen, dealers and traders; and in 2012 supply networks, whereby fishing villages were supplying traders established in Toliara and Mahajanga, were uncovered (IOSEA, 2014; and references therein). The present assessment found a complex trade network to be present in Madagascar operating between north and south of the country, along its western coast, suggesting that the *modus operandi* of the trade has likely not changed significantly.

In **Mozambique**, some respondents reported that domestic trade has drastically declined since the end of the civil war in 1992. Still, in line with what has been previously reported by IOSEA (2014), the present study found marine turtle take in the waters of Mozambique to continue to be largely perpetrated by locals. Also the illegal killing of marine turtles near fishing camps was thought to be of significant concern in 2012 (IOSEA, 2014; and references therein), and more recently, Williams (2017) confirmed that this prevails.

For the Inter-American subregion, where previous attempts to assess trade were found to be more widely reported in the literature, temporal comparisons are frequently not possible because assessments have often not focused on consistent locations, survey efforts have differed, and/or clear trends cannot be drawn. For example, respondents in Colombia, Nicaragua and Panama generally perceived illegal trade to have reduced in the last 10 years. However, for example, in **Colombia** these perceptions contrast with existing literature, whereby an expansion of trade in hawksbill items into neighbouring tourist locations from 2012 onwards has been reported (Harrison *et al.*, 2017; and references therein).

In **Nicaragua**, respondents reported that they no longer worked carapace as they used to because it can no longer be easily sold. Still, they perceived an increase in the demand in recent years for hawksbill products by other countries in the subregion. Among countries in Latin America and the Caribbean assessed by Harrison *et al.* (2017), Nicaragua was found to have the most widespread availability of hawksbill products, although a few vendors reported that the hawksbill items that they had for sale were old stock, and that they would not purchase further stock once all of it was sold. Additional work in Nicaragua by Fauna & Flora International (2011) found trade in certain locations to be three times higher than previously documented (by Chacón, 2002), but found also the level of demand for hawksbill items to be lower than in 2002.

While respondents generally perceived trade to be declining in **Panama**, some respondents also perceived consumption to have increased in particular areas. Previous research (Harrison *et al.*, 2017) reported that it is possible that the sale of hawksbill carapace items may have declined in Panama, although it is not clear to what extent. On the other hand, the sustained volume of eggs seized from 2012 to 2018 in Panama identified during the present study does not suggest a decreasing trend in illegal trade (at least in this product) during this period.

In the countries assessed in the Southeast Asia/Coral Triangle subregion, trade appears to have generally become more secretive, as mentioned above. In **Indonesia**, findings indicate that the open sale of turtle carapace specimens is limited in physical markets when compared to previous work in 2009 (TRAFFIC, 2009; TRAFFIC Southeast Asia, 2009). It seems that the trade has been driven largely underground. The open availability of specimens is now more apparent in online markets than in physical ones. This shift is possibly due to increased enforcement efforts and media coverage of incidents. A trend that was also noticed during the present work was the sale of freshwater softshell turtle (Trionichidae) meat as marine turtle meat, illustrating how demand prevails.

In Terengganu, **Malaysia**, some 365,000 eggs/year were estimated (this study) to be sold in Pasar Payang in Kuala Terengganu. As this value generally correlates to the 422,000 eggs/year that had been estimated in 2009 (TRAFFIC, 2009), this suggests that trade may not have decreased during this period. Moreover, a demand for marine turtle specimens in China and Viet Nam had previously been reported (Lam *et al.*, 2012; WWF-Malaysia *et al.*, 2018; Riskas

et al., 2018), and recent (2015-2018) seizure incidents analysed in the present study confirm that trade implicating Malaysia and those countries continues to occur.

In **Viet Nam**, a study in 2009 found the number of outlets and turtle items in trade in Ho Chi Minh City and Hanoi to have decreased considerably in relation to 2002 (TRAFFIC, 2004; Stiles, 2009). However, trade was found to have increased in other places, including Ha Long, Phu Quoc, and Ha Tien, where marine turtle products were openly purchased. The present assessment found trade to have become less conspicuous.

While the analysis of CITES Trade data from 2000 to 2017 did not allow to draw solid conclusions on the trend of illegal international trade, its findings are still worthy of consideration. The analysis indicated a declining trend in the number of legal trade transactions reported by CITES Parties as “confiscated or seized specimens” from 2008 to 2013. From 2013 to 2017, the volume of these transactions somewhat plateaued. The observed decline from 2008 to 2013 could indeed reflect a global decrease in the volume of specimens traded illegally at the international level (although it could also just reflect poor reporting compliance by CITES Parties, which is a well-known, ongoing issue [D’Cruze *et al.*, 2016; and references therein]). Taking into account this consideration, as well as the information reported above concerning proxies for trends in the different countries assessed, it is only possible to confidently state that illegal trade is prevalent in the countries assessed; it is not possible to conclude with certainty on the trend of illegal international trade.

Conservation impacts associated to take

The findings of the present study found illegal take, use and trade to prevail along the Pacific and Caribbean coasts of the Inter-American subregion; in the Eastern coast of Africa; and in the waters and beaches of Southeast Asia and, particularly, its Coral Triangle subregion.

While the present study has not included a thorough assessment of the source rookeries from which the marine turtles that are taken in the different countries come from, it is probable that some of these individuals originate from stocks that have been considered threatened (e.g. by Wallace *et al.*, 2011), given that marine turtles are highly migratory species, and that different Regional Management Units (RMUs) mix in foraging grounds. In 2011, Wallace *et al.* identified the world’s eleven most endangered marine turtle regional management units (RMUs) and, considering the geographical location of the countries assessed in the present study, it seems very probable that the pressure of illegal take, use and trade reported in this study for marine turtles in the countries assessed may be contributing to further endangering, at least some, of the critical RMUs identified by Wallace *et al.* (2011).

Despite the seizure records analysed not having always revealed the marine turtle species that were involved in each incident, or the structuring of interviews not always enabling the identification of the species that respondents referred to, information reported in the literature and during the present study, indicate that green and hawksbill turtles are very commonly found/sought-after in trade.

Limitations of the present assessment

It is important to acknowledge that the present *in-situ* assessments were accompanied by challenges which may have influenced estimates of take, interviewees responses, and generalizations thereof. The relatively short time frame available for *in-situ* work only allowed for site assessments of rapid nature. This could be problematic, as researchers would preferably have been embedded in communities for lengthy periods to gain respondents’ trust. The limited time available for field work also meant that only a limited number of locations on the ground could be assessed, and therefore other locations which could bear significant data may have been excluded.

In some locations, interviews with relevant stakeholders (e.g. fishers) had to be undertaken in the presence of senior representatives, and this may have influenced responses, particularly those reporting on illegal activities.

The rapid nature of the research prevented a more comprehensive quantification of trade levels, and on the impact of take and trade on marine turtle populations. Of further note, when extrapolating take numbers to larger scales (e.g. provincial or national levels) was possible, this was based on qualitative methodologies, which may be problematic for different reasons: not all coastal locations could be assessed; only small samples of respondents were surveyed;

some respondents' were illiterate and because of this there was confusion among on the questions being asked; in some areas there was confusion between targeted and non-targeted take given that bycaught specimens would typically be retained; underreporting is likely common given the illegality of the activities being surveyed; take/fisheries effort varies within the country, geographically and seasonally; and species distribution also varies, and therefore so do potential conservation impacts.

Way forward

The status, scope and trends of the illegal trade vary among the subregions studied, making it challenging to prioritize the allocation of efforts in one subregion over another. It is instead more reasonable to discuss the type of activities that must be prioritized within the subregions themselves. The following paragraphs elaborate on these type activities.

East African subregion (Madagascar and Mozambique):

- Collecting baseline information on artisanal, semi-industrial and industrial fisheries (including IUU) operating in national waters to understand the impacts of these fisheries on marine turtles and their linkage to illegal trade
- Working with communities and their traditional leadership/management approaches to identify effective alternatives to the exploitation of marine turtles
- Improving the enforcement of legislation and regulations that apply to marine turtles at coastal areas and transaction points
- Building awareness at the community and government levels on marine turtles and respective applicable legal frameworks
- Exposing to the public cases of illness/death associated to the consumption of marine turtle specimens

Inter-American subregion (Colombia, Nicaragua and Panama):

- Working with communities to identify effective alternatives to the exploitation of marine turtles
- Improving the enforcement of legislation and regulations that apply to marine turtles at coastal areas and transaction points
- Countering illegal online trade
- Building awareness at the community and government levels on marine turtles and respective applicable legal frameworks
- Improving cooperation among different domestic governance levels, and also among other countries in the subregion (including Colombia, Costa Rica, Ecuador, El Salvador, Guyana, Honduras, Mexico, Nicaragua, Panama, Suriname, and Venezuela)

Southeast Asian/ Coral Triangle subregion (Indonesia, Malaysia and Viet Nam):

- Addressing gaps, overlaps and inconsistencies in national legal frameworks applicable to marine turtles
- Working with communities to identify effective alternatives to the exploitation of marine turtles
- Improving the enforcement of legislation and regulations that apply to marine turtles at beaches, entry/exit points and market places
- Combating illegal online trade
- Building awareness at the community and government levels on marine turtles and respective applicable legal frameworks
- Improving cooperation among different domestic governance levels, and also among other countries in the subregion (including China, Indonesia, Japan, Malaysia, the Philippines, and Viet Nam)

A comprehensive list of recommendations stemming from the present assessment, and which address these priority types of activities, is included in the “Recommendations” section that follows.

Recommendations

This section contains the final recommendations that stem from the present assessment. They aim to address the identified challenges in conserving marine turtles, and those relating to the legal and illegal take and use of, and trade in these species. The recommendations apply to the eight countries studied - Colombia, Indonesia, Madagascar, Malaysia, Mozambique, Nicaragua, Panama, and Viet Nam -, but are also be relevant to other countries in the East-African, Inter-American, and Southeast Asian/Coral Triangle subregions. The recommendations are tabled below, and are accompanied by a list of relevant stakeholders that should be involved in their implementation. These stakeholders have been categorized as follows:

- **Academia:** universities, research institutions and other bodies undertaking scientific research
- **Communities:** people involved in the take and use of, and trade in marine turtles
- **CSOs** (Civil Society Organisations)
- **Government agencies:** national environmental authorities, fisheries authorities, enforcement authorities, education authorities, policy-makers, and other relevant ones
- **IGOs and related instruments:**
 - **CITES** (Convention on International Trade in Endangered Species of Wild Fauna and Flora, and/or CITES Management and Scientific Authorities)
 - **CMS** (Convention on the Conservation of Migratory Species of Wild Animals)
 - **FAO** (Food and Agriculture Organization of the United Nations)
 - **IAC** (Inter-American Convention for the Protection and Conservation of Sea Turtles)
 - **IOSEA Marine Turtle MoU** (Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia [concluded under the auspices of CMS])
 - **Ramsar Convention** (Convention on Wetlands of International Importance especially as Waterfowl Habitat)
 - **SPAW Protocol** (Protocol concerning Specially Protected Areas and Wildlife [concluded under the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region])
 - **WIDECAST** (Wider Caribbean Sea Turtle Conservation Network [a Regional Activity Network of the SPAW Protocol])
- **Private sector**
- **RFBs** (Regional Fisheries Bodies)
- **Wildlife enforcement networks:** ASEAN-WEN, CA-WEN, Carib-WEN, CTI-CFF, ICCWC, INTERPOL, UNODC, and other (sub)regional networks, as appropriate.

CITES-focused recommendations

1. Convey to the relevant CITES Management and Scientific Authorities the findings of the present study with a view to inform targeted conservation and management efforts.
2. Subject to the availability of resources, support Parties, upon request, with the development, implementation and/or update of management and action plans for the conservation of marine turtles.
3. Encourage Parties to fully implement the provisions of CITES that are relevant to the seven Appendix I-listed species of marine turtle.
4. Encourage Parties to use the fora provided by CITES to raise and discuss challenges relating to illegal trade in marine turtles.
5. Continue communication and collaboration with other multilateral agreements with mandates relating to the regional and global conservation, management and sustainable use of marine turtles, such as CMS, its IOSEA Marine Turtle MoU, IAC, the Ramsar Convention and the SPAW Protocol to ensure the compatibility of activities, optimize resources, and enhance synergies concerning the conservation of marine turtles.
6. Subject to the availability of resources, assist Parties, upon request, with the identification of inconsistencies, overlaps and gaps in national legislation and regulations relating to the implementation of CITES for marine turtles.
7. Encourage Parties to collect illegal wildlife trade data in a standardized manner, including at different governance levels, that can be used for monitoring trade in CITES-listed species, including marine turtles.
8. Subject to the availability of resources, and upon request by Parties, build national capacity on the implementation of CITES provisions relevant to marine turtles.
9. Encourage CITES Parties to submit data on illegal trade in marine turtles in their annual illegal trade reports to the CITES Secretariat.
10. Encourage ICCWC to use data on illegal trade in marine turtles submitted to the CITES Secretariat in its research and reports.
11. Convey to FAO the findings of the present study as to inform efforts by RFBs addressing marine turtle bycatch and illegal take, and collaborate, as appropriate.
12. Collaborate with RFBs, including through the exchange of information on illegal take in marine turtles, to better understand the extent to which illegal take at sea contributes to illegal trade.

Overarching recommendations

| | <u>Conservation and management</u> | <u>Stakeholders involved</u> |
|---|---|--|
| Support to conservation and management planning | 1. Convey to marine turtle range States and those involved in marine turtle trade novel information on marine turtle conservation status, take, use and trade that can inform national targeted marine turtle conservation and management efforts. | - CITES, CMS, IAC, IOSEA Marine Turtle MoU, UNEP SPAW / WIDECAST - Academia, CSOs |
| | 2. Support marine turtle range States, as needed, with the development, implementation and/or update of management and action plans for the conservation of marine turtles. | - CITES, CMS, IAC, IOSEA Marine Turtle MoU, Ramsar Convention, UNEP SPAW / WIDECAST - RFBs - Academia, CSOs |
| | 3. Ensure that the needs of the people involved in the take and use of, and trade in marine turtles are accounted for when determining conservation and management measures for countering illegal take and use of, and trade in marine turtles. | - Government agencies - Communities - Academia, CSOs |
| | 4. Explore long-term funding options to support national efforts for marine turtle conservation and management. | - Government agencies - UNEP SPAW / WIDECAST - RFBs |
| Legal take | 5. Where harvest quotas for marine turtle specimens are necessary, develop robust and standardized frameworks for determining national harvest quotas. These should be science-based, integrate a determination of sustainable offtake levels, account for existing quotas in other States sharing the marine turtle stock(s), and account for national enforcement capacity. | - Government agencies - RFBs - Communities - Academia |
| Fisheries | 6. Fully implement marine turtle bycatch mitigation-related regulations (e.g. those relating to the use of TEDs, circle hooks, particular bait types, fisheries logbook and observer schemes) where these regulations are already in place. | - Government agencies - RFBs - CSOs |
| | 7. Encourage States' adherence to marine turtle bycatch mitigation-related regulations (e.g. those relating to the use of TEDs, circle hooks, bait types, fisheries logbook and observer schemes) where such regulations are not yet in place. | - UNEP SPAW / WIDECAST - RFBs - CSOs |
| | 8. Work with States and their fisher communities to ensure that there is effective documentation at the national level of marine turtle fisheries bycatch and mortality that can inform posterior conservation and management measures. | - Government agencies - UNEP SPAW / WIDECAST - RFBs - CSOs |
| | 9. Ensure that there is periodic verification of the implementation of existing marine turtle bycatch mitigation-related regulations by vessels operating in national waters. | - Government agencies - RFBs |
| | 10. Collaborate with FAO and RFBs to identify best approaches to address marine turtle fisheries bycatch, mortality and illegal take. | - Government agencies - FAO - RFBs |

| | | |
|---------------------------------------|--|--|
| Captivity and hatchery establishments | 11. Consider implementing reward schemes for compliance with marine turtle bycatch mitigation-related regulations where these regulations are in place (e.g. market access, preferential treatment at ports, government recognition); and penalty schemes for non-compliance (e.g. licensing penalties). | - Government agencies - RFBs |
| | 12. Reassess the role of existing marine turtle captivity and hatchery establishments (including those used as tourist attractions) to ensure that these provide conservation value to marine turtle populations. | - Government agencies - CMS, IOSEA Marine Turtle MoU, UNEP SPAW / WIDECAST - Academia/CSOs |
| | 13. Develop science-based operational protocols for marine turtle captivity and hatchery establishments to follow as a way to ensure that their operations provide conservation value to marine turtle populations. | - Government agencies - CMS, IOSEA Marine Turtle MoU, UNEP SPAW / WIDECAST - Academia/CSOs |
| | 14. Monitor the activity of marine turtle captivity and hatchery establishments to ensure that these establishments do not facilitate the illegal use of, and trade in marine turtle specimens. | - Government agencies |
| Cooperation | 15. Invite States in the IOSEA subregion which have marine turtle populations and are not yet CMS Parties and IOSEA Marine Turtle MoU signatory States, to ratify the Convention and its MoU. | - CMS, IOSEA Marine Turtle MoU - CSOs |
| | 16. Invite States in the Inter-American subregion which have marine turtle populations and are not yet IAC Parties, to ratify the Convention. | - IAC - CSOs |
| | 17. Encourage States to fully implement the provisions of existing multilateral agreements which they have ratified, and which relate to the regional and global conservation, management and sustainable use of marine turtles, including CITES, CMS, IAC, IOSEA Marine Turtle MoU, the Ramsar Convention, and the SPAW Protocol. | - CITES, CMS, IAC, IOSEA Marine Turtle MoU, Ramsar Convention, UNEP SPAW / WIDECAST - CSOs |
| | 18. Encourage States to use the fora provided by existing multilateral agreements relating to the regional and global conservation, management and sustainable use of marine turtles, including CITES, CMS, IAC, IOSEA Marine Turtle MoU, the Ramsar Convention, the SPAW Protocol and WIDECAST to raise and discuss challenges relating to the conservation and management of marine turtles. | - CITES, CMS, IAC, IOSEA Marine Turtle MoU, Ramsar Convention, UNEP SPAW / WIDECAST - CSOs |
| | 19. Enhance the exchange of information on illegal trade in marine turtles between different national and subregional governance levels to counter illegal take and use of, and trade in these species. | - Government agencies - CITES, CMS, IAC, IOSEA Marine Turtle MoU, Ramsar Convention, UNEP SPAW / WIDECAST |

| | | <ul style="list-style-type: none"> - RFBs - Wildlife enforcement networks |
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| | 20. Continue communication and coordination among CITES, CMS, IAC, IOSEA Marine Turtle MoU, the Ramsar Convention, the SPAW Protocol and other agreements to address marine turtle conservation and management challenges, including illegal trade. | <ul style="list-style-type: none"> - CITES, CMS, IAC, IOSEA Marine Turtle MoU, Ramsar Convention, UNEP SPAW / WIDECAST |
| Needs assessment | 21. Assess staffing and equipment needs for implementing marine turtle conservation and management measures at the national level (e.g. patrolling equipment, prosecutors with an understanding of relevant legislation, etc.), and consider how civil society organisations, or other entities can support governments in this regard. | <ul style="list-style-type: none"> - Government agencies - UNEP SPAW / WIDECAST - RFBs - CSOs - Private sector |
| | 22. Review national legislation and regulations relating to marine turtle conservation and management to identify inconsistencies, gaps and overlapping areas that need to be addressed by policy-makers. Special attention should be given to reviewing legislation and regulations that enable the harvest of marine turtle specimens by particular communities and/or in particular administrative areas. | <ul style="list-style-type: none"> - Government agencies - CITES, CMS, IAC, IOSEA Marine Turtle MoU, UNEP SPAW / WIDECAST - RFBs - CSOs |
| Research | | Stakeholders involved |
| Alternative livelihoods | 23. Assess the needs of the people involved in the take and use of, and trade marine in turtles to identify alternative livelihoods that can effectively reduce these sources of exploitation. This assessment should examine the potential for different social and economic incentives to simultaneously benefit marine turtle conservation and communities. | <ul style="list-style-type: none"> - Government agencies - UNEP SPAW / WIDECAST - Communities - Academia/CSOs |
| Extent of take | 24. Undertake future comparative research in the locations and communities covered in the present assessment to understand how trade has evolved. | <ul style="list-style-type: none"> - UNEP SPAW / WIDECAST - Academia/CSOs |
| Impact | 25. Undertake comprehensive assessments of the scale and impact that national artisanal, semi-industrial and industrial fisheries, including IUU, have on marine turtle populations. | <ul style="list-style-type: none"> - Government agencies - UNEP SPAW / WIDECAST - RFBs - Academia/CSOs |
| | 26. Undertake research to determine the origin (i.e. the Regional Management Unit) of marine turtles taken in the eight countries studied, the productivity of those RMUs and their threats to better understand the impact of take levels. | <ul style="list-style-type: none"> - UNEP SPAW / WIDECAST - Academia/CSOs |

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| | 27. Develop holistic regional marine turtle survival probability models to assess the sustainability of current harvest levels. These should take into account threats from multiple countries (number of turtles of different age classes taken from populations), limitations of source rookeries (number of turtles recruited per year), natural survival probabilities, and marine turtle biology. Where possible, these models should build on existing models, such as those developed by the IUCN Marine Turtle Specialist Group. | - Academia/CSOs |
| Protection measures | 28. Undertake biological and socio-economic research that can support the development and implementation of (additional) (spatial) protection measures for marine turtle foraging, nesting and migratory areas. | - Government agencies - UNEP SPAW / WIDECAST - RFBs - Communities - Academia/CSOs |
| Enforcement | | Stakeholders involved |
| | 29. Ensure that existing legislation and regulations that apply to marine turtles are effectively implemented at the national level, and that appropriate judicial processes are effectively followed in cases of non-compliance. | - Government agencies - RFBs |
| | 30. Consider standardizing marine turtle trade monitoring procedures at different governance levels within States and amongst them to facilitate cooperative enforcement efforts. | - Government agencies - Wildlife enforcement networks |
| | 31. Examine the feasibility of implementing a standardized collection of genetic samples of seized marine turtle specimens at the national level, and the potential for this to inform management decisions aiming to counter illegal take and trade. | - Government agencies - RFBs - Academia/CSOs |
| Monitoring | 32. Undertake periodic monitoring of marine turtle legal harvest levels where harvest quotas exist to ensure that these are respected. | - Government agencies - RFBs |
| | 33. Improve monitoring and enforcement patrols at nesting sites; at sea; onboard; at points of landing, transshipment and transactions; at land borders; at markets; and at airports to ensure that marine turtle specimens are not illegally taken, retained or traded. | - Government agencies - UNEP SPAW / WIDECAST |
| | 34. Work with online platforms with commercial potential to determine effective ways to address illegal online trade in wildlife specimens. | - Government agencies - UNEP SPAW / WIDECAST - Wildlife enforcement networks - CSOs |
| | 35. Support activities by civil society organisations working on the ground to promote marine turtle conservation and counter illegal harvest. | - Government agencies - UNEP SPAW / WIDECAST |
| Reporting | 36. Encourage CITES Parties to submit data on illegal trade in marine turtles in their annual illegal trade reports to the CITES Secretariat. | - CITES, UNEP SPAW / WIDECAST - CSOs |

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| Building capacity | 37. Encourage ICCWC to use data on illegal trade in marine turtles submitted to the CITES Secretariat in its research and reports. | - CITES |
| | 38. Build capacity of national enforcement authorities and prosecutors on the legislation and regulations that apply to marine turtles. | - Government agencies - CITES, CMS, IAC, IOSEA Marine Turtle MoU, UNEP SPAW / WIDECAST - RFBs - CSOs |
| | 39. Build capacity of national enforcement authorities on the identification of marine turtle specimens in trade at key points in the trade chain. | - Government agencies - RFBs - Wildlife enforcement networks - CSOs |
| | 40. Build awareness of conservation management and enforcement authorities on the importance of protocols for systematic monitoring and reporting of illegal wildlife trade incidents. | - Government agencies - CITES, UNEP SPAW / WIDECAST - RFBs - CSOs |

| <u>Awareness</u> | | Stakeholders involved |
|-------------------|---|--|
| People and policy | 41. Implement public education and awareness programmes that focus, amongst others, on exposing the conservation status of marine turtles, their ecological importance, the national legislation and regulations that apply to these species, opportunities to minimize bycatch, and meaningful conservation actions that can be taken. | - Government agencies - UNEP SPAW / WIDECAST - RFBs - CSOs |
| | 42. Build fishermen's awareness on the importance of reporting marine turtle bycatch and mortality. | - Government agencies - UNEP SPAW / WIDECAST - RFBs - CSOs |
| | 43. Build political awareness on the conservation status of marine turtles and on the national-level importance of promoting the conservation of these species. | - CMS, IAC, IOSEA Marine Turtle MoU, Ramsar Convention, UNEP SPAW / WIDECAST - CSOs |

References

- Abarca G., Urteaga J., Sirias I. (2011). *Diagnóstico sobre el comercio de subproductos de tortugas marinas en el Pacífico de Nicaragua*. Fauna & Flora International, Managua, Nicaragua, 70pp.
- Abreu-Grobois A., Plotkin P. (IUCN SSC Marine Turtle Specialist Group) (2008). *Lepidochelys olivacea*. The IUCN Red List of Threatened Species 2008: e.T11534A3292503.
- Barnett L., Emms C., Jallow A., Cham A., Mortimer J. (2004). *The distribution and conservation status of marine turtles in The Gambia, West Africa: a first assessment*. Oryx: 38: 203-208.
- Barr (2001). *Current Status of Trade and Legal Protection for Sea Turtles in Indonesia*. Greenpeace International. Marine Turtle Newsletter, 54: 4-7.
- Barrios-Garrido H., Espinoza N., Rojas-Cañizales D., Palmar J., Wildermann N., Montiel-Villalobos *et al.* (2018). *Trade of marine turtles along the Southwestern Coast of the Gulf of Venezuela*. Marine Biodiversity Records, 10: 15.
- Boura L., Abdullah S., Nada M. (2016). *New observations of sea turtle trade in Alexandria, Egypt. A report by MEDASSET – Mediterranean Association to Save the Sea Turtles*, 27 pp.
- Bräutigam A., Eckert K. (2006). *Turning the Tide: Exploitation, Trade and Management of Marine Turtles in the Lesser Antilles, Central America, Colombia and Venezuela*. TRAFFIC International, Cambridge, United Kingdom.
- Brito A. (2012). *An interview-based assessment of the incidental capture and mortality of sea turtles in Mozambique's Sofala Bank commercial shrimp fishery*. Revista de Investigação Pesqueira, 30: 31-56.
- Casale P., Margaritoulis D. (eds) (2010). *Sea turtles in the Mediterranean: Distribution, threats and conservation priorities*. Gland, Switzerland: IUCN, 294 pp.
- Casale P., Tucker A. (2017). *Caretta caretta (amended version of 2015 assessment)*. The IUCN Red List of Threatened Species 2017: e.T3897A119333622.
- Casale P., Broderick A., Camiñas J., Cardona L., Carrerras C., Demetropoulous A., *et al.* (2018). *Mediterranean sea turtles: current knowledge and priorities for conservation and research*. Endangered Species Research, 36: 229-267.
- Castroviejo J., Juste B., Del Val J., Castelo R., Gil R. (1994). *Diversity and status of sea turtle species in the Gulf of Guinea islands*. Biodiversity and Conservation, 3: 828-836.
- Catry P., Barbosa C., Paris P., Indjai B., Almeida A., Limoges B., *et al.* (2009). *Status, ecology, and conservation of sea turtles in Guinea-Bissau*. Chelonian Conservation and Biology, 8: 150-160.
- Cétamada (2012). *Evaluation préliminaire de la filière tortue marine dans la baie de Moramba, les zones de Marovasa Be et d'Anjajavy*. December 2012, Antananarivo. Cétamada, 11 pp.
- Chacón D. (2002). *Diagnóstico sobre el comercio de tortugas marinas y sus derivados en el Istmo Centroamericano*. Red Regional para la Conservación de Tortugas marinas en Centroamérica (RCA). San José, Costa Rica, 247 p.
- Chan (2006). *Marine turtles in Malaysia: On the verge of extinction?* Aquatic Ecosystem Health and Management, 9:175-184. Taylor and Francis Group.
- Chan E., Liew H. (1996). *Decline of the leatherback population in Terengganu, Malaysia, 1956-1995*. Chelonian Conservation and Biology, 2: 196-203.
- Chu T., Nguyen T. (2015). *Sea Turtles in Vietnam: on the edge of extinction*. Journal of Life Sciences, 9: 356-361.
- CITES, Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, D.C., 3 March 1973, amended at Bonn, 22 June 1979 and at Gabarone, 30 April 1983.
- CMS, Convention on the Conservation of Migratory Species of Wild Animals, Bonn, 23 June 1979.
- CRES, Centre for Natural Resources and Environmental Studies, University of Ha Noi, Viet Nam (1994). *Investigation of Trade in Hawksbill Turtles in Viet Nam*. TRAFFIC Southeast Asia Field Report, 7.
- Compost Y. (1980). *Pilot survey of exploitation of dugong and sea turtle in the Aru Islands*. Yayasan Indonesia Hijau, 82 pp.
- D'Cruze N., Macdonald D. (2016). *A review of global trends in CITES live wildlife confiscations*. Nature conservation, 15: 47-63.
- Department of Fisheries Malaysia. (2008). *National Plan of Action on for conservation and management of marine turtles*. Department of Fisheries Malaysia. Kuala Lumpur, Malaysia.

- Duc L., Broad S. (1995). *Exploitation of Hawksbill Turtles in Viet Nam*. TRAFFIC Bulletin 15: 77. Cambridge, United Kingdom.
- Fernandes R., Williams J., Valladolid S., Muaves L., Louro C., Pereira M. (2017). *Monitoring, tagging and conservation of marine turtles in Mozambique: Annual report 2016/2017*. Centro Terra Viva, Maputo, 30 pp.
- Firliansyah E., Kusri M., Sunkar A. (2017). *Pemanfaatan dan Efektivitas Kegiatan Penangkaran Penyu di Bali bagi Konservasi Penyu*. Journal of Tropical Biodiversity and Biotechnology, 2: 21-27.
- Frontier-Madagascar (2003). *Artisanal and traditional turtle resource utilisation in South West Madagascar*. Frontier-Madagascar Environmental Research Report 2. Society for Environmental Exploration, UK and the Institute of Marine Sciences, University of Toliara, Madagascar.
- Garland K., Carthy R. (2010). *Changing Taste Preferences, Market Demands and Traditions in Pearl Lagoon, Nicaragua: A community Reliant on Green Turtles for Income and Nutrition*. Conservation and Society, 8: 55-72.
- Garnier J., Hill N., Guissamulo A., Silva I., Witt M., Godley B. (2012). *Status and community-based conservation of marine turtles in the northern Quirimbas Islands (Mozambique)*. Oryx, 46: 359–367.
- Gobierno de Colombia (2018). *Pobreza monetária La Guajira*, Año 2017. Boletín Técnico, Bogotá, 6 April 2018. Available at https://www.dane.gov.co/files/investigaciones/condiciones_vida/pobreza/2017/Guajira_Pobreza_2017.pdf.
- Golding C., Gibbons E., Kumar J., Ramanajehimanana L., Wouters O. (2017). *The marine turtle fishery in the Bay of Ranobe, Madagascar*. Indian Ocean Newsletter, 25, 9 pp.
- Gove D., Magane S. (1996). *The status of sea turtle conservation in Mozambique*. In: Humphrey S., Salm R. (eds). Status of sea turtle conservation in the western Indian Ocean. Regional Seas Reports and Studies, 165: 89-94.
- Gove D., Pacule H., Gonçalves M. (2001). *The impact of Sofala Bank (Central Mozambique) shallow water shrimp fishery on marine turtles and the effects of introducing TED (Turtle Excluder Device) on shrimp fishery*. Report to the Eastern Africa Marine Eco-Region of WWF, 23 pp.
- Guissamulo A. (1993). *Distribuição e abundância de golfinhos e dugongos e suas interações com algumas pescarias nas Baías de Maputo e Bazaruto*. Trabalho de Licenciatura. Maputo, Departamento de Ciências Biológicas, UEM, 93 pp.
- Hancock J., Furtado S., Merino S., Godley B., Nuno A. (2016). *Exploring drivers and deterrents of the illegal consumption and trade of marine turtle products in Cape Verde, and implications for conservation planning*. Oryx, 51: 428-436.
- Harrison E., Weller P., Nahill B. (2017). *Endangered souvenirs, hawksbill sea turtle specimens for sale in Latin America & the Caribbean*. Urteaga J., Dunbar S., Azanza J. (eds). Available at <http://uswta.org/wp-content/uploads/2016/04/Endangered-Souvenirs.pdf>.
- Haysom S. (2018). *Where crime compounds conflict. Understanding northern Mozambique's vulnerabilities*. Global Initiative Against Transnational Organized Crime. Switzerland, 32 pp.
- Humber F., Hykle D. (2011a). *Report on the Workshop for the Adoption of a Management and Conservation Plan for Marine Turtles in Madagascar*. Blue Ventures Conservation and IOSEA, London, UK.
- Humber F., Godley B., Ramahery V., Broderick A. (2011b). *Using community members to assess artisanal fisheries: the marine turtle fishery in Madagascar*. Animal Conservation, 14, 175– 185.
- Humber F., Godley B., Broderick A. (2014). *So excellent a fishe: a global overview of legal marine turtle fisheries*. Biodiversity Research, 20: 579-590.
- Humber F., Andriamahefazafy M., Godley B., Broderick A. (2015). *Endangered, essential and exploited: How extant laws are not enough to protect marine megafauna in Madagascar*. Marine Policy, 60: 70–83.
- Humber F., Godley B., Nicolas T., Raynaud O., Pichon F., Broderick A. (2016). *Placing Madagascar's marine turtle populations in a regional context using community-based monitoring*. Oryx, 51: 542–553.
- Hutomo M., Moosa M. (2005). *Indonesian marine and coastal biodiversity: Present status*. Indian Journal of Marine Sciences, 34: 88-97.
- IAC, Inter-American Convention for the Protection and Conservation of Sea Turtles, Salvador, 2001.
- IDPPE, Instituto Nacional de Desenvolvimento da Pesca de Pequena Escala (2013). *Censo da Pesca Artesanal, Principais Resultados*. Ministério das Pescas: Instituto Nacional de Desenvolvimento da Pesca de Pequena Escala (IDPPE), Maputo, 124 pp.
- IFAD, International Fund for Agricultural Development (2011). *Republic of Mozambique, Country strategic opportunities project*. Technical report EB 2011/103/R.13.

- IOTC, Indian Ocean Tuna Commission (2016). *Report of the 12th Session of the IOTC Working Party on Ecosystems and Bycatch*. IOTC–2016–WPEB12–R[E] Victoria, Seycelles, 105 pp.
- IOSEA, Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (2014). *Illegal take and trade of marine turtles in the IOSEA region*. MT-IOSEA/SS.7/Doc. 10.1 Agenda item 8c. Seventh Meeting of the Signatory States, Bonn, Germany, 8-11 September 2014.
- Jin J., Indab A., Nabangchang O., Thuy T., Harder D., Subade R. (2010). Valuing marine turtle conservation: A cross-country study in Asian cities. *Ecological economics*, 69: 2020-2026.
- Jones K. (2012). *Examining trends in taste preference, market demand, and annual catch in an indigenous marine turtle fishery in south west Madagascar*. Honour thesis. Washington State University, 45pp.
- Kasprzyck Z. (2008). *Shrimp fishing in Madagascar*. In: Gillett R. (ed). *Global study of shrimp fisheries*. FAO fisheries technical paper 475. Rome (Italy): United Nations Food and Agriculture Organization.
- Kiester A., Mandimbihasina A., Lewis R., Goode E., Juvik J., Young R., *et al.* (2013). *Conservation of the Angonoka (Ploughshare Tortoise) Astrochelys yniphora*. In: Castellano C., Rhodin A., Ogle M., Mittermeier R., Randriamahazo H., Hudson R., Lewis R. (eds). *Turtles on the Brink in Madagascar: Proceedings of Two Workshops on the Status, Conservation, and Biology of Malagasy Tortoises and Freshwater Turtles*. Chelonian Research Monographs, 6: 162–170.
- Lagueux C., Campbell C., Strindberg S. (2014). *Artisanal green turtle, Chelonia mydas, fishery of Caribbean Nicaragua: I. Catch rates and trends, 1991-2011*. PLoS ONE, 9: e94667.
- Lam T., Ling X., Takahashi S., Burgess E. (2012). *Market Forces: An Examination of Marine Turtle Trade in China and Japan*. TRAFFIC East Asia, Hong Kong.
- Le Manach F., Gough C., Harris A., Humber F., Harper S., Zeller D. (2012). *Unreported fishing, hungry people and political turmoil: The recipe for a food security crisis in Madagascar?* Marine Policy, 36: 218–225.
- Le Manach F., Andrianajona C., Oleson K., Clausen K., Lange G. (2013). *Natural capital accounting and management of the Malagasy fisheries sector. A technical case study for the WAVES global partnership in Madagascar*. Report, 48 pp.
- Lewis G., Kumar S., Chan-Yuan (2016). *The contribution of ethnic groups to Malaysian scientific output, 1982-2014, and the effects of the new economic policy*. Scientometrics, 109: 1877-1893.
- Liew H. (2011). *Tragedy of the Malaysian leatherback population: What went wrong*. In: Dutton, P.H., Squires, D. and Ahmed. *Conservation of Pacific Sea Turtles* nor do the University of Hawai'i Press.
- Lilette V. (2006). *Mixed Results: Conservation of the Marine Turtle and the Red-Tailed Tropicbird by Vezo Semi-Nomadic Fishers*. Conservation and Society, 4: 262.
- Louro C., Pereira M., Costa A. (2006). *Relatório sobre o estado de conservação das tartarugas marinhas em Moçambique*. Ministério para a Cooperação da Acção Ambiental, República de Moçambique.
- Madrigal-Ballesteros R., Jurado D. (2017). *Economic Incentives, Perceptions and Compliance with Marine Turtle Egg Harvesting Regulation in Nicaragua*. Conservation and Society, 15: 74-86.
- Manjozy T., Razafimanahaka J., Ronto W., Randrianavelona R., Ganzhorn J., Jenkins K. (2017). *The supply of illegal tortoise meat to Toliara City, southwestern Madagascar*. Oryx, 51: 437-440.
- Marco A., Abella E., Liria-Loza A., Martins S., López O., Jiménez-Bordón, *et al.* (2012). *Abundance and exploitation of loggerhead turtles nesting in Boa Vista island, Cape Verde: the only substantial rookery in the eastern Atlantic*. Animal Conservation, 15: 351-360.
- Marine Turtle Specialist Group (1996). *Lepidochelys kempii*. The IUCN Red List of Threatened Species 1996: e.T11533A3292342.
- Mazaris A., Schofield G., GKazinou C., Almpnidou V., Hays G. (2017). *Global sea turtle conservation successes*. Science advances, 3: e1600730.
- McClanahan T., Cinner J., Abunge C., Rabearisoa A., Mahatante P., F Ramahatratra *et al.* (2014). *Perceived benefits of fisheries management restrictions in Madagascar*. Ecology and Society, 19: 5.
- Meylan A., Meylan P., Ordoñez, C. (2013). *Marine turtles of Bocas del Toro Province and the Comarca Ngöbe-Buglé, Republic of Panamá*. Chelonian Conservation and Biology, 12: 17-33.
- Ministerio de Ambiente (2017). *Plan de Acción Nacional para la Conservación de las Tortugas Marinas en Panamá*. Araúz E., Pacheco L., Binder S., de Ycaza R., Posada J. (eds). Ministerio de Ambiente, Ciudad de Panamá, 32 pp.

- Ministerio del Medio Ambiente (2002). *Programa Nacional para la Conservación de las Tortugas Marinas y Continentales en Colombia*. Dirección General de Ecosistemas. Available at: http://www.widecast.org/Resources/Docs/Programa_conservacion_de_tortugas_Colombia.pdf.
- Ministério do Mar, Águas Interiores e Pesca (2003). *Regulamento Geral de Pesca Marítima (REPMAR)*. Available at: http://www.mozpesca.gov.mz/REPMAR_-_Regulamento_Geral_da_Pesca_Mar%C3%ADtima-Decreto_n_43-2003_de_10_de_Dezembro.pdf.
- MIPE, Ministério das Pescas (2013). *Realizações do Sector das Pescas: 2005- 2014*. Maputo, Ministério das Pescas.
- Mortimer J., Donnelly M. (IUCN SSC Marine Turtle Specialist Group) (2008). *Eretmochelys imbricata*. The IUCN Red List of Threatened Species 2008: e.T8005A12881238.
- Moss S., Van Der Wal M. (1998). *Rape and Run in Maluku: Exploitation of Living Marine Resources in Eastern Indonesia*. Cakalele, 9: 85–97.
- Nada M., Casale P. (2011). *Sea turtle bycatch and consumption in Egypt threatens Mediterranean turtle populations*. Oryx, 45: 143-149.
- Pilcher N., Enderby S. (2001). *Effects of Prolonged Retention in Hatcheries on Green Turtle (Chelonia mydas) Hatchling Swimming Speed and Survival*. Journal of Herpetology, 35: 633-638.
- Obura D., Bandeira S., Bodin N., Burgener V., Braulik G., Chassot E., et al. (2019). *The Northern Mozambique Channel*. In World Seas: an Environmental Evaluation. Academic Press. pp. 75-99.
- Pereira M., Litulo M., Santos R., Leal M., Fernandes R., Tibiriçá Y., et al. (2014). *Mozambique marine ecosystems review. Final report submitted to Fondation Ensemble*. Maputo, Biodinâmica/CTV, 139 pp.
- Pierce S., Trerup M., Williams C., Tilley A., Marshall A., Raba N. (2008). *Shark fishing in Mozambique: A preliminary assessment of artisanal fisheries*. Eyes on the Horizon, Maputo.
- ProFauna (2007). *ProFauna's Annual Report 2007*. Available at <http://profauna.net/sites/default/files/downloads/profauna-indonesia-annual-report-2007.pdf>.
- Rakotonirina B., Cooke A. (1994). *Sea turtles of Madagascar- their status, exploitation and conservation*. Oryx, 28: 51-61.
- Rakatosamimanana, V. (2014). *Etude des pratiques et croyances alimentaires pour comprendre la malnutrition à Madagascar : intérêt de l'introduction de feuilles de Moringa oliefera*. Alimentation et Nutrition. Université de Bourgogne, 2014. Français. <NNT : 2014DIJOS076>. <tel-01211445>
- Rakotoson L., Tanner K. (2006). *Community-based governance of coastal zone and marine resources in Madagascar*. Ocean & Coastal Management 49: 855-872.
- Razafindrainibe H. (2010). *Baseline study of the shrimp trawl fishery in Madagascar and strategies for bycatch management*, Project TCP/MAG/3201- REBYC2. Rome (Italy): United Nations Food and Agriculture Organization.
- Red List Standards & Petitions Subcommittee (1996). *Natator depressus*. The IUCN Red List of Threatened Species 1996: e.T14363A4435952.
- Rich V. (2012). *Carving a Life: The Political Economy of Woodcarver Livelihoods in Cabo Delgado, Northern Mozambique*. PhD Thesis, SOAS, University of London.
- Riskas K., Tobin R., Fuentes M., Hamann M. (2018). *Evaluating the threat of IUU fishing to sea turtles in the Indian Ocean and Southeast Asia using expert elicitation*. Biological Conservation, 217: 232-239.
- Runhovde S. (2018). *Illegal online trade in reptiles from Madagascar*. The Global Initiative Against Transnational Organised Crime. Geneva, Switzerland, 19pp.
- Salleh S., Shah S., Chowdhury, A. (2018). *Assessing Nesting Status of Green Turtles, Chelonia Mydas in Perak, Malaysia*. Tropical Life Sciences Research, 29: 155–171.
- Segniagbeto G., Okangny D., Afiademagno K., Kpotor K., Daniele D., Fretey J., et al. (2016). *Spatio-temporal patterns in occurrence and niche partitioning of marine turtles along the coast of Togo (West Africa)*, Herpetozoa, 29: 15-26.
- Seminoff J. (Southwest Fisheries Science Center, U.S.) (2004). *Chelonia mydas*. The IUCN Red List of Threatened Species 2004: e.T4615A11037468.
- Seminoff J., Schumacher, J. (2016). *Stable isotope values of hawksbill (Eretmochelys imbricata) shell material recovered from confiscated rooster spurs: a forensic approach to determining origin of turtles*. Unpublished Report to Ministerio de Ambiente, Panama, 8 pp.
- Stiles D. (2009). *The Marine Turtle Product Trade in Viet Nam*. TRAFFIC Southeast Asia.

- Suarez M., Starbird C. (1995). *A Traditional Fishery of Leatherback Turtles in Maluku, Indonesia*. Marine Turtle Newsletter, 68: 15-18.
- Teh L.S., Teh, L.C., Jolis, G. (2018). *An economic approach to marine megafauna conservation in the coral triangle: Marine turtles in Sabah, Malaysia*. Marine Policy, 89: 1-10.
- Tomás J., Godley B., Castroviejo J., Raga J. (2010). *Bioko: critically important nesting habitat for sea turtles of West Africa*. Biodiversity Conservation, 19: 2699-2714.
- TRAFFIC (2004). *The trade in marine turtle products in Viet Nam*. TRAFFIC Southeast Asia – Indochina, Ha Noi, 56 pp.
- TRAFFIC (2009). *A preliminary report of the nature and scale of domestic and international trade in marine turtles in Indonesia*: unpublished report. TRAFFIC Southeast Asia, Kuala Lumpur, Malaysia.
- TRAFFIC Southeast Asia (2009). *Survey of Marine Turtle Egg Consumption and Trade in Malaysia Report*. WWF-Malaysia, March 2009.
- Troëng S., Drews C. (2004). *Money talks: Economic aspects of marine turtle use and conservation*. WWF-International, Gland, Switzerland.
- Van Dijk P., Shepherd C. (2004). *Shelled out? A Snapshot of Bekko Trade in Selected Locations in South-east Asia*. TRAFFIC Southeast Asia, Petaling Jaya, Malaysia.
- Wallace B., DiMatteo A., Hurley B., Finkbeiner E., Bolten A., Chaloupka M., et al. (2010). *Regional Management Units for Marine Turtles: A Novel Framework for Prioritizing Conservation and Research across Multiple Scales*. PLoS ONE 5: e15465.
- Wallace B., DiMatteo A., Bolten A., Chaloupka M., Hutchinson B., Abreu-Grobois F., et al. (2011). *Global Conservation Priorities for Marine Turtles*. PLoS ONE, 6: e24510.
- Wallace B., Tiwari M., Girondot M. (2013). *Dermochelys coriacea*. The IUCN Red List of Threatened Species 2013: e.T6494A43526147.
- Warwick C., Arena P., Steedman C. (2013). *Health implications associated with exposure to farmed and wild sea turtles*. Journal of the Royal Society of Medicine, 4: 8.
- WCS, Wildlife Conservation Society (2016). *Organized poaching is decimating Madagascar's sea turtles*. Available at: www.sciencedaily.com/releases/2016/09/160901125652.htm.
- Weir C., Ron T., Morais M., Duarte A. (2007). *Nesting and at-sea distribution of marine turtles in Angola, West Africa, 2000-2006: occurrence, threats and conservation implications*. Oryx, 41: 224-231.
- Westerman K., Gardner C. (2013). *Adoption of socio-cultural norms to increase community compliance in permanent marine reserves in southwest Madagascar*. Conservation Evidence, 10: 4-9.
- Williams J., Pierce S., Fuentes M., Hamann M. (2016). *The Tradition of Take: Sea Turtle Consumption in Dovelá, Mozambique*. African Sea Turtle Newsletter 5: 27–31.
- Williams J. (2017). *Multidisciplinary insights into the conservation and biology of sea turtles in Mozambique*. PhD Thesis, College of Marine and Environmental Studies, James Cook University, Townsville, Australia.
- WWF-Malaysia, Sabah Wildlife Department (2018). *Perdagangan telur dan pemburuan penyu di Sabah, Malaysia* (The hunting of turtles and the trade in their eggs in Sabah, Malaysia). WWF Malaysia and Sabah Wildlife Department, Sabah, Malaysia.
- Yifan L. (2018). *Sea turtles: an uncertain future*. Ma P., Vallianos C., Yuan T., Zhang M. (eds) Available at <https://wildaid.org/wp-content/uploads/2018/05/SeaTurtleReport.pdf>.
- Zafra-Calvo N., Lobo J., Prada C., Nielsen M., Burgess N. (2018). *Predictors of elephant poaching in a wildlife crime hotspot: The Ruvuma landscape of southern Tanzania and northern Mozambique*. Journal for Nature Conservation, 41: 79-87.