FISH for the PEOPLE

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Initiatives for safeguarding the **Commercially-exploited Aquatic Species** under international concern

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Editorial

Aquatic species are exploited for food security and livelihood but some of them could be fully exploited or overexploited if not properly managed. The ASEAN Member States (AMSs), *i.e.* Indonesia, Philippines, Thailand, and Viet Nam, are among the top producers of fish and fishery products that are supplied to the international markets including the United States, Europe, China, Japan, and others. One of the global initiatives to ensure that international trade in wild animals and plants does not threaten the survival of the species is the establishment of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1975 as an international agreement between governments. During the past decade, several commercially-exploited aquatic species (CEAS) had been proposed and listed in the Appendices of CITES. However, the proposals for inclusion of species into the CITES Appendices have to be considered and decided by votes by the CITES Parties. Therefore, the Food and Agriculture Organization of the United Nations (FAO) is actively assessing the proposals for listing CEAS in the CITES Appendices from a scientific perspective and in accordance with CITES biological listing criteria; while the Southeast Asian Fisheries Development Center (SEAFDEC) is providing fora for the Member Countries to share information, build up relevant technical capacity, and develop common/coordinated positions in response to the proposals.

In the region, there are several CEAS that are subject to CITES as well as other conservation and management measures, such as sharks and rays, seahorses, anguillid eels, among others. This issue of "*Fish for the People*" features the international concern relevant to CEAS, including the roles of FAO and SEAFDEC in gathering data and information to obtain a better knowledge of the status and trends of some of these species, and ensuring conservation and management for sustainable utilization. However, there is also a need to recognize that the Southeast Asian region fisheries are characterized by a large number of small-scale fishers using multigear and harvesting multispecies of aquatic organisms.

Sharks and rays are commercially important species in the region but they are not targeted for most fisheries and are usually bycatch. However, this resource could result in overexploitation if fishing activities are not properly managed. The activities were led by SEAFDEC Marine Fishery

Resources Development and Management Department (MFRDMD) to obtain sufficient information including the collection of data on landings, trade, and nursery grounds; identification of species through DNA analysis; development of human resources; raising public awareness; among others. Such information is also necessary to support the development of non-detrimental findings (NDFs) that are crucial for the countries to export the species listed in CITES Appendix II. In commitment to the International Plan of Action for Conservation and Management of Sharks (IPOA-Sharks), several Southeast Asian countries have adopted their respective NPOA-Sharks that outline the measures to ensure that the species are properly managed toward sustainable utilization.

The United States is the topmost country in the world importing aquatic products, and marine mammals are among the species groups under their concern. In order to protect marine mammals, the US Marine Mammal Protection Act (MMPA) was decreed which prohibits importations of commercial fish or fishery products from commercial fishing operations resulting in incidental killing or serious injury (bycatch) of marine mammals. Considering that the implementation of MMPA could impact the region's fisheries sector, SEAFDEC in 2021 started providing a forum for the AMSs to discuss the major issues and challenges in complying with the MMPA.

For tropical anguillid eels, the species are catadromous making them vulnerable to fishing activities, especially considering the high price and market demand. Several AMSs developed their respective national fishery management programs and regulations to carry out effective management practices for the sustainable use and conservation of tropical anguillid eel resources. The Inland Fishery Resources Development and Management Department (IFRDMD) of SEAFDEC supported the AMSs by conducting activities on data collection, biodiversity monitoring, stock enhancement, and involvement of stakeholders. Furthermore, the SEAFDEC Aquaculture Department also conducted a study of the performance and feed utilization of high-value eel species in cage conditions, the results of which are relevant information to the aquaculture development of tropical anguillid eels.

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CONTENTS

FISH for the PEOPLE is a special publication produced by the Southeast Asian Fisheries Development Center (SEAFDEC) to promote sustainable fisheries for food security in the Southeast Asian region.

Listing of Commercially Exploited Aquatic Species in the CITES Appendices: FAO and SEAFDEC Perspectives

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Aquatic species have been exploited worldwide to support food security and income generation either for commercial or subsistent purposes making a large number of species becoming fully exploited or overexploited, while some are threatened with the risk of being endangered. Several conservation and management measures have been developed either within the exclusive economic zones of coastal States or on the high seas by the respective regional fisheries management organizations (RFMOs) to ensure that the species targeted for fishing activities could be utilized in a sustainable manner. In addition to the efforts to ensure sustainable harvest of the species, it is also envisaged that trading, especially international trade, of the species also contributes to more exploitation of the resources posing risk to their survival. Thus, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was established as an international agreement between governments with the aim to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species. The text of the Convention was agreed upon at a meeting of representatives of 80 countries in March 1973, and in July 1975 the CITES entered into force.

This article portrays the roles of the Food and Agriculture Organization of the United Nations (FAO) in assessing proposals for listing of commercially-exploited aquatic species in the CITES Appendices from a scientific perspective and in accordance with CITES biological listing criteria, and those of the Southeast Asian Fisheries Development Center (SEAFDEC) in providing fora for countries in Southeast Asia to share information, build up relevant technical capacity, and develop common/coordinated positions in response to the proposals.

The international trade in vulnerable aquatic species is regulated once they are listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendices (**Box**). For the species to be listed, the Parties to the Convention have to submit proposals at least 150 days before the meeting of the CITES Conference of the Parties (CoP). Then, listing the species in the CITES Appendices would be adopted by a vote of the two-thirds majority of Parties present at the CoP. Currently, over 38,700 species—including roughly 5,950 species of animals (114 fish species listed in Appendix II) and 32,800 species of plants—are protected by CITES against overexploitation through international trade (CITES, 2023c).

Box. CITES Appendices (CITES, 2023b)

Appendix I
Appendix I lists species that are the most endangered among CITES-listed animals and plants. They are threatened with extinction and CITES prohibits the international trade in specimens of these species except when the purpose of the import is not commercial, for instance for scientific research. In these exceptional cases, trade may take place provided it is authorized by the granting of both an import permit and an export permit (or re-export certificate).

Appendix II
Appendix II lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled. It also includes so-called "look-alike species" *i.e.* species whose specimens in trade look like those of species listed for conservation reasons. International trade in specimens of Appendix II species may be authorized by the granting of an export permit or re-export certificate. No import permit is necessary for these species under CITES (although a permit is needed in some countries that have taken stricter measures than CITES requires). Permits or certificates should only be granted if the relevant authorities are satisfied that certain conditions are met, above all that trade will not be detrimental to the survival of the species in the wild.

Appendix III
Appendix III is a list of species included at the request of a Party that already regulates trade in the species and that needs the cooperation of other countries to prevent unsustainable or illegal exploitation. International trade in specimens of species listed in this Appendix is allowed only on presentation of the appropriate permits or certificates.

Nevertheless, after nearly half a century of entering into force, the CITES procedures and implementation have posed some challenges in ensuring its effectiveness in better conservation and existence of the species listed in the Appendices due to several reasons. Decisions to list species in CITES do not require, encourage, or even allow for consideration of the impacts of its key decisions. Moreover, decisions to list species in CITES are based only on a set of biological and trade information according to the CITES listing criteria. The decisions of the CITES Parties that resulted in listed species conservation failure without any formal consideration of such consequences were discussed by Cooney *et al.* (2021). Regarding the species listing in Appendix II, the key challenge is the difficulty to show how CITES trade controls will improve the conservation status of such listed species. Once the species was listed under Appendix II, there is limited informational trade information as well as scientific data to be obtained because of the impact listing of such species.

Role of FAO in Listing of CEAS in the CITES Appendices

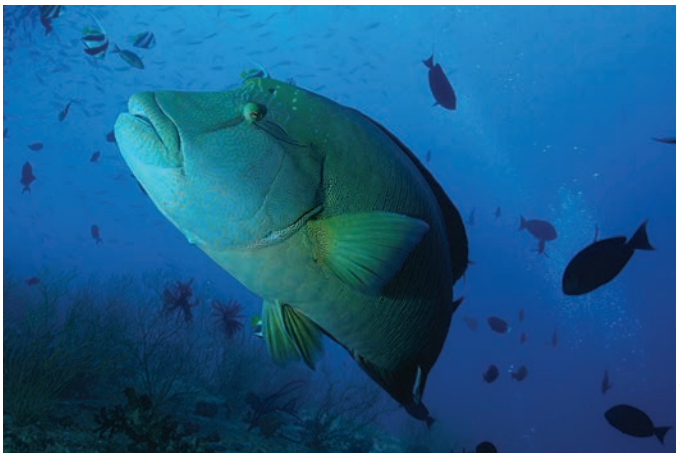
While the proposals for listing species in CITES Appendices in the past focused mainly on terrestrial flora and fauna, starting from the early 2000s, an increasing number of commercially exploited aquatic species (CEAS) have been proposed for inclusion in CITES Appendices. As of 2022, CITES Appendices include more than 100 CEAS of fishes, mollusks, echinoderms, among others (FAO, 2022). **Table 1** shows the major CEAS included in CITES Appendices since 1975.

Table 1. Major commercially exploited aquatic species listed in CITES Appendices in 1975–2022

CITES CoP and year	Species	CITES Appendix
CoP1 in 1975	Arapaima, *Arapaima gigas*	Appendix II
CoP4 in 1983	Giant clams, Tridacnidae	Appendix II
CoP7 in 1989	Stony corals, Scleratinia	Appendix II
CoP9 in 1994	Caribbean queen conch, *Strombus gigas*	Appendix II
CoP10 in 1997	Sturgeons and paddlefish, Acipenseriformes (*Acipenser brevirostrum* and *A. sturio* in Appendix I)	Appendix II apart from two species in Appendix I
CoP12 in 2002	Basking shark, *Cetorhinus maximus*	Appendix II
	Pipefishes and seahorses, *Hippocampus* spp.	Appendix II
	Whale shark, *Rhincodon typus*	Appendix II
	Sea cucumber, *Isostichopus fuscus*	Appendix III
CoP13 in 2004	Humphead (Napoleon) wrasse, *Cheilinus undulatus*	Appendix II
	Mediterranean date mussel, *Lithophaga lithophaga*	Appendix II
	Great white shark, *Carcharodon carcharias*	Appendix II
CoP14 in 2007	European eel, *Anguilla anguilla*	Appendix II
	Sawfishes, Pristidae	Appendix I
CoP16 in 2013	Scalloped hammerhead shark, *Sphyrna lewini*	Appendix II
	Great hammerhead shark, *Sphyrna mokarran*	Appendix II
	Smooth hammerhead shark, *Sphyrna zygaena*	Appendix II
	Oceanic whitetip shark, *Carcharhinus longimanus*	Appendix II
	Porbeagle shark, *Lamna nasus*	Appendix II
	Sawfish, *Pristis microdon*	Appendix I
	Manta rays, *Manta* spp.	Appendix II
CoP17 in 2016	Silky shark, *Carcharhinus falciformi*	Appendix II
	Thresher sharks, *Alopias* spp.	Appendix II
	Devil rays, *Mobula* spp.	Appendix II
	Clarion angelfish, *Holacanthus clarionensis*	Appendix II
	Nautilus, Nautilidae spp.	Appendix II
CoP18 in 2019	Mako sharks, *Isurus oxyrinchus* and *Isurus paucus*	Appendix II
	Guitarfishes, *Glaucostegus* spp.	Appendix II
	Wedgefishes, Rhinidae spp.	Appendix II
	Teatfish, *Holothuria* spp. *Holothuria fuscogiva*, *H. nobilis*, and *H. whitmaei*	Appendix II
CoP19 in 2022	Carcharhinidae spp.	Appendix II
	Hammerhead shark, Sphyrnidae spp.	Appendix II
	Freshwater stingray, *Potamotrygon albimaculata*, *P. henlei*, *P. jabuti*, *P. leopoldi*, *P. marquesi*, *P. signata*, and *P. wallacei*	Appendix II
	Guitarfish, Rhinobatidae spp.	Appendix II
	Sea cucumber, *Thelenota* spp.	Appendix II
	Zebra pleco, *Hypancistrus zebra*	Appendix II

However, as the global and regional approaches for the management of fishery resources are generally based on the best scientific evidence available, it is also of the view that listing CEAS into the CITES Appendices should be also decided from a scientific perspective. CITES, therefore, established formal relationships with the Food and Agriculture Organization (FAO) and relevant RFMOs such as the International Commission for the Conservation of Atlantic Tunas (ICCAT) and the Secretariat of the Pacific Regional Environment Programme (SPREP) to strengthen cooperation and collaboration to share information on marine species of common concerns cooperation (CITES, 2023a).

The collaboration between CITES and FAO was initiated in 1997. The Memorandum of Understanding was signed in 2006 for FAO and the CITES Secretariat to work together to ensure adequate consultations in the scientific and technical evaluation of proposals for including, transferring, or removing CEAS in the CITES Appendices. Under the MOU, FAO takes the major role to carry out scientific and technical reviews of such proposals and for the output to be transmitted to the CITES Secretariat in order that the CITES Secretariat would further communicate the results to the CITES Parties (CITES, 2006).



Among the very first commercially-exploited aquatic species listed in the CITES Appendices are giant clams, Tridacnidae in 1983, whale shark, *Rhincodon typus* in 2002, humphead (Napoleon) wrasse, *Cheilinus undulatus* in 2004, and Great white shark, *Carcharodon carcharias* in 2004 *(clockwise from top left))*

Along this line, the twenty-fifth session of the FAO Committee on Fisheries in 2003 established the FAO Ad Hoc Expert Advisory Panel for Assessment of Proposals to CITES. The terms of reference for the Panel defined the assessment process and composition of the Panel established by the FAO Secretariat in advance of CITES CoP with the main task to assess proposals from a scientific perspective and in accordance with CITES biological listing criteria. The Panel consists of a core group of 10 experts and 10 supplement specialists on the species being considered and aspects of fisheries relevant to the species being proposed to be listed in CITES Appendices. The Panel assesses and provides advice on proposals to amend CITES Appendices I and II concerning CEAS. During the discussion of the Panel, key issues are identified including possible elements of differences in the interpretation of uncertainties regarding the definition of decline and the estimation of the baseline, definition of reduction, types of indicators and alternatives, treatment of data-poor technical information, and flexibility on the evaluation and a precaution approach. Such elements are analyzed together with trade data, extent of the decline of the species, existing management measures, and mitigation considerations.

The criteria used by the Panel include the reliability of information derived from different sources for use as indices of abundance considering the reliability index of population abundance. As shown in **Table 2**, a score of 0 indicates that

Table 2. Criteria used by the FAO Ad Hoc Expert Advisory Panel to assign a measure of the reliability of information derived from different sources for use as indices of abundance (FAO, 2004)

Reliability Index of Population Abundance Information	Source of Data or Information
5	Statistically designed, fishery-independent survey of abundance
4	Consistent and/or standardized catch-per-unit effort data from the fishery
3	Unstandardized catch-per-unit effort data from the fishery; scientifically-designed, structured interviews; well-specified and consistent anecdotal information on major changes from representative samples of stakeholders
2	Catch or trade data without information on effort
1	Confirmed visual observations; anecdotal impressions
0	Information that does not meet any of the above, or equivalent, criteria; flawed analysis or interpretation of trends

the information is considered not reliable, while a score of 5 indicates that it is considered highly reliable. Any information on abundance allocated a non-zero value was considered to be useful. These scores could be adjusted either up or down in any particular case, depending on the length of the time series and the amount of information that was available on the sources and methods (FAO, 2004).

Generally, the assessment process is shown in **Figure**. Through such assessment, comprehensive comments on technical aspects of the proposal in relation to biology, ecology, trade, and management issues for improving their respective species management will be made and reported to CITES by FAO. In parallel, FAO will also obtain additional information on the proposal within a specified timeframe from

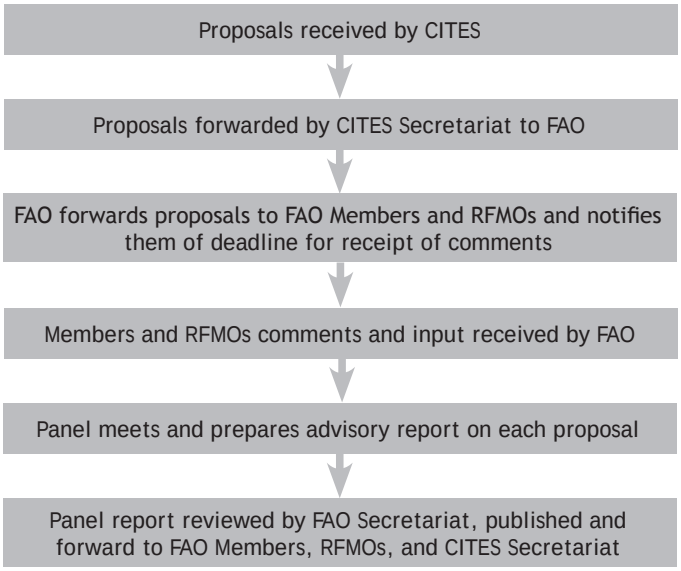


Figure. Assessment process of the FAO Expert Advisory Panel for Assessment of Proposals to CITES

FAO Members, relevant RFMOs, as well as experts who are not a member of the Panel if required. As a result, prior to each CITES CoP, the Panel makes a report based on its assessment and review, providing comprehensive information and advice as appropriate on each listing proposal. Such a report is distributed as soon as it is finalized to all FAO Members and the CITES Secretariat with a request that they distribute it to all CITES Parties.

During the CITES CoP, CITES Parties would be tasked to consider (and where appropriate adopt) proposals to amend the lists of species in Appendices I and II through voting. A debate of each proposal starts with the introduction of the proposal by the Proponent and is followed by the debate among the Parties that support or oppose the proposal with additional inputs from observers. Each Party would then consider, by taking into consideration the information and recommendations from the Panel and/or the International Union for Conservation of Nature (IUCN), potential livelihood concerns and use in national trade and environment, from their respective national information on fish stocks, among others, and make their respective decision. It should be noted that despite the Panel conclusions based on the scientific information available and considering the CITES listing criteria, the decision of CITES on each of the proposals was based on voting by the CITES Parties. The final decision for amendments in Appendices I and II would be adopted by a two-thirds majority of the Parties. Nevertheless, several proposals for CEAS were reviewed by the Panel that do not meet the CITES listing criteria, but the species were supported by the CITES Parties and listed in the CITES Appendices. From its first meeting in 2004 until the seventh meeting in 2022, the EAP reviewed several proposals which are summarized in **Table 3** (FAO, 2004, 2007, 2010, 2013, 2016, 2019, 2022).

Table 3. CITES CoP Proposals reviewed by the FAO Expert Advisory Panel from 2004 to 2022

CITES CoP proposal	Conclusion of the FAO Expert Advisory Panel	CITES CoP decision
CoP13 Proposal 32. Proposal to include *Carcharodon carcharias* (white shark) in CITES Appendix II, including an annotation that states that a zero annual export quota is established for this species.	Insufficient information to develop an informed opinion about the relative importance of international trade to the conservation of white sharks. (First Meeting in 2004)	Adopted
CoP13 Proposal 33. Proposal to include *Cheilinus undulatus* (humphead wrasse) in Appendix II in accordance with Article II, paragraph 2(a) of the Convention.	Regulation of trade as a result of CITES listing could make a significant contribution to the conservation problems for this species. Therefore, strengthening regional and national management of the live reef food fish trade and domestic fisheries is necessary to ensure the protection of this species. (First Meeting in 2004)	Adopted
CoP13 Proposal 35. Proposal to include *Lithophaga lithophaga* (Mediterranean date mussel) in Appendix II.	Could not accurately determine the extent to which the species is exploited throughout its range, although it was clear that destructive fishing practices threaten the species at the local and perhaps national levels in certain parts of the Mediterranean Sea. (First Meeting in 2004)	Adopted
CoP13 Proposal 36. Proposal for an amendment of the annotation for *Helioporidae* spp., *Tubiporidae* spp., *Scleractinia* spp., *Milleporidae* spp., and *Stylasteridae* spp.	There could be conservation issues with the export of live rocks (*i.e.* potential damage to live reefs) but was unable to determine the extent of the potential impact, as this is a complex question on which little information was available. (First Meeting in 2004)	Withdrawn
CoP14 Proposal 15. Proposal to include *Lamna nasus* (porbeagle shark) on CITES Appendix II in accordance with Article II paragraph 2(a)	Globally, the species did not meet the biological decline criteria for listing in CITES Appendix II. (Second Meeting in 2007)	Rejected

Table 3. CITES CoP Proposals reviewed by the FAO Expert Advisory Panel from 2004 to 2022 *(Cont'd)*

CITES CoP proposal	Conclusion of the FAO Expert Advisory Panel	CITES CoP decision
CoP14 Proposal 16. Proposal to include *Squalus acanthias* (spiny dogfish) on CITES Appendix II in accordance with Article II paragraph 2(a)	Globally, the species did not meet the biological criteria for listing in CITES Appendix II. (Second Meeting in 2007)	Rejected
CoP14 Proposal 17. Proposal to include all species of the family Pristidae (sawfishes) in CITES Appendix I in accordance with Article II paragraph 1	The available evidence supported the proposal to include all species of Pristidae in CITES Appendix I in accordance with Article II paragraph 1. (Second Meeting in 2007)	Adopted
CoP14 Proposal 18. Proposal to include *Anguilla anguilla* (European eel) in CITES Appendix II in accordance with Article II paragraph 2(a)	The available evidence supported the proposal to include *Anguilla anguilla* (European eel) in CITES Appendix II in accordance with Article II paragraph 2(a). (Second Meeting in 2007)	Adopted
CoP14 Proposal 19. Proposal to include *Pterapogon kauderni* (Banggai cardinalfish) in CITES Appendix II in accordance with Article II paragraph 2(a)	The proposal did not meet the biological criteria for the Appendix II listing. (Second Meeting in 2007)	Withdrawn
CoP14 Proposal 20. Proposal to include the species of *Panulirus argus* and *P. laevicauda* of the Brazilian lobster population in CITES Appendix II in accordance with Article II paragraphs 2(a) and 2(b)	The available evidence did not support the proposal to include the Brazilian populations of *Panulirus argus* and *P. laevicauda* in CITES Appendix II. (Second Meeting in 2007)	Withdrawn
CoP14 Proposal 21. Proposal to include all species in the genus *Corallium* (red/pink corals) in CITES Appendix II in accordance with Article II paragraph 2(a)	The available evidence did not support the proposal to include all species in the genus *Corallium* in CITES Appendix II in accordance with Article II paragraph 2(a). (Second Meeting in 2007)	Rejected
CoP15 Proposal 15. Proposal to include *Sphyrna lewini* (scalloped hammerhead) in CITES Appendix II in accordance with Article II paragraph 2(a), and to include *S. mokarran* (great hammerhead), *S. zygaena* (smooth hammerhead), *Carcharhinus plumbeus* (sandbar shark), and *C. obscurus* (dusky shark) in CITES Appendix II in accordance with Article II paragraph 2(b)	The available evidence supported the proposal to include scalloped hammerhead (*S. lewini*) in CITES Appendix II in accordance with Article II paragraph 2(a), along with the look-alike species, great hammerhead shark (*S. mokarran*) and smooth hammerhead shark (*S. zygaena*), in accordance with Article II paragraph 2(b). However, there was insufficient evidence to also include sandbar shark (*Carcharhincus plumbeus*) and dusky shark (*C. obscurus*) in accordance with Article II paragraph 2(b) due to inadequate evidence relating to "look-alike" considerations. (Third Meeting in 2009)	Rejected
CoP15 Proposal 16. Proposal to include *Carcharhinus longimanus* (oceanic whitetip shark) in CITES Appendix II in accordance with Article II paragraph 2(a)	The available evidence supported the proposal to include *C. longimanus* (oceanic whitetip shark) in CITES Appendix II. (Third Meeting in 2009)	Rejected
CoP15 Proposal 17. Proposal to include *Lamna nasus* (porbeagle shark) in CITES Appendix II in accordance with Article II paragraphs 2(a) and 2(b)	The available evidence supported the proposal to include *L. nasus* (porbeagle shark) in CITES Appendix II. (Third Meeting in 2009)	Rejected
CoP15 Proposal 18. Proposal to include *Squalus acanthias* (spiny dogfish) in Appendix II in accordance with Article II paragraphs 2(a) and 2(b)	The available evidence did not support the proposal to include *S. acanthias* (spiny dogfish) in CITES Appendix II. (Third Meeting in 2009)	Rejected
CoP15 Proposal 19. Proposal to include *Thunnus thynnus* (Atlantic bluefin tuna) in CITES Appendix I in accordance with Article II paragraph 1	The available evidence supported the proposal to include *Thunnus thynnus* (Atlantic bluefin tuna) in CITES Appendix I. (Third Meeting in 2009)	Rejected
CoP15 Proposal 21. Proposal to include all species in the family Coralliidae (red and pink corals) in CITES Appendix II in accordance with Article II paragraphs 2(a) and 2(b)	The available evidence did not support the proposal to include all species in the family Coralliidae (*Corallium* spp. and *Paracorallium* spp.) in CITES Appendix II. (Third Meeting in 2009)	Rejected
CoP16 Proposal 42. Proposal to include *Carcharhinus longimanus* (oceanic whitetip shark) in CITES Appendix II in accordance with Article II paragraph 2(a)	Met the biological criteria for listing in CITES Appendix II. (Fourth Meeting in 2012)	Adopted

Table 3. CITES CoP Proposals reviewed by the FAO Expert Advisory Panel from 2004 to 2022 *(Cont'd)*

CITES CoP proposal	Conclusion of the FAO Expert Advisory Panel	CITES CoP decision
CoP16 Proposal 43. Inclusion of *Sphyrna lewini* in CITES Appendix II in accordance with Article II 2(a) and inclusion of *S. mokarran* and *S. zygaena* in Appendix II in accordance with Article II paragraph 2(b)	The available evidence on scalloped hammerhead (*Sphyrna lewini*) met the biological criteria for listing in CITES Appendix II. The other two proposed species, great hammerhead shark (*S. mokarran*) and smooth hammerhead shark (*S. zygaena*) fulfill the criteria for inclusion under CITES Appendix II stipulated in Article II paragraph 2b ("look-alike clause"). (Fourth Meeting in 2012)	Adopted
CoP16 Proposal 44. Inclusion of *Lamna nasus* in CITES Appendix II in accordance with Article II paragraph 2(a)	The species met the decline criteria for Appendix II. (Fourth Meeting in 2012)	Adopted
CoP16 Proposal 45. Transfer of *Pristis microdon* from CITES Appendix II to Appendix I in accordance with Article II paragraph 1	The evidence met the biological criteria for CITES Appendix I listing. (Fourth Meeting in 2012)	Adopted
CoP16 Proposal 46. Inclusion of the genus *Manta* in CITES Appendix II in accordance with Article II paragraph 2(a)	Both species are pan-oceanic in distribution and did not qualify under the distribution criterion. (Fourth Meeting in 2012)	Adopted
CoP16 Proposal 47. Inclusion of the ceja river stingray (*Paratrygon aiereba*) in CITES Appendix II in accordance with Article II paragraph 2(a)	The species was widely distributed, did not meet the restricted area criterion, and the populations were not believed to meet the criterion of a small population. (Fourth Meeting in 2012)	Rejected
CoP16 Proposal 48. Inclusion of freshwater stingrays *Potamotrygon motoro* and *P. schroederi* in CITES Appendix II in accordance with Article II paragraph 2(a)	There was insufficient information to show that the species met the criteria for inclusion in CITES Appendix II, and it was suggested that it would be more useful to strengthen management measures at the country level. (Fourth Meeting in 2012)	Rejected
CoP17 Proposal 42. Proposal to include silky shark (*Carcharhinus falciformis*) in CITES Appendix II in accordance with Article II paragraph 2(a)	Evidence of decline in abundance was reported for Colombia, but not to the extent required for consideration in Appendix II. (Fifth Meeting in 2016)	Adopted
CoP17 Proposal 43. Proposal to include bigeye thresher shark (*Alopias superciliosus*) in CITES Appendix II in accordance with Article II paragraph 2(a). If listed, this would include all other species of thresher sharks (*Alopias* spp.) in CITES Appendix II in accordance with Article II paragraph 2(b)	There was no reliable evidence of a decline in bigeye thresher that would meet CITES Appendix II listing criteria. (Fifth Meeting in 2016)	Adopted
CoP17 Proposal 44. Proposal to include sicklefin devil ray (*Mobula tarapacana*) and spinetail devil ray (*M. japonica*) in CITES Appendix II in accordance with Article II paragraph 2(a). If listed, this would include all other species of mobula rays (*Mobula* spp.) in CITES Appendix II in accordance with Article II paragraph 2(b)	No global population estimates were available and there was little known about their stock structure. These species were considered to have low productivity; and based on the best available evidence, the data on decline met the CITES Appendix II listing criteria. (Fifth Meeting in 2016)	Adopted
CoP17 Proposal 45. Proposal to include Raya (*Potamotrygon motoro*) in CITES Appendix II in accordance with Article II paragraph 2(a)	Raya did not meet the CITES Appendix II criteria, but noted that CITES Parties have previously recommended range States consider including Raya in CITES Appendix III. (Fifth Meeting in 2016)	Withdrawn
CoP17 Proposal 46. Proposal to include the Banggai cardinalfish (*Pterapogon kauderni*) in CITES Appendix II in accordance with Article II paragraph 2(a)	The local extinction at five sites across the Banggai archipelago, with a further seven sites where the decline in abundance met the criteria for listing in CITES Appendix II. (Fifth Meeting in 2016)	Withdrawn
CoP17 Proposal 47. Proposal to include clarion angelfish (*Holacanthus clarionensis*) in CITES Appendix II in accordance with Article II paragraph 2(a)	No decline in the overall population was demonstrated and did not meet the criteria for CITES Appendix II listing. (Fifth Meeting in 2016)	Adopted
CoP17 Proposal 48. Proposal to include family Nautilidae in CITES Appendix II in accordance with Article II paragraph 2(a)	Met the CITES Appendix II listing criteria. (Fifth Meeting in 2016)	Adopted

Table 3. CITES CoP Proposals reviewed by the FAO Expert Advisory Panel from 2004 to 2022 *(Cont'd)*

CITES CoP proposal	Conclusion of the FAO Expert Advisory Panel	CITES CoP decision
CoP18 Proposal 42. Proposal to include the mako shark (*Isurus oxyrinchus*) in CITES Appendix II in accordance with Article II paragraph 2(a) and *I. paucus* in CITES Appendix II in accordance with Article II paragraph 2(b)	The available data did not provide evidence that the species met the CITES Appendix II listing criteria. (Sixth Meeting in 2019)	Adopted
CoP18 Proposal 43. Proposal to include blackchin guitarfish (*Glaucostegus cemiculus*) and sharpnose guitarfish, (*G. granulatus*) in CITES Appendix II in accordance with Article II paragraph 2(a) and inclusion of all other giant guitarfish (*Glaugostegus* spp.) in accordance with Article II paragraph 2(b)	There was insufficient evidence to decide in relation to CITES criteria, recommending that CITES Parties take note of the one example of extirpation, the widespread lack of management, and the very high value of guitarfish fins in international trade. (Sixth Meeting in 2019)	Adopted
CoP18 Proposal 44. Proposal to include white-spotted wedgefish (*Rhynchobatus australiae*) and *R. djiddensis* in CITES Appendix II in accordance with Article II paragraph 2(a). If listed, this would include *R. cooki*, *R. immaculatus*, *R. laevis*, *R. luebberti*, *R. palpebratus*, *R. springeri*, *Rhynchorhina mauritaniensis*, *Rhina ancylostoma*, and all other putative species of family Rhinidae (wedgefish) in CITES Appendix II in accordance with Article II paragraph 2(b)	There was insufficient evidence to make a decision in relation to CITES criteria, recommending that CITES Parties take note of the widespread lack of management and the very high value of wedgefish fins in international trade. (Sixth Meeting in 2019)	Adopted
CoP18 Proposal 45. Proposal to include the subgenus *Holothuria* (Microthele): *H. fuscogilva*, *H. nobilis*, and *H. whitmaei* in CITES Appendix II in accordance with Article II paragraph 2(a)	The available data for *H. fuscogilva* did not meet the CITES Appendix II listing criteria. There was insufficient evidence to determine *H. nobilis*, but *H. whitmaei* did meet the CITES Appendix II listing criteria. (Sixth Meeting in 2019)	Adopted
CoP19 Proposal 37. Proposal to include 19 shark species in family Carcharhinidae in CITES Appendix II in accordance with Article II, paragraph 2(a) and satisfying criteria A and B in Annex 2a of CITES Resolution Conf. 9.24 (Rev. CoP17). This proposal included 35 to 40 species as "look-alikes".	Did not meet the CITES criteria as a single proposal. Three species met the CITES Appendix II listing criteria, *i.e.* grey reef shark (*Carcharhinus amblyrhynchos*), smalltail shark (*C. porosus*), and Ganges shark (*Glyphis gangeticus*). Twelve species did not meet the CITES Appendix II listing criteria, *i.e.* Borneo shark (*C. borneensis*), Pacific smalltail shark (*C. cerdale*), Pondicherry shark (*C. hemiodon*), lost shark (*C. obsoletus*), Caribbean reef shark (*C. perezi*), night shark (*C. signatus*), daggernose shark (*Isogomphodon oxyrhynchus*), Borneo broadfin shark (*Lamiopsis tephrodes*), whitenose shark (*Nasolamia velox*), whitecheek shark (*C. dussumieri*), dusky shark (*C. obscurus*), and sandbar shark (*C. plumbeus*). Other four species had insufficient data to decide, *i.e.* blacknose shark (*C. acronotus*), smoothtooth blacktip shark (*C. leiodon*), broadfin shark (*Lamiopsis temmincki*), and sharptooth lemon shark (*Negaprion acutidens*). Separate proposals should be considered for the assessed species to meet the CITES Appendix II listing criteria. (Seventh Meeting in 2022)	Adopted
CoP19 Proposal 38. Proposal to include *Sphyrna tiburo* in CITES Appendix II in accordance with Article II, paragraph 2(a) and satisfying criteria A and B in Annex 2a, and all remaining species in the family Sphyrnidae as "look-alikes"	Met the criteria (Seventh Meeting in 2022)	Adopted
CoP19 Proposal 39. Proposal to include *Potamotrygon wallacei* and *P. leopoldi* in CITES Appendix II in accordance with Article II and satisfying criteria A and B in Annex 2a of CITES Resolution Conf. 9.24 (Rev. CoP17), and to include *P. henlei*, *P. albimaculata*, *P. jabuti*, *P. marquesi*, and *P. signata* as "look-alikes".	*P. wallacei* met the criteria, while *P. leopoldi* did not meet the criteria (Seventh Meeting in 2022)	Adopted

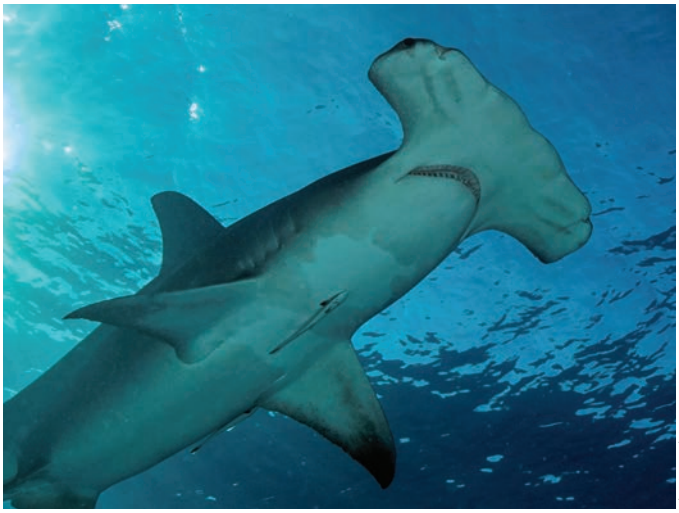
Table 3. CITES CoP Proposals reviewed by the FAO Expert Advisory Panel from 2004 to 2022 *(Cont'd)*

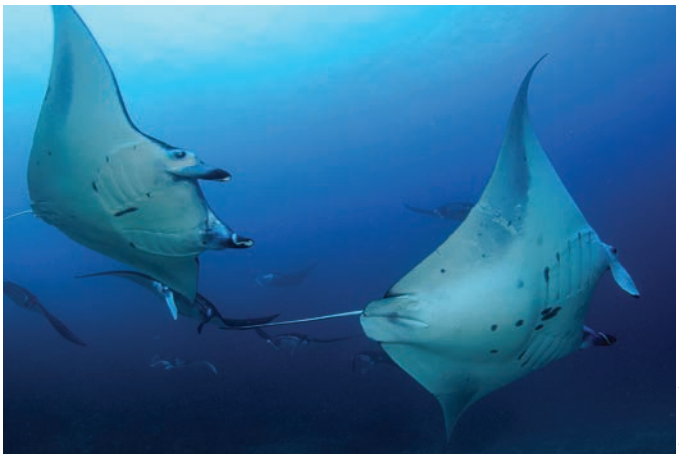
CITES CoP proposal	Conclusion of the FAO Expert Advisory Panel	CITES CoP decision
CoP19 Proposal 40. Proposal to include six species of guitarfish (*Acroteriobatus variegatus*; *Pseudobatos horkelii*; *Rhinobatos albomaculatus*; *R. irvinei*; *R. rhinobatos*; and *R. schlegelii*) in CITES Appendix II in accordance with Article II paragraph 2(a) and satisfying criteria A and B in Annex 2a of CITES Resolution Conf. 9.24 (Rev. CoP17). In addition, to add 37 species as "look-alikes".	Did not meet the criteria (Seventh Meeting in 2022)	Adopted
CoP19 Proposal 41. Proposal to include *Hypancistrus zebra* in CITES Appendix I in accordance with Article II paragraph 1, and by meeting Annex 1 B (iii; iv) and Annex 1 C (i; ii) of CITES Resolution Conf. 9.24 (Rev. CoP17). No "look-alikes"	Did not meet the criteria (Seventh Meeting in 2022)	Adopted to be listed in Appendix II
CoP19 Proposal 42. Proposal to include three species belonging to the genus *Thelenota* in CITES Appendix II in accordance with Article II paragraph 2(a) qualifying for criteria A and B in Annex 2a of CITES Resolution Conf. 9.24 (Rev. CoP17). No "look-alikes"	Did not meet the criteria (Seventh Meeting in 2022)	Adopted

Role of SEAFDEC in Relation to CITES Issues

SEAFDEC has been playing an active role in supporting the ASEAN Member States (AMSs) to achieve Sustainable Development Goals (SDGs), particularly SDG14: Life below Water to conserve and sustainably use the oceans, seas and marine resources; and in enhancing the awareness and capacity of the AMSs in addressing requirements as stipulated in other international instruments such as the FAO Code of Conduct for Responsible Fisheries, as well as in addressing trade-related issues. Furthermore, the AMSs need to cooperate and develop common positions in the international fish trade-related fora which was reflected in the Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region Towards 2030 (RES&POA-2030), *i.e.* Plan of Action no. 82 "*Strengthen cooperation and mechanisms among AMSs to work towards common positions that could be reflected in international fish trade related fora, e.g. World Trade Organization (WTO), Food and Agriculture Organization of the United Nations (FAO)/COFI Sub-committee on Fish Trade, Office International des Epizooties (OIE), Codex Alimentarius Commission (CAC), and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).*"

Since the early 2000s, SEAFDEC started implementing its programs and projects to enhance the capacity of the countries in Southeast Asia in data collection of aquatic species under international concerns, such as marine turtles, sharks and rays, sea cucumbers, tunas, anguillid eels, and others focusing on species identification, collection of data on catch/landings, stock assessment, socioeconomic assessment, development of





A number of elasmobranch species including sharks and rays had been proposed for listing in the CITES Appendices starting from early 2000s, while SEAFDEC is undertaking several studies to collect data on the species up to the present

Table 4. SEAFDEC programs and projects on aquatic species under international concern

Year	Project	Funding
1999–2004	Fish Trade and Environment	JTF
1999–2004	Sea Turtle Hatchery Management Studies	JTF
1999–2004	Sea Turtle Tagging Survey	JTF
2003–2006	Management of Fisheries and Utilization of Sharks and Research on Sea cucumbers in Southeast Asia	JTF
2003–2006	Survey of Shark Utilization in Southeast Asia – DNA analysis of Shark	JTF
2004–2009	Stock Enhancement for Threatened Species of International Concern	JTF
2004–2009	Research for Stock Enhancement of Sea Turtles	JTF
2005–2022	Assistance for Capacity Building in the Region to Address International Trade-related Issues	JTF
2008–2011	Cetacean Research in Southeast Asian Waters: Cetacean Sighting Program	JTF
2010–2014	Resource Enhancement of International Threatened and Over-exploited Species in Southeast Asia through Stock Release	JTF
2010–2014	Research and Management of Sea Turtles in Foraging Habitats in the Southeast Asia Waters	JTF
2013–2014	Research and Management of Sharks and Rays in the Southeast Asian Waters	JTF
2015–2024	Research for Enhancement of Sustainable Utilization and Management of Sharks and Rays in the Southeast Asian Region	JTF
2015–2019	Enhancement of Sustainability of Catadromous Eel Resources in Southeast Asia	JTF
2017–2019	Enhancing Sustainable Utilization and Management Scheme of Tropical Anguillid Eel Resources in Southeast Asia	JAIF
2018–2019	SEAFDEC-EU/CITES Sharks Project Phase II	EU through CITES Secretariat
2020–2022	Development of Stock Assessment Method and Strengthening of Resources Management Measures on Tropical Anguillid Eels in ASEAN Region	JAIF
2020–2024	Sustainable Utilization of Anguillid Eels in the Southeast Asian Region	JTF

Japanese Trust Fund (JTF)
Japan-ASEAN Integration Fund (JAIF)

non-detriment findings, aquaculture, and stock enhancement of the species (**Table 4**). Such efforts are envisaged to enhance the capacity of the respective countries in data collection on several species under international concerns, including vulnerable species that may be subject to CITES. In addition, information on the existing conservation and management measures undertaken by the countries that could serve as the basis for discussion during the CITES CoP was also compiled by SEAFDEC.

SEAFDEC exhibition booth at the CITES CoP13 in Bangkok, Thailand in 2004 showing projects on data collection on sharks proposed for listing into the CITES Appendices

Moreover, as instructed by the SEAFDEC Council, SEAFDEC also provided the regional forums with funding support from the Japanese Trust Fund (JTF) under the project "Assistance for Capacity Development in the Region to Address International Fisheries-related Issues" for the ASEAN-SEAFDEC Member Countries on the proposed listing of CEAS into the CITES Appendices to share available information on the species proposed for CITES CoP and discuss the possibility of developing common or coordinated positions based on scientific evidence to help the fisheries and CITES authorities of the respective countries in raising their voices during the CITES CoP meetings. The common/coordinated positions of ASEAN-SEAFDEC Member Countries were submitted for endorsement by the SEAFDEC Council and subsequently by the ASEAN Sectoral Working Group on Fisheries (ASWGFi), and finally endorsed by the Senior Officials Meeting of the ASEAN Ministers on Agriculture and Forestry (SOM-AMAF). The list of regional platforms organized by SEAFDEC is shown in **Table 5**.

As for the CITES CoP19 on 14–25 November 2022 in Panama City, Panama, 52 proposals for animals and plants including CEAS were discussed. In preparation for the CoP19,

Table 5. Regional platforms provided by SEAFDEC for the development of common/coordinated positions of the ASEAN-SEAFDEC Member Countries on CITES CoP proposals

Date and venue	Regional platforms provided by SEAFDEC	CITES CoP
22 January 2013, Bangkok, Thailand	Regional Consultation on the ASEAN-SEAFDEC Common Positions for the Commercially-exploited Aquatic Species	CoP16
19–20 May 2016, Bangkok, Thailand	Regional Consultation for Development of the ASEAN-SEAFDEC Common Position on the Proposed listing of CEAS into the CITES Appendices	CoP17
30–31 January 2019, Bangkok, Thailand	Regional Consultation for Development of the ASEAN-SEAFDEC Common Position on the Proposed Listing of Commercially-exploited Aquatic Species into the CITES Appendices	CoP18
30 August –1 September 2022, Bangkok, Thailand	Regional Technical Consultation on Development of the ASEAN-SEAFDEC Common Position on the Proposed Listing of Commercially-exploited Aquatic Species into the CITES Appendices	CoP19

Participants of the 2022 "Regional Technical Consultation on Development of the ASEAN-SEAFDEC Common Position on the Proposed Listing of Commercially-exploited Aquatic Species into the CITES Appendices"

SEAFDEC with funding support from the JTF convened the "Regional Technical Consultation (RTC) on Development of the ASEAN-SEAFDEC Common Positions on the Proposed Listing of Commercially-exploited Aquatic Species (CEAS) into the CITES Appendices" on 30 August–1 September 2022 in Bangkok, Thailand. The RTC aimed to discuss the technical information on the CEAS proposed for listing in the CITES Appendices as well as develop the ASEAN-SEAFDEC common position on the proposed listing of CEAS in the CITES Appendices. During the RTC, the assessment and views on the six CEAS from the 7th Meeting of Expert Advisory Panel of FAO organized in July 2022 were shared by one of the members of the FAO EAP. **Table 6** summarizes the outcomes of the RTC (SEAFDEC, 2022).

During CoP19, SEAFDEC convened the side event "Resource Utilization of Commercially-exploited Aquatic Species (CEAS) in Southeast Asia: Regional Cooperation to Support National Actions" on 18 November 2022. With support from the Japanese Trust Fund, the side event was intended to share the experiences of SEAFDEC including regional initiatives and lessons learned in supporting the ASEAN-SEAFDEC Member Countries through the implementation of capacity-building programs on the identification of sharks and rays and conduct of the study on the market and trade of sharks including the major actors, market channels, practices, and utilization, to

CITES CoP19 on 14–25 November 2022 in Panama City, Panama *(above)* and the side event organized by SEAFDEC *(below)* to disseminate information on SEAFDEC works on aquatic species under international concern

Table 6. Outcomes of the 2022 Regional Technical Consultation on Development of the ASEAN-SEAFDEC Common Positions on the Proposed Listing of Commercially-exploited Aquatic Species (CEAS) into the CITES Appendices

CITES CoP19 Proposal	Technical information on the proposed species	Impacts of listing in Appendices I and II	ASEAN-SEAFDEC Position
Proposal 37. Inclusion of the grey reef shark (*Carcharhinus amblyrhynchos*), dusky shark (*C. obscurus*), smalltail shark (*C. porosus*), Ganges shark (*Glyphis gangeticus*), sandbar shark (*C. plumbeus*), Borneo shark (*C. borneensis*), Pondicherry shark (*C. hemiodon*), smoothtooth blacktip shark (*C. leiodon*), sharptooth lemon shark (*Negaprion acutidens*), Caribbean reef shark (*C. perezi*), daggernose shark (*Isogomphodon oxyrhynchus*), night shark (*C. signatus*), whitenose shark (*Nasolamia velox*), blacknose shark (*C. acronotus*), whitecheek shark (*C. dussumieri*), lost shark (*C. obsoletus*), Pacific smalltail shark (*C. cerdale*), Borneo broadfin shark (*Lamiopsis tephrodes*) and the broadfin shark (*Lamiopsis temminckii*) in CITES Appendix II in accordance with Article II paragraph 2(a) and satisfying Criterion A and B in Annex 2a of Resolution Conf. 9.24 (Rev. CoP17). Inclusion of all other species in the family Carcharhinidae (requiem sharks): Genus *Carcharhinus*, Genus *Isogomphodon*, Genus *Loxodon*, Genus *Nasolamia*, Genus *Lamiopsis*, Genus *Negaprion*, Genus *Prionace*, Genus *Rhizoprionodon*, Genus *Scoliodon*, Genus *Triaenodon* and any other putative species of family Carcharhinidae in CITES Appendix II in accordance with Article II paragraph 2(b) and satisfying Criterion A in Annex 2b of Resolution Conf. 9.24 (Rev. CoP17).	- Approximately 39 species under family Carcharhinidae are found in the region. The species are mostly bycatch from commercial or artisanal fisheries, and are fully utilized. - Nineteen (19) species of family Carcharhinidae have a range of distinctly different sizes, morphological appearances, productivity, fishery, and trade profiles, thus, making evaluation as a group difficult. - The most traded species in the region are "look-alike." Many species can be differentiable from one another, although some look very similar. In certain cases, it is difficult to quickly identify commodities to species level, but there are marked differences in the trade profiles of these species, and for traders, the commodities can be differentiated. - Identification to species level is more difficult in the case of meat, cartilage, skin, and oil products.	- Two species, *i.e. C. longimanus* and *C. falciformis*, are already in CITES Appendix II. It is anticipated that the listing of all remaining species under family Carcharhinidae including look-alike species would create difficulty in the implementation and management, and would require a lot of resource investment, *e.g.* capacity building on species identification, inspection of specimens, development of non-detriment finding (NDF) documents, etc.	No common position not to support the Proposal
Proposal 38. Inclusion of *Sphyrna tiburo*, commonly referred to as the bonnethead shark, in CITES Appendix II in accordance with Article II paragraph 2(a) and satisfying Criterion A and B in Annex 2a of Resolution Conf. 9.24 (Rev. CoP17). Inclusion of all remaining species in the family Sphyrnidae (hammerhead sharks) which are not already listed in CITES Appendix II, including: *S. media*, *S. tudes*, *S. corona*, *S. gilberti*, and *Eusphyra blochii*, as well as any other yet to be identified species of the Family Sphyrnidae, in CITES Appendix II in accordance with Article II paragraph 2(b) and satisfying Criterion A in Annex 2b of Resolution Conf. 9.24 (Rev. CoP17)	- *Sphyrna* spp. are caught as bycatch from inshore and offshore areas in Southeast Asian countries and utilized for livelihood and food security.	- Although *S. tiburo* is not found in the Southeast Asian region, it is anticipated that the inclusion of all species in the family as "look-alike" species would impact the export of other shark commodities from the region. - It is anticipated that the listing of species in the CITES Appendix II would result in not reporting and recording of catch and trade of the species creating difficulty and burden for authorities to collect scientific data to support the management of the species.	No common position to support the Proposal
Proposal 39. Inclusion of *Potamotrygon wallacei* and *P. leopoldi* in CITES CITES Appendix II in accordance with Article II and satisfying criteria A and B in Annex 2a of CITES Resolution Conf. 9.24 (Rev. CoP17) Inclusion of look-alike endemic freshwater stingray species that are on the ornamental fish trade legally as *P. henlei* and illegally as *P. albimaculata*, *P. jabuti* from the black stingray group. The illegally exported species such as *P. marquesi* and *P. signata* of the brown stingray group such as *P. wallacei* in accordance with Criteria A of Annex 2b (Conf. 9.24, Rev. CoP17).	- No species of family Potamotrygonidae occurs in the natural habitats of the Southeast Asian region. - Potamotrygons are cultured for ornamental purposes (mostly as hybrids) and traded by countries in the region, *e.g.* Malaysia and Thailand. Breeders that were generally domesticated and imported from other countries were not sourced from the wild. Countries trading (importing/exporting) the species are applying regulations for traders to obtain permits from fisheries authorities.	It is anticipated that the listing of the species in the CITES Appendix II would pose hurdles in the trade of aquaculture-bred and reared stingrays, *e.g.* documentation requirements to certify facilities and sources of breeders, packaging requirements, export checks of live product in transit, which could impact the growth of the industry. In addition, the breeding facilities are developing market-favored hybrids species that are difficult to identify/record.	No common position not to support the Proposal

Table 6. Outcomes of the 2022 Regional Technical Consultation on Development of the ASEAN-SEAFDEC Common Positions on the Proposed Listing of Commercially-exploited Aquatic Species (CEAS) into the CITES Appendices *(Cont'd)*

CITES CoP19 Proposal	Technical information on the proposed species	Impacts of listing in Appendices I and II	ASEAN-SEAFDEC Position
	(Cont'd) - Trade of wild-caught stingrays has been regulated in Brazil since 1998, including the exported number of each species and number per species plus the maximum size that were in place since 2003. In addition, all Potamotrygons in this proposal have already been listed in CITES Appendix III since January 2017. - Production of Potamotrygonins in the aquaculture sector is a positive practice as it removes pressure on the wild stock.		
Proposal 40. Inclusion of the six species of guitarfish (*Acroteriobatus variegatus*, *Pseudobatos horkelii*, *Rhinobatos albomaculatus*, *R. irvinei*, *R. rhinobatos*, and *R. schlegelii*) in CITES Appendix II in accordance with Article II, paragraph 2(a) and satisfying criteria A and B in Annex 2a of CITES Resolution Conf. 9.24 (Rev. CoP17). In addition, add another 37 species as "look-alikes" to the list	- At least seven species of guitarfish (family Rhinobatidae) are commonly found in the Southeast Asian region. The small-sized guitarfish species are caught as bycatch mainly from inshore areas and utilized for livelihood and food security. - Large-sized guitarfish species are already listed in the CITES Appendix II. This proposal will add small-sized species that are primarily utilized as food as well as commodities that have lower export value. - Different species under the same family are difficult to identify/ differentiate, especially by parts and in product forms and derivatives. - The international trade information on these species is limited.	It is anticipated that the listing of species in CITES Appendix II would result in not reporting and recording of catch and trade of the species creating difficulty and burden for authorities to collect scientific data to support the management of the species.	No common position not to support the Proposal
Proposal 42. Inclusion of all species in the genus *Thelenota* which includes the three species *T. ananas*, *T. anax*, and *T. rubralineata* in CITES Appendix II in accordance with Article II paragraph 2(a)	- *Thelenota ananas* and *T. anax* are harvested by countries in the Southeast Asian region and traded both domestically and internationally; while *T. rubralineata* is rare in natural habitats and not considered a traded species. However, *Thelenota* spp. is considered a low-value species compared to other market-preferred sea cucumber species, *e.g. Holothuria* spp. - Identification/differentiation of *Thelonota* species in live and dried form is relatively simple; however, countries, *e.g.* Malaysia is also producing sea cucumber oil (minyak gamat) from other sea cucumber species, which is harder to identify to species level. - As a result of the long debate, CITES Commission I in CoP16 agreed that sea cucumbers should be managed by the respective countries rather than CITES regulations.	It is anticipated that the listing of species in CITES Appendix II would create difficulties to trade concerning identification of species as raw materials for products such as sea cucumber oil and balm.	No common position not to support the Proposal

Table 6. Outcomes of the 2022 Regional Technical Consultation on Development of the ASEAN-SEAFDEC Common Positions on the Proposed Listing of Commercially-exploited Aquatic Species (CEAS) into the CITES Appendices *(Cont'd)*

CITES CoP19 Proposal	Technical information on the proposed species	Impacts of listing in Appendices I and II	ASEAN-SEAFDEC Position
Proposal 41. Inclusion of *Hypancistrus zebra* in CITES Appendix I in accordance with Article II, paragraph 1 and satisfying criterion in Annex 1 B (iii; iv) and Annex 1 C (i; ii) of CITES Resolution Conf. 9.24 (Rev. CoP17).	- The habitat of this species in Brazil is negatively affected by a hydroelectric dam. - Brazil has issued several national legal instruments including banning of collection, transportation, and exportation of the species since 2005, and listed the species in CITES Appendix III since 2017. - The species produced from ornamental fish farms are being traded in some AMSs, *e.g.* Malaysia and Thailand. Listing of the species in CITES Appendix I would mean that trade in the species (including from captive breeding of ornamental fish farms) would be also prohibited which will result in the loss of sustainable production and livelihoods in the ornamental aquaculture sector. - Production of zebra catfish in the aquaculture sector is a positive practice as it removes pressure on the wild stock.	It is anticipated that the listing of the species in CITES Appendix I would make trading in the species produced from captive breeding no longer possible.	No common position not to support the Proposal

support sustainable development and management of shark and ray resources in the Southeast Asian region. Moreover, the common positions of the ASEAN-SEAFDEC Member Countries on the proposed listing of commercially-exploited aquatic species into the CITES Appendices at the CoP19 were also shared during the side event.

Trading of CEAS listed in CITES Appendix I is generally not possible except for purposes such as scientific research and requires both import and export permits. While listing the CEAS in CITES Appendix II, although possible for a commercial purpose, could result in complications due to various reasons. From the RTC organized by SEAFDEC, the anticipated issues are summarized as follows:

- When the species is listed in CITES Appendices, the countries harvesting the species would amend the national legislation to regulate not only trading but also catching of the species. With such regulations, catching and trading of the species is prohibited. The catching and trading may continue as most of the catches are bycatch, but could neither be declared nor recorded, making data for such species unavailable and it becomes difficult to obtain information on the status of the species in the future, unless through research.
- In proposing the species to be listed in CITES Appendix II, the proposed species may not only comprise those that are threatened with extinction but also include "look-alike species," whose traded specimens look like those of species listed for conservation reasons. Although the specimens must have an export permit or re-export certificate, identification of the species by looking at the specimens could be difficult, especially if the specimens are not the whole body of the species, but only as meat, fin, oil, bone, etc. requiring appropriate methods for species identification.
- Trading of species listed in CITES Appendix II requires documents to certify that trade will not be detrimental to the survival of the species in the wild (non-detriment findings or NDF) granted by the State's scientific authority. Nevertheless, the issuance of NDF documents also requires scientific data that may not be available if the State prohibited catching and trading or did not conduct scientific research on the species.
- Stringent regulation in harvesting and trading of CITES-listed species could create an adverse impact on the income and livelihood of small-scale fishers and fishing communities catching the species as bycatch without any positive consequences on their population.

Way Forward

In order to ensure that the scientific information would be used in the future discussion and decision of the CITES CoP, it was recommended that the countries that are Parties to CITES need to increase the involvement not only by CITES authority but also by fisheries authority when conducting any consultations in relation to species that are subject to CITES discussion. There is also a need for countries to collect scientific data and information on the species subject to discussion at the CITES CoP. This is to ensure that the fisheries perspective as well as the scientific information available is appropriately

Several species listed under CITES Appendices are traded in various product forms as well as in parts making species identification of traded specimens difficult

considered when developing the country's positions to be reflected at the CITES CoP. SEAFDEC and the relevant fora of ASEAN, *i.e.* ASEAN Working Group on CITES and Wildlife Enforcement (AWG CITES & WE), could serve as regional fora to facilitate sharing of information as well as developing common/coordinated positions among countries to be reflected at the CITES CoP.

As for the CEAS listed under the CITES Appendices, especially Appendix II, considering that in many countries, harvesting and trading of such species may be prohibited by their national legal framework resulting in discontinued data collection on catch and landing of the species; thus, scientific data collection program should be considered to obtain information on the status and trends of the species. Capacity building in terms of species identification and scientific data collection is also necessary to support the data collection program as well as in providing necessary data to support the development of non-detriment finding documents by the scientific authority of the respective countries to enable the trade of the species. Moreover, methodologies and capacity building on species identification of traded specimens is also necessary especially for customs officers to ensure that trade of the species listed in CITES Appendices is regulated in accordance with the CITES Provisions. However, it should be also recognized that the listing of species in CITES Appendices may pose more risk of illegal trade of the specimens that could not be regulated, and measures should be established to address this issue. Moreover, it should be also recalled that listing species in CITES Appendices may not necessarily result in the reduction in catch of the species considering that the species could still be caught as bycatch; therefore, regulation of the harvest and trade of the species need to take into account this issue. Furthermore, the importance of the species for the livelihood of people especially the small-scale fishers and their communities that are dependent on harvesting these natural resources, and the long-term impacts of listing of CEAS in CITES Appendices need to be assessed.

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Deriving More Information on Sharks and Rays of Southeast Asia for Sustainable Utilization and Management

Hamizah Nadia Alias@Yusof, Wahidah Mohd Arshaad, and *Abd Haris Hilmi Ahmad Arshad*

Sharks, rays, skates, and chimaeras are collectively known as cartilaginous fishes under the class Chondrichthyes. Cartilaginous fishes occupy a variety of habitats. In the Southeast Asian region, they are found in all oceans, from freshwater ecosystems to the deep abyss. At least 196 species of sharks, 160 species of rays, 30 species of skates, and seven chimaeras are found in the region. Comparative to other marine fishes, sharks are characterized by relatively slow growth, late sexual maturity, and a small number of young per brood. These biological factors make many shark species vulnerable to overfishing. Moreover, many shark species have been overexploited because their fins are highly valued for shark fin soup.

Sharks and rays are not targeted for most fisheries in the region, however, uncontrollable fishing activities with no proper actions taken to manage this resource could result in overexploitation. As part of the conservation and management, sharks, and rays species were proposed and included under the Appendices of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) starting from its 12th Conference of the Parties (CoP) in 2002. The growing number of listed species has increased the pressure on the international trade of sharks and rays. Non-detrimental findings (NDFs) by species to collect scientific data which includes landings, biological, socioeconomic data, and trade data is crucial to be conducted by the countries for the export purpose of species listed in Appendix II of CITES. Since 2015, MFRDMD has been actively conducting and implementing several research and activities at national and regional levels to enhance the sustainable utilization and management of sharks and rays in Malaysia and in the Southeast Asian region.

Landing data collection

In the Southeast Asian region, cartilaginous fish had received little specialized attention due to its low-level production as bycatches, especially by trawl nets. Compared with bony fishes, the landing of cartilaginous fish by countries in the region is generally less than two percent, except for Indonesia which is more than five percent. Meanwhile, some countries did not include sharks and rays landing in their national statistics.

In order to obtain better information on shark catch and landing, landing data collection program was therefore undertaken by the Southeast Asian Fisheries Development Center (SEAFDEC) through its Marine Fishery Resources

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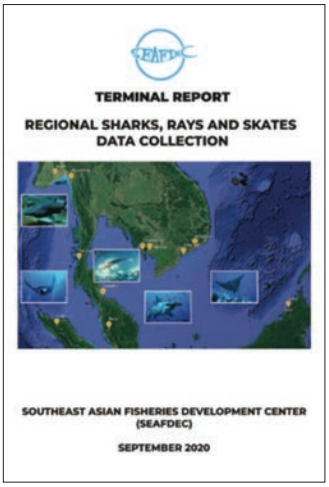
Development and Management Department (MFRDMD) in collaboration with the Training Department (TD) in six Member Countries from 2015 to 2019. The landing data were collected from Cambodia (2018–2019), Indonesia (2015–2016), Malaysia (2015–2016), Myanmar (2018–2019), Thailand (2015–2016), and Viet Nam (2015–2016). In general, almost all species were utilized for human consumption. This activity was funded by the EU-CITES (2015–2016) and the Japanese Trust Fund VI (2018–2019).



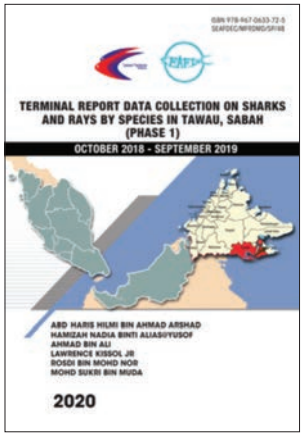
Terminal Report of the Collaborative Project supported by the CITES Secretariat and the Japanese Trust Fund (2015-2016)

A total of 60 species of sharks, 78 species of rays, and eight species of skates were recorded. It was found that the catch composition of sharks, rays, and skates was less than 2 % of the total marine landings and the price range was USD 0.22–8.99/kg, USD 1.00–7.34/kg, and USD 0.20–2.00/kg, respectively.

In Malaysia, landing data collection was conducted at two major landing sites in Sabah, namely: Kota Kinabalu and Tawau in collaboration with the Department of Fisheries Malaysia (DoFM). The landing data of sharks and rays include species length, weight, sex, and appropriate information of the vessel that landed the catches. Individual specimens of sharks and rays were measured if the total number was less than 50 from each vessel. However, only 5–10 % were measured individually if the total number was more than 50. The results showed that Shark and ray landings contributed to about 0.4 % and 0.9 % of the total marine catch, respectively; and the main gear was trawl net. The most abundant shark species was *Chiloscyllium punctatum*, followed by *C. plagiosum,* and *Atelomycterus marmoratus*. As for rays, the most abundant ray species was *Neotrygon orientalis*, followed by *Maculabatis gerrardi*, and *Telatrygon zugei*. The recorded data by species is important to observe the abundance of sharks and rays in the fishery area while the data is vital in the preparation for NDFs study in the future.

Practical session during the Workshop on Landing Data Collection on Sharks and Rays held in 2020

Data collection by the designated enumerator in Kota Kinabalu, Sabah



Publications on data collection on sharks and rays in Malaysia

Marketing and trade survey

The marketing and trade survey on sharks and rays was conducted in collaboration with the Institute of Agricultural and Food Policy Studies, Universiti Putra Malaysia (IKDPM, UPM). The surveys were conducted in Sabah (2015), Perak and Pahang (2016), and Sarawak (2018). It was found that there were no finning activities onboard and all sharks and rays were brought back as a whole to jetties and fully utilized. In general, the marketing channels were highly localized and price ranges varied depending on size, species, and occasion.

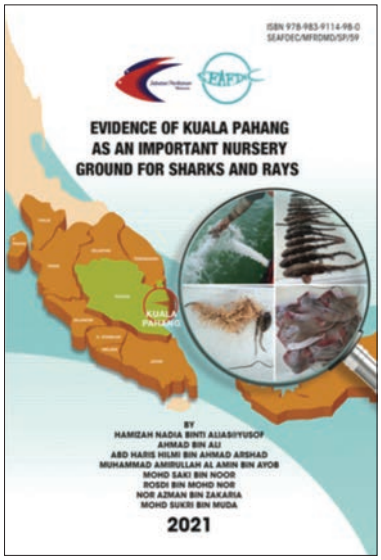
Meanwhile, in Indonesia, the Center for Fisheries Research, Ministry of Marine Affairs and Fisheries in collaboration with MFRDMD conducted two surveys in Java and Sumatera (2018) and in Kalimantan (2019). There was a high diversity of products produced from sharks and rays such as meat, skin, cartilage, teeth, intestine, and stomach. In addition, the demand for fins is still available with the biggest markets for fin-based trade in Asian and Southeast Asian countries. Live sharks and rays were also targeted by foreign markets for export through international airports.

Publications on the marketing and trade of sharks and rays in Malaysia and Indonesia

Nursery ground study of sharks and rays

A pilot study on the nursery ground of sharks and rays was conducted by MFRDMD in Kuala Pahang, Pahang, Malaysia. The State of Pahang has the highest landing of sharks and rays in Peninsular Malaysia. Fishers in Zone A (0–5 nm from shore) of East Coast Peninsular Malaysia are given a special permit to operate monsoon season trawl net (PTMT) below 2 nm from shore during northeast monsoon (November–March). The inspection that was carried out on trash-fish creel of fishers operated PTMT in Pahang found that many juvenile sharks and rays were caught together with other fishes and sold at a low price of around USD 0.1–0.2/kg. Concerning this finding, a study to identify the nursery ground of sharks and rays was conducted from November 2018 until March 2021 in Kuala Pahang waters and was supported by the DoFM with support from the JTF. All specimens caught during trawl activity were released back to the sea after recording length, weight, and sex data. A total of 1,139 individuals of sharks (three species) and 1,456 individuals of rays (13 species) were recorded with 98.8 % of sharks and 75.5 % of rays still at birth/juvenile stage. In addition, a collaborative study between MFRDMD and Universiti Malaysia Terengganu to determine the food

Sharks and rays at juvenile stage sorted out from low-value fishes caught by fishers operating monsoon season trawl net in Kuala Pahang, Malaysia



sources network using stable isotope analysis of carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) proved that juvenile sharks and rays highly relied on the terrestrial linked carbon resources available in the study area. This study is also conducted in Nenasi waters in the southern part of coastal waters of Pahang starting in November 2021 and is expected to complete in March 2024.

Diversity of freshwater stingrays

MFRDMD collected samples of freshwater stingrays from the main river in the State of Pahang since 2004 and the species was confirmed to be *Fluvitrygon signifier* (**Figure 1**). From 2016 onward, more samples were collected from the States of Perak, Kelantan, and Johor. The discovery of *F. kittipongi* (**Figure 1**) in Perak in 2016 was considered to be a new record of species in Malaysia as it was previously found only in Thailand and Indonesia (Last *et al*., 2016). Later on, this species was also found in the main rivers and tributaries in Kelantan and Pahang. In addition, samples from rural areas in Johor were confirmed as *Urogymnus polylepis*. Although only three species could be confirmed up to the present, it is believed that many other species also inhabit

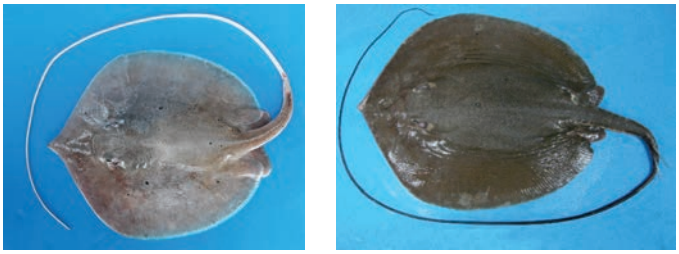


Figure 1. *Fluvitrygon signifier(left)* and *F. kittipongi (right)*

rivers in Peninsular Malaysia, especially in the rural areas. Sample collection has therefore been actively undertaken especially in remote areas considering that it is crucial to update information on the biodiversity of freshwater stingrays to improve the sustainable management of these resources.

Species identification through DNA analysis

Accurate identification of shark species is one of the most challenging tasks, especially for look-alike species. While morphology is often the fastest and cheapest approach to identifying the species, other species identification methods are also necessary such as for those that are identical or when only some parts of the specimen are available. DNA barcoding is a taxonomic tool that uses a short-standardized piece of DNA sequence to identify an organism belonging to a specific taxonomic group (Hebert *et al*., 2003). The DNA marker commonly used for species identification in barcoding fishes is a 650-base fragment of the mitochondrial DNA called Cytochrome C Oxidase subunit I (COI) is proposed as a global standard because the variation in COI within species is lower relative to that among species. The nucleotide sequence for the selected marker is obtained and compared to a library of reference sequences which is stored and managed in online global databases (*e.g.* http://www.boldsystems.org). Ward *et al*. (2008) recommend this approach for marine ecologists working on chondrichthyans in the absence of expert taxonomists. The efficiency of this method in identifying and confiscating illegal species (Griffiths *et al*., 2013).

DNA barcoding is also possible when only part of an organism is available (John *et al*. 2016). In such cases, the method is useful in animal forensics (Holmes *et al*., 2009). Many researchers argued that elasmobranchs exhibit cryptic morphological overlapping characters, species complexity besides ontogenetic color patterns or variation which are shared among the closely related taxa that make accurate identification challenging (Cerutti-Pereyra *et al*., 2012; Sandoval-Castillo & Rocha-Olivares, 2011; Toffoli *et al*., 2008). It also leads to taxonomic misidentification in the field sampling and thereby affecting conservation-related research and fishery management. Therefore, DNA-based species identification was proposed and well-established on many cryptic taxonomic forms such as lepidopteron, fishes, spiders, polychaetes, and many other organisms (Blagoev *et al*., 2016; Burns *et al*., 2007; Hebert *et al*., 2003; Hebert & Gregory, 2005; Steinke, Prosser, & Hebert, 2016; Ward, *et al*., 2009).

Since 2013, DNA samples were collected from selected sites throughout the Southeast Asian region (**Figure 2**). A total of 145 shark, 250 ray, and 20 skate specimens were successfully sequenced for DNA barcoding comprising 39 species of sharks, 42 species rays, and five skates (**Table 1**). Almost all samples showed high similarity percentage (> 99 %) with corresponding species data available in database. The samples with similarity below 98 % with unconfirmed species identity by their morphology were eliminated. The number of samples per species is shown in **Table 2** and the phylogenetic relationship among species of sharks and rays are shown in **Figure 3**. Samples collected from Sungai Perak

Figure 2. Study sites in Southeast Asia for the DNA sampling for sharks, rays, and skates

Table 1. Number of samples for DNA barcoding of sharks, rays, and skates from selected sites in Southeast Asia

Country	Landing site	Sharks	Rays	Skates
Cambodia	Sihanoukville	-	6	-
Malaysia	Bagan Panchor	20	20	-
	Hutan Melintang	1	-	-
	Sungai Perak	-	2	-
	Dungun	2	11	-
	Kuantan	54	65	-
	Nenasi	-	2	-
	Tanjung Gemuk	-	1	-
	Temerloh	-	8	-
	Mukah	16	32	-
	Kota Kinabalu	9	18	-
	Sandakan	9	27	-
	Tawau	-	2	-
	Beluran	-	2	-
Myanmar	Yangon	4	-	-
Thailand	Andaman Sea	4	7	2
	Phuket	-	4	7
Viet Nam	Vung Tau	26	43	11
	Total	**145**	**250**	**20**

Specimen collection in Kuantan Port, Pahang, Malaysia

Primers optimization for genetic study of sharks and rays

and Temerloh were freshwater ray, *Fluvitrygon kittipongi* and *F. signifer*. Using DNA barcoding, all samples identified at first as *Neotrygon kuhlii* were confirmed as *N. varidens* and *N. caeruleopunctate* according to DNA sequence by Last *et al.* (2016). DNA barcoding showed excellent progress to support and verify the findings, usually using morphometric and meristic data. MFRDMD had submitted the DNA barcodes for 34 species of sharks and 43 species of rays to the Barcode of Life Data System (BOLDSYSTEM) with six new records which can be accessed globally.

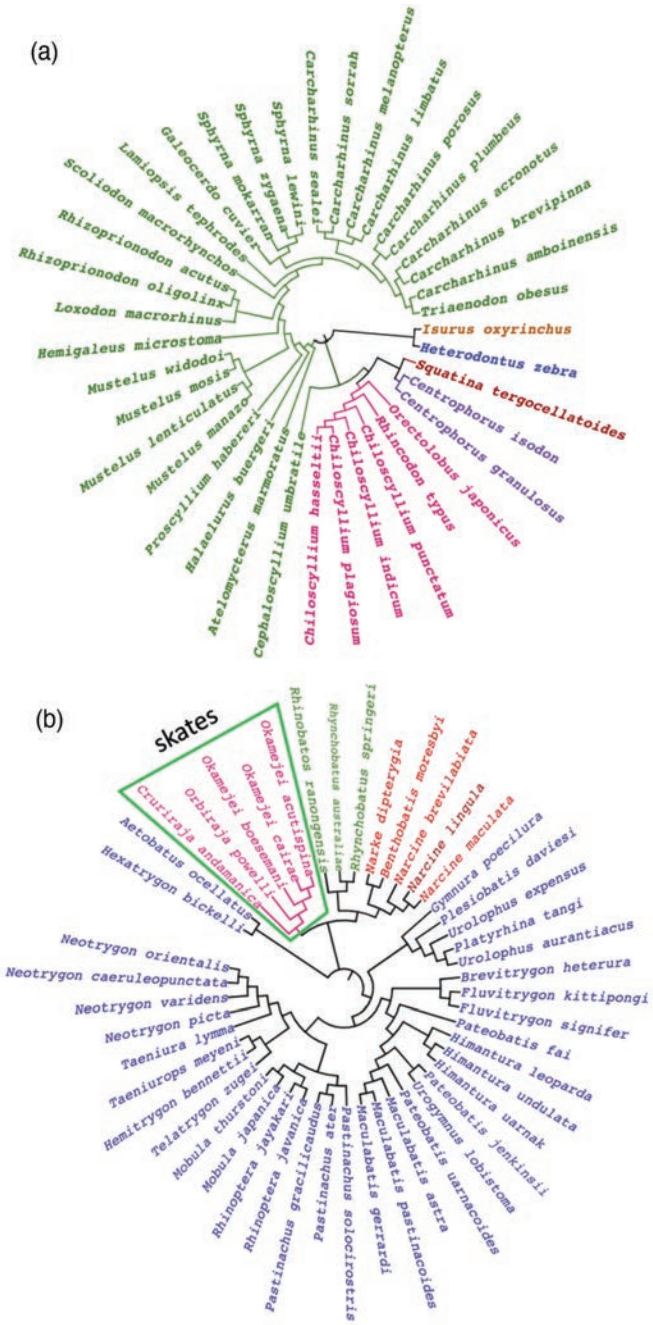


Figure 3. Phylogenetic relationship among sharks species **(a)** and among rays and skates species **(b)**
*(**Note:** color coding of text is also applied in **Table 2**)*

Table 2. DNA-barcoded species of sharks, rays, and skates

Sharks	n
Carcharhiniformes	**101**
Atelomycterus marmoratus	8
Carcharhinus acronotus	1
Carcharhinus amboinensis	1
Carcharhinus brevipinna	7
Carcharhinus limbatus	5
Carcharhinus melanopterus	1
Carcharhinus plumbeus	4
Carcharhinus porosus	3
Carcharhinus sealei	7
Carcharhinus sorrah	5
Cephaloscyllium umbratile	2
Galeocerdo cuvier	2
Halaelurus buergeri	3
Hemigaleus microstoma	3
Lamiopsis tephrodes	3
Loxodon macrorhinus	2
Mustelus lenticulatus	2
Mustelus manazo	7
Mustelus mosis	1
Mustelus widodoi	1
Proscyllium habereri	3
Rhizoprionodon acutus	13
Rhizoprionodon oligolinx	1
Scoliodon macrorhynchos	2
Sphyrna lewini	8
Sphyrna mokarran	3
Sphyrna zygaena	1
Triaenodon obesus	2
Heterodontiformes	1
Heterodontus zebra	1
Squaliformes	4
Centrophorus granulosus	3
Centrophorus isodon	1
Lamniformes	**1**
Isurus oxyrinchus	1
Orectolobiformes	**37**
Orectolobus japonicus	1
Rhincodon typus	2
Chiloscyllium hasseltii	13
Chiloscyllium indicum	8
Chiloscyllium plagiosum	5
Chiloscyllium punctatum	8
Squatiniformes	**1**
Squatina tergocellatoides	1
Total	**145**

Rays	n
Myliobatiformes	**198**
Aetobatus ocellatus	7
Brevitrygon heterura	14
Fluvitrygon kittipongi	2
Fluvitrygon signifer	8
Gymnura poecilura	20
Hemitrygon bennettii	6
Hexatrygon bickelli	1
Himantura leoparda	13
Himantura uarnak	2
Himantura undulata	1
Maculabatis astra	1
Maculabatis gerrardi	14
Maculabatis pastinacoides	7
Mobula japanica	2
Mobula thurstoni	8
Neotrygon caeruleopunctata	**2**
Neotrygon orientalis	**4**
Neotrygon picta	**2**
Neotrygon varidens	**14**
Pastinachus ater	**10**
Pastinachus gracilicaudus	**7**
Pastinachus solocirostris	**5**
Pateobatis fai	**5**
Pateobatis jenkinsii	**8**
Pateobatis uarnacoides	**7**
Plesiobatis daviesi	**1**
Rhinoptera javanica	**6**
Rhinoptera jayakari	**1**
Taeniura lymma	**6**
Taeniurops meyeni	**2**
Telatrygon zugei	**5**
Urogymnus lobistoma	**2**
Urolophus aurantiacus	**2**
Urolophus expensus	**3**
Rhinopritiformes	16
Rhinobatos ranongensis	**1**
Rhynchobatus australiae	**13**
Rhynchobatus springeri	**2**
Terpediniformes	***36***
Benthobatis moresbyi	**4**
Narcine brevilabiata	**5**
Narcine lingula	**12**
Narcine maculata	**9**
Narke dipterygia	**6**
Total	**250**

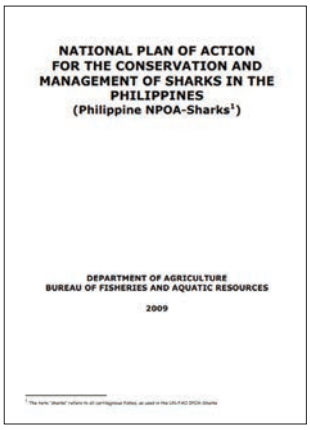
Skates	n
Rajiformes	20
Cruriraja andamanica	2
Okamejei acutispina	1
Okamejei boesemani	3
Okamejei cairae	7
Orbiraja powelli	7
Total	**20**

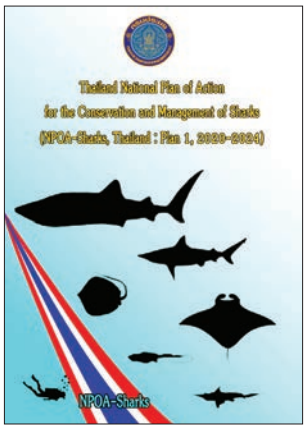
Shark conservation and management measures

In 1999, the Food and Agriculture Organization of the United Nations (FAO) adopted the International Plan of Action for Conservation and Management of Sharks (IPOA-Sharks) which is a voluntary instrument that applies to all States where fishers engage in shark fisheries. The IPOA-Sharks sets out a set of activities which States are expected to carry out, including an assessment of whether a problem exists with respect to sharks, adopting a National Plan of Action for the conservation and management of sharks (NPOA-Sharks), as well as procedures for national reviews and reporting requirements (FAO, 1999).

Malaysia was one of the first Southeast Asian countries to develop the National Plan of Action for Sharks (NPOA-Sharks). The first NPOA-Sharks was adopted in 2006 with the main objective to ensure the conservation and management of sharks and their long-term sustainable use. MFRDMD actively participated in preparation of NPOA-Sharks Plan 1 in 2006 and Plan 2 in 2014. The NPOA-Sharks Plan 3 is will be published in 2023. MFRDMD also actively participated in a collaborative activity with DoFM in updating Fisheries Regulations (Control of Endangered Species of Fish) 1999. In 2019, there were additional four species of shark and two species of ray as protected species under Malaysian Fisheries Act including *Sphyrna mokarran*, *S. zygaena*, *Eusphyra blochii*, *Carcharhinus longimanus*, *Manta alfredi*, and *M. birostris*.

The Philippines and Thailand also adopted their own NPOA-Sharks. Even though Philippines is not a major shark fishing nation, the country committed to develop its NPOA-Sharks and adopted it in 2009 as a member country of the FAO and as agreed upon during the 2nd ASEAN-SEAFDEC Regional Technical Consultation on Sharks Fisheries held in 2004. Moreover, Thailand established its plan of action during 2020–2024. The plan outlined the key actions necessary to improve the management and conservation of shark resources in Thai waters. For Viet Nam, the NPOA-Sharks is being developed for implementation during 2017–2025.





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Human resource development and public awareness

Various activities, such as workshops and training at national and regional levels especially on taxonomy, species identification, landing data collection and data analysis, biology, genetics, among others were organized by MFRDMD with the objective to enhance human resources in the SEAFDEC Member Countries in elasmobranch taxonomy and biology as well as ensure the capability of all participants on technique in data collection of sharks and rays up to species level.

In addition to capacity building on data collection on sharks and rays, starting 2021, MFRDMD in collaboration with Universiti Malaysia Terengganu also introduced another approach by monitoring parasites which play a crucial part in understanding species endemicity and if the population is more susceptible to certain environmental ques due to the presence of certain parasite species. A workshop on conservation of sharks and rays through parasites perspective was organized in 2021. It is expected that the information derived from parasite monitoring would contribute to better conservation and management of the population of these species groups in the future.

Consultations and campaigns with stakeholders have also been conducted occasionally, especially in Malaysia, to raise awareness of the importance of sustainable conservation and management of sharks and rays. This included a campaign to release juvenile sharks and rays caught by monsoon coastal trawlers in 2019–2020. Posters of updated list of protected species in Malaysia including actions to be taken if any of species are unintentionally caught was published by MFRDMD and distributed to all stakeholders and the DOF Malaysia. All fishers in the State of Sabah were also advised to display the poster on their fishery vessels.

Way Forward

MFRDMD will continue to implement projects on sharks and rays especially on landing data collection by species at major landing sites, workshops and trainings on taxonomy and biology, study on genetic population structure of selected species, and marketing and trade surveys at selected areas. Moreover, MFRDMD is looking forward to expanding the scope to study the population of sharks and rays at selected areas through the parasites' perspective.

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Complying with the Import Provisions of the US Marine Mammal Protection Act (MMPA): issues and challenges of the ASEAN Member States

Pattaratjit Kaewnuratchadasorn

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In 2017, the United States government through its National Oceanic and Atmospheric Administration (NOAA) Fisheries announced the final rule to implement the import provisions under the Marine Mammal Protection Act (MMPA) which prohibits importations of commercial fish or fish products from commercial fishing operations resulting in incidental killing or serious injury (bycatch) of marine mammals. MMPA established the conditions that the nations exporting fish and fish products to the United States must demonstrate they have a regulatory program for reducing marine mammal incidental mortality and serious injury that is comparable in effectiveness to United States standards. As of 21 October 2022, NOAA Fisheries announced the Modification of Deadlines Under the Fish and Fish Product Import Provisions of the Marine Mammal Protection Act and issued the final rule to revise the regulations implementing the import provisions of the MMPA. The final rule was extended for one year, with the exemption period ending on 31 December 2023.

Regarding the Import Provisions Rule of the Marine Mammal Protection Act (MMPA) which will enter into force in 2024, the United States requires the exporting countries to meet the new requirement including banning the seafood products that incidentally capture any marine mammal. However, this regulation could adversely affect the countries trading with the United States, especially Southeast Asian countries. The fisheries of Southeast Asia play important role in contributing to the protein food supply of the world and generating revenue for the national economy. Many ASEAN Member States (AMSs), *i.e.* Indonesia, Philippines, Thailand, and Viet Nam, are among the highest producers of fish and fishery products that are supplied to the world market including the United States, Europe, China, Japan, and others. As exporting countries, the AMSs made a tremendous effort in improving their legal frameworks and implementing necessary actions to comply with international trade measures such as the MMPA and EC Regulation 1005/2008 in order to access international markets. Therefore, SEAFDEC extended support to the AMSs by providing a regional platform to update the status of the MMPA and exchange information on major issues and challenges to comply with the MMPA.

The estimated global fishery production was 213 million t in 2019, dropping to 178 million t in 2020. Asian countries (excluding China) were the main producers, accounting for around 70 percent of the total fisheries and aquaculture production. For global marine capture fishery, the production was 78.8 million t in 2020, of which six AMSs, namely: Indonesia, Viet Nam, Philippines, Malaysia, Thailand, and Myanmar were among the top 25 producers (**Figure 1**) (FAO, 2022).

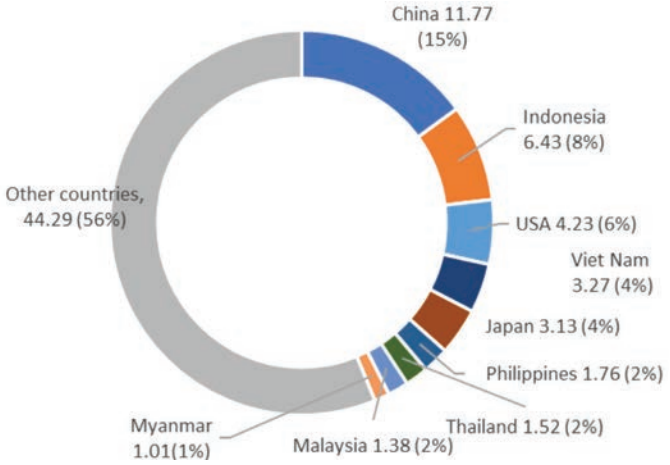

Figure 1. The quantity (t) and share (%) of top producers in global marine capture fisheries in 2020 (FAO, 2022)

In global seafood trading, Europe was the top exporter of fish and fishery products in 2019 with a share of 36 percent of the total exports in terms of quantity and value. Moreover, the Southeast Asian region shared 13–14 percent of the total exports in terms of quantity and value (**Figure 2**). In 2020, Viet Nam and Thailand were among the top ten exporting countries of aquatic products (FAO, 2022). The major exported products of Viet Nam were farmed pangasius and farmed shrimp, while Thailand exported canned tuna and farmed shrimp and supplied raw materials landed directly by fishing fleets in Thai ports. Thailand also played a key role in the international tuna trade of which the United States is the primary destination of processed tuna (FAO, 2022). Furthermore, Indonesia is recently one of the largest suppliers of farmed shrimp to the world market and an exporter of tuna and tilapia. For imports, **Figure 3** shows that Europe shared about 35 percent of the total imports in terms of quantity and 40 percent of the total imports in terms of value. While the Southeast Asian region shared about 10 percent of the total imports in terms of quantity and 6 percent of the total imports in terms of value (SEAFDEC, 2022a).

In 2020, the United States was the largest importing country, accounting for about 15 percent of the world import value of aquatic products, followed by China (10 percent), Japan (9 percent), Spain (5 percent), and France (4 percent) (FAO, 2020). In terms of quantity (live weight), China was the top importing country of aquatic products, far ahead of the United States. During 2017–2022, Indonesia was the top exporting

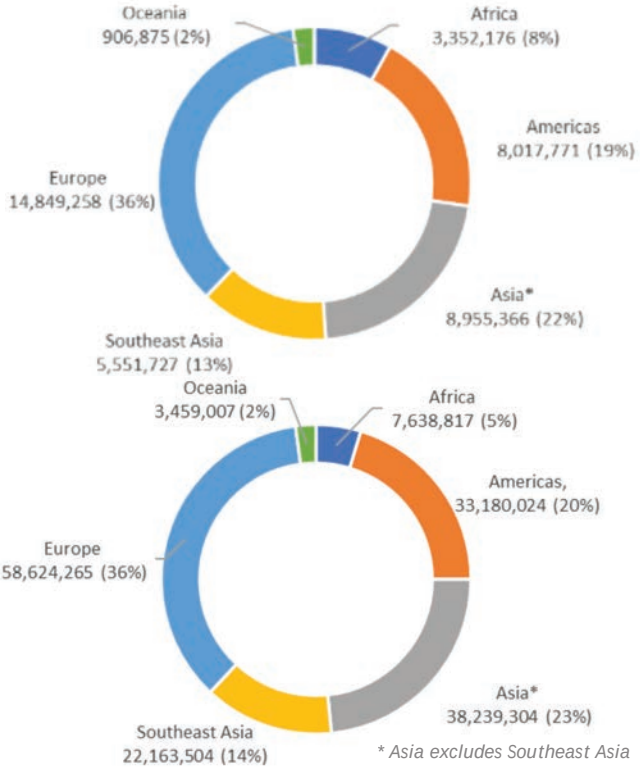

Figure 2. Percentage share by continent of export of fish and fishery products by quantity (t) *(above)* and value (USD thousand) *(below)* in 2019

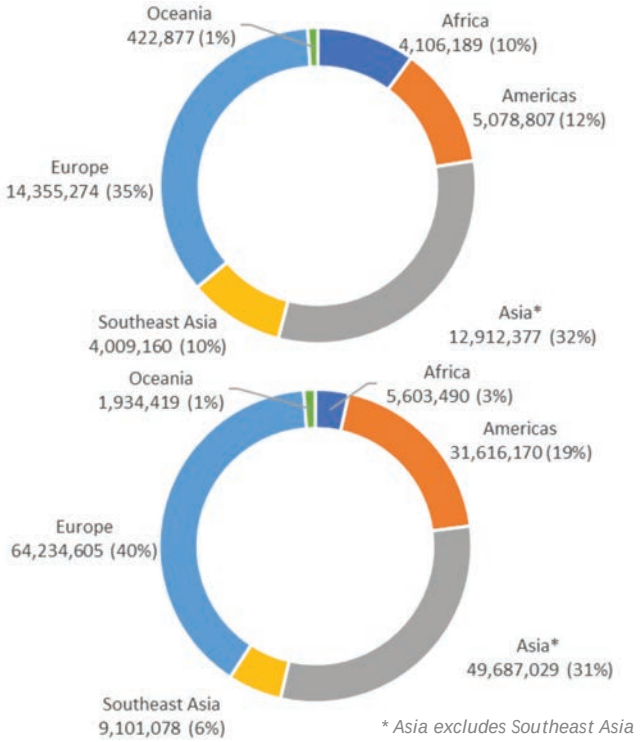

Figure 3. Percentage share by continent of import of fish and fishery products by quantity (t) *(above)* and value (USD thousand) *(below)* in 2019

country of seafood products to the United States market in terms of value, followed by Viet Nam, Japan, and Thailand; while in terms of quantity, Viet Nam was at the top followed by Indonesia and Thailand (USDA, 2022) (**Table**).

Table. United States import of fish and fishery products by value (USD thousand) and quantity (t) during 2017-2022

Countries	2017		2018		2019	
	Value (USD thousand)	Quantity (t)	Value (USD thousand)	Quantity (t)	Value (USD thousand)	Quantity (t)
Brunei Darussalam	8	0.9	0	0	172	31.8
Cambodia	0	0	16	1.8	12	0.7
Indonesia	1,853,957	178,277.50	1,943,417	192,435.90	1,856,943	199,729.90
Japan	305,290	21,417.80	292,918	20,130.80	338,008	23,938.00
Malaysia	24,023	4,565.50	28,075	5,166.60	37,280	6,139.10
Philippines	252,714	30,902.40	244,190	28,140.30	236,207	30,902.30
Thailand	1,439,273	211,937.40	1,238,375	192,122.10	1,250,646	203,305.70
Viet Nam	1,393,000	228,099.10	1,570,173	236,507.20	1,282,770	205,631.80

Countries	2020		2021		January - August 2022	
	Value (USD thousand)	Quantity (t)	Value (USD thousand)	Quantity (t)	Value (USD thousand)	Quantity (t)
Brunei Darussalam	355	67.7	0	0	0	0
Cambodia	120	6.5	16	1.2	31	4.2
Indonesia	2,103,965	231,250.40	2,448,285	249,943.50	1,905,519	174,996.30
Japan	231,486	17,641.00	382,310	27,401.90	404,708	24,526.70
Malaysia	30,320	5,769.40	29,536	6,282.00	19,561	3,737.50
Philippines	177,306	31,008.40	258,467	30,348.80	191,339	21,259.90
Thailand	1,379,923	237,131.80	1,194,673	195,932.20	925,865	151,691.40
Viet Nam	1,396,099	227,968.30	1,863,623	280,626.30	1,603,024	222,035.80

United States Fisheries Laws

In line with international policies, treaties, and conventions relevant to fisheries *e.g.* 1982 United Nations Convention on the Law of the Sea (UNCLOS), 1995 UN Fish Stock Agreement (UNFSA), among others, States and international organizations put their effort to meet the requirements for effective fisheries management by sustaining and rebuilding marine fishery resources. Likewise, the fisheries of the United States are an important sector providing food supply within the country and international trade communities. The United States is one of the leading countries in implementing fisheries management under several laws including the Magnuson-Stevens Fishery Conservation and Management Act, Marine Mammal Protection Act, and Endangered Species Act to prevent overfishing, restore overfished stocks, increase the long-term benefits of fisheries, and ensuring a safe and sustainable seafood supply.

One of the important fisheries laws of the United States is the Marine Mammal Protection Act (MMPA) which was enacted on 21 October 1972. The MMPA prevents marine mammal species and population stocks from declining beyond the point where they ceased to be significant functioning elements of the ecosystems of which they are a part. Moreover, the MMPA prohibits the taking and importation of marine mammals and marine mammal products, where "take" means to harass, feed, hunt, capture, or kill any marine mammal. This Act bans seafood products from exporting countries that incidentally capture marine mammals at a level above what is set in the United States for allowable bycatch.

In August 2016, the United States National Marine Fisheries Service (NMFS) and the National Oceanic and Atmospheric Administration (NOAA) published a final rule "Fish and Fish Product Import Provisions of the Marine Mammal Protection Act" effective from 1 January 2017 (NOAA, 2016). The Rule established conditions for evaluating a harvesting nation's regulatory program for reducing marine mammal incidental mortality and serious injury in fisheries that export fish and

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fish products to the United States. Under this Rule, fish and fish products from fisheries identified by the Assistant Administrator in the List of Foreign Fisheries can only be imported by the United States if the harvesting nation has applied for and received a Comparability Finding from NMFS. The Rule establishes procedures that a harvesting nation must follow and conditions it must meet to receive a Comparability Finding for a fishery. The Rule also established provisions for intermediary nations to ensure that such nations do not import and re-export to the United States fish or fish products subject to an import prohibition. The Rule provided a five-year exemption period from 1 January 2017 that allowed harvesting nations to develop regulatory programs and provide data on fisheries and their impacts on marine mammals. In addition, NOAA Fisheries identified fisheries that have interactions with marine mammals and export fish and fish products to the United States and consulted with harvesting nations with such fisheries to gather information about their marine mammal bycatch. The deadline for the Comparability Finding application was on 30 November 2021 and NOAA Fisheries is in the progress of reviewing Comparability Finding applications from more than 130 nations.

Nonetheless, to provide an additional one-year extension to harvesting nations to receive a Comparability Finding for their commercial fishing operations to export fish and fish products to the United States, NOAA Fisheries issued a final rule on "Modification of Deadlines Under the Fish and Fish Product Import Provisions of the Marine Mammal Protection Act" on 21 October 2022 (NOAA, 2022). NOAA Fisheries needs additional time to review and evaluate these applications, correspond with nations, make its final determination, and notify nations of its findings. With this extension, nations will have until 31 December 2023 to receive a Comparability Finding for their commercial fishing operations to export fish and fish products to the United States. However, due to the COVID-19 pandemic, the effective date of the Rule would be on 1 January 2024, when any exporting nations to the United States have to comply with a new import rule that mandates the requirements concerning marine mammal bycatch.

Considering that the fisheries situations and trading in the Southeast Asian countries differed from country to country, the respective countries submitted the application on a comparability and regulation program to the NOAA Fisheries by end of November 2021. The review and clarification are ongoing bilaterally between NOAA Fisheries and countries.

Issues and challenges of the ASEAN Member States

SEAFDEC, with the support of the Japanese Trust Fund, organized the Webinar on Regional Responses to the U.S. MMPA on 2–3 November 2021. The Webinar was attended by representatives from the AMSs as well as officials from the SEAFDEC Secretariat, Training Department, and

Box. Issues and challenges of the ASEAN Member States in response to the United States Marine Mammal Protection Act

Issues and challenges

- Trade barrier for fishery products entering the United States market and continued export to the United States
- Comparability Findings for all listed fisheries under the list of foreign fisheries (LOFF) and flexible space for currently not listed under a LOFF of the other future fisheries as harvesting nations
- Non-compliance with most fisheries
- Consideration of the United States of fish and fish products from an intermediary nation (re-export country) that will not be contaminated with fish from the banned area (export fishery) after MMPA implementation
- Limited data on national and regional marine mammal abundance
- Cross-sectoral issues (fisheries, environment, among others) that could delay the information-gathering process and consider the need to enhance multiagency coordination
- Lack of monitoring mechanisms
- Lack of bycatch, mortality, and injured data
- Ways to deal with wide-range small-scale fisheries
- Limited experts on marine mammals

Technical assistance needed

- Marine mammal abundance survey
- Determination of bycatch limit
- Monitoring Program
- Methods for marine mammal population estimate and stock assessment
- Marine mammal surveys and stranded animal necropsies for the cause of death
- Research on marine mammal bycatch based on fishing gear, especially in small-scale fisheries
- Gear modifications and technologies to lessen marine mammal interaction in fishing operations
- Development of mitigation measures and monitoring programs to reduce the bycatch, especially fishing industry where the total bycatch exceeds the limited bycatch based on biological parameters
- Improved programs for identifying priorities and long-term conservation strategies
- Stranding network along coastal regions
- Roll out of the relevant FAO Technical Guideline to prevent and reduce bycatch of marine mammals in capture fisheries
- Good handling practices to mitigate serious injuries and mortalities of marine mammal bycatch
- Cooperation among the AMSs on the study of the distribution of transboundary marine mammals in Southeast Asian waters
- Collaboration among the AMSs on catch certification that fish and fish products do not originate from MMPA-banned areas

Participants of the Webinar on Regional Responses to U.S. Marine Mammal Protection Act organized by SEAFDEC on 2–3 November 2021

Marine Fishery Resources Development and Management Department. During the Webinar, the status of the MMPA regarding "Implementation of Fish and Fish Product Import Provisions of the Marine Mammal Protection Act" as well as information on major issues and challenges of the AMSs related to MMPA (SEAFDEC, 2022b). The major issues and concerns of the AMSs are summarized in the **Box**. Generally, the key issues and challenges on MMPA faced by the AMSs include the improvement of data collection methodology and system to accommodate information on bycatch of marine mammals. This would help in assessing the status and stock of marine mammals and their interaction with various fishing gear and practices in the region. Another challenge is the establishment of a collaborative mechanism to work with national authorities in dealing with the issues of conservation of marine mammals. This is because, in most of the countries in the region, the national fisheries agency has no mandate in conserving and protecting marine mammals. Lastly, the livelihoods of small-scale fishers in the region who contribute a high proportion of fisheries products could be indirectly impacted by the MMPA.

Way Forward

The AMSs are in the progress of consultation with NOAA Fisheries for the final approval of the Comparability Finding. Meanwhile, SEAFDEC would continue to explore the technical and capacity-building support to be extended to the AMSs. The support could include marine mammal abundance stock assessment as a sub-regional or regional program, bycatch limit estimation, enhancement of the existing networks (*e.g.* fishing gear/practices modification for reducing mortality by fishing gear), provision of regional fora for sharing information, and enhancement of the cooperation among international and regional organizations for technical support.

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Implementing Sound Policies and Regulations for the Sustainability of Eel Fisheries in Southeast Asia

Dina Muthmainnah, Ni Komang Suryati, Zulkarnaen Fahmi, Toni Ruchimat, Evelyn C. Ame, Myint Than Soe, and *Giang Pham Thruong*

The rapid population decline of temperate eels and the listing of some anguillid eel species, *i.e. Anguilla anguilla* and *A. japonica* in the CITES Appendices, have led to the increase in the market value of tropical eels during the recent years. European, American, and Japanese eels are seriously threatened with extinction due to high consumption, and demand is still increasing. After the stocks and recruitment collapse in the present target eel species and areas, it has to seek other targets for replacement and compensation to continue eel consumption (Arai, 2015). Since 2009, CITES for international trade listed the European eel in Appendix II due to their decreasing population and potential extinction. In East Asia, the large consumption of the Japonica eel has led to a rapid decline in the number of glass eels. Moreover, the demand for tropical anguillid eels in Southeast Asia has increased, not only for domestic consumption but also mainly for export to East Asian countries. Since the Japanese eels and European eels are under the control of the IUCN, the development of sustainable anguillid eel fisheries could be an excellent prospect to increase the source of income of small-scale fishers in Southeast Asia.

SEAFDEC conducted the studies to obtain a better understanding of the status, biology, and life cycle of eel stocks and promote sustainable management and utilization of anguillid eel fishery resources in the region. To better understand the stock status, biology, and life cycle of eel stocks and promote sustainable management and utilization of anguillid eel fisheries resources in the region, SEAFDEC carried out two projects, namely: "Development of Stock Assessment Methods and Strengthening of Resources Management Measures for Tropical Anguillid Eel in Southeast Asia" in 2020–2022 and "Sustainable Utilization of Anguillid Eels in the Southeast Asia Region" in 2020–2024. The former Project was implemented by the SEAFDEC Secretariat in collaboration with IFRDMD with funding support from the Japan-ASEAN Integration Fund (JAIF) with the aims to collect catch data and biological/ecological information for the estimation of eel resources stocks and develop methods for estimating tropical anguillid eel resources. While the latter Project was implemented by IFRDMD with funding support from Japan Trust Fund VI (JTF) Phase 2 with the aim of keeping the sustainable management and utilization of anguillid eel fisheries resources in the Southeast Asian region through the strategic program of sustainable eel resources management. The anguillid eels are common in several ASEAN Member States (AMSs), namely: Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand, and Viet Nam. This article presents the capture fishery practices for anguillid eels in the AMSs and the national fishery management programs and regulations implemented by the respective countries to sustain the utilization of eel resources in the region.

Presently, there are 16 species and three subspecies of anguillid eels in the world (Watanabe *et al*., 2009), which are distributed from tropic to subarctic zones except in the west coasts of the North and South American continents, the west coast of Africa, and the east coast of South America, except the north coast along the Caribbean Sea (Kuroki & Tsukamoto, 2012). They are catadromous fish species with a life cycle mainly spent in freshwater environments and migrate to the sea to spawn. Starting from eggs to leptocephalus then to glass eel, they go to the mouth of the river. After entering the river, it becomes an elver, grows into a yellow eel, then a silver eel, and becomes an adult (**Figure 1**).

Figure 1. Life stages of anguillid eels: glass eel *(left)*, elver (*top right)*, and yellow eel *(bottom right)*

However, many factors can be traced from the deteriorating eel resources, such as the conversion of their habitats into other development structures and installations, overexploitation, diseases, climate change, and water pollution. The construction of dams and weirs in many rivers to supply the water needed for crop irrigation and for running the hydroelectric power plants creates a blockage of the water flow. This river blockage hinders the migration pathways of many aquatic species. In the case of eels, this also impedes the movement of eels going upstream or undertaking reverse migration as part of their life cycle. Besides, overexploitation can be due to non-selective fishing gear and unsustainable fishing methods and practices. The lack of regulatory management on the maximum number and the distance between the gears would lead to the decreasing populations of the anguillid eels that migrate to the oceans. The damage to watersheds is also a threat that needs attention.

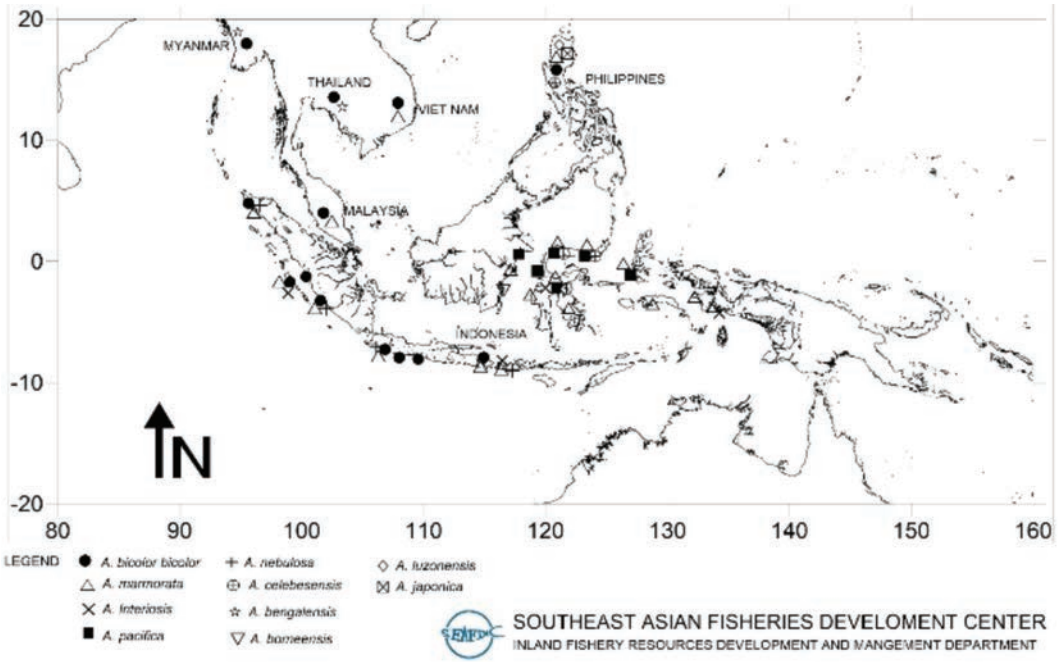

Figure 2. Distribution of *Anguilla* spp. in Southeast Asia

Eel fisheries in Southeast Asia

Southeast Asia is home to several tropical anguillid eel species, particularly in Indonesia, Malaysia, Myanmar, Philippines, Thailand, and Viet Nam (Arai *et al*., 1999) (**Figure 2**). Anguillid eel resources are one of the most economically important inland fishery resources in the region as it is an important food with high nutrition. The international market for cultured eels exceeded 200,000 t in 2000 and reached 275,014 t in 2009 (FAO, 2015). The economically important eel species in the region are *Anguilla bicolor* and *A. marmorata*.

In Indonesia, fishers catch the yellow eels in the middle basin of the river using 'bubu' trap, while capturing the glass eels using a hand-held scoop net. In the Philippines, fishers catch the glass eels using a hand-held scoop net, fyke or fence net, or other rigid structures near the mouth of rivers. The wings or leads guide the fish towards the entrance of the bags. In Myanmar, eel collectors or fishers use bamboo traps to collect eels using crabs or earthworms as bait and rear the catch for about one week. In Viet Nam, the main fishing gears used to catch glass eels are towing net and scoop net (Suryati *et al*., 2017). The different types of fishing gear that are used to catch eels are shown in **Figure 3**.

In Indonesia and Philippines, the fishers obtain their fishing gear from the collectors to catch glass eels. The distribution channel for eels involves consolidators because of the need to transport/trade eels in their live state. Therefore, the distribution structure is concentrated around the consolidators.

Figure 3. Types of fishing gear for catching eels: fyke net in the Philippines *(top)*, bamboo trap in Indonesia *(top right)*, scoop net in the Philippines *(bottom right)*

Anguillid eel is consumed directly fresh or as food product. The value chain in Indonesia and Philippines starts with glass eels collection from fishers, rearing the glass eels for a few days in temporary rearing tanks, then transporting the eels to eel farms. The eel farmers rear the glass eels to marketable size; then, upon reaching the size for consumption, the eels are harvested and processed into different food products. Marketing starts from the shipment of glass eels and elvers to eel farmers and the yellow eels or table-size eels to local and overseas markets.

The price of eel depends on the demand and usually, it is necessary to coordinate with collectors to ensure that a sufficient number of eels for the market are collected in Indonesia and Philippines. It can be noted that fishers of glass eels are usually temporary fishers who work only from evening to midnight. Most of them have other jobs from morning until noon. The capture activity is not done every day. Because of that, glass eel is sold at a high price (Muthmainnah *et al*., 2021). The products are exported to Japan, Korea, and China.

Anguillid eels as an aquatic species under international concern

Strengthening the management of tropical Anguillid eels was one of the CITES Animal Committee Meeting recommendations in 2018. Moreover, the 18th Meeting Conference of the Parties to CITES (CoP18) in 2019 discussed the issues of range States of non-CITES *Anguilla* spp. in international trade particularly *A. rostrata, A. japonica, A. marmorata* and *A. bicolor*. In view of the sustainable development of eel stocks in the Southeast Asian region, the AMSs were encouraged to a) where appropriate, implement conservation and management measures, such as adaptive eel management plans, enhanced collaboration within countries, between authorities and other stakeholders with responsibilities for eel management, and related legislation to ensure the sustainability of harvests and international trade of *Anguilla* spp. and make these widely available; b) collaborate and cooperate with other range States on shared stocks to develop shared objectives for these stocks and their management, improve the understanding of the biology of the species, conduct joint programs of work and share knowledge and experience; c) establish monitoring programs and develop abundance indices in range States where none exist. For ongoing programs, identifying opportunities for expanding to new locations and/or live stages would be favorable; improve traceability of *Anguilla* spp. in trade (both live and dead); and e) provide information to the Secretariat on the implementation of this Decision to allow it to report to the Animals Committee and Standing Committee, as appropriate. Six of the 10 ASEAN Member States, namely: Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand, and Viet Nam are range States for tropical anguillid eels. The respective AMSs developed their own national fishery management programs (**Box**) and agreed to collaborate with the vision of developing effective management practices for sustainable use and conservation of tropical anguillid eel resources in the region.

Box. Policies and regulations of the ASEAN Member States for sustainable development of anguillid eel resources in the Southeast Asian region

Cambodia

- On 6 July 2016, the Ministry of Agriculture, Forestry and Fisheries established the aquaculture of aquatic animals specifically on the number of eels to be cultured. The Fisheries Administration (FiA) of Cambodia obtained > 1,000 individuals for culture, while 600-1,000 individuals required permission from FiA at the provincial level.

Indonesia

- The policy regarding eel management started in 1973 through a Ministerial Decree of Agriculture KepMentan No. 214/Kpts/Um/V/1973 prohibiting the export of some species of fish seeds including eels. The decree was revised in 2009 to prohibit the export of eel seeds except for research purposes and improve the management of anguillid eel resources.
- In 2012 as indicated in the Ministerial Decree of the Ministry of Marine Affairs and Fisheries (MMAF) No. 19/2012, the export of eels below 150 g per individual was prohibited. In this decree, the National Plan of Action (NPOA) for eel conservation for the 1st period of 2016–2020 was established.
- As a commitment of the Government of Indonesia to protect the country's eel resources, the Ministry of Marine Affairs and Fisheries issued the decree 80/KEPMEN-KP/2020 on 17 July 2020 concerning the protection of anguillid eels (*Anguilla* spp.) by limiting their capture. Since then, the government implemented a quota system that limits the transfer and receiving of anguillid eels to those who have a certificate (SIPJI) within different areas in Indonesia.
- The established protection scheme limits the capture of eels in certain time periods and a certain size for protecting eel resources include:
  - Seeds of anguillid eels at the glass eel stage should not be caught every new moon on 27–28 Hijriah (Arabic calendar)
  - Adults of *Anguilla bicolor* and *A. interioris* weighing more than 2 kg should not be caught at any time
  - Adults of *A. marmorata* and *A. celebesensis* weighing more than 5 kg should not be caught at any time
- MMAF established the Eel Management plan through Ministerial Decree No. 118 in 2021 as guidelines for the MMAF, local government, related agencies, and eel stakeholders in implementing the management of eel fishery in Indonesia.
- Regarding the eel restocking, as well as catching and handling the glass eel, Indonesia issued the Decree of the Director General of Capture Fisheries No. 7 of 2022 on Technical Guidelines for Restocking Eel, and Decree of the Director General of Capture Fisheries No. 8 of 2022 concerning Technical Guidelines for Catching and Handling Glass Eel.
- Management policies on anguillid eels within Indonesia
  - Poso Regent Regulation No. 26 of 2017 concerning the management of Anguillid eels
  - Sukabumi Regent Regulation No. 25 of 2018 concerning the management and protection of anguillid eel resources
  - Decree of the Sukabumi Regent No. 523/Kep 643.1-Dislutkan/2018 concerning the cultivation of plasma core system fish
  - Sukabumi Regent Circular No. 523/2090/Dislutkan concerning the restocking of the prospective broodstocks of Anguillid eels

Box. Policies and regulations of the ASEAN Member States for sustainable development of anguillid eel resources in the Southeast Asian region *(Cont'd)*

Myanmar

- Closed season to promote eel recruitment, support the silver eel migrating to the ocean for spawning, and allow glass eel to enter the mouth of the river for growing
- Closed season and no collection period for eel from 1 June to 31 August every year.
- So far, the government has not yet implemented the closed area for eel management. The reason is closed-season approach is more appropriate than the closed area based on experience.

Philippines

- The export of eel seeds with lengths less than 15 cm is prohibited by virtue of Fisheries Administrative Order (FAO) No. 242 in 2014. Under this law, imprisonment of eight years, confiscation of the same or a fine equivalent to double the export value of the same upon the discretion of the court, and revocation of the fishing and/or export accreditation/permit shall be imposed on offenders.
- Fishermen registration under the "Fish R" program of the Bureau of Fisheries and Aquatic Resources is being implemented to protect the preferential rights of fishermen and for efficient delivery of government programs for the fisherfolk. This was backed up with the registration of boats and fishing gear to fast track and complete the nationwide registration of municipal fishing boats 3 GT and below and municipal fishing gear as required under "Boat and gear R" of Executive Order No. 305 s. 2004 and Section 19 of RA 10654 (formerly RA 8550) or the Philippine Fisheries Code of 1998.
- FAO 233 on aquatic wildlife conservation which includes eels
- FAO 319 on the requirements for exporting live food fish and crustaceans
- Philippine General Memorandum Circular Order No 2 S 2009 on the requirements for the export of live animals.

Viet Nam

- Regulation to manage the eel fisheries in Viet Nam is included in the enacted Fisheries Law of 2003 (amended in 2017).
- Red Book Viet Nam for *Anguilla japonica*.
- Ministry Decision No. 57/2008/QD-BNN for eel aquaculture
- Ministry Decision No.82/2008/QD-BNN for regulation of the trading of rare and endangered aquatic species.
- The Ministry of Agriculture and Rural Department (MARD) published Circular 19/2018 regarding the fishing close areas for protecting the *A. japonica* and *A. marmorata*. MARD through this Circular updated the data on fisheries and aquaculture on the National Fisheries Database.
- Government Decree 26/2019 in articles 7, 9, 39, 40, 41, 67,68, and 69 (Binh, 2019)
  - Article 7 is for aquatic endangered species
    - o List I - (including *A. japonica* and *A. bicolor*) only permitted to be caught for the following purposes: conservation, scientific research, initial seed research, and international cooperation (fishing).
    - o List II: similar to List I and with specific conditions specified in Part II of Annex II: *A. marmorata* and *A. borneensis*: catch permitted from 1 March to 30 April.
  - Article 9 indicates the procedures for issuing the permission for fishing aquatic endangered species with the Directorate of Fisheries as the competent authority
  - Articles 39, 40, and 41 deal with the detail regulation on the management and catch certification, aquaculture establishments of aquatic endangered species.
  - Articles 67, 68, and 69 showed detail regulations on the export, import, re-export, import from sea, transit of aquatic endangered species.

Way Forward

Several issues on the conservation and management of tropical eels have been identified by many Southeast Asian countries that need to be addressed. These include inadequate statistical data on the utilization of the eel resources such as catch data as well as a systematic data collection scheme, limited information on eel aquaculture, insufficient data on the geographic range of the anguillid eels, limited stock assessment studies, inadequate effective conservation and management measures, and mixed statistical data on international trade of eel species. Therefore, the suggested strategic measures to sustain the anguillid eel resources as a source of livelihood or food for the AMSs countries include data collection, biodiversity monitoring, stock enhancement, and establishment of the closed season and involve the stakeholder.

Data collection

The collection of information and statistical data on the utilization of anguillid eel resources is the most important and urgent activity to be pursued. Catch data should be collected from the enumerators and/or collectors or consolidators of glass eels, elvers, yellow eels, and silver eels to be able to derive information useful for policy formulation. The data should include species, life stages, and fishing gear. Long-term data collection should be also undertaken to generate the resource status and trends based on the catch per unit effort data. Fishing effort data includes the duration of fishing operations, number of fishing gear, and number of fishers. The data could facilitate the understanding of the current status of the fisheries for carrying out a stock assessment. In addition, it is also necessary to collect biological data such as length, weight, age of elvers/yellow eels, among others. The data for collection could also be based on the trading profiles that had been compiled from the national trade data and statistics on exports and imports (Muthmainnah *et al*., 2016).

Biodiversity monitoring

The establishment of biodiversity monitoring sites and fish sanctuaries should be undertaken based on the following criteria: habitats and ecosystems are being degraded, species population is threatened and declining, management interventions are lacking, local communities should gain the most benefit from the resources, and restoration of habitats should obtain the intended impacts.

Stock enhancement and establishment of a closed season

To conserve the eel stocks, restocking activities could be an option. This activity aims to replenish depleted stocks as a result of overfishing. Resource enhancement could also be promoted through the enforcement of closed season during certain periods which should be considered more appropriate than closed areas. The involvement of the community is very important in this aspect to ensure effective collective efforts and outcomes.

Involvement of stakeholders

In the management of eel fisheries, the stakeholders should be involved from the planning process until the implementation of the management policies. The stakeholders are the institutions in charge of fisheries affairs in the province/district/city, which include higher educational institutions, research institutes, fishers, and collectors. The exploitation activities in the inland waters that interfere with the sustainable management of the eel resources can be monitored by such groups. For instance, dams or canalization that can cut off the migration of eels, and the construction of hydropower that discharges wastewater that can kill the eel seeds can be impeded. The institutions in charge could facilitate the establishment of a network of fishers, collectors, cultivators, and exporters that will serve as management bodies that will oversee the conservation and sustainable utilization of anguillid eels. Besides, the conduct of regular meetings and establishing Eel Cooperatives are equally important for the realization of the goals of promoting anguillid eels towards sustainability.

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Promoting Tropical Eel Culture in the Philippines: comparative performance of *Anguilla bicolor pacifica* and *A. marmorata* in captivity

Frolan A. Aya

Eel aquaculture is an important activity in Southeast Asian countries such as Indonesia, Philippines, and Viet Nam. With the decline in the wild fishery stock of cold-water eel species (European eel *Anguilla anguilla*, Japanese eel *A. japonica*, and American eel *A. rostrata* (Tatsukawa, 2003; Gómez-Limia *et al*., 2022), there has been an increasing interest in the culture of tropical eel species as an export commodity. In the Philippines, species of anguillid eels cultured are mainly the Pacific shortfin eel *A. bicolor pacifica* and the giant mottled eel *A. marmorata*. *Anguilla bicolor pacifica* is now being considered as an alternative to *A. japonica* (Muthmainnah *et al*., 2016), being the most preferred eel species for consumption in East Asian countries. However, *A. marmorata*, which comprised the bulk of the wild glass eel catch in the Cagayan River, Philippines, has rarely been cultured as an export commodity. Comparison of performance and feed utilization may provide relevant information on the culture requirements of these two eel species under cage conditions.

The Philippines is not traditionally an eel-consuming country. However, eel culture has already been practiced in the country since the early 1970s. Tropical eels, locally known as 'igat' or 'palos' are snake-like creatures that inhabit marine, brackishwater, and inland waters such as rivers and tributaries. There are about 19 species/subspecies (Froese and Pauly, 2022) of the freshwater eels of the genus *Anguilla*, but only five cold-water species (American eel *A. rostrata*, European eel *A. anguilla*; Japanese eel *A. japonica*; Australian shortfin eel *A. australis*, Australian longfin eel *A. dieffenbachii*) are commonly cultured. In the Philippines, seven species (*A. japonica, A. celebesensis, A. marmorata, A. interioris, A. bicolor bicolor, A. bicolor pacifica, A. luzonensis*) have been identified (Briones *et al*., 2007; Jamandre *et al*., 2007; Teng *et al*., 2009; Watanabe *et al*., 2009; Han *et al*., 2012; Aoyama *et al*., 2015). However, only two species, *A. marmorata* and *A. bicolor pacifica* are predominantly cultured.

The giant mottled eel *A. marmorata* (**Figure 1a**) is naturally distributed in the tropical and subtropical western Pacific and Indian Oceans (Luo *et al*., 2013; Arai, 2016). Considered one of the largest anguillid eel species, it can reach up to a maximum length of 148 cm (Leander *et al*., 2014). In Yakushima Island, Japan, *A. marmorata* inhabits rivers and tributaries with substrates made of large rocks, boulders, and cobbles (Kumai *et al*., 2020). They are also found in crevices in their wild habitat (Valdez and Castillo, 2016).

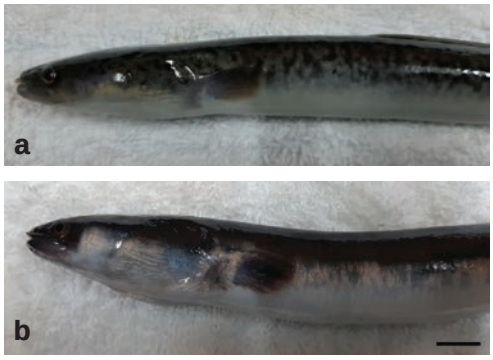

Figure 1. Tropical eels **(a)** *Anguilla marmorata* and **(b)** *A. bicolor pacifica (Scale bar = 10 mm)*

Meanwhile, the Pacific shortfin eel *A. bicolor pacifica* (**Figure 1b**) is one of the commercially important eel species in Southeast Asia, particularly in Indonesia, Philippines, and Viet Nam (Crook, 2014; Gollock *et al*., 2018; Aoyama *et al*., 2018; Marini *et al*., 2021). It is preferred for culture in commercial eel nursery farms as it fetches a higher market price and has the same appearance and flesh quality as Japanese eel (Cuvin-Aralar *et al*., 2019).

Eel collection and culture areas in the Philippines

Eel farming is still dependent on wild glass eels collected from estuaries and tidal rivers (Liao *et al*., 2002). Several fishing grounds in the Philippines (**Figure 2**) are potential sources of glass eels for nursery culture.

Wild eel stocks, mostly *A. marmorata*, are sourced from the Cagayan River (**Figure 3**). This eel species also comprised the bulk of the wild glass eel catch from the Pangi River (Valdez and Castillo, 2016). Lagonoy Gulf is also considered a potential glass eel fishing ground with a higher abundance of *A. bicolor pacifica* than *A. marmorata* (Nieves and Nolial, 2019). In Southern Mindanao, glass eel collection areas for *A. bicolor pacifica* include Rio Grande de Mindanao, Davao Gulf, and Sarangani Bay (E.C. Ame, personal communication, 17 December 2021).

The Philippine Bureau of Fisheries and Aquatic Resources (BFAR) disclosed that eels are cultured in 23 provinces (E.C. Ame, personal communication, 17 December 2021). In these eel culture areas, farming techniques of the Philippine native eels are adopted mainly from the culture of European and Japanese eel species, which are commonly done in concrete

tanks or ponds. A culture of glass eels or elvers in cages inside a concrete pond is not common, although this culture practice has been documented in the southern Philippines (Surtida, 2000). Examining the performance of these two eel species reared simultaneously under cage conditions may offer an alternative culture method.

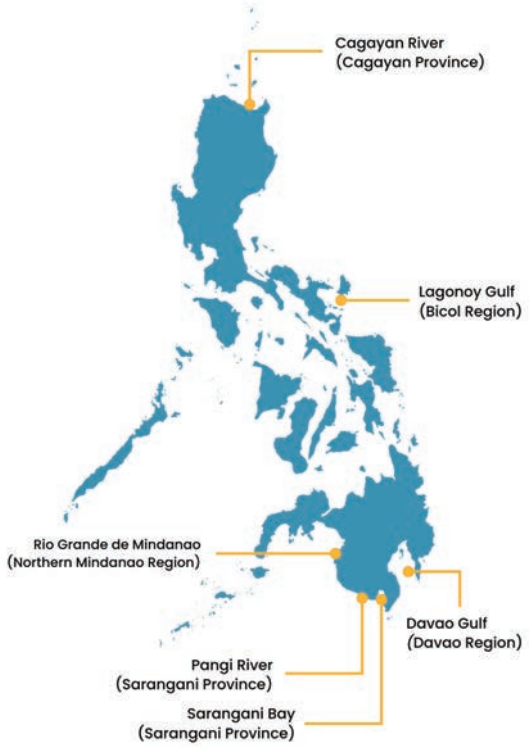

Figure 2. Glass eel fishing grounds in the Philippines

Figure 3. Glass eels collected *(top)* by eel fishers *(bottom)* from the Cagayan River in the Philippines

Cage as a suitable environment for the growth of *A. bicolor pacifica*

Aya and Garcia (2022) conducted a study to compare the suitability and performance of *A. bicolor pacifica* and *A. marmorata* in cage conditions. They reared the elvers of these two eel species with 1.73 g in weight in hapa net cages measuring 1.0 m × 1.0 m × 1.5 m which were suspended in outdoor concrete tanks. The growth and feed utilization of elvers were monitored throughout the 210-day trial (**Figure 4**) in the grow-out facility of the Binangonan Freshwater Station of SEAFDEC Aquaculture Department in Binangonan, Rizal, Philippines.

Figure 4. Cage set up for rearing *A. bicolor pacifica* and *A. marmorata* elvers

Results of the growth trial showed that both *A. bicolor pacifica* and *A. marmorata* elvers had comparable survival rates of 80.0 % and 74.4 %, respectively, at the end of the culture period. In comparison, the culture of *A. marmorata* glass eels to elver stages in many eel farms in Viet Nam only had a 60.0 % survival rate (Thuc and Van, 2021). However, *A. bicolor pacifica* weighed 64.51 g which was much heavier than *A. marmorata* which only weighed 7.77 g (**Figure 5**). Water quality parameters examined throughout the growth trial were within the acceptable range for the culture of eel species. This result suggests that the growth difference between the two eel species was not explained by environmental factors since they were reared under similar cage conditions. It is reported that *A. marmorata* lives in shallow and fast-flowing water (Itakura and Wakiya, 2020), while *A. bicolor pacifica*, a plain eel similar to *A. japonica*, may stay in areas with deep and slow-flowing water (Kumai *et al*., 2020). Hence, water depth and velocity may have explained the findings described above.

Figure 5. Tropical eels *Anguilla bicolor pacifica* **(a-b)** and *A. marmorata* **(c-d)** reared in hapa net cages

Other growth parameters such as percent weight gain, specific growth rate, and yield were higher for *A. bicolor pacifica*, demonstrating the suitability of this species in cage culture conditions. In the case of *A. marmorata*, the closed environment, such as small hapa net cages and the absence of physical substrate, may have resulted in the poor growth of this species.

Feed acceptability: an important issue for growing *A. marmorata*

A formulated eel powder diet (49.77 % crude protein and 10.21 % crude lipid) made into a paste was given to both eel species during culture. The process of making a paste diet involves adding 700 ml of water to 1 kg of eel powder diet and mixing the dough mixture for 15 min using an electric mixer (**Figure 6**). The proximate composition of the eel powder diet was based on the information available for *A. japonica* (Arai, 1991; Damusaru *et al*., 2018). Aya and Garcia (2022) reported that *A. bicolor pacifica* consumed more feeds than *A. marmorata*, resulting in a faster growth rate of the former species. This means that the paste diet was well accepted and digested by *A. bicolor pacifica* than in the case of *A. marmorata*. Thus, feed acceptability may explain the observed feed intake between the two eel species. The addition of feeding stimulants may improve the feed acceptance of *A. marmorata* juveniles.

Figure 6. Preparation of formulated eel powder to paste diet before feeding to elvers

Way Forward

In comparison to the giant mottled eel *Anguilla marmorata*, information on the performance of the Pacific shortfin eel *A. bicolor pacifica* during culture is limited. The aforementioned findings demonstrated that the faster growth rate of *A. bicolor pacifica* than *A. marmorata* suggests the suitability of this eel species under similar cage culture conditions. Supplementation of feeding stimulants in diets for *A. marmorata* is an area that requires further research to improve the performance of this species with potential as an export or valuable culture commodity.

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Learning the Lessons from the Integrated Small-scale Inland Fisheries Business in Kampong Patin Village, Indonesia

Dina Muthmainnah, Zulkarnaen Fahmi, Freddy Supriyadi, Aroef Hukmanan Rais, Sevi Sawestri, and *Eko Prianto*

Inland fisheries are not often a priority in national and regional governance, being undervalued and overlooked, although it is recognized as important to food security, livelihoods, and human well-being. In inland waters, fishing is an important occupation for many rural people and plays a major role in social and economic development (Muthmainnah & Prisantoso, 2016). Inland fishery is also known as "subsistence fishing" or "family fishing." The community who lives surrounding the waterbody perceives that inland fishery resource is common property and open to all at any time of the year. Since it is worked by individuals with traditional fishing gear and small boats, it is called small-scale fishery. Small-scale fisheries in inland waters are carried out in a wide diversity of ecosystems, namely: lakes, rivers, reservoirs, ponds, and wetlands (DFID, 2002), as well as in rice fields during the rainy season.

However, inland fisheries are strongly impacted by other users of water and land resources, such as agriculture, transportation, and home industries. The management of inland fisheries requires an ecosystem approach and the engagement of relevant stakeholders. The priority focus of inland fishery management is sustainability to ensure that short-term actions do not jeopardize the options for future generations to benefit from the full range of goods and services provided by freshwater inland water ecosystems.

SEAFDEC Inland Fishery Resources Development and Management Department (IFRDMD) is currently implementing the project "Management Scheme of Inland Fisheries in the Southeast Asian Region" with support from the Japan Trust Fund VI Phase 2. Under the Project, SEAFDEC/IFRDMD assessed the inland fisheries activities in Kampong Patin, XIII Koto Kampar District, Kampar Regency, Riau Province, Indonesia during 2020 to 2022 to obtain data and information on the potential of inland fisheries that would improve the livelihoods of local fishers.

In Southeast Asia, Indonesia has the largest inland waters with an area of around 54 million ha consisting of 11.95 million ha of river waters and their floodplain, 39.4 million ha of swamp waters 2.1 million ha of lakes and reservoirs as well as other inundations (Kartamihardja *et al*., 2017). It is estimated that 1,300 fish species inhabit the country's inland waters, and some of them are economically important as food and ornamental fish (Kottelat *et al*., 2013). In 2019, the inland fishery production of the country was around 649,978 t (2.8 % of total fish production) with a value of about USD 1.16 million and engaged 515,545 fishers (SEAFDEC, 2019). However, changes in land use and runoff from household and industrial activities have reduced the benefits of inland waters, including decreasing fish diversity and decreasing income of fishers. Management actions have been carried out by the competent authorities but there are still more issues that need to be addressed. If the management of inland waters is further developed, the potential of inland capture fisheries can reach more than 3 million t. Moreover, inland aquaculture development could also increase fishery production to support food and economic security.

In Riau Province in Indonesia, Kampar Regency has a high potential for inland fisheries (including capture and aquaculture) with a total production of 52,884 t in 2019 which is the highest in the province (**Figure 1**). The inland fishery production was mainly from the Kotopanjang Reservoir and Kampar River including the floodplain and oxbow lake. These inland water bodies have high biodiversity of endemic and economically important fish species. Moreover, the aquaculture production of Kampar Regency is approximately 70 % of aquaculture production in Riau Province (**Figure 1**) and is among the highest in the country. Therefore, the Kampar Regency government is implementing programs to support aquaculture production.

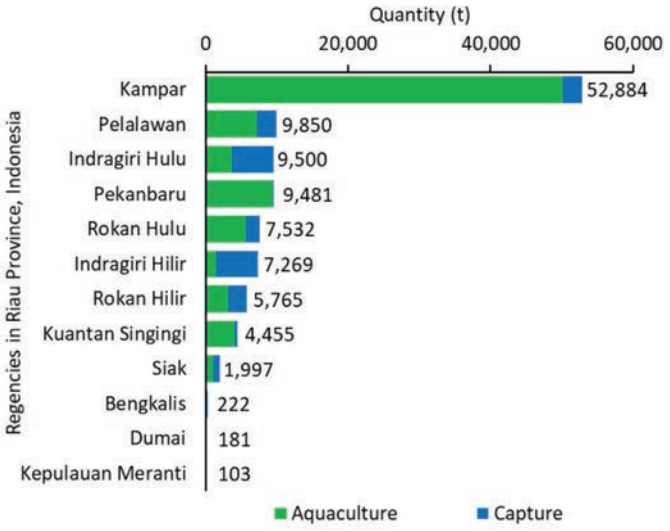

Figure 1. Inland fisheries (capture and aquaculture) production of regencies in Riau Province, Indonesia by quantity (t) in 2020 (Fishery Service of Riau Province, 2022)

In Kampar Regency, the highest inland fishery production (including capture, pond culture, and cage culture) of 21,441 t was from XIII Koto Kampar District (**Figure 2**) where the ecosystem approach to fisheries management is applied by involving relevant stakeholders including the private sector and non-government organizations in developing fishery regulations, promoting environment-friendly fishing practices, and establishing sanctuary areas based on local wisdom.

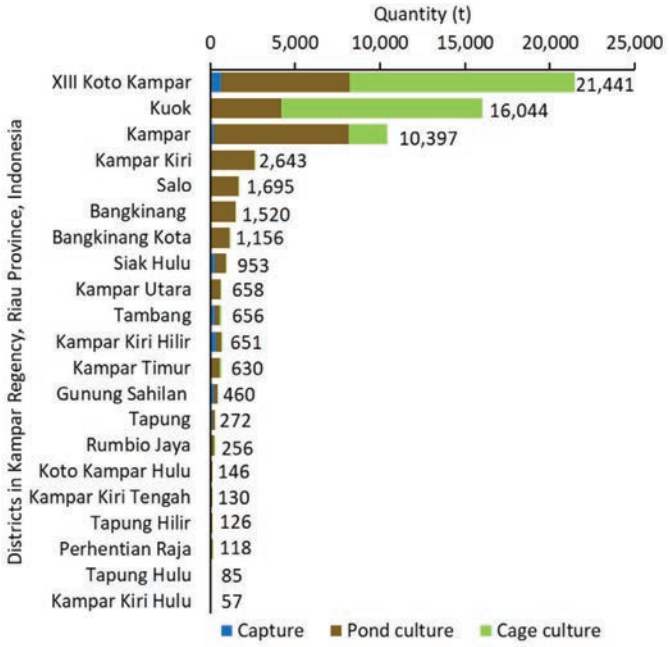

Figure 2. Inland fisheries (capture and aquaculture) production of districts in Kampar Regency, Riau Province, Indonesia by quantity (t) in 2020 (Fishery Service of Riau Province, 2022)

Kampong Patin as the center of integrated fisheries

One of the government's missions was to build rural areas which could be achieved through community empowerment to increase productivity and the diversity of existing businesses, provide facilities to support village economic development, strengthen institutions that support production and marketing chains, and optimize human resources for village economic growth. The participation of the community was also necessary for carrying out structural policies (Handayani *et al*., 2021). In XIII Koto Kampar District, Koto Masjid Village (also known as Kampong Patin) is one of the villages in Indonesia where a village development strategy through community empowerment was implemented. The villagers originally lived in a watershed area but had to move to a hilly area starting in 1992 due to hydroelectric reservoir construction. For their relocation, the motto of the Village was "no house without fish pond" which meant they requested one unit of pond for each household, either a soil pond, constructed pond, or pond coated with plastic (Fadiya & Adianto, 2021).

- **Aquaculture**

Kampong Patin is located on the plateau close to the Kotopanjang Reservoir (**Figure 3**) with an area of 425 ha including 116 ha of ponds. The main occupation is semi-intensive aquaculture for most residents consisting of 1,156 women and 1,216 men. There are 1,747 residents of productive age (16–64 years) As potential workers. More than 1,000 floating cages are installed in the Kotopanjang

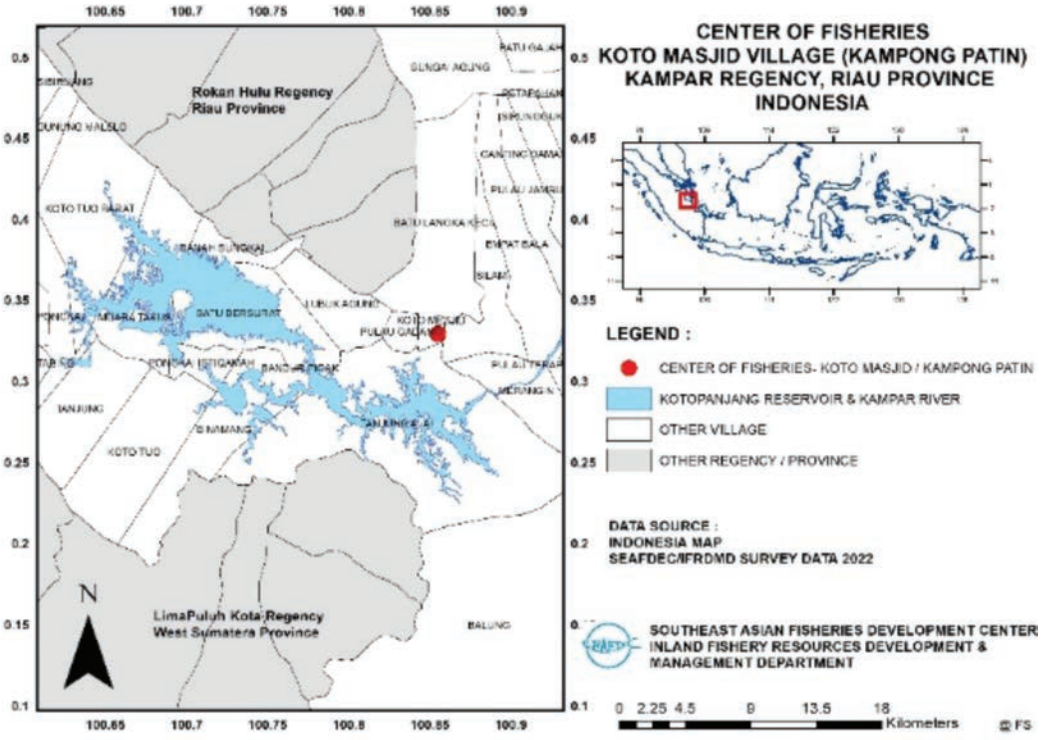

Figure 3. Location of Koto Masjid Village, XIII Koto Kampar District, Kampar Regency, Riau Province, Indonesia

Reservoir to culture Pangasius, common carp, and tilapia fed with floating feed, sinking feed, and worms. The stocked size is 1–4 cm and harvested when the fish reach 4–6 individuals per kilogram. The culture period is 120 days and the harvest is twice per year with total production reaching 7,304 t/year (Warningsih, 2016).

For one production cycle, inputs including vaccines and probiotics as well as the equipment for producing seed, nursery, and feed are necessary. To sustain the supply of 2.0–2.5 million seeds per month, the fish farmers in Koto Masjid Village coordinate with a local private hatchery that produces the seeds, while the broodstock is obtained from the Fisheries Service of Kampar Regency and other hatchery centers. The fish farmers believe that the quality of seeds from local hatcheries could adapt and grow well to the water source (**Figure 4**). Moreover, local feed producers help supply cheap feed for growing Pangasius. However, additional trash fish and bran come from other provinces such as North Sumatera and West Sumatera to acquire the 18–20 % feed protein.

Figure 4. Aquaculture facilities for Pangasius seedlings and grow-out ponds in Kampong Patin, Riau Province, Indonesia

- **Fish processing**

Koto Masjid Village has 13 fish processing facilities, one cold storage, and one fish market. Post-harvest training courses are provided by the government to add value to fish and encourage the residents to eat fish. The government established 21 groups to produce various processed fish and fishery products including 11 groups for smoked fish, three groups for fish nuggets, two groups for fish skin crackers, three groups for fish balls, and two groups for salted fish. The main product of Kampong Patin is smoked fish using *Pangasius djambal*. The product has a high-quality dried rate and taste. This fish species is locally produced, easy to cultivate, has a fast growth rate, and has a good meat texture.

As shown in **Figure 5**, the women are in charge of the preparation of raw materials including size selection, washing, and filleting 200–300 kg of fish per day. For fish size, they process 4–6 fish per kilogram, and 1 t of fresh fish could produce 290 kg of smoked fish. Moreover, the men are involved in the drying process which can be finished in approximately 2–3 days depending on the combustibles and weather conditions. The fish is smoked in the afternoon until the following day, then taken out from the oven, laid in twelve hours, and re-smoked in the afternoon. After the smoking process, the women clean and pack the smoked fish and sell the product. The packaging materials include cardboard or plastic wrap. One group can produce smoked fish around 20 times in one month.

The fresh catfish price is USD 1/kg while smoked fish can be sold for around USD 4/kg. The smoked fish product has a very large market and most of them are sent to other provinces such as West Sumatera, Jambi, North Sumatera, and Kepulauan Riau. Consumers prefer to consume the product in 3–5 fish/kg, while restaurants demand small sizes of 6–8 fish/kg.

- **Other inland fisheries activities**

The fishery activities in Kampong Patin improved the economic welfare of the local people of various ages and education levels. The Village has a total pond area of 62 ha with a daily production of around 6 t equivalent to USD 6,000 (Hasibuan *et al*., 2019). Aside from aquaculture, the Village has an integrated fisheries business from fish processing, fish marketing, tourism, and education. With the beautiful landscape of the Kotopanjang Reservoir, the local people in Koto Masjid Village promote fishery tourism. The government is also promoting the Village as the center of education for fishery business. The local knowledge of *Lubuk Larangan* is applied by the local people where catching fish is prohibited within one year. Another conservation effort is the restocking of native fish such as pangasius, mystus, and gourami by the local government. Gourami has been successfully domesticated and cultivated in the Kotopanjang Reservoir.

Way Forward

Although the fisheries activities are going well in Kampong Patin, the local people still need capacity-building and strengthening to sustain their livelihood. There is a need to promote the Internet of Things (IoT) which is a growing area of interest in the Indonesian fisheries sector to carry out activities without having to make physical contact during the COVID-19 pandemic. Currently, the most widely practiced IoT-based aquaculture is the monitoring of water quality parameters, including temperature, dissolved oxygen, and pH. Moreover, the government should facilitate the addressing of the needs of the local people, such as providing venues to promote local fishery products, development of fisheries infrastructures and facilities, and providing education for prospective entrepreneurs.

Figure 5. Smoked fish processing in Kampong Patin, Riau Province, Indonesia

IFRDMD in collaboration with the local government is providing assistance to local fishers to improve their skills as well as training young workers in fisheries jobs on technology and digital application of scientific knowledge.

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Guide to Contributing Articles

Fish for the People is a policy-oriented Special Publication produced by the Southeast Asian Fisheries Development Center (SEAFDEC). The first issue of the Special Publication was launched in early 2003 to commemorate the first anniversary of the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security in the New Millennium: "Fish for the People" organized in 2001 from which the Special Publication got its banner title *Fish for the People*. Through the years, *Fish for the People* has been recognized by various stakeholders as a significant source of information to support their works on the sustainable development and management of fisheries and aquaculture in the region. The SEAFDEC Secretariat publishes three issues of the Special Publication each year with support from the Japanese Trust Fund. The publication of articles in *Fish for the People* is free of charge.

Prospective Contributors

- SEAFDEC Secretariat and Departments (researchers, technical staff, project managers)
- SEAFDEC Member Countries (national focal persons of SEAFDEC projects, researchers, fishery officers, professors, students)
- SEAFDEC partner organizations (researchers, technical staff, project managers)
- Non-member countries and other organizations (researchers, managers of projects in the SEAFDEC Member Countries, researchers, fishery officers, professors, students, and those who wish to share experiences that could be applicable to Southeast Asia)

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Types of Articles

- **Research article** - report of new and original research findings including the methodology, data, and analysis in popularized format (2,000–4,000 words)
- **Short communications** - brief analysis and commentary on fisheries development and management that may not be suitable for a full-length research article (1,000–2,000 words)
- **Report on activities under projects** - results and implications including strategy or approach, conclusions, and recommendations for the future direction of work (2,000–4,000 words)
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- **Feature article** - a brief overview of scientific findings for a general audience; interviews and newsworthy topic based on the author's personal experience
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Format and Structure

- Articles should be written in Times New Roman font 11, single space, one-column layout
- The total number of words excludes the abstract, acknowledgments, references, etc.
- Articles should be written in correct English by using spell-check and grammar-check functions and applications to avoid unnecessary errors
- Articles should contain standard style and formats based on SEAFDEC Style (access at http://www.seafdec.org/documents/2021/12/seafdec-style.pdf)
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- Introduction should provide sufficient background (*e.g.* relevance to the RES&POA-2030 and/or other international, regional, or national instruments) and specify the goal and objectives of the work
- Describe the details of materials and method applied, as appropriate for the specific type of article
- Discuss the significance of the key results of the work
- Tables should be created as editable text and not as images
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- Math equations should be given in editable text and not as images
- National currencies should be converted to or provided with equivalent US Dollars (USD)
- Present the main conclusions based on the objectives of the work and applicability of the work to other sites, countries, or regions
- Indicate the future activities of the work, if any
- For non-SEAFDEC articles, indicate the relevance of the work to Southeast Asia
- Briefly describe the role of the donor(s) in the conduct of the work and/or preparation of the article
- Recognize the individuals who provided help during the research and participated in certain substantive aspects of the article (*e.g.* data collection, translations, language editing)
- Ensure that all in-text citations are included in the reference list, and vice versa, please see SEAFDEC Style for the detailed guide to the proper format; consider using a reference management software (*e.g.* Zotero, Mendeley, others) for automatic formatting and make sure to unlink citations and remove all field codes before submitting the article
- Provide the complete names and affiliations of each author including the office/organization's full name and address, email, and other contact details
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CALENDAR OF EVENTS

Date	Mode/venue	Event	Organizer
		2022	
23-24 August	Online	7th Meeting of Scientific Working Group on Neritic Tunas Stock Assessment in the Southeast Asian Region	SEAFDEC/MFRDMD
23-24 August	Pattaya, Thailand	Regional Workshop on Monitoring, Control and Surveillance for Combating IUU Fishing in Southeast Asia	SEAFDEC/TD
23–26 August	Pattaya, Thailand	2nd Regional Technical Consultation on Fishery Statistics and Information in Southeast Asia	SEAFDEC Secretariat
12–17 September	Samut Prakan, Thailand	Regional Training Course on Fisheries Management Tools for Ecosystem Approach to Fisheries Management (EAFM)	SEAFDEC/TD
13–15 September	Sumut Prakan, Thailand	Regional Training on Port State Measures Inspection in Focus of Shipping Container for Fish and Fisheries Product	SEAFDEC/TD
19–28 September	Iloilo, Philippines	Training Course on Mangrove Crab Nursery and Grow-out Operations	SEAFDEC/AQD
20–29 September	Samut Prakan and Rayong Provinces, Thailand	Regional Training Workshop on Gender Mainstreaming in Small-scale Fisheries and Aquaculture in Southeast Asia	SEAFDEC Secretariat & TD
28–29 September	Online meeting	2nd Core Expert Meeting on Fisheries Management Strategies for Pelagic Fish Resources in the Southeast Asian Region	SEAFDEC/MFRDMD
2–6 October	Kuala Terengganu, Malaysia	Regional Training and Workshop on Chondrichthyan Taxonomy, Biology and Data Collection	SEAFDEC/MFRDMD
17–19 October	Bangkok, Thailand	1st Meeting of the Regional Scientific and Technical Committee(RSTC) for the Project Implementing the Strategic Action Programme for the South China Sea and Gulf of Thailand (SCS SAP Project)	SEAFDEC/TD/ SCS project
7–11 November	Samut Prakan, Thailand	Training Course on Ecosystem Approach to Fisheries Management for Mekong River Fisheries Community	SEAFDEC/TD
7–21 November	Rizal, Philippines	Training Course on Community-based Freshwater Aquaculture for Remote Rural Areas of Southeast Asia	SEAFDEC/AQD
8–10 November	Jakarta, Indonesia	7th Meeting of the Regional Scientific and Technical Committee (RSTC7) for the Project Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand (Fisheries Refugia Project)	SEAFDEC/TD/ Fisheries *refugia* project
9 November	Online	FAO Workshop on Fisheries Data Collection and Statistics (Global)	FAO
14–25 November	Panama City, Panama	19th Meeting of the Conference of the Parties of the Convention on International Trade in Endangered Species of Wild Fauna and Flora	CITES
15–27 November	Samut Prakan, Thailand	Regional Training Course on Fish Larvae Phase I: Larval Identification and Early Life History of Marine Fishes	SEAFDEC/TD
22-24 November	Australia (and online)	15th RPOA-IUU Coordination Committee Meeting	RPOA-IUU Secretariat
26–27 November	Samut Prakan, Thailand	Regional Training Course on Fish Larvae Phase I: Larval Fish Identification and Fish Early Life History Science	SEAFDEC/TD/*Refugia* Project
28 Nov–3 Dec	Samut Prakan, Thailand	Regional Training Course on Fish Larvae Phase II: Determining Spawning-nursing Ground and Season Using Larvae Survey Result	SEAFDEC/TD
29 November	Kayu Agung, Indonesia	Workshop of Manual Guidelines for Remodelling of Swamp Fisheries: Conservation Area	SEAFDEC/IFRDMD
29–30 November	Thailand	Regional Workshop to Exchange Information on Catch Documentation Scheme and Traceability of Fish and Fishery Products	SEAFDEC/TD
5–7 December	Iloilo, Philippines	45th Meeting of SEAFDEC Program Committee	SEAFDEC Secretariat & AQD
6–9 December	Samut Prakan, Thailand	Regional Practical Training Course on Geographic Information System and Remote Sensing for Aquaculture	SEAFDEC/TD
8–9 December	Iloilo, Philippines	25th Meeting of the Fisheries Consultative Group of the ASEAN-SEAFDEC Strategic Partnership (FCG/ASSP)	SEAFDEC Secretariat
12 December	Rome, Italy	6th Meeting of the Global Record Working Group	FAO
13–14 December	Rome, Italy	3rd Meeting of the PSMA Technical Working Group on Information Exchange	FAO
23 December	Online	8th Meeting of the Project Steering Committee for the SEAFDEC/ UNEP/GEF Project on Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand	SEAFDEC/TD/Fishery *Refugia* Project

Southeast Asian Fisheries Development Center (SEAFDEC)

What is SEAFDEC?

SEAFDEC is an autonomous intergovernmental body established as a regional treaty organization in 1967 to promote sustainable fisheries development in Southeast Asia. SEAFDEC currently comprises 11 Member Countries: Brunei Darussalam, Cambodia, Indonesia, Japan, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Viet Nam.

Vision

Sustainable management and development of fisheries and aquaculture to contribute to food security, poverty alleviation and livelihood of people in the Southeast Asian region

Mission

To promote and facilitate concerted actions among the Member Countries to ensure the sustainability of fisheries and aquaculture in Southeast Asia through:

i. Research and development in fisheries, aquaculture, post-harvest, processing, and marketing of fish and fisheries products, socio-economy and ecosystem to provide reliable scientific data and information.
ii. Formulation and provision of policy guidelines based on the available scientific data and information, local knowledge, regional consultations and prevailing international measures.
iii. Technology transfer and capacity building to enhance the capacity of Member Countries in the application of technologies, and implementation of fisheries policies and management tools for the sustainable utilization of fishery resources and aquaculture.
iv. Monitoring and evaluation of the implementation of the regional fisheries policies and management frameworks adopted under the ASEAN-SEAFDEC collaborative mechanism, and the emerging international fisheries-related issues including their impacts on fisheries, food security and socio-economics of the region.


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The third prize winner, *Pham Thu Thao*, from the national drawing contest in Viet Nam

National Drawing Contests were organized in all ASEAN-SEAFDEC Member Countries as part of the preparatory process for the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security Towards 2020 "Fish for the People 2020: Adaptation to a Changing Environment" held by ASEAN and SEAFDEC in June 2011 in Bangkok, Thailand, in order to create awareness on the importance of fisheries for food security and well-being of people in the region.