



**PROJECT DOCUMENT**

**ACHIEVEMENTS FOR YEAR 2019**

**Project ID:** 2015040103

<b>Program Category</b>	ASEAN-SEAFDEC ASSP and FCG Mechanism		
<b>Project Title</b>	Research for Enhancement of Sustainable Utilization and Management of Sharks and Rays in the Southeast Asian Region		
<b>Program Strategy No.</b>	I	<b>Total Duration</b>	2015 - 2019
<b>Lead Department</b>	Marine Fishery Resources Development and Management Department (MFRDMD)	<b>Lead Country</b>	None
<b>Donor/Sponsor</b>	Japanese Trust Fund (JTF)	<b>Total Donor Budget</b>	USD 235,578
<b>Project Partner</b>	Training Department (TD) and Secretariat (SEC)	<b>Budget for 2019</b>	USD 43,792
<b>Project Leader</b>	Ahmad Ali / MFRDMD	<b>Project Participating Country(ies)</b>	Cambodia, Indonesia, Malaysia, Myanmar, Thailand and Viet Nam

**PART I: OVERALL PROJECT DESCRIPTION**

**1. Brief Project Description:**

Recently, on a regional level the pressure to list commercially captured shark and ray species on CITES is growing. Therefore, governments need to collect data on these species and to prepare management plans when needed. Identification of elasmobranchs (sharks & rays) species is fundamental of data collection and law enforcement related to CITES. Expertise on identification and biological data collection on sharks and rays in the region needs to be strengthened. In addition, information on utilization of by-catch sharks and rays will be collected and compiled in order to enhance understanding on the importance of sharks and rays in the Southeast Asian region and necessity of fisheries management measures.

**2. Background and Justification:**

About 126 thousand tons of sharks and rays were captured in 2009 in Southeast Asia. High demands for shark fin in Asia raise a concern about shark populations. In 1998, FAO proposed International Plan of Action for the Conservation and Management of Sharks (IPOA-SHARKS) corresponds to increase of shark catch. SEAFDEC conducted the basic study of sharks in the ASEAN region in 2003-2004. Species composition and landing were available for one year at major ports in Brunei, Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand, and Viet Nam. Because of workshops on taxonomy and identification of sharks and rays by SEAFDEC in 2012 and 2014 and publications of three field guidebooks in 2012, 2013 and 2014, data collection on sharks and rays in the region is improving. However, fisheries data in sharks and rays are still insufficient in many Member Countries. On a regional level the pressure to list commercially important and valuable marine species on CITES is growing. Therefore, governments need to collect data on these species and to prepare management plans. Identification of elasmobranch species is fundamental of biological data collection. Expertise on identification and biological data collection on sharks and rays in the region need to be strengthened. Recognition of fully utilized by-catch sharks and rays by a

socio-economic study is necessary in the region. Information on utilization of by-catch sharks and rays will improve fishery management in the region. These activities correspond to 2011 Resolution (No. 10: Strengthen knowledge/science-based development and management of fisheries through enhancing the national capacity in the collection and sharing of fisheries data and information) and Plan of Action (No.4: Enhance regional fishery information systems and mechanisms to facilitate sharing, exchange and compilation of statistics and information that are required at the sub-regional and regional level and apply, where appropriate, regionally standardized definitions and classifications for statistical data to facilitate regional compilation, analysis and data exchange; No. 76: Increase participation and involvement of Member Countries in international fora and technical committees such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); Codex Alimentarius Commission; Food and Agriculture Organization of the United Nations (FAO); Office International des Epizooties (OIE); Regional Fisheries Bodies (RFBs); and World Trade Organization (WTO); and promote ASEAN interest, recognizing that fisheries policies of relevance to the ASEAN region are increasingly discussed and agreed upon at the global level) at the ASEAN-SEAFDEC Conference.

### 3. Project Overall Objectives, Outcomes, Outputs, Indicators and Activities:

#### 3.1 Objectives, Outcome and Output of the Project

Objective	Outcomes	Outputs	Activities
<b>Objective 1:</b> To train technical officers in the participating Member Countries to be able to collect taxonomic and biological data on sharks and rays in their countries	<b>Outcome 1:</b> Improved landing data collection on sharks and rays	Output 1: Taxonomic information of sharks and rays in the region	Activity 1: Identification of Sharks and Rays in the Southeast Asian Region 1.1 On-site training and data collection in the region 1.2 Workshops on identification of sharks and rays and Core Expert Meeting on Sharks Data Collection in the region
<b>Objective 2:</b> To obtain/summarize genetic information for shark and ray species identification in the region by DNA bar-coding	<b>Outcome 2:</b> Improved customs inspection	Output 2: Genetic information for sharks and rays species identification in the region has been obtained/summarized by DNA bar-coding.	Activity 1: Identification of Sharks and Rays in the Southeast Asian Region 1.3 Identification of shark and ray species by DNA bar-coding
<b>Objective 3:</b> To collect information on utilization of sharks and rays in the region for proper fishery management and sustainable utilization	<b>Outcome 3:</b> Improved fishery management on sharks and rays	Output 3: Socio-economic and marketing information of sharks and rays in the region	Activity 2 :Utilization of By-catch Sharks and Rays

#### 3.2 Overall Scope/Description of Project

Activity	Description
Activity 1 Identification of Sharks and Rays in the Southeast Asian Region	MFRDMD will assist Member Countries to strengthen expertise on identification and biological data collection on sharks and rays in the region through on-site trainings and workshops. Also, MFRDMD will obtain and compile genetic information for shark

	and ray species identification in the region by DNA bar-coding.
Activity 2 Utilization of By-catch Sharks and Rays	MFRDMD will visit Member Countries and collect and compile information on utilization of sharks and rays in order to enhance understanding of the importance of sharks and rays in the Southeast Asian region and necessity of fisheries management measures. MFRDMD will hold Core Expert Meetings to summarize the information together with other information including biodiversity, taxonomy and draft of NDFs for SEAFDEC member countries.

**3.3 Activity, Sub-activity and Proposed Budget for 2015-2019** (in case of 5 year project from 2015)

(Unit: USD)

Activity	Sub-Activity	Y1 2015	Y2 2016	Y3 2017	Y4 2018	Y5 2019
Activity 1: Identification of Sharks and Rays in the Southeast Asian Region	Sub-activity 1.1 On-site training in the region	18,400		8,430	10,420	
	Sub-activity 1.2 Workshops on identification of sharks and rays in the region		25,909	9,905		25,909
	Sub-activity 1.3: Identification of shark and ray species by DNA bar-coding	18,900	10,000	13,500	27,400	2,590
Activity 2: Utilization of By-catch Sharks and Rays	Sub-activity 2.1: Country visits	6,492		4,433	9,871	9,000
	Sub-activity 2.2: Summarization and publication					6,293
	Sub-activity 2.3: Core Expert Meeting				28,126	
	<b>Sub-Total Budget</b>	<b>43,792</b>	<b>35,909</b>	<b>36,268</b>	<b>75,817</b>	<b>43,792</b>

**PART II: ACHIEVEMENT OF 2019 PROJECT IMPLEMENTATION**

**1. Achievements of the Project Implementation for the present year <2019>:**

**Sub-activity 1.2:** The Regional Training and Workshop on Chondrichthyan Taxonomy, Biology and Data Collection was conducted from 16-20 June 2019 at MFRDMD. Overall objective is to enhance human resource development in elasmobranch taxonomy and biology as well as technique in data collection of sharks and rays up to species level. Specific objectives are; to conduct a training course on chondrichthyans taxonomy and biology for new participants; to train trainees in the appropriate techniques in recording the morphometric and meristic data at landing sites; to train trainees in collecting and preserving specimens as well as to collect tissue samples for DNA study; to train trainees in collecting and preserving specimens ;to train trainees in management of data recorded at landing sites for NDFs and other purposes. The training was attended by 18 participants from MCs (except Lao PDR, Singapore and Brunei Darussalam), TD and MFRDMD. Participants were trained on the species identification of sharks and rays, SOP for collection of tissue samples for DNA analysis, selecting of samples at landing site, and measurement technique of sharks and rays at landing sites as well as introduction of SEAFDEC-Shark Database. At the end of the training all

participants are able to identify common sharks and rays in the region especially caught in coastal waters.

**Sub-activity 1.3: Identification of shark and ray species by DNA bar-coding**

MFRDMD had received a total number of 27 samples of sharks, rays and chimaeras collected from Andaman Sea (Thailand). We managed to identify their species through DNA barcode which consist two species of sharks (*Centrophorus granulosus* *Centrophorus cf. moluccensis*) six species samples of rays (*Rhinobatos ranongensis*, *Narcine prodorsalis*, *Benthobatis moresbyi*, *Cruriraja andamanica*, *Hexatrygon bickelli*, *Taeniurops meyeri*) and two species of chimaeras (*Chimaera macrospina* and *Hyrolagus cf mitsukurii*). All of these samples except for *Taeniurops meyeri* were new specimens' species collection for MFRDMD data. Other 11 samples (10 samples of sharks and one sample of chimaera) are still in progress since it failed to get their DNA sequences.

**Sub-activity 2.1: A survey on fishers' dependencies, marketing, and trade of sharks and rays at Pontianak, Banjarmasin, Balikpapan and Tarakan in Kalimantan Indonesia** was conducted from 1-16 September in collaboration with researchers from Research Center for Fisheries Jakarta. The specific objectives are: to study the sharks and rays marketing and trade in Kalimantan; to identify the major actors in the marketing and trade of sharks and rays at study areas; to study the shark and ray marketing channels and practices in selected areas in Kalimantan; and to collect basic information on socio-economics and trade data for preparation of NDFs for Indonesia. Initial findings showed that shark and ray resources are found to be important marketing products at all study sites in Kalimantan. Most products were in dried and fresh form. Domestic markets were to Java Island and foreign markets to many countries within and out site the region. Data on marketing channels at all study sites is now analyzed by all researchers and the result will be published by the first quarter of 2020.

**2. Information of Present Year Activity including Involved Stakeholders:**

List of Actual Sub-activity	Type of activity*	Number of Participants			Spent Budget (USD)
		MCs	SEAFDEC	Others	
<b>Activity 1</b>					
Sub-activity 1.2	Training and workshop	15 (7) Cambodia - 2 (0) Indonesia - 2 (2) Malaysia - 3 (1) Myanmar - 2 (1) Philippines - 2 (2), Thailand - 2 (1) Viet Nam - 2 (0)	10 (1) MFRDMD 9 (1) TD 1 (0)		25,909
Sub-activity 1.3	DNA analysis		3 (2) MFRDMD		0
<b>Activity 2</b>					
Sub-activity 2.1	Survey	2 (0) Indonesia	2 (0) MFRDMD		9,871

*Remarks) Regarding the number of participants, please indicate total number of participants (and number of female participants within), such as 20 (10).*

**3. Achievements and Expected Outcome/Outputs of the Activity:**

Planned activity	Expected outcome/output	Achievements
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<b>Activity 1</b>		
Sub-activity 1.2	Improved landing data collection on sharks and rays/ Taxonomic information of sharks and rays in the region/ Yearly updated information on chondrichthyans biodiversity in the region	All participants are able to identify species of sharks and rays using guide books with guidance from lecturers during the training and workshop. The latest updated on the biodiversity of sharks in SEAFDEC member countries was published in 2019 in Indonesian Fisheries Research Journal, Volume 24 No 2: 133-140. The title of paper is 'Biodiversity and Habitat Preferences of Living Sharks in the Southeast Asian Region' Based on regional and national studies conducted by SEAFDEC and member countries since 1999, a total of 196 species of sharks from nine orders and 30 families have been recorded inhabiting from fresh water to deep ocean in this region. Publication of 'Identification guide on Sharks, Skates and Rays in the Southeast Asian Region' (Volume 2) in progress. This volume mostly focuses on deep sea species and coastal species not included in volume 1 published in 2017.
Sub-activity 1.3	Improved customs inspection/ Genetic information for species identification of sharks and rays in the region has been obtained/summarized by DNA bar-coding.	MFRDMD had managed to get DNA sequences of 142 sharks' specimens, 261 rays' specimens, 18 skates' specimens and 2 chimaeras' specimens for DNA barcoding. These specimens consist of 43 species of sharks, 51 species of rays, 4 species of skates and 2 species of chimaeras.
<b>Activity 2</b>		
Sub-activity 2.1	Improved fishery management on CITES listed shark and ray species/socio-economic and marketing information of sharks and rays in Kalimantan Indonesia	Initial findings found that there is no part of shark and ray being wasted. There are high diversity of products produced from shark and ray excluding fin, such as meat, skin, cartilages, teeth, intestine, stomach; it generated massive livelihood for community not on the direct beneficial, such as fishers, boat owners, exporters, collectors, wholesalers, retailers and processors but also various labor workers in different level such as port workers and transportation; livelihood and source of protein has been significantly generated by shark and ray resources. Community have dependency to the resources as part of their livelihood or affordable protein resources.

**4. List of Completed Publications and Others (e.g. technical report, VDO, presentation file, etc.):**

<b>List of completed publications for the year 2019</b>	<b>Type of media</b>	<b>Attached e-file</b>
1. Dharmadi, Andhika, P.P. and Ahmad A. 2019. Marketing and Trade of Sharks and Rays in Java and Sumatera, Indonesia. SEAFDEC/MFRDMD/43. 32pp	<b>Book</b>	<b>Yes</b>
2. Ahmad, A., Lim, A.P.K., Fahmi, Dharmadi and Krajangdara, T. 2017. Identification Guide to Sharks, Rays and Skates of the Southeast Asian Region (Volume 2) . SEAFDEC/MFRDMD/SP/31: Will be published by December 2019	<b>Book</b>	<b>No</b>
3. Mohd Amirullah, A, Hamizah, A and Ahmad, A. 2019. Proceeding of Core Expert Meeting on Research for Enhancement of Sustainable Utilization and Management of Sharks and Rays in the Southeast Asian Region9 – 10 October 2018, Kuala Lumpur, Malaysia.	<b>E-book</b>	<b>Yes</b>
4. Ahmad, S., Ahmad, A., Tai, S.Y., Aswani, F.M.N., and Nurhafizah, M. 2019. Perception of Artisanal Fishers on Shark and Ray Resources, Proceeding Second Indonesia Sharks and Rays Symposium 2018: Ministry of Marine Affair and Fisheries, Indonesia. ISBN: 978-979-789-055-1, pp 339-347.	<b>Proceeding of Regional Workshop</b>	<b>Yes</b>
5. Aswani, F.M.N., Ahmad, S., Tai, S.Y., Ahmad, A., and Nurhafizah, M. 2019. Dependency of Artisanal Fishers on Sharks and Rays in Sabah, Malaysia, Proceeding Second Indonesia Sharks and Rays Symposium 2018: Ministry of Marine Affair and Fisheries, Indonesia. ISBN: 978-979-789-055-1, pp 349-358.	<b>Proceeding of Regional Workshop</b>	<b>Yes</b>
6. Illisriyani, I., Fatimah, M.A., Kusairi, M.N., Tai, S.Y., Ahmad, S., Ahmad, A., Aswani, F.M.N, Nurhafizah, M., and Allia, F.R. 2019. A Study on Domestic Marketing of Sharks and Rays in Sabah, Malaysia. Proceeding Second Indonesia Sharks and Rays Symposium 2018: Ministry of Marine Affair and Fisheries, Indonesia. ISBN: 978-979-789-055-1, pp 193-203.	<b>Proceeding of Regional Workshop</b>	<b>Yes</b>
7. Tassapon, K, Ahmad, A. Chavalit, V. Supachai, R and Nantarika, C, 2019 Guidebook to cartilaginous Fishes of Thailand and Adjacent Waters. Department of Fisheries Thailand. 146 pp. In press will be ready by November 2019	<b>Book (in Thai Language)</b>	<b>No</b>
8. Sukchai, A., Ahmad, A., Worawit, W. and Virgilia, T. S. Paving the Way for the Development of Non-detriment. Findings: Towards Precise Species Identification of Sharks and Rays in Southeast Asia. Fish for the people. Volume 17 Number 2: 2019; 10-15	<b>Fish for the People</b>	<b>Yes</b>
9. Ahmad, A. 2019. Status of Elasmobranch Fisheries in the Southeast Asian Region. Paper Presented at Training on Age Determination Using Vertebra for Sharks and Rays. 29 April-1 May 2019, Bangkok Thailand	<b>Power point/Pdf</b>	<b>Yes</b>
10. Ahmad, A. 2019. Overview on the Proposed Listing of Shortfin mako shark ( <i>Isurus oxyrinchus</i> ) Longfin mako	<b>Power point/Pdf</b>	<b>Yes</b>

shark ( <i>Isurus paucus</i> ) into CITES Appendices: Paper presented at Regional Consultation for Development of the ASEAN-SEAFDEC Common Position on the Proposed Listing of Commercially-exploited Aquatic Species into the CITES Appendices 30-31 January 2019, Bangkok, Thailand.		
11. Ahmad, A., Abdul Haris Hilmi, A.A., and Lawrence K. Jr. 2019. Possible Development of NDF documents for <i>Glucostegus</i> spp. <i>Rhina encylostoma</i> and <i>Rhynchobatus</i> spp. Paper Presented at National Workshop on Non-Detriment Findings (NDFs) for CITES Listed Marine Species 6-7 August 2019 Tawau, Sabah, Malaysia.	<b>Power point/Pdf</b>	<b>Yes</b>
12. Ahmad, A. and Lawrence, K. Jr. 2019. NDFs for Sharks (Malaysia). Case study: NDFs for <i>Sphyrna lewini</i> in Malaysia. (Using Germany's NDFs). Paper Presented at National Workshop on Non-Detriment Findings (NDFs) for CITES Listed Marine Species 6-7 August 2019, Tawau, Sabah, Malaysia.	<b>Power point/Pdf</b>	<b>Yes</b>
13. Ahmad, A. 2019. NDFs of Aquatic Marine Species in Malaysia. Paper Presented at National Workshop on Non-Detriment Findings (NDFs) for CITES Listed Marine Species 18 September 2019 Jakarta, Indonesia.	<b>Power point/Pdf</b>	<b>Yes</b>
14. Ahmad, A. 2019. Research Finding on Status of Sharks and Rays Resources and Biodiversity (Case Study in Malaysia). Paper presented at National Workshop on Non-Detriment Findings (NDFs) for CITES Listed Marine Species 18-19 July 2019 Bangkok, Thailand.	<b>Power point/Pdf</b>	<b>Yes</b>
15. Ahmad, A. NDFs for silky shark ( <i>Carcharhinus falciformis</i> ) in Indonesia. Paper presented at National Workshop on Non-Detriment Findings (NDFs) for CITES Listed Marine Species 18-19 July 2019 Bangkok, Thailand.	<b>Power point/Pdf</b>	<b>Yes</b>
16. Ahmad, A. 2019. Status Elasmobranch Fisheries in South East Asia. Paper Presented at Training on the Taxonomic Identification and SEAFDEC Data Collection Protocol for Sharks and Rays in the Philippines. 15-17 January 2019, Iloilo City. Philippines.	<b>Power point/Pdf</b>	<b>Yes</b>
17. Ahmad, A. 2019. Data Management for Stock Assessment Using Excel and Pivot Table. Paper presented at Training on the Taxonomic Identification and SEAFDEC Data Collection Protocol for Sharks and Rays in the Philippines. 15-17 January 2019, Iloilo City. Philippines	<b>Power point/Pdf</b>	<b>Yes</b>
18. Ahmad, A. and Sato, A. 2019. Update on Progress and Status of Endangered Aquatic Species Issues. Position of the ASEAN-SEAFDEC Member Countries on the Listing of Commercially-Exploited Aquatic Species into the CITES Appendices at the CITES-COP18 (longfin and shortfin makos, guitarfishes, wedgefishes, three species belonging to the subgenus <i>Holothuria</i> ). Paper presented at The Fifteenth Meeting of The ASEAN Working Group on the Convention on	<b>Power point/Pdf</b>	<b>Yes</b>

International Trade In Endangered Species on Wild Fauna and Flora and Wildlife Enforcement (15th AWG-CITES and WE) 2-4 April 2019, Sandakan, Malaysia.		
19. Wahidah Mohd Arshaad & Noorul Azliana Jamaludin. 2019. DNA Barcoding Revealed Species of Rays in Southeast Asian Region. Paper presented at National Research Seminar on 22-24 January 2019 at Fisheries Research Institute, Penang.	<b>Power point/Pdf</b>	<b>Yes</b>
20. Wahidah Mohd Arshaad & Noorul Azliana Jamaludin. 2019. Species Identification of Sharks in Southeast Asian Region through DNA Barcoding Approach. Paper presented at National Research Seminar on 22-24 January 2019 at Fisheries Research Institute, Penang.	<b>Power point/Pdf</b>	<b>Yes</b>

**5. Evaluation from Participants of Member Countries for WS and Training Course (if available):**

<b>Planned activity</b>	<b>Evaluation/ Views from Participants</b>
<b>Activity 1</b>	
Sub-activity 1.2	Course Content: very good Course duration: appropriate Training Methods, Equipment and Facilities: Appropriate

**6. Major impacts/issues:**

The major issue is lack of communication skill in English among participants and limited funding to conduct study and on-site training at large scale. In some case trained enumerators were promoted to higher level with new work commitments. New enumerators need to be trained each year to replace them. Some countries send wrong participants such as administrator and manager to attend training and workshop on taxonomy without and any basic knowledge on biology. They are not working in the field as well as in sharks' data collection project. When back to their countries most of them were not able to teach their enumerators to follow SOP on data collection provided by SEAFDEC. In this regard member countries should send qualified candidates as stated in the invitation letter those are directly involved in the data collection project. Participants from some countries also lack knowledge in statistics and need to be trained properly. In this regard data evaluation and verification workshop in each participating country are compulsory to ensure all data are validated by experts.

**PART III: ACHIEVEMENTS IN OVERALL PROJECT DURATION**

**1. Abstract of Achievements in the Overall Project Duration (5 years):**

Objective 1:  
Since 2015, 40 participants attended the training and workshop at MFRDMD and more than 40 participants attended on-site training in Viet Nam. Trained participants from member countries, SEAFDEC and universities are able to identify species of sharks and rays using SEAFDEC guidelines with guidance by lecturers during the training and workshop conducted at MFRDMD. Most of participants from member countries are now working in the field on data collection under SEAFDEC and country funding.

The Core Expert Meeting on Research for Enhancement of Sustainable Utilization and Management of Sharks and Rays in the Southeast Asian Region was organized by the Marine Fishery Resources Development and Management Department (SEAFDEC/MFRDMD) in Kuala Lumpur, Malaysia from 9<sup>th</sup> – 10<sup>th</sup> October 2018. This meeting is part of the continuous efforts organized by SEAFDEC



for sustainable utilization of sharks and rays in the Southeast Asian waters. The Core Expert Meeting aims at obtaining information on the current landing data collection and trade of sharks and rays and discussing ways to improve the data/information collection in the new 5-year Japanese Trust Fund VI Phase II project from 2020-2024. The meeting was attended by the representatives from Cambodia, Indonesia, Malaysia, Myanmar, the Philippines, Thailand, Viet Nam, SEAFDEC/Secretariat, SEAFDEC/TD, SEAFDEC/MFRDMD as well as resource persons from Japan Fisheries Research and Education Agency, Kasetsart University and Ubon Ratchathani University. Issues presented and discussed were including data collection/management (NPOA-Sharks)/CITES listed species, marketing, international trade (NDFs) and socioeconomic studies on sharks and rays.

**Objective 2:**

MFRDMD had collected samples from 16 locations namely Beluran, Kota Kinabalu, Sandakan and Tawau (Sabah); Kuantan, Temerloh, Pekan and Rompin (Pahang); Bagan Panchor (Perak); Dungun (Terengganu); Mukah (Sarawak) for Malaysia, Sihanoukville (Cambodia); Yangon (Myanmar); Phuket and Andaman Sea (Thailand) and Vung Tau (Viet Nam). Samples were collected during site visit and training program implemented for this project. MFRDMD had managed to sequence 142 sharks' specimens, 261 rays' specimens, 18 skates' specimens and 2 chimaeras' specimens for DNA barcoding. These specimens consist of 43 species of sharks, 51 species of rays, 4 species of skates and 2 species of chimaeras. From of this DNA sequence, 60% have been uploaded to the Barcode of Life Data Systems (BOLD; <http://boldsystems.org>) as reference globally. Some of the data were new DNA sequences in BOLD.

**Objective 3:**

Survey conducted in Java, Sumatera and Kalimantan in 2018 and 2019 found that there were high diversity of products produced from sharks and rays excluding fin, such as meat, skin, cartilages, teeth, intestine and stomach. Resources of sharks and rays generated massive livelihood for coastal communities of not only direct beneficiaries i.e. fishers, boat owners, exporters, collectors, wholesalers, retailers and processors but also various labor workers in different level of marketing channels such as, factories, port and transportation workers. A source of livelihood and protein has been significantly generated by shark and ray resources. Poor remote communities in the middle part of Indonesia depend on the dried meat of sharks and rays as protein resources. A survey report conducted in Java and Sumatera in 2018 was published in 2019.

**2. Implemented Activities/sub-activities in the Overall Project Duration:**

List of Activities	Description of Implemented Activities
<b>Activity 1</b>	
Sub-activity 1.1	On-site training was conducted at Vung Tau in Viet Nam in 2015, 2017 and 2018 in collaboration with SEAFDEC Secretariat. The 4 days- training were conducted by lectures, field trips at landing sites and laboratory works. In summary 20 participants attended the training and most of them were working in the field of data collection. Others were university lecturers and post graduate students. All specimens used during the training were preserved in formalin and ethanol at Vung Tau Fisheries Research Center for future references.
Sub-activity 1.2	Two workshops on identification of sharks and rays in the region were conducted at MFRDMD in 2016 and 2019. The 5-day trainings were conducted by lectures, field trips and laboratory work. During each training participant was guided to identify at least 30 species of sharks and 30 species of rays. All specimens were in fresh condition. At the end of training all specimens were preserved in formalin and ethanol in MFRDMD repository for future references.

Sub-activity 1.3	Necessary chemicals, disposable laboratory consumables, DNA extraction kits, a PCR machine were purchased for genetic analysis. DNA extraction, PCR analysis, sequencing was done by using mitochondrial <i>cytochrome oxidase I</i> (COI) universal primers (CCDB Protocols). Sequences were deposited in Genbank and BOLD after verification by blast search and construction of phylogenetic trees.
<b>Activity 2</b>	
Sub-activity 2.1	Country visits to study marketing and trade of sharks and rays were conducted in 2018 in Java (Jakarta, Cilacap, Pelabuhan Ratu, Surabaya, Indramayu, Tegal and Semarang) and Sumatera (Lampulo, Banda Aceh and Melabuh) and 2019 in Kalimantan (Pontianak, Banjarmasin, Balikpapan and Tarakan). Data were collected using standard form prepared by MFRDMD. Respondents interviewed were traders, factory owners, processors, middlemen, skippers, small scale processors and wholesales.
Sub-activity 2.2 (if any)	
Sub-activity 2.3	The Core Expert Meeting on Research for Enhancement of Sustainable Utilization and Management of Sharks and Rays in the Southeast Asian Region was organized by the Marine Fishery Resources Development and Management Department (SEAFDEC/MFRDMD) in Kuala Lumpur, Malaysia from 9th – 10th October 2018. The meeting was attended by the representatives from Cambodia, Indonesia, Malaysia, Myanmar, the Philippines, Thailand, Viet Nam, SEAFDEC/Secretariat, SEAFDEC/TD, SEAFDEC/MFRDMD as well as resource persons from Japan Fisheries Research and Education Agency, Kasetsart University and Ubon Ratchathani University. Issues presented and discussed were including data collection/management (NPOA-Sharks)/CITES listed species, marketing, international trade (NDFs) and socio-economic studies on sharks and rays.

### 3. Achievements and Outcomes/Outputs of Activities in the Overall Project Duration:

List of Activities	Achievements and Outcomes/Outputs of Activities
<b>Activity 1</b>	
Sub-activity 1.1	<p>Outcome. Improved landing data collection on sharks and rays. Landing data at several landing sites in participating countries are recorded at species level. The project is still continued in Malaysia, Myanmar, Cambodia and Indonesia using SEAFDEC and national budget.</p> <p>Output. Taxonomic information of sharks and rays in the region. The total number of shark, skate and ray species in the region increased especially on skates in Viet Nam, sharks in Myanmar and deep water sharks and rays in Thailand</p>
Sub-activity 1.2	<p>Outcome. Quality of landing data collection on sharks and rays in the region was improved based on presentation by participating countries. Some countries such as Indonesia and Malaysia manage to prepare NDFs for CITES listed species based on data collection project sponsored by SEAFDEC.</p> <p>Output. Taxonomic information of sharks and rays in the region. Based on</p>

	regional and national studies conducted by SEAFDEC and member countries since 1999, a total of 196 species of sharks from nine orders and 30 families have been recorded inhabiting from fresh water to deep ocean in this region.
Sub-activity 1.3	Outcome 2: Improved customs inspection. Genetic information (DNA bar-coding) assists to distinguish the look-a-like species and incomplete specimen (e.g. a piece of tissue). Output 2: Genetic information for species identification of sharks and rays in the region has been obtained/summarized by DNA bar-coding.
<b>Activity 2</b>	
Sub-activity 2.1	Outcome: Improved fishery management on sharks and rays. Information on marketing and trade collected in 2018 and 2019 studies are very useful for Indonesia to prepare NPOA-Sharks as well as to prepare NDFs for new listing of sharks and rays during CoP18. Output: Socio-economic and marketing information of sharks and rays in the region showed that many fishers in the region utilized almost all part of sharks and rays. A source of livelihood and protein has been significantly generated by shark and ray resources. Poor remote communities in the middle part of Indonesia and Malaysia depend on the dried meat of sharks and rays as protein sources. The survey report conducted in Java and Sumatera in 2018 was published in 2019. The report for Sabah was published in 2017 using the national fund.
Sub-activity 2.2 (if any)	
Sub-activity 2.3	The Core Expert Meeting on Research for Enhancement of Sustainable Utilization and Management of Sharks and Rays in the Southeast Asian Region was organized by the Marine Fishery Resources Development and Management Department (SEAFDEC/MFRDMD) in Kuala Lumpur, Malaysia from 9th – 10th October 2018. Papers presented during the CEM were published in an e-book proceeding.

#### 4. Evaluation and Major Impacts/Issues in the Overall Project Duration:

All planned activities were successfully conducted with a very good cooperation from all AMSs. Some AMSs such as Malaysia and Indonesia manage to use landing and marketing data collected during the study period to prepare NDFs for CITES listed species such as scallop hammerhead sharks in Malaysia and silky sharks in Indonesia. Nevertheless, there were some issues on the reliability of the landing data collection because some participating countries were not able to record accurately due to less experiences and knowledge of their enumerators. The final report was prepared after all data were verify and correction was made accordingly by experts. The other issue was limited budget to hire enumerators to work more than five days a month. All AMSs except Thailand, Malaysia and Indonesia implementing the project totally depending on the SEAFDEC fund. The national data collection project will be terminated by AMSs after allocation of budget from SEAFDEC was stopped. With short-term length-weight data, information on stock status and biomass of each species especially CITES listed species is not possible to be estimated.

Survey to collect information on marketing and trade of sharks and rays conducted only in Java, Sumatera and Kalimantan in Indonesia. Information from other countries except Malaysia is scanty. At present most information on trade and marketing depends only on limited survey conducted by NGOs and some information is not true. Since resources of sharks and rays is very important as a source of income for livelihood of coastal fishers and a source of protein of poor communities in the

region, this study should be extended to other countries such as Myanmar, the Philippines, Cambodia and Viet Nam.

The project has successfully obtained the genetic information for sharks and rays through DNA barcoding, for present and future species identification. The DNA barcodes also have greatly assisted in confirmation of look-like species.

## 5. Publications and Others (e.g. technical report, VDO, presentation file, etc.):

### 2015

1. Ahmad, A. 2015. Implementation of the National Plan of Action for Conservation and Management of Shark Resources in Malaysia (Malaysia NPOA-Shark). Southeast Asian Fisheries Development Center – Marine Fisheries Resources Development and Management Department. SEAFDEC/MFRDMD/SP/30, 55 pp.
2. **Ahmad, A.**, Annie, L.P.K., Fahmi, Dharmadi and Tassapon, K. 2015. Diversity and look-alike species of sharks and rays in the Southeast Asian waters. Paper presented at the Core Expert Meeting on Sharks and Rays in Southeast Asian Waters”, 3-4 March 2015, Quality Hotel, Kuala Lumpur.
3. Wahidah, M.A., **Ahmad, A.**, and Adam, K.P. 2015. Genetic species identification of sharks and rays at the JTF5 project in 2013-14. Paper presented at the Core Expert Meeting on Sharks and Rays in Southeast Asian Waters”, 3-4 March 2015, Quality Hotel, Kuala Lumpur.
4. **Ahmad, A.** 2015. Data collection of sharks and rays up to species. Malaysia experience. Paper presented at the Regional Technical Meeting on Sharks and Rays Data Collection and Project Planning Year 2015-2016. 26- 28 May 2015, Bangkok, Thailand.
5. **Ahmad, A.** 2015. Knowledge experience and lesson learnt in reviewing of non-detriment findings (NDFs) of Scallop hammerhead (*Sphyrna lewini*) in Malaysia. Paper presented at the Regional Technical Meeting on Sharks and Rays Data Collection and Project Planning Year 2015-2016. 26 - 28 May 2015, Bangkok, Thailand.
6. Robert, H., **Ahmad, A.**, and U Saw, H. S. 2015. Status of the sharks and rays fishery within Myanmar Including socio-economic importance. TCP Report No 12, May 2015. BOBLME/FFI. 36p Robert, H., **Ahmad, A.**, and U Saw, H. S. 2015. Status of the sharks and rays fishery within Myanmar Including socio-economic importance. TCP Report No 12, May 2015. BOBLME/FFI. 36p
7. **Ahmad, A.**, Abdul Haris Hilmi, A. A and Ismail, I. 2015. Implementation of the National Plan of Action for Conservation and Management of Shark Resources in Malaysia (Malaysia NPOA-Shark). BOBLME Terminal Report. 35pp

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1. **Ahmad, A.** 2016. Case study: NDFs for *Sphyrna lewini* in Malaysia. Paper Presented at Workshop on CITES Species Non-detriment Findings (NDFs) 21 to 22 July 2016 Sandakan, Sabah Malaysia
2. SEAFDEC MFRDMD. 2016. DNA Barcoding of Sharks and Rays. *Special Report of SEAFDEC Newsletter* 39 (4), 8-9.
3. Wanchana, W and **Ahmad, A.** 2016. Application of Standard Operating Procedures for Collecting Data on Sharks and Rays in Southeast Asian Countries. *Fish for the People*, 43 (3), 51-55.
4. Wanchana, W and **Ahmad, A.** 2016. Recording Sharks and Rays Statistics from Southeast Asia at Species Level. *Fish for the People*, 14 (1), 2-6.
5. **Ahmad, A.**, Lim, P.K. 2016. Elasmobranch biodiversity in the Southeast Asian Region. Paper presented at On-site training on taxonomy and biology of elasmobranch in Vietnam. Vun Tau, Vietnam; 23-27 May 2016
6. **Ahmad, A.**, and Lim, A.P. 2016. Introduction to taxonomy and biology of Chondrichthyes. Paper presented at On-site training on taxonomy and biology of elasmobranch in Vietnam. Vun Tau, Vietnam; 23-27 May 2016

7. **Wahidah, A., Adam Luke, A.P and Ahmad, A.** 2016. DNA barcoding technique for identification of Chondrichthyes species and SOP for collecting tissue sampling for DNA study. Vun Tau, Vietnam; 23-27 May 2016
8. **Ahmad, A.** 2016. Analysis of Shark and Ray Landings Data for Fisheries Management in Myanmar using Pivot Table. Paper Presented at National Workshop on Validation of Sharks and Rays Landing Data, 9-11 February 2016 Yangon, Myanmar.
9. **Ahmad, A.** 2016. Analysis of Shark and Ray Landings Data for Fisheries Management in Thailand using Pivot Table. Paper Presented at National Workshop on Validation of Sharks and Rays Landing Data, 29-30 April 2016, Songkhla, Thailand.
10. **Ahmad, A.** 2016. Analysis of Shark and Ray Landings Data for Fisheries Management in Vietnam using Pivot Table. Paper Presented at National Workshop on Validation of Sharks and Rays Landing Data. 22- 27 May 2016. Vun Tau, Vietnam.
11. Tai, S. Y., Kusairi, M.N., Ahmad, S., Fatimah, M.A., **Ahmad, A.**, Aswani Farhana, M.N. and Nurhafizah, M. 2016. A Study on Fishers Dependencies and Marketing of Sharks and Rays in Sabah. Paper presented at the FAO Meeting on the Impacts of CITES Listing of Sharks and Rays in the South and Southeast Asian Region 19-20 April 2016, Penang.
12. **Ahmad, A.** 2016. Inclusion of the genus *Mobula spp.* in Appendix II CITES. Paper presented at 'SEAFDEC Experts Meeting on Commercially-exploited Aquatic Species' 16-17 May 2016, Bangkok, Thailand.
13. **Ahmad, A.**, Abdul Haris Hilmi, A.A, Lawrence. K.Jr. Kissol Jr., and Lim, A.P.K. 2016. Research Findings on the Status of Chondrichthyes Biodiversity in Malaysia. Paper Presented at CITES Species Non-Detriment Findings Workshop (NDFs), 21-22 July 2016, Sandakan, Sabah Malaysia.
14. Ahmad, S., Tai, S. Y., Fatimah, M. A., Kusairi, M. N., **Ahmad, A.**, Aswani Farhana, M. N. and Nurhafizah, M. 2016. A Study on Fishers Dependencies of Sharks and Rays in Sabah. Paper presented at CITES Species Non-Detriment Findings Workshop (NDFs), 21-22 July 2016, Sandakan, Sabah Malaysia
15. **Ahmad, A.** 2016 Introduction to CITES Sharks and Rays Non-Detriment Findings (Germany's NDF). Paper Presented at CITES Species Non-Detriment Findings Workshop (NDFs), 26-27 July 2016, Jakarta, Indonesia.
16. **Ahmad, A.** 2016. Standard Operational Procedures on Sharks Data Collection. Paper presented at 'Project-end-Meeting on Sharks Data Collection in Southeast Asia 16 - 18 August 2016, Manila, Philippines.
17. Abdul Haris Hilmi, A.A. and **Ahmad, A.** 2016. Status of Data Collection of Shark and Ray Landings in Perak. Paper presented at CITES Species Non-Detriment Findings Workshop (NDFs), 21-22 July 2016, Sandakan, Sabah Malaysia.
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19. Fatimah, M. A., Tai, S. Y., Ahmad, S., Kusairi, M. N., **Ahmad, A.**, Aswani Farhana, M. N. and Nurhafizah, M. 2016. Progress of Marketing of Sharks and Rays study in Sabah. Paper Presented at CITES Species Non-Detriment Findings Workshop (NDFs), 21-22 July 2016, Sandakan, Sabah Malaysia.

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3. Fatimah, M. A., Kusairi, M. N., Tai, S. Y., Ahmad, S., **Ahmad, A.**, Nurhafizah, M., Aswani Farhana, M. N., Allia Farhana R. 2017. Marketing of Sharks and Rays in Sabah and International Trade of Malaysia's Sharks and Rays. SEAFDEC/MFRDMD/SP33
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6. Tan, G.H., **Ahmad, A.**, Syed Abdullah, S.A.L., Haryati, W. and Faizah, I. 2017. Malaysia initiative on threatened species management and conservation. Paper presented at CTI-CFF First Threatened species working group meeting, 22-23 Mac 2017, Putrajaya. Malaysia.
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2. **Ahmad, A.**, Dharmadi, Andhika, P. P. and Mohd Saki Nor. (2018). A Survey on Fishers Dependencies, Marketing and Trade of Sharks and Rays in Java and Sumatera, Indonesia (30 July-7 Sep. 2018). Paper present at Core Expert Meeting on Research for Enhancement of Sustainable Utilization and Management of Sharks and Rays in the Southeast Asian Region, 9-10 October 2018 Kuala Lumpur, Malaysia
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5. **Ahmad, A.**, Lawrence, K. and Yusri, Y. 2018. Case study: NDFs for *Sphyrna lewini* in Malaysia (Using Germanys' NDF). Paper presented at the ASEAN CITES WORKSHOP Implementing the sharks and rays Appendix II Listings on the Convention on International

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  7. Ahmad, S., **Ahmad, A.**, Tai, S. Y., Aswani Farhana, M. N. and Nurhafizah M. 2018. Perception of Artisanal Fishers on Shark and Ray Resources. Paper presented at 2nd Indonesia Shark and Ray Symposium. 28-29 Mac 2018, Jakarta, Indonesia.
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  13. Akbar, B. J., Muhamad Asrul, M. A., **Wahidah, M. A.**, Jalal, K. C. A. and Hassan I. S. 2018. DNA Barcoding of Rays from the South China Sea. *In: Subrata, T. et al. (eds.) DNA Barcoding and Molecular Phylogeny.* Springer: pp.229-244.
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