Report of the Technical Experts Meeting on Management of Transboundary Species for Northern Andaman Sea

Bangkok, Thailand

13-14 March 2018

THE SECRETARIAT

SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER

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REPORT OF THE TECHNICAL EXPERTS MEETING ON MANAGEMENT OF TRANSBOUNDARY SPECIES FOR NORTHERN ANDAMAN SEA
13-14 March 2018, Bangkok, Thailand

EXECUTIVE SUMMARY

The Technical Experts Meeting on Management of Transboundary Species for Northern Andaman Sea was held on 13-14 March 2018 in Bangkok, Thailand which was organized and facilitated by SEAFDEC-Sweden Project. Total 22 participants from Myanmar and Thailand, SEAFDEC Secretary-General, SEAFDEC/Marine Fishery Resources Development and Management Department (MFRDMD), SEAFDEC Secretariat, SEAFDEC/Training Department (TD) and members of Regional Fisheries Policy Network (RFPN) participated in the Meeting.

The objective of the Meeting was to identify existing data on anchovies, mackerels and Neritic tunas that can be used to produce maps of these features covering the Northern Andaman Sea. The Meeting focused on data on spawning grounds, spawning seasons, other biological data, habitats and migration patterns as well as existing fisheries regulations. The resulting maps could serve as inputs to future coordination of national fisheries measures.

The Meeting agreed on a roadmap to produce digital maps of the biological features and fisheries regulations for anchovies, mackerels and Neritic tunas in the Northern Andaman Sea. Other supporting information such as catch statistics would also be collected. The main action points in the roadmap are listed below.

- The two countries agreed on a list of maps they would be likely to have data for and will collect and compiled these existing data for anchovies, mackerels and Neritic tunas in collaboration and coordination with other agencies, research institutions and universities.
- The data will be sent to SEAFDEC/Training Department (TD) in accordance with a number of deadlines but at the latest 31 May 2018. SEAFDEC/TD will make a first set of draft maps based on the data provided by the countries.
- SEAFDEC will send the draft maps to the participants in advance of the follow up meeting which is planned for beginning of July. At the meeting the draft maps will be discussed and needs for revision identified. Depending on data quality the meeting will also study possible future needs for coordination of fisheries measures, based on the maps.

I. BACKGROUND AND OPENING OF THE MEETING

1. The Technical Experts Meeting on Management of Transboundary Species for Northern Andaman Sea was held on 13-14 March 2018 in Bangkok, Thailand. The Meeting was attended by Senior Officers of Myanmar and Thailand, SEAFDEC Secretary-General, SEAFDEC/Marine Fishery Resources Development and Management Department (MFRDMD), SEAFDEC/Secretariat, SEAFDEC/Training Department (TD) and members of Regional Fisheries Policy Network (RFPN). This Meeting was organized and facilitated by the SEAFDEC-Sweden Project. The list of participants appears as **Annex 1**.

2. The Meeting was convened as follow-up to the recommendation made at the Third Sub-regional Consultative Workshop of the Northern Andaman Sea, which was held on 16-17 November 2017 in Bangkok, Thailand. In that Consultative Workshop, it was recommended that the transboundary species of anchovies, mackerels, and Neritic tunas, should be targeted for cooperation and collaboration between Thailand and Myanmar, thus, the objective of this Meeting is to identify the existing biological and fisheries related information to understand the migration patterns of these species to be able to agree on the facts and present situation. Based on these facts Myanmar and

Thailand can then discuss what cooperation would be necessary to manage the fisheries on these species.

3. *Dr. Kom Silapajarn*, SEAFDEC Secretary-General, and also the Chairperson of the Meeting, warmly welcomed the participants. He stressed the important work of this Meeting will form the scientific basis for coordination of management and co-management and conservation of transboundary species in the Northern Andaman Sea. The opening remarks appears as **Annex 2**.

II. INTRODUCTION AND OBJECTIVES OF THE MEETING AND ADOPTION OF AGENDA

4. *Dr. Bamroongsak Chatananthawej*, Andaman Sea and Mekong River Basin Sub–region Coordinator, on the introduction, briefly explained the background of the Meeting. During the meeting, the "*Third Sub-regional Consultative Workshop of the Northern Andaman Sea/Myeik Archipelago*" on 16-17 November 2017 held in Bangkok, Thailand. Myanmar and Thailand agreed that existing biological data and fisheries related activities on some transboundary species from the Northern Andaman Sea should be compiled so that it will serve as a basis for future coordination of management of transboundary species between Myanmar and Thailand. This is also in line with the MoU between Department of Fisheries for Myanmar and Thailand from February 2017.

5. The objectives of the Meeting were to identify existing data on anchovies, mackerels and Neritic tunas that can be used as inputs to a future coordination of national management plans and to determine any additional data needed to confirm spawning ground, spawning season including biological data, habitats and migration pattern based on existing information. The objective of the meeting appears as **Annex 3**.

6. The general timeline for the work proposed was to compile data and produce draft joint maps for a follow up meeting in the end of June. From July to October a draft agreement of coordination of management of the transboundary species will be developed to be discussed at a bilateral meeting in October.

7. The Meeting adopted the agenda which appears as **Annex 4**.

III. PRESENTATION ON AVAILABLE DATA AND INFORMATION ON THE TARGET TRANSBOUNDARY SPECIES IN NORTHERN ANDAMAN SEA

3.1 Anchovies

- **Myanmar** (Myeik Archipelago)

8. *Dr. Htun Thein***,** Deputy Director of Myanmar Department of Fisheries (DoF), presented the anchovy fisheries in Myanmar. There are two main types of purse seine nets operated in Myanmar waters, the fish purse seine which is used to catch small pelagic species and the anchovy purse seine used in coastal waters. There are two dominant species of anchovy in Myanmar, the *Stolephorus indicus* and *Stolephorus commersoni*. The average size is about 14.8 cm in Rakhine (Arakhan) coast. The total catch in three different regions, Rakhine, Delta and Tanintharyi (6,299 NM^2) is about 51.763 MT and not separated by species. The Tanintharyi Region had the highest catches of pelagic fish of the three regions. Fisheries survey data on stock size from acoustic sampling of pelagic species include however all pelagic species. The data can however probably be disaggregated to species composition. There was no information on the spawning grounds. The larvae are usually found close to the river mouth which could therefore be to functional nursery ground. There was no more information about anchovy as stated. The presentation is available in **Annex 5**.

9. Presently there are eggs and larvae data from the Fritjof Nansen surveys, the last survey from 2013-2015. These data could possibly be used to estimate spawning areas for anchovy in Myanmar areas. Participants who attended the previous "Training Course on Larvae Identification" by

SEAFDEC/TD in 2017, could possibly contribute. Additional egg and larvae information could possibly also be found at two Marine Science Universities in Myanmar. Myanmar will make the most use of these data sources to see if any further data can be obtained.

- **Thailand**

10. *Ms. Nipa Kulanujaree*, Fisheries Biologist, Department of Fisheries (DoF) Thailand, presented available data and information of anchovies in northern Andaman Sea. In Thailand's water there are three important species of anchovy namely: *Encrasicholina heteroloba, E. punctifer* and *E. devisi*.

11. For *E. heteroloba* its size at first maturity between 6.09-6.44 cm. The spawning season is in July. For *E. punctifer* size at first maturity is between 6.19-6.47 cm and the peak of spawning season is in January, while for *E. devisi* size at first maturity is between 6.44-7.21 cm. The spawning season peak is in June.

12. Main fishing gear used for anchovies is anchovy purse seine, operating during day time. The fishing and spawning grounds are at the boundary of Thai-Myanmar waters in the Ko Phayam (Ranong Province). Catches of anchovy in 2006 in Area 6 (Northern Andaman Sea) were about 10,000 MT, while in 2017 due to a ban of using purse seines during night time, and also a closure for commercial vessels to fish within three (3) nautical miles from the shore.

13. The stock assessment for the period 1996-2014 of anchovy in the Andaman Sea (Area 6 and 7) estimate that catches are now approximately on MSY level (1% above) at 33,903 tons. The information on geographical area for fishing ground and spawning area data were collected directly by interviewing fishermen at fishing ports as well as collection of gonad maturation data but there were no data on migratory routes of anchovy in this study area. Spawning areas of anchovy have been identified on the border between Myanmar and Thailand off Ranong's coast. The presentation can be seen as **Annex 6**.

14. Some of the data on spawning grounds from Thailand could be useful to identify spawning areas also on the Myanmar side and the meeting concluded that one should come back to this once the existing data from both countries had been plotted to see if any further conclusions could be drawn on the geographical extent of spawning areas.

- **SEAFDEC/MFRDMD (Northern Andaman Sea)**

15. *Ms. Mazalina Ali*, SEAFDEC/MFRDMD Research Officer, Malaysia, presented the information available in the MFRDMD data base on the anchovy fisheries in both countries, Myanmar and Thailand. In Myanmar waters the commercially important anchovy predominantly belong to the species of *Stolephorus* spp. The commerson's anchovy (*Stolephorus commersoni*) and Indian anchovy (*Stolephorus indicus*) are commercially important and available abundance in the near shore shallow waters, while the main species in Thailand are *Encrasicholina punctifer, E. heteroloba* and *E. devisi.*

16. The major fishing gear for anchovies in the Northern Andaman Sea is anchovy purse seine, powered by two boats. The number of anchovy purse seine vessels operated in Myanmar in 1996-2016 were about 300-400 vessels, while in Thailand it was about 25-130 vessels. During the same period catches of anchovy in Thailand decreased from about 35,000 MT to about 25,000 MT, while in Myanmar, catches increased from 5,000 MT to 15,000 MT.

17. The CPUE for anchovy purse seine in Thailand was 1-2 MT/vessel/day and about 300-400 MT/vessel/year. In Myanmar CPUE was 0.2 MT/vessel/day and less than 50 MT/vessel/year. The proportion of anchovy in pelagic catches in Thailand were 89% in 1996-2015, and in Myanmar about 43% in 2006-2014. The minimum mesh size in Thailand is 6 mm while in Myanmar 0.75 inch (19

mm). Length at first maturity of 5 species of anchovy were for females of *E. punctifer*, *E. heteroloba*, *E. devisi*, *Stolephorus commersoni* and *S. indicus* 6.47, 6.44, 7.21, 7.30 and 9.0 cm respectively. The proportion of anchovy caught in Myanmar during the year 2006-2014 was 43%, the other part of the catch consisted of sardines, mackerels and other pelagic species. In Thailand during 1996-2015, anchovies was 89% and the rest other species like tunas, mackerels, sardines, scads and squids shared as other catch. The source of data is Japan Trust Fund 6 (JTF6) as stated. The presentation can be seen as **Annex 7**.

3.2 Mackerels

- **Myanmar (Myeik Archipelago)**

18. *Mr. Soe Win*, Fishery Officer, Department of Fisheries (DoF), Myanmar, presented the available data and information of mackerel in northern Andaman Sea. There are two species of mackerel found in Tanintharyi's coast namely, *Rastrelliger kanagurta* (Indian mackerel) and *Rastrelliger brachysoma* (short mackerel). The *R. kanagurta* fishing season is from January to February and November to December in Rakhine's area, while in Tanintharyi's area is from January to April and November to December.

19. The production of Indian mackerel in Tanintharyi's area during the year 2009-2010 was 6,682.75 MT and in 2015-2016 was 10,518.77 MT. The highest yearly catches so far was in 2012-2013 with 22,711.54 MT. The mixed pelagic fisheries include mackerels which was caught in three areas of Myanmar with catches of 83,835 MT, however, different species of mackerel were not separated. Peak catching season for Indian mackerel is in November to February. The program on Commercially Important Pelagic Fish Tagging Program in cooperation was also running during in 2008-2010 on 2 sites in Tanintharyi Division, namely, Site-1 (between Lagnan Kyun and Sin Kyun, Boke Pyin Township) and Site-2 (Shwe Kyun, Kaw Thaung Township). This program including tissue sampling for stock/population identification and there are some results from this program that could be used. The presentation appears as **Annex 8**.

- **Thailand (Ranong)**

20. *Ms. Nipa Kulanujaree*, Fisheries Biologist, Department of Fisheries (DoF), Thailand, presented the available data and information on mackerels in northern Andaman Sea. The fishing area in northern Andaman Sea (Area 6) is Ranong - upper part of Phang Nga Province. The main fishing gear for catching *Rastrelliger brachysoma* in Andaman Sea are Thai purse seine and Chinese purse seine. The size at first maturity for female *R. brachysoma* is 17.40-19.80 cm. The spawning grounds are located in western of Ranong Province, western Ko Kam, Ko Phayam, Ko Chang and connecting to southern part of Myanmar water. Spawning period is all year round but there are two peaks, December to May and July to October.

21. The *R. kanagurta* can be found in Thailand fishing both areas (Area 6 and 7). The maximum female size of *R. kanagurta* was 30.50 cm. The size at first maturity was 18.92 cm. The main fishing gear is light luring purse seine and purse seine with fish aggregating device and Thai purse seine. The F_{msy} of the *R. kanagurta* (excluded anchovy) in the Andaman Sea by using Fox model to calculate catch data from year 1997-2014 was 118,477 tons which corresponds to 54,238 days by effort. This is 16.5% higher than present catches of 99,039 tons or 64,925 days by effort meaning that the fishing pressure is currently sustainable on this species. Indian mackerel has spawning period during December to August. The presentation appears as **Annex 9**.

22. The Meeting asked if there are any catches of juvenile mackerel in anchovy purse seines. *Ms. Nipa* informed that in some season in Prachuap Khiri Khan Province, after the area has been close during the spawning season (April to June) the catch can constitute of up to 50% juvenile mackerels. There were also suggestion to use the fishing areas during the spawning season as indications of spawning areas.

- **SEAFDEC/MFRDMD**

23. *Ms. Mazalina* presented the information on mackerels in northern Andaman Sea. The dominant species in the region are *Rastrelliger kanagurta* and *Rastrelliger brachysoma.* They are mainly caught in Rakhine's and Tanintharyi's coast. In Myanmar, the Indian mackerels are caught mainly by fish purse seine with light luring device, encircling gillnets and occasionally by bottom trawls. No FADs are used.

24. The catch composition of pelagic fishes in the Andaman Sea coast in 1996 to 2015 was 12% Indo-Pacific mackerel 8% Indian mackerel and other pelagic fishes including anchovies, round scads, Neritic tunas, squids, etc. In Myanmar, the catch composition was 1% Indian mackerels, 43% anchovies and 34% other pelagic fishes. The number of fishing vessels during 1996-2016 are slightly increasing from 400 to 600 vessels in Myanmar but in Thailand the number of vessels has been stable between 200 to 300 vessels. The landings of pelagic fishes in Thailand has been decreasing from 50,000 to 10,000 MT during the period of 1995 to 2015 and CPUE has been decreasing while for Myanmar catches are seemingly constant. In regards to the presentation the CPUE for Thailand and Myanmar was hardly comparative due to differentiate use in term of unit of effort, for example, Thailand using weight/day or weight/haul whereas Myanmar using weight/hour.

25. The trend of CPUE (landings/vessel) during 1996-2015 showed that CPUE for 7 major pelagic species was about 2.7 MT/day or 0.9 MT/haul in Thailand and 0.104 MT/haul in Myanmar. The difference of CPUE is significant because of the vessel and fishing gear capacity. The MSY assessment for Thailand calculated on mixing for 7 species of pelagic fish species together the equivalent catches of 200,000 MT. Data are also available for some biological parameters, such as spawning season, sex ratio, length-weight relationship and some progress of tagging mackerel project collaborated between Myanmar and SEAFDEC/MFRDMD indicate migration patterns. There is also DNA study showing information on stock structure as well as information on restriction of fish gear and techniques and closed season for Myanmar and Thailand. The presentation appears as **Annex 10**.

3.3. Neritic Tunas

- **Myanmar**

26. *Dr. Htun Thein***,** Deputy Director of Myanmar Department of Fisheries (DoF). He gave presentation that there was not much information on the existing tuna fisheries of the country. The Regional Plan of Action (RPOA) include kawakawa (*Euthynnus affinis*) and longtail tuna (*Thunnus tonggol*) which are found in the southern part (Tanintharyi Region) of Myanmar but biological data are not available. The presentation appears as **Annex 11**.

27. The Meeting commended that the landed tunas at fishing ports of Myanmar and fishing grounds during spawning season could be used as indicator for spawning areas as a start.

- **Thailand**

28. *Ms. Praulai Nootmorn*, Senior Expert of Marine Fisheries, DoF Thailand, presented the status of Neritc tunas in Northern Andaman Sea. Thailand fishing Area 6 (Ranong - upper part of Phang Nga Province). There were three different species of Neritic tuna that form the major catches by Thailand in this area: (1) frigate tuna (*Auxis thazard),* (2) kawakawa (*Euthynnus affinis)* and (3) longtail tuna (*Thunnus tonggol).*

29. The spawning season is throughout the year with 2 dominant peak seasons in January-March and August-November for frigate tuna and January-May and October–December for kawakawa. The spawning ground covered the west side of Ko Surin and Ko Tachai, Phang Nga Province for frigate tuna while for kawakawa, the south of Ko Kam, Ranong Province; Ko Tachai, west of Ko Surin, Phang Nga Province.

30. The average annual catch for each species is about 2,000-6,000 MT. The main fishing gear used for catching Neritic tunas are purse seine with fish aggregating device. Also light luring purse seine, purse seine with fish aggregating device, Thai purse seine and tuna purse seine are used.

31. The migration route starts end of August coming from Malaysia then in Thai water and go to Myeik Archipelago. The data came from the Indo-Pacific Tuna Development and Management Programme (IPTP) study on migration route. Furthermore the Meeting informed that a DNA study for *Thunnus tonggol* and *Euthynnus affinis* is ongoing and undertaken tuna tissue by Thailand and the analysis result will be sent to SEAFDEC/MFRDMD. The presentation appears as **Annex 12**.

32. Thailand is testing an effort regulation system covering the Neritic tunas fishery where the number of allowed fishing days per year and boat is limited. The allowed fishing day for purse seine in Andaman Sea is 235 days per year. The MSY in Thailand is calculated every year, but the effort quota is determined every 2 years. This is in conformity with the renewal of fishing license every 2 years.

- **SEAFDEC/MFRDMD**

33. *Ms. Mazalina* presented on Neritic tunas. The Neritic tuna catches constitute about 6% of pelagic catches of Thailand in Andaman Sea. The size of first female maturity fish for frigate tuna and longtail tuna are 28.88 and 39.71 cm respectively. The spawning season was predicted twice a year during January-March and August-November for frigate tuna and during May and October-December for kawakawa. MFRDMD had no information on fishing and spawning grounds. Myanmar had no data on Neritic tunas for comparison. The presentation appears as **Annex 13**.

IV. DISCUSSION ON THE NEED AND AVAILABILITY OF ADDITIONAL DATA AND INFORMATION

34. The presentation of both countries on presence of biological information, spawning grounds/seasons and other parameters of anchovies, mackerels and Neritic tunas show that there are already some data available that can be compiled.

35. The Meeting proposed Myanmar to verify and confirm the target species of anchovy *(Stolephorus indicus* and *S. commersoni*) and to use the larvae distribution and aquatic data-collected by the Fritjof Nansen survey to try to identify additional spawning areas etc.

36. The Meeting requested Thailand to verify the species of *Encrasicholina puntifer, E. heteroloba* and *E. devisi* catch and landing, MSY of anchovies, and included fishing ground and number of fishing vessels involving mackerels.

V. COUNTRY PRESENTATION OF EXISTING MANAGEMANT MEASURES RELATING TO MACKERELS, ANCHOVIES AND NERITIC TUNAS

- **Myanmar**

37. *Dr. Htun Thein*, Deputy Director of Myanmar Department of Fisheries (DoF), the aquatic resources are facing problems. This is seen in the changes of water quality from eutrophication causing consequences such as the bloom of unexpected species like jelly fish, red tide phenomenon and toxic algae blooming. The harmful blooming could have negative effects on for example juvenile or young fish and in conservation areas.

38. On the national level, Myanmar has already developed the National Biodiversity Strategy and Action Plan 2015-2020. The vision of the strategic plan is conservation, management, and utilization of biodiversity in sustainable manner. The implementation of the agenda is to establish Marine Spatial Planning (MSP) for integrated management, similar to the integrated coastal management system in the past. The fisheries management plan would be a part of this wide spectrum program.

All existing laws will be subjective for updating, revision and amending. The Union Fisheries Law will be revised in order to compile with core management system. The amended law or updated new law will discard the protection area for mackerels fishing. Furthermore, the regulation dealing with conservation will be decentralized to local government included its control measure. Now the control measure should involve the community. To prevent or control over fishing and to protect the resources. Myanmar has applied spatial and temporal restriction since 2013. Some areas are prohibited for fishing, seasonally and/or spatially. The presentation appears as **Annex 14**.

- **Thailand**

39. *Ms. Praulai Nootmorn*, Senior Expert of Marine Fisheries, DOF Thailand, presented the existing fisheries management regulations in Thailand. The total marine capture production within period of 1950-2015 started at 100,000 MT and the catches increased to a peak over 2,500,000 MT in 1995 because of extensive fisheries outside Thai water. She highlighted the key issues for fisheries management in Thailand. These issues are Legal Framework on amending concerned laws or regulations; Fisheries Management Plan (FMP) by integrating legal framework and fishery policy; Traceability System for checking fish and fishery products and cross-checking all information before issuing Catch Certificate; MCS System and National and International Cooperation on strengthening cooperation agreement on combating IUU fishing with Fiji, South Korea, Myanmar, Japan, etc. and MoU or agreement. The presentation appears as **Annex 15**.

VI. DISCUSSION ON DATA FORMATS AND NEEDS FOR THE PRODUCTION OF THEMATIC (GIS BASED) MAPS

40. *Ms. Siriporn Pangsorn*, representation from SEAFDEC/TD, presented information on how the countries should provide their data for formats and needs for the production of thematic GIS based Map. Maps can be made from data with Latitude and Longitude position in WGS84 format. The data can be either in Excel/Word/Text files. Another option is if the country already have digital maps as shape files. Then TD can use these as well. A third option is that the countries send maps in paper format where the positions can be indicated by hand or printed and TD can then digitalize these maps.

41. The SEAFDEC/TD requested both countries to send in the data according to the deadlines listed in **Annex 16** where the data types agreed at the meeting are also listed. The countries were also asked to send existing data as soon as possible to allow TD to start the work of producing the maps.

42. *Ms. Nipa*, the representative for DoF Thailand, mentioned that Thailand have available data on close zone management for commercial area in coastal province and will submit data files to SEAFDEC/TD. For Myanmar, *Dr. Htun Thein*, there is an option to use secondary data source from Universities (there are specified for each data type in **Annex 17**), and Thailand could possibly share some of the data that can be useful to Myanmar. The regulation for protection of some species in some specific areas are available, however, it needs to be verified specially the mackerel species. Myanmar need technical advices related to the aspect of transboundary species, included stock assessment and its MSY assessment of other species. Myanmar was urged to contact Thailand or SEAFDEC if they need further assistance with any specific topic.

VII. DRAFTING A DETAIL WORKPLAN FOR PRODUCING THEMATIC MAPS, ROADMAP AND WORKPLAN

43. The countries agreed to a list of data that should be sent to SEAFDEC/TD. The data and deadlines are listed in annex 18. All existing data should preferably be sent to SEAFDEC before April 1, 2018 and for regulatory data on different fisheries regulation relevant for the three species groups should be sent before April 30, 2018. The final deadline for data to be sent to SEAFDEC/TD is May 31, 2018. The TD will verify the data starting June 7, 2018. A draft map and set of

information is planned to be sent to the participants by June 15, 2018. Conditioned on that are delivered to TD in line with the agreed deadlines. The conclusion appears as **Annex 18**.

VIII. NEXT STEPS AND WAY FORWARD

44. If data are delivered on time SEAFDEC/Secretariat will invite for a new meeting by beginning of July to discuss, revise and agree on the draft maps. If time permits this meeting will also outline proposals for future coordination of national measures with regarding to anchovies, mackerels and Neritic tunas based on the compiled maps and information. SEAFDEC Secretariat will then develop this proposal further to be discussed by the countries at a later date during 2018.

IX. CLOSING THE MEETING

45. *Dr. Kom*, thanked everyone for the productive participation in this Meeting. He acknowledged delegates from Myanmar and Thailand and the SEAFDEC/MFRDMD and TD for the valuable data information. He finally declared the Meeting closed and wished everyone safe and enjoyable trip back home.

Annex 1

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Annex 2

OPENING REMARKS

By *Dr. Kom Silapajarn,*
SEAFDEC Secretary-General

Distinguished experts from Thailand and Myanmar,
Distinguish participants and SEAFDEC officials,
Ladies and Gentlemen.

Good morning to all of you!

Firstly, I would like to express my warm welcome to all of you for participating in the 1st Technical Experts Meeting on Management of Trans-boundary Species for the Northern Andaman Sea.

The fisheries in the Andaman Sea is an important economic sector for both Thailand and Myanmar since it provides food, jobs and revenues for the countries. A part of this fishing is done on fish species that move between the national waters of two countries, the so called trans-boundary species. Since both countries fish on the same stocks it would be beneficial to adopt a coordinated approach on how these species are managed. Such an approach could guarantee that the stocks would be able to provide food and revenue also in the future.

In February 2017, a MoU on fisheries cooperation between the DOF of Myanmar and DOF of Thailand was signed which intends to strengthen fisheries cooperation and promote technology. SEAFDEC also organized the 3rd Sub-regional Consultative Workshop of the Northern Andaman Sea in November 2017. As a result of the workshop, Myanmar and Thailand recommended that the two countries should compile existing data on Anchovies, Mackerels and Neritic tuna in the Northern Andaman Sea. The compiled data should then be used as a basis for a bilateral discussion on how the management of these species could be coordinated.

Based on the recommendations from Myanmar and Thailand, SEAFDEC is organizing this meeting to draft a work-plan to compile data and produce joint maps of the biological features of these species in the Northern Andaman Sea.

The important work you will start during this meeting will form the scientific basis for future coordination of the management which will be a key step to secure a sustainable fisheries in the sub-region.

Finally, I would like to thank Sweden for funding this work including this meeting and not the least the participating national experts and the SEAFDEC Secretariat team for their preparations for this meeting.

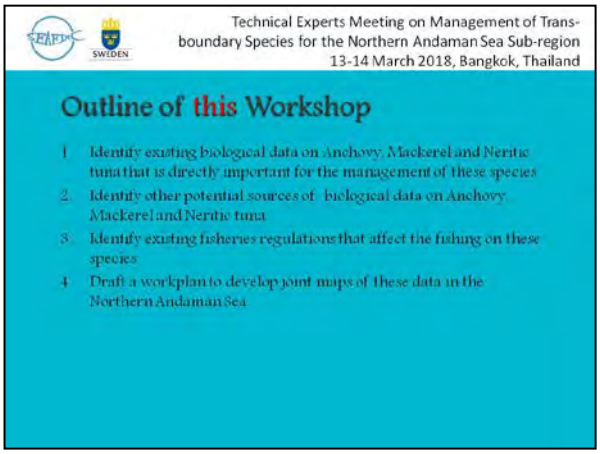
Once again, I wish you a successful meeting and enjoy the Bangkok hospitality.

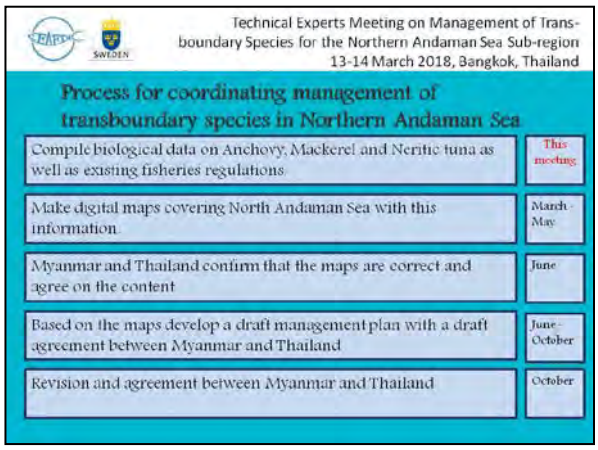
Thank you.

Annex 3

BACKGROUND AND OPENING OF THE MEETING

By *Dr. Jacob Hagberg*





Annex 4

PROSPECTUS

I. Background

Since 2009, the SEAFDEC-Sweden Project organized the Andaman Sea Sub-regional Meetings which one of the activity for the effort to strengthen the sub-regional cooperation among countries around the Andaman Sea sub-region (Myanmar, Thailand, Malaysia and Indonesia) and other relevant institutions with regards to integrate fisheries and habitat management as well as to manage fishing capacity. By the SEAFDEC-Sweden Project, with different ecological features, Andaman Sea sub-region is divided into the northern and southern part in terms of fisheries activities and transboundary fisheries resources management. During the course of the Project, the promotion of bilateral cooperation to improve management of fishing capacity, including the initiation of sub-regional MCS Networks together with development of port monitoring capacity and coordinated efforts to combat IUU fishing in the north Andaman Sea and trilateral cooperation in the south Andaman Sea has been recognized in events organized by SEAFDEC, FAO (BOBLME) and others.

Advancement has been made through the signed MoU on fisheries cooperation between the DoF of Myanmar and DoF of Thailand which was signed in February 2017, it was emphasized the work in combating IUU fishing and fisheries management between Thailand and Myanmar (Northern Andaman Sea). Aside from the collaboration between two countries has been made in 2017, the SEAFDEC-Sweden Project facilitated two countries to discuss during *the Third Sub-regional Consultative Workshop of the Northern Andaman Sea/Myeik Archipelago* held on 16-17 November 2017 in Bangkok, Thailand and co-chaired by the DG of DoF Myanmar and the DDG of DoF Thailand, with reference to the MoU between Myanmar and Thailand.

Challenges ahead include the development of agreements for cooperation on fisheries and habitat management including options for joint approaches to the regulation of fisheries on *Rastrelliger* spp., hilsa and related species and together with conservation measures for the protection of important habitats in the Northern Andaman Sea with the development of a larger "fisheries resources conservation area" that could possibly expand as far as from north of the Myeik Archipelago into waters north of Phuket (based on indicated migration path for *Rastrelliger* spp. and related species). During the discussion at the *Third Sub-regional Consultative Workshop of the Northern Andaman Sea/Myeik Archipelago*, with the focus on transboundary resources management, it was emphasized on the collection of available information on mackerels and related species. Information would also include migration patterns across a border that highlights the transboundary nature and the need to cooperate on the protection of spawning areas and important habitats between Thailand and Myanmar.

During the Workshop, it was suggested the proposal to develop a map of spawning areas based on existing data for anchovies, mackerels and Neritic tunas, of which the map should be presented to a high level meeting to consider a process to develop coordinated management plans. The SEAFDEC-Sweden Project developed the road map and submitted to DOF Thailand and Myanmar in January 2018. It was also agreed that both countries should facilitate and ensure the appointment of 1**)** a technical focal points and expert group for priority transboundary species, and 2) a national technical group for the coordination of MCS related activities (the group should consist of members from existing national MCS coordination units).

II. RATIONALE OF THE MEETING

In follow-up on the proposed road map, this First Technical Experts Meeting on Management of Transboundary Species (Mackerels, Anchovies, Neritic Tunas) for the Northern Andaman Sea Sub-region will be facilitated to come up with the documentation of relevance existing data as input to management planning. It is anticipated by the end process joint/coordinated fisheries management

plans would be developed for management recommendations to be provided on the conservation and management of important habitats and spawning areas for mackerels and related species. Based on available information digitized reference maps should be prepared for the management planning with regards to critical areas (spawning, etc.) in the life cycle of target species together with indication of migration paths. Cross-border migration paths highlight the transboundary nature of target species and related fishing activities. Transboundary migration and the need to conserve sensitive areas are important indication on the need coordinate efforts on monitoring, control and enforcement of rules and regulation by authorities in Myanmar and Thailand.

III. OBJECTIVES OF THE MEETING

The Technical experts meeting on the transboundary species (Mackerels, Anchovies and Neritic Tuna) for the Northern Andaman Sea will be arranged and facilitated by SEAFDEC-Sweden Project for continuing cooperation between Myanmar and Thailand.

1) Provide outline for the inputs to management plan(s) and determine any additional data needed to confirm spawning ground, spawning season including biological data, data on important habitats and migration patterns of mackerels, anchovies and Neritic tunas (based on existing information)
2) The Meeting should discuss and conclude the relevance of compiled information and data as a basis for the identification of spawning areas, important life-cycle habitats and migrations paths as a basis for the development of a joint northern Andaman Sea management and conservation plan for priority transboundary species.
3) Initiate the development of a joint northern Andaman Sea management and conservation plan for priority transboundary species

IV. EXPECTED OUTPUTS

- Sets of existing data collected on target species including catch data
- Documentation provided with comments on the value and relevance of existing data as input to management planning
- Outline provided on inputs to the management plan(s) and maps with indication of any additional data needs for determining spawning area, spawning season and to confirm migration patterns as a basis for continued development of management plans
- Agreement of Work Plan 2018

V. EXPECTED OUTCOMES

- Agreement by stakeholders in Myanmar and Thailand on management plans for transboundary species, protection of spawning areas and measures or regulations of monitoring, controlling and surveillance on fishing capacity
- The development of (digitized) maps as a basic reference for the implementation of the joint management plans should be clarified and agreed upon (at a later stage to be linked with the development of the MCS coordinating body be in place by end of 2018)

VI. EXPECTED PARTICIPANTS OF THE MEETING

Approximately total participants 25-28 persons

- Appointed TFPs for each country (max. 3 persons), namely Myanmar and Thailand total 6 persons
- SEAFDEC Secretariat/TD/ MFRDMD (11 persons)
- Regional Fisheries Policy Network (RFPN) (7 persons)
- Resource persons should have experiences in related issues (1)

TIMETABLE AND AGENDA

12 MARCH 2018 (MON)	
	Arrival of all participants
13 MARCH 2018 (TUE)	
08.30	Registration
09.00-09.15	Agenda 1: Opening of the Meeting
09.15-09.30	Agenda 2: Introduction and Objectives of the Meeting and Adoption of Agenda
09.30-10.30	Agenda 3: Presentation on Available Data and Information on the Target Trans-boundary Species in Northern Andaman Sea 3.1 Anchovies - Myanmar (Myeik Archipelago) - Thailand (Ranong) - SEAFDEC/MFRDMD (Northern Andaman Sea) *Note: Time will be allocated for 15 minutes for each country to make a presentation on the available data and information of Anchovies, including Available Data and Information on the Target Transboundary Species in Northern Andaman Sea data on spawning areas, migration routes and stock structure, catch data, etc. with specific area of the Northern Andaman Sea. Then, time will be for 15 minutes for the discussion.*
10.30-11.00	*Coffee break and group photo*
11.00-12.00	Agenda 3: Presentation on Available Data and Information on the Target Transboundary Species in Northern Andaman Sea 3.2 Mackerels (Indo-Pacific Mackerel and Indian Mackerel) - Myanmar (Myeik Archipelago) - Thailand (Ranong) *Note: Time will be allocated for 30 minutes for each country to make a presentation on the available data and information of Mackerels, including data on spawning areas, migration routes and stock structure, catch data, etc. with specific area of the Northern Andaman Sea.*
12.00-13.30	*Lunch*
13.30-14.30	Agenda 3: Presentation on Available Data and Information on the Target Transboundary Species in Northern Andaman Sea 3.2 (con't) Mackerels (Indo-Pacific Mackerel and Indian Mackerel) - SEAFDEC/MFRDMD *Note: Time will be allocated for 30 minutes for each country to make a presentation on the available data and information of Mackerels, including data on spawning areas, migration routes and stock structure, catch data, etc. with specific area of the Northern Andaman Sea. Then, time will be for*
14.30-15.00	*Coffee break*

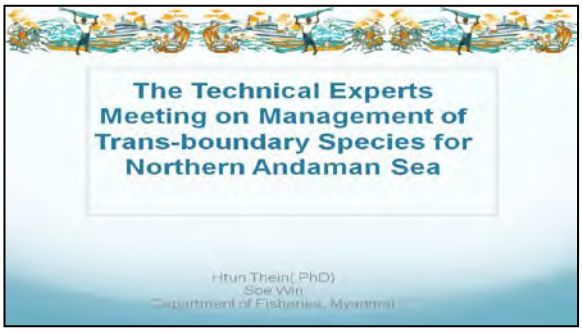
15.00-16.30	3.3 Neritic Tuna (Longtail Tuna, Kawakawa) - Myanmar - Thailand - SEAFDEC/MFRDMD *Note: Time will be allocated for 30 minutes for each country to make a presentation on the available data and information of Neritic Tunas, including data on spawning areas, migration routes and stock structure, catch data, etc. with specific area of the Northern Andaman Sea. Then, time will be for 15 minutes for the discussion.*
18:30-20:30	*Reception dinner* by SEAFDEC
14 MARCH 2018 (WED)	
09.00-10.30	Agenda 4: Discussion on the Need and Availability of Additional Data and Information *Note: SEAFDEC will present the Template on required data and information (such as Biological Information (larvae abundance and distribution, spawning ground and season, migratory pattern, etc.), Oceanographic parameters, Fisheries Information (catch and landing, fishing efforts, fishing vessels, fishing gear targeting the trans-boundary species). After the presentation, the Meeting will discuss on the need and available of additional data and information, identify type of data, and how to obtain the missing data and suggestion on how to obtain the data and information from other institutions such as responsible agencies, universities,*
10.30-11.00	*Coffee break*
11.00-12.00	Agenda 5: Country Presentation of Existing Management Measures relating to Mackerels, Anchovies and Neriti Tuna - Myanmar - Thailand *Note: Country will present the current management measures relating to the target species Mackerels, Anchovies and Neritic Tuna (such as closed areas and seasons, vessel limitations, gear restrictions, catch limitations, etc.) including observations on threats and issues/problems involved in the conservation and management of trans-boundary species.*
12.00-13.30	*Lunch*

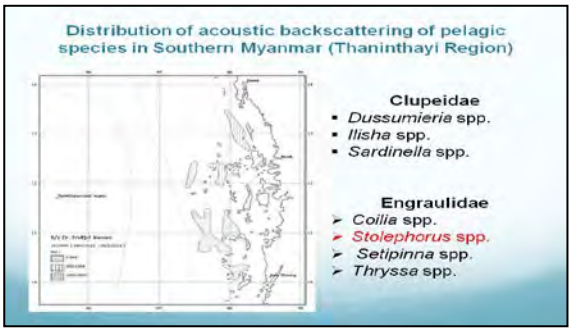
13.30-15.00	Agenda 6: Discussion on Data Formats and Needs for the Production of Thematic (GIS based) Maps *Note: SEAFDEC present on the sample of expected final product. The Meeting will discuss data format requirement, thematic (GIS based) mapping based on available data and information as provided in the previous Agendas (3-5) such as spawning areas, migration routes, nursery areas, existing closed areas, gear regulations and similar relevant features. Furthermore, the Meeting will indicate possible problems or "threats" in obtaining necessary information including reluctance or restrictions to share (mapped) information. The Meeting will be requested to provide feedback and agreed on the Template accordingly.*
15.00-15.30	*Coffee break*
15.30-16.30	Agenda 7: Drafting a Detailed Workplan for Producing Thematic maps *Note: SEAFDEC will present the draft detailed workplan for producing the thematic map (final product) on target trans-boundary species that will form the basis for the joint fisheries management plan for Northern Andaman Sea. The Meeting will decide on what data should be compiled and included, if any additional data should be sought from external sources, responsible persons, timeline and deadlines – including potential upcoming threats and problems*
16.30-17.00	Agenda 8: Next steps and way forward
17.00-17.10	Agenda 9: Closing of the Meeting

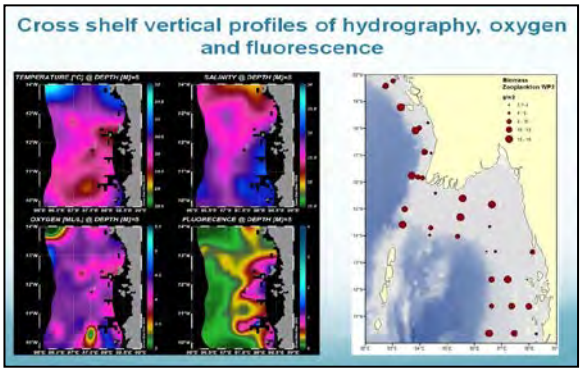
Annex 5

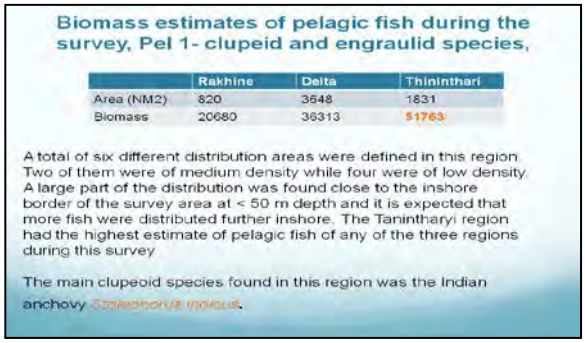
ANCHOVIES: MYANMAR

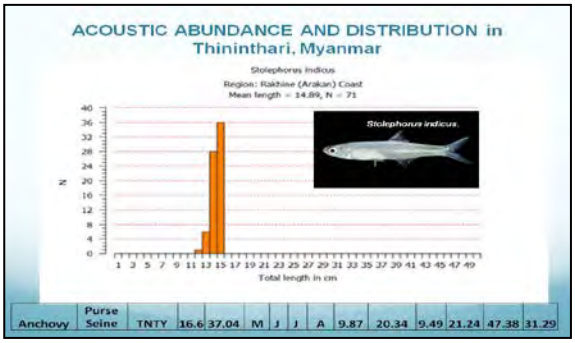
By *Dr. Htun Thein*

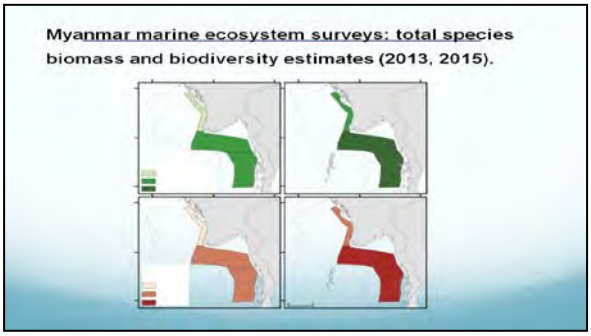












Annex 6

ANCHOVIES: THAILAND

By *Ms. Nipa Kulanujaree*

The Technical Experts Meeting on Management of Trans-boundary Species for Northern Andaman Sea: THAILAND

Mrs. Praulai Nootmorn Senior Expert in Marine Fishery
Miss. Nipa Kulanujaree Fishery Biologist, Practitioner Level
Miss. Thanawan Somjit Fishery Biologist, Practitioner Level

ANCHOVY

Encrasicholina heteroloba (Rppell, 1837)	Shorthead anchovy	
Encrasicholina punctifer Fowler, 1938	Buccaneer anchovy	
Encrasicholina devisi (Whitley, 1940)	Devis' anchovy	

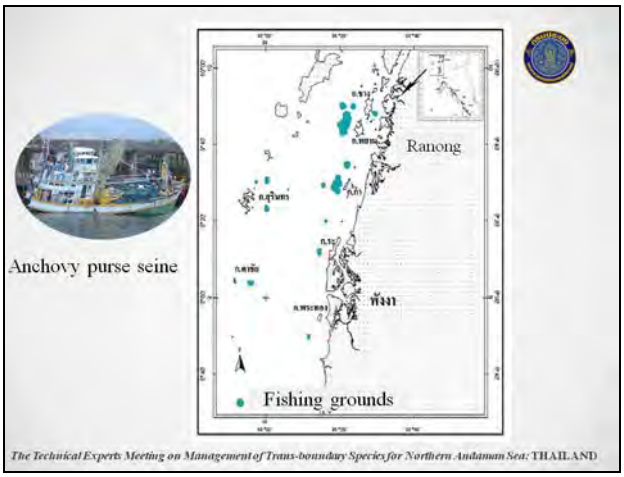
	total length (cm)	size at first maturity (cm)	
		male	female
E. heteroloba	3.50-9.50	6.09	6.44
E. punctifer	3.20-9.80	6.19	6.47
E. devisi	3.60-9.00	6.44	7.21

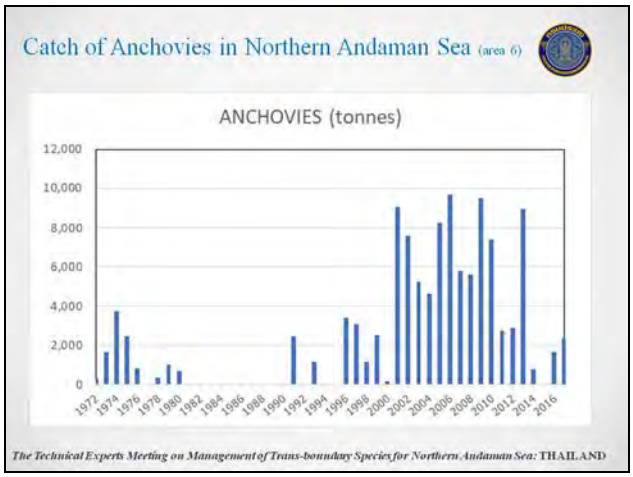
Spawning grounds:

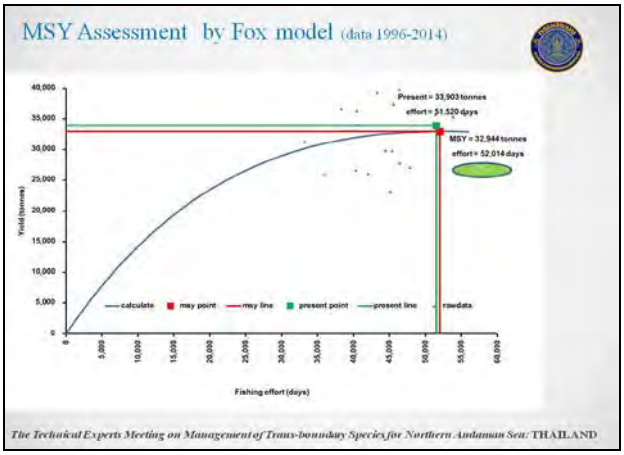
- Boundary of Thai-Myanmar waters
- Koh Phayam (Ranong Province)

Spawning season

Encrasicholina heteroloba	found all year, while the peak showed in July.
Encrasicholina devisi	found all year, while the peak showed in June.
Encrasicholina punctifer	found all year, while the peak showed in January.


Anchovy purse seine
Ranong
พังงา
Fishing grounds
The Technical Experts Meeting on Management of Trans-boundary Species for Northern Andaman Sea: THAILAND


Catch of Anchovies in Northern Andaman Sea (area 6)
ANCHOVIES (tonnes)
12,000
10,000
8,000
6,000
4,000
2,000
0
1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016
The Technical Experts Meeting on Management of Trans-boundary Species for Northern Andaman Sea: THAILAND

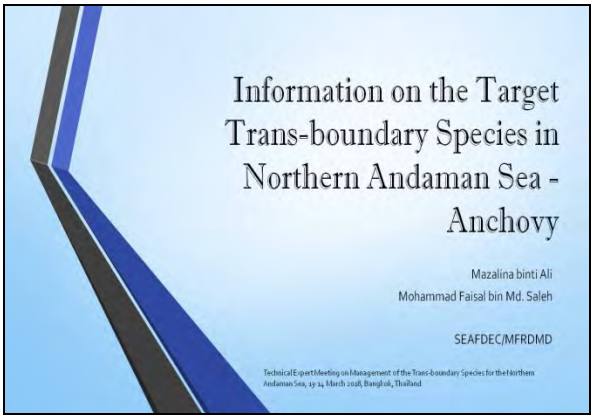

MSY Assessment by Fox model (data 1996-2014)
Present = 33,903 tonnes
effort = 51,520 days
MSY = 32,944 tonnes
effort = 52,014 days
Yield (tonnes)
Fishing effort (days)
calculate
msy point
msy line
present point
present line
rawdata
The Technical Experts Meeting on Management of Trans-boundary Species for Northern Andaman Sea: THAILAND

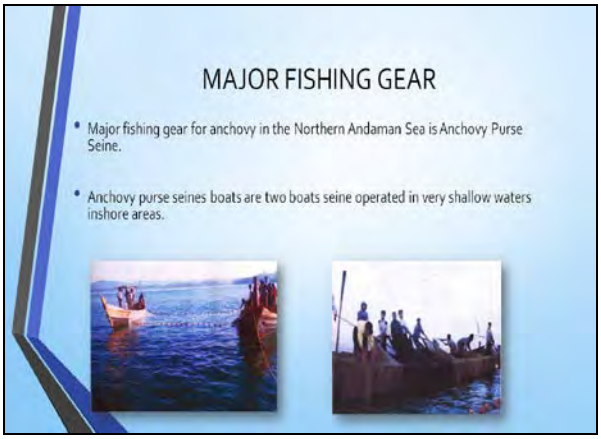

Thank you
The Technical Experts Meeting on Management of Trans-boundary

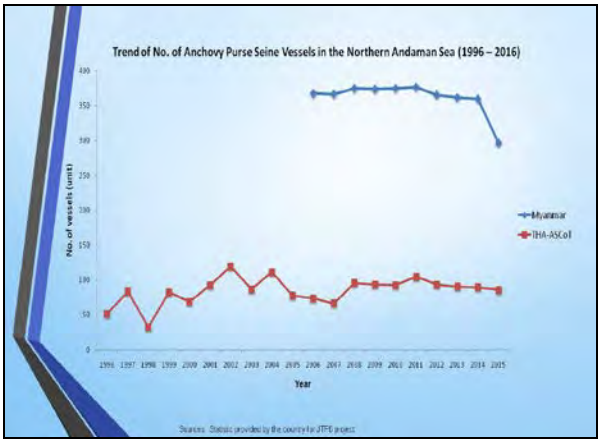
Annex 7

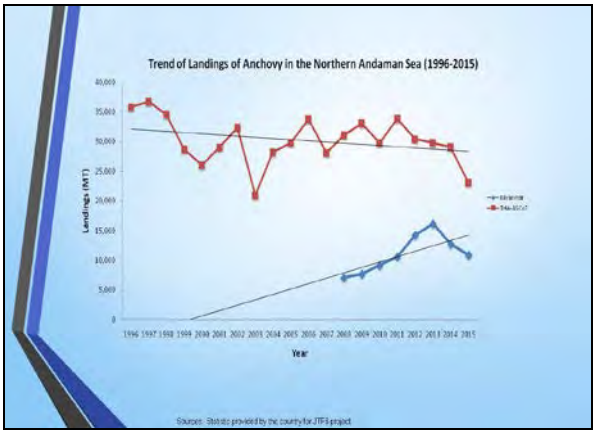
ANCHOVIES: SEAFDEC/MFRDMD

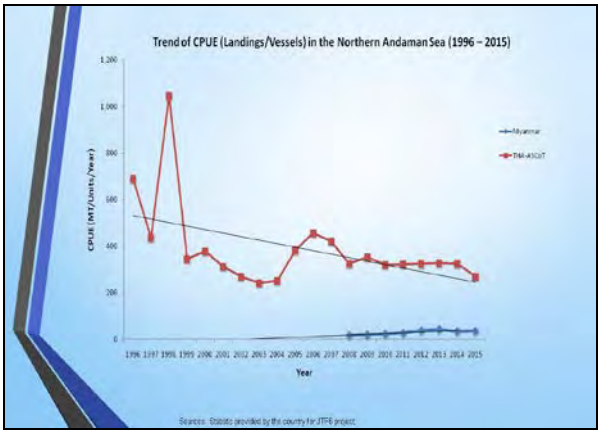
By *Ms. Mazalina Ali*



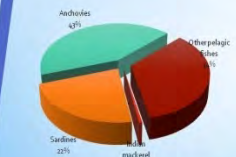






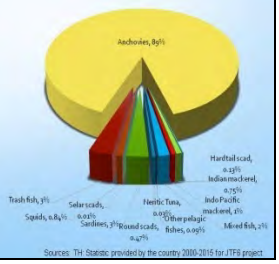


Composition of Anchovy Purse Seine in Myanmar (2006-2014)



Sources: MYM: Statistic provided by the country 2006-2018 for JTF6 project

Composition of Anchovy Purse Seine in the Andaman Sea Coast of Thailand (1996-2015)



Sources: TH: Statistic provided by the country 2000-2015 for JTF6 project

Length at 1st Maturity

Species	Sex	Length at 1st maturity (cm)
Encrasicholina punctifer	M	6.19[a]
	F	6.47[a]
Encrasicholina heteroloba	M	6.09[a]
	F	6.44[a]
Encrasicholina devisi	M	6.44[a]
	F	7.21[a]
Stolephorus commerson		7.3[b]
Stolephorus indicus		9[b]

[a]Yakoh et al. (2014)
[b]Fishbase

Length-weight Relationship

Species	Sex	Length-weight relationship (n; r)
Encrasicholina punctifer	M	$W = 0.0047TL^{3.2437}$ (1,680; 0.9833)
	F	$W = 0.0050TL^{3.2191}$ (1,171; 0.9831)
Encrasicholina heteroloba	M	$W = 0.0042TL^{3.2762}$ (1,911; 0.9806)
	F	$W = 0.0041TL^{3.2947}$ (1,595; 0.9719)
Encrasicholina devisi	M	$W = 0.0039TL^{3.3285}$ (1,145; 0.9823)
	F	$W = 0.0039TL^{3.3177}$ (788; 0.9843)

Yakoh et al. (2014)

n: Number of samples, *r*: Correlation coefficient

Spawning Season and Sex Ratio

Species	Spawning season (peak season)	Sex ratio (M:F)
Encrasicholina punctifer	YR (Jan)[b]	1:0.7[a]
Encrasicholina heteroloba	YR (Jul)[b]	1:0.8[a]
Encrasicholina devisi	YR (Jun)[b]	1:0.7[a]

[a]Yakoh et al. (2014)
[b]Yakoh et al. (2016)

Restriction of Fishing Gear & Technique

Myanmar

- Prohibit net mesh size less than 0.75 inch in Anchovy Seines

Thailand

- Prohibit anchovy net mesh size less than 6mm

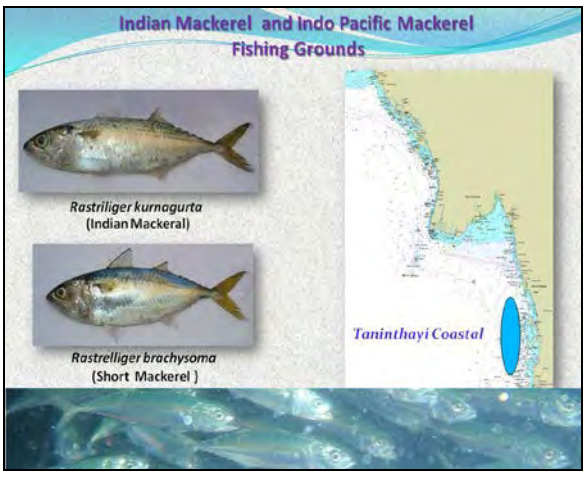
Thank You

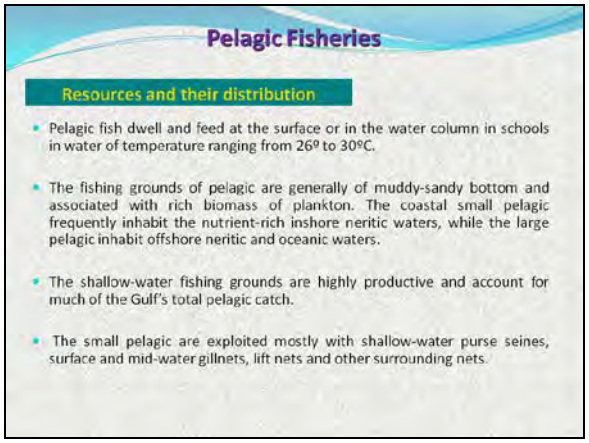
Terima Kasih

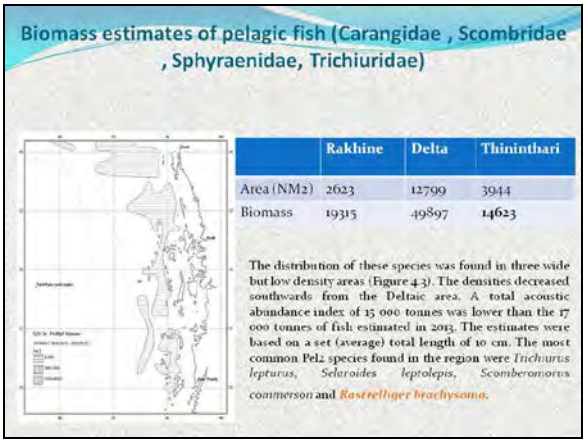
Annex 8

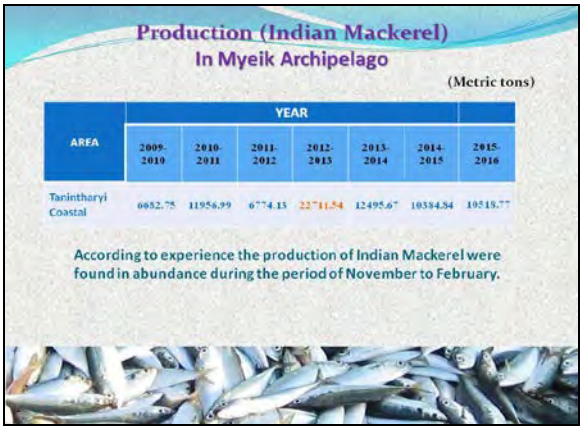
MACKERELS: MYANMAR

By *Mr. Soe Win*









Conservation Measures

Commercially Important Pelagic Fish Tagging Program, cooperation and collaboration with SEAFDEC under Japanese Trust Fund II, 2008-2010

- Core Expert Meeting held in Thailand agreed to implement the Tagging Program at two sites in Myanmar-
  1. Yangon, Yangon Division
  2. Myeik, Tanintharyi Division

DoF, Myanmar informed SEAFDEC-MFRDMD to conduct the Tagging Program Implementation -
1. Thandwe, Rakhine State
2. Myeik, Tanintharyi Division

(inconvenience in finding required number of live target fish and in availability of fishing vessels)

- The SEAFDEC-MFRDMD suggested two sites in Andaman Sea.

Site-1/ Between Lagnan Kyun and Sin Kyun, Boke Pyin Township, Tanintharyi Division.
(10° 10' N 98° 15' E to 10° 15' N 98° 18' E)

Site-2/ Shwe Kyun , Kaw Thaung Township, Tanintharyi Division
(11° 00' N 98° 00' E to 11° 15' N 98° 17' E)

Tissue Sampling for Stock/population Identification In 2011

- This study was conducted in cooperation with SEAFDEC/MFRDMD
- This programme is supported by SEAFDEC/MFRDMD under Japanese Trust fund.
- This study was carried out in November 2011.
- Standard Operation Procedure was provided by SEAFDEC/MFRDMD
- According to SEAFDEC/MFRDMD, Department of Fisheries could collected 35 samples at landing jetty in Yangon Region.
- All collected tissue samples were sent to MFRDMD

Tissue Sampling Activities in 2012

- Two participants from Myanmar attended BOBLME Indian mackerel fisheries working group meeting in Columbo (Srilanka) in 2012
- According to the meeting outcome, 8 members countries would agreed and have to be collected the tissue sample from Indian mackerel for BOBLME project
- In BOBLME coastal area, 8 members countries will be taken tissue samples of Indian mackerel within 10, 000 Kilometer (25 samples from each landing site)
- Distance of each landing site is 400 Kilometer.
- According to the afore mentioned working group meeting, 200 tissue samples have been collected in Myanmar marine fisheries area.
- And then collected the tissue samples according to the Standard Operation Procedure
- 100 tissue samples from Rakhine State and 100 from Taninthayi Region coastal area.
- Those 200 tissue samples were sent to Southeast Asia Fisheries Development Center(SEAFDEC)- Marine Fisheries Resources Development Management Department (MFRD MD)
- According to the agreement between Myanmar and MFRDMD, MFRDMD will be sent the tissue samples result BOBLME project coordination unit.

Tissue Sampling Activities

- Collected the 100 fishes at landing site (those fishes were caught by inshore drift gill net and off shore purse seine nets) in Kaw Thaung, Thanintahyi Region and Kept fishes in styrofoam box and chilled with Ice
- Collected the 100 fishes at Fish Market (those fishes were caught by inshore drift gill net and in shore purse seine nets) in Sittwe, Rakhine State and kept fishes in styrofoam box and chilled with Ice

- Collected tissue samples , counted gill rakers ,and measured length and weighted from target fishes and also determined weight and size of testis and gonad development stage), and then filled the data in form-1
- Both teams (Taninthayi Region and Rakhine State) followed SOP exactly.

Summary

Tanintharyi

Inshore purse seine

- Standard Length
  - a Size of SL were found
  - maority of fishes size between 20-22cm and 22-24 cm
  - 54% amongst 50 tails (fishes)
- Weight
  - 2 category of weight were found
  - Most of the weight of fishes is between 450-500 gm
  - 58% amongst 50 tails (fishes)
- Sex Development
  - Most male and female gonad development stages are three (Ripening) and four (Ripe)
  - 74% amongst 50 tails (fishes)
- Nos. of Gill rakers
  - 10 categories of gill rakers were searched
  - Most of the fishes have 50 gill rakers
  - 58% amongst 50 tails (fishes)

Inshore drift gill net

- Standard Length
  - 6 Sizes of SL were found
  - maority of fishes size between 18-19 and 19-20 cm
  - 72% amongst 60 tails (fishes)
- Weight
  - 11 category of weight were found
  - Most of the weight of fishes is between 150-160, 160-170, 170-180 and 170-180 gm
  - 56 % amongst 60 tails (fishes)
- Sex Development
  - Most male and female gonad development stages are three (Ripening) and three (Ripe)
  - 75 % amongst 60 tails (fishes)
- Nos. of Gill rakers
  - 11 categories of gill rakers were searched
  - Most of fishes have 53 and 54 gill rakers
  - 58 % amongst 60 tails (fishes)

Rakhine

Inshore purse seine

- Standard Length
  - 5 Sizes of SL were found
  - maority of fishes size between 21-22 cm
  - 80.5 % amongst 48 tails (fishes)
- Weight
  - 1 category of weight were found
  - Most of the weight of fishes is between 180-190 gm
  - 33% amongst 48 tails (fishes)
- Sex Development
  - Most of the males gonad development stages are three (Ripening)
  - 91% amongst 48 tails (fishes)
- Nos. of Gill rakers
  - 10 categories of gill rakers were searched
  - Most of the fishes have 44 and 46 gill rakers
  - 35 % amongst 48 tails (fishes)

Inshore drift gill net

- Standard Length
  - 7 Sizes of SL were found
  - maority of fishes size between 24-25 cm
  - 58% amongst 50 tails (fishes)
- Weight
  - 6 category of weight were found
  - Most of the weight of fishes is between 70-80 gm
  - 58% amongst 50 tails (fishes)
- Sex Development
  - Most males gonad development stages are three (Ripening) (Difficult to find gonad development because fishes are small) 100 %
- Nos. of Gill rakers
  - 10 categories of gill rakers were searched
  - Most of the fishes have 43 and 44 gill rakers
  - 44% amongst 48 tails (fishes)

Annex 9

MACKERELs: THAILAND

By *Ms. Nipa Kulanujaree*

The Technical Experts Meeting on Management of Trans-boundary Species for Northern Andaman Sea: THAILAND

Mrs. Praulai Nootmorn Senior Expert in Marine Fishery
Miss. Nipa Kulanujaree Fishery Biologist, Practitioner Level
Miss. Thanawan Sonujit Fishery Biologist, Practitioner Level

Mackerel

Map of Fishing area in Thailand

Andaman Sea

Northern Andaman Sea (Area 6): Ranong - Upper part of Phang Nga Province

Southern Andaman Sea (Area 7): Phang Nga, Phuket, Krabi, Trang and Satun Province

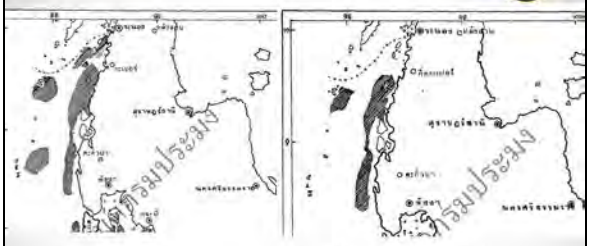
Rastrelliger brachysoma: Short mackerel

	Mature female (Total length: cm) (area 6)	L_{50} (area 6)	Spawning season
Rastrelliger brachysoma (Short mackerel)	17.40-19.80	19.33±0.13	All year spawning period, two peaks of spawning season including November or December-May and July-October

Short mackerel

Spawning grounds the west of Ko Kam, Ko Phayam and Ko Chang of Ranong Province to the southern waters of Burma.

Fishing ground



Thai Purse Seine

Chinese Purse Seine

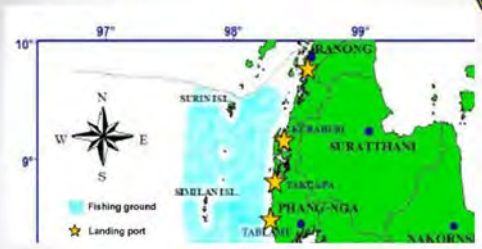
Fishing gear

Thai Purse Seine

Rastrelliger kanagurta: Indian mackerel

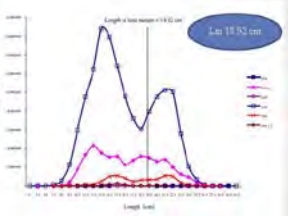
	Total Length (cm) (area 6+area7)	Average size (area 6+area7)	Spawning season (area 6)
Indian mackerel	4.00-30.50	16.44 ± 3.75	December-August

Indian mackerel



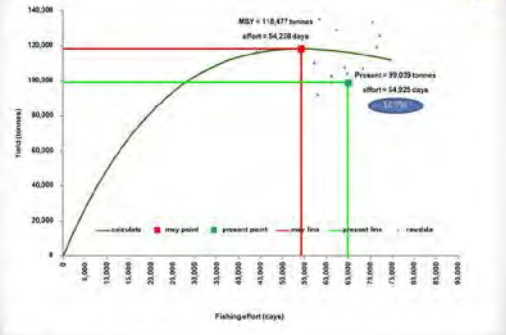
Indian mackerel fishing ground of purse seiners

Fishing gear



Light luring purse seine, LPS (72.85%)
Fish aggregating device luring purse seine, FPS (22.14%)

MSY Assessment by Fox model (data 1997-2014)

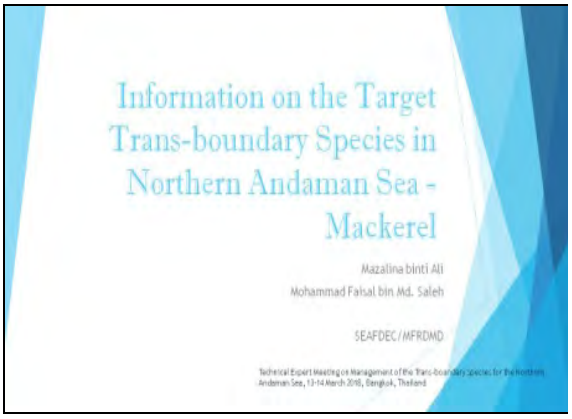


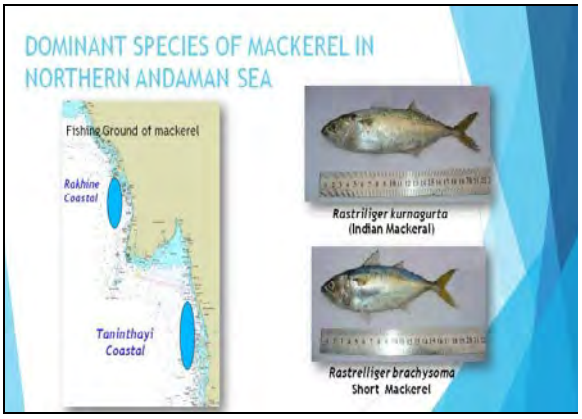
Thank you

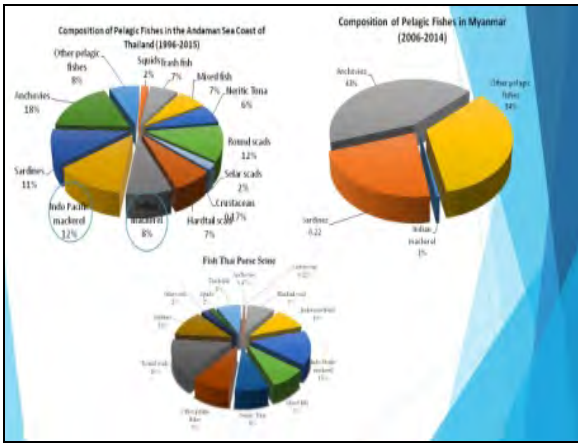
Annex 10

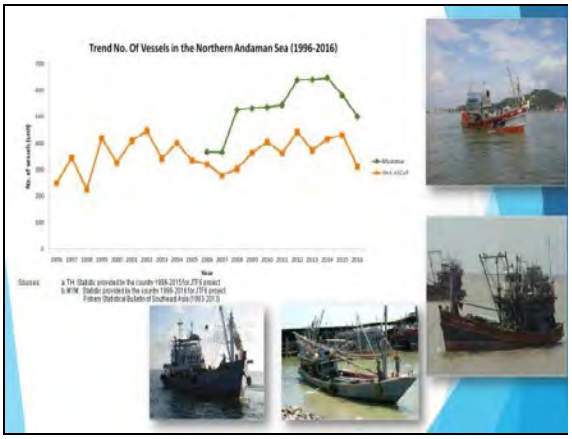
MACKERELS: SEAFDEC/MFRDMD

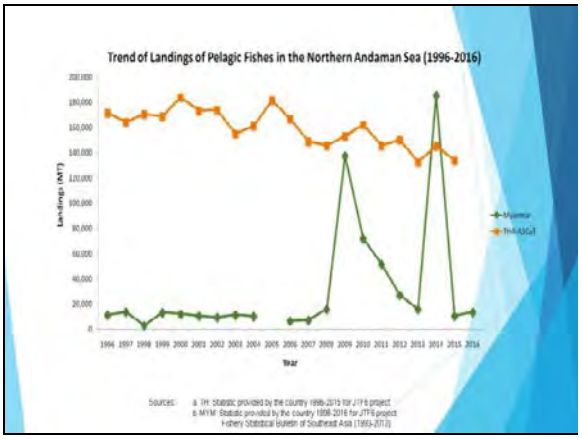
By *Ms. Mazalina Ali*

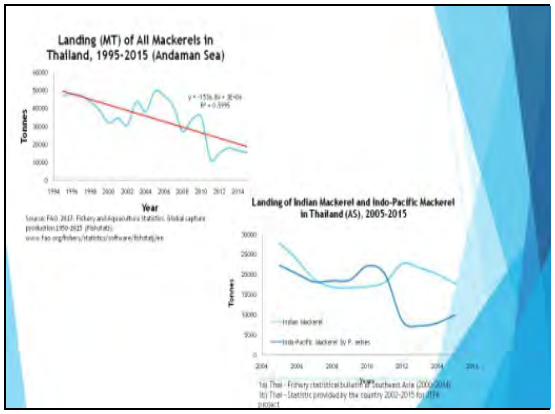












Length at 1st Maturity

Species	Sex	Length at 1st maturity (cm)
Rastrelliger branchysoma	M	16.09
	F	15.33
Rastrelliger kanagurta	M	17.83
	F	18.92

Kriangkrai et al. (2007)

Length-weight Relationship

Species	Sex	Length-weight relationship (n; r)
Rastrelliger branchysoma	M	$W = 0.0110TL^{3.0290}$ (1,068, 0.9208)
	F	$W = 0.0193TL^{2.8339}$ (913, 0.8935)
Rastrelliger kanagurta	M	$W = 0.0156TL^{2.9102}$ (2,035, 0.9103)
	F	$W = 0.0139TL^{2.9503}$ (1,784, 0.9040)

Kriangkrai et al. (2007)

n: Number of samples; *r*: Correlation coefficient

Spawning Season and Sex Ratio

Species	Spawning season (peak season)	Sex ratio (M:F)
Rastrelliger branchysoma	YR (Nov-May/Jul-Sep)	1:0.9
Rastrelliger kanagurta	YR (Dec-Mar/Aug-Sep)	1:0.9

Kriangkrai et al. (2007)

Fishing Season of the Indian Mackerel in Myanmar

Area	Months											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rakhine	■	■									■	■
Tanintharyi	■	■	■	■							■	■

Maximum Sustainable Yield (MSY)

Species	Thailand	Myanmar
7 major pelagic sp. (Indo-Pacific mackerel, Indian mackerel, Neritic tuna, King mackerel, Scads, Sardines, Anchovies)	136,602	
Total pelagic fish	Fox model: 200,000 MT Schaefer model: 190,000 MT	110,000 MT

Major Project Conducted by MFRDMD

- Information collection for commercially important pelagic species in the South China Sea areas: 2002 - 2007
- Tagging program for economically important small pelagic species in the South China Sea and Andaman Sea: 2007 - 2012
- Population study of Indian Mackerel in the Bay of Bengal (BOBLME): 2012 - 2014
- Comparative studies for management of purse seine fisheries in the Southeast Asian region: 2013 - 2019

Released and recovered tagged Short mackerel (*Rastrelliger brachysoma*) in ... monsoon in ... Sea, 2008 to 2011

Country	Site	Season	Individuals released	Number of Recovery	Rate of Recovery (%)	Longest period between release and recovery (days)
Myanmar	Boke Pyu	Southwest	214	1	0.47	67
		Northeast	2,901	23	0.72	159
	Kaw Thaung	Southwest	86	0		
		Northeast	28	7	25	19
Thailand	Ranong	Northeast	724	2	1.61	34
Northern All		Northeast	3,123	32	27	192
		Southwest	300	1	0.47	67
		All	3,423	33	28	259

Released and recovered tagged Indian mackerel (*Rastrelliger kanagurta*) in ... monsoon in ... 2009 to 2011

Country	Site	Season	Individuals released	Number of Recovery	Rate of Recovery (%)	Longest period between release and recovery (days)
Myanmar	Boke Pyu	Southwest	358	0		
		Northeast	2,410	0		
	Kaw Thaung	Southwest	245	0		
		Northeast	1,072	0		
Thailand	Ranong	Southwest	141	7	1.14	20
		Northeast	615	5		
Northern All		Northeast	4,096	0		
		Southwest	744	0		
		All	4,840	7	1.14	20

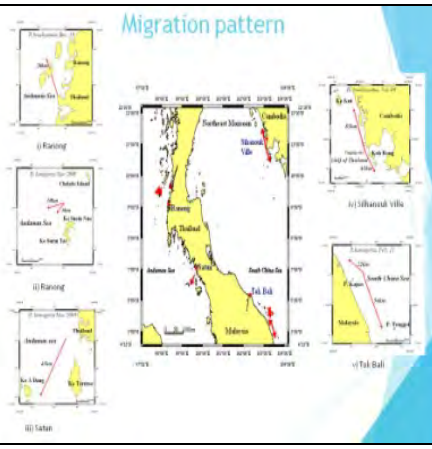
Rastrelliger brachysoma (Short mackerel)

	SCS	AS
No. of tagged fish	5220	5975
No. of recaptured	12	33
Recovery rate (%)	0.23 %	0.55 %

Rastrelliger kanagurta (Indian mackerel)

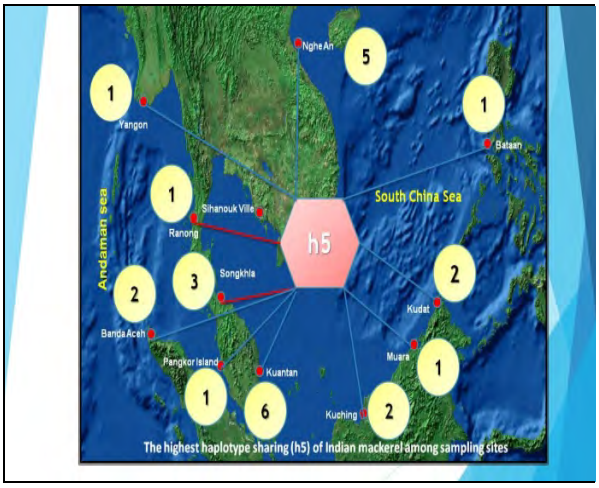
	SCS	AS
No. of tagged fish	7642	6636
No. of recaptured	16	8
Recovery rate (%)	0.21 %	0.15 %

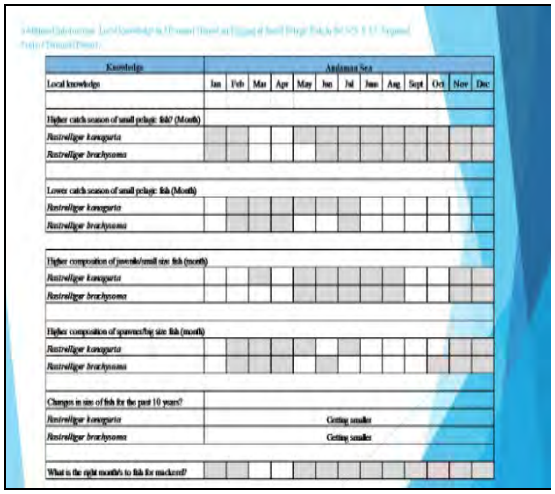
Migration pattern



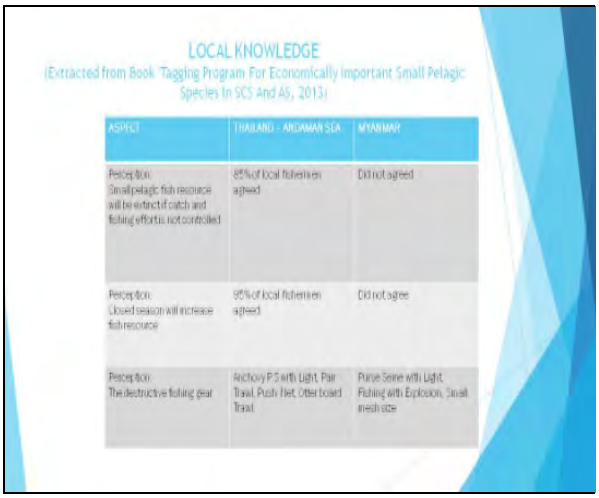
Genetic Study

- From 434 individuals of Indian mackerel analyzed, **323 haplotypes were produced.**
- **14 haplotypes shared** by more than one sites for *R. kanagurta*.
- Among of 14 shared haplotype in *R. kanagurta*, h5 was shared by the most number of sites (25 samples).
- It shows that Indian mackerel in the South China Sea and Andaman Sea are **shared or derived from the same stock** with high genetic variation among the sampling sites.





Knowledge	Andaman Sea											
Local knowledge	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Higher catch season of small pelagic fish? (Month)												
Rastrelliger kanagurta												
Rastrelliger brachysoma												
Lower catch season of small pelagic fish (Month)												
Rastrelliger kanagurta												
Rastrelliger brachysoma												
Higher composition of juvenile/small size fish (month)												
Rastrelliger kanagurta												
Rastrelliger brachysoma												
Higher composition of spawner/big size fish (month)												
Rastrelliger kanagurta												
Rastrelliger brachysoma												
Changes in size of fish for the past 10 years?												
Rastrelliger kanagurta	Getting smaller											
Rastrelliger brachysoma	Getting smaller											
What is the right month/s to fish for mackerel?												



LOCAL KNOWLEDGE

(Extracted from Book 'Tagging Program For Economically Important Small Pelagic Species In SCS And AS, 2013)

ASPECT	THAILAND - ANDAMAN SEA	MYANMAR
Perception: Small pelagic fish resource will be extinct if catch and fishing effort is not controlled	85% of local fishermen agreed	Did not agreed
Perception: Closed season will increase fish resource	95% of local fishermen agreed	Did not agree
Perception: The destructive fishing gear	Anchovy PS with Light, Pair Trawl, Push Net, Otter board Trawl	Purse Seine with Light, Fishing with Explosion, Small mesh size

Restriction of Fishing Gear & Technique

Myanmar

- Prohibit net mesh size less than 2.5 inch in fish purse seines.

Thailand

- Prohibit net mesh size less than 25mm during night time and for Light Luring Method of Purse Seine

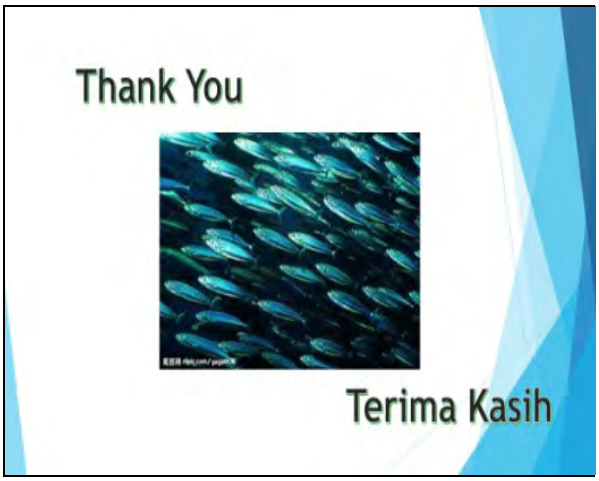
Close season

Myanmar

2 months (1st Apr- 30th May)

Thailand

- 3 months (1st April - 30th June) started 2007.
- Expanded 1955 km2 to 4.353 km2
- 1 patrol office (at Krabi)



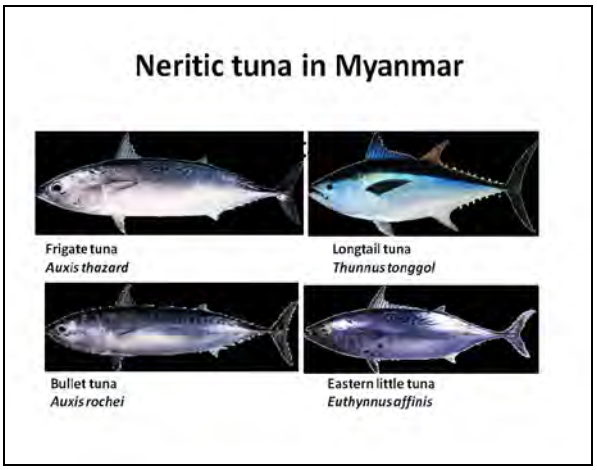
Thank You

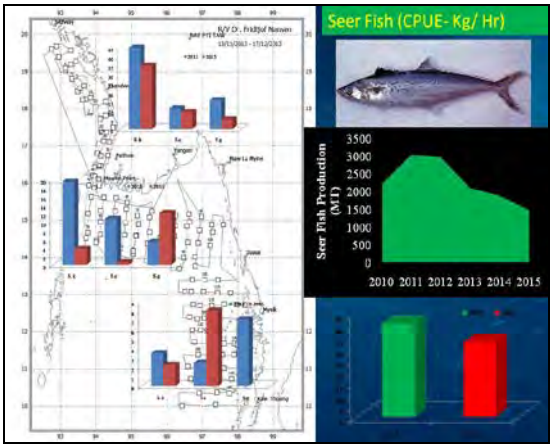
Terima Kasih

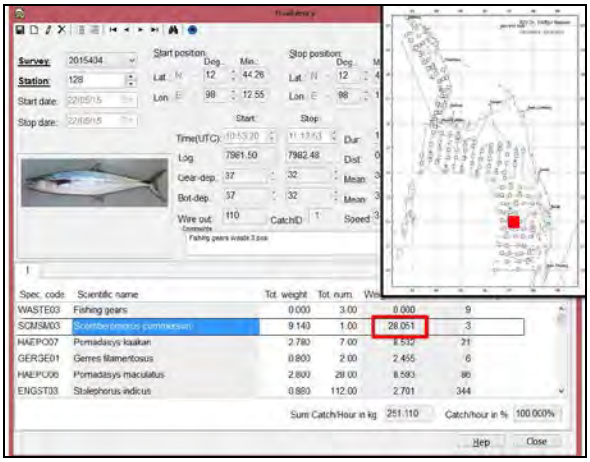
Annex 11

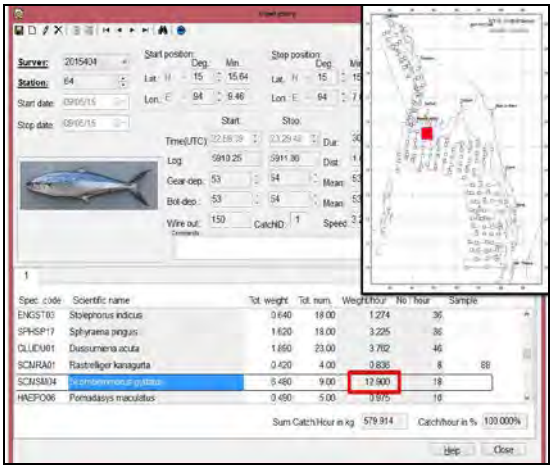
NERITIC TUNA: MYANMAR

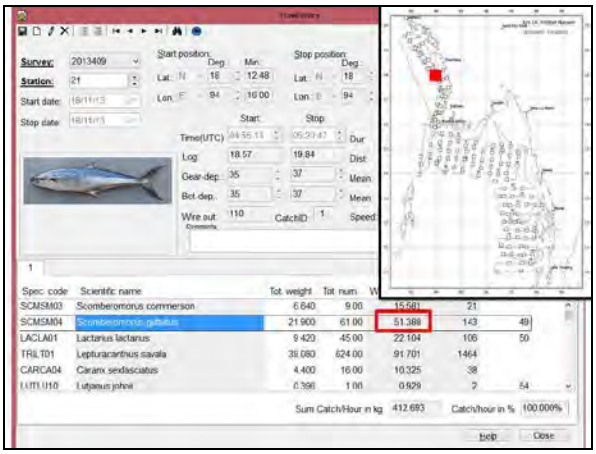
By *Dr. Htun Thein*











Annex 12

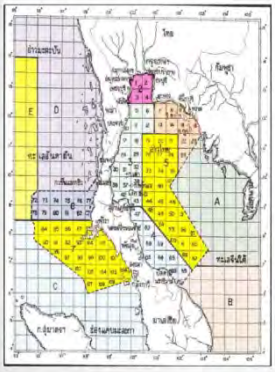
NERITIC TUNA: THAILAND

By *Ms. Praulai Nootmorn*

The Technical Experts Meeting on Management of Trans-boundary Species for Northern Andaman Sea: THAILAND

Mrs. Praulai Nootmorn Senior Expert in Marine Fishery
Miss. Nipa Kulanujaree Fishery Biologist, Practitioner Level
Miss. Thanawan Somjit Fishery Biologist, Practitioner Level

Map of Fishing area in Thailand



Andaman Sea

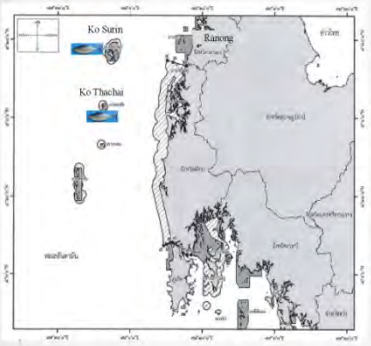
Northern Andaman Sea (Area 6): Ranong - Upper part of Phang Nga Province

Southern Andaman Sea (Area 7): Phang Nga, Phuket, Krabi, Trang and Satun Province

Auxis thazard (Lacepède, 1800)	(Frigate Tuna)	
Euthynnus affinis (Cantor, 1849)	(Eastern Little Tuna, Kawakawa)	
Thunnus tonggol (Bleeker, 1851)	(Longtail tuna)	

	Size (Folk length: cm) (area 6 + area 7)	L_{50} (area 6 + area 7)
Auxis thazard (Frigate tuna)	10.20-44.50	Male = 26.57 Female = 28.88
Euthynnus affinis (Eastern Little tuna)	7.00-60.00	Male = 37.74 Female = 39.71
Thunnus tonggol (Longtail tuna)	7.00-64.00	Male = 41.46 Female = 43.76

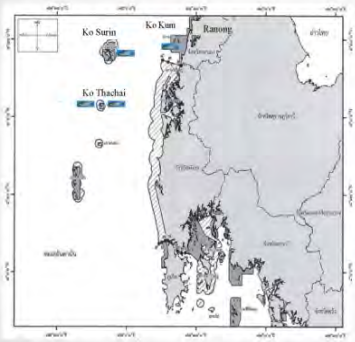
Auxis thazard: Frigate Tuna



Spawning season throughout the year with 2 peaks of spawning season including January-March and August-November

Spawning grounds the west of Ko Surin and Ko Thachai of Phang-Nga Province

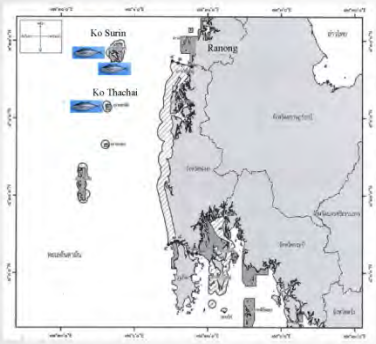
Euthynnus affinis: Eastern Little Tuna



Spawning season throughout the year. Two peaks of spawning season showed during January-May and October-December

Spawning grounds the south of Ko Kam of Ranong Province, the west and the east of Ko Tarchai and the east of Ko Surin of Phang-Nga Province

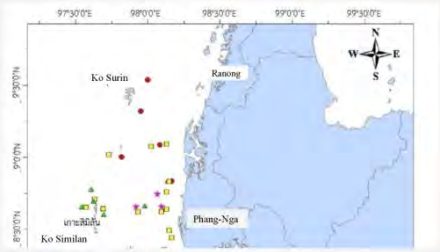
Thunnus tonggol (Longtail tuna)



Spawning season throughout the year with peak of spawning in April

Spawning grounds the south and the west of Koh Surin and the south of Koh Tarchai of Phang-Nga Province

Fishing grounds of Tunas



- Thai purse seine (TPS)
- Light luring purse seine (LPS)
- Purse seine with fish aggregating devices (FADs)
- Tuna purse seine (TUN)

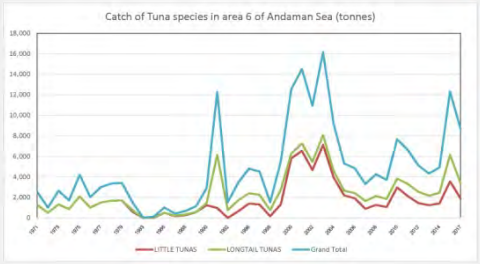
Fishing gears of Tunas

Purse seine with fish aggregating devices (FADs)

Light luring purse seine (LPS)

Thai purse seine (TPS)

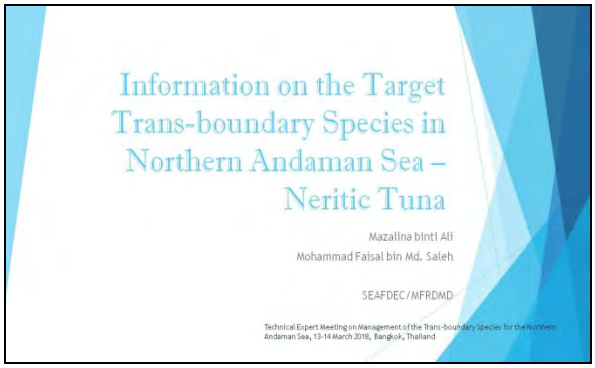
Tuna purse seine (TUN)

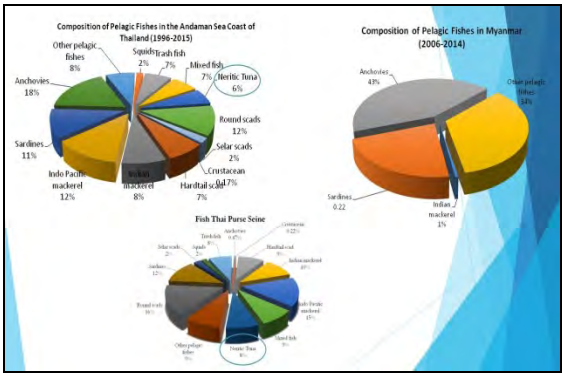


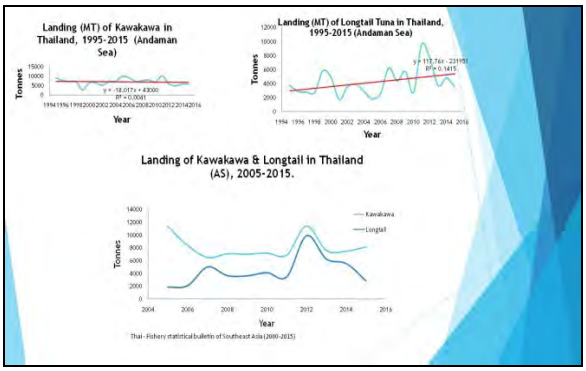
Annex 13

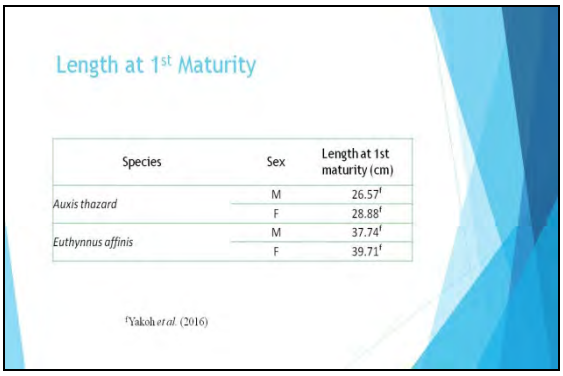
NERITIC TUNA: SEAFDEC/MFRDMD

By *Ms. Mazalina Ali*



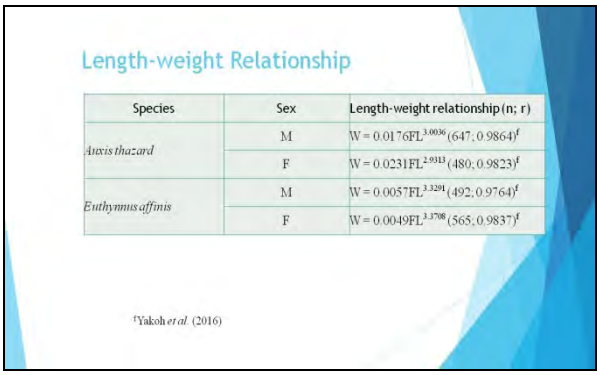






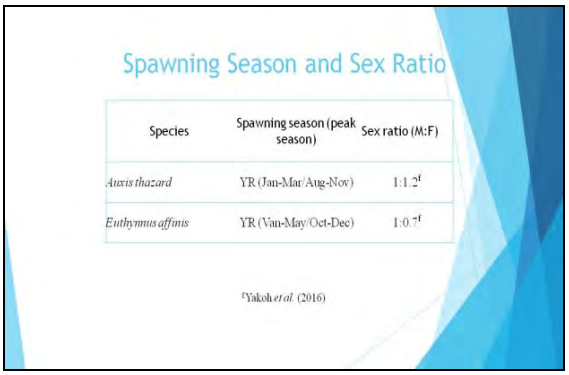
Species	Sex	Length at 1st maturity (cm)
Auxis thazard	M	26.57[f]
	F	28.88[f]
Euthynnus affinis	M	37.74[f]
	F	39.71[f]

[f]Yakoh *et al.* (2016)



Species	Sex	Length-weight relationship (n; r)
Auxis thazard	M	$W = 0.0176FL^{3.0036}$ (647; 0.9864)[f]
	F	$W = 0.0231FL^{2.9313}$ (480; 0.9823)[f]
Euthynnus affinis	M	$W = 0.0057FL^{3.3291}$ (492; 0.9764)[f]
	F	$W = 0.0049FL^{3.3708}$ (565; 0.9837)[f]

[f]Yakoh *et al.* (2016)



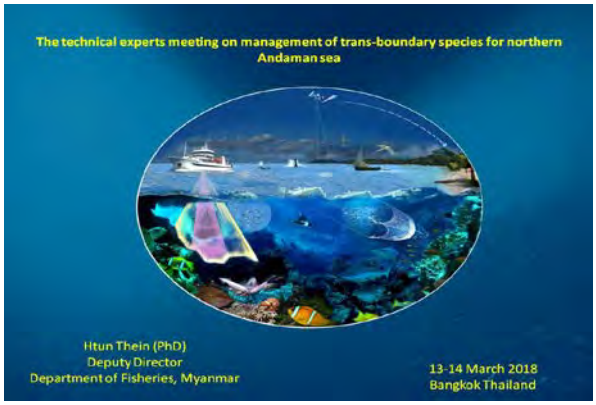
Species	Spawning season (peak season)	Sex ratio (M:F)
Auxis thazard	YR (Jan-Mar/Aug-Nov)	1:1.2[f]
Euthynnus affinis	YR (Jan-May/Oct-Dec)	1:0.7[f]

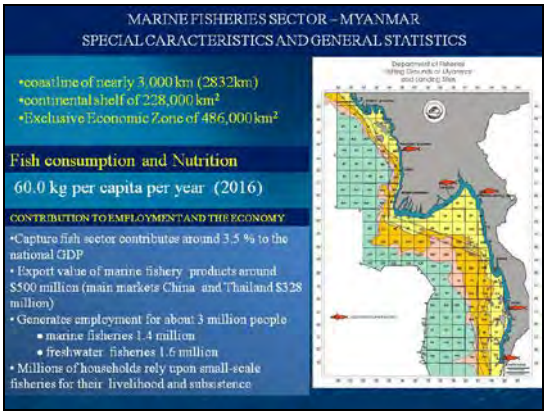
[f]Yakoh *et al.* (2016)

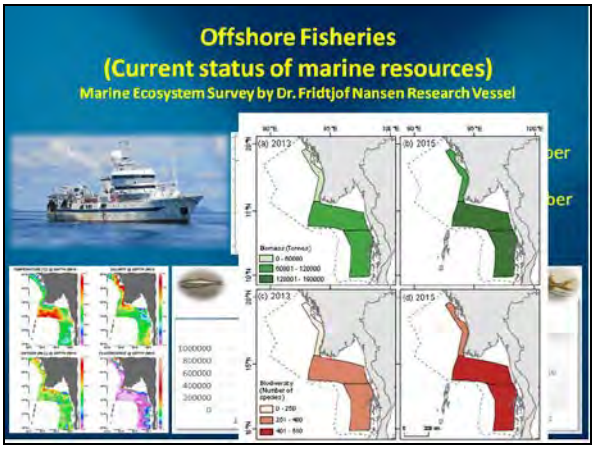
Annex 14

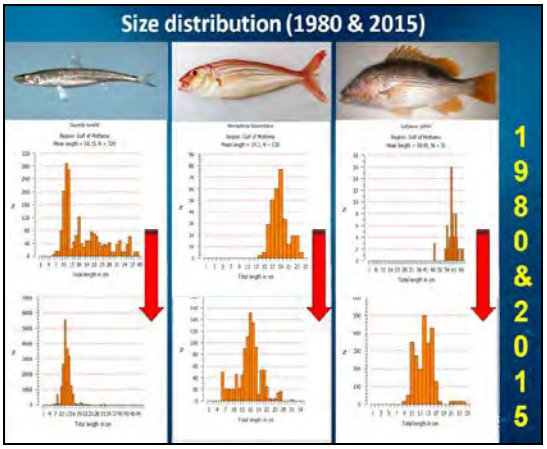
COUNTRY PRESENTATION OF EXISTING MANAGEMANT MEASURES RELATING TO MACKERESLS, ANCHOVIES AND NERITIC TUNAS: MYANMAR

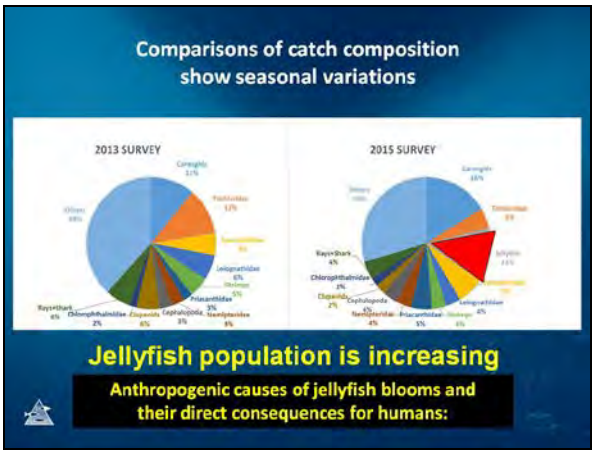
By *Dr. Htun Thein*

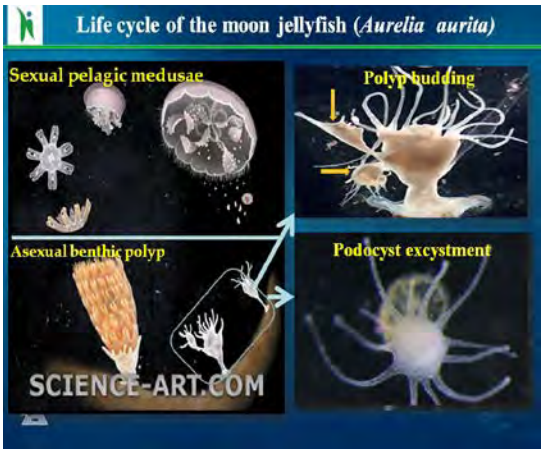


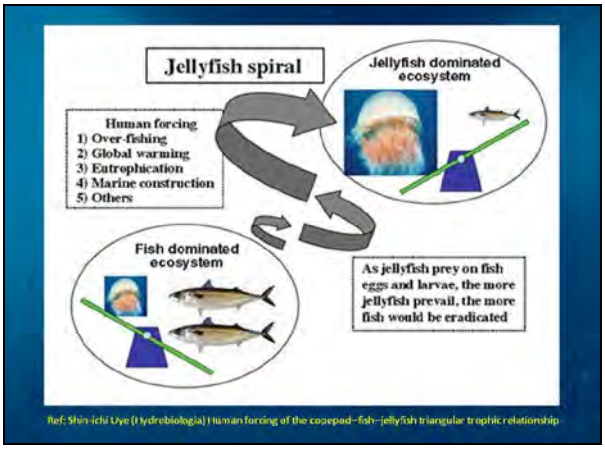


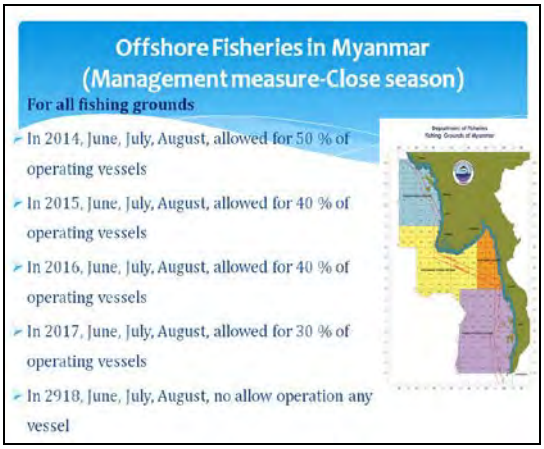


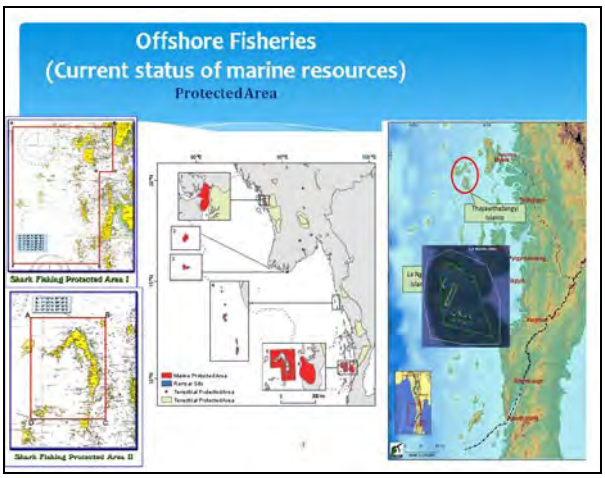


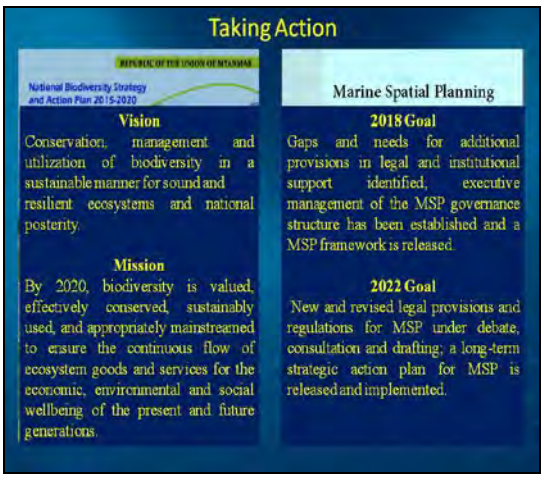





Jellyfish spiral
Jellyfish dominated ecosystem
Human forcing
1) Over-fishing
2) Global warming
3) Eutrophication
4) Marine construction
5) Others
Fish dominated ecosystem
As jellyfish prey on fish eggs and larvae, the more jellyfish prevail, the more fish would be eradicated
Ref: Shin-ichi Uye (Hydrobiologia) Human forcing of the copepod–fish–jellyfish triangular trophic relationship

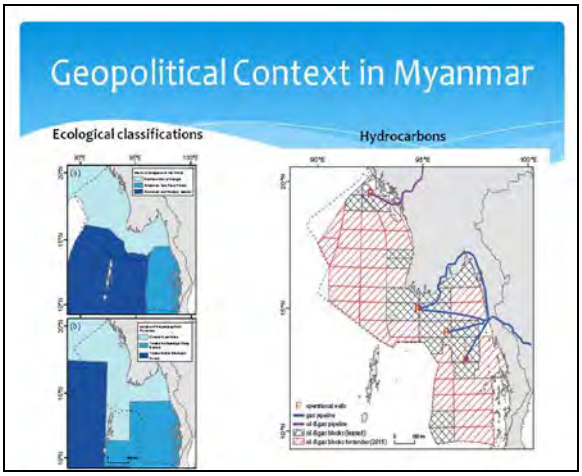

Offshore Fisheries in Myanmar
(Management measure-Close season)
For all fishing grounds
In 2014, June, July, August, allowed for 50 % of operating vessels
In 2015, June, July, August, allowed for 40 % of operating vessels
In 2016, June, July, August, allowed for 40 % of operating vessels
In 2017, June, July, August, allowed for 30 % of operating vessels
In 2918, June, July, August, no allow operation any vessel

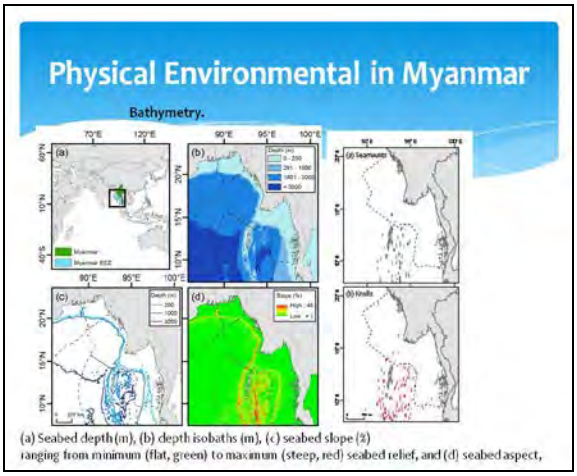

Offshore Fisheries
(Current status of marine resources)
Protected Area
Shark Fishing Protected Area I
Shark Fishing Protected Area II

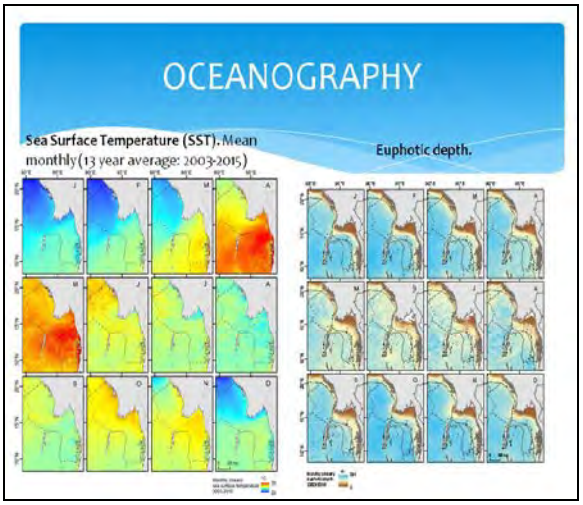

Taking Action
National Biodiversity Strategy and Action Plan 2015-2020
Vision
Conservation, management and utilization of biodiversity in a sustainable manner for sound and resilient ecosystems and national posterity.
Mission
By 2020, biodiversity is valued, effectively conserved, sustainably used, and appropriately mainstreamed to ensure the continuous flow of ecosystem goods and services for the economic, environmental and social wellbeing of the present and future generations.
Marine Spatial Planning
2018 Goal
Gaps and needs for additional provisions in legal and institutional support identified, executive management of the MSP governance structure has been established and a MSP framework is released.
2022 Goal
New and revised legal provisions and regulations for MSP under debate, consultation and drafting; a long-term strategic action plan for MSP is released and implemented.

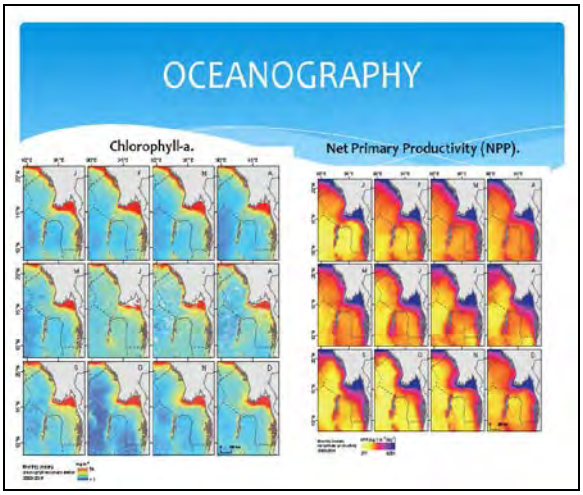

Marine Spatial Planning in Myanmar
Progress
THE MSP PLANNING PROCESS
The development and implementation of MSP involves a number of steps[1], typically:
1. Identifying need and establishing authority
2. Obtaining financial support
3. Organizing stakeholder participation
4. Organizing the process through pre-planning
5. Defining and analyzing existing conditions
6. Defining and analyzing future conditions
7. Preparing and approving the spatial management plan

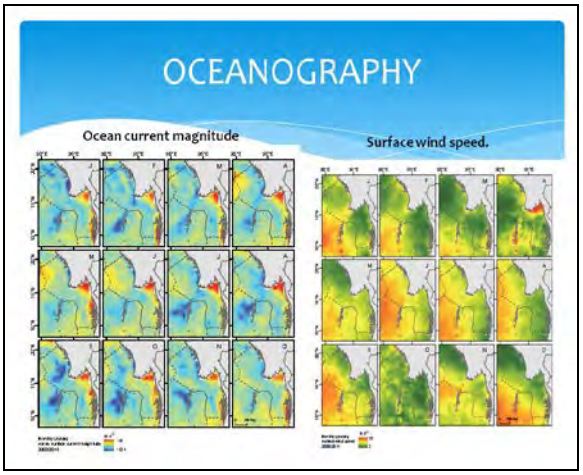

Marine Spatial Planning in Myanamr
OUR OCEAN
Myanmar
OUR OCEAN, AN OCEAN FOR LIFE
The Government of Myanmar announced its commitment to develop a marine spatial plan by 2021; it should cover approximately 485,000 square kilometers of Myanmar's exclusive economic zone.
The plan foresees developing further the Myanmar's marine protected area network, providing support to sustainable fisheries, as well as ensuring the development of a sustainable blue economy for all marine stakeholders.

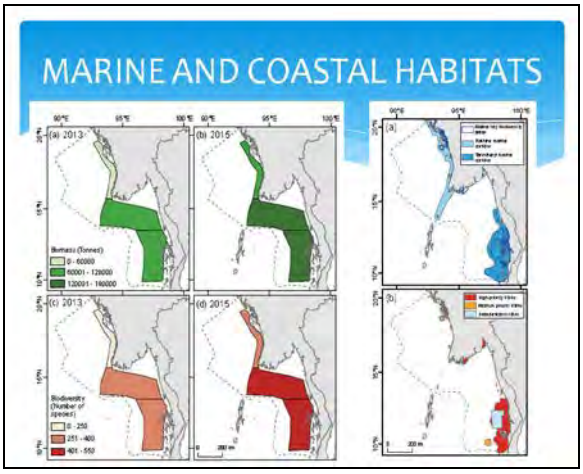

Geopolitical Context in Myanmar
Ecological classifications
Hydrocarbons


Physical Environmental in Myanmar
Bathymetry.
(a) Seabed depth (m), (b) depth isobaths (m), (c) seabed slope (%)
ranging from minimum (flat, green) to maximum (steep, red) seabed relief, and (d) seabed aspect,


OCEANOGRAPHY
Sea Surface Temperature (SST). Mean
monthly (13 year average: 2003-2015)
Euphotic depth.


OCEANOGRAPHY
Chlorophyll-a.
Net Primary Productivity (NPP).

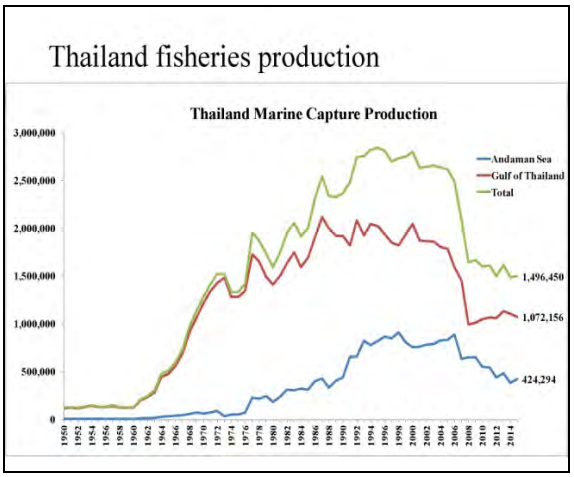

OCEANOGRAPHY
Ocean current magnitude
Surface wind speed.

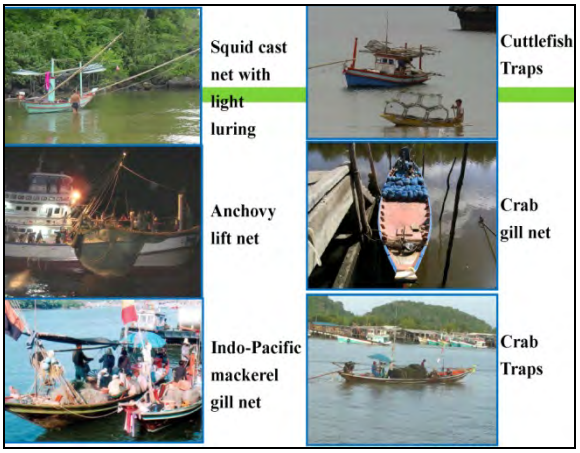

MARINE AND COASTAL HABITATS

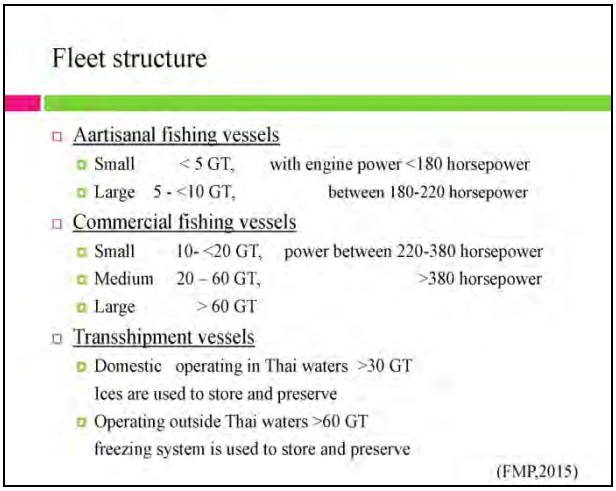
Annex 15

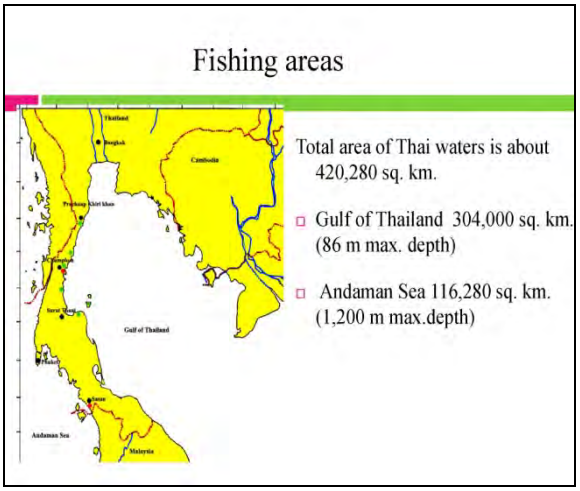
COUNTRY PRESENTATION OF EXISTING MANAGEMANT MEASURES RELATING TO MACKERESLS, ANCHOVIES AND NERITIC TUNAS: THAILAND

By *Ms. Praulai Nootmorn*









Fisheries Management

- Thailand government is willing and committed to manage the marine resources for sustainable utilization
- Reforming and modernizing fisheries sector in compliance with international rules
- Fisheries in Thailand has been transform
  Open access ⟹ limited access
- Key issues use for fisheries management in Thailand

1. Legal framework

- The Royal Ordinance on Fisheries B.E. 2558 (2015) was approved by the cabinet came into force on November 2015.
- Highlights of the Royal Ordinance include:
  - Sustainable resources management
  - Definition of illegal fishing
  - Introduce strictly penalty which proportional to sanction or resources exploitation
  - Concordance with international law and regulation

1. Legal framework

- After the Royal Ordinance (2015) entry into force, some amendments needs to close existing legal loopholes and to maximise the efficiency of its implementation and enforcement
- The Royal Ordinance (No.2) 2017 was approved by the Cabinet on June 2017.
- Royal Ordinance on Fisheries (2015 and 2017) are internationally and up to date

1. Legal framework

Related Law and Regulation

- NCPO Notification
- Ministerial Notification
- The Royal Ordinance on Thai Vessels
- The Royal Ordinance on the Navigation

2. Fisheries Management Plan (FMP)

- FMP (2015-2019) has been published in the Royal Gazette since December 2015
- FMP applies the EAFM that aims to balance ecological well-being with human well-being
- Implementing of FMP
  - to reduce fishing capacity,
  - to develop sustainable fisheries, and
  - to ensure full protection of the marine resources.

2. Fisheries Management Plan (FMP)

- FMP has integrated legal framework and fishery policy and closely linked to
  - The Royal Ordinance on Fisheries (2015 and 2017)
  - National Plan of Action to prevent, deter and eliminate Illegal, unreported and unregulated fishing (NPOA-IUU)
  - Monitoring control and Surveillance (MCS)
  - National Plan of Control and Inspection (NPCI)
  - Traceability

2. Fisheries Management Plan (FMP)

- To implement FMP and the fleet reduction measures properly, a clear and accurate picture of the fleet is necessary
- The latest fishing vessels survey (31 May 2017)
  - 10,616 Fishing License in Thai waters
  - 16 Oversea Fishing License

  Up to date (real time) vessel data base called "Fishing info"
- Electronics fishing license system based on MSY has been developed
- Increasing 221 government officials for new tasks under the Royal Ordinance

2. Fisheries Management Plan (FMP)

- **Allowable catches and Allowable fishing days based on MSY has been introduced in Thailand**

Groups	Gulf of Thailand		Andaman Sea	
	Allowable Catches (tons) in 2016	Allowable fishing days (days) in 2016	Allowable catches (tons) in 2016	Allowable fishing days (days) in 2016
Demersal species	54,616	101,627	14,789	16,989
Pelagic fish	26,499	28,815	6,850	4,321
Anchovies	23038	21,932	3,104	4,277
Total	104,153	152,374	24,743	25,587

3. Traceability

- Thailand has developed "National traceability System" for catches from both Thai-flagged vessels and imported fish and fishery products to ensure their origin and movements
- Two electronic databases have been developed to strengthen the level of accuracy and in cross-checking information before issuing Catch Certificate and Processing Statement
  - Thai flagged traceability system
  - PSM linked and Processing Statement System (PPS)

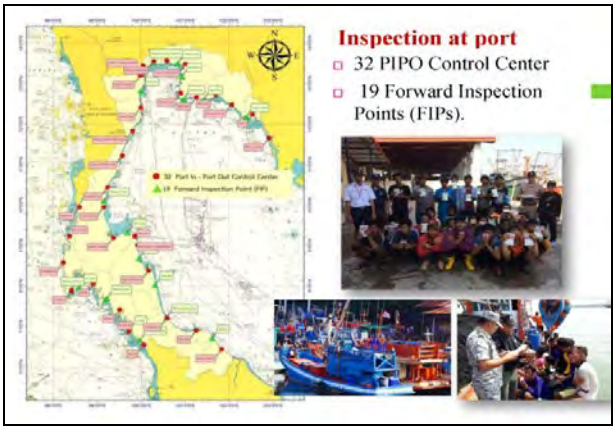
4. Monitoring, Control and Surveillance (MCS) Systems

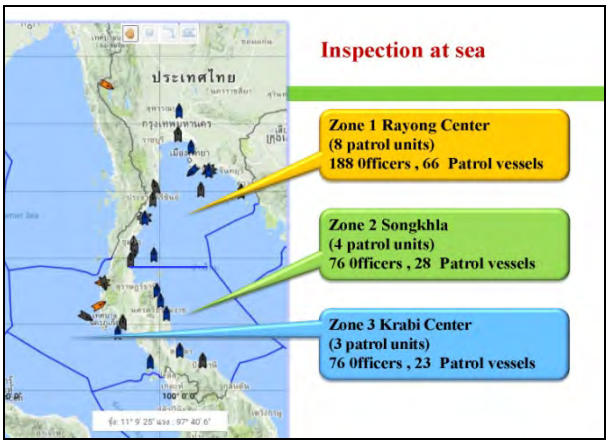
- MCS measures have been implemented to ensure fishing activities comply with the new fisheries laws and regulations
- Fisheries Monitoring Center (FMC)
  - VMS
  - Inspection at port
  - Inspection at sea
- Improved coordination mechanism among agencies involved in MCS activities

MCS Components to implement control measures

4. Monitoring, Control and Surveillance (MCS) Systems

- VMS
  - > 30 GT are installed VMS
  - all VMS devices must be sealed, to prevent a possibility of removal from the vessel
  - VMS switched on at all time, in case of signal lost FMC team take immediate action
- To control oversea fleet and carriers
  - new electronic surveillance system has been developed
    - Electronic Reporting System (ERS)
    - Electronic Monitoring (EM)
  - Observer on board





5. National and international co-operation

Strengthening cooperation with various third countries and RFMOs

- Thailand has successfully signed cooperation agreements on combating IUU fishing with Fiji, South Korea, the Philippines, Myanmar and Japan
- Many MoU or agreements which have been drafted
- RFMOs : Thailand is member of
  - Indian Ocean Tuna Commission (IOTC),
  - Southern Indian Ocean Fisheries Agreement (SIOFA) , effective on May 2017

Annex 16

DISCUSSION ON DATA FORMATS AND NEEDS FOR THE PRODUCTION OF THEMATIC (GIS BASED) MAPS

Template for Required Data/Information

The Technical Experts Meeting on Management of Trans-boundary Species for Northern Andaman Sea

13-14 March 2018, Bangkok, Thailand

Required Data/Information

- Major fishing gear catching target species
- Size and engine power of the vessel catching target species
- Target species/group
- Major fishing ground/area
- Fishing season
- Annual landing trend
- Fishing efforts (no. of vessel, CPUE, maximum, minimum, etc.)
- Post-harvest utilization (salt, dry, etc.)

Required Data/Information

- MSY (pelagic in AS 200,000 MT and 110,000 MT)
- Size at first maturity of the target species
- Sex ratio
- Length weight relationship
- Fecundity
- Percentage of stage distribution [eggs stage 1 ... %, stage 2 .... %, stage 3 ... %, stage 4 ... , stage 5, etc.]
- Spawning area
- Spawning season
- Eggs and larvae distribution (area, depth of water, etc.)
- Juvenile distribution area
- Fishery management measures for target species

3-months plan of activities

Data	Myanmar	Thailand	Action Needs

Annex 17

LIST OF MAPLAYERS INPUT DATA AND TIMELINE MYANMAR

Timeline on preparing set of required data and Information for developing draft maps for spawning ground and season

Final deadline May 31

Provide existing data by April 1

Jun-15 **Draft map and set of information**

Jun-07 **Data Clarified by TD**

Myanmar

Deadlines	**Map layer**	**Comment/available data**
May-31	Spawning ground anchovy (if possible by species)	Myanmar need to analyse backscatter data. Interview with fishermen. Check with Myeik University. Smithsonian, Flora and Fauna International.
May-31	Spawning ground mackerel (if possible by species)	Myanmar need to analyse backscatter data. Interview with fishermen. Check with Myeik University. Smithsonian, Flora and Fauna International.
May-31	Spawning ground Neritic tuna (if possible by species)	Myanmar need to analyse backscatter data. Interview with fishermen. Check with Myeik University. Smithsonian, Flora and Fauna International.
May-31	Spawning season anchovy (if possible by species)	Myanmar need to analyse backscatter data. Interview with fishermen. Check with Myeik University. Smithsonian, Flora and Fauna International.
May-31	Spawning season mackerel (if possible by species)	Myanmar need to analyse backscatter data. Interview with fishermen. Check with Myeik University. Smithsonian, Flora and Fauna International.
May-31	Spawning season Neritic tuna (if possible by species)	Myanmar need to analyse backscatter data. Interview with fishermen. Check with Myeik University. Smithsonian, Flora and Fauna International.
Apr-30	Fishing ground anchovy (if possible by gear)	Have
Apr-30	Fishing ground mackerel (if possible by gear)	Have
Apr-30	Fishing ground Neritic tuna (if possible by gear)	Have
Apr-30	Fishing season anchovy (if possible by gear)	Have
Apr-30	Fishing season mackerel (if possible by gear)	Have
Apr-30	Fishing season Neritic tuna (if possible by gear)	Have
Apr-30	Larva distribution (if possible by species)	Don't have
Apr-30	Gear restrictions (by area, season and gear, mesh size, as appropriate)	Have
Apr-30	Closed areas (seasonal and permanently including MPAs, LMMAs and	Have

	community/provincial)	
Apr-30	Stock Structure Anchovy	?
Apr-30	Stock Structure Mackerel (if possible by species)	Not finished
Apr-30	Stock Structure Neritic tuna (if possible by species)	Have
	Additional data	
Apr-30	Catch data Anchovy	Maybe limited - only dried
Apr-30	Catch data Mackerel	Have
Apr-30	Catch data Neritic tuna	Have
Apr-30	CPUE Anchovy	Don't have
Apr-30	CPUE Mackerel	MFRDMD can send the source of data to Myanmar
Apr-30	CPUE Neritic Tuna	Have
Apr-30	MSY Anchovy	Don't have
Apr-30	MSY Mackerel	Don't have
Apr-30	MSY Neritic Tuna	Don't have
Apr-30	Length first maturity Anchovy (if possible by species)	Have
Apr-30	Length first maturity Mackerel (if possible by species)	Have
Apr-30	Length first maturity Neritic Tuna (if possible by species)	Have
Apr-30	Vessel limitation/no of vessel	MFRDMD inform what the data source is used
Apr-30	Fishing effort limitation	Have
Apr-30	Catch composition (by gear)	Partly
	Provide existing data	
Apr-01	To disseminate existing data in your hands to TD	

LIST OF MAPLAYERS INPUT DATA AND TIMELINE: THAILAND

Timeline on preparing set of required data and Information for developing draft maps for spawning ground and season

Final deadline May 31

Provide existing data by April 1

Jun-15 **Draft map and set of information**

Jun-07 **Data Clarified by TD**

Thailand

Deadlines	Map layer	Comment/available data
May-31	Spawning ground anchovy (if possible by species)	Have
May-31	Spawning ground mackerel (if possible by species)	Have for short
May-31	Spawning ground Neritic tuna (if possible by species)	Area need to be defined and controlled with owner of data
May-31	Spawning season anchovy (if possible by species)	Three species
May-31	Spawning season mackerel (if possible by species)	Short and Indian mackerel
May-31	Spawning season Neritic tuna (if possible by species)	Longtail, Kawakawa, Frigate
Apr-30	Fishing ground anchovy (if possible by gear)	Have
Apr-30	Fishing ground mackerel (if possible by gear)	Short and Indian mackerel
Apr-30	Fishing ground Neritic tuna (if possible by gear)	Have
Apr-30	Fishing season anchovy (if possible by gear)	Have
Apr-30	Fishing season mackerel (if possible by gear)	Short and Indian mackerel
Apr-30	Fishing season Neritic tuna (if possible by gear)	Have
Apr-30	Larva distribution (if possible by species)	Have
Apr-30	Gear restrictions (by area, season and gear, mesh size, as appropriate)	Have
Apr-30	Closed areas (seasonal and permanently including MPAs, LMMAs and community/provincial)	Have
Apr-30	Stock Structure Anchovy	?
Apr-30	Stock Structure Mackerel (if possible by species)	Have
Apr-30	Stock Structure Neritic tuna (if possible by species)	Have

Additional data

Apr-30	Catch data Anchovy	Species grouped togeether
Apr-30	Catch data Mackerel	Have
Apr-30	Catch data Neritic tuna	Have
Apr-30	CPUE Anchovy	Species grouped together
Apr-30	CPUE Mackerel	Have
Apr-30	CPUE Neritic Tuna	Have
Apr-30	MSY Anchovy	Grouped species
Apr-30	MSY Mackerel	Grouped species
Apr-30	MSY Neritic Tuna	Both SEAFDEC SWG result and IOTC result

Apr-30	Length first maturity Anchovy (if possible by species)	Have
Apr-30	Length first maturity Mackerel (if possible by species)	Have
Apr-30	Length first maturity Neritic Tuna (if possible by species)	Have
Apr-30	Vessel limitation/no of vessel	Have
Apr-30	Fishing effort limitation	Have
Apr-30	Catch composition (by gear)	Partly

Provide existing data

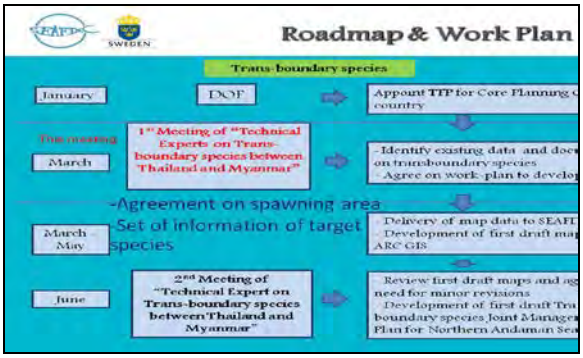
Apr-01	To disseminate existing data in your hands to TD	

Annex 18

DRAFTING A DETAIL WORKPLAN FOR PRODUCING THEMATIC MAPS ROADMAP AND WORKPLAN

By *SEAFDEC/TD Team*

The Draft Detailed Work Plan
for
Producing the Thematic Map



Work Plan & Timeline

- Compile needed Data (for Maplayers)
  01 April 2018 ➡ 31 May 2018
- Production of Draft maps
  07 June 2018 ➡ 15 June 2018

Timeline

Activities	Due Date
First Data Dissemination (Please disseminate all data in your hand)	1-April
Second Data Dissemination (Fishing ground and season, Closing area/ Gear restriction, Protected area and existing regulation, etc., are requested to disseminate) * *Fishing ground and season was requested to provide by each gear*	30-April
Third Data Dissemination (Spawning ground by Spawning season by species Data disseminate to SEAFDEC)	31-May
Data Clarification	7-June
Draft map and set of information	15-June

Data for Maplayers

	Dead-line
• **Spawning ground** (if possible by species): Anchovy, Mackerels, neritic tuna	31 May
• **Spawning season** (if possible by species): Anchovy, Mackerels, neritic tuna	31 May
• **Fishing ground** (if possible by gear)	30 April
• **Fishing season** (if possible by gear)	30 April
• **Larval distribution** (if possible by species): Anchovy, Mackerels, neritic tuna	30 April
• **Gear restrictions** (by area, season, gear, mesh size, as appropriate)	30 April
• **Closed areas** (seasonal and permanently including MPAs, LMMAs and community/provincial)	30 April
• **Stock Structure** (if possible by species): Anchovy, Mackerels, neritic tuna	30 April

Additional Data

	Dead-line
• **Catch data** by species: Anchovy, Mackerels, neritic tuna	30 April
• **CPUE** by species: Anchovy, Mackerels, neritic tuna	30 April
• **MSY** by species: Anchovy, Mackerels, neritic tuna	30 April
• **Length first maturity** by species: Anchovy, Mackerels, neritic tuna	30 April
• **Vessel limitation/no. of vessel**	30 April
• **Fishing effort limitation**	30 April
• **Catch composition** (by gear)	30 April

Work Plan

- Produce Draft Map
- Compile Needed Data

90 days ➡ to complete preparing task