



Southeast Asian Fisheries  
Development Center



United Nations  
Environment



Global Environment  
Facility

Establishment and Operation of A Regional System of Fisheries *Refugia*  
in the South China Sea and Gulf of Thailand

**REPORT**  
**THE SECOND MEETING OF**  
**THE REGIONAL SCIENTIFIC AND TECHNICAL COMMITTEE**

**KAMPOT, CAMBODIA**  
**21<sup>ST</sup>- 23<sup>RD</sup> MAY 2019**



**SEAFDEC/UNEP/GEF**  
**Fisheries *Refugia***

**JUNE 2019**

**Cover Graphic:**  
Namfon Imsamrarn and Somboon Siriraksophon

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## Report of the Meeting

### 1. OPENING OF THE MEETING

#### 1.1 Welcome Speech from the Chairperson of RSTC for 2018

1. Mr. Leng Sy Vann, Chairperson of the Regional Scientific and Technical Committee for 2018, welcomed all participants to Kampot, Cambodia as one of the fisheries refugia site. He mentioned that Fisheries Administration of Cambodia (FiA) originally planned to hold the meeting at Koh Kong, unfortunately, there was a problem of electricity shortage, therefore the meeting venue was moved to Kampot Province.

2. He informed the meeting that Viet Nam signed the Letter of Intent for implementing the national fisheries refugia. In addition, Indonesia will sign the Letter of Agreement within this week in Bangkok, Thailand. These are good news that all relevant 6 countries are on board for implementation of all 14 Fisheries Refugia Sites. Then he expressed his wish that all participants had a pleasant stay on the beautifully landscaped hill on the Bokor Mountain in Kampot. His welcome speech appears as [ANNEX 1](#).

#### 1.2 Opening Speech by Guest of Honor from Fisheries Administration/Cambodia

3. Mr. Ouk Vibol, Director Department of Fisheries Conservation, Fisheries Administration (FiA) and concurrently the National Focal Point of the Fisheries Refugia Project greeted and expressed his warmest welcome to all participants from 6 members countries, regional experts from Thailand and Philippines, partners to Fisheries Refugia, representatives from SEAFDEC Training Department and PCU members for attending the 2<sup>nd</sup> Meeting of the Regional Scientific and Committee Meeting. He reiterated the difficulty faced by FiA to co-organize the RSTC2 during the dry seasons due to shortage of electricity in many provinces. Finally, FiA decided to hold the meeting in Kampot.

4. He informed the meeting that Cambodia is facing a problem on the Red card from EU regarding to IUU fishing. He congratulated Thailand who had got the yellow card during the past and could achieve effective fisheries management resulting to the lifting of the yellow card.

5. In addition, he referred to the Strategic Planning Framework for Fisheries: 2010 – 2019 that was adopted by the Royal Government of Cambodia and the updated Strategic Planning Framework for Fisheries: 2015-2024 which provides guidance to contribute to the Royal Government's vision for the future, where the Cambodian people continue to get benefits from abundant fisheries resources.

6. He also expressed his deepest appreciation for UNEP, SEAFDEC, member countries, and sincere wish for successful meeting. He then declared the meeting open at 08.42 hrs. His opening speech appears as [ANNEX 2](#).

#### 1.3 Introduction of Members

7. Mr. Leng Sy Vann, the chairperson, noted that there were a number of new members following the election of officers for the regional working groups and invited the participants to introduce themselves to the meeting. The list of participants is attached as [ANNEX 3](#) to this report.

8. Mr. Somboon Siriraksophon expressed his gratitude to Mr. Ouk Vibol for his warm welcome and kind support making this meeting possible in Kampot, Cambodia. He also thanked on behalf of the committee to Mr. Ouk Vibol for providing a reception dinner when all participants arrived in Kampot province on 20<sup>th</sup> May.

## 2. ORGANISATION OF THE MEETING

### 2.1 Designation of Officers for 2019

9. Dr. Somboon Siriraksophon, Project Director informed members that the Rules of Procedure state that, the Regional Scientific and Technical Committee shall elect, from amongst the members, a Chairperson, a Vice-Chairperson and a Rapporteur to serve for one year as mentioned in the TORs for RSTC adopted at the first meeting of the Project Steering Committee held in December 2018. The rules state further that officers shall be eligible for re-election no more than once in the same year. Mr. Leng Sy Vann from Cambodia, Mr. Valeriano M. Borja from Philippines and Mr. Nguyen Thanh Binh from Viet Nam who have served as a Chairperson, a Vice-Chairperson and a official Rapporteur respectively, during 2018, are therefore, all eligible for re-election in 2019.

10. The current chairperson, Mr. Leng Sy Vann invited the participants to nominate the new Chairperson, Vice-Chairperson and Rapporteur for the RSTC 2. The results are 1) Mr. Valerino M. Borja, 2) Dr. Ngurah N. Wiadnyana, and 3) Mr. Richard Rumpet will serve as the Chairperson, the Vice-Chairperson and the Rapporteur respectively, during the 2019.

11. A new Chairperson, Mr. Valerino M. Borja was invited to give his first speech. He expressed his gratitude for all members who had traveled a long way to attend this meeting. He gave thanks to regional experts for their cooperation and the FiA of Cambodia for having held this meeting.

### 2.2 Documentation Available to the Meeting

12. Mr. Valerino M. Borja introduced the documentation available to the meeting by referring to document SEAFDEC/UNEP/GEF/FR-RSTC.2 INF.4. He informed the meeting that most of the documents had been circulated in advance of the meeting and had been lodged on the project web site. (<https://fisheries-refugia.org/2nd-rstc-meeting>) as [ANNEX 4](#).

13. Mr. Somboon Siriraksophon informed the meeting that most of the documents had been circulated in advance of the meeting and had been lodged on the project web site. There were some papers waited to be the inputs from the meeting and will be uploaded later such as the recommendations for the future work for short mackerel and frigate tunas, database system, and awareness building programs and promotional media for enhancing the fisheries refugia concept at all level of stakeholders.

### 2.3 Organization of Work

14. Mr. Somboon Siriraksophon briefed participants on the administrative arrangements for the conduct of the meeting (SEAFDEC/UNEP/GEF/FR-RSTC.2\_INF.1), and the propose of the organization of work (SEAFDEC/UNEP/GEF/FR-RSTC.2 INF.2a-c). He noted that the meeting would be conducted in English, and in plenary as far as possible.

## 3. ADOPTION OF THE MEETING AGENDA

15. The Chairperson, Mr. Valerino M. Borja invited Mr. Somboon Siriraksophon to introduce the Provisional Agenda prepared by the Project Coordinating Unit (PCU) in consultation with the out-going Chairperson for 2018 for the meeting as SEAFDEC/UNEP/GEF/FR-RSTC.2 INF.2b and invited members to propose any amendments or additional items for consideration by the committee.

16. There was no other proposals or amendments, the meeting adopted the agenda and timetable, as [ANNEX 5](#).



## 4. REPORT OF THE PROJECT DIRECTOR ON PROGRESS WORKS

17. Mr. Somboon Siriraksophon, the Project Director presented Report of the Progress on Activities for Establishment and Operation of Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand during a period of 2016 – May 2019 as [ANNEX 6](#).
18. Mr. Somboon Siriraksophon informed the meeting that 5 out of 6 countries signed the Letter of Agreement as of May 2019. Also, Indonesia had finalized the LOA last week. The MMAF of Indonesian asked the PCU to join the MMAF meeting on revising the national project documents held during 2<sup>nd</sup> week of June 2019 and expected that the signing will be held as soon as possible.
19. He also informed the meeting on countries' decisions for 10 of 14 refugia sites in Cambodia (3), Malaysia (2), Philippines (3), and Thailand (2). Then he summarized all activities and achievements since the project started including improvement of the management of critical habitats for fish stocks of transboundary significance.
20. Mr. Noel Barut, a regional expert from Philippines pointed out that the habitat component of the 1<sup>st</sup> Phase of this project has identified fisheries as one of the key threats to the marine habitats such as coral reefs, mangrove, seagrass and wetland, it is therefore needed to integrate the management of fisheries together with habitats. In response to this, the Project Director informed the meeting that the 2<sup>nd</sup> phase of the SAP implementation for the South China Sea was already endorsed, it is expected that the inception workshop will be organized soon and the relevant authorities for marine environment and fisheries refugia focal points shall be invited to participate.
21. Mr. Nguyen Thanh Binh, the Representative for Viet Nam pointed out on the improvement of the management of critical habitats that the Government of Viet Nam had endorsed 3 refugia sites as mentioned in the national project document. Regarding to this, the Project Director responded that the budget arrangements for Viet Nam is ready to implement all 3 sites. He would show the budget table during his visit to Viet Nam.

## 5. PRESENTATIONS BY THE NATIONAL SCIENTIFIC AND TECHNICAL COMMITTEE ON THE PROGRESS WORK OF THE PROJECT ACTIVITIES AT THE NATIONAL LEVEL DURING JUNE 2018 – MAY 2019

### 5.1 Cambodia

22. Mr. Leng Sy Vann, the Scientific and Technical focal point for Cambodia presented the progress works and achievement from implementation of the national activities during the 2<sup>nd</sup> Quarter of 2018 to the 2<sup>nd</sup> Quarter of 2019. He referred to many meetings at provincial level in three refugia sites at Kep, Kampot, and Koh Kong. He added that Blue Swimming Crab Fisheries Refugia in Kep has been promulgated by Minister of Ministry of Agriculture, Forestry, and Fisheries. At this time, there are two management committee in Kep which has created including Provincial management committee and Technical working group. Moreover, the mapping and demarcating the boundary of Mackerel Fishery Refugia has been approved by Provincial Authority. He conducted the public awareness for local authority, FiA committee, and fishermen. He also presented the future costed workplan for the 2019/Q3 and Q4 which included cost for hiring a consultant for development of extension media to support public-awareness building.
23. He also introduced the baseline survey of short mackerel in Koh Kong with the technical support from the Project Co-ordinating Unit. He indicated that the purpose is to provide scientific data to support the establishment and management of mackerel fisheries refugia in Koh Kong province.
24. He showed that the project benefited into national fisheries framework and policy such as Fisheries Law, National Action Plan on Combating IUU Fishing, the 10-year Strategic Planning

Framework for fisheries. The overall detailed presentation is as [ANNEX 7a](#). After his presentation, Chairperson opened for clarification and discussions.

25. Mr. Somboon Siriraksophon comments on the results from baseline survey and larval fish data collection for the short mackerel that the proposed management areas in Koh Kong sometimes does not cover the area that has high abundance of short mackerel larval fish. Therefore, it would be excellent that the proposed fisheries management areas could be expanded in the future. In addition, the similar results on the maturity stage in Trat Province and Koh Kong Province support each other. Taking into consideration of these findings, both countries need to work together for effective management of short mackerel spawning grounds.

26. Mr. Barut also suggested that Cambodia use length at first maturity as one of the indicators in managing the fisheries in the refugia sites. He also reminded the participants to always bear in mind that the concept of fisheries refugia comprised the integration of fisheries and habitat management together in order the site could be called fisheries refugia. If this two are separately manage then the sites could either be called marine protected area or fish sanctuary which is not the essence of fisheries refugia.

27. Dr. Kornrawee Aiemsomboon commented on larval fish identification should be in genus rather than at family level. She found the correlation between short mackerel and phytoplankton. In this connection, the PCU was requested to support the work study made by Cambodia.

28. Mr. Isara Chanrachkij acknowledges Cambodia data collection program, he also refers to the activities under the Collaborative Research Program in the Gulf of Thailand led by SEAFDEC Training Department. It would be useful results to support Cambodia fisheries refugia. In addition, the SEAFDEC Training Department could also technically support the larvae fish identification by biological network of the program at genus and or species levels.

## 5.2 Malaysia

29. Mr. Richard Rumpet, the Scientific and Technical Committee focal point for Malaysia presented the Progress Work of the Project Activities in Malaysia (June 2018-May 2019). The contents of his presentation focused on two selected fisheries refugia in Kuala Baram, Sarawak, and Tanjung Leman, Johor, work progress and financial report. He mentioned that there are 5 main activities for lobster refugia: 1) collection of lobster landing data from several sites (Sedili, Tanjung Leman, Endau); 2) Lobster Resource Survey and Documentary Filming – Oct 2018; 3) Lobster Phyllosoma Study (2017 & 2018); 4) Socio-economic survey and 5) stakeholder consultations.

30. For tiger prawn refugia study in Kuala Baram, the CPUE and Catch Composition from cast net fishing gear were conducted at three sites (Lutong River, Pasu River, and Sibuti River). The overall detailed presentation is appeared as [ANNEX 7b](#).

31. Mr. Somboon Siriraksophon acknowledges the supports from the Department of Fisheries Malaysia for establishment of national fisheries refugia and the production of documentary film for tiger prawn and lobsters.

## 5.3 Philippines

32. Mr. Valeriano M. Borja, the Scientific and Technical focal point for Philippines presented the overall progress works during the 2<sup>nd</sup> Quarter of 2018 to the 2<sup>nd</sup> Quarter of 2019. He updates the current situation of Fisheries Refugia project such as fisheries data collection in 3 refugia sites Ichthyoplankton survey and stakeholder consultation. The preliminary results is appeared as [ANNEX 7c](#).

33. Mr. Somboon Siriraksophon suggested that Fisheries refugia activities have national activities supporting the activity rather than working individually which will take longer period for baseline

survey. In addition, the results from establishment of fisheries refugia in Philippines need to get endorsement from relevant institutions such as BFAR as a policy making.

#### 5.4 Thailand

34. Mr. Kumpon Loychuen the Scientific and Technical focal point for Thailand presented the overall progress works during the 2<sup>nd</sup> Quarter of 2018 to the 2<sup>nd</sup> Quarter of 2019. The overall detailed presentation is appeared as [ANNEX 7d](#).

#### 5.5 Indonesia

35. Dr. Ngurah N. Wiadnyana, Representative from Ministry of Marine Affairs and Fisheries of Republic of Indonesia, informed the meeting that MMAF Indonesia had finalized the Letter of Agreement and sent to SEAFDEC for consideration and comments. In this regard, MMAF will organize the internal meeting to revise and finalize the national project document and workplan in Jakarta on 27-29 May 2019. SEAFDEC PCU would be invited to participate in the discussion. It is expected that the LOA with the revised national project documents will be approved before signing ceremony at SEAFDEC Secretariat on the second week of June 2019.

#### 5.6 Viet Nam

36. Mr. Nguyen Thanh Binh, Representative from Directorate of Fisheries (D-Fish) of Viet Nam, informed the meeting on submission of the LOI between SEAFDEC and D-Fish in May 2019, and he expected the support from PCU during the initial project implementation. In addition, he invited the concerned partners, e.g. SEAFDEC Sweden project to join in Phu Quoc to support Viet Nam activity as well.

## 6. PROJECT EVALUATION OF THE NATIONAL ACTIVITY FROM 2017 TO MAY 2019 IN RESPONSE TO THE QUESTIONNAIRES

37. Mr. Somboon Siriraksophon referred to the [ANNEX 4](#): Country Inputs on Rating Project Performance and Risk of the Report of the Progress on Activities for Establishment and Operation of Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand during a period between July 2018 and May 2019 as [ANNEX 6](#). Then he informed the meeting that the country inputs on rating project performance has to be evaluated in June annually. He highly appreciated all participating countries for their inputs and will further analyze for submission to the UNEP/GEF during the 2<sup>nd</sup> week of June 2019.

## 7. DATA AND INFORMATION NEEDS TO SUPPORT ACTIVITIES

### 7.1 Management of Transboundary Species: Short Mackerel, Frigate Tuna, Etc.

38. Mr. Somboon Siriraksophon introduced the needs for management of Transboundary Species by referring to the Straddling Fish Stocks Agreement (formally, the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks). He also mentioned the levels of cooperation in resource management and conservation of transboundary species for highest benefit to concerned country and for sustainable utilization of fish stock which final results affect the social wellbeing of fishing community. His presentation is appeared as [ANNEX 8](#).

## 7.2 Indo-Pacific mackerel/Short Mackerel<sup>1</sup>

- **Results from the SEAFDEC-SWEDEN Project on Indo-Pacific mackerel.**

39. Ms. Saisunee Chaksuin, the Gulf of Thailand Sub-region Coordinator for the SEAFDEC-SWEDEN Project presented the Results from the SEAFDEC-Sweden Project on Indo-Pacific mackerel (*Rastrelliger brachysoma*) focusing management of transboundary fish stocks of Indo-Pacific in the Gulf of Thailand. She referred a series of meetings and consultations had been convened since 2016 or even earlier which aims to develop a joint management plan for small pelagic species including the Indo-Pacific mackerel.

40. She also pointed out that the results from latest research on the Indo-Pacific mackerel data collection and genetic studies significantly shows that the Indo-Pacific mackerel distribution in the Gulf of Thailand is from all coastal countries. In addition, she emphasized that the next step for the Gulf of Thailand Countries to have a discussion to develop the sub-regional transboundary species management plan or action of Indo-Pacific mackerel. Her presentation is appeared as [ANNEX 9](#).

41. She also pointed out the results from recently study on genetic of Indo-Pacific mackerel in Gulf of Thailand that Mackerels in Trat are not related to the Cambodian ones. But the Pattani's is related to Cambodian and Viet Nam. The DNA study indicates that there's a difference in Indo-Pacific mackerel's DNA.

42. Mr. Noel Barut asked that when the 4 sites share the same genetics. The genetics are genetically difference in categorization. The information from the Department of Fisheries, the database is compared to Cambodia's sites. The information shows that the 4 sites share same species but different stocks.

43. In addition, Ms. Saisunee Chaksuin said we still needed the whole year data to see the migratory pattern and current movement within the Gulf of Thailand which may affect the larvae movement.

- **Biological Study of Indo-Pacific mackerel in Trat Province, Thailand**

44. Mr. Kumpon Loychuen presented on Biological Study of Indo-Pacific mackerel in Trat Province, Thailand which is a part of the National program entitled "Monitoring of the Life Cycle of Indo-Pacific mackerel in the Gulf of Thailand" conducted by Fisheries Research Centers, Department of Fisheries of Thailand. His presentation is appeared as [ANNEX 10](#).

45. He showed some results on spawning ground of the short mackerel with the size of greater than 17 cm distributed off Trat Province. In addition, more than 60% of short mackerel found in January-March were at the maturity stage, after that, the larval fishes were appeared.

46. Mr. Somboon Siriraksophon required further clarification on the term maturity stage. In response to this, Dr. Kornrawee Aiemsomboon clarified that maturity stage refers to maturity stage 3 to 4.

47. Mr. Richard Rumpet pointed out that two islands (Koh Chang and Koh Kut) act as Fish aggregating device (FADs). These fish only move around these two islands because the larvae are found around there. In response to this, Ms. Saisunee Chaksuin mentioned that Koh Chang is a national park and many natural habitats are around there. In addition, she also mentioned that there is a no-take zone area between Koh Chang and the mainland (Chang Strait).

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<sup>1</sup> There are two different common names of *Rastrelliger brachysoma* in region; "Short Mackerel" base on FAO and "Indo-Pacific Mackerel" base on Thailand documents.



48. Mr. Isara Chanrachkij pointed out that spawning ground and season of short mackerel around Koh Chang and Koh Kut may impact by seasonal upwelling during northeast monsoon. These phenomena should be further studied on oceanography or remote sensing.

49. Mr. Richard Rumpet also suggested that as the result of the biological study is complete in the paper. There should be presented in a diagrammatic form in the presentation.

- **Biological Study of Short Mackerel in Koh Kong Province, Cambodia**

50. Asst.Prof. Dr. Kornrawee Aiemsomboon, a Regional Expert on Fish Biology and Ecology from Chulalongkorn University, Thailand presented Biological Study of Short Mackerel in Koh Kong Province, Cambodia based on her preliminary study to support Cambodia on finding of science-based information and results. She pointed out the importance of required science-based information for fisheries management purposes. The overall results in her studies revealed the relationship between sea surface temperature, chlorophyll-a and planktons which fishes including Short mackerel's feed (confirmed by stomach content study). In addition, the marine environmental changes especially a rising in sea surface temperature might be a reason for the period of peak gonad development in Short mackerel had a bit shift from normal. Her presentation is appeared as [ANNEX 11](#).

51. Mr. Somboon Siriraksophon stated that the result on maturity state of short mackerel in Koh Kong and Trat province supports each other, however the genetic study from Thailand indicates that they are different populations. He also suggested Dr. Kornrawee Aiemsomboon that Thai data collection and analysis should collaborate with the Cambodia's. Two areas should work together on sub-regional analysis. He said that Dr. Kornrawee emphasized the high density of larvae found outside the proposed management area.

52. Mr. Isara Chanrachkij suggested to identify the minimum requirements for data collection between two areas and better focus on the geographic area.

- **Comments and Recommendations for Future Works**

53. Mr. Somboon Siriraksophon facilitated the discussion on future works of the Transboundary species to support the establishment of fisheries refugia in transboundary areas and possibility for development of Action Plan at Sub-regional Gulf of Thailand. He opened the discussion.

54. Referring to the recommendation for study on distribution and abundance of the Zooplankton off Koh Kong areas as one of the key indicators, Mr. Leng Sy Vann stated that Cambodia doesn't have the equipment to collect data, he therefore seeks for support from the SEAFDEC PCU.

55. In conclusion, the recommendations for future works on Transboundary species are as follows:

- MSA study in Cambodia, Malaysia and Viet Nam
- Monitor the change of tidal Sea Surface Temperature which is affected to migratory pattern of short mackerel
- Monitor larvae transportation in relation to the current movement
- Ocean simulation: chlorophyll A concentration, temperature, salinity, and etc.
- Biological and physical study
- Conduct the Stock assessment using the existing framework established under the ASEAN Mechanism: Scientific Working Group for Stock Assessment for Neritic tuna and small pelagic fishes.
- Establishment of database for short mackerel in sub-region or region
- Regional cooperation for development of action/management plan
- Study of distribution and abundance of zooplankton, diatoms, copepod, etc.

### 7.3 Frigate Tuna

- **Frigate Tuna of Western Luzon (In the SCS)**

56. Mr. Noel Barut, a Regional Expert on Fisheries *Refugia* from Philippines presented on Frigate tuna data trends in the West Philippine sea. His presentation is appeared as [ANNEX 12](#). In his presentation there are two Regions: namely Region 1 or Ilocos Region, and Region 3 or Central Luzon are the main fishing ground and catch trends for the Frigate tuna in west Philippines.

- **Regional Study by SEAFDEC**

57. Mr. Somboon Siriraksophon shared the general information on biology and ecology of the Frigate tuna, and the regional studies on tunas including the Frigate Tuna compiled at the SEAFDEC Seminar on Fishery Resources in the South China Sea, Area IV : Vietnamese Waters. Based on studies, he indicated that Frigate tuna behavior has correlation with temperature and other environmental changes, the spawning season varies with areas, but in some place it may even extend throughout the year. He also states that Philippines study of Frigate tuna needs to identify the migratory pattern or life cycle movement is still lacking. Establishment of the Frigate Tuna Refugia in Masinloc for protection of the juvenile Frigate tuna is needed as proposed in the national program, if resources available, the migratory route of frigate tuna needed to be identified too. His presentation is appeared as [ANNEX 13](#).

58. Mr. Barut mentioned that the Philippines has conducted a study on frigate tuna under the South China Sea Fisheries Development and Coordinating Program funded by Food and Agriculture Organization (FAO) in the early to mid 80's. He further mentioned that this could be a good reference to conduct further study on frigate tuna.

59. In response, Mr. Somboon Siriraksophon referred to the concept of the fisheries refugia. If we know the migratory route, then we can come up with more proper conservation and management of that species. He suggested that it might be possible that the Philippines can compile or even hold sub-regional meeting of frigate tuna study to identify the migratory route of frigate tuna based on the existing data in each country. Mr. Noel agrees with the suggestion of Dr. Somboon Siriraksophon.

- **Comments and Recommendations for Future Works**

60. Mr. Somboon Siriraksophon facilitated the discussion on future works of Frigate tuna if their migration patterns were connected to the other areas or country. The Committee are requested to provide a view, recommendations for consideration by implementing country.

61. In conclusion, the recommendations for future works on Frigate tuna are concluded as follows:

- Conduct the regional assessment of frigate tuna to understanding the migratory route;
- Seeking the Small Grant Program (SGP) Fund and other sources to support the activities;
- Identify data needs;
- Biological study and genetic study.

### 7.4 Best Practice Fishing Gears and Methods

62. Mr. Weerasak Yingyuad, on behalf of Mr. Isara Chanrakhij, Head of Research and Development Division, SEAFDEC/Training Department, introduced the needs of best practice fishing gears and methods to solve problems and challenges on inshore fishing pressures caused by the use of destructive fishing gear and practices, such as the operation of demersal trawls and push nets in seagrass areas, and the detonation of explosives in coral reef areas. He compiled all threats, immediate cause, root cause affects to some economically important species while suggested for management

action from the quarterly reports submitted by respective country. In addition, he referred to the FAO technical guidelines for responsible fisheries where the options to manage fishing are summarized under the EAFM frameworks. His presentation is appeared as [ANNEX 14](#).

63. He also proposed to work on fishing gear modification and fishing practice improvement to support an Establishment of fisheries refugia at country level which reflected to the regional program requirement. The workplans and selected country were discussed.

64. Mr. Somboon Siriraksophon added that the reason why PCU needs to support the modification and promotion of the use of fishing technology in the refugia sites is because the regional program has certain amount of budget which can be used to organize the consultations to more practical works on gear modification to see the further activities to reduce the impact to habitat from fishing gear.

65. Ms. Chin Leakhena from Cambodia requested the PCU to conduct the scientific study to prove the fact on pros and cons of specific fishing gear such as elongated and collapsible trap for further policy's maker consideration the management measures. In responsible to this, the Project Director suggested to add this issue into the workplan on fishing gear modification and fishing practice improvement led by SEAFDEC/TD in collaboration and funded by PCU Regional program.

66. Mr. Nguyen Thanh Binh Representative from Viet Nam also stated the same problem with Cambodia on the use of Elongated and Collapsible traps net and electricity. These fishing gears have been prohibited in Viet Nam since January 1<sup>st</sup>, 2019 even though there has been insufficient scientific evidence on their negative impacts on the resources. He also suggested the precautionary approaches as specified in the Fisheries Law.

67. Dr. Ngurah N. Wiadnyana Representative from Indonesia informed the meeting that the MMAF of Indonesia prohibited the use of all trawl gears through Minister of Marine Affairs and Fisheries Regulation no.2 2015. Indonesia promoted alternative gears such as bottom longline fishing for demersal fishes, Trammel net fishing for prawns. In addition, the trawlers were modified to other boat type of gears as mentioned above and others.

## 7.5 GIS Mapping and Existing Ocean Modelling

68. Ms. Nuttida Chanthasiri, a researcher from Thailand-China Joint Laboratory for Climate and Marine Ecosystem, Representative from Department of Marine and Coastal Resources (DMCR) Thailand presented the progress in Ocean Forecasting System in Thailand. Her presentation is appeared as [ANNEX 15](#).

69. She informed the meeting a series of works for development and official launching of the Ocean Forecasting System (OFS) in Thailand in 2015. Meanwhile, DMCR linked the OFS website, <http://ofs.dmcr.go.th/thailand/result.jsp>, to the Central Database System and Data Standard for Marine and Coastal Resources webpage, <https://marinegiscenter.dmcr.go.th>, to distribute the forecast product to the public. Furthermore, the OFS Thailand provides outputs in five parameters; i.e., wind, wave height, sea level, current and temperature, the last two of which are in 21 layers.

70. Mr. Somboon Siriraksophon informed the meeting of the importance of ocean modeling which is one of the target output of fisheries refugia project. Taking it into consideration, the project proposal was developed almost more than 5 years ago which aims to come up with ocean simulation under the regional activities. However, to-date, many institutions expertise on oceanic data management and modeling system have developed many platforms for ocean modelling for predicting the ocean changes such as movement direction of current could help marine recuse works, predicting the habitats changes for example algal bloom, coral reef bleaching, predicting sea temperature increase, larval dispersal, predicting the oil spill, etc. He therefore consulted with the RSTC that the PCU will not spend money for development of the Ocean simulation, but rather use money to integrate the work between countries and institutions responsible for development of the ocean modelling under the

framework of IOC/Westpac. He also emphasized that the system should cover all SCS and GoT areas. This issue will be further consulted to the Project Steering Committee in November 2019

71. Also, he asked Ms. Nutthida Chanthasiri whether it only covers the Gulf of Thailand or the whole SCS. She informed that in the next phase, the present version will further function and intended to establish the higher resolution model by the end of 2019. However, it needs more cost for the development in the whole SEA domain. Therefore, it has to be operated by separating areas which cover the Andaman Sea and the Gulf of Thailand to make it more easily function and accessible.

72. Mr. Somboon Siriraksophon also questioned on how often the OFS need to validate the data with the observation data from cruise survey. Because the relevant countries of fisheries refugia have conducted the baseline survey both on land and at sea. It is possible to get cooperation on sharing of country data to the OFS for validation of the system and further improve the accuracy of the system for predicting or forecasting.

73. Mr. Somboon Siriraksophon suggested the cooperation between Fisheries Refugia project and Ocean Modelling Institutions needed to be created, and the data requirement to support the OFS needed to be identified too. In response to this, Ms. Nutthida Chanthasiri suggested that the online data from mooring buoy system is useful for the model validation since they can be accessible by everyone everywhere. However, the Cruise survey data is also important such as the local net current and CTD data. In addition, she also mentioned the seabed platform data since she deployed it in Samui Island, one month later, the fishermen destroyed the equipment.

74. Mr. Richard Rumpet stated that he agrees that the project needs to use this modelling to locate the larvae. He encouraged the networking to local experts in ASEAN and collect local data as well. He also asked if the OFS is applicable to the river since Malaysia has some big rivers which have tiger prawns too. But, unfortunately, the system is applicable to ocean data only.

75. In response to Mr. Richard Rumpet, Mr. Isara Chanratchkij informed the meeting that the SEAFDEC Japanese trust fund and Japan ASEAN Integration Funds works under the SEAFDEC Training Department to apply the remote sensing to help inland fisheries resource management. He will provide the name of project coordinator to Malaysia's Representative.

76. Miss Nutthida Chantasiri preliminary presented the upwelling phenomena around Koh Chang and Koh Kut, Thailand, which can be investigated during northeast monsoon by the observation data for OFV validation. Her presentation consists with the information of spawning ground and spawning season of short mackerel presented by Mr. Kampon Loycheun.

## 7.6 Baseline Survey Data

77. Mr. Somboon Siriraksophon presented on the Baseline Survey Data which aims to emphasize the importance of baseline study and baseline data to support, monitor, and evaluate the project implementation at national levels. He also pointed out that baseline study and baseline data should be designed in alignment with the identified key deliverable and benchmarks for the project as shown in the Appendix 4 of the Project Document. Then he welcomed the committee to provide a scientific and technical recommendations on baseline data required to support country implementation. His presentation is appeared as [ANNEX 16](#).

78. In addition, Mr. Somboon Siriraksophon also proposed that there are three issues are linked such as data inputs for the website, existing baseline survey data conducted by countries, and the database system within the data menu of the website. In this connection, the PCU proposes to discuss this matter at the next RSTC3. Before that meeting. The PCU will circulate the questionnaires on data requirements for consideration and inputs.

79. Mr. Richard Rumpet supports the idea and request PCU communicate via email to the member countries for inputs to be discussed at the 3<sup>rd</sup> RSTC meeting.



## 7.7 Information and Education Program

- **Project Websites at Country and Regional Programs**

80. Mr. Somboon Siriraksophon introduced a new structure of the regional website for Fisheries Refugia project to support the Information Management and Dissemination in support of national and regional-level implementation of the fisheries refugia concept in the South China Sea and Gulf of Thailand. In addition, the website is able to share the Knowledge generated and experiences from establishing and operating fisheries refugia nationally, regionally, and globally.

81. He also referred to the report of PSC1 held in December 2018 mentioned that “Regarding the national web portal development, the PCU with inputs from the RSTC, will create a content template, design and share among member countries for translation into their respective national languages” in this regards the PCU have developed the country web portals contents for consideration. The presentation is appeared as [ANNEX 17](#).

82. Mr. Valeriano M. Borja asked if members will give approval to translate the web portal into their own native language so that it is unnecessary to create their own national web portal. Mr. Noel Barut stated that countries have their own website so maybe country could put access onto their website to link the country webpage under the regional webpage.

83. Mr. Richard Rumpet agreed with suggestion made by Mr. Noel that country should add more local information and local languages.

84. Mr. Nguyen Thanh Binh Representative from Viet Nam supported that it is important to translate the website into local languages. Viet Nam has national Fisheries database that could be utilized to publish and disseminate information about Fisheries Refugia Sites.

85. Mr. Somboon Siriraksophon concluded that the national webpage for fisheries refugia will be developed by countries themselves. However, each country is requested to link their countries’ web portals under the regional website.

- **Fisheries Refugia Center(s) at National Level: Lessons Learned from Malaysia**

86. Mr. Richard Rumpet, a Scientific and Technical focal point for Malaysia introduced the Country Fisheries Refugia Centres as a good lesson learned from Department of Fisheries Malaysia as a part of Fisheries Refugia Project in Malaysia. His presentation is appeared as [ANNEX 18](#).

87. Mr. Somboon Siriraksophon acknowledged a good lesson learned from the national fisheries refugia activities and he encouraged other member countries to enhance fisheries refugia centres in their selected sites.

88. Mr. Isara Charnrajki commented that this is a constructive program which is useful to the public. However, to create another information center maybe costly, he then suggested to seek cooperation with the public facilities such as aquariums and museums for promoting the project concept to the public.

- **Development of Fisheries *Refugia* Database**

89. Mr. Somboon Siriraksophon referred to the development of the Regional Website as mentioned in 7.7.1 which is linked to the country database needed to develop by 2019. He informed the committee to refers to the agreed action appeared in agenda 7.6 on baseline survey data.

90. In conclusion, the database system is in principle agreed by the committee to be discussed together with compilation of baseline data collection at the next RSTC.

- **Awareness Building on Fisheries *Refugia* Concept**

91. Mr. Somboon Siriraksophon requested the committee to share their views and suggestions on the awareness building to promote the Fisheries Refugia concept either at national and /or regional levels.

92. He concluded recommendation from one and half day activities reported by the countries as well as successful establishments of the educational centers at sites in Malaysia, and many activities at national level with all stakeholders and seek more inputs from the meeting. He also added that if any countries had already developed any media for awareness building, please share the design to the PCU for References.

93. Mr. Weerasak Yingyuad from the PCU recommended the country to use the results of communication survey from the stakeholder consultation workshop which successfully conducted in Cambodia, Thailand, and the Philippines. In this regard, Mr. Leng Sy Vann replied that Cambodia communicated via messengers which is useful to reach local people. He also planned to create posters containing information useful for local people to ensure their understanding of fisheries refugia concept.

94. Mr. Noel Barut added that it is necessary to know the target sector of the community such as: policy maker, fisherfolk, students, and other stakeholder and then make policy according to target requirements or needs.

95. Ms. Saisunee Chaksuin shared her experiences with SEAFDEC-Sweden project. She suggested to identify the targets first because we need different approaches to them. The fisherman might need translated methods from academic to easily comprehensible one to them. Also, the social media application such as LINE and Facebook do not success in communication. She encouraged the members to find out the familiar media their locals prefer.

96. Mr. Isara Chanrachkij suggested to seek a partner/cooperation with the CSR (Corporate Social Responsibility). He coordinated with the CP company which shares CSR policy that alignment with the Fisheries Project objectives on promotion of sustainable fisheries and conservation of habitats. Maybe the project can be promoted to relevant private partnership.

97. The results from discussion are concluded as follows:

- 1) The meeting discussed types of awareness building and promotional materials of fisheries refugia project as follows:
  - Extension media for promotion of fisheries refugia:
  - Establishment of the education/information center at sites, public either for private or public institutions such as aquarium/museum.
  - Documentary filming for target species
  - Series of Cartoon Books for promotion fisheries refugia
  - Stickers for social communication/media
  - Posters:
  - Radio news
  - Billboard
- 2) Country could come up with their own way to develop media or promotional materials for promotion and build the awareness to specific stakeholders to understand the Refugia concept. However, PCU requests country to share those materials or media for consideration where appropriate could be shared to other countries.

## 8. OTHER BUSINESS

### 8.1 Financial Report

98. Mr. Somboon Siriraksophon informed the meeting on process for requesting the cash advance as well as the required financial report. Regarding this the PCU requests for all cooperation from Country to understand the process for requesting the Cash Advance and follow the template for financial report. The presentation is appeared as [ANNEX 19](#).

### 8.2 Costed Workplan for 2019/Q3-Q4

99. The project Director acknowledged all relevant countries for the submission of the Costed workplan for 2019/Q3 and Q4 by mid of June 2019. It was also noted that Viet Nam and Indonesia will initiate the project implementation as soon as possible with the support from the PCU. Regarding the costed workplan for two countries will be developed and submit to the PCU in June 2019.

100. The submitted costed workplan for 4 countries appears as [ANNEX 20](#).

### 8.3 Technical Visit to Refugia Sites on Thursday 23<sup>rd</sup>, May

101. All participants visited and observed the fisheries refugia sites and important marine habitats in Kep province such as Marine Conservation Cambodia at Koh Ach Ses, the blue swimming crab Fisheries Refugia site, crab market in city of Kep Province, and sight-seeing to the vicinity of Kampot and Kep Province. The site visit was started from 7:00 – 15:00 hrs.

## 9. DATE AND PLACE OF THE THIRD REGIONAL SCIENTIFIC & TECHNICAL COMMITTEE MEETING

102. The committee from 6 countries are requested to propose for date and place of the next meeting. After deliberation, Mr. Nguyen Thanh Binh is requested to host the 3<sup>rd</sup> RSTC as agreed at the 1<sup>st</sup> RSTC. In this connection, he proposes the meeting venue at **Phu Quoc Island** – one of the selected fisheries refugia sites in Viet Nam from **26 – 28 November 2019**.

103. However, the PCU will further communicate with the Directorate of Fisheries of Viet Nam on the estimated accommodation and travelling cost before final decision taking into consideration the available budget. In case, it is necessary to change the venue to other place where selected refugia is located, the PCU will inform to all RSTC members 2 months in advance.

## 10. ADOPTION OF THE REPORT OF THE MEETING

104. The rapporteur, Mr. Richard Rumpet, presented the draft report prepared by the PCU, which was considered, amended, and adopted as it appears in this document.

## 11. CLOSURE OF THE MEETING

105. The Chairperson expressed his gratitude to all participants, committee, regional experts, and researchers, for all their discussions and patience dedicated to this meeting. He thanked FiA of Cambodia for hosting 2<sup>nd</sup> RSTC meeting.

106. There was no further business the Chairperson closed the meeting at 18.50 hrs.



## ANNEX 1

### WELCOME SPEECH BY CHAIR OF THE REGIONAL SCIENTIFIC AND TECHNICAL COMMITTEE

- H.E. Ouk Vibol, Director of Fisheries Conservation, Fisheries Administration of Cambodia and concurrently the National Focal Point of Fisheries Refugia Project for Cambodia
- All scientific and technical Committee;
- Invited Regional Experts
- Project Director and PCU Staffs
- Ladies and Gentlemen.

First of all I would like to express my warmest welcome you all to the 2<sup>nd</sup> Meeting of the Regional Scientific and Technical Committee for the *SEAFDEC/UNEP/GEF Project on Establishment and Operation of a Regional System for Fisheries Refugia in the South China Sea and Gulf of Thailand* which will be held in this hotel of Kampot from today till Thursday of 23<sup>rd</sup> May 2019. Originally, we planned to hold the meeting at Koh Kong Province, but due to the facilities issues and shortage of electricity during the dry seasons, the Fisheries Administration of Cambodia as a host institution decided to move the meeting venue to here in Kampot Province, therefore on behalf of the Chairman of RSTC and the Project Co-ordinating Unit we highly appreciate to the FiA for excellent arrangements for the meeting. I would like to inform you that Thansur Sokha Hotel is the first and only highland resort in the Mekong Sub-Region amid the pristine jungle wilderness and pleasant cool weather on the beautifully landscaped hill on the Bokor Mountain. I wish you all are comfortable and enjoy stay during stay for the meeting.

Distinguished Guest and Committee...

I have good news to inform you all that Viet Nam has signed the Letter of Intent for implementing the national fisheries refugia. I also would like to inform you that Indonesia will sign the Letter of Agreement within this week in Bangkok, Thailand. These are good news that all relevant 6 countries on board the implementation to ensure that all 14 Fisheries Refugia Sites are implemented and make a Regional System of the Fisheries Refugia completed.

Concerning with our meeting at this time, I strongly believe that this is a good opportunity to all committee and regional expert to discuss, giving recommendation and exchange good experiences receiving from the past implementation of works from each country and regional expert. In addition, the meeting aiming to stimulate new ideas for implementing the arrangement to establish the fisheries refugia system in all relevant country and to work together on the transboundary species.

Once again, on behalf of Chair, I wish the whole meeting to have a good carrying out and to get a fruitful success as the expectation and wish your stay and extension of stay for recreation in Kampot Province get a convenience and extreme satisfaction.

Thank You!



## ANNEX 2

### OPENING SPEECH

#### BY CHAIR OF THE REGIONAL SCIENTIFIC AND TECHNICAL COMMITTEE

Good Morning:

- Dr. Somboon Siriraksophon, Project Director, SEAFDEC/UNEP/GEF Fisheries Refugia
- Members of Scientific and Technical Committee, represented from Cambodia, Indonesia, Malaysia, the Philippine, Thailand and Vietnam
- Project experts
- PCU members
- Distinguish, Ladies and Gentlemen

On behalf of H.E. Eng Cheasan, Director General of Fisheries Administration, Ministry of Agriculture, Forestry and Fisheries, I am very pleased to have the privilege this morning to open the 2nd Regional Scientific and Technical Committee Meeting for the *SEAFDEC/UN Environment/GEF Project on Establishment and Operation of a Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand* in Cambodia. On the occasion I would like to extend my warmest welcome and sincere appreciation to your participations and stay in Thansur Sokha Hotel on the top of Bokor Mountain, Kampot Province Cambodia and especially to our PCU for co- hosting the 2nd RSTC in Cambodia. Please apology for any inconveniences of your travel from Phnom Penh International Airport to Kampot province.

Distinguished Delegates, Ladies and Gentlemen...

Kampot is one of four coastal provinces of Cambodia, located in the Southwest of the country. It has a coastline of around 45 km on the Gulf of Thailand. It is rich in has abundant natural resources. The provincial town is named Kampot and sits near the base of the abundant green Elephant Mountains and the famous Bokor Hill Station. The Thansour Bokor is 32 kilometers and 1,101 meters up from the national road N. 3 near Kampot, is the Bokor Mountain Hill Station, in Bokor National Park. Hope you can enjoy with faithful climate, waterfall, pagoda and and other tourist sites.

The Cambodian fishery sector is made up of the marine, coastal and inland fishery, estimated to be with a total of about 1,000,000 tons of fish caught annually. Fisheries provide livelihoods to about 6.7 million people and fish is the second most important food source for Cambodians, after rice: The average annual supply of fish per capita is 52.4 kg, with fish accounting for up to 81.5% of total animal protein supply, with the total fishery valued at about US\$1.25 billion, and providing 8-10% of the country's GDP. Thus, the fisheries are an essential provider of food security and nutrition, public and private revenue, and livelihoods for the nation.

An important milestone of sector management is the Strategic Planning Framework for Fisheries: 2010-2019 (SPF) which was fully adopted by the Royal Government of Cambodia. The SPF was integrated into the "Rectangular Strategy" for Growth, Employment, Equity and Efficiency Phase III (RS III) and the National Strategic Development Plan 2014-2018 (NSDP) and is fully aligned with the Agriculture Sector Strategic Development Plan (ASDP). The updated Strategic Planning Framework for Fisheries: 2015-2024 provides guidance to contribute to the Royal Government's vision for the future, where the Cambodian people continue to benefit from abundant fisheries resources.

Recent measures to improve management and development of the sector and the conservation of fisheries resources include the formulation of a National Plan of Action to prevent



deter and eliminate Illegal, Unreported and Unregulated (IUU) Fishing, the National Plan of Control and Inspection and the revision of the Fisheries Law.

The draft 10-year Strategic Plan for Fisheries Conservation and Management has been formulated to continue these efforts and pursue a vision where “Cambodia’s fisheries resources and ecosystems are restored where depleted, conserved and protected, for livelihoods and food security and nutrition of present and future generations”. Its overall objective entails that “All stakeholders collaborate to ensure that Cambodia’s fisheries are utilized sustainably, conserved and managed in an environmentally non-degrading, ecologically appropriate, economically viable, and socially acceptable manner”.

Our distinguish, ladies and gentlemen...

We recognize and strongly support the Marine Fisheries Refugia as an effective tool to protect the key aquatic species and habitats to ensure sustainable resource utilization, therefore, we already classified it as a type of fisheries management area included in the amended law of fisheries, especially in article 11, 12, 18 and others.

Furthermore, as I mentioned above, we have been formulating a 10 Year Strategic Plan for Fisheries Conservation and Management and the creation and operation of marine fisheries refugias are included using our current practical work.

On behalf of the Fisheries Administration, I would like to once again express our deep appreciation to UNEP/GEFF and SEAFDEC, as well as our member governments, for their support in Establishment and Operation of a Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand.

I wish to confer to each of you the Buddhist blessings of longevity, good health, peace and prosperity and my sincere desire for a successful meeting and fruitful results.

I am now very pleased to announce the opening of the 2nd Regional Scientific and Technical Committee Meeting in Thansour Sokha Hotel, Kampot Province, Cambodia.

Thank you very much! Thank You!

## ANNEX 3

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## ANNEX 4

### LIST OF DOCUMENTS

#### DISCUSSION DOCUMENTS

SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.1	REPORT OF THE PROJECT DIRECTOR ON PROGRESS WORKS
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.2a	THE PROGRESS WORK OF THE PROJECT ACTIVITIES AT THE NATIONAL LEVEL DURING JUNE 2018 – MAY 2019: CAMBODIA
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.2b	THE PROGRESS WORK OF THE PROJECT ACTIVITIES AT THE NATIONAL LEVEL DURING JUNE 2018 – MAY 2019: MALAYSIA
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.2c	THE PROGRESS WORK OF THE PROJECT ACTIVITIES AT THE NATIONAL LEVEL DURING JUNE 2018 – MAY 2019: PHILIPPINES
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.2d	THE PROGRESS WORK OF THE PROJECT ACTIVITIES AT THE NATIONAL LEVEL DURING JUNE 2018 – MAY 2019: THAILAND
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.2e	THE PROGRESS WORK OF THE PROJECT ACTIVITIES AT THE NATIONAL LEVEL DURING JUNE 2018 – MAY 2019: INDONESIA
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.2f	THE PROGRESS WORK OF THE PROJECT ACTIVITIES AT THE NATIONAL LEVEL DURING JUNE 2018 – MAY 2019: VIET NAM
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.3	MANAGEMENT OF TRANSBOUNDARY SPECIES: SHORT MACKEREL, FRIGATE TUNA, ETC.
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.3a1	RESULTS FROM THE SEAFDEC/SWEDEN PROJECT ON SHORT MACKEREL
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.3a2	BIOLOGICAL STUDY OF SHORT MACKEREL IN TRAT, THAILAND
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.3a3	BIOLOGICAL STUDY OF SHORT MACKEREL IN KOH KONG, CAMBODIA
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.3a4	COMMENTS AND RECOMMENDATIONS FOR FUTURE WORKS ON TRANSBOUNDARY SPECIES: SHORT MACKEREL
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.3b1	FRIGATE TUNA OFF WESTERN LUZON (IN THE SCS)
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.3b2	REGIONAL STUDY ON FRIGATE TUNA IN SOUTHEAST ASIA BY SEAFDEC
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.3b3	COMMENTS AND RECOMMENDATIONS FOR FUTURE WORKS ON TRANSBOUNDARY SPECIES: FRIGATE TUNA
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.4	BEST PRACTICE FISHING GEARS AND METHODS

SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.5	GIS MAPPING AND EXISTING OCEAN MODELLING
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.6	BASELINE SURVEY DATA
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.7.1	PROJECT WEB-SITES AT COUNTRY AND REGIONAL PROGRAMS
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.7.2	FISHERIES REFUGIA CENTER(S) AT NATIONAL LEVEL: LESSONS LEARNED FROM MALAYSIA
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.7.3	DEVELOPMENT OF FISHERIES REFUGIA DATABASE
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.7.4	AWARENESS BUILDING ON FISHERIES REFUGIA CONCEPT
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.8.1	FINANCIAL REPORT
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.8.2	COSTED WORKPLAN FOR 2019-Q3 (COUNTRY INPUTS)
SEAFDEC/UNEP/GEF/FR-RSTC.2 WP.9	<i>ADOPTED REPORT OF THE RSTC2 MEETING (on 23<sup>rd</sup> May)</i>

**INFORMATION DOCUMENTS**

SEAFDEC/UNEP/GEF/FR-RSTC.2 INF.1	INFORMATION NOTES
SEAFDEC/UNEP/GEF/FR-RSTC.2 INF.2a	PROVISIONAL PROSPECTUS
SEAFDEC/UNEP/GEF/FR-RSTC.2 INF.2b	PROVISIONAL AGENDA AND TIMETABLE
SEAFDEC/UNEP/GEF/FR-RSTC.2 INF.2c	ANNOTATED AGENDA
SEAFDEC/UNEP/GEF/FR-RSTC.2 INF.3	LIST OF PARTICIPANTS
SEAFDEC/UNEP/GEF/FR-RSTC.2 INF.4	LIST OF DOCUMENTS



## ANNEX 5

### AGENDA AND TIMETABLE

DATE/TIME	AGENDA		
<b>MONDAY 20<sup>TH</sup>, MAY 2019</b>			
TIME	SCHEDULE OF GROUP A	TIME	SCHEDULE OF GROUP B
08:00-10:00	ARRIVAL OF PARTICIPANTS AT PHNOM PENH INT' AIRPORT	10:00-14:00	ARRIVAL OF PARTICIPANTS AT PHNOM PENH INT' AIRPORT
10:00-15:00	LEAVE INT' AIRPORT FOR THANSUR SOKHA HOTEL BY VAN	14:00-18:45	LEAVE INT' AIRPORT FOR KAMPOT CITY BY VAN
15:00-17:45	CHECK-IN, PCU STAFF PREPARATION FOR MEETING		
17:45-18:45	LEAVE HOTEL FOR KAMPOT CITY		
18:45-20:00	RECEPTION DINNER HOSTED BY FIA AT KAMPOT CITY		
20:00-21:00	LEAVE KAMPOT CITY TO HOTEL		
21:00 ~	ARRIVE AT HOTEL		
<b>DAY 1: TUESDAY 21<sup>ST</sup>, MAY 2019</b>			
08:00-08:30	REGISTRATION		
08:30-09:00	<b>AGENDA 1: OPENING OF THE MEETING</b> 1.1 WELCOME AND OPENING ADDRESS 1.1.1 WELCOME ADDRESS BY CURRENT CHAIRPERSON (2018) 1.1.2 OPENING ADDRESS BY REPRESENTATIVE FROM FIA 1.2 INTRODUCTION OF MEMBERS		
09:00-09:20	<b>AGENDA 2: ORGANISATION OF THE MEETING</b> 2.1 ELECTION OF OFFICERS FOR 2019 2.2 DOCUMENTATION AVAILABLE TO THE MEETING 2.3 ORGANISATION OF WORK		
09:20-09:30	<b>AGENDA 3: ADOPTION OF THE MEETING AGENDA</b>		

09:30-10:30	<b>AGENDA 4: REPORT OF THE PROJECT DIRECTOR ON PROGRESS WORKS</b>
10:30-10:50	<b>BREAK NETWORKING</b>
10:50-12:30	<p><b>AGENDA 5: PRESENTATIONS BY THE NATIONAL SCIENTIFIC AND TECHNICAL COMMITTEE ON THE PROGRESS WORK OF THE PROJECT ACTIVITIES AT THE NATIONAL LEVEL DURING JUNE 2018 – MAY 2019</b></p> <p>5.1 CAMBODIA 5.2 MALAYSIA 5.3 PHILIPPINES 5.4 THAILAND 5.5 INDONESIA 5.6 VIET NAM</p>
12:30-14:00	LUNCH BREAK
14:00-14:20	<b>AGENDA 6: PROJECT EVALUATION OF THE NATIONAL ACTIVITY FROM 2017 TO MAY 2019 IN RESPONSE TO THE QUESTIONNAIRES</b>
14:20-15:30	<p><b>AGENDA 7: DATA AND INFORMATION NEEDS TO SUPPORT ACTIVITIES</b></p> <p>7.1 MANAGEMENT OF TRANSBOUNDARY SPECIES: SHORT MACKEREL, FRIGATE TUNA, ETC.</p> <p>a) SHORT MACKEREL</p> <ol style="list-style-type: none"> <li>1) RESULTS FROM THE SEAFDEC/SWEDEN PROJECT ON SHORT MACKEREL (SWEDEN PROJECT)</li> <li>2) BIOLOGICAL STUDY IN TRAT, THAILAND (NSTC/TH)</li> <li>3) BIOLOGICAL STUDY IN KOH KONG, CAMBODIA (REG-EXPERT/TH)</li> <li>4) COMMENTS AND RECOMMENDATIONS FOR FUTURE WORKS (PCU)</li> </ol> <p>b) FRIGATE TUNA</p> <ol style="list-style-type: none"> <li>1) FRIGATE TUNA OFF WESTERN LUZON (IN THE SCS) (REG-EXPERT/PH)</li> <li>2) REGIONAL STUDY BY SEAFDEC (PCU)</li> <li>3) COMMENTS AND RECOMMENDATIONS FOR FUTURE WORKS (PCU)</li> </ol>
15:30-15:50	BREAK NET WORKING
15:50-17:00	<p><b>(CONTINUED) AGENDA 7: DATA AND INFORMATION NEEDS TO SUPPORT ACTIVITIES</b></p> <p>7.2 BEST PRACTICE FISHING GEARS AND METHODS (SEAFDEC/TD)</p> <p>7.3 GIS MAPPING AND EXISTING OCEAN MODELLING (WESTPAC/TH)</p>
17:00 ~	ALL PARTICIPANTS ARE FREE
<b>DAY 2: WEDNESDAY 22<sup>ND</sup>, MAY 2019</b>	
08:30-10:30	<p><b>(CONTINUED) AGENDA 7: DATA AND INFORMATION NEEDS TO SUPPORT ACTIVITIES</b></p> <p>7.4 BASELINE SURVEY DATA (PCU)</p> <p>7.5 INFORMATION AND EDUCATION PROGRAM</p> <p>7.5.1 PROJECT WEB-SITES AT COUNTRY AND REGIONAL PROGRAMS (PCU)</p>

	<p>7.5.2 FISHERIES REFUGIA CENTER(S) AT NATIONAL LEVEL: LESSONS LEARNED FROM MALAYSIA (NSTC/MY)</p> <p>7.5.3 DEVELOPMENT OF FISHERIES REFUGIA DATABASE (PCU)</p> <p>7.5.4 AWARENESS BUILDING ON FISHERIES REFUGIA CONCEPT (PCU)</p> <p>7.5.5 OTHERS</p>
10:30-10:50	BREAK NET WORKING
10:50-12:30	<p><b>AGENDA 8: OTHER BUSINESS</b></p> <p>8.1 FINANCIAL REPORT (PCU)</p> <p>8.2 COSTED WORKPLAN FOR 2019/Q3-Q4 (ALL NSTCs)</p> <p>8.2.1 CAMBODIA</p> <p>8.2.2 INDONESIA</p> <p>8.2.3 MALAYSIA</p> <p>8.2.4 PHILIPPINES</p> <p>8.2.5 THAILAND</p> <p>8.2.6 VIET NAM</p> <p>8.3 OTHERS</p>
12:30-14:00	LUNCH BREAK
14:00-15:00	<b>(CONTINUED) AGENDA 8: OTHER BUSINESS</b>
15:00-15:15	BRIFING ON TECHNICAL SITE VISIT (PCU)
15:15 ~	<p>ALL PARTICIPANTS ARE FREE</p> <p>PREPARATION FOR DRAFT REPORT</p>
<b>DAY 3: THURSDAY 23<sup>RD</sup>, MAY 2019</b>	
07:00-08:30	LEAVE HOTEL BY VAN FOR TOURIST PORT AT KEP PROVINCE
08:30-09:00	BY BOAT TO MARINE CONSERVATION CAMBODIA (MCC-LOCAL NGO) AT KOH ACH SES
09:00-10:00	VISIT MCC AND PRESENTATION ON THE PROCESS OF MARINE FISHERIES MANAGEMENT
10:00-10:30	LEAVE KOH ACH SES TO BLUE SWIMMING CRAB FISHERIES REFUGIA SITE AT KOH PO
10:30-11:00	LEAVE KOH PO FOR CRAB MARKET AT KEP PROVINCE
11:00-11:30	VISIT CRAB MARKET
11:30-13:00	LUNCH
13:00-15:00	LEAVE KEP PROVINCE FOR THANSUR SOKHA BOKO HOTEL
15:00-16:00	RESTING AT HOTEL AND PREPARING FOR THE LAST SESSION MEETING

16:00-17:30	<b>AGENDA 9: ADOPTION OF THE REPORT OF THE MEETING</b>
17:30-17:40	<b>AGENDA 10: DATE AND PLACE OF THE 3RD REGIONAL SCIENTIFIC &amp; TECHNICAL COMMITTEE MEETING</b>
17:40-17:50	<b>AGENDA 11: CLOSURE OF THE MEETING</b>
18:30-21:00	FAREWELL DINNER HOSTED BY SEAFDEC/PCU
<b>FRIDAY 24<sup>TH</sup>, MAY 2019</b>	
05:30 ~	LEAVE HOTEL FOR INTERNATIONAL AIRPORT AT PHNOM PENH
11:00-17:00	LEAVE PHNOM PENH FOR HOME COUNTRY

## ANNEX 6

# REPORT OF THE PROJECT DIRECTOR ON ACTIVITIES SINCE 2016 TO MAY 2019

### I. INTRODUCTION

The South China Sea is a global center of shallow water marine biological diversity that supports significant fisheries that are important to food security and export incomes of the Southeast Asian countries. Consequently, all inshore waters of the South China Sea basin are subject to intense fishing pressure. With fish production being intrinsically linked to the quality and area of habitats and the heightened dependence of coastal communities on fish, a need exists to improve the integration of fish habitat considerations and fisheries management in the region.

Taking into consideration the aforementioned circumstances, SEAFDEC/Training Department (TD) embarked in 2016 a 5-year project “Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand” with the specific objective of “*operating and expanding the network of fisheries refugia in the South China Sea and Gulf of Thailand for improved management of fisheries and critical marine habitats linkages in order to achieve the medium and longer-term goals of the fisheries component of the Strategic Action Programme for the South China Sea.*”

To facilitate the achievement of the goals and objectives of project, a Regional Scientific and Technical Committee (RSTC) was established and its TORs was adopted at the 1<sup>st</sup> Project Steering Committee held in December 2018 with responsibility for: overseeing the scientific and technical elements of the project; ensuring effective implementation of activities undertaken during project execution; and providing sound scientific and technical advice to the Project Steering Committee.

Since the RSTC meeting will be meet bi-annually, the 1<sup>st</sup> RSTC was held in September 2018 and the meeting agreed that the following RSTC meeting will be held in May. In this connection this paper aims to update the activities and its achievements since project started till May 2019.

### II. PROGRESS ON PROJECT IMPLEMENTATION

#### 1) SUBMISSION OF LOA/LOI

##### 1.1) Signed LOA by 4 Countries

After the Inception Workshop held in November 2016 with aims to enhance the understanding and effectiveness of the relevant fisheries officers who are nominated as a national focal points and scientific and technical focal point from 6 relevant countries on the project implementation, in 2017 there were 4 countries signed letter of agreement (LOA) namely: Cambodia (in January 2017); Philippines (in March 2017); Thailand (in March 2017); and Malaysia (in June 2017). The remaining 2 relevant countries namely Indonesia and Viet Nam are still pending till now due to emerging government policy change such as receiving Grants from the project, and policy on country collaboration with other donors, etc. However, all regional activities conducted since the project started till present, SEAFDEC/PCU invited those 6 relevant countries to participate for updating the countries situation. The follow-up and progress of submission for the LOA by remaining two countries could be summarized as follows:

##### 1.2) Status of LOA for Indonesia and Viet Nam

###### 1.2.1. INDONESIA

There are two main issues related to the LOA between SEAFDEC and National Lead Agency in Indonesia: 1) any SEAFDEC activities conducted in collaboration with Indonesian National Agency on

Fisheries required the MOU between SEAFDEC and National Lead Agency. However, since Indonesia is a SEAFDEC Member Country, one SEAFDEC Council, therefore do not support that SEAFDEC have to make MOU with Indonesia since April 2018. This matter is also linked to the Implementation on establishment of fisheries refugia by Indonesia that in case the overall MOU between SEAFDEC and Indonesia is signed, the implementation of Fisheries Refugia by Indonesia will be covered. 2) Issues on Co-finance particularly for in-kind and cash co-finance is one of the key issues for decision maker on countries contribution to the project. However, SEAFDEC/PCU have explained to the responsible person(s) for better understanding on both term-definitions under the frame of country commitment to the project. SEAFDEC/PCU also invited 3 representatives from MMAF/Indonesia to attend the 1st Project Steering Committee held on 4-5 December 2019 in Bangkok, Thailand where the agreed DSA rate for calculation of the in-kind Co-finance was discussed as well as the Co-finance report from other 4 countries were shown as examples for Indonesian representatives. The discussion with Indonesia on the LOA was made again at the 51th SEAFDEC Council Meeting held in Surabaya, Indonesia on 18-20 March 2019 where Indonesia commit to process on submission of the signed LOA to SEAFDEC by mid of May 2019. At present SEAFDEC/PCU keep communicates to Responsible Agency in Indonesia for the said LOA for further signing od the LOA between SEAFDEC and National Lead Agency. And SEAFDEC PCU prepare the advance budget for Country implementation as soon as received the submission of LOA from Indonesia.

### 1.2.2. VIET NAM

There are long communication with a National Focal Point on submission of the Letter of Agreement since after inception workshop in 2016. The SEAFDEC/PCU have visited Viet Nam for discussion on this matter in 2017 and follow-up with e-mail, but it is still pending. In 2018, a National Focal Point suggested SEAFDEC/PCU to change from LOA to the Letter of Intent (LOI) in which the PCU have revised and drafted the LOI before submission to NFP/Viet Nam in mid of August 2018 for further consideration and in-country coordination. The drafted LOI was discussed again in early of 2019, and Viet Nam led by D-Fish as a National Lead Agency agreed the LOI signed by SEAFDEC and D-Fish in April 2019. In this connection, SEAFDEC PCU received the submission of LOI from Viet Nam signed on 3 May 2019.

## 2) ESTABLISHMENT OF FISHERIES REFUGIA SITES BY 4 RELEVANT COUNTRIES

To date, a total of ten priority fisheries *refugia* sites have been identified (see details from the Map) and implemented in four countries as follows:

- a) **Cambodia**, there are 3 priority fisheries *refugia* sites as follows:
  - i. Kep Province: for blue swimming crab (*Portunus pelagicus*) *refugia* at relevant habitats areas such as coral, mangrove and seagrass bed off Kep coastal area;
  - ii. Kampot Province: for juvenile grouper (*Epinephelus spp.*) *refugia* in the seagrass bed. This is a new priority site to replace Preah Sihanouk Province for juvenile grouper *refugia* in the coral reef area of Koh Rong Archipelago where the local government reserved as a conservation area in 2018; and
  - iii. Koh Kong Province: for short mackerel (*Rastrelliger brachysoma*) *refugia* that is identified as a transboundary species with Trat Province of Thailand;
- b) **Malaysia**, there are 2 priority fisheries *refugia* sites as follows:
  - i. Tanjung Leman, Johor: for spiny lobsters (*Panulirus polyphagus* as a main species) and other *Panulirus spp.* such as *P. versicolor*, *P. ornatus*, *P. homarus* and *P. longipes*) *refugia*; and
  - ii. Miri, Sarawak: for tiger prawn (*Penaeus monodon*) *refugia*
- c) **Philippines**, there are 3 priority fisheries *refugia* sites as follows:
  - i. Bolinao, Pangasinan: for Rabbitfish (*Siganus spp.*) *refugia* in seagrass bed off Bolinao;
  - ii. Masinloc, Zambales :- for juveniles of Frigate tuna (*Auxis thazard*) *refugia*; and
  - iii. Coron, Palawan: for fusilier fish *refugia* in coral reef area, and mud crab *refugia* in mangrove area.

- d) **Thailand**, there are 2 priority fisheries *refugia* sites as follows:
- i. Trat Province: for short mackerel (*Rastrelliger brachysoma*) as a transboundary species with Koh Kong Province of Cambodia; and
  - ii. Surat Thani Province: for blue swimming crab (*Portunus pelagicus*) *refugia*. This is a new priority site to replace short mackerel in Samui Archipelago where the Fisheries Department established a *refugia* under the national management policy for short mackerel since 2017 as one of the follow-up activities under the UNEP/GEF/SCS Phase I, by this reason a new *refugia* site for blue swimming crab is agreed at the National Fisheries *Refugia* Committee.

**Figure 1.** shows the priority sites and selected target species of fisheries *refugia* in 4 countries and will be finalized soon for the *Refugia* Sites in Indonesia and Viet Nam.

For Indonesia, there are 2-3 tentative priority fisheries *refugia* sites proposed by Indonesia during the Inception Workshop in November 2016 and reiterated at the 1<sup>st</sup> Regional Scientific and Technical Committee Meeting in September 2018: **two priority sites** are at Bangka Belitung and Tambelan Bintan for the small pelagic fishes; another one is at Benkayang in west coast of Borneo for penaeid shrimps. The target species for those three priority sites will be discussed again after Indonesia start the project implementation.

In addition, for Viet Nam, there are also 2-3 tentative priority sites of fisheries *refugia*, the details on target selecting species will be consulted with national focal point and relevant officers after country's appointment.

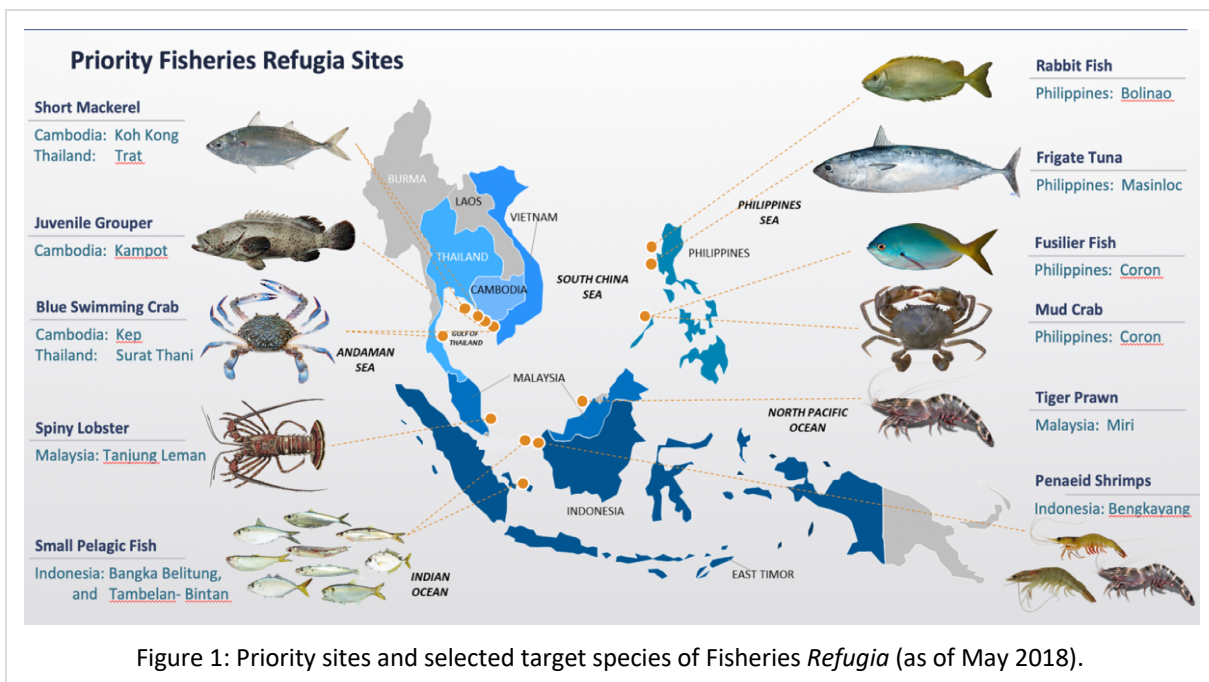


Figure 1: Priority sites and selected target species of Fisheries *Refugia* (as of May 2018).

### 3) ALL ACTIVITIES AND ACHIEVEMENTS SINCE PROJECT STARTED

Site Level Inception Workshops and Baseline Data Collection are generally conducted by participating countries since starting the project implementation in 2017. Major achievements had been attained. These included:

- a) intensive series of consultations on the boundaries of fisheries *refugia* which have been supported by facilitated processes to identify key threats to fisheries *refugia* sites and initiate discussion about possible management measures for evaluation, *i.e.* governance reviews, stakeholder analyses, socio-economic information and data collation, and reviews of existing management arrangements that are still underway;



- b) improvement of the management of critical habitats for fish stocks of transboundary significance via national and regional actions to strengthen the enabling environment and knowledge-base for fisheries *refugia* management in the South China Sea, *i.e.* development of working document for regional level review on key threats from fishing and the environment to fish stock and critical habitat linkages at the priority sites in the participating countries; existing regulations and by-laws in the areas of the ten (10) sites where the project is presently working, compiled and reviewed with feedback provided to national teams to aid in the formulation of recommendations on policy and legal reforms to support promotion of responsible fishing at times and at locations critical to fish stock and critical habitat linkages; workshops with local stakeholders and officials on policy and legal aspects of *refugia* (terminology, procedures, recommended reforms) in the participating countries that allowed discussions viewed through a more realistic lens to reflect the local stakeholders' needs, expectations, and concerns about socio-economic impacts of management; questionnaire survey templates prepared to: (a) compile and update information and data on the distribution of habitats, known spawning areas, locations of *refugia*, MPAs, fisheries management areas, and critical habitats for endangered species; (b) produce detailed site characterizations for the 10 of the 14 priority fisheries *refugia* sites for incorporation into national and regional datasets, and preparation of detailed Terms of Reference for the development and application of a modeling system linking oceanographic, biochemical, and fish early life history information to improve regional understanding of fish early life history and links to critical habitats and discussion with regional universities, and internationally-recognized institutions with expertise in this field;
- c) information management and dissemination in support of national and regional-level implementation of the fisheries *refugia* concept in the South China Sea, *i.e.* the [www.fisheries-refugia.org](http://www.fisheries-refugia.org) webpage established and populated with newly developed short films, and journal articles written by regional project staff, all supported by various social media platforms including YouTube and Facebook, and a six-part short film social media campaign prepared and disseminated in December 2017; and
- d) national cooperation and coordination for integrated fish stock and critical habitat management in the South China Sea and Gulf of Thailand were enhanced through the signing of Letters of Agreement with four out of the six participating countries, training of national teams in project management and governance arrangements, and following up on the progress of establishing agreements in ten out of 14 sites including the detailed terms of reference for site-based management boards (as of May 2019).

### 3.1 REGIONAL ACTIVITIES, TECHNICAL SUPPORT AND ACTIVITIES UNDER GEF/UNEP

During the year 2018, The PCU had undertaken a series of country visit to supporting national lead agency for the project in undertaking quarterly and annual project work planning, budgeting and reporting. The support mission was started from National Fisheries Research and Development Institute, Philippine, Fisheries Administration Cambodia, Department of Fisheries of Thailand, and Department of Fisheries of Malaysia, respectively. Also, The PCU's staffs participated to project partner activities such as the SEAFDEC-Sweden project, SEAFDEC-JTF project as well as the Ocean and Fisheries Partnerships. Participations to the SEAFDEC regional meetings hosted by said donors are aimed to strength the project cooperation and coordination with other SEAFDEC Donors on specific issues such as Gender mainstreaming in Fisheries Social Well-being, fish stock assessments, etc. The summary of all activities has been compiled since started till present are shown in **Appendix 1**.

### 3.2 MONITORING AND SELF-EVALUATION ON PROJECT PERFORMANCE

Since 2017, the project has been implementing until present, the PCU circulated the Project Performance and Risk template (**Appendix 2**) which is modified from the original form developed by UNEP. This template for self-evaluation was sent to all national focal point of participating countries (CAM, MY, TH and VN) for inputs, and the PCU has already received the feedback from 3 countries namely Cambodia, Malaysia and Thailand by due date in first week of May 2019. These inputs from relevant countries will be





### Appendix 1: The activity carried-out by the PCU during November 2016 to May 2019

#### A: Participation to the GEF events, Regional and International For a:

Activity	Period	Objective	Results/outputs
1. Attended to the 8 <sup>th</sup> Annual Large Marine Ecosystem and Coastal Partners Meeting, IOC/UNESCO Headquarters	6-9 December 2016	To strengthen the cooperation of the project.	Promotion of the Fisheries <i>Refugia</i> Project to another LMEs
2. Attended to the 6th Meeting of the GoT Meeting	28 February – 3 March 2017	To strengthen the cooperation with alignment project implementing by other donors.	Introduction of the Fisheries <i>Refugia</i> Project to the GoT project
3. Attended to the 49th Meeting of SEAFDEC Council	2-8 April 2017	To strengthen the cooperation of the project.	Report the progress of Fisheries <i>Refugia</i> project to SEAFDEC Council
4. Participation to the UN conference	5-9 June 2017	To strengthen the cooperation of the project.	Promotion of the Fisheries <i>Refugia</i> Project to another agencies. Discussion with UN Environment for future cooperation
5. Attended to Sustainable Agro Business Forum 26-27 Sep	26-27 September 2017	To strengthen the cooperation for the project.	Observation and sharing of information on Fisheries <i>Refugia</i>
6. Attended to the Building International Partnership to Enhance Science Based Ecosystem Approaches and the 19 <sup>th</sup> Annual Large Marine and Coastal Partners Meeting	27 November – 1 December 2017	To strengthen the cooperation of the project.	Observation and sharing of information on Fisheries <i>Refugia</i>
7. Attended to the Experts Consultation Workshop on Guidance to Monitoring and Evaluation of Gender Equality and Social Well-being	8-10 August 2018	To strengthen the cooperation with alignment project implementing by other donors.	The list of indicators for gender mainstreaming to support the implementation of the project
8. Attended to the 2 <sup>nd</sup> Sub-Regional Technical Meeting on Effective Fisheries Management between Cambodia and Thailand	29-30 August 2018	To strengthen the cooperation with alignment project implementing by other donors.	Support workplan for management of transboundary species between Thailand and Cambodia.
9. Organized the 1 <sup>st</sup> Regional Scientific and Technical Committee meeting, Trat Province, Thailand	10-14 September 2018	To strengthen the regional cooperation in the integration of scientific knowledge and research outputs with management and policy making.	Report on the progress work of the project activity at national level to the RSTC. Shared experience and discussed on scientific and technical aspects of the fisheries <i>refugia</i> project

10. Attended to the 7th meeting of the Gulf Thailand sub-region, Pattaya, Chonburi	31 October – 3 November 2018	To strengthen the cooperation with alignment project implementing by other donors.	Introduction of the Fisheries <i>Refugia</i> Project to the GoT project
11. the attend the 41st meeting of the SEAFDEC Program Committee meeting, Langkawi, Malaysia	4 – 8 November 2018	To strengthen the cooperation of the project.	Report the progress of Fisheries <i>Refugia</i> project during year 2018 to SEAFDEC Program Committee.
12. Attended to the 9th GEF biennial international waters conference & the 20th annual LME (marine)consultation at Marrakech, Morocco	3 – 8 November 2018	To strengthen the cooperation of the project.	Promotion of the Fisheries <i>Refugia</i> Project to another LMEs
13. Organized the 1st Project Steering Committee meeting of the SEAFDEC/UNEP/GEF project, Bangkok, Thailand	4 - 5 DECEMBER 2018	To strengthen the regional cooperation in the establishment and operation of a regional system of fisheries <i>refugia</i>	<p>The countries statements to supports for implementation of the project was shared to the meeting</p> <p>Agreed on the terms of reference and rules of procedure for the project steering committee</p> <p>Agreed on the national results framework and proposed workplan adjustment for 2019 and onward;</p> <p>discussed on the financial arrangements for national and regional programs including the expenditures in 2017 till September 2018</p>
14. Attended to the 2 <sup>nd</sup> Annual Asia-Pacific Regional Network Meeting, Hanoi	18 February 2019	To strengthen the cooperation of the project.	Promotion of the Fisheries <i>Refugia</i> Project to another LMEs and GEF small grant program focal point.
15. Attended to the training course on MPS & Blue Economy and Ocean Governance	19-21 February 2019	To building up the capacity of PCU staff and share the information on project implementation in the South China Sea and Gulf of Thailand	The PCU staff gained a new knowledge on MSP and Ocean Governance. Promotion of the Fisheries <i>Refugia</i> Project implementation to another LMEs
16. Attended to the Regional Workshop on “GoT Fish: Promoting the Blue Economy of the Gulf of Thailand through the Ecosystem Approach to Fisheries”	14-15 March 2019	To strengthen the cooperation for the project.	Observation and sharing of information on Fisheries <i>Refugia</i>

17. Attended to the Fifty-first Meeting of the Council (51CM) of the Southeast Asian Fisheries Development Center (SEAFDEC) in Surabaya City, East Java, Indonesia	18-22 March 2019	To strengthen the cooperation of the project.	Report the progress of Fisheries <i>Refugia</i> project to SEAFDEC Council
18. Attend the 12th Intergovernmental Session of the IOC Sub-Committee for the Western Pacific (WESPAC-XII), Manila, the Philippines	2-5 April 2019	To strengthen the cooperation of the project particularly on Ocean Science Information sharing	Make use the existing Ocean Simulation developed under the Thai-China Cooperation within the framework of IOC/Westpac.
19. Organized the 2 <sup>nd</sup> Regional Scientific and Technical Committee meeting, KAMPOT, CAMBODIA	21-23 MAY 2019	To strengthen the regional cooperation in the integration of scientific knowledge and research outputs with management and policy making.	Report on the progress work of the project activity at national level to the RSTC. Shared experience and discussed on scientific and technical aspects of the fisheries <i>refugia</i> project

#### B: Attend and Support Member Countries on National Activity

Activity	Period	Objective	Results/outputs
1. Attended to the Fisheries <i>Refugia</i> Management Committee Meeting, Coron, Philippines	18-22 April 2017	To attend the site-based committee meeting	Observation and Technical support to national activities
2. Technical support for Cambodia	30 January – 3 February 2017	To support the national lead agency for project work planning and budgeting	Observation and Technical support to national activities
3. Technical support for Philippines	5-8 February 2017	To support the national lead agency for project work planning and budgeting	Observation and Technical support to national activities
4. Technical support for Vietnam	13-16 February 2017	To support the national lead agency for project initiating phase	Observation and Technical support to national activities
5. Technical support for Malaysia	6-8 March 2017	To support the national lead agency for project work planning and budgeting	Observation and Technical support to national activities
6. Technical support for Philippines	18-28 February 2017	To support the national lead agency for project work planning and stakeholder consultation meeting	Observation and Technical support to national activities
7. Technical support for cambodia	4-6 May 2017	To support the national lead agency for project work planning and budgeting	Observation and Technical support to national activities
8. Technical support for cambodia	2-6 July 2017	To support the national lead agency for project work planning and budgeting	Observation and Technical support to national activities

9. Organized the Capacity Building for Stakeholder Consultation Workshop	1-3 August 2017	To building a capacity of the national project staff on arrangement of stakeholder Consultation Workshop	2 representatives from Cambodia, 3 from Thailand, and 3 from Philippine had trained
10. Technical support for Thailand	7 September 2017	To support the national lead agency for project work planning	Observation and Technical support to national activities
11. Technical support for Cambodia	14-17 October 2017	To support the national lead agency for project work planning, budgeting, and reporting	Observation and Technical support to national activities
12. Attended to the inauguration ceremony of FR information center on Tanjung Leman, Malaysia	19-20 November 2017	To attend for inauguration ceremony of FR information center on Tanjung Leman	Observation on the achievement on establishment of the Fisheries <i>Refugia</i> institution at selected site
13. Filming of footage at Kep province, Cambodia	14- 20 December 2017	To support the communication and social media of the project.	Fisheries Refugia film
14. Consultation visit to NFRDI, Philippine	20-22 June 2018	To support the national lead agency on project reporting and budgeting	Observation and Technical support to national activities
15. Consultation visit to FiA, Cambodia	18-20 July 2018	To support the national lead agency on project reporting and budgeting	Observation and Technical support to national activities
16. Consultation visit to DoF, Malaysia	24-27 July 2018	To support the national lead agency on project reporting and budgeting	Observation and Technical support to national activities
17. Attended to the stakeholder consultation workshop, at Bolinao, Pangasinan, Philippines	18 – 21 September 2018	To support the national lead agency on project reporting and budgeting	Observation and Technical support to national activities
18. the visit MMAF/ID for discussion with MMAF on the fisheries refugia LoA at the Our Ocean conference in Nusa Dua Bali, Indonesia	29 - 30 October 2018	To support the national lead agency for project initiating phase	Observation and Technical support to national activities
19. Technical support for Cambodia	8-9 January 2019	To support the national lead agency for project work planning, budgeting, and reporting	Observation and Technical support to national activities
20. Support a Technical Training for fisheries officers of Fisheries Administration (FiA)/Cambodia on Biological Studies of Short Mackerel ( <i>Rastrelliger Branchysoma</i> ) Koh Kong Province, Cambodia	12-15 February 2019	To building capacity for fisheries officers of Fisheries Administration (FiA) /Cambodia on Biological Studies of Short Mackerel ( <i>Rastrelliger Branchysoma</i> )	9 fisheries officers of Fisheries Administration (FiA) /Cambodia gained the knowledge on biological study of Short Mackerel ( <i>Rastrelliger Branchysoma</i> ) for base-line information and data collection, which aim to support establishment of fisheries <i>refugia</i> area in Cambodia. Also, they learned on how to apply the aerial

			visual application to support the project implementation at level site.
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**C: Development of website and VDO**

<b>Activity</b>	<b>Period</b>	<b>Objective</b>	<b>Results/outputs</b>
1) Developed the project website	October 2016	To develop a prototype project website	Project website was initially developed with URL address: <a href="https://fisheries-refugia.org/">https://fisheries-refugia.org/</a>
2) Developed the Short film and animations for the project	December 2016	To produce an inception phase short film and animation for the project	A short film of the project was launched on the project website, Facebook fan page, and YouTube channel of the project.
3) Improved the Fisheries Refugia Websites	Mar-May 2019	To restructure of the prototype project website developed in 2016 and provide update news, information as well as including the country webpage for sharing to public.	Project website was upgraded with URL address: <a href="https://fisheries-refugia.org/">https://fisheries-refugia.org/</a>

## Appendix 2: Country Inputs on Rating Project Performance and Risk

For 2019 Fiscal Year (June)

### 1. RATING PROJECT PERFORMANCE AND RISK

Based on inputs by the National Focal Point (NFP), the PCU, Project Director will make an overall assessment and provide ratings of:

- (i) Progress towards achieving the project objective(s)- see section 1.1
- (ii) Implementation progress – see section 1.2

Section 1.3 on Risk should be first completed by the NFP. The PCU, Project Director will subsequently enter his own ratings in the appropriate column.

#### 1.1 Progress towards achieving the project objective (s)

Project objective and Outcomes	Description of indicator	Baseline level	Mid-term target	End-of-project target	Progress rating <sup>1</sup>
<b>Outcome 1:</b> <i>Reduced stress on fish stocks and coastal habitats via improved national management of key anthropogenic threats to fisheries and critical habitat linkages in the South</i>	1. Status of boundary delineation and agreement on proposed management interventions	<i>Refugia</i> site locations identified regionally although need to work with stakeholders, locally including academe and researchers, to delineate boundaries	Equivalent to end-of-project target	Agreement among stakeholders on the boundaries of fisheries <i>refugia</i> , key threats to <i>refugia</i> , and priority management interventions for 14 sites	
	2. Status of adoption and implementation of the management plans,  Total area of fisheries <i>refugia</i> (ha) under management	Guide to planning of <i>refugia</i> management developed and published in inter-governmentally endorsed regional guidelines and a need exists to apply this at the local level	Key threats to fisheries <i>refugia</i> sites identified  Draft management plans	Community-based <i>refugia</i> management plans developed, adopted, and under implementation at 14 fisheries <i>refugia</i> sites	

<sup>1</sup> Use GEF Secretariat required six-point scale system: Highly Satisfactory (HS), Satisfactory (S), Marginally Satisfactory (MS), Marginally Unsatisfactory (MU), Unsatisfactory (U), and Highly Unsatisfactory (HU). See Annex 2 which contains GEF definitions.



Project objective and Outcomes	Description of indicator	Baseline level	Mid-term target	End-of-project target	Progress rating <sup>1</sup>
<i>China Sea and Gulf of Thailand</i>	3. Status and effectiveness of the management board and volunteer networks	Efforts to strengthen monitoring, control, and surveillance capabilities in all countries are ongoing, although need exists to refine scope of work to support <i>refugia</i> management	None	Networks of management boards and community-based fisheries and habitat management volunteers for <i>refugia</i> management established at 14 fisheries <i>refugia</i> sites.	
	4. Increase in the proportion of target community members [minimum of 30 percent women] participating in <i>refugia</i> management, including enforcement, at the site level	Capacity building programmes at the community level focus on seafood quality and capacity issues with little emphasis on links between fisheries and environment	Stakeholder capacity for participation in mgmt. benchmarked  Agreed objectives, syllabus and schedule for capacity building activities	Community capacity programmes at 14 fisheries <i>refugia</i> sites, including participatory activities to monitor fish habitats within <i>refugia</i> , collect lost and abandoned fishing gear, and develop responsible fishing practices at the community level	
	5. Number of GEF Small Grants Programme projects commissioned and implemented in support of <i>refugia</i> management objectives	Low level mobilization of civil society, community organization and the private sector in site-based fisheries and habitat management	Suitable GEF SGP proponent identified at 14 sites	Operational partnership with the GEF Small Grants Programme to strengthen civil society and community organisation participation	
<b>Outcome 2:</b> <i>Increased institutional capacity in the 6 participating countries for the designation and operational management of fisheries refugia via the transformation of enabling environments and the generation of</i>	1. Status of policy revision and endorsement	Environmental impacts of fishing and aquaculture reflected in national and regional fisheries policies although minimal attention to effects of fishing on critical fish habitats			
	2. Status of endorsement of national guidelines	ASEAN-SEAFDEC regional guidelines endorsed			
	3. Status of endorsement of national fisheries refugia policies, enactment of supporting laws, and plan implementation	Absence of clear and effective policies, laws, and plans relating to the demarcation of boundaries, formal designation, and operational management of fisheries <i>refugia</i>			

Project objective and Outcomes	Description of indicator	Baseline level	Mid-term target	End-of-project target	Progress rating <sup>1</sup>
<i>knowledge for planning</i>	4. Volume of new and additional information compiled on: biomass trends; recruitment; fish size; fish habitat area and quality; and volume and value of landings by fishing area and fishing gear use	Review of fisheries and their habitats on the SCS coast prepared for Cambodia, Indonesia, the Philippines, Thailand and Viet Nam during 2004-2006	Proposed policy and legal reforms for promotion of responsible fishing at priority sites formulated  Consultations with fishing industry initiated	Measures for the fisheries sector's sustainable use of fish habitats and biodiversity, and based on site-level models of ecosystem carrying capacity, incorporated in the fisheries policies of participating countries	
	5. Status of national and regional databases and the number of datasets contained therein	Access to data generated from fish early life history research constrained both nationally and regionally by a lack of central repository	Guidelines drafted  National and local consultative process initiated	National guidelines on the use of fisheries <i>refugia</i> in integrating fisheries and habitat developed and endorsed by heads of national government departments responsible for fisheries and ) environment in the participating countries	
	6. Status of the national and regional GIS and the number of sites presented and characterised	Information relating to fisheries and their habitats contained a number of national databases and the SCS project website although need for improved access to information regarding management areas	Consultations on required policy & legal reforms for <i>refugia</i> demarcation and management initiated	National policy, legal and planning frameworks for demarcating boundaries and managing <i>refugia</i> assessed and required reforms endorsed in the participating countries and reflected in an updated regional action plan	
	7. Completeness of site characterisations for 14 priority <i>refugia</i>	Information collection largely focuses on volumes with little attention to species & size selectivity of gear, size frequency and maturity, role of habitats in production	First annual synthesis reports published	Annual synthesis reports of new and additional information and data relating to the stocks of priority fish, crustaceans and molluscs and their habitats published in each country and disseminated at national and regional levels	

Project objective and Outcomes	Description of indicator	Baseline level	Mid-term target	End-of-project target	Progress rating <sup>1</sup>
	8. Status of modelling system and extent of its use in decision-making and planning	Absence of information regarding links between circulation patterns, biochemistry and fish early life history in the South China Sea and Gulf of Thailand	National and regional inventories of fish egg and samples prepared  First annual status report on fish early life history research prepared	Establishment and population of 6 online national databases, and 1 regional database, of fish egg and larvae distribution and abundance in national waters and the SCS basin	
	9. Status of demonstration activities	Few regionally or locally appropriate examples of practical solutions to key threats to fisheries <i>refugia</i>	Site characterisation templates prepared and agreed by NSTC and RSTC	National and regional online Geographical Information Systems on fisheries and marine biodiversity featuring information on locations and management status of coastal habitats, fisheries <i>refugia</i> , MPAs, and critical habitats for threatened and endangered species	
<b>Outcome 3:</b> <i>Strengthened knowledge management and information sharing and access for enhanced uptake of good practice in integrating fisheries management and biodiversity conservation in the design and implementation of fisheries and environmental management</i>	Number of best practice approaches and measures tested and codified	Lessons learned in coastal habitat management from the SCS project's network of 23 demonstration sites have been documented, although there are few regionally relevant examples of best practice in integrated fisheries and biodiversity management	Online database for cataloguing best practice examples accessible via project website	Best practice approaches and measures for integrated fisheries and habitat management captured, documented and communicated nationally and regionally	
	Number, scope and reach of communications to share best practices				
	Demonstrable use of best practices in policy and planning	Awareness programmes at the community level rarely address area-based management approaches	Community acceptance of <i>refugia</i> approach in project Yr 1 benchmarked	Public awareness and outreach programme to promote local social, economic and environmental benefits of fisheries <i>refugia</i> implemented at 14 priority locations in the South China Sea and Gulf of Thailand	
	Extent of community acceptance of the use of fisheries <i>refugia</i> in coastal fisheries management				

Project objective and Outcomes	Description of indicator	Baseline level	Mid-term target	End-of-project target	Progress rating <sup>1</sup>
<i>systems, including Marine Spatial Planning</i>	Status of national web portals	No existing mechanism for the capture, management and sharing of knowledge and experiences in the use of area-based tools for fisheries management in the South China Sea region	Web portal for the exchange of knowledge on <i>refugia</i> approach accessible online	National knowledge management systems on the use of fisheries <i>refugia</i> in capture fisheries management established and operational	
	Status of publication of GEF IW experience notes				
	Status of the Regional Education and Awareness Centre at SEAFDEC	Access to information and training materials on integrated fisheries and habitat management limited to that produced through SCS project and accessible via SCS website	None	Regional Education and Awareness Centre on fisheries and critical habitats established and operating as a facility for the production and sharing of information and education materials for <i>refugia</i> management	
	Volume of information and education material compiled, produced and made accessible				
	Status of regional agreements	Efforts to standardise reporting of regional fisheries statistics underway although little consideration given to issues relating to fish stock and habitat links	None	Regional agreement on standardised information and data collection procedures in support of longer-term operation of a regional system of fisheries <i>refugia</i> , including design of stress reduction and environmental state indicators for managed <i>refugia</i>	
	Extent of demonstrated use of the agreed procedures in operation of site-level information and data collection programmes				
<b>Outcome 4:</b> <i>Cost-effective and efficient coordination of national and regional level cooperation for integrated fisheries and environmental management</i>	Extent and continuity of national government agency participation in National Fisheries <i>Refugia</i> Committee meetings	Limited cross-sectorial engagement in the planning of coordinated actions to manage threats to fish stocks and critical habitat linkages	Quarterly meetings of NFRCs	National Fisheries <i>Refugia</i> Committees (NFRC) established in 6 countries, functional and advising national decision-makers and regional <i>fora</i>	
	Status of the NTSC's and the uptake of the scientific and technical advice they provide	Lack of a formal mechanism for the sharing of science and technical knowledge between government agencies and other stakeholders involved in fish stock and coastal environmental management in all countries	Biannual meetings of NTSCs	National Technical and Scientific Committees (NTSC) established in 6 countries, functional and advising site-level management boards, the NFRC and the Regional Scientific and Technical Committee	

Project objective and Outcomes	Description of indicator	Baseline level	Mid-term target	End-of-project target	Progress rating <sup>1</sup>
	Continuity of participation of community stakeholders in the planning, monitoring and evaluation of fisheries <i>refugia</i> management	Minimal stakeholder participation in planning of local actions to manage threats to fish stocks and critical habitats linkages	Quarterly meetings of Site-Based Management Boards	Local community action catalysed via establishment and operation of site-based management boards for fisheries <i>refugia</i> at 14 locations in the South China Sea and Gulf of Thailand	
	Status of the RSTC and the uptake of the scientific and technical advice it provides  Continuity of participation of members in annual meetings	Lack of a formal mechanism for the sharing of science and technical knowledge relating to fisheries <i>refugia</i>	Biannual meetings of the RSTC	Regional Scientific and Technical Committee (RSTC) established and functioning as a bridge between the scientific community and decision-makers for operation of a regional system of fisheries <i>refugia</i> [annual meetings]	
	Status of the PSC  Continuity of participation of members in annual meetings	UNEP and GEF requirement for establishment of regional decision making and planning body for the project	Annual meetings of the PSC  Completion of Annual Project Implementation Reviews	Project Steering Committee established and functioning to oversee and act as a principal decision making body for the project	
	Program coordination unit recruited and staff retained	Executing agency has managed components of larger FAO/GEF projects but is yet to act as executing agency for GEF project of this magnitude	Timely and cost effective delivery of project outputs	Functioning regional Project Coordinating Unit (PCU) supporting the coordination of regional and national level activities associated with the establishment and operation of regional system of fisheries <i>refugia</i> and meeting reporting requirements of UNEP and the GEF	

## 1.2 Project implementation progress

Outputs <sup>2</sup>	Expected completion date <sup>3</sup>	Implementation status as of 30 May 2019 (%)	Comments if variance <sup>4</sup> . Describe any problems in delivering outputs
<b>Outputs 1 Adopted management plans including regular reports of meetings of national and regional project management bodies, and Reports of independent mid-term and terminal project evaluations</b>			
Activity 1.1: Developing fisheries and coastal habitat information and data collection programmes for national priority fisheries refugia sites			
Activity 1.2: Facilitating agreement among stakeholders on the boundaries of fisheries refugia at national priority fisheries refugia sites			
Activity 1.3: Developing Community-Based Management Plans for national priority fisheries refugia sites			
Activity 1.4: Establishing operational management for national priority fisheries refugia sites			
Activity 1.5: Strengthening civil society and community organization participation in the management of national fisheries refugia sites			
<b>Output 2: Endorsed policies and plans including regular reports of meetings of national and regional project management bodies, and Reports of independent mid-term and terminal project evaluations</b>			
Activity 2.1: Enhancing policy guidance for improved management of the effects of fishing on critical habitats in the 6 participating countries			
Activity 2.2: Defining the policy and legal basis for formal designation and establishment of fisheries refugia in the 6 participating countries			
Activity 2.3: Development of national guidelines on the establishment and operation of fisheries refugia and reflected in an updated regional refugia action plan			

<sup>2</sup> Outputs and activities as described in the project logframe or in any updated project revision.

<sup>3</sup> As per latest workplan (latest project revision)

<sup>4</sup> Variance refers to the difference between the expected and actual progress at the time of reporting.

Outputs <sup>2</sup>	Expected completion date <sup>3</sup>	Implementation status as of 30 May 2019 (%)	Comments if variance <sup>4</sup> . Describe any problems in delivering outputs
Activity 2.4: Reforming national and regional policy, legal and planning frameworks for demarcating boundaries and managing refugia			
Activity 2.5: Enhancing access to information relating to status and trends in fish stocks and their habitats in waters of the SCS marine basin			
Activity 2.6: Improved national and regional-level management and sharing of information and data on fish early life history in the waters of the SCS			
Activity 2.7: Enhancing access to information relating to the locations and status of coastal habitats and management areas in the SCS			
Activity 2.8: Strengthening the information base for the planning, monitoring and evaluation of management at priority fisheries refugia sites			
Activity 2.9: Improving basin-wide understanding of linkages between ocean circulation patterns, nutrient/chlorophyll concentrations, and sources and sinks of fish larvae in the South China Sea			
Activity 2.10: Regionally and locally appropriate best practices generated to address the effects of trawl and push net fishing on seagrass habitat, and the capture of juveniles, pre-recruits and fish in spawning condition			
<b>Output 3: Routine communications on progress and lessons learned prepared and shared including Annual results reports published and disseminated, and National and regional web portals for knowledge management and information exchange accessible online</b>			
Activity 3.1: Enhancing uptake of best practices in integrating fisheries management and biodiversity conservation in the 6 participating countries			
Activity 3.2: Improving community acceptance of area-based approaches to marine management in the 6 participating countries			
Activity 3.3: Knowledge generated and experiences from establishing and operating fisheries refugia			

Outputs <sup>2</sup>	Expected completion date <sup>3</sup>	Implementation status as of 30 May 2019 (%)	Comments if variance <sup>4</sup> . Describe any problems in delivering outputs
captured and shared nationally, regionally, and globally			
Activity 3.4: Information and Education Campaigns for small-scale fisherfolk on the links between fisheries, habitats and biodiversity coordinated regionally through a Regional Education and Awareness Centre			
Activity 3.5: Standardised methods for collection and analysis of information and data for use in assessing impacts of refugia and design appropriate indicators for the longer-term operation of the regional system of fisheries refugia			
<b>Output 4: Regular reports of meetings of national and regional project management bodies including Reports of independent mid-term and terminal project evaluations</b>			
Activity 4.1: Strengthened cross-sectoral coordination in the establishment and operation of fisheries refugia in the participating countries			
Activity 4.2: Harnessing national scientific and technical expertise and knowledge to inform policy, legal and institutional reforms for fisheries refugia			
Activity 4.3: Catalyzing local community action via establishment and operation of site-based management boards at 14 priority refugia sites			
Activity 4.4: Regional cooperation in the integration of scientific knowledge and research outputs with management and policy making			
Activity 4.5: Regional cooperation in the establishment and operation of a regional system of fisheries refugia			
Activity 4.6: Effective coordination of regional and national-level activities and reporting requirements of UNEP and GEF satisfied			
<b>Output 3: Routine communications on progress and lessons learned prepared and shared including Annual results reports published and disseminated, and National and regional web portals for knowledge management and information exchange accessible online</b>			



### 1.3. Risk

There are two tables to assess and address risk: the first “risk factor table” to describe and rate risk factors; the second “top risk mitigation plan” should indicate what measures/action will be taken with respect to risks rated **Substantial** or **High** and who is responsible to for it.

RISK FACTOR TABLE																		
<p><i>Project Managers will use this table to summarize risks identified in the <b>Project Document</b> and reflect also <b>any new risks</b> identified in the course of project implementation. The <b>Notes</b> column should be used to provide additional details concerning manifestation of the risk in your specific project, <b>as relevant</b>. The “Notes” column has one section for the Project Manager (<b>PM</b>) and one for the UNEP Task Manager (<b>TM</b>). If the generic risk factors and indicators in the table are not relevant to the project rows should be added. The <b>UNEP Task Manager</b> should provide ratings in the right hand column reflecting his/her own assessment of project risks.</i></p>																		
Risk Factor	Indicator of Low Risk	Indicator of Medium Risk	Indicator of High Risk	Country Rating						Notes	Project Director Rating (compiled all)							
				Low	Medium	Substantial	High	Not Applicable	To be determined		Low	Medium	Substantial	High	Not Applicable	To be determined		
<b>INTERNAL RISK</b>																		
<b>Project management</b>																		
Management structure	Stable with roles and responsibilities clearly defined and understood	Individuals understand their own role but are unsure of responsibilities of others	Unclear responsibilities or overlapping functions which lead to management problems							Country:  PCU								
Governance structure	Steering Committee and/or other project bodies meet periodically and provide effective direction/inputs	Body(ies) meets periodically but guidance/input provided to project is inadequate. TOR unclear	Members lack commitment Committee/body does not fulfil its TOR							Country:  PCU								

Risk Factor	Indicator of Low Risk	Indicator of Medium Risk	Indicator of High Risk	Country Rating						Notes	Project Director Rating (compiled all)							
				Low	Medium	Substantial	High	Not Applicable	To be determined		Low	Medium	Substantial	High	Not Applicable	To be determined		
<b>INTERNAL RISK</b>																		
<b>Project management</b>																		
Internal communications	Fluid and cordial	Communication process deficient although relationships between team members are good	Lack of adequate communication between team members leading to deterioration of relationships and resentment							Country:								
										PCU								
Work flow	Project progressing according to work plan	Some changes in project work plan but without major effect on overall timetable	Major delays or changes in work plan or method of implementation							Country:								
										PCU								
Co-financing	Co-financing is secured and payments are received on time	Is secured but payments are slow and bureaucratic	A substantial part of pledged co-financing may not materialize							Country:								
										PCU								
Budget	Activities are progressing within planned budget	Minor budget reallocation needed	Reallocation between budget lines exceeding 30% of original budget							Country:								
										PCU								
Financial management	Funds are correctly managed	Financial reporting slow or deficient	Serious financial reporting							Country:								

Risk Factor	Indicator of Low Risk	Indicator of Medium Risk	Indicator of High Risk	Country Rating						Notes	Project Director Rating (compiled all)					
				Low	Medium	Substantial	High	Not Applicable	To be determined		Low	Medium	Substantial	High	Not Applicable	To be determined
<b>INTERNAL RISK</b>																
<b>Project management</b>																
	and transparently accounted for		problems or indication of mismanagement of funds							PCU						
Reporting	Substantive reports are presented in a timely manner and are complete and accurate with a good analysis of project progress and implementation issues	Reports are complete and accurate but often delayed or lack critical analysis of progress and implementation issues	Serious concerns about quality and timeliness of project reporting							Country:						
										PCU						
Stakeholder involvement	Stakeholder analysis done and positive feedback from critical stakeholders and partners	Consultation and participation process seems strong but misses some groups or relevant partners	Symptoms of conflict with critical stakeholders or evidence of apathy and lack of interest from partners or other stakeholders							Country:						
										PCU						

Risk Factor	Indicator of Low Risk	Indicator of Medium Risk	Indicator of High Risk	Country Rating						Notes	Project Director Rating (compiled all)							
				Low	Medium	Substantial	High	Not Applicable	To be determined		Low	Medium	Substantial	High	Not Applicable	To be determined		
<b>INTERNAL RISK</b>																		
<b>Project management</b>																		
External communications	Evidence that stakeholders, practitioners and/or the general public understand project and are regularly updated on progress	Communications efforts are taking place but not yet evidence that message is successfully transmitted	Project existence is not known beyond implementation partners or misunderstandings concerning objectives and activities evident							Country:								
										PCU								
Short term/long term balance	Project is addressing short term needs and achieving results with a long term perspective, particularly sustainability and replicability	Project is interested in the short term with little understanding of or interest in the long term	Longer term issues are deliberately ignored or neglected							Country:								
										PCU								
Science and technological issues	Project based on sound science and well established technologies	Project testing approaches, methods or technologies but based on sound analysis of options and risks	Many scientific and /or technological uncertainties							Country:								
										PCU								
Political influences	Project decisions and choices are	Signs that some project decisions	Project is subject to a variety of political influences							Country:								

Risk Factor	Indicator of Low Risk	Indicator of Medium Risk	Indicator of High Risk	Country Rating						Notes	Project Director Rating (compiled all)					
				Low	Medium	Substantial	High	Not Applicable	To be determined		Low	Medium	Substantial	High	Not Applicable	To be determined
<b>INTERNAL RISK</b>																
<b>Project management</b>																
	not particularly politically driven	are politically motivated	that may jeopardize project objectives							PCU						
Other, please specify. Add rows as necessary										Country:						
										PCU						

Risk Factor	Indicator of Low Risk	Indicator of Medium Risk	Indicator of High Risk	Project Manager Rating						Notes	Task Manager Rating					
				Low	Medium	Substantial	High	Not Applicable	To be determined		Low	Medium	Substantial	High	Not Applicable	To be determined
<b>EXTERNAL RISK</b>																
<b>Project context</b>																
Political stability	Political context is stable and safe	Political context is unstable but predictable and not a threat to project implementation	Very disruptive and volatile							Country:						
										PCU						

Risk Factor	Indicator of Low Risk	Indicator of Medium Risk	Indicator of High Risk	Project Manager Rating						Notes	Task Manager Rating							
				Low	Medium	Substantial	High	Not Applicable	To be determined		Low	Medium	Substantial	High	Not Applicable	To be determined		
<b>EXTERNAL RISK</b>																		
<b>Project context</b>																		
Environmental conditions	Project area is not affected by severe weather events or major environmental stress factors	Project area is subject to more or less predictable disasters or changes	Project area has very harsh environmental conditions							Country:								
										PCU								
Social, cultural and economic factors	There are no evident social, cultural and/or economic issues that may affect project performance and results	Social or economic issues or changes pose challenges to project implementation but mitigation strategies have been developed	Project is highly sensitive to economic fluctuations, to social issues or cultural barriers							Country:								
										PCU								
Capacity issues	Sound technical and managerial capacity of institutions and other project partners	Weaknesses exist but have been identified and actions is taken to build the necessary capacity	Capacity is very low at all levels and partners require constant support and technical assistance							Country:								
										PCU								
Others, please specify																		



## ANNEX 7a

# THE PROGRESS WORK OF THE PROJECT ACTIVITIES AT THE NATIONAL LEVEL DURING JUNE 2018 – MAY 2019: CAMBODIA



## National Progress Report in Cambodia

ESTABLISHMENT AND OPERATION OF A REGIONAL SYSTEM OF FISHERIES REFUGIA IN THE SOUTH CHINA SEA  
AND GULF OF THAILAND

**LENG SY VANN**

**Deputy Director of Department of Fisheries Conservation,  
Fisheries Administration of Cambodia and  
National Scientific and Technical Focal Point**

**Supported by Fisheries *Refugia* SEAFDEC/UNEP/GEF**

**21-23 May 2019**

**Thansur Sokha Hotel, Kampot Province, Cambodia**



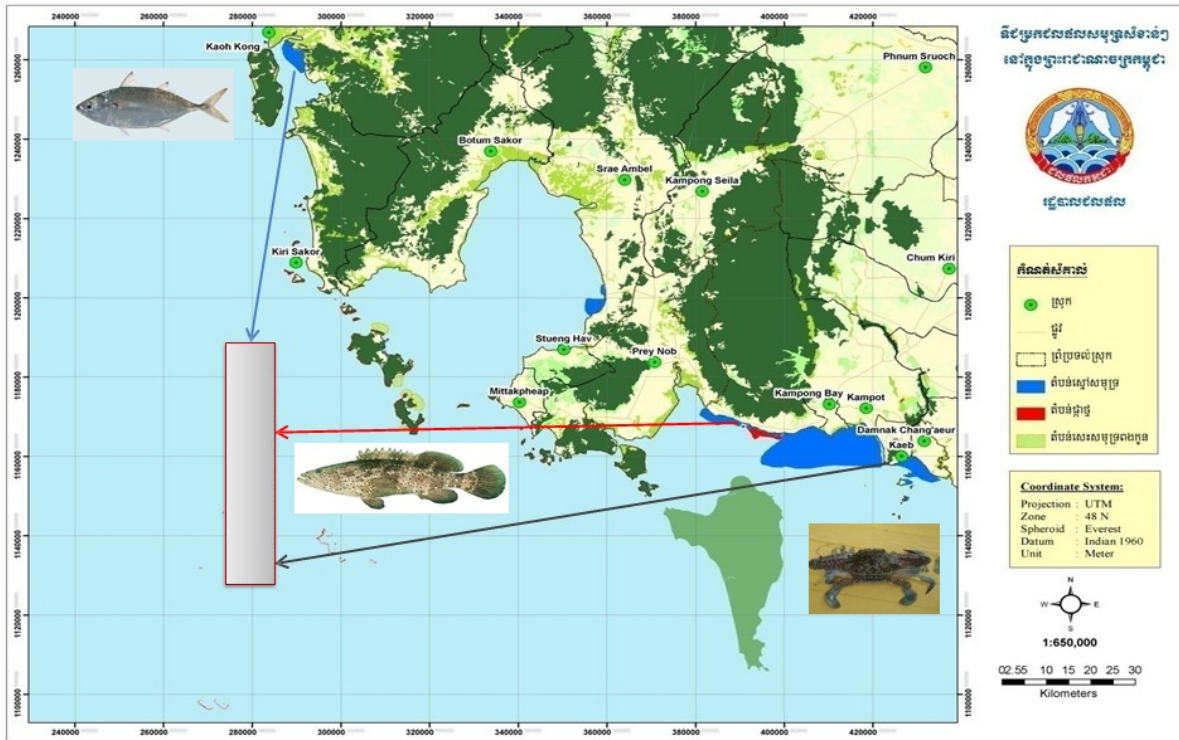
## Content of Presentation

1. General Aspect of Fisheries Refugia Project
2. Management and Coordination Structure
3. Project Progressing Report from September 2018 to May 2019
4. Implementation of Activities in Fisheries *Refugia* Sites
5. Baseline Survey of Short mackerel (*Rastrelliger brachysoma*) in Koh kong
6. Project Benefit into National Fisheries Framework and Policy
7. Next costed work plan for Q3 and Q4 in 2019

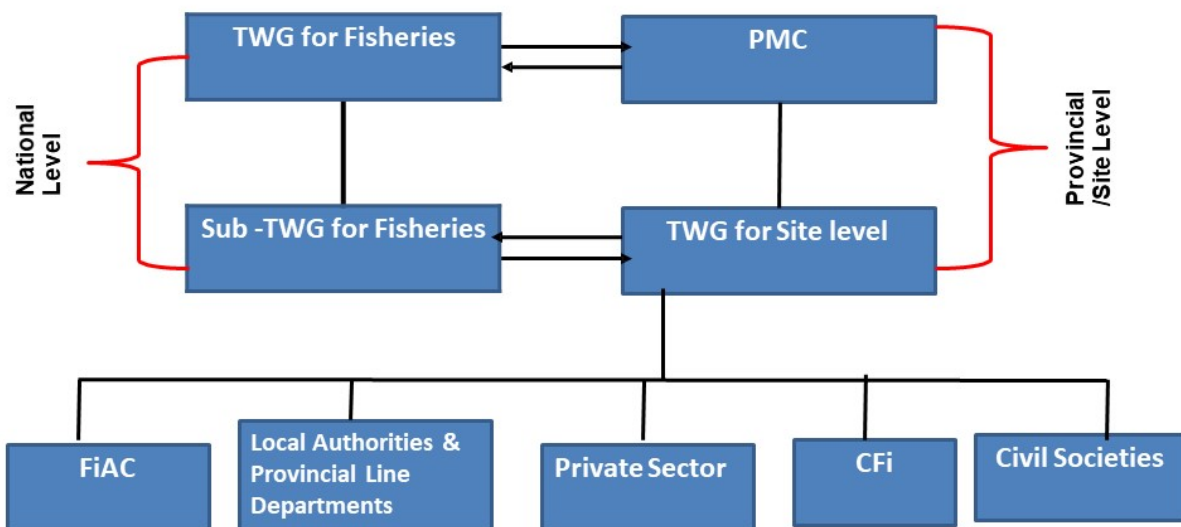




## 1. PROJECT SITES



## 2. MANAGEMENT AND COORDINATION STRUCTURE



### 3. PROJECT PROGRESSING REPORT FROM SEPTEMBER 2018 TO MAY 2019



Activities	Kep Province	Koh Kong Province	Kampot Province
Stakeholder consultation workshop	Done August 2017	Done September 2017	Done November 2018
Mapping and Demarcating Fisheries <i>Refugia</i> Boundaries	Done April 2018	Done March 2018	Draft Expect to approve for Q3
Site Base Management Board Establishment	Done Sept 2018	Draft Expect to approve for Q3	Draft Expect to approve for Q3
Fisheries <i>Refugia</i> Proclamation Promulgated by MAFF's Minister	Done April 2018	Draft approved by provincial authority	Draft approved by provincial authority
Management Plan Preparation for Fisheries <i>Refugia</i> Sites	Draft Expect to approve for Q2	Not yet Expect to start for Q3	Not yet Expect to start for Q3
Key Species in Fisheries <i>Refugia</i> Sites	Blue Swimming Crab	Short mackerel	Juvenile Grouper

### STAKEHOLDER CONSULTATION WORKSHOP IN KAMPOT



Stakeholder consultation workshop with community fisheries and fishers in Kampot



Stakeholder consultation workshop with community fisheries and fishers in Kampot



Stakeholder consultation workshop with provincial line departments in Kampot



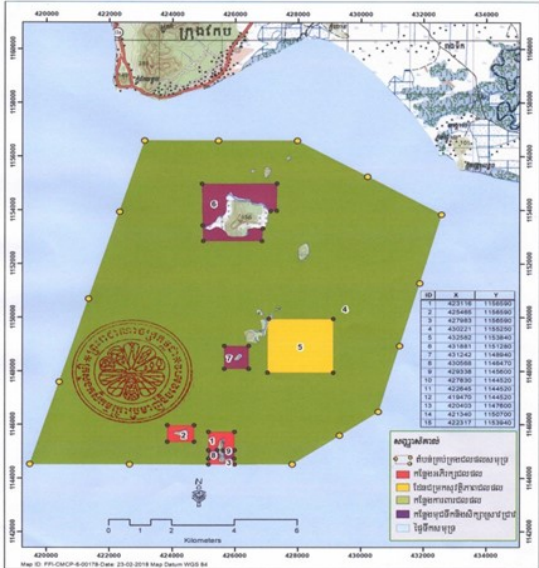
Stakeholder consultation workshop with provincial line departments in Kampot



**MAPPING AND DEMARCATING BOUNDARIES OF FISHERIES REFUGIA SITES**

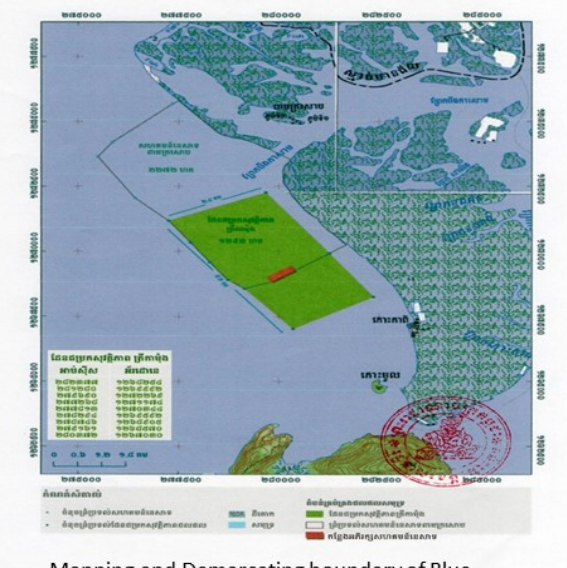


ឧបសម្ព័ន្ធ វិទ្យាសាស្ត្រ ចុងក្រោយ ថ្ងៃទី ១២ ខែ វិច្ឆិកា ឆ្នាំ ២០១៨ ស្តីពីការបង្កើតតំបន់ម្រប់ជនសមុទ្រ តំបន់ម្រប់ជនសមុទ្រ ខេត្តកោះកុង



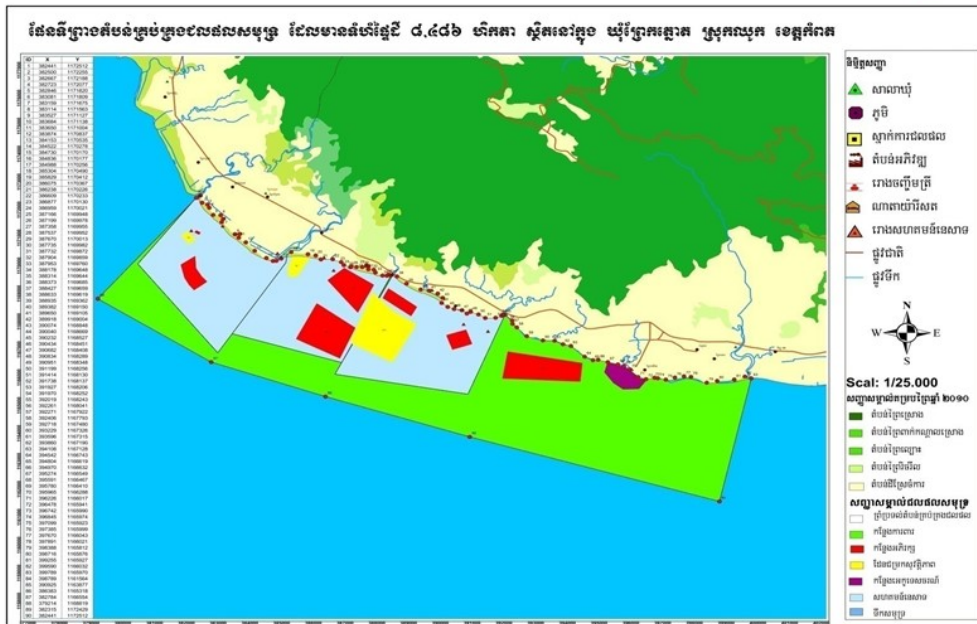
Mapping and Demarcating boundary of Blue swimming crab Fisheries Refugia approved by MAFF's Minister

ឧបសម្ព័ន្ធ វិទ្យាសាស្ត្រ ចុងក្រោយ ថ្ងៃទី ១២ ខែ វិច្ឆិកា ឆ្នាំ ២០១៨ ស្តីពីការបង្កើតតំបន់ម្រប់ជនសមុទ្រ តំបន់ម្រប់ជនសមុទ្រ ខេត្តកោះកុង



Mapping and Demarcating boundary of Blue swimming crab Fisheries Refugia approved by Koh Kong Provincial Hall Administration

**Mapping and Demarcating draft boundary of fisheries refugia site in Kampot province**



In principal, it has been approved by CFis, local authorities, DoA, and FiAC, but still discuss with provincial governor. It expect to be approved on next quarter



**MEETING WITH PROVINCIAL LINE DEPARTMENTS ON DRAFT PROCLAMATION ON ESTABLISHMENT AND MANAGEMENT OF FISHERIES REFUGIA AT PROVINCIAL LEVEL**



Meeting with provincial line departments chaired by Deputy Governor of Kampot



Meeting with provincial line departments chaired by Deputy Governor of Kampot



Meeting with provincial line departments chaired by Koh Kong Governor



Meeting with provincial line departments chaired by Deputy Governor of Koh Kong

**MEETING WITH TWG ON MANAGEMENT PLAN PREPARATION FOR BLUE SWIMMING CRAB FISHERIES REFUGIA IN KEP**



Technical Working Group Meeting chaired by Deputy Governor of Kep on Management Plan Preparation for Blue swimming crab Fisheries Refugia in Kep



Technical Working Group Meeting chaired by Deputy Governor of Kep on Management Plan Preparation for Blue swimming crab Fisheries Refugia in Kep





## IMPLEMENTATION OF ACTIVITIES IN FISHERIES REFUGIA SITES



### 1. BLUE SWIMMING CRAB FISHERIES REFUGIA IN KOH PO, KEP

*FiA has collaborated with FiAC in Kep to conduct public awareness on the role and function of blue swimming crab fisheries refugia in Koh Po in March 2019 to wider local authorities, CFIs, and fishermen and demarcate the boundary of that area to ensure effective patrol management, funded by Fisheries Refugia Project SEAFDEC/UNEP/GEF. There are total 150 participants in three events*



*FiA has collaborated MCC to build and deploy concrete block into marine fisheries management area in aim of (1) protecting coral reef, sea grass, and spawning ground from illegal fishing, and (2) serving as artificial habitat for some key species.*

*1600 concrete block (80 artificial boxes) have been deployed into marine fisheries management area and will plan to deploy furthermore next quarter*







*Officers of FiAC in Kep as patrolling group operated to crack down illegal fishing in marine fisheries management area of fisheries refugia site of blue swimming crab.*



## 2. MACKEREL FISHERIES REFUGIA IN PEAM KRASOB, KOH KONG



*FiA has collaborated with FiAC in Koh Kong to conduct public awareness on the role and function of mackerel FR on March 2019 in Peam Krasob, Koh Srolao, and Koh Kapi, funded by FR Project SEAFDEC/UNEP/GEF. There are total 155 participants in three events.*



Dissemination activities of the importance of mackerel FR in Koh Ka Pi



Dissemination activities of the importance of mackerel FR in Koh Sro Lao



Dissemination activities of the importance of mackerel FR in Peam Krasob





## BASELINE SURVEY OF SHORT MACKEREL (*Rastrelliger brachysoma*) IN KOH KONG

### 1. PURPOSE

To provide scientific data to support the establishment and management of mackerel fisheries *refugia* in Koh Kong province

### 2. METHODOLOGY

There are several methods to be conducted such as

- Collecting fish sampling from local market, landing site, and fishing ground
- Operating fish to check its gonad development
- Collecting its DNA
- Harvesting sampling of fish larvae using bongo net with the size of less 500micron



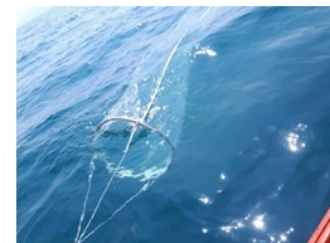
Collecting fish sample at local market in Koh Kong



Collecting DNA



Collecting sample of fish larvae



Operating fish to check its gonad







### 3. RESULTS

**Table1: Monthly distribution of short mackerel by sex**

No.	Month/year	Sex				Total
		Female	%	Male	%	
1	Dec-18	17	40.48	25	59.52	42
2	Jan-19	18	22.22	63	77.78	81
3	Feb-19	62	73.81	22	26.19	84
4	Mar-19	28	32.18	59	67.82	87
5	Apr-19	75	87.21	11	12.79	86
6	May-19	40	63.49	23	36.51	63
		<b>240</b>	<b>54.18</b>	<b>203</b>	<b>45.82</b>	<b>443</b>

*In this research, 443 fish sampling were collected from local market, fishing ground, and landing site, including 240 females (54.18%) and 203 males (45.82%) according to table 1.*



**Table 2: Monthly distribution of short mackerel total length and body weight by sex**

No.	Month/year	Female		Male	
		TL (cm)	BW (g)	TL (cm)	BW (g)
1	Dec-18			14.69	51.77
2	Jan-19	15.22	58.89	14.68	52.12
3	Feb-19	17.70	67.94	17.13	58.9
4	Mar-19	17.03	58.70	16.65	53.52
5	Apr-19	16.25	52.24	16.15	50.17
6	May-19	17.61	58.10	16.65	50.42

*Table 2 showed that Female' mature is total length from 15.22 cm to 17.70 cm and its body weight from 52.24g to 67.94g meanwhile male's mature is total length from 14.68 to 17.13 and body weight from 50.17g to 58.9g*





Table3: Monthly distribution of short mackerel's body weight, ovary weight, and gonad somatic index

Month/year	Average T W of Body (g)	Average TW of Ovary (g)	Average GSI of Ovary
Dec-18	58.89	1.45	2.46
Jan-19	57.75	1.02	1.77
Feb-19	67.94	1.63	2.40
Mar-19	58.70	1.15	1.96
Apr-19	52.24	0.64	1.23
May-19	58.10	2.97	5.11

GSI value of short mackerel ovary varies up on total weight of body and ovary weight. Table 1 showed average GSI value increased 2.46, indicating that fish spawning in December and then GIS value start declining 1.77, indicating fish start releasing egg into sea water in January. Then GSI value increase 2.40, fish start spawning in February and GSI value decrease from 1.96 to 1.23, fish start releasing egg into sea water in March to April. GSI value increase 5.11, fish start spawning again in May



Figure 1: Monthly distribution of short mackerel's Gonad Somatic Index

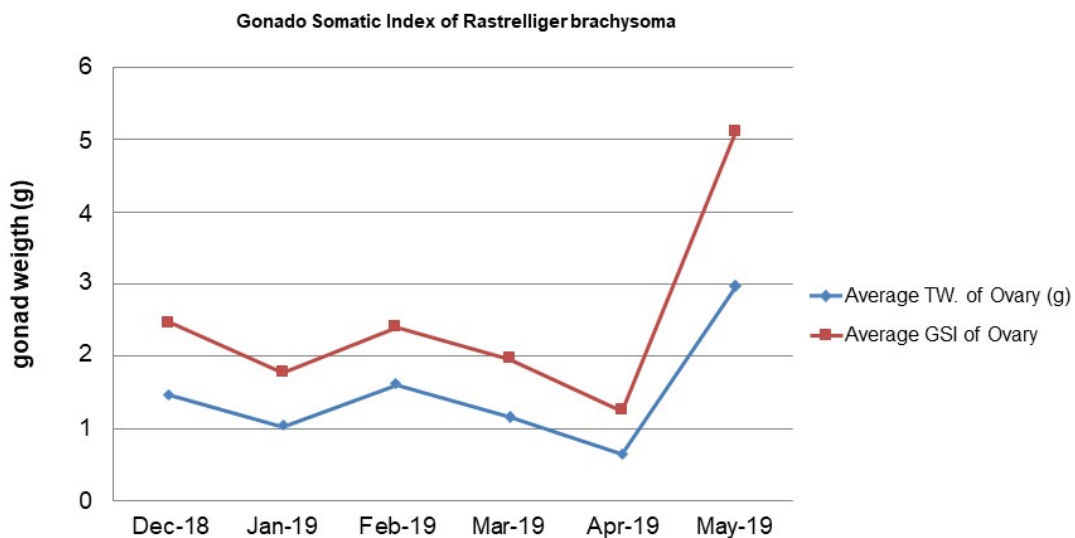


Figure 1 showed average GSI value increased 2.46, indicating that fish spawning in December and then GIS value start declining 1.77, indicating fish start releasing egg into sea water in January. Then GSI value increase 2.40, fish start spawning in February and GSI value decrease from 1.96 to 1.23, fish start releasing egg into sea water in March to April. GSI value increase 5.11, fish start spawning again in May

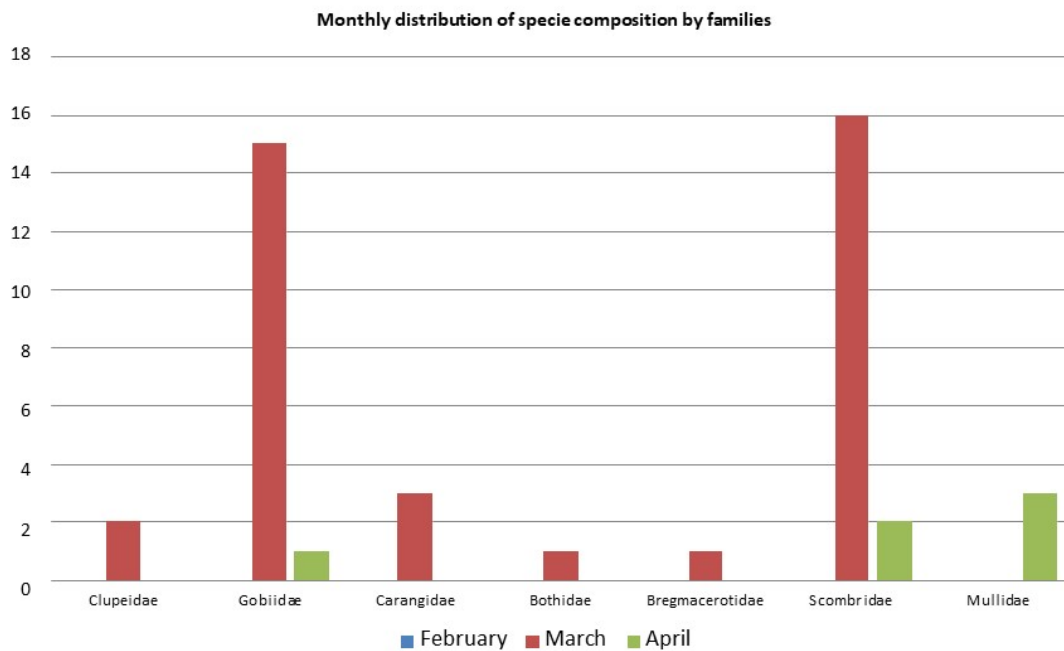


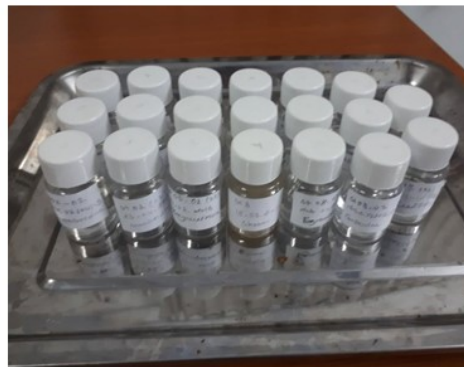
**Table 4: Monthly identification of specie composition by families and by station**

Families	Station1	Station2	Station3	Station4	Station5	Station6	Station7	Station8	Total
<b>February</b>									
Small shrimp									
Sea weed									
worm									
<b>March</b>									
Clupeidae	1			1					2
Gobiidae					13			2	15
Carangidae					3				3
Bothidae					1				1
Bregmacerotidae					1				1
Scombridae		1	14				1		16
<b>sub-Total</b>	<b>1</b>	<b>1</b>	<b>14</b>	<b>1</b>	<b>18</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>38</b>
<b>April</b>									
Scombridae	2								2
Mullidae							3		3
Gobiidae	1								1
<b>Sub-Total</b>	<b>3</b>						<b>3</b>		<b>6</b>
<b>Grand Total</b>	<b>4</b>	<b>1</b>	<b>14</b>	<b>1</b>	<b>18</b>	<b>0</b>	<b>4</b>	<b>2</b>	<b>44</b>



**Figure 2: Monthly distribution of specie composition by families**





## PROJECT BENEFIT INTO NATIONAL FISHERIES FRAMEWORK AND POLICY



Fisheries *refugia* concept will be integrated into national fisheries framework and policy such as

✓ Fisheries Law

At least 5 articles (Chapter on protection and conservation of fisheries , and Penalties) related to fisheries *refugia* establishment and management including zoning type, certain period of closed season for particular species as well as sanction to the fishing offender

✓ National action plan on combating IUU,

✓ 10 year strategy plan for fisheries conservation, and

✓ 5 year management plan for fisheries conservation,





**NEXT COSTED WORKPLAN FOR Q3 & Q4 IN 2019**

Project Components/Activities		Estimated Costed-Workplan for Q3 and Q4/2019		
<b>Component 1</b>	<b>Identification and management of fisheries and critical habitat linkages at priority fisheries refugia in the South China Sea</b>	Q3	Q4	Total
Activity 1.2	Facilitating agreement among stakeholders on the boundaries of fisheries refugia at 14 priority fisheries refugia sites	3,000.00		3,000.00
Activity 1.3	Developing Community-Based Management Plans for 14 priority fisheries refugia sites	5,000.00	5,000.00	10,000.00
Activity 1.4	Establishing operational management for 14 priority fisheries refugia sites	10,000.00	10,000.00	20,000.00
Activity 1.5	Strengthening civil society and community organization participation in the management of 14 fisheries refugia sites	500.00	500.00	1,000.00
	<b>sub-total</b>	<b>18,500.00</b>	<b>15,500.00</b>	<b>34,000.00</b>
<b>Component 2</b>	<b>Improving the management of critical habitats for fish stocks of transboundary significance via national and regional actions to strengthen the enabling environment and knowledge-base for fisheries refugia management in the South China Sea</b>	Q3	Q4	Total
Activity 2.3	Development of national guidelines on the establishment and operation of fisheries refugia and reflected in an updated regional refugia action plan	3,000.00	5,000.00	8,000.00
Activity 2.5	Enhancing access to information relating to status and trends in fish stocks and their habitats in waters of the SCS marine basin	4,000.00	8,000.00	12,000.00
Activity 2.6	Improved national and regional-level management and sharing of information and data on fish early life history in the waters of SCS	6,000.00	6,000.00	12,000.00
Activity 2.8	Strengthening the information base for the planning, monitoring and evaluation of management at priority fisheries refugia sites	1,500.00	1,500.00	3,000.00
	<b>sub-total</b>	<b>14,500.00</b>	<b>20,500.00</b>	
<b>Component 3</b>	<b>Information Management and Dissemination in support of national and regional-level implementation of the fisheries refugia concept</b>	Q3	Q4	Total
Activity 3.2	Improving community acceptance of area based approaches to marine management in the 6 participating countries		2,000.00	2,000.00
	<b>sub-total</b>	<b>-</b>	<b>2,000.00</b>	<b>2,000.00</b>
<b>Component 4</b>	<b>National and regional cooperation and coordination for integrated fish stock and critical habitat management in the South China Sea</b>	Q3	Q4	Total
Activity 4.3	Catalyzing local community action via establishment and operation of site-based management boards at 14 priority refugia sites	2,000.00	2,000.00	4,000.00
	<b>sub-total</b>	<b>2,000.00</b>	<b>2,000.00</b>	<b>4,000.00</b>
	<b>SUB TOTAL PROJECT COST (\$)</b>	<b>2,000.00</b>	<b>2,000.00</b>	<b>4,000.00</b>
	<b>TOTAL PROJECT COST (2019) (\$)</b>	<b>35,000.00</b>	<b>40,000.00</b>	<b>75,000.00</b>



**Thank you very much for your attention**



## ANNEX 7b

# THE PROGRESS WORK OF THE PROJECT ACTIVITIES AT THE NATIONAL LEVEL DURING JUNE 2018 –MAY 2019: MALAYSIA



SEAFDEC/UN  
ENVIRONMENT/GEF  
Fisheries Refugia Project

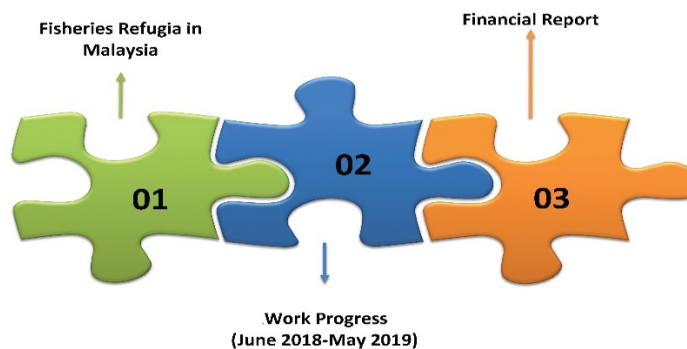


## Progress Work of the Project Activities in Malaysia (June 2018-May 2019)

By  
Department of Fisheries  
Malaysia

The 2<sup>nd</sup> Regional Scientific and Technical Committee Meeting for the SEAFDEC/UN Environment/GEF Project on Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand, 21-23 May 2019,

## Contents



## 1. Fisheries Refugia in Malaysia

- i. Lobster Refugia at Tanjung Leman, Johor
- ii. Tiger Prawn Refugia at Kuala Baram, Sarawak



showeet

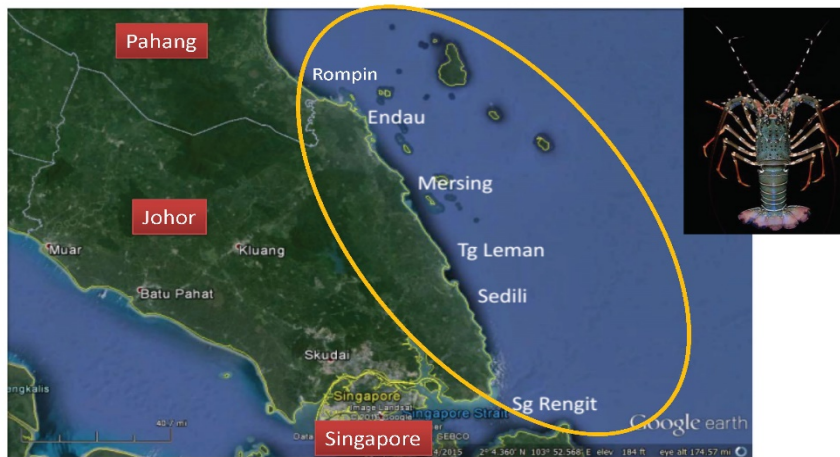
## Refugia Sites in Malaysia



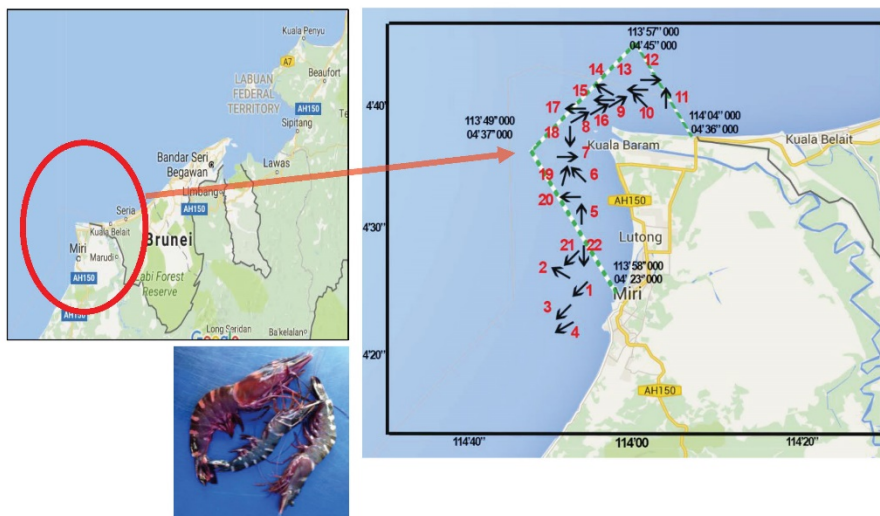
Site 1: Tanjung Leman, Johor – Lobster (*Panulirus* spp.)

Site 2: Kuala Baram, Sarawak – Tiger Prawn (*P. monodon*)

## Spiny Lobster Fishery Area at South Pahang-East Johor

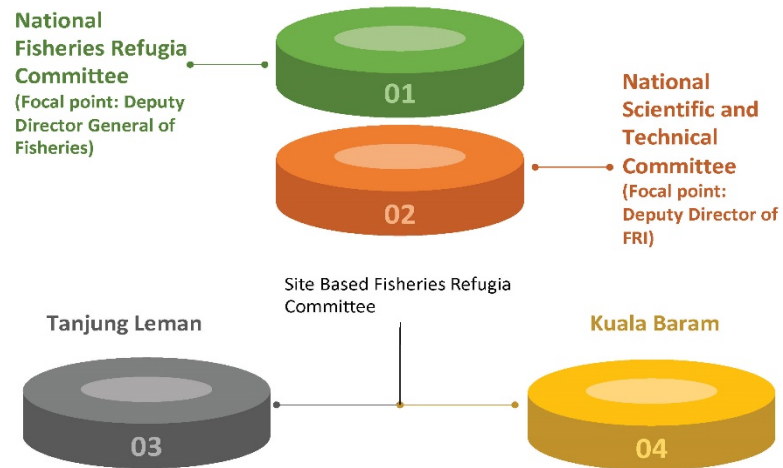


## Proposed Tiger Prawn Refugia Site at Kuala Baram, Sarawak





### National Coordination Mechanism



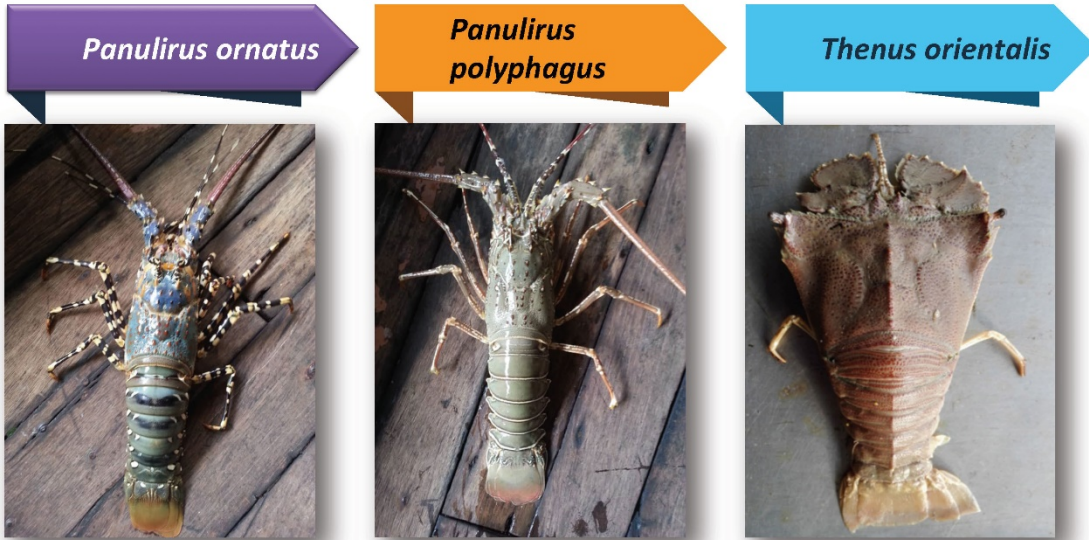
## 2. Work Progress 2018-2019



## Lobster Refugia South Pahang – East Johor



# Lobster Species



# Lobster Refugia Related Activities

Lobster Resource  
Survey and  
Documentary  
Filming – Oct 2018

Socio-economic  
survey



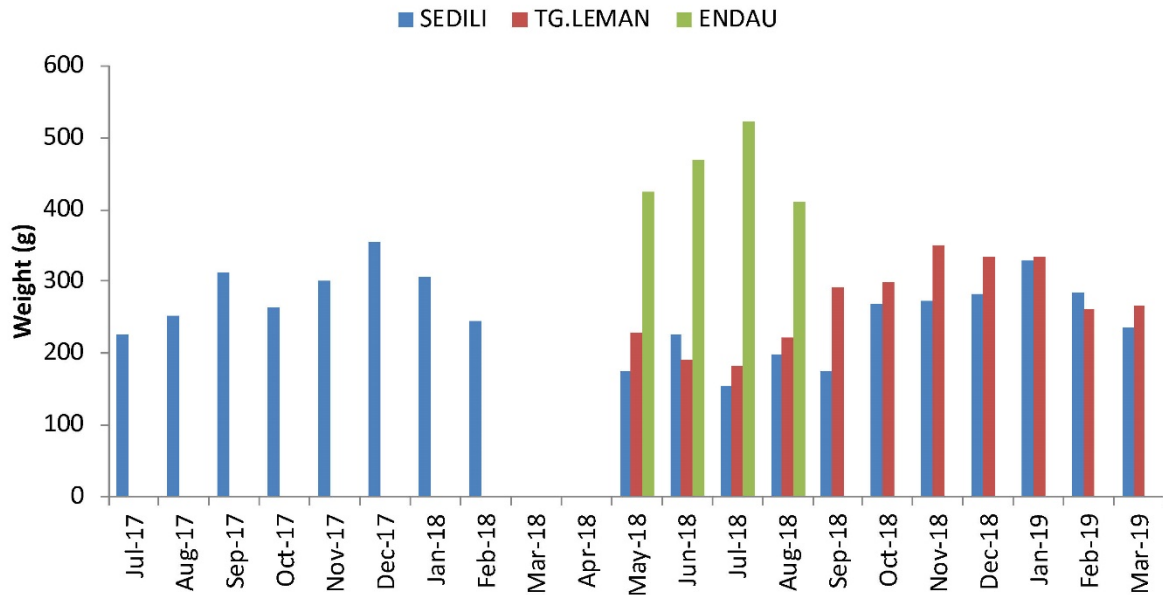
01  
Collection of  
lobster landing  
data from several  
sites (Sedili,  
Tanjung Leman,  
Endau)

02  
03  
Lobster Phyllosoma  
Study (2017 &  
2018)

04  
05  
Stakeholder  
consultation

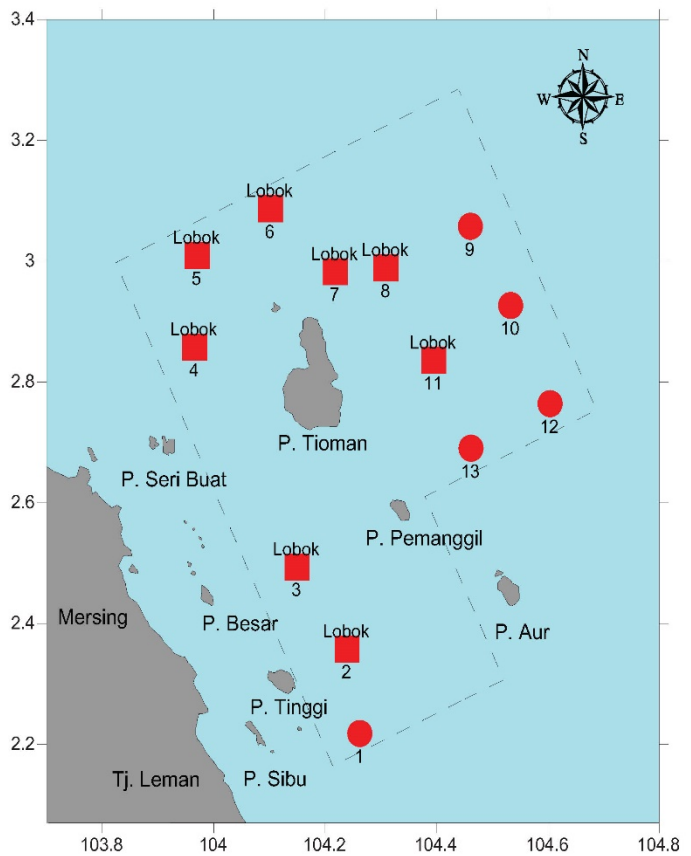
## Lobster Landing Trend: Johor Area

**Average Weight of Spiny Lobster (*P. polyphagus*) at Sedili, Tj. Leman & Endau**

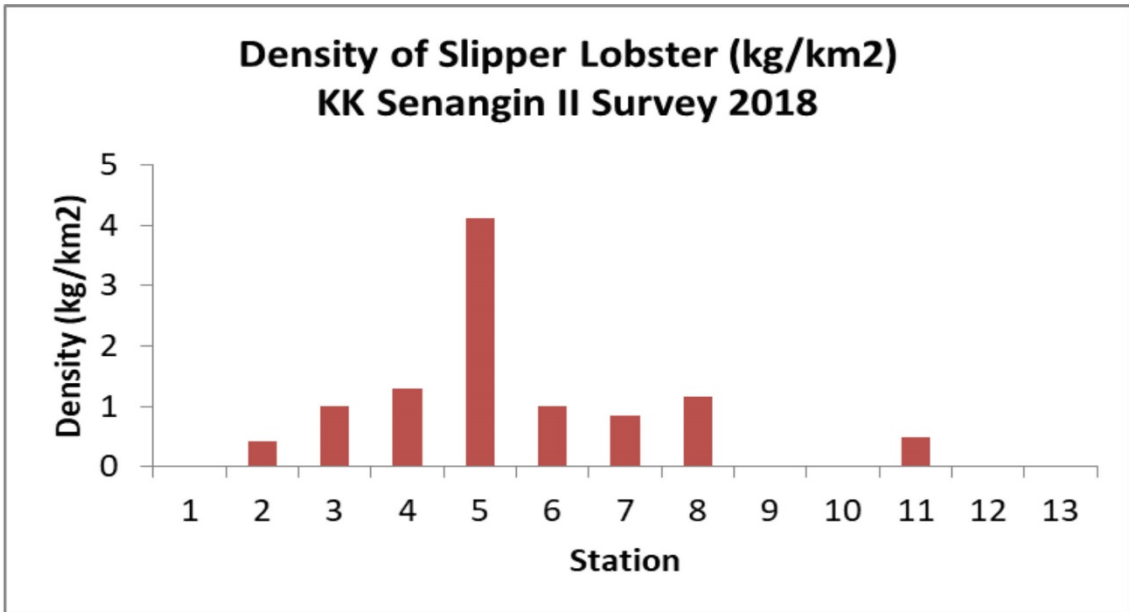


### Lobster Resource Survey, 24-28 Oct 2018

- Location of survey stations
- Only slipper lobsters were caught during the survey (red square)
- Study area (dotted line) estimated to be about 6294 km square

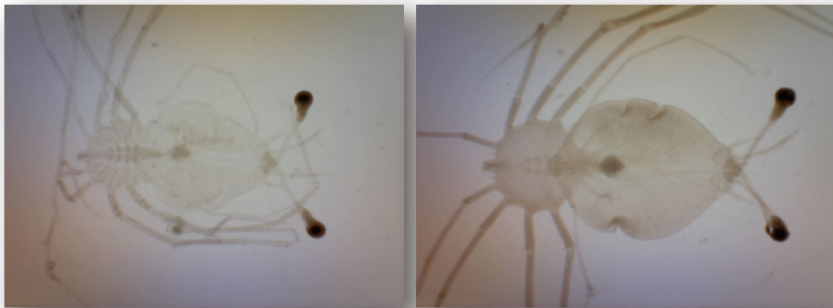


## Average Density of Slipper Lobster

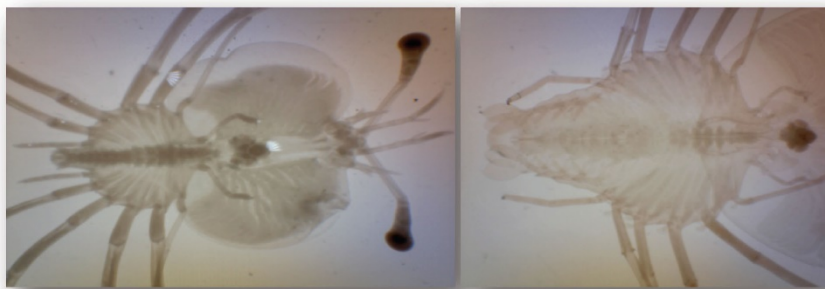


- 8 locations
- Average density  $1.29 \pm 0.42$  kg.km<sup>-2</sup>

## Distribution and Density of Phyllosoma in East Johor Waters

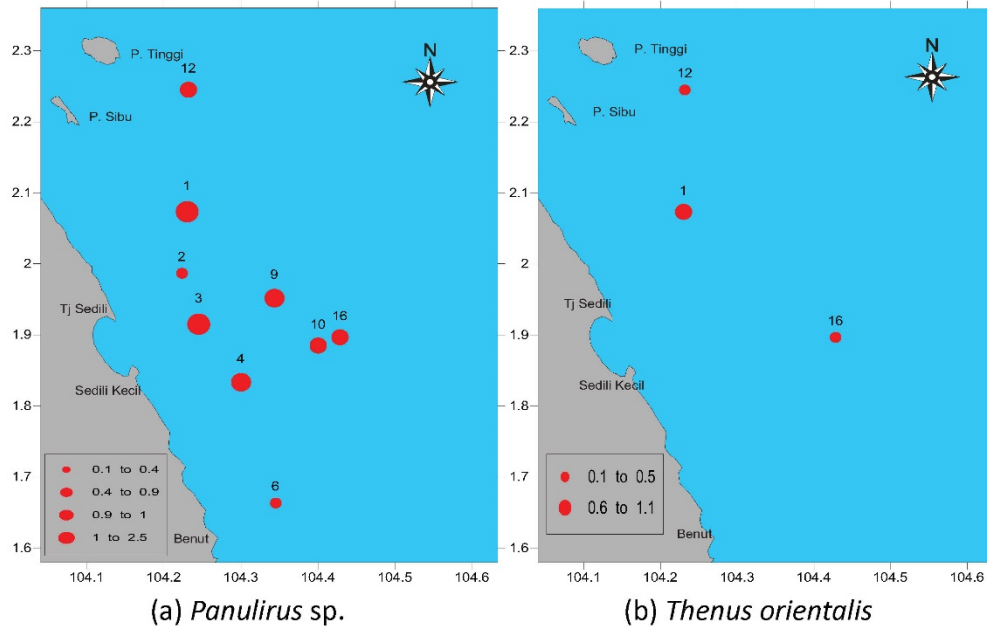


*Phyllosoma Panulirus* spp.



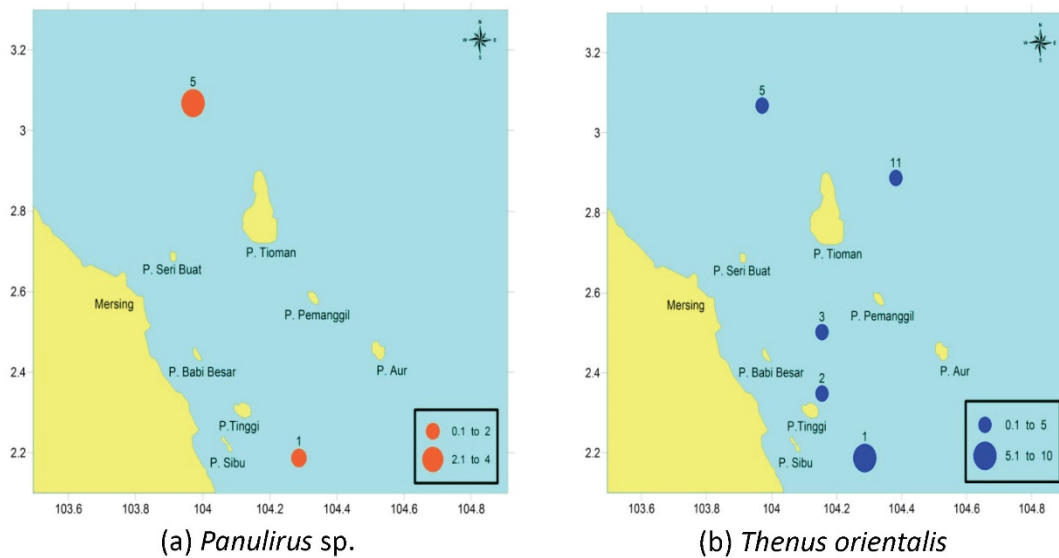
*Phyllosoma Thenus orientalis*

### Phyllosoma density from year 2017 survey (Tanjung Leman waters)



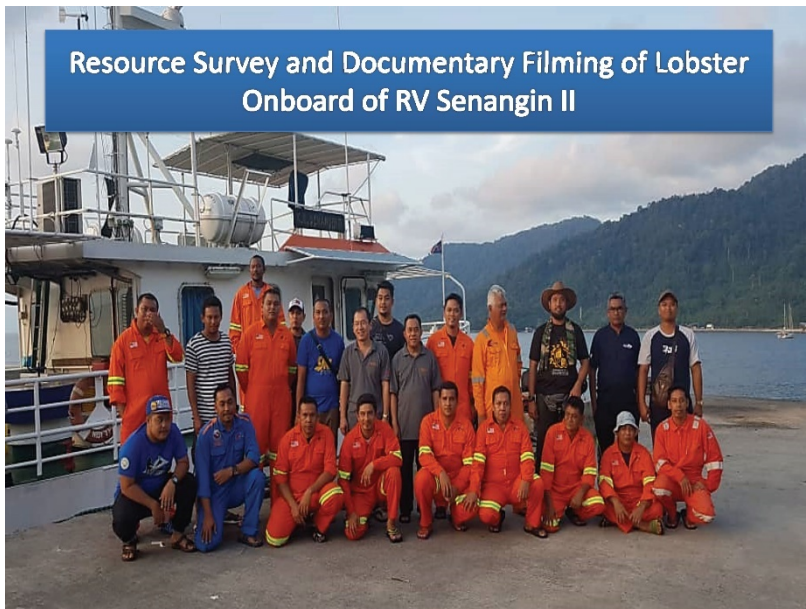
Density (ind./1000m<sup>3</sup>) of (a) *Panulirus* spp. dan (b) *Thenus orientalis* phyllosoma in 2017 survey.

### Phyllosoma density from year 2018 survey (Tioman archipelago)



Density (ind./1000m<sup>3</sup>) of (a) *Panulirus* spp. dan (b) *Thenus orientalis* phyllosoma in 2018 survey.





Laboratory work at Sedili Laboratory





## Publications 2018-2019

01

Ryon Siow, Abd Haris Hilmi A.A. and Nur Hidayah A. (2019). Lobster Resource Study in East Johor. Oral. Simposium Penyelidikan Perikanan Tangkapan Marin, Penang. 2-3 Oct 2018. (*in press*)



02

Noor Hanis, A.H. and Ryon Siow. (2019). Lobster Resources and Fisheries in Sedili, Johor. Oral. Seminar Penyelidikan Perikanan, FRI Bt. Maung. 22-24 Jan 2019. (*in press*)



03

Norhanida Daud and Rozita Hani S. (2018). Kajian Kesan Pra-Projek Penubuhan Kawasan Refugia Udang Karang Terhadap Sosio-Ekonomi Nelayan Pahang Selatan – Johor Timur. Report. FRI Batu Maung.



04

Abd Haris Hilmi A.A., Nadiyatul Atikah H. and Nur Hidayah A. (2019). Taburan, Kepadatan dan Komposisi Spesies Larva Udang Karang (Filosoma) di Perairan Johor Timur. Report. FRI Kg. Acheh.



## Coordination Meeting, 6-7 December 2018, Putrajaya







**Preview: Documentary on Lobster Refugia, Tg Leman, 25<sup>th</sup> Dec 2018**



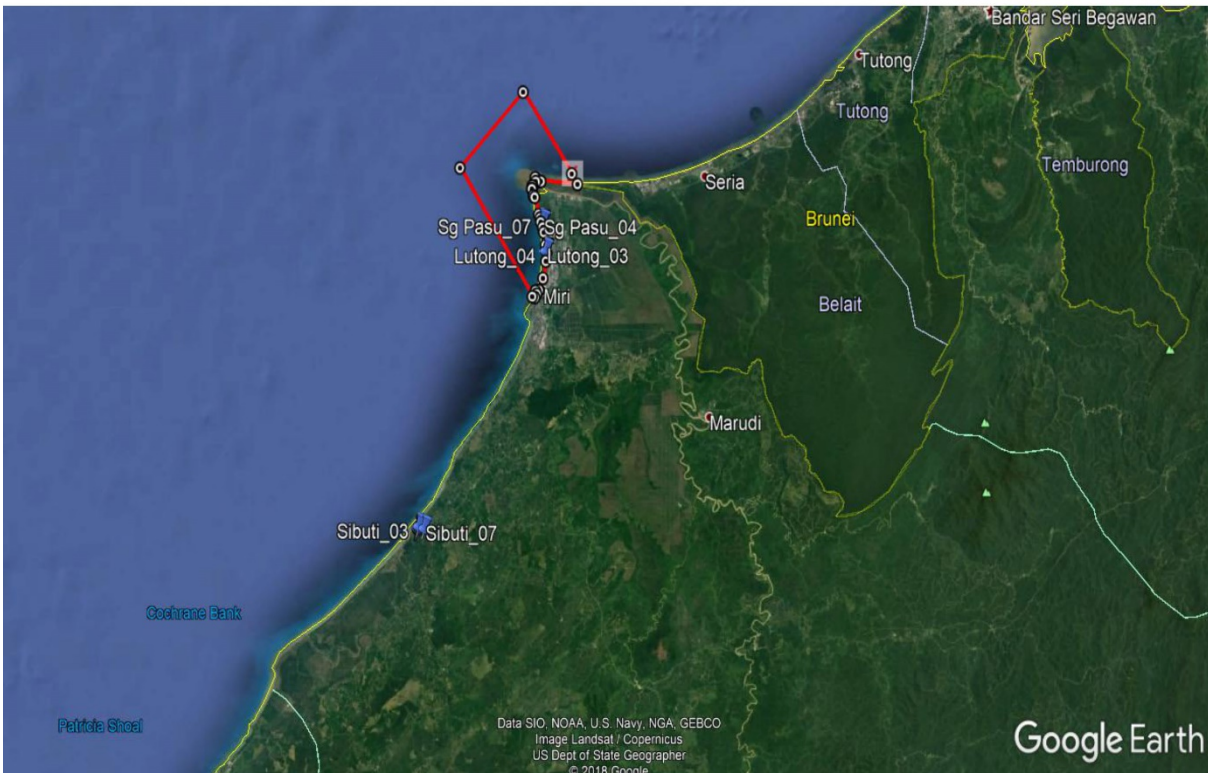




## Tiger Prawn Refugia Kuala Baram, Sarawak

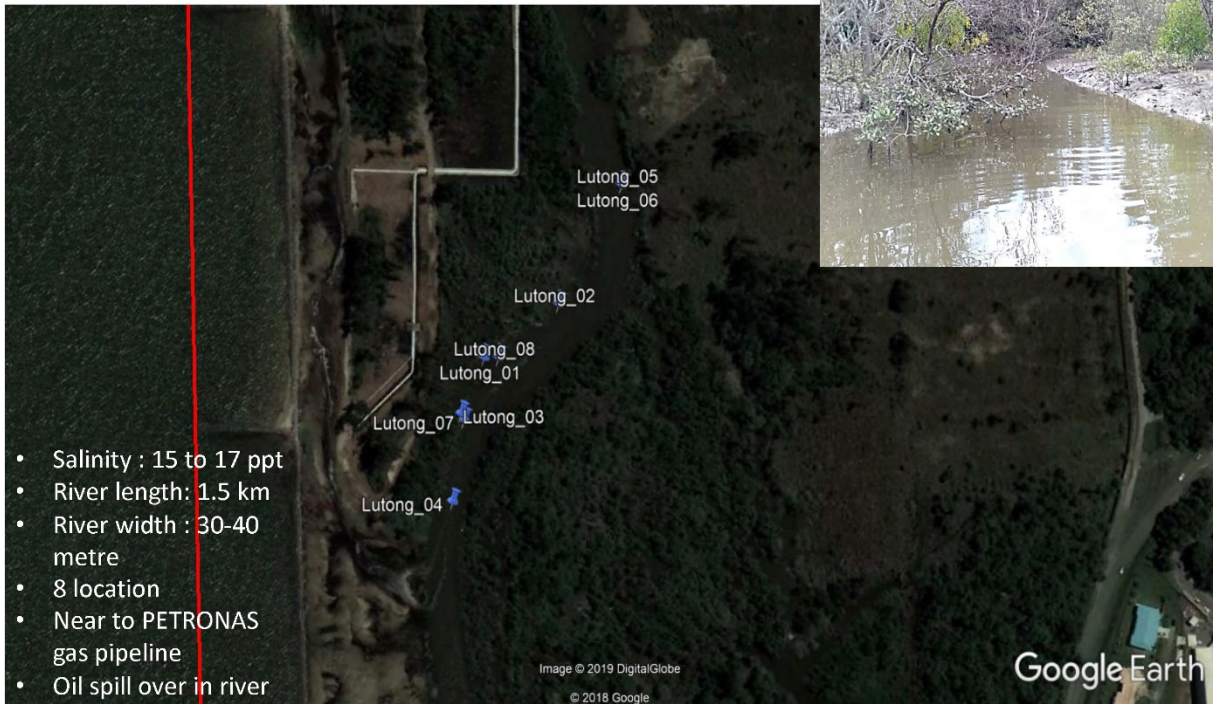
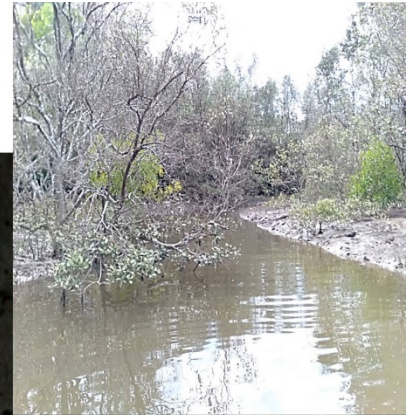


### Tiger Prawn Survey Locations (Juvenile)





# Study Site 1: Sungai Lutong



- Salinity : 15 to 17 ppt
- River length: 1.5 km
- River width : 30-40 metre
- 8 location
- Near to PETRONAS gas pipeline
- Oil spill over in river



Species composition



Cast net





Juvenile tiger prawn catch by cast net

## CPUE and Catch Composition

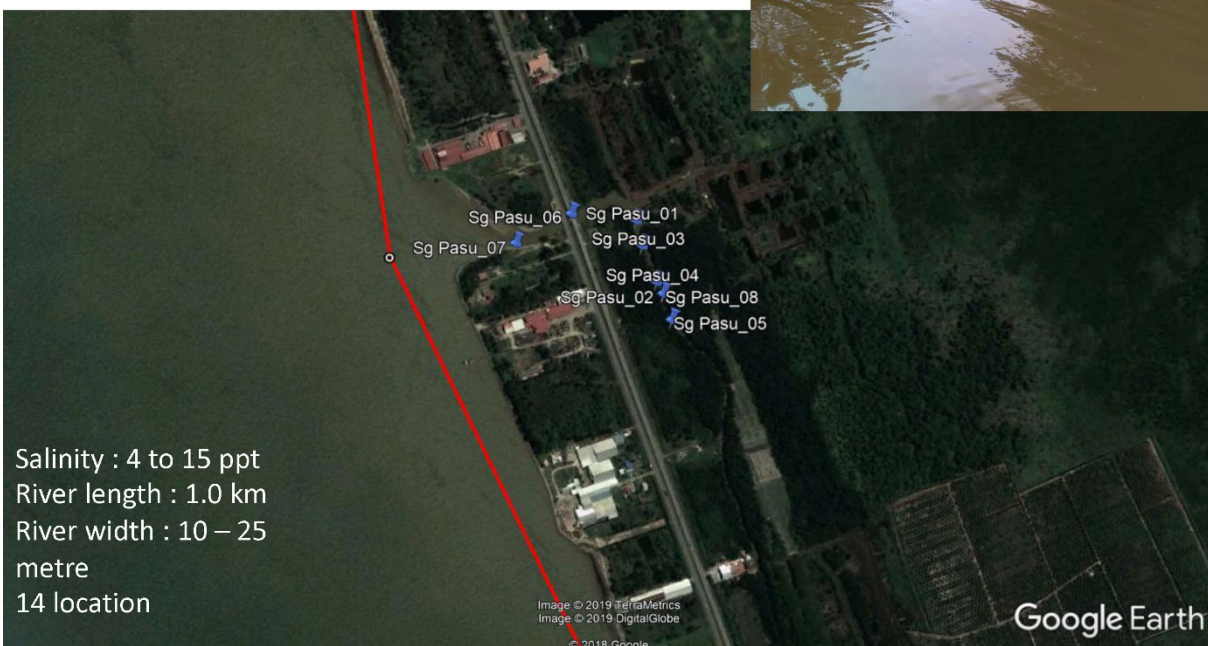
Casting no :40 times in 3 hours  
CPUE : 0.83 tail/cast OR 30 g/cast  
33 tail total weight : 1.2 kg

Species composition :

- i. *Fenneropenaeus merguensis*  
(Banana prawn)
- ii. *Moolgarda cunnesius*  
(Kedera/Belanak)
- iii. *Carangoides* sp.
- iv. *Pomadasys kaakan* (Gerut gerut)
- v. *Gerres erythrourus* (Kapas sungai)
- vi. *Megalops cyprinoides* (Bulan bulan)
- vii. *Eubleekeria splendens* (Kikek)
- viii. *Lutjanus argentimaculatus* (Ikan merah bakau),
- ix. *Thryssa setirostris*
- x. *Chelon subviridis* (Kedera/Belanak)

Cast net diameter : 10 metre

## Study Site 2: Sungai Pasu



Salinity : 4 to 15 ppt  
River length : 1.0 km  
River width : 10 – 25  
metre  
14 location

Image © 2019 TerraMetrics  
Image © 2019 DigitalGlobe  
© 2018 Google

Google Earth





## CPUE and Catch Composition

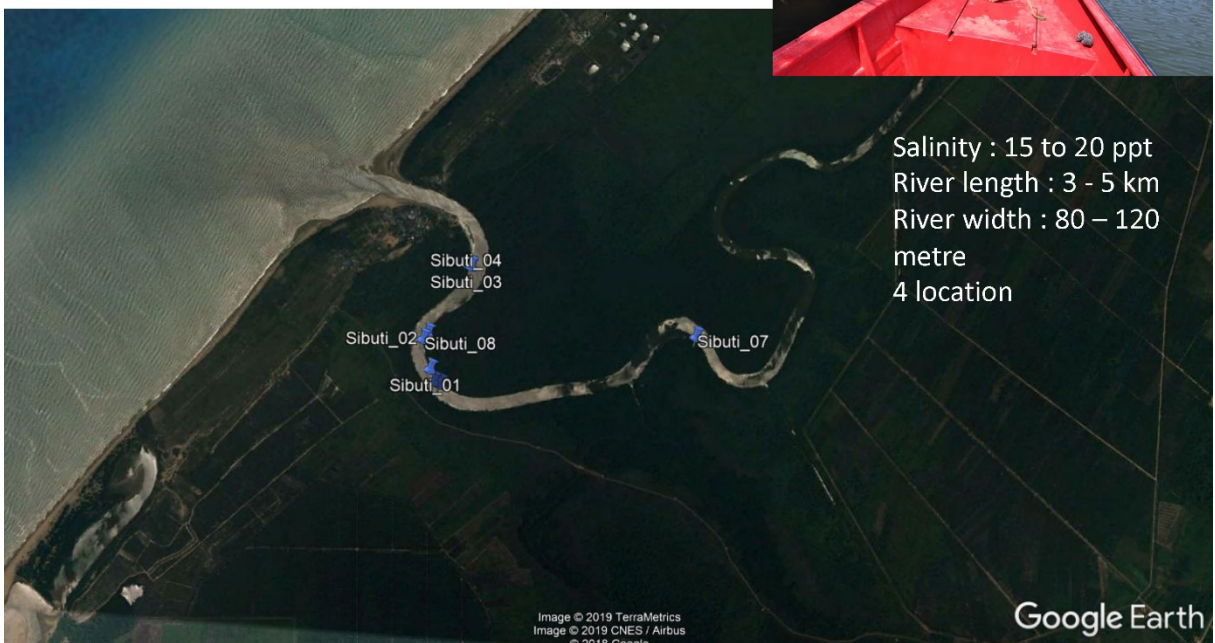
15 tail total weight 589.6 gram  
Casting no : 63 times in 3 hours  
CPUE : 0.24 tail/cast OR 9.36 g/cast

### Species composition:

- i. *Siganus* sp., (Kitang),
- ii. *Fenneropenaeus merguensis*
- iii. *F. indicus*
- iv. *Metapenaeus brevicornis* (Yellow prawn)
- v. *Coilia borneensis* (Gonjeng)
- vi. *Encrasicholina punctifer* (Bilis)
- vii. *Raonda russeliana* (Ikan nipis)
- viii. *Otolithes ruber* (Gelama jarang gigi),

Cast net diameter : 10 metre

## Study Site 2: Sungai Sibuti



Salinity : 15 to 20 ppt  
River length : 3 - 5 km  
River width : 80 - 120 metre  
4 location





## CPUE and Catch Composition

8 tails total weight 320.8 gram  
Casting No 30 times in 3 hours  
CPUE : 0.27 tail/cast OR 10.7 g/cast  
Sampling at night

Species composition:

- i. *Siganus* sp., (Kitang)
- ii. *Fenneropenaeus merguensis*
- iii. *F. indicus*
- iv. *Metapenaeus brevicornis* (Yellow prawn)
- v. *Coilia borneensis* (Gonjeng)
- vi. *Encrasicholina punctifer* (Bilis)
- vii. *Raconda russeliana* (Ikan nipis)
- viii. *Otolithes ruber* (Gelama jarang gigi),

Cast net diameter : 10-15 metre



Resource Survey and Documentary Filming of Tiger Prawn



Resource Survey and Documentary Filming of Tiger Prawn



Preview: Documentary on Tiger Prawn Catch in Kuala Baram, 4<sup>th</sup> Dec 2018





### 3. Financial Report Q1 - 2019



#### Budget Allocation

2017	2018	2019
<b>National Fund USD 34,998</b>	<b>National Fund USD 81,503</b>	<b>National Fund USD 105,475</b>
	<b>GEF USD 81,503</b>	<b>GEF (Q1) USD 15,132</b>



Note: Budget allocation from 11<sup>th</sup> Malaysia Plan (not include OE)

South China Sea Fisheries Refugia Initiative  
Project Statement of Allocation, Expenditure and Balance from January 2018 to 30 April 2019

TOTAL ALLOCATION USD 250,000.00  
1ST REMITTANCE USD 27,230.00 / RM 104,835.50  
2ND REMITTANCE USD 15,131.66 / RM 61,585.86

Code	Description	Budget Allocation (USD)	Actual Expense (USD)	Balance (USD)
<b>10</b>	<b>PROJECT PERSONNEL COMPONENT</b>			
1100	Project Personnel			
1101	Appointment of project manager	5,221	4,675	546
1199	Sub total	5,221	4,675	546
1200	Consultants	0	0	0
1201	Literature review and data collection	240	0	240
1202	Analysis of larvae sample from East Johor	1,703	1,309	394
1299	Sub total	1,943	1,309	634
1600	Travel on official bussiness	0	0	0
1601	Site based survey and reconnaissance for socio-economic study	2,849	946	1,903
1608	Daily collection of lobster & tiger prawns landing data Sedili Pengerang Mersing Rompin Kuala Baram	18,757	14,177	4,580
1699	Sub total	21,606	15,123	6,483
	COMPONENT TOTAL	28,770	21,107	7,664

<b>20</b>	<b>SUB-CONTRACT COMPONENT</b>			
	COMPONENT TOTAL	0	0	0
<b>30</b>	<b>TRAINING COMPONENT</b>			
3200	Group training			
3201	Workshop on past lobster survey data on lobster resources in johor waters & Tiger prawns survey in sarawak waters	3,293	1,277	2,016
3202	Consultation workshop with the traditional gears fishermen in Rompin	0	0	0
3203	National Fisheries Refugia Committee Meeting	2,459	2,727	-268
3204	1 meeting in Johor, Pahang and Sarawak	2,256	519	1,737
3299	Sub total	8,008	4,524	3,485
	COMPONENT TOTAL	8,008	4,524	3,485
<b>40</b>	<b>EQUIPMENT &amp; PREMISES COMPONENT</b>			
4300	Premises	0	0	0
4301	Establish 1 information center for refugia site	4,800	11,350	-6,550
4399	Sub total	4,800	11,350	-6,550
	COMPONENT TOTAL	4,800	11,350	-6,550
<b>50</b>	<b>MISCELLANEOUS COMPONENT</b>			
5200	Reporting costs			
	Printing costs	783	0	783
	COMPONENT TOTAL	783	0	783
<b>TOTAL</b>		<b>42,361</b>	<b>36,980</b>	<b>5,382</b>





*thank you*

## ANNEX 7c

### THE PROGRESS WORK OF THE PROJECT ACTIVITIES AT THE NATIONAL LEVEL DURING JUNE 2018 –MAY 2019: PHILIPPINES



**The 2<sup>nd</sup> Regional Scientific and Technical Committee Meeting for the UNEP-GEF-SEAFDEC “Establishment and Operation of a Regional System of Fisheries Refugia in the South China and Gulf of Thailand” Project**

by

**Valeriano M. Borja**  
21-23 May, 2019  
Thunsur SokhaHotel,  
Kampot Province, Cambodia

## Progress Work on National Level Activities June 2018 – May 2019

### ✓ **Technical Support Mission of Project Coordinating Unit Staff in the Philippines for the SEAFDEC/UNEP/GEF Project “Establishment and Operation of a Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand”**

Date: 20-21 June 2018

Venue: NFRDI Conference Room, NFRDI, Quezon City

12 participants

- Updates on the current situation of Fisheries Refugia (FR) project
- Joint program between Fisheries Refugia Project and South China Sea (SCS) Project and its benefit
- Support of SEAFDEC on the National Technical work of Fisheries Refugia project
- Progress and Financial Reporting of Philippines
- Work planning and budgeting for succeeding quarter







## Fisheries Refugia Stakeholders Consultation Workshop in 3 Projects Sites

The objective of the workshop is to:

- Initially identify major species to be consider in the establishment of Fisheries Refugia in 3 project sites;
- Identify threats to fisheries and identify possible management measures and;
- Finalize the composition and to be able to discuss and agree on the terms of Reference of Refugia Site Management Committee



### Fisheries Refugia Stakeholders Consultation – Bolinao Site

Date: 19-21 September 2018

Venue: Treasures of Bolinao,  
Bolinao, Pangasinan

Participants:

- Office of the Municipal Agriculturist
- Office of the Sangguniang Bayan
- Bureau of Fisheries and Aquatic Resources Regional Office I
- Provincial Fisheries Office
- Chairman/Representative form coastal Barangays
- Fisherfolk Representatives



### Fisheries Refugia Stakeholders Consultation – Bolinao Site





## Fisheries Refugia Stakeholders Consultation – Coron Site

Date: 20-22 November 2018

Venue: Wildfern Villa,  
Coron, Palawan

### Participants:

- Office of the Municipal Agriculturist
- MDRRMO
- Community Environment and Natural Resources Office (CENRO)
- BFAR Provincial Fisheries Office
- Chairman from Coastal Barangays
- Fish Warden
- Maritime Police
- Philippines Coast Guard
- Coron School of Fisheries
- Palawan Council for Sustainable Development (PCSD)
- Coron MPA Network



## Fisheries Refugia Stakeholders Consultation Workshop Outputs

THREATS/ISSUES/CONCERNS TO FISHERIES	Species/habitat	Existing ordinances, laws
Use of inappropriate fishing gear	All species/coral	RA 10654 /Municipal Fisheries Ordinance
Dynamite fishing/blast fishing	Corals, all kinds of fish	RA 10654
Encroachment (commercial vessel)	Galunggong Dilis and other species caught on municipal fishing ground	Municipal Fisheries ordinance
Climate Change	corals	Climate Change Act
Siltation		Clean Water Act, Water Quality Management Area
Encroachment of Informal Settlers in Mangrove Areas, Conversion of mangrove areas for tourism purposes	Mangroves, juvenile fish, crabs etc.	Zoning Ordinance, Easement Policies, PD 705 section 84, 68 and 69
Siltation	Corals, seagrass	Clean Water Act, Water Quality Management Area

## Fisheries Refugia Stakeholders Consultation Workshop Outputs

THREATS/ISSUES/CONCERNS TO FISHERIES	Species	Existing Ordinances/laws
Oil spill	Mangrove areas/corals/all kinds of fish	Marine environmental laws
Catching of threatened species	threatened species listed in cites	CITES, RA 8550/10654
Pollution	all kinds of fish	Municipal Ordinance/Environmental laws
human recreational activities (eg. tourism), Non-compliance of tourism establishment within coastal areas	Seagrass, corals	RA 8550/10654 PD 705
Overfishing		
Live Fish Trade Industry	Grouper, Mangrove Jacks, Wrasse	PCSD AO 05



## Fisheries Refugia Stakeholders Consultation – Masinloc Site

Date: 28-30 November 2018

Venue: DFARM Resort, Masinloc, Zambales

### Participants:

- Municipal Environments and Natural Resources Office
- Office of the Municipal Agriculturist
- BFAR Provincial Fisheries Office
- Chairman/Representative from coastal Barangays
- Fisherfolk Representatives
- Philippines Coast Guard
- Academe Representative
- Fish Warden Representatives



## Continued Baseline Fisheries Data Collection

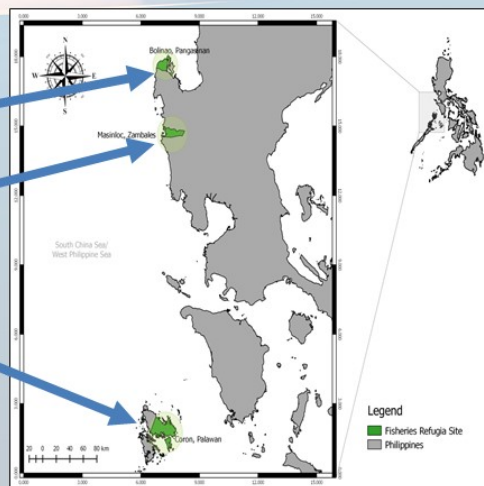
Fisheries data collection was conducted in 3 project sites  
National Stock Assessment Program (NSAP) Sampling protocol  
was used in collecting data in selected fisheries landing sites



NSAP Sampling forms were used in recording fisheries data and submitted monthly to NFRDI for data encoding and processing using NSAP Database System

## 3 Project Sites

- Bolinao, Pangasinan
- Masinloc, Zambales
- Coron, Palawan

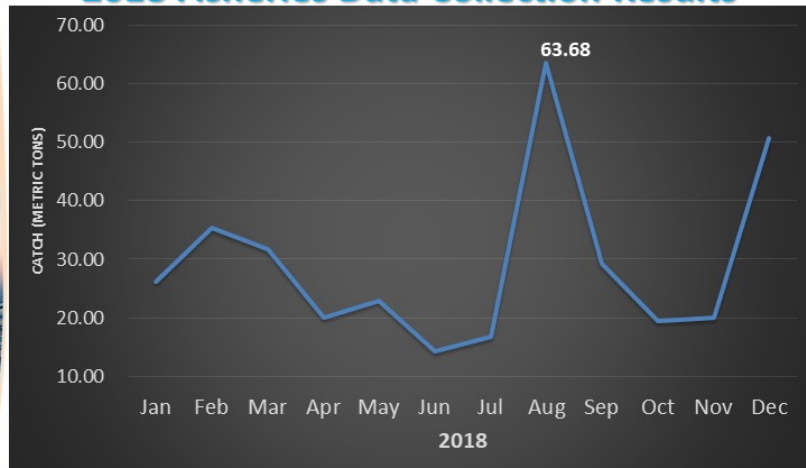




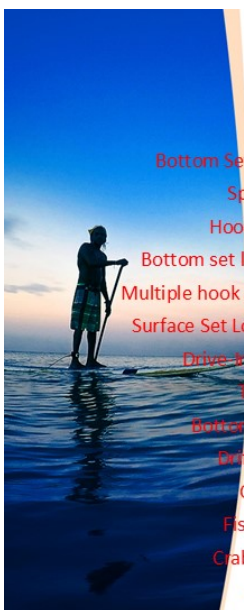
## 2018 Fisheries Data Collection Results



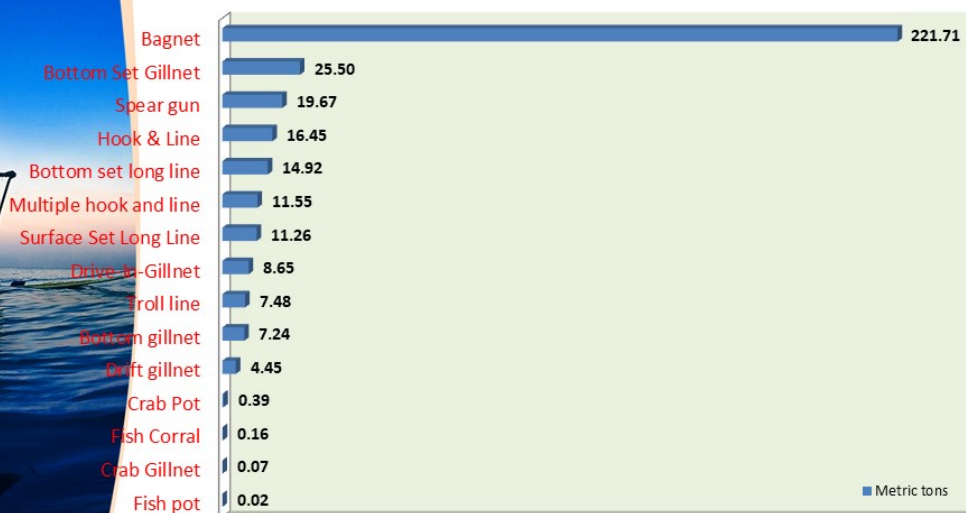
### 2018 Fisheries Data Collection Results



Monthly Landed Catch in Coron, Palawan, 2018

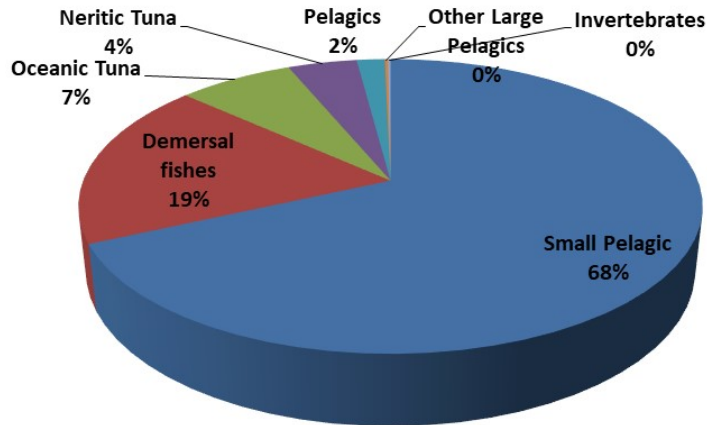


### 2018 Fisheries Data Collection Results





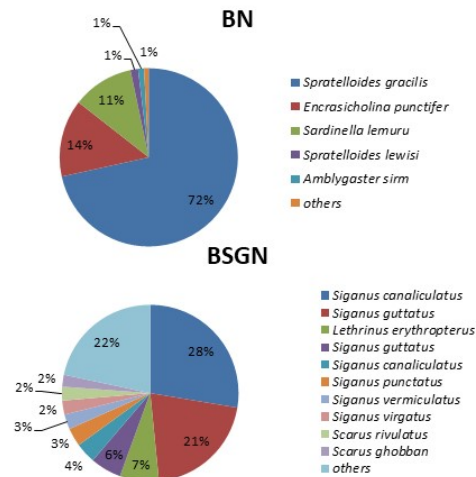
### 2018 Fisheries Data Collection Results



Landed catch by Species Group in Coron, Palawan (2018)



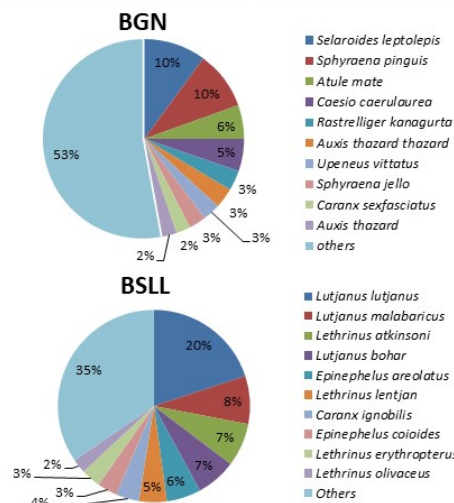
### 2018 Fisheries Data Collection Results



Species composition by Gear, Coron, Palawan



### 2018 Fisheries Data Collection Results

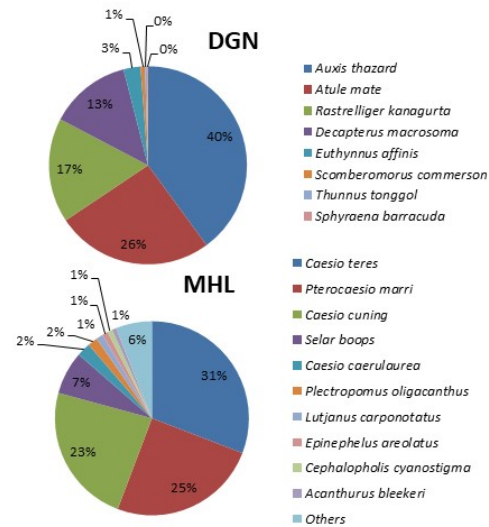


Species composition by Gear, Coron, Palawan





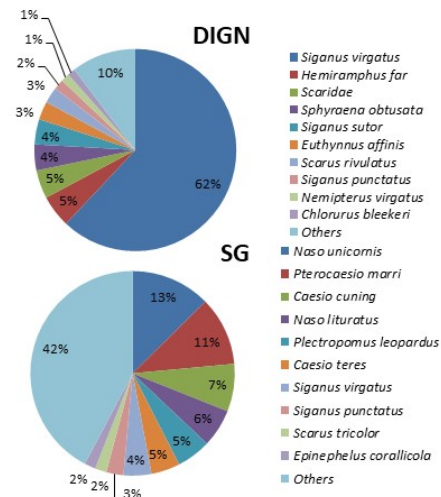
### 2018 Fisheries Data Collection Results



Species composition by Gear, Coron, Palawan



### 2018 Fisheries Data Collection Results



Species composition by Gear, Coron, Palawan



### 2018 Fisheries Data Collection Results

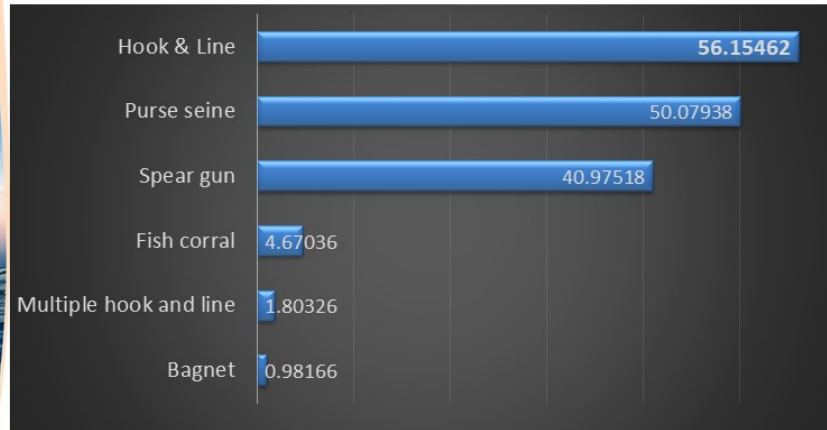


Monthly Landed Catch in Bolinao, Pangasinan





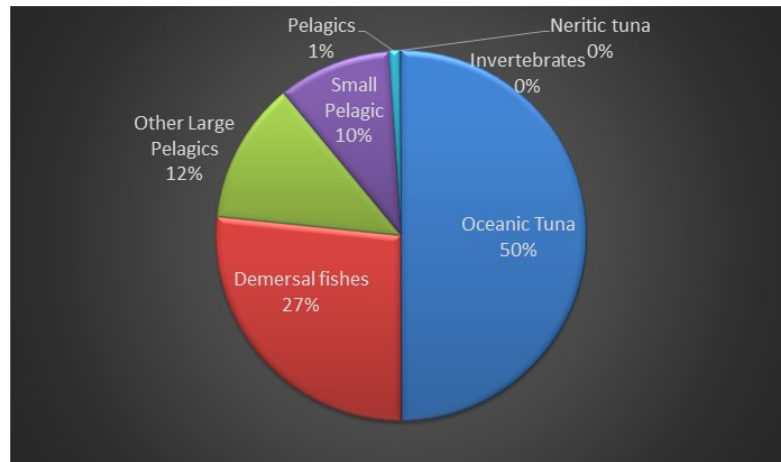
### 2018 Fisheries Data Collection Results



Landed catch per gear in Bolinao, Pangasinan



### 2018 Fisheries Data Collection Results

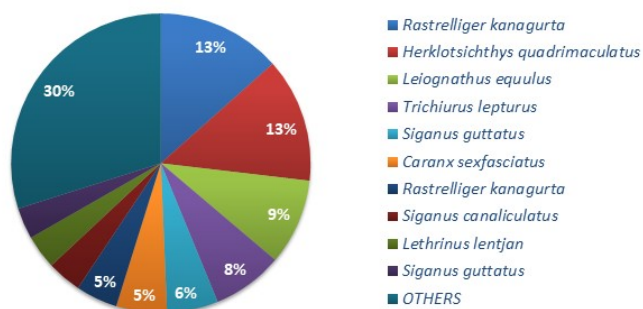


Landed catch by Species Group in Bolinao, Pangasinan



### 2018 Fisheries Data Collection Results

#### FISH CORRAL

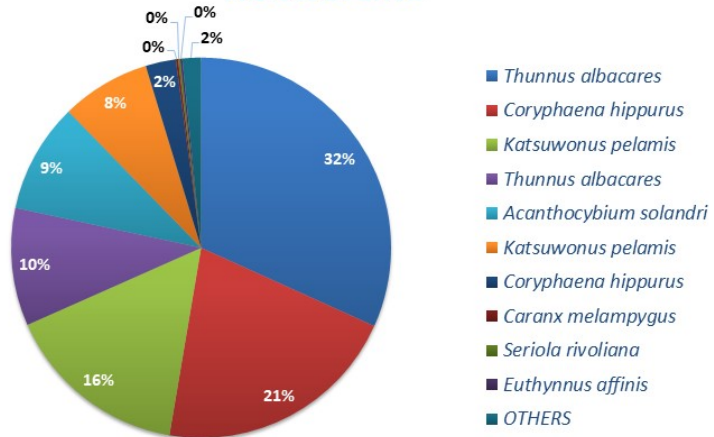


Species composition by Gear, Bolinao, Pangasinan



## 2018 Fisheries Data Collection Results

### HOOK & LINE

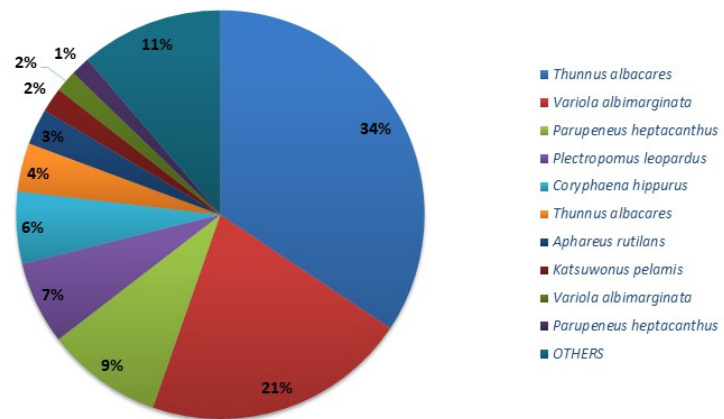


Species composition by Gear, Bolinao, Pangasinan



## 2018 Fisheries Data Collection Results

### MULTIPLE HOOK & LINE

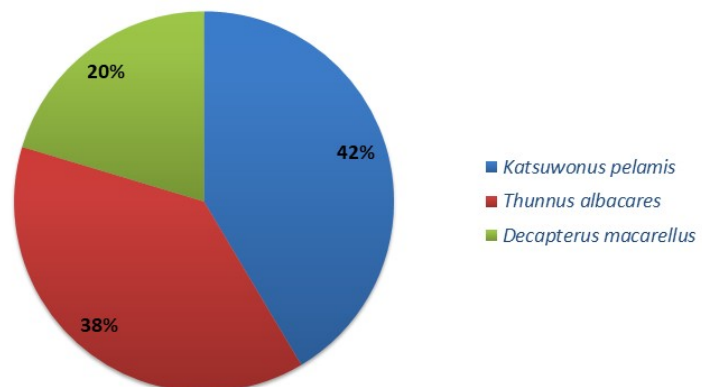


Species composition by Gear, Bolinao, Pangasinan



## 2018 Fisheries Data Collection Results

### PURSE SEINE

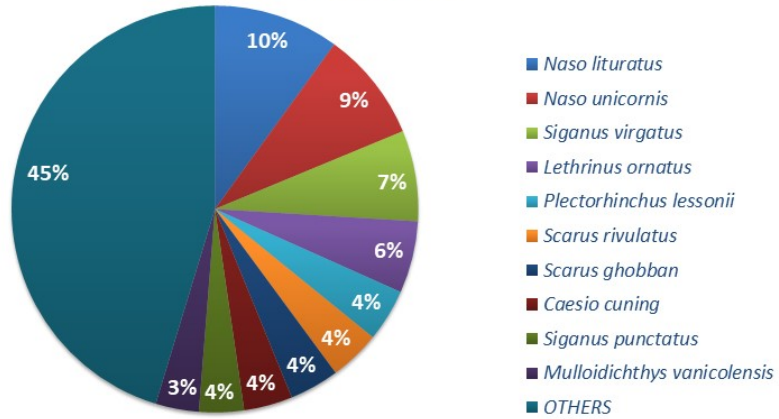


Species composition by Gear, Bolinao, Pangasinan



### 2018 Fisheries Data Collection Results

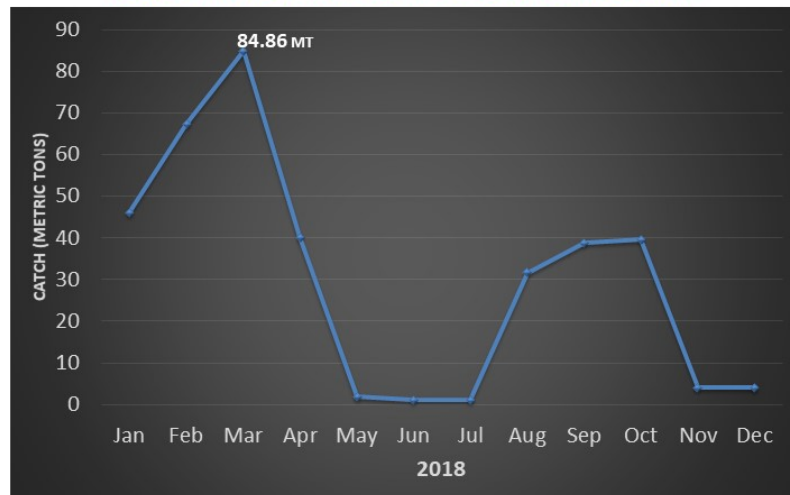
#### SPEARGUN



Species composition by Gear, Bolinao, Pangasinan



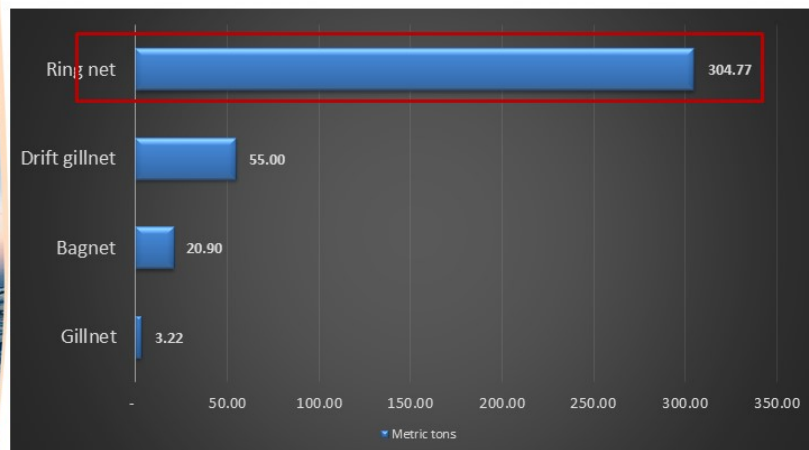
### 2018 Fisheries Data Collection Results



Monthly Landed Catch in Masinloc, Zambales



### 2018 Fisheries Data Collection Results

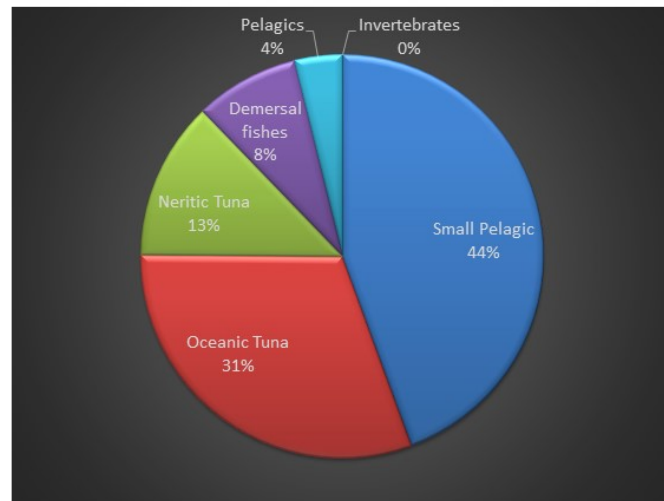


Landed catch per gear in Masinloc, Zambales





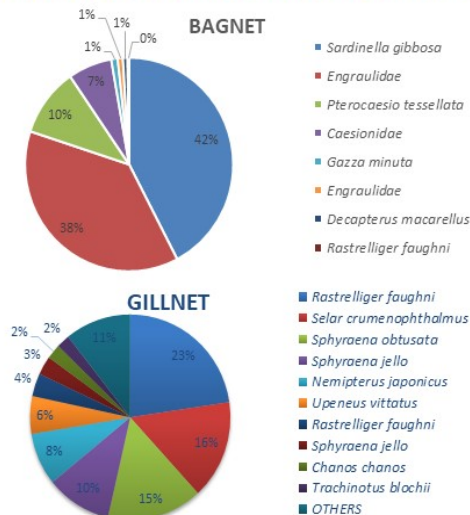
## 2018 Fisheries Data Collection Results



Landed catch by Species Group in Masinloc, Zambales



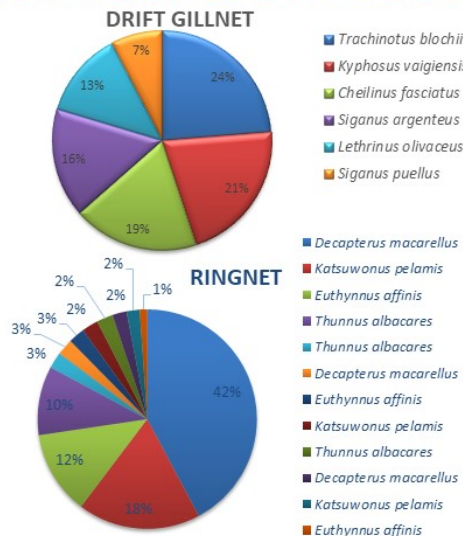
## 2018 Fisheries Data Collection Results



Species composition by Gear, Masinloc, Zambales

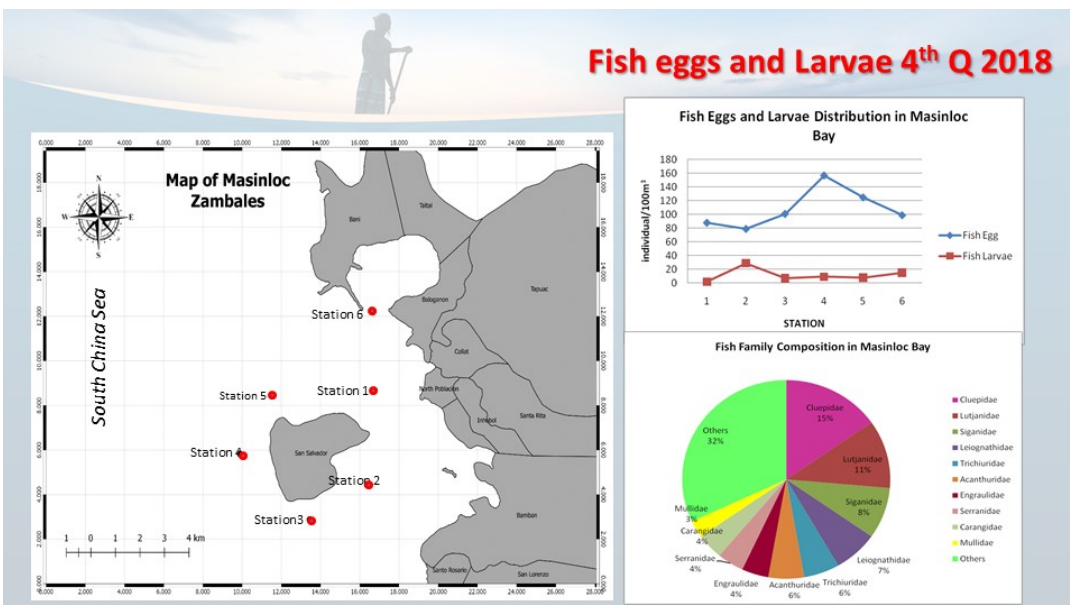
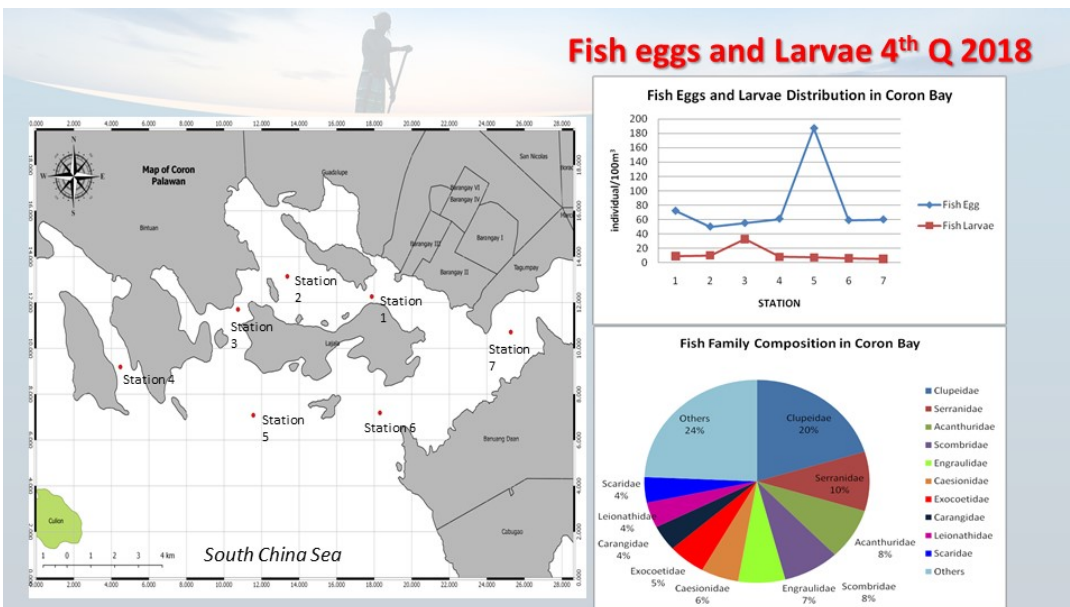


## 2018 Fisheries Data Collection Results

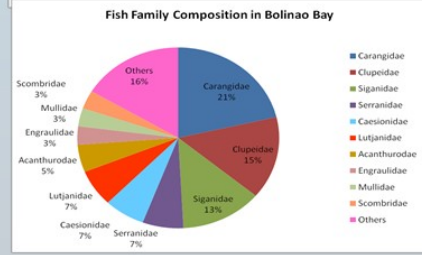
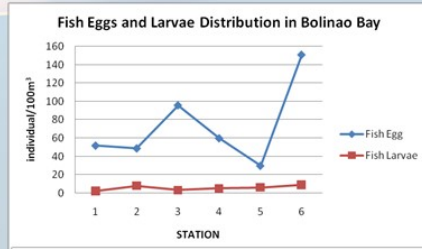
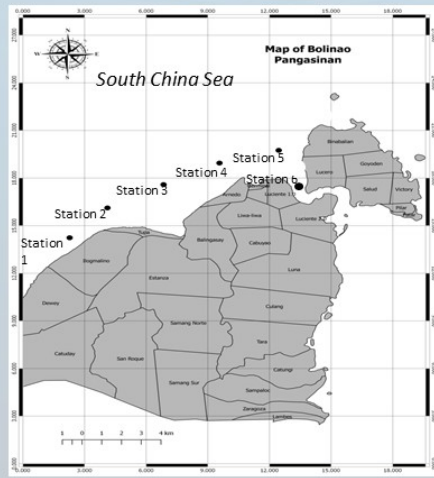


Species composition by Gear, Masinloc, Zambales

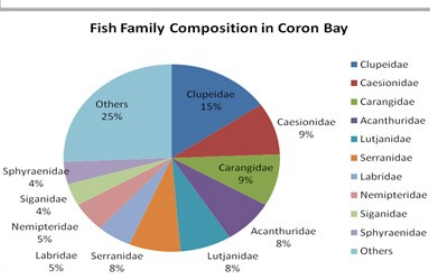
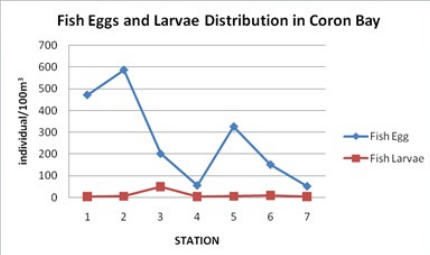
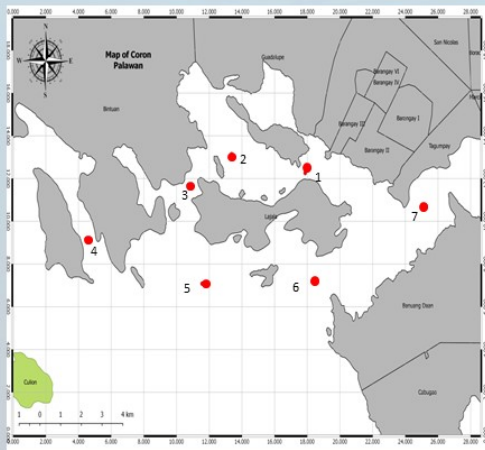




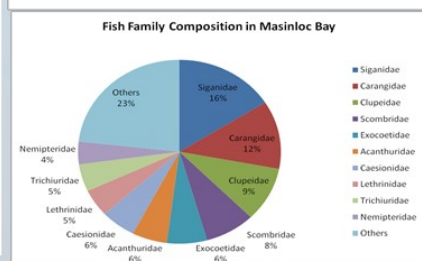
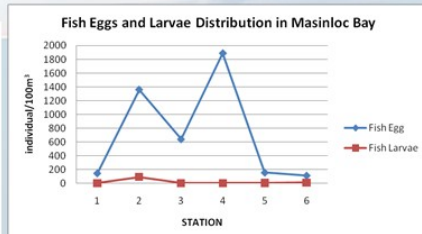
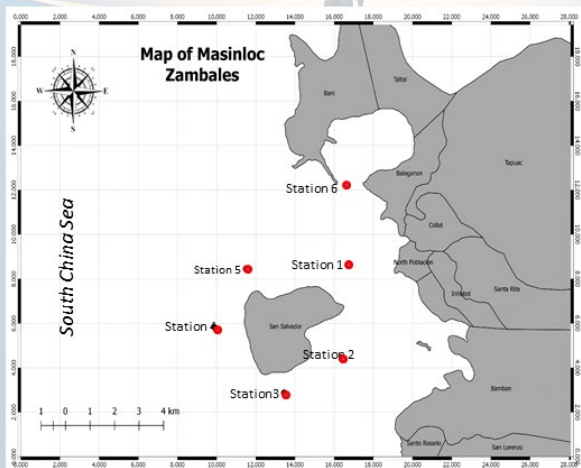
### Fish eggs and Larvae 4<sup>th</sup> Q 2018

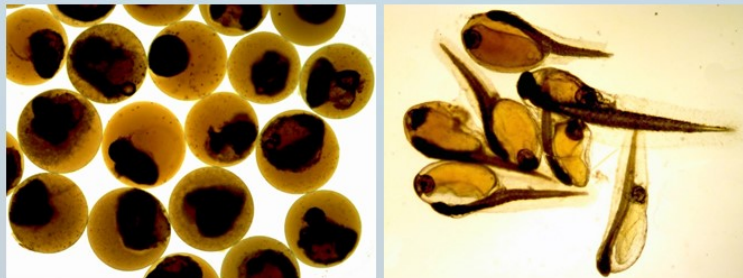
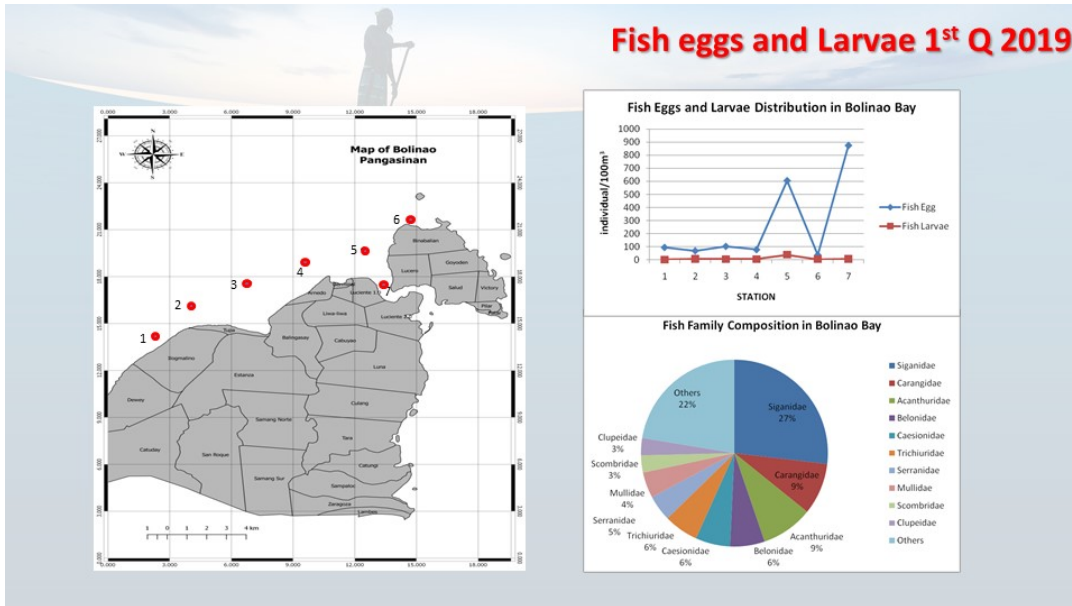


### Fish eggs and Larvae 1<sup>st</sup> Q 2019



### Fish eggs and Larvae 1<sup>st</sup> Q 2019





Fish eggs and Larvae Collected in Bolinao, Pangasinan

## Future Activities

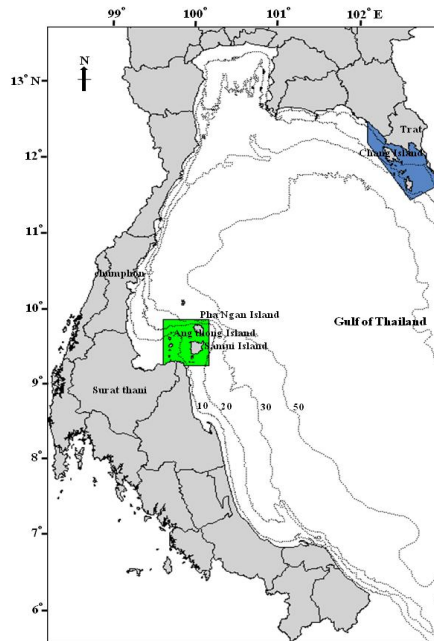
- Conduct of community-based consultation workshop in 3 sites to develop and draft the Fisheries Refugia Management plan
- Continued fisheries data collection
- Fish eggs and larvae survey
- Conduct practical capacity building programme for management volunteers
- Conduct of consultation workshop in 3 sites for policy review and reforms.





## ANNEX 7d

### THE PROGRESS WORK OF THE PROJECT ACTIVITIES AT THE NATIONAL LEVEL DURING JUNE 2018 – MAY 2019: THAILAND



Fisheries Refugia in Thailand initially composes of 2 sites, Chang Strait of Trat Province and Samui Island of Surat Thani Province, with Indo-Pacific mackerel as the priority species in both sites. Nevertheless, after the meetings and consultations, both nationally and locally, the priority species in Surat Thani Province has been finally changed to the blue swimming crab, whereas the actual areas of the project sites have been defined upon scientific and technical information, including meeting resolutions of the Thailand's National Fisheries Refugia Committee meetings. Memberships and TORs of all committees and boards have been revised in order to make them more relevant. Some of the members of Provincial Fisheries Committees in Trat and Surat Thani Provinces were involved in the Site-Based Fisheries Refugia Management Boards for efficient integration of fisheries management in the Fisheries Refugia sites in their respective provinces.

The activities of Fisheries Refugia Project in Thailand from June 2018 to May 2019 compose of 13 meetings and consultations with their objectives and results as follows:

#### 1. The First Meetings of Thailand's National Fisheries Refugia Committee and Thailand's Scientific and Technical Committee, on 22 August 2018, at the Department of Fisheries, Bangkok, Thailand

##### 1.1 Objectives:

- To present an overview background of Fisheries Refugia Project
- To introduce the memberships of "National Fisheries Refugia Committee", "National Scientific and Technical Committee", and "Site-Based Management Boards"
- To report the following:
  - Work plan and budget
  - Preliminary implementation
  - Project sites and priority fisheries species
  - Baseline information to be collected

##### 1.2 Meeting Results:

- Intensive scientific and technical information have to be well-prepared under National Scientific and Technical Committee consultation in order to get the accurate-defined Fisheries Refugia areas.
- The committee members have to be defined by their positions unless any members' names are necessary. Lists of members and TORs of all the Committees have to be revised.
- Priority/target species have to be considered and defined under National Scientific and Technical Committee consultation on the basis of area-based scientific information.



- Baseline data collection has to be scoped under Project objectives and work plan which would be the key factors for Project achievement.

2. **The First Consultation Meeting of the Project Implementation, on 5th October 2018, at the Department of Fisheries, Bangkok, Thailand**

2.1 Objectives:

- To prepare the inputs for the 2nd National Fisheries Refugia Committee (NFRC) meeting including:
  - Priority species and sites for Project implementation
  - Memberships and TORs of Project committees
  - Meeting allowances and travel expenses for committee members

2.2 Meeting Results:

- Proposed priority species and Project sites:
  - Trat Province:
    - Priority species: Indo-Pacific mackerel
    - Project site: From Trat Bay to Thai-Cambodian border
  - Surat Thani Province:
    - Priority species: Blue swimming crab
    - Project site: Ban Don Bay
- NFRC should be chaired by Director General of the Department of Fisheries, and composes of senior executive representatives from the following organizations:
  - Department of Fisheries
  - Department of Marine and Coastal Resources
  - Kasetsart University
  - GISTDA
- NSTC should be chaired by Senior Expert in Fisheries Management of the Department of Fisheries, and composes senior technical representatives from the following organizations:
  - Department of Fisheries
  - Department of Marine and Coastal Resources
  - Kasetsart U., Burapha U., Walailak U.

3. **The Second Meeting of Thailand National Fisheries Refugia Committee, on 10th October 2018, at the Department of Fisheries, Bangkok, Thailand**

3.1 Objectives:

- To propose Indo-Pacific mackerel as the priority species in Trat Province and blue swimming crab as the priority species in Surat Thani Province
- To propose the revised memberships and TORs of NFRC and NSTC
- To propose quarterly progress report, expenditure report, costed work plan, and cash advance request for approval

3.2 Meeting Results:

- Priority fisheries species and project sites have to be considered and defined by National Scientific and Technical Committee.
- The following names should be added to **National Fisheries Refugia Committee**
  - 1) Senior Expert in Resources and Environmental Research in Marine and Coastal Ecosystem, Department of Marine and Coastal Resources, and
  - 2) representative from Project Coordinating Unit.
- The following names should be added to **National Scientific and Technical Committee**

- 1) Senior Expert in Resources and Environmental Research in Marine and Coastal Ecosystem, Department of Marine and Coastal Resources,
- 2) Lecturer from Mae Joe University, Chumphon Campus,
- 3) Representative from GISTDA, and
- 4) Researcher from SEAFDEC.

- quarterly progress report, expenditure report, costed work plan, and cash advance request were approved.

4. **The Second Consultation Meeting for Project Implementation, on 13th November 2018, at the Department of Fisheries, Bangkok, Thailand**

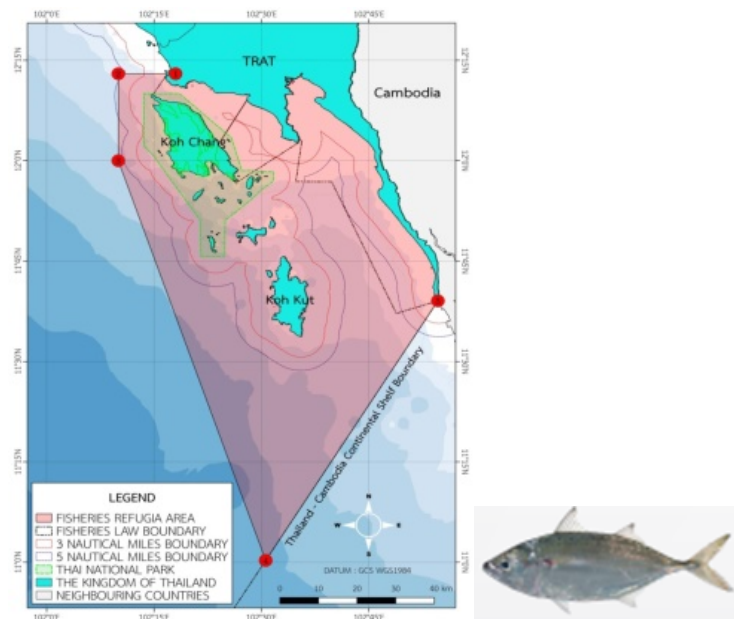
4.1 Objectives:

- to discuss technical information available for defining priority species and fisheries refugia sites in Trat and Surat Thani Provinces

4.2 Meeting Results:

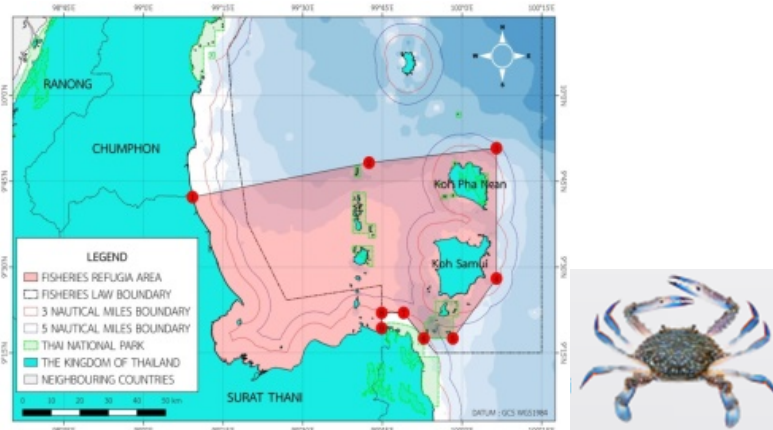
- Priority species and Project site in Trat Province:

- Priority species: Indo-Pacific mackerel
- Project site: The coastal area of Trat Province, including Chang and Kud Islands, and closed to Thai-Cambodian Boarder



- Priority species and Project site in Surat Thani Province:

- Priority species: Blue swimming crab
- Project site: The coastal area of Surat Thani Province, including Samui and Pha Ngan Islands



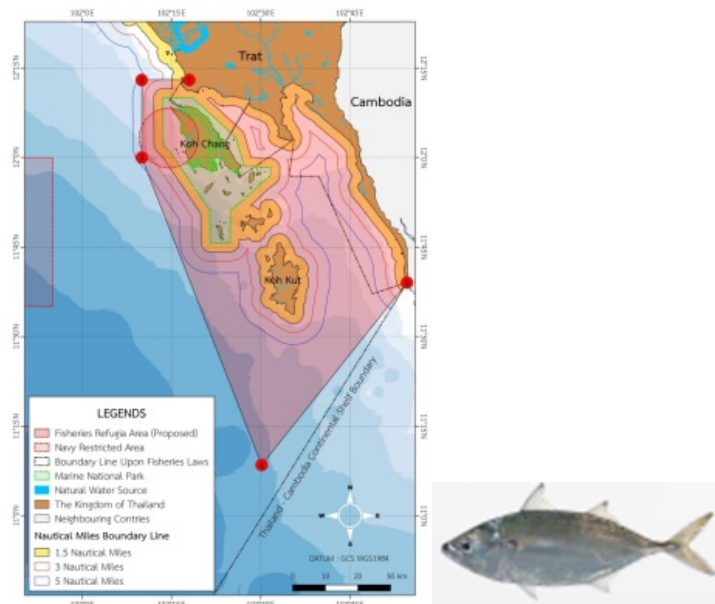
5. **The First Meeting of Thailand’s National Scientific and Technical Committee, on 17 December 2018, at the Department of Fisheries, Bangkok, Thailand**

5.1 Objectives:

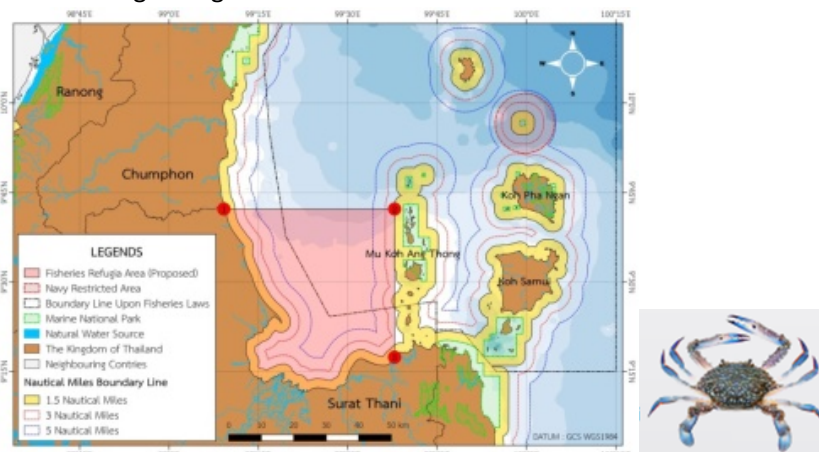
- To present an overview background of Fisheries Refugia Project
- To report the following:
  - Progress of the project implementation, national and regional levels
  - Technical information of fisheries, marine resources, environment, and ecosystem related to Indo-Pacific mackerel in Trat Province and blue swimming crab in Surat Thani Province
- To discuss the appropriate fisheries refugia boundary and priority species in Trat and Surat Thani Provinces

5.2 Meeting Results:

- Priority species and Project site in Trat Province:
  - Priority species: Indo-Pacific mackerel
  - Project site: The coastal area of Trat Province, with a little shift of the boundary line from Thai-Cambodian boarder



- Priority species and Project site in Surat Thani Province:
  - Priority species: Blue swimming crab
  - Project site: The coastal area from shoreline of Surat Thani Province closed to the protected area of Mu Koh Ang Thong National Marine Park



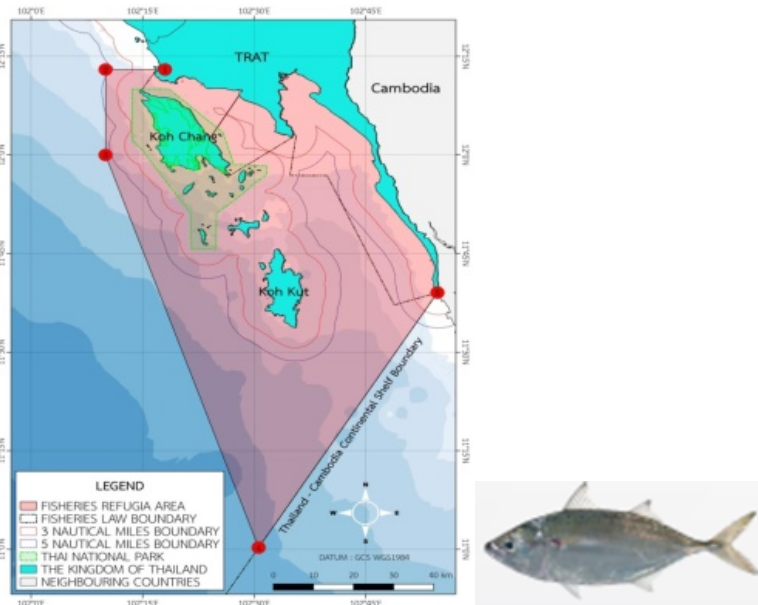
6. **The Third Meeting of Thailand National Fisheries Refugia Committee, on 16 January 2019, at the Department of Fisheries, Bangkok, Thailand**

6.1 Objectives:

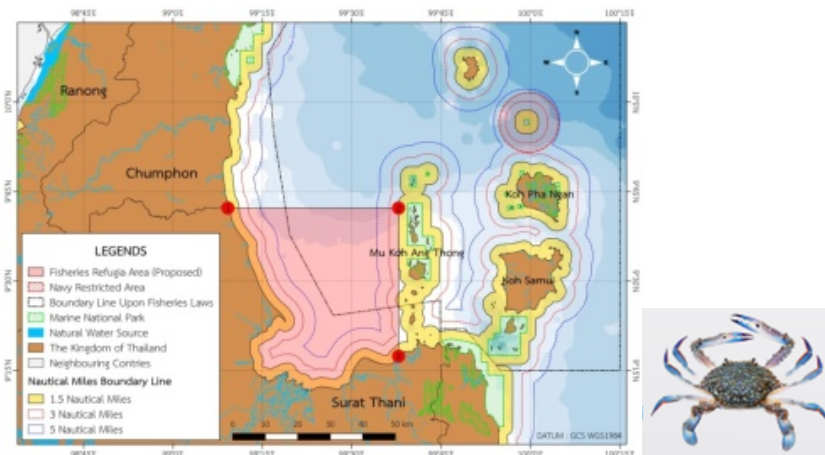
- To report on the revised memberships and TORs of Thailand’s National Fisheries Refugia Committee (NFRC) and Thailand’s National Scientific and Technical Committee (NSTC)
- To report on the progress of the Project implementation, nationally and regionally
- To propose the latest-revised Project sites and priority species for consideration
- To propose quarterly progress report, expenditure report, costed work plan, and cash advance request for approval

6.2 Meeting Results:

- **Final** priority species and Project site in Trat Province:
  - Priority species: Indo-Pacific mackerel
  - Project site: The coastal area of Trat Province, including Chang and Kud Islands, closed to Thailand-Cambodian continental shelf boundary



- **Final** priority species and Project site in Surat Thani Province:
  - Priority species: Blue swimming crab
  - Project site: The coastal area from shoreline of Surat Thani Province closed to the protected area of Mu Koh Ang Thong National Marine Park





7. **The Third Consultation Meeting for Project Implementation (Arrangement of Site-Based Fisheries Refugia Management in Surat Thani Province), on 29 January 2019, at Surat Thani Province, Thailand**

7.1 Objectives:

- To clarify the Project purposes and activities to the staff of Surat Thani Fisheries Provincial Office
- To guide and discuss with the staff of Surat Thani Fisheries Provincial Office on the membership properties and TOR for revision of Site-Based Fisheries Refugia Management Board in Surat Thani Province
- To observe crab bank in Moo Ban Phumriang, Chaiya District, Surat Thani Province

7.2 Meeting Results:

- The membership and TOR of Site-Based Fisheries Refugia Management Board in Surat Thani Province was revised in which the members of Provincial Fisheries Committee were included; it was finally signed by the Surat Thani Governor and issued in the form of Notification of Surat Thani Province.

8. **The Fourth Consultation Meeting for Project Implementation (Arrangement of Site-Based Fisheries Refugia Management in Trat Province) on 20 February 2019, at Trat Province, Thailand**

8.1 Objectives:

- To clarify the Project purposes and activities to the staff of Trat Fisheries Provincial Office
- To guide and discuss with the staff of Trat Fisheries Provincial Office on the membership properties and TOR for revision of Site-Based Fisheries Refugia Management Board in Trat Province

8.2 Meeting Results:

- The membership and TOR of Site-Based Fisheries Refugia Management Board in Trat Province was revised, in which the members of Provincial Fisheries Committee were included; it was finally signed by the Trat Governor and issued in the form of Notification of Trat Province.

9. **The Fifth Consultation Meeting for Project Implementation (Arrangement of Baseline Data Collection), on 28 February 2019, at the Department of Fisheries, Bangkok, Thailand**

9.1 Objectives:

- To discuss baseline data collection with the staff of Fisheries Research Centers, Fisheries Provincial Offices, SEAFDEC, and NGOs, who involve in fisheries data collection in the Project areas

9.2 Meeting Results:

- Templates, items, and methods were raised, discussed, and clarified for suitable data collection.

10. **The Sixth Consultation Meeting for Project Implementation (Preparation for Financial Audit), on 7 March 2019, at the Department of Fisheries, Bangkok, Thailand**

10.1 Objectives:

- To discuss among the Project staff of DOF, SEAFDEC and auditor, on the formats and methods for preparing the statement of revenues and expenditures for Project financial audit

10.2 Meeting Results:

- Project staff of DOF understand the methods for preparation of formal financial statement for audit.

**11. The Fourth Meeting of Thailand National Fisheries Refugia Committee, on 29th March 2019, at the Department of Fisheries, Bangkok, Thailand**

**11.1 Objectives:**

- To report on the revised memberships and TORs of the Site-Based Fisheries Refugia Management Boards in Trat and Surat Thani Provinces
- To report on the co-finance and audit for Thailand
- To propose quarterly progress report, expenditure report, costed work plan, and cash advance request for approval

**11.2 Meeting Results:**

- quarterly progress report, expenditure report, costed work plan, and cash advance request were approved.

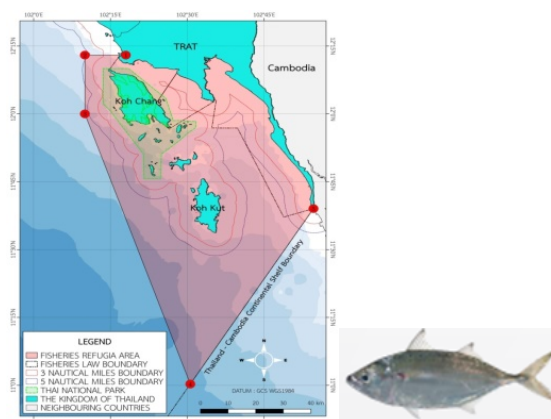
**12. The First Meeting of Site-Based Fisheries Management Board in Trat Province, on 4th April 2019, at Trat Province, Thailand**

**12.1 Objectives:**

- To introduce the Fisheries Refugia Project
- To present the following:
  - The status of marine coastal resources, ecosystem, and marine environment in Trat Province
  - The status of marine fisheries and resources in Trat Province
  - The context of communities towards coastal fisheries management in Trat Province
  - The context of Indo-Pacific mackerel in the Gulf of Thailand
- To discuss the management approaches towards Fisheries Refugia of Indo-Pacific mackerel in Trat Province

**12.2 Meeting Results:**

- Indo-Pacific mackerel was approved to be the priority species for Fisheries Refugia in Trat Province.
- The proposed area was approved to be the study area for Fisheries Refugia site in Trat Province.
- The existing marine fisheries/coastal resources measures including measures in each fisheries Community in Trat Province have to be shown in the area map for obvious baseline data.
- Study area and technical data for Fisheries Refugia in Koh Kong of Cambodia should be illustrated in order to support the consideration of co-management.
- Intensive technical information of Indo-Pacific mackerel in Trat Province had to be presented in the next meeting.



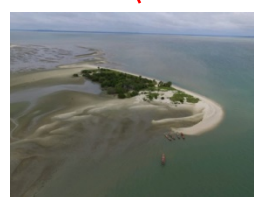
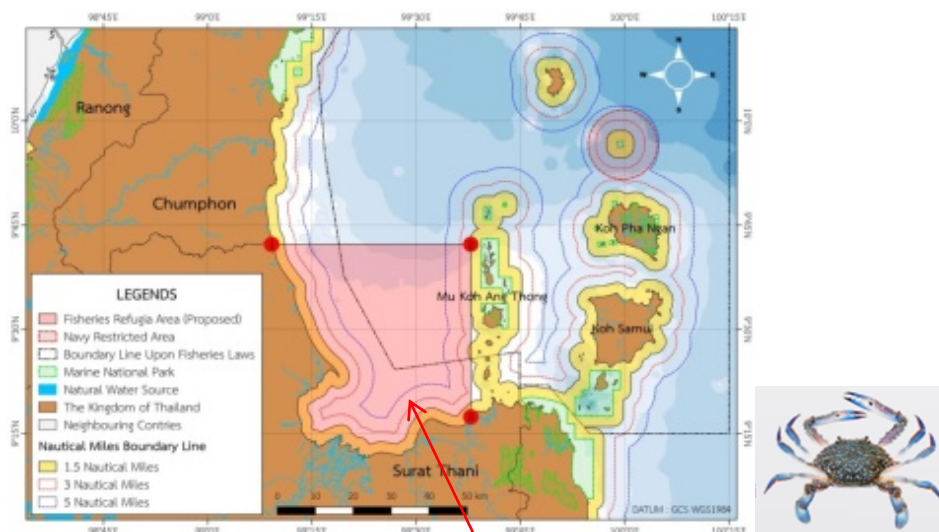
13. **The First Meeting of Site-Based Fisheries Management Board in Surat Thani Province, on 26th April 2019, at Surat Thani Province, Thailand**

13.1 Objectives:

- To introduce the Fisheries Refugia Project
- To present the following:
  - The status of marine fisheries and resources in Surat Thani Province
  - Knowledge of blue swimming crab resources, and ecosystem for blue swimming crab integrated management in Bandon Bay of Surat Thani Province
  - A review of blue swimming crab management in Thailand
- To discuss the management approaches towards Fisheries Refugia of blue swimming crab in Surat Thani Province

13.2 Meeting Results:

- Blue swimming crab was approved to be the priority species for Fisheries Refugia in Surat Thani Province.
- The proposed area was approved to be study area for Fisheries Refugia site in Surat Thani Province.
- Koh Sed in Ban Don Bay is suitable for the conservation area of blue swimming crab during their early life stage.
- Intensive technical information of topography, ecosystem, and marine resources around Koh Sed are needed.
- Cooperation of stakeholders are the most concern.



Koh Sed

## ANNEX 8

### MANAGEMENT OF TRANSBOUNDARY SPECIES: SHORT MACKEREL, FRIGATE TUNA, ETC.

#### I. INTRODUCTION

One of the valuable analyses of the problems of managing and conserving shared fishery resources was that prepared by John Gulland of the FAO, prior to the close of the UN Third Conference on the Law of the Sea (Gulland, 1980). In his paper, Gulland focuses on transboundary stocks, because of their then perceived importance. In any event, Gulland presents a biological/geographical categorization of transboundary fish stocks, which is useful in setting the stage for the discussion of the problems of managing the resources. He makes the following distinctions:

- I. stocks occurring within two or more EEZs, but showing no clear migratory pattern;
- II stocks occurring within two or more EEZs, and displaying a clear pattern of movement:
  - A. resulting from seasonal migration
  - B. according to development stages.

Change stocks occurring within two or more EEZs, in I and II, to stocks occurring within the EEZ and the adjacent high seas, and one has a description of **straddling and highly migratory fish stock**<sup>1</sup> In the case of (I), Gulland contends, it is not always clear that exploitation on one side of the relevant boundary will necessarily have a significant effect upon harvesting opportunities on the other side of the boundary. It is therefore needs to consider the cooperation on conservation and management of transboundary species as well as areas through our works on fisheries refugia concept.

#### II. WHAT'S TRANSBOUNDARY FISH STOCK?

Munro (1987) provides such an example in the form of the rich Georges Bank scallop fishery, shared by Canada and the United States. The resource was, and is, clearly a transboundary fish stock. It was, however, questionable whether Canadian (American) harvesting of scallops would have any significant impact upon American (Canadian) harvesting opportunities. Adult scallops are more or less stationary. Moreover, while there is some transboundary movement at the larval stage, there were, in 1987, extensive beds of larvae producing scallops, which were free from exploitation due to the sea bed terrain. These facts led to the argument that, since Americans and Canadians could harvest the resource without affecting one another's harvest opportunities, cooperative fisheries management of this shared resource was largely beside the point (Munro, 1987).

#### III. LEVELS OF COOPERATION IN RESOURCE MANAGEMENT AND CONSERVATION

There are, as Gulland points out, at least two levels of cooperation (Gulland, 1980).

- 1) The first level, or what we might term the primary level, consists of cooperation in research alone, without reference to coordinated management programmes. Since all parties should stand to

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<sup>1</sup> The Straddling Fish Stocks Agreement (formally, the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks) is a multilateral treaty created by the United Nations to enhance the cooperative management of fisheries resources that span wide areas, and are of economic and environmental concern to a number of nations. As of December 2016, the treaty had been ratified by 84 parties, which includes 83 states and the European Union. Straddling stocks are fish stocks that migrate through, or occur in, more than one exclusive economic zone. The Agreement was adopted in 1995, and came into force in 2001.



benefit from improved information and data, the cooperation should be relatively easy to achieve. The emphasis is on the word relative, however. It is still possible that one or more parties may suspect that research information, which it shares, will serve to benefit its rival exploiters of the resource, at its own expense.

- 2) the secondary level - "active management" - involves, almost by definition, the establishment of coordinated joint management programmes. As Gulland (1980) informs us, this will require:
  - a. allocation of harvest shares among the participating states (or entities);
  - b. determination of an optimal management strategy through time, including inter alia, the determination of optimal global harvests over time;
  - c. implementation and enforcement of coordinated management agreements.

Regarding this, the Report of the Norway-FAO Expert Consultation (FAO, 2002a) maintains that, in order to achieve all of this, it will be necessary to have:

- a cooperative management authority;
- a detailed joint management plan;
- a set of agreed upon common objectives;
- agreed upon tools for managers, including indicators and reference points to monitor performance;
- a joint scientific body to provide advice.

The detailed joint management plan should be expected, at a minimum, to contain: (i) a description of the fishery, (ii) objectives of management, (iii) measures to achieve the objectives, (iv) indicators and reference points to be used to measure actual performance against objectives, (v) decision rules on how to change management, when the objectives are not being reached, and (vi) information needs and research required to support management (FAO, 2002a).

#### **IV. THE SIGNIFICANCE OF TRANSBOUNDARY FISH STOCKS IN SCS AND GOT LMES**

Difficulties of achieving effective cooperation in resource management to one side, the significance of the issue of cooperative management of shared fishery resources is dependent ultimately upon the importance of shared fishery resources in the region. No precise measures exist, but there is enough evidence to indicate that the significance of shared fish stock in regional fisheries is decidedly non-trivial.

SEAFDEC-Sweden project has attempted to support its member countries to come-up with the joint management plan or plan of actions for the **transboundary** fish stocks and /or shared fish stocks. The success on neritic-tuna Plan of Action in the Southeast Asia was adopted by ASEAN in 2015 together with the establishment of the Scientific Working Group for Stock Assessment. Other attempts are on the same practice to help member countries for development of the joint management plan for other small pelagic species particularly on short mackerel, anchovy, blue swimming crab and etc. In this connection, as one of the main tasks of the SEAFDEC/UNEP/GEF Project to establish the fisheries refugia for some transboundary species, the PCU therefore point out how importance of the conservation and management of transboundary fish stock for highest benefit to concerned country and for sustainable utilization of fish stock which finally the results will effect to the social wellbeing of fishing community. **As above mentioned, the RSTC2 is requested to provide comments, suggestion for achieving the project target.**

## ANNEX 9

# RESULTS FROM THE SEAFDEC/SWEDEN PROJECT ON SHORT MACKEREL



  Sweden  
Sverige

### Management of Transboundary Fish Stocks of Indo-Pacific Mackerel in the Gulf of Thailand

*Ms. Saisunee Chaksuin  
Gulf of Thailand Sub-region Coordinator  
SEAFDEC-Sweden Project*

Regional scientific and Technical Committee Meeting of the SEAFDEC/UNEP/GEF Fisheries *Refugia* in the South China Sea and Gulf of Thailand, 21-23 May 2019, Kampot, Cambodia

SEAFDEC-Sweden Project (2013-2019)   Sweden  
Sverige






## VISION

**Sustainable use of aquatic resources and reduced vulnerability to climate change, by fishing communities in the ASEAN region**

### OUTLINE

- Introduction
- Background
- Activities
- Results
- Conclusion
- Next Step



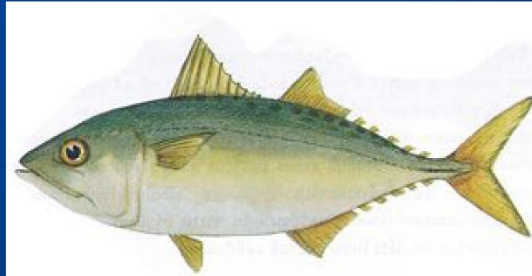
  Sweden  
Sverige

## INTRODUCTION



### Target species

- Common name: short mackerel, Indo-Pacific mackerel, Platoo (Thai)
- Scientific name: *Rastrelliger brachysoma*



## BACKGROUND



### Gulf of Thailand Sub-regional Initiatives on transboundary fish stocks

- SEAFDEC-Sweden project supports the Gulf of Thailand countries (Cambodia, Malaysia, Thailand and Viet Nam) to discuss on the transboundary species towards for the sustainable use of fisheries resources.

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## BACKGROUND



### Gulf of Thailand Sub-regional Initiatives on transboundary fish stocks

At the 5<sup>th</sup> Meeting of the GoT in 2015, SEAFDEC was suggested to:

- Encourage GoT countries to formulate policies by including data collection activities in the national policy frameworks to support long-term fisheries management
- Conduct sub-regional activities for better understand stock status and migratory pattern of Platoo which will be used as a basis for establishing agreements on coordinated national measures for transboundary stock.

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## ACTIVITIES



### Sub-regional Initiatives for Transboundary Fish Stocks in GoT

- 2016: Expert Group Meeting on Stock Status and Geographical Distribution of AIB Species in the GoT
- 2017: Technical Meeting on Planning for Development of Stock Study for AIB Species in the GoT
- 2017: Stock Study on Indo-Pacific mackerel in GoT since late 2017



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## ACTIVITIES



### Sub-regional Initiatives for Transboundary Fish Stocks in GoT

- 2018:
  - Indo-Pacific mackerel Tissue Sampling were collected in Cambodia, Malaysia, Thailand and Viet Nam
  - DNA Analysis were conducted by Genetic Laboratory of Kasetsart University, Thailand



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## ACTIVITIES

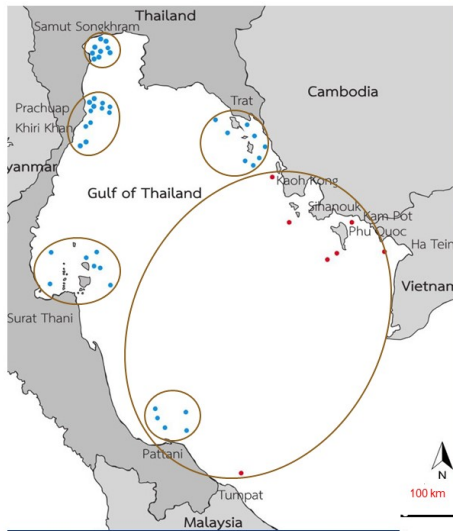


- 2018:
  - ❖ Gulf of Thailand Technical Meeting on Management of Transboundary Species: Indo-Pacific Mackerel 19-20 December 2019, Bangkok, Thailand
  - ❖ Objective to disseminate the result from the DNA studying of Indo-Pacific mackerel in the Gulf of Thailand

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## RESULTS



### Sampling localities in the GoT

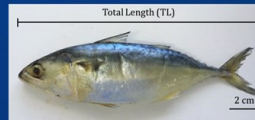
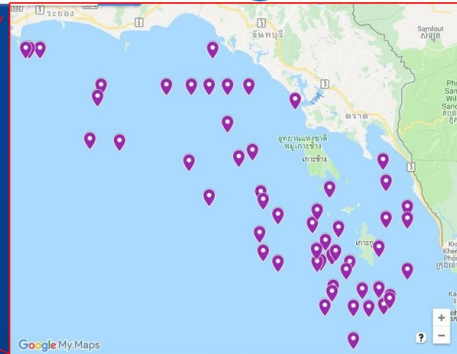
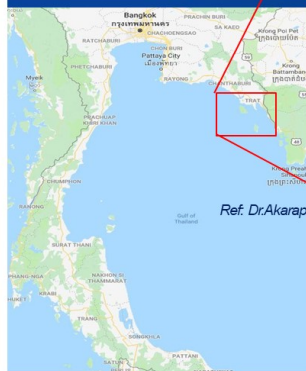
- Population differentiation is found in the GoT
- Thailand populations are genetically different to each other in moderate level
- Cambodia, Vietnam, Malaysia and Pattani (Thailand) populations are genetically similarly to each other.

Ref: Dr.Akarapong/Dr.Sirinthon, Kasetsart University, 2018

## RESULTS



### Thailand and Cambodia



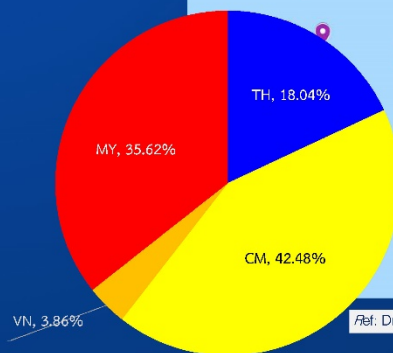
n=311; mean TL±SD = 16.65 ± 1.38 cm

Ref: Dr.Akarapong/Dr.Sirinthon, Kasetsart University, 2018

## RESULTS



### Thailand and Cambodia



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Ref: Dr.Akarapong/Dr.Sirinthon, Kasetsart University, 2018

## CONCLUSION



**Recommendations** and **follow-up actions/needs** towards development of the sub-regional transboundary species management plan- Indo-Pacific mackerel

Recommendations	Follow-up actions/needs
1. MSA study in Cambodia, Malaysia, and Viet Nam	Fishery <i>refugia</i> project to be consulted with RSWG for accommodating in their work plan of activity
2. Monitor the change of tidal, sea surface temperature	Consult with the countries the possibility to install data logger in safe place of the participating countries, or to have collaboration research with academic
3. Monitor larvae transport	(same as above)

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## CONCLUSION



**Recommendations** and **follow-up actions/needs** towards development of the sub-regional transboundary species management plan- Indo-Pacific mackerel

Recommendations	Follow-up actions/needs
4. Simulation of chlorophyll A, current, temperature and etc.	To coordinate and collaborate with the countries (fishery <i>refugia</i> project)
5. Biological and physical study in the GOT	To follow-up with SWG physical oceanography and larvae expert (JTF project)
6. Biological and physical study in the GOT	Hotspot of eggs and larvae and logbook (refer to survey result conducted by MV SEAFDEC 2)

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## CONCLUSION



**Recommendations** and **follow-up actions/needs** towards development of the sub-regional transboundary species management plan- Indo-Pacific mackerel

Recommendations	Follow-up actions/needs
7. Stock assessment	<ul style="list-style-type: none"> <li>- To conduct stock assessment through existing SWG (ASEAN-SEAFDEC)</li> <li>- Procedures: 1) conduct population stock in the GOT; 2) total landing; 3) MSA; and 4) prioritization of the most important genetic stock</li> </ul>
8. Establishment of database	<ul style="list-style-type: none"> <li>- all important data/information for management</li> <li>- establish specialist group</li> </ul>

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## NEXT STEP



SEAFDEC-Sweden Project in discussion with  
SEAFDEC/UNEP/ GEF Fisheries *Refugia*  
Project to facilitate the sub-regional  
consultation to develop action/management  
plan for Indo-Pacific mackerel (short  
mackerel) within 2019

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## ANNEX 10

### BIOLOGICAL STUDY OF SHORT MACKEREL IN TRAT, THAILAND

Biological study of Indo-Pacific mackerel in Trat Province of Thailand is a part of the project entitled “Monitoring of the Life Cycle of Indo-Pacific mackerel in the Gulf of Thailand” under the research centers of the Department of Fisheries of Thailand. The project includes 5 research topics, namely:

1. Study on sources and size distribution of Indo-Pacific mackerel in Gulf of Thailand;
2. Study on reproductive biology of Indo-Pacific mackerel in Gulf of Thailand;
3. Study on abundance and distribution of Indo-Pacific mackerel in Gulf of Thailand;
4. Study on stomach content of Indo-Pacific mackerel in Gulf of Thailand; and
5. Study on the genetic characteristics of the population of Indo-Pacific mackerel in Gulf of Thailand

#### Procedures for data collection (Figure 1)

1. Interview master fishermen or crewmembers of the Indo-Pacific mackerel fishing boats regarding fishing ground and fishing efforts, such as, how many days for one fishing trip? How many times for fishing operation and total catch per trip? As well as sampling aquatic animal. Based on the results of interview and fish sampling, analyzing capture rate (catch per unit effort), species composition, fishing grounds, and distribution of Indo-Pacific mackerel by sizes in different fishing grounds information, as well as the information obtained from the VMS installed in the 30 Gross Ton fishing boats or over.

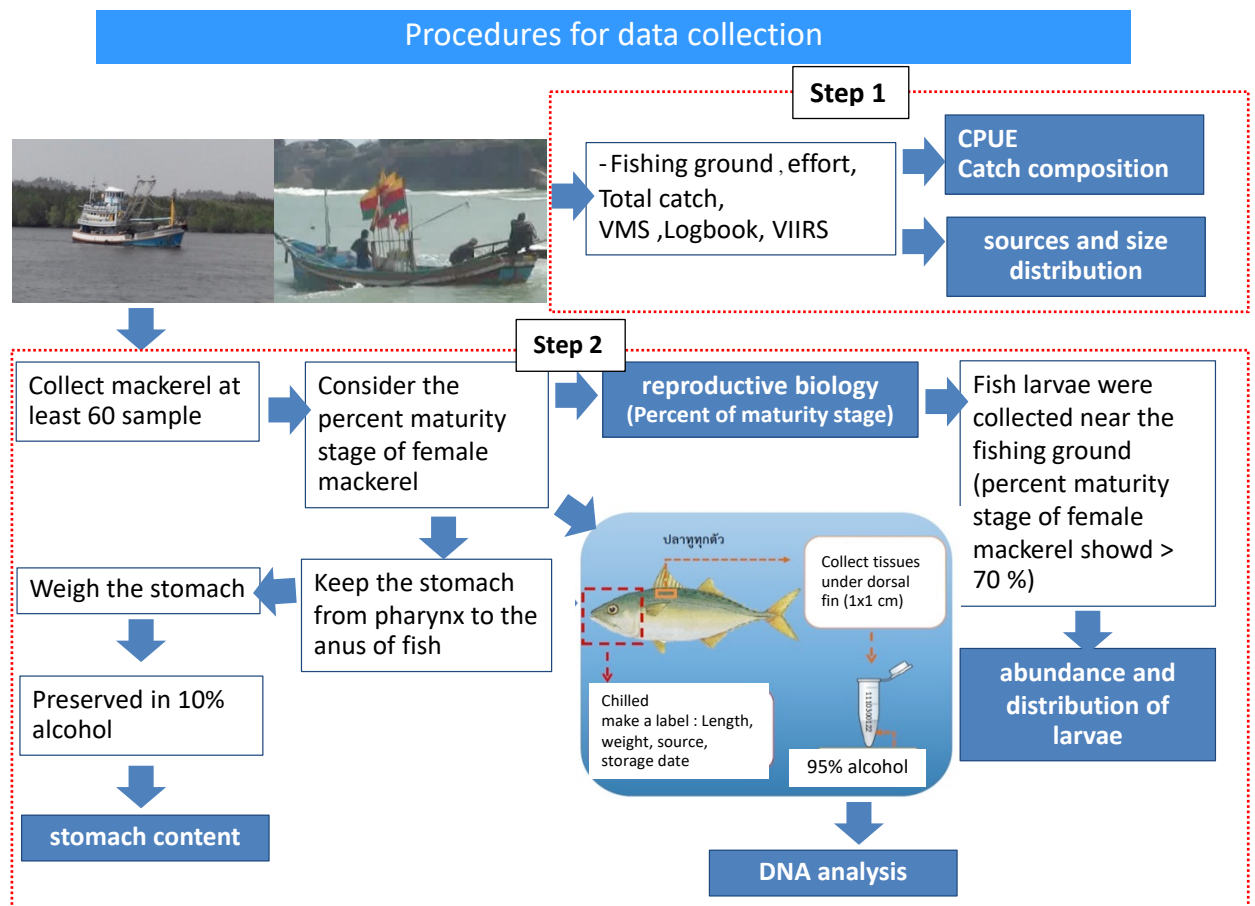


Figure 1: The procedures for data collection



2. Collect the mackerel at least 30 samples from each boats for identification of maturity stage, if the results of analysis show that over 70% of the fish samples are maturity stage, within one week, the research team then go to the area where the mackerel were caught, using a plankton net with the mesh size of 330 micron collecting the larvae for identification of species composition. In addition, study of stomach content to examine the mackerel's diet and assess its feeding habits and the tissue at the base of dorsal fin are collected and preserved in 95% alcohol for DNA analysis, while the head of fish samples are chilled for otolith analysis

### Examine of results to know period of spawning season and spawning grounds

The main objective of biological study on Indo-Pacific mackerel is to examine period of spawning season of mackerel in Trat Province based on 3 studies results, including

1. Study on size distribution of Indo-Pacific mackerel
2. Percentage maturity stage of female
3. Abundance distribution of Mackerel's juveniles

The results showed that the mackerel with the size of greater than 17 cm were found at the spawning grounds during spawning season. More than 60% of them were at the maturity stage, after that, the Mackerel's larvae were appeared

### Spawning season and spawning grounds






Focus on Trat Province that results on size distribution of Indo-Pacific mackerel, percentage maturity stage of female and abundance distribution of Mackerel's juveniles will be displayed as a symbol in the map. Show results monthly (Figure 2-13)

Consideration of information on size distribution of Indo-Pacific mackerel, percentage maturity stage of female and abundance distribution of Mackerel's juveniles in the year. The result showed that spawning season was found all year, while the peak showed in January-April. The spawning grounds were in the areas near Koh Kood and Koh Chang, Trat Province. (Figure 14)





Shows 3 important information as follows:

1. Information on distribution of mackerel, represented by blue fish. It can be divided into 4 sizes, over 17 cm long, which are indicated as the breeders, juvenile fish are range between 14-17 cm, while less than 14 cm long are identified as the small fish.
2. Percentage of maturity stage of female, represented by red fish, dividing into 4 level, including, over 80%, 2) 65-80%, 3) 50-65%, and 4) less than 50%
3. Fish larvae abundance, represented by red cycle, higher volume is shown with the bigger cycle





#### LARVAE (INDIVIDUAL) / 1000 LITERS

-  1 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  200 - 250

#### PERCENT (%) OF FEMALE MATURE

-  0 - 50
-  50 - 65
-  65 - 80
-  80 - 100

#### CAUGHT AVERAGE LENGTH (CM)

-  0.0 - 10.0
-  10.0 - 14.0
-  14.0 - 17.0
-  17.0 - 25.8

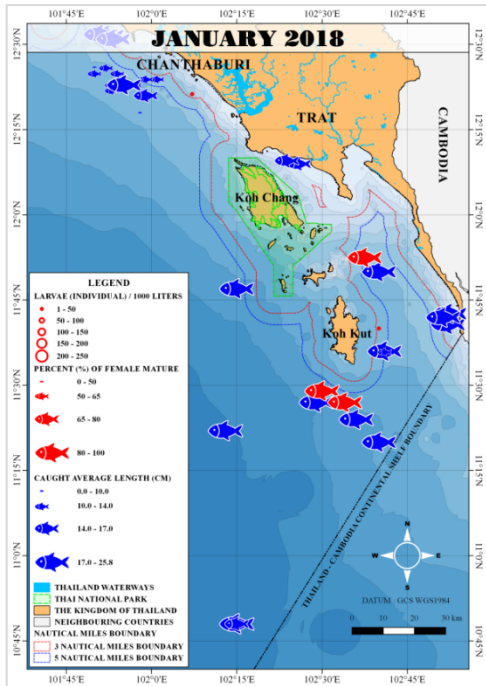


Figure 2: January

mature mackerel were found surrounding Koh Kood near the Cambodian waters. Over 80% of total mackerel were at maturity stage. Mackerel larvae were also found near Koh Kood

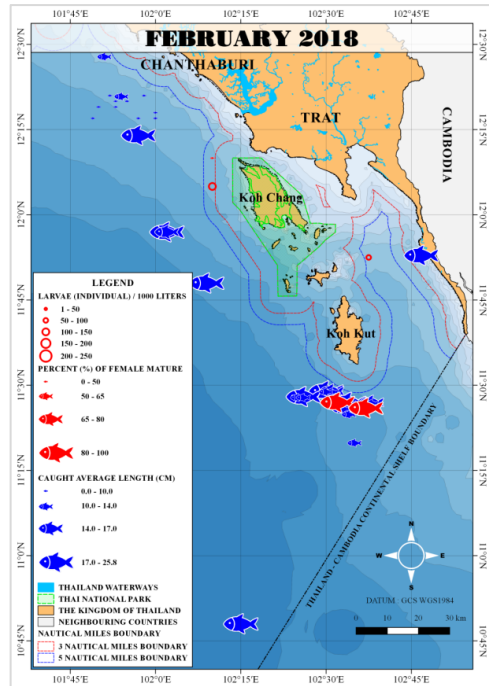


Figure 3: February

mature mackerel were found near Koh Kood, in front of Koh Yai, about 3-5 nautical miles from the coastline, as well as in front of Koh Chang. Over 80% of total mackerel were at maturity stage. Mackerel larvae were also found near Koh Chang.

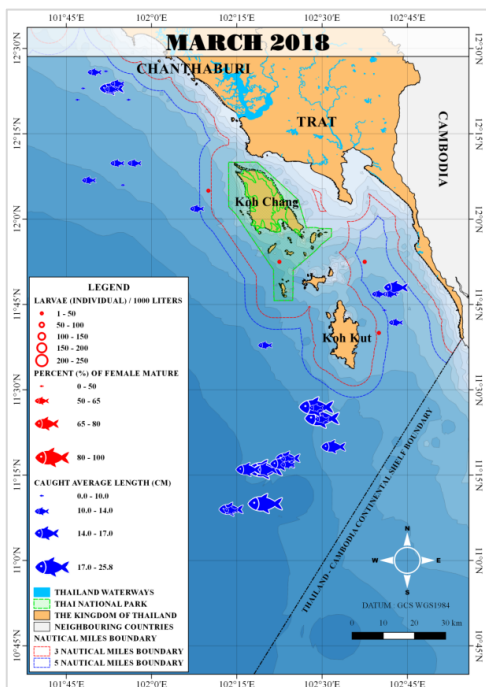


Figure 4: March

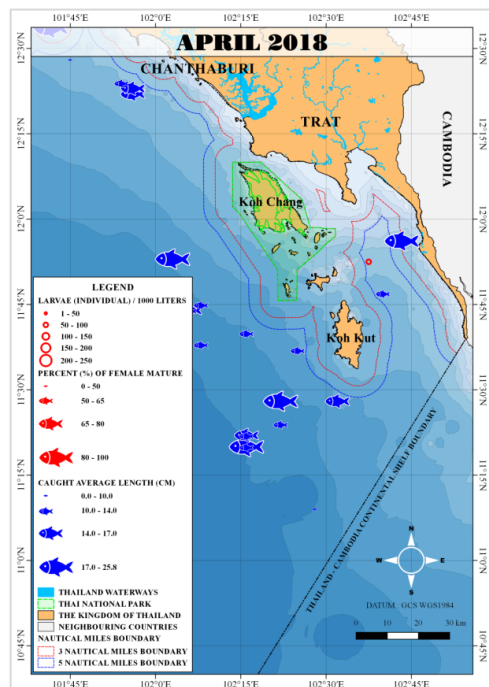


Figure 5: April

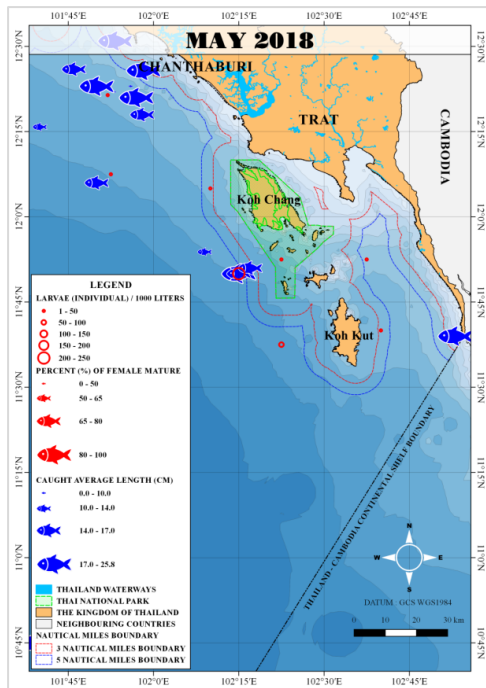


Figure 6: May

-mature mackerel were found at the areas of Klong Yai District, about 3-5 nautical miles from the coastline, as well as in front of Koh Chang. Mackerel larvae were also found surrounding Koh Kood and Koh Chang.

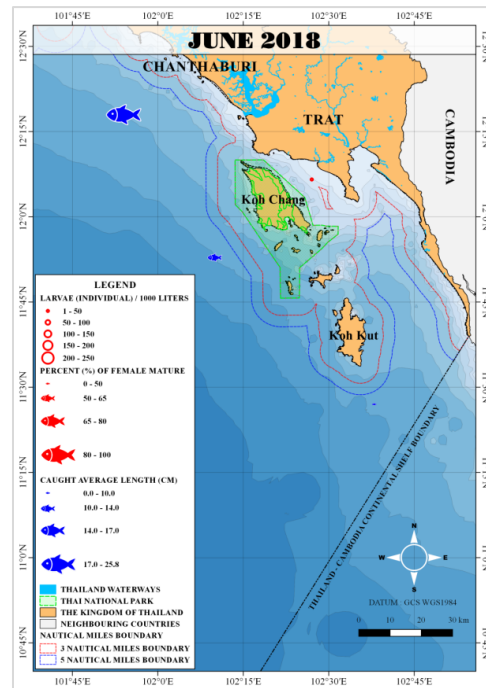


Figure 7: June

-mackerel were not found in Trat Province

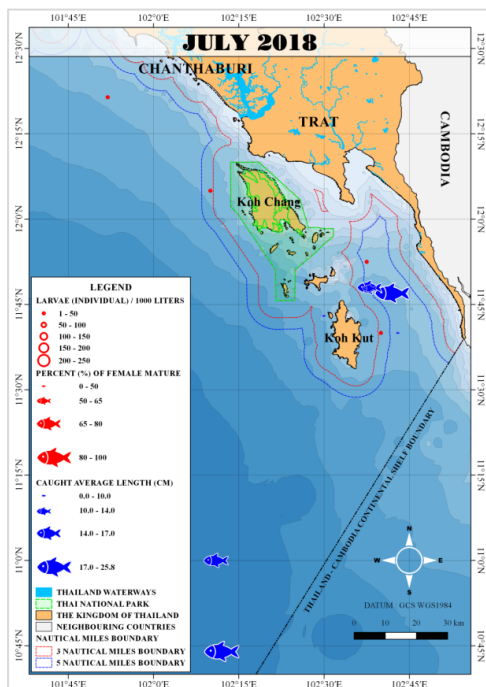


Figure 8: July

-Few mature fish were found in front of Klong Yai District, about 5-10 nautical miles from the coastline.  
-Few number of mackerel larvae were appeared.

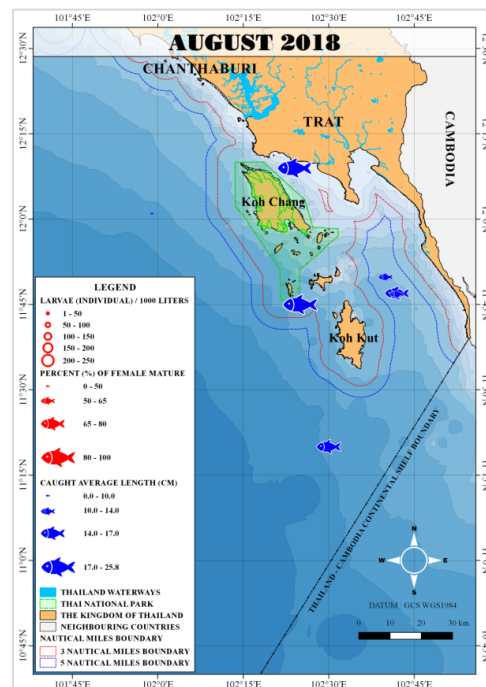


Figure 9: August

-Few mature fish were found at the areas of Koh Kood and Koh Chang.  
-Mackerel larvae was not found

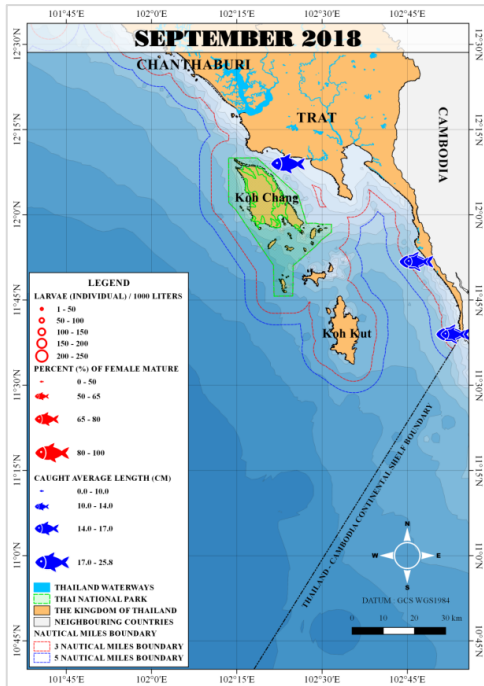


Figure 10: September

Few mature fish were found in front of Klong Yai District, and Chang Strait, about 5-10 nautical miles from the coastline. No mackerel larvae were appeared.

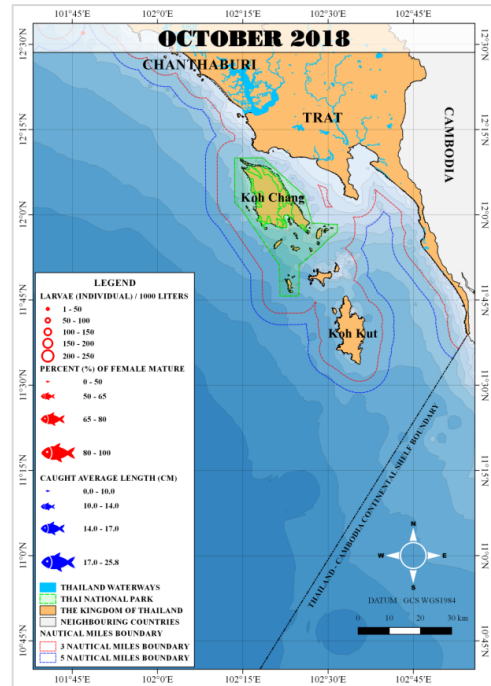


Figure 11: October

Mackerel were not found in the areas of Trat Province

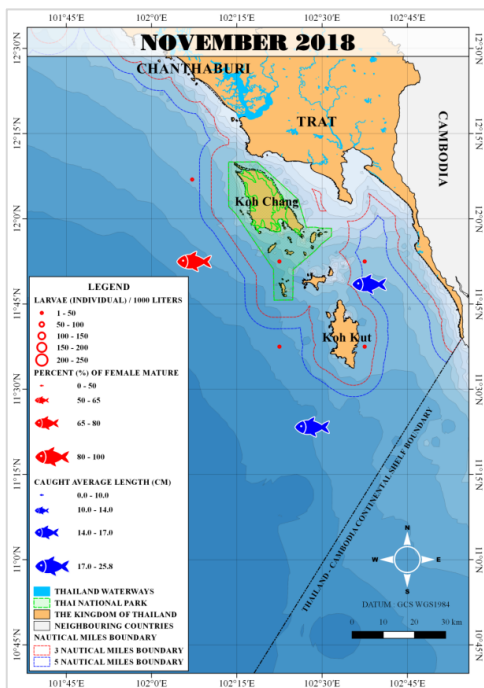


Figure 12: November

-Few mature fish were found in front of Klong Yai District and near Koh Kood.  
-Few number of mackerel larvae were appeared surrounding Koh Kood.

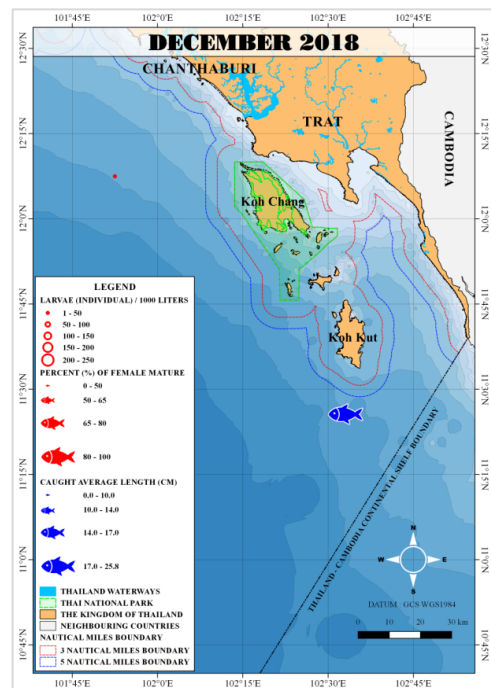


Figure 13: December

Few mature fish were found near Koh Kood.  
Mackerel larvae were also found.



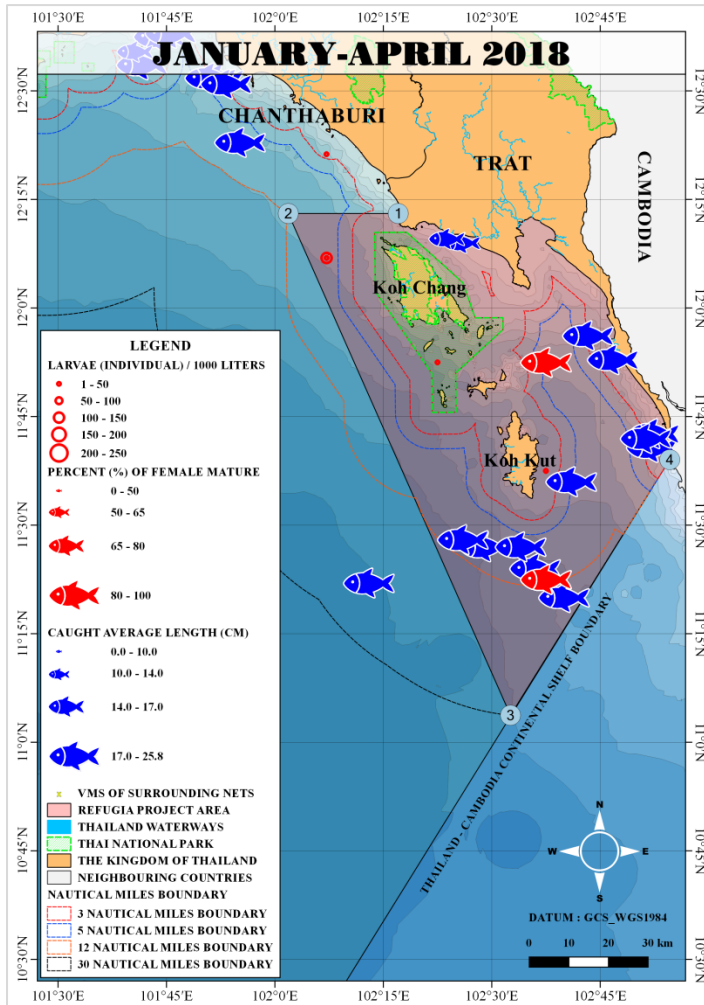


Figure 14: The peak of spawning season in January-April near Koh Kood and Koh Chang, Trat Province.

## ANNEX 11

# BIOLOGICAL STUDY OF SHORT MACKEREL IN KOH KONG, CAMBODIA

### I. INTRODUCTION

Short mackerel (*Rastrelliger brachysoma*) is a pelagic fish that tolerates slightly reduced salinities in estuarine habitats and occurs in areas where surface temperatures range between 20 and 30° C. This marine fish species found disperse along the coast throughout the major part of the Central Indo-West Pacific region, including Viet Nam, Cambodia, Thailand, Myanmar, Malaysia, Indonesia, Papua New Guinea, Philippines, Solomon Islands and Fiji. Considering the decreasing number of the wild population of Short mackerel, mainly due to the overfishing and the deterioration of the environment. The major source of this fish has been only from the capture fishery, which is not enough to meet for consumer demand. Therefore, incorporate strategies that aim to work towards better management of fisheries and marine habitats are needed to complement the management measures for sustainable fisheries.

### II. REQUIRED SCIENCE-BASED INFORMATION FOR MANAGEMENT

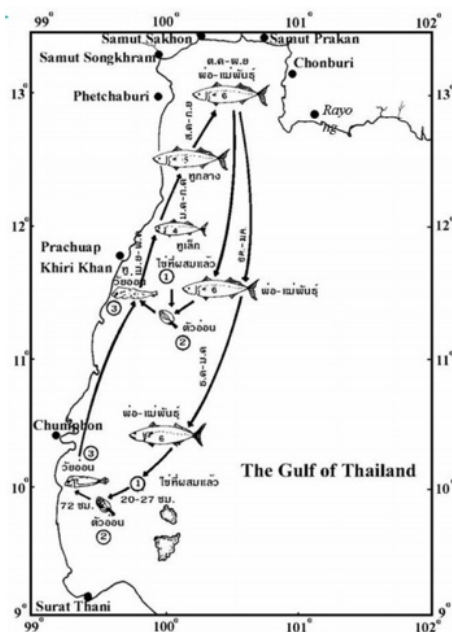


Figure 1: the migration patterns of short mackerel in the Gulf of Thailand by DOF.

The realistic approach to the sustainable utilization of fisheries resources is to integrate all knowledges not only on science but also local based information as well as applying the baseline information and ocean forecasting system that affects to the fisheries resources of short mackerel. Developing of any area-based approach fisheries management measures for short mackerel, therefore it is needed to understand the key important issues as follows:

#### A. Life cycle history

In the Gulf of Thailand, particularly the west and north coast, the migration patterns of short mackerel were discovered by the Department of Fisheries of Thailand (see Figure. 1). This spatially and geographically defined of spawning grounds, nursery grounds and their migration route are very important information for the management. However, lack of life cycle history in the eastern part of the Gulf of Thailand, in the coastal areas of Cambodia and South Viet Nam induce the low effectiveness of fisheries management for short mackerel by those countries.

#### B. Fishery Biological Consideration

As living populations or communities, aquatic living resources are capable of on-going renewal through the processes of growth in size and mass of individuals and additions to the population or community through reproduction (leading to what in fisheries is often called 'recruitment'). In a population at equilibrium, the additive processes of growth and reproduction on average equal the loss process of total mortality. For sustainable fisheries on short mackerel, it is required a total population is maintained above a certain abundance or biomass, but also that the age structure of the population is maintained in a state in which it is able to maintain the level of reproduction, and hence recruitment, necessary to replenish the

losses through mortality. But in fact, due to the declining of short mackerel stock due to fishing over a long period on selected portions of a stock, for example large individuals or individuals spawning at a specific time or locality within a wider spawning season or range, can reduce the frequency of the particular genetic characteristics giving rise to that feature or behavior. This has the effect of reducing the overall genetic diversity of the stock in principle. With reduced genetic diversity, the production potential of the population can be adversely affected, and it may also become less resilient to environmental variability and change. It is therefore needed to understand the overall genetic diversity of short mackerel in the Gulf of the Thailand. By these reasons, SEAFDEC supported by the Sweden Government conducted the survey in collaboration with coastal countries in the Gulf of Thailand namely Cambodia, Malaysia, Thailand and Viet Nam (SEAFDEC, 2018). The results of genetic analysis of 436 short mackerel samples from the coastal areas as shown in Figure 2 indicate that: 1) Population differentiation is found in the Gulf of Thailand; 2) Thailand populations are genetically different to each other in moderate level; 3) Cambodia, Vietnam, Malaysia and Pattani (Thailand) populations are genetically different to each other in low level. In addition, make use these genetic results focused in the Trat province where located nearby Cambodia border as shown in Figure 3, indicates that the short mackerel harvested off Trat province consisted of 42.48% from Cambodia, 35.63% from Malaysia and 3.86% from Viet Nam, while only 18% from Thai waters.

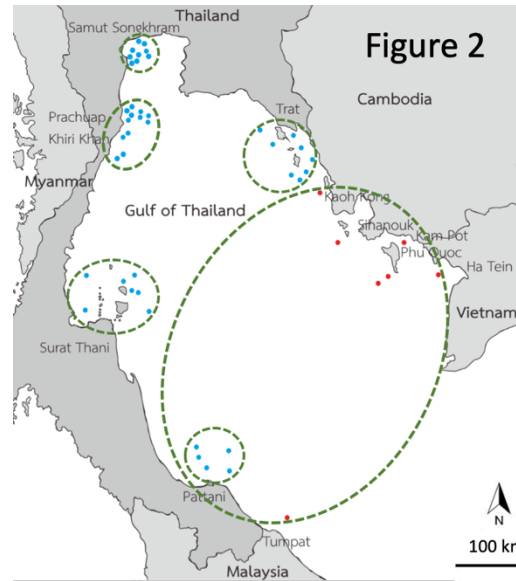
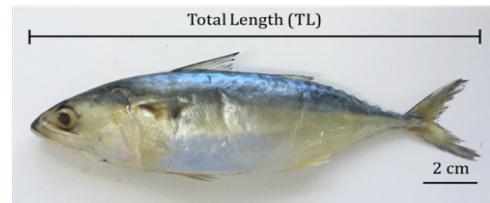
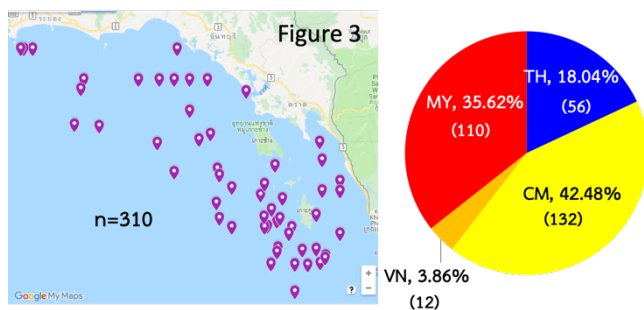


Figure 2: Map indicating sampling localities and population differentiation of Short mackerel in the Gulf of Thailand.



n=310; mean TL±SD = 16.65 ± 1.38 cm

Figure 3: the contributions of the Short mackerel populations in the Gulf of Thailand by DOF according to the origin by countries in year 2014.

### C. Environment Parameters

The oceanography and biogeochemical characteristics determine the abundance, growth, survival, and recruitment of marine resources and significantly influence the magnitude of fisheries in the sea. A study on Indo-Pacific Mackerel (Short Mackerel) Resource in Relation to Sea Surface Environment in The Gulf of Thailand had conducted. The study was aimed to investigate changes of Chlorophyll-a and sea surface temperature using satellite data along with a relationship between Short mackerel resource actual data from field survey sample and Chlorophyll-a and sea surface temperature. The study results indicated the relative between sea surface temperature, chlorophyll-a and planktons which fishes including Short mackerel's feed (confirmed by stomach content study) as shown in Figure 4 and Figure 5. The overall results revealed that environment in the sea have changed especially a rising in sea surface temperature which

might be a reason for the period of peak sex organ development in Short mackerel had a bit shift from normal (Methee et al.,2017).

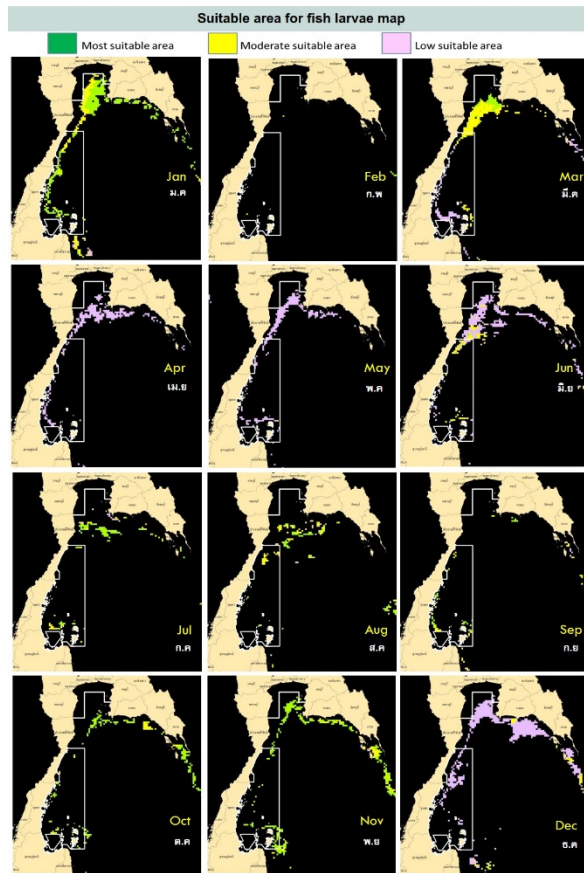


Figure 4: suitable area for fish larvae map generate by MODIS data in year 2015.

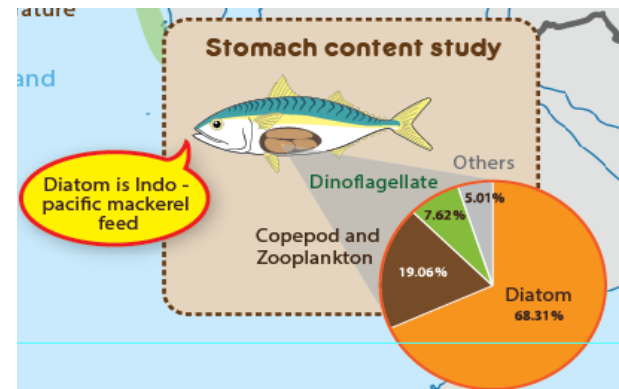


Figure 5: Stomach content of Short mackerel in Prachuap Khiri Khan Province, Thailand during 2013.

### III. ENHANCING INFORMATION OF SHORT MACKEREL IN CAMBODIA

Thus, it was acknowledged that Short mackerel is common in Cambodian waters but there is limited knowledge as compared to that of the western part of the Gulf of Thailand on the migratory patterns, and where the most important spawning area of Short mackerel is, etc. However, it is expected that similar pattern exists for the eastern Gulf, even down to the waters of Vietnam. The pattern of migration during critical stages of the lifecycle needs to be studied with the scientific base. Here the aim is, through the establishment of refugia, to ensure the sustainable use of important fisheries resources during critical stages of their life cycle by specific management measures on their habitats. In connection with progressive results from the project implementation, The Project Coordinating Unit of the SEAFDEC/UNEP/GEF Fisheries Refugia project (PCU) in cooperation with Fisheries Administration Cambodia (FiA) was conducted a Technical Training to officers from Fisheries Administration/Cambodia on Biological Studies of Short Mackerel (*Rastrelliger brachysoma*) during 11<sup>th</sup> to 15<sup>th</sup> February 2019. The specific subjects are focused on species identification, maturity stage identification, and methodology for larval and juvenile fish surveys in the coastal areas of Koh Kong Province, Cambodia. The information to be obtained from these studies is as follows:

- ❖ Biological data:
  - Monthly size composition of short mackerels
  - Length-weight relationship
  - Length at first maturity
  - Sex ratios
  - Spawning season determination from Gonadosomatic Index (GSI) and % of maturity
  - Stock unit/population structure using DNA analysis methods
- ❖ Larval and juvenile fish surveys:



- Monthly larval and juvenile fish species and composition in coastal area of Koh Kong province
- Phytoplankton, zooplankton, sea surface temperature and salinity, etc.
- Etc.

#### **IV. MANAGEMENT OF TRANSBOUNDARY SHORT MACKEREL SPECIES**

The Project Coordinating Unit of the SEAFDDEC/UNEP/GEF project on Fisheries Refugia in collaboration with the National Lead Agency on Fisheries Refugia in Cambodia and Thailand will work together to understand more on the transboundary species, short mackerel. Furthermore, it is believed that based on the project implementation by both Cambodia and Thailand, the sub-regional cooperation for management of short mackerel refugia between Thai-Cambodia can be established by 2020. By this reason, the scientific data/information sharing among two countries for identification of fish refugia such as spawning ground, nursery ground and migratory route are required.

## ANNEX 12

### FRIGATE TUNA DATA TRENDS IN THE WEST PHILIPPINE SEA

#### I. Introduction

Tuna fishing is one of the major sector of the fishing industry in the country. Among the major tuna species caught in both coastal and offshore waters are the small tunas such as. frigate tuna, bullet tuna, eastern little tuna and the oceanic tuna namely skipjack tuna, yellowfin tuna and bigeye tuna. Catches of these tuna species varies from year to year. Purse seine, ringnet and handline are the major gears in catching tunas. Other gears used in catching tunas are, hook and line, multiple hook and line, troll line, drift gillnet, bottom set gillnet, danish seine, bagnet, etc. Roundscads and other small pelagic species are also caught by the gears mentioned above.

The fishing sector is classified into two categories namely, the commercial and municipal fishing sectors. The municipal fishing sector operates by using fishing boats less that 3 gross tonnage (GT) and operates within the municipal waters which is measured 15 km from the coastline at low tide while the commercial fishing sector operates by using more than 3 GT fishing vessels and are not allowed to fish within the municipal waters.

West Philippine Sea (WPS) is an important fishing ground for both the municipal and commercial fishing sectors of the coastal municipalities facing the WPS. This includes the provinces comprising the Administrative Regions of the country namely Regions 1 and 3 out of the 16 administrative Regions of the country

The Philippine Statistics Authority (PSA) is the official government agency that collects and publish the annual Philippine Fisheries Statistics. The data collected by the PSA is used for national account and planning purposes for the fisheries sector. The Bureau of Fisheries and Aquatic Resources (BFAR) through the National Stock Assessment Program (NSAP) also collect fisheries data to be used as basis in formulating policies and regulations for fisheries management.

#### II. Catch by Fishing Ground and Gear

In Region 1 or Ilocos Region, the fishing grounds are Northwest Philippine Sea-Ilocos Coast, WPS-Lingayen Gulf by the commercial fishing sector while the fishing vessels under the municipal fishing sector are fishing in the coastal or nearshore fishing grounds of the WPS and the inner portion of Lingayen Gulf.

In Region 3 or Central Luzon, the fishing ground is mainly the West Philippine Sea both for the commercial and municipal fishing sectors. The catch are unloaded in the three major landing centers namely: Subic Fishing Port, Subic, Zambales, Matalvis, Masinloc, Zambales and Misa, Sta. Cruz Zambales

#### III. Catch Trends

The data used in this report were taken from the report of the National Stock Assessment Program from Region 1 Ilocos Region and Region 3 Central Luzon. There were years and months that data were not available or no fishing operations done during those years and months.

- Ilocos Coast, Lingayen Gulf and West Philippine Sea

Data from the NSAP showed that catch varies from year to year, month to month and day to day in terms of volume and effort. The NSAP has a regular scheme in data collection in each of the identified landing centers. While there is a regular sampling days, this is dependent to the availability of funds and staff to conduct the scheduled sampling days.

The catch from the Ilocos coast are landed in the different landing centers in each of the municipalities bordering the Ilocos coast. This is also true to the catch from Lingayen Gulf and West Philippine Sea. The data available for this report are the catch from 2012 to 2016 for Ilocos Coast, Lingayen Gulf for years 2014 and 2015 and West Philippine Sea from 2014 to 2016.

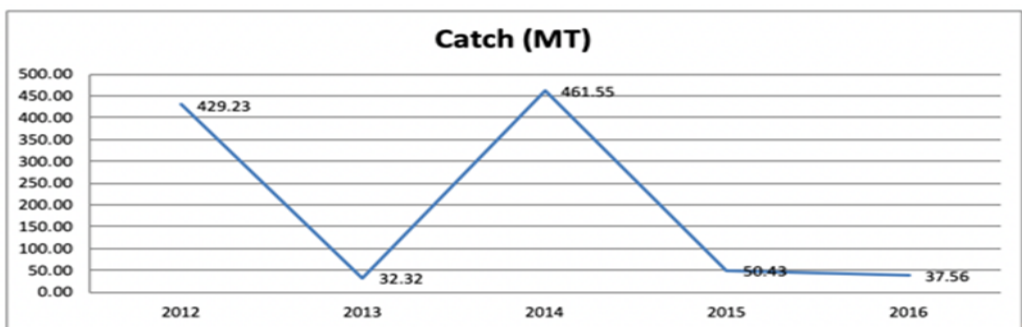
The total catch from Ilocos Coast in 2012 was 429.23 mt and decline to 32.32 mt in 2013 and again increased to 461.55 mt and showed a decreased in 2015 and 2016 at 50.43 mt and 17.56 mt respectively. The recorded catch in Lingayen Gulf was for three years only. In 2013, the total catch was 398.1 mt, then no data was recorded in 2013, then followed by 8.15 mt in 2014 and 0.625 mt in 2015. There was no data in 2012 and 2013 in the West Philippine Sea while the catch in 2014 was recorded to be 0.221 mt and in 2015 at 0.625 mt and increased to 28 mt in 2016 (Appendix 1).

There are three major landing centers in Region 3 Central Luzon facing the West Philippine Sea, namely: Sta. cruz, Zambales, Masinloc, Zambales, the fisheries refugia project site and Subic, Zambales where both commercial and municipal fishing vessels are unloading their catch as there is a fishing port provided by the municipality. The data available for this report are from 2011 to 2017 in Sta Cruz, 2010 to 2017 in Masinloc, 1999 to 2001 then 2010 to 2017 in Subic.

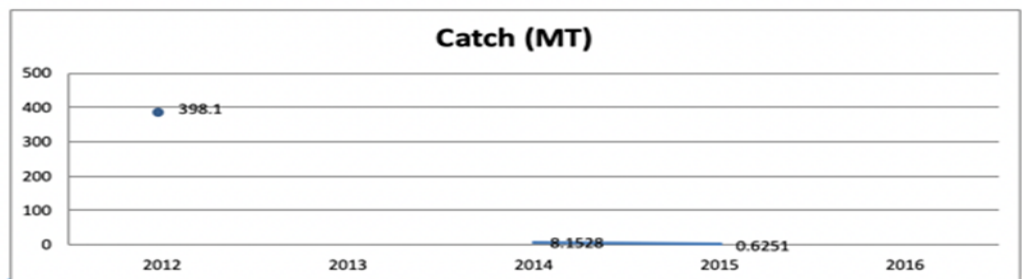
In Sta. Cruz, the data was observed to be 1174.02 mt in 2011 then declined in 2012 (913.5 mt) increased in 2013 (1005.28 mt) and 2014 ((1594.47 mt) and showed a declining trend from 2015 to 2017 (Annex 2). In Masinloc, the highest catch recorded was 1,340.54 mt in 2010. In 2011 the catch recorded was only 87.12 mt. There was no catch recorded in 2012. In 2013, the catch was recorded at 24.6 mt then increased in 2014 (544.36 mt) and decreased in 2015 (494.4 mt) and again increased in 2016 (831 mt) and decreased to 452.64 mt in 2017. In Subic, the catch from 1999 to 2001 was recorded at 77.28 mt, 135.66 mt and 30.73 mt respectively. From 2010 the catch are as follows: 2010-3,035 mt, 2011-2,581.96 mt and in 2012-183.4 mt. There was no catch recorded in 2013. The recorded catch in 2014 was 7.20 mt, then in 2015 and 2016, 58.64 mt and in 2017 33.24 mt (Appendix 2).

Appendix 3 and 4 present the years and months used for this report with catch observed/recorded. There were several years observed to have no catch recorded as well as months without catch recorded. In some instances, there was only a month catch in a year used in this report.

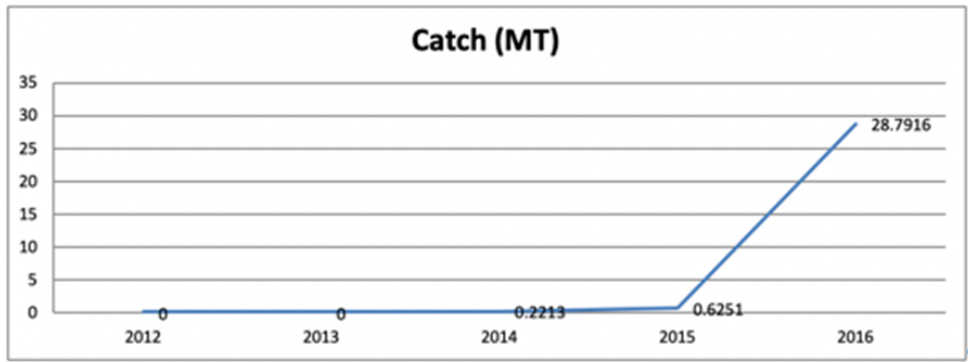
**Appendix 1: Region 1 Catch trend**



Ilocos coast catch trend

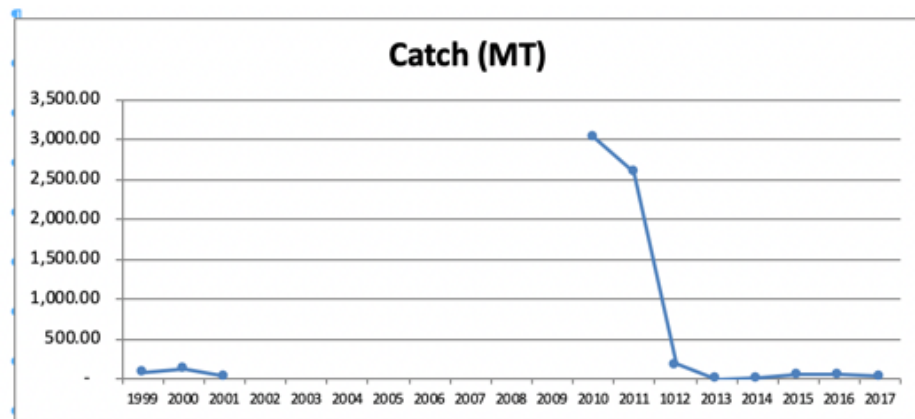


Lingayen Gulf catch trend

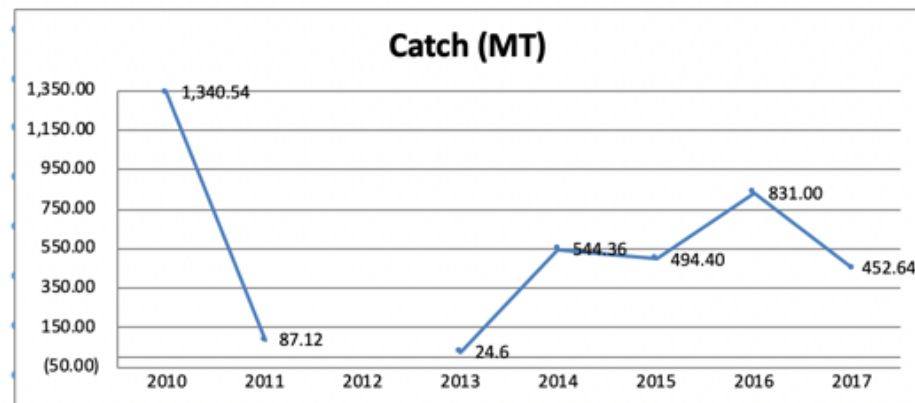


WPS etc catch trend

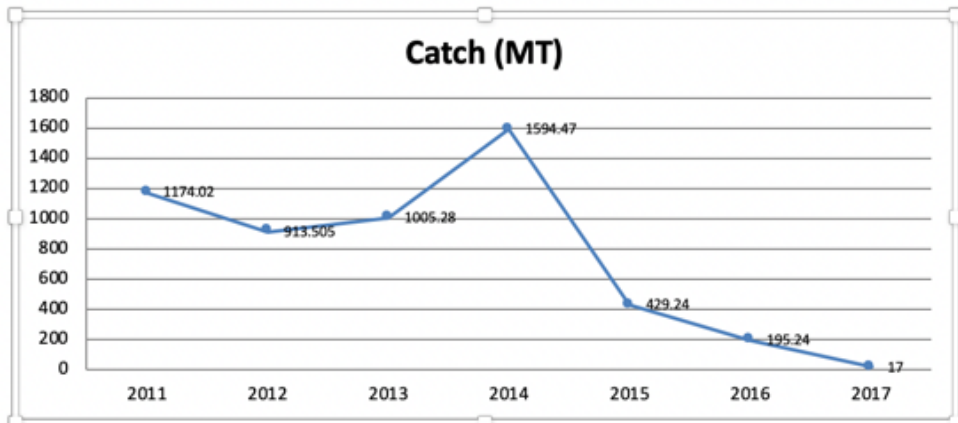
Appendix 2: Catch (mt) trend of frigate tuna in Region 3 Central Luzon



A. Subic, Zambales



B. Masinloc, Zambales



C. Sta. Cruz, Zambales



**Appendix 3: Region 3 summary of Years and months with fishing operations (by landing Center)**

	Subic, Zambales		Masinloc, Zambales		Masinloc, Zmbales	
YEAR	Months with data	Months w/o data	Months with data	Months w/o data	Months	Months w/o data
1999	3,4	10				
2000	4,6,7,10,11,12	6				
2001	3,5,6	9				
2002-2009						
2010	8,9,10,11,12	7	1,4,6,10,11,12	6		
2011	1	11	1,5,	10	1,6,7,8,9,10,11,12	4
2012	5,6,7	9			1,2,5,6	8
2013			5	11	5,9,10,11,12	7
2014	5	11	3,5,6,7,8,9,10,11,12	3	1,4,5,6,7,8,11	5
2015	5,6	2	1,2,3,5,6,8,9,10,11,12	2	5,7,8,9,	8
2016			1,2,3,4,5,6,8,9,10,11,12	1	5,6,9,12	8
2017	5	11	1,2,3,4,6,7,8,9,10,11,12	1	10	

Source: NSAP Region 3

**Appendix 4: Region 1 summary of Years and months with fishing operations ( by Fishing Ground)**

	West Philippine Sea – Ilocos Coast, Lingayen Gulf		Lingayen Gulf		Ilocos Coast, Northwest Philippine Sea	
YEAR	Months	Months w/o data	Months	Months w/o data	Months	Months w/o data
2012			1,2,3	9	5,7,10,12	8
2013					3,4,5,6,7,	7
2014	6	11	6,7	10	6,7	10
2015	2	11	2	11		
2016	1	11				

Source: NSAP Region 1

## ANNEX 13

# REGIONAL STUDY ON FRIGATE TUNA GENERAL INFORMATION

### I. GENERAL INFORMATION

#### Classification / Names

Actinopterygii (ray-finned fishes) > Perciformes (Perch-likes) > Scombridae (Mackerels, tunas, bonitos) > Scombrinae

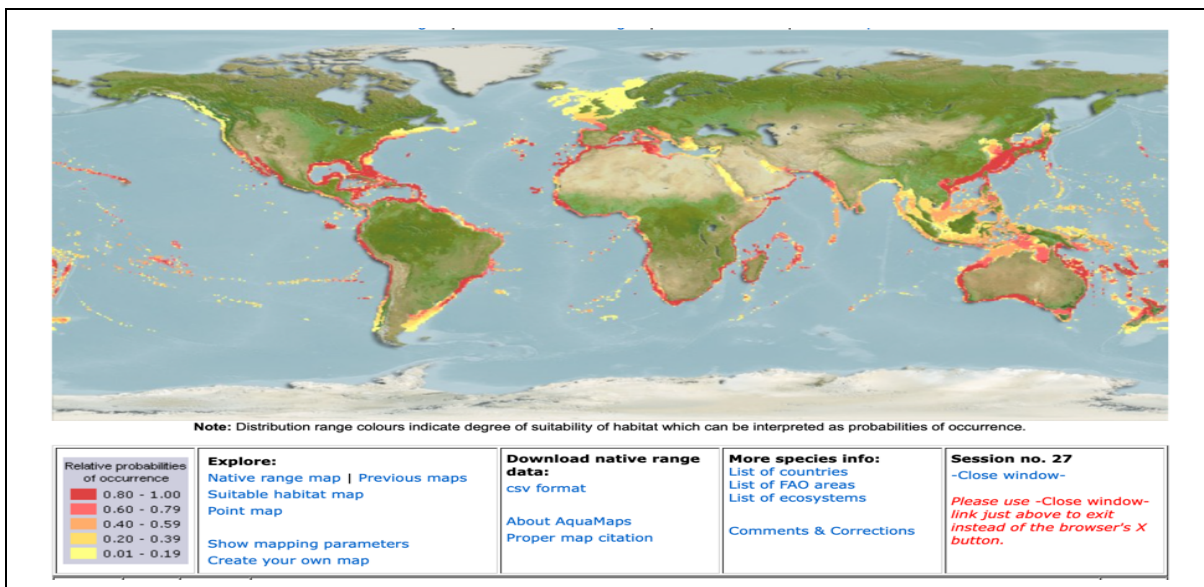
Eymology: Auxis: Greek, auxis = a variety of tunna (Ref. 45335). More on author: Lacepède.

#### Environment: climate zone / depth range / distribution range Ecology

Marine; pelagic-neritic; oceanodromous (Ref. 51243); depth range 50 - ? m (Ref. 9340). Tropical; 27°C - 28°C; 61°N - 51°S, 180°W - 180°E

#### Distribution Countries

Atlantic, Indian and Pacific (Western Central). Eastern Pacific population recognized as subspecies *Auxis thazard brachydorax* (Ref. 32349). Many authors have used the name *Auxis thazard* as including *Auxis rochei* in the belief that there was only a single worldwide species of *Auxis*. Highly migratory species, Annex I of the 1982 Convention on the Law of the Sea (Ref. 26139).



#### Length at first maturity / Size / Weight / Age

Maturity: Lm 29.5, range 29 - ? cm

Max length : 65.0 cm FL male/unsexed; (Ref. 29114); common length : 60.0 cm TL male/unsexed; (Ref. 47377); max. published weight: 1.7 kg (Ref. 40637); max. reported age: 5 years (Ref. 29114)

#### Short description Morphology | Morphometrics

Dorsal spines (total): 10 - 12; Dorsal soft rays (total): 10-13; Anal spines: 0; Anal soft rays: 10 - 14. This species is distinguished by the following characters: a robust body, elongated and rounded; teeth small and conical, in a single series; total gill rakers on first gill arch 36-42; dorsal fins 2, D1 X-XII, separated from the second by a large interspace (at least equal to length of first dorsal-fin base), second dorsal fin followed by 8 finlets; anal fin followed by 7 finlets; pectoral fins short, but reaching past vertical line from anterior margin of scaleless area above corselet; a large single-pointed flap (interpelvic process) between pelvic fins; body naked except for the corselet, which is well developed and narrow in its posterior part (no more than 5 scales wide under second dorsal-fin origin); a strong central keel on each side of caudal-fin base between 2 smaller keels. Colour of back bluish, turning to deep purple or almost black on the head; a pattern of 15 or more narrow, oblique to nearly horizontal, dark wavy lines in scaleless area above lateral line; belly white; pectoral and pelvic fins purple, inner sides black (Ref 9684).

### Biology

Adults are epipelagic in neritic and oceanic waters (Ref. 9340). They feed on small fish, squids, planktonic crustaceans (megalops), and stomatopod larvae (Ref. 5213). Because of their abundance, they are considered an important element of the food web, particularly as forage for other species of commercial interest. They are preyed upon by larger fishes, including other tunas (Ref. 9987). Marketed fresh and frozen (Ref. 9340) and also utilized dried or salted, smoked and canned (Ref. 9987).

### Life cycle and mating behavior

In correlation with temperature and other environmental changes, the spawning season varies with areas, but in some places it may even extend throughout the year.

### Main reference

FISHBASE: <https://www.fishbase.de/Summary/SpeciesSummary.php?ID=94&AT=frigate+tuna>

## II. REGIONAL STUDIES<sup>1</sup>

1. Tuna and tuna-like species are recognized as the most promising target species in off-shore waters of Vietnam. The first studies on biology of tuna were conducted in 1960. To ensure the sustainable exploitation of tuna resources in off-shore waters, studies on biology of tuna are being carried out by the Research Institute of Marine Products.
2. Materials on biology of tuna were collected on board of research and commercial vessels. Fishing gears were drift gillnets with different mesh-size and longline.
3. The results of study showed that tuna and tuna-like species are distributed widely in both neritic and oceanic waters of Vietnam. The percentage of Skipjack tuna caught by gillnet in total catch was highest (25.3%) then followed by Frigate tuna (8.9%) and Bullet tuna (3.4%). Yellowfin and Bigeye tunas were dominant in catch by longline.
4. Biological characteristics of Frigate Tuna length frequency distribution, reproduction, feeding, growth and recruitment, mortality rate were described as follows:

#### 4.1 Length frequency distribution

- Size of Frigate tuna caught in the Southwest monsoon period ranged 23.5-43.0 cm with the mean length of 34.5 cm, mode of 39.0 cm and in the Northeast monsoon ranged 26.5- 45.0 cm

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<sup>1</sup> **Study on Biology of Tuna in the South China Sea, Area IV; Vietnamese Waters by Dr. Chu Tien Vinh** (*Proceedings of the SEAFDEC Seminar on Fishery Resources in the South China Sea, Area IV : Vietnamese Waters*)

with the mean length of 36.7 cm. It shows the size caught in Northeast monsoon was a little bit larger than in Northeast monsoon.

- For the whole year, Frigate tuna have length ranged from 23.5 - 45.0 cm and weight ranged 0.1 to 1.9 kg respectively. The mean length of Frigate tuna captured by gillnet of mesh- size 73mm was 35.3 cm, of 95mm - 40.3 cm, of 123mm- 35.9 cm, of 150mm- 36.9 and of 160 mm- 37.3 cm.
- Total length and fork length relationship was:  $L_f = 0.9372 L_t + 3.1655$  and  $r^2 = 0.9856$

#### 4.2 Length-weight relationship

- Length-weight relationship of both sexes was:  $W = 0.0113 \times L^{3.1547}$ ,  $r^2 = 0.9298$

#### 4.3. Reproduction

- In the Southwest monsoon, 10.0 % and 16.7 % of females having gonads of IV and VI stage respectively, and 2.2 % of resting stage [ Fig.22 ]. In this period, the ratio of male and female was 1.7: 1. It showed that the spawning season of Frigate mackerel is in this monsoon period with the peak in April-June.
- In the Northeast monsoon, only 8.8 % of female having gonads belonged to IV stage, in this time the ratio of male and female was 1.5 : 1 [ Fig. 23 ].

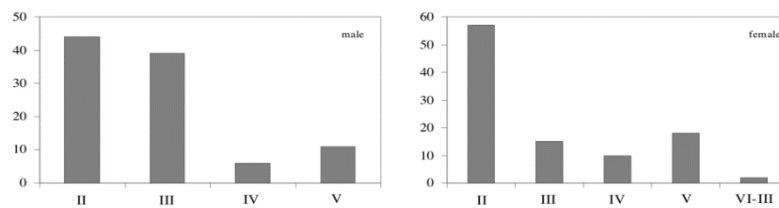


Fig. 22. Maturity stage of Frigate mackerel in Southwest monsoon.

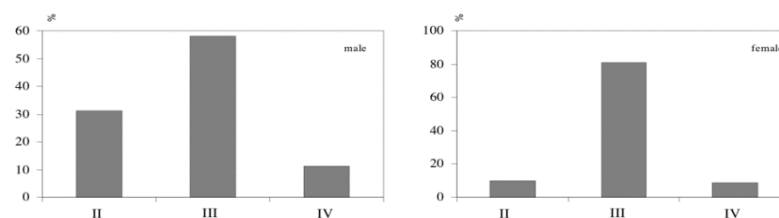


Fig. 23. Maturity stage of Frigate mackerel in Northeast monsoon.

- The absolute fecundity of females of 36.5-40.0 cm ranged 129,648- 357,006 eggs. Size at first maturity was about 34 cm.( 2 years group ).
- In Thailand Gulf, the length of first maturity of Frigate mackerel was 31 cm, and fecundity of fish of length 31-39 cm ranged 78.000- 719.900 eggs. [Yesaki ( 1994 )].

#### 4.4 Feeding

- In the Southwest monsoon, stomach fullness of 3 and 4 degree accounted only for 4.88 % while in the Northeast monsoon 18.44 %.

Degree of stomach fullness of Frigate mackerel.		
Degree of fullness	Southwest monsoon (%)	Northeast monsoon (%)
0	25.61	64.54
1	61.38	5.67
2	8.13	11.35
3	4.88	17.02
4	0	1.42

- Squid and Shrimp were often found in their stomach.



4.5. Growth and recruitment

Areas	Growth parameters			Length at age			Authors
	K	L8	t <sub>0</sub>	1	2	3	
West of Java West coast of Thailand	0.70	47.5		24	36	42	Dwiponggo et al.,1986
Sri Lanca	0.80	47.2		26	37	43	Yesaki, 1994
India	0.54	58.0		25	39	47	Joseph et al.,1986
	0.49	63.0	-0.270	29	42	50	Silas et al,1985

- Growth parameters and length at age of Frigate tuna.

Parameters of the von Bertalanffy growth equation was estimated as follows:  
 $L_8 = 49.02 \text{ cm}$ ,  $K = 0.426$ ,  $t^0 = -0.867$

4.6. Mortality rate

- Total mortality.  $Z=1.44$ ,
- Natural mortality  $M=0.67$ ,
- Fishing mortality.  $F=0.77$ and
- exploitation rate  $E = 0.53$

## ANNEX 14

### BEST PRACTICE FISHING GEARS AND METHODS

#### I. ISSUES AND THREATS FROM FISHERIES TO COASTAL RESOURCE AND HABITAT IN THE SOUTH CHINA SEA

The South China Sea is a global centre of shallow water marine biological diversity that supports significant fisheries that are important to the food security and export income of Southeast Asian countries. These fisheries are characterised by high levels of fishing effort from the small-scale sector. Accordingly, all inshore waters of the South China Sea basin are subject to intense fishing pressure. This situation of high small-scale fishing pressure and declining fisheries resources has contributed to the adoption of unsustainable fishing methods to maintain catch and increase incomes in the short-term. These include the use of destructive fishing gear and practices, such as the operation of demersal trawls and push nets in seagrass areas, and the detonation of explosives and release of fish poisons in coral reef areas. Small-scale inshore fishing pressure has therefore been identified as a significant cause of the degradation and loss of coastal habitats in the South China Sea. By these reasons, the rate of loss of coastal habitats has been implemented by countries bordering the South China Sea, the decadal rate of loss of such habitats remains high, e.g., seagrass beds (30 percent), mangroves (16 percent), and coral reefs (16 percent)(Vo et al, 2013)<sup>1</sup>. This continued decline in the total area of habitats critical to the life cycles of most aquatic species, combined with the high levels of coastal community dependence on fish, has raised serious concerns for the long-term sustainability of small-scale fisheries in the region. With fish production being intrinsically linked to the quality and area of habitats and the heightened dependence of coastal communities on fish, a need exists to improve the integration of fish habitat considerations and fisheries management in the region.

#### II. THE USE OF DESTRUCTIVE AND/OR UNSUSTAINABLE FISHING GEAR AND PRACTICES IN THE SOUTH CHINA SEA

This issue is prevalent across a range of fisheries and habitat types in the South China Sea. For example, destructive and/or unsustainable fishing gear and practices have been identified as key threats to fish stocks and their habitats in the mangrove areas at Trat in Thailand and at Batu Ampur in Indonesia, the extensive seagrass areas of Bolinao in the Philippines and Kampot in Cambodia, and at the regionally significant coral reef areas at Belitung in Indonesia, Masinloc in the Philippines and Phu Quoc in Vietnam. The destructive and/or unsustainable fishing gear and practices in the SEA was reported as follow:

**Push netting and inshore trawl fishing** cause habitat impacts and selectivity issues. Catches in these gear types from inshore waters are largely composed of juveniles, and at high fishing effort levels are thought to contribute to growth over-fishing in South China Sea basin. Such a situation hinders fisheries management efforts which largely focus on development of sustainable livelihoods and is a key threat in inshore where push nets are used extensively over seagrass beds to take juveniles of the economically important species.

**Digging and gleaning** of seagrass beds and mangrove forests is an area of concern at a majority of the priority *refugia* sites in the South China Sea. Growing demand for seafood in local markets has resulted in a marked increase over recent years in the number of people digging for sipunculid worms, gastropods, and

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<sup>1</sup> Vo, S.T., Pernetta, J.C., Paterson, C.J., 2013. Status and trends in coastal habitats of the South China Sea. *Ocean and Coastal Management* 85, 152-162.

crustaceans in the seagrass beds, leading to damage of seagrass plants, de-stabilisation of sediments (and subsequent erosion), and the over-exploitation of benthic organisms. Intensive digging and grazing in some mangrove areas is considered to be contributing to the occurrence of dwarf, low-density mangrove stands at several sites due to disturbance of mangrove roots and seedlings.

**Blast fishing, poisons, and unselective fishing gears/practices** are well-known and documented threats to fisheries and habitats in nearly all areas of the South China Sea. These fishing practices often result in mortalities of a wide range of size-classes of target and non-target species, contributing to both growth and recruitment over fishing. The effects of blasting on the physical structure of coral communities is of particular concern, and the occurrence of blast fishing “craters” on heavily blasted reefs has a major impact on coral reef associated fish assemblages. Non-selective fishing gears, such as trammel nets, are utilised in most fished coral reef areas along the South China Sea coast. The use of unselective fishing gear and practice/method, such as luring light purse seine in Thailand<sup>2</sup> and large scale lift net with light in Indonesia<sup>3</sup>, has been identified that those are an environmental-unfriendly fishing practice due to catching of immature stock, high rate of by-catch and discard. Those unselective fishing activities are causing problem of declining of fisheries resources. The growing need to minimise the impacts of such practices on critical habitats necessitates the development of best practices in the management of these problems.

### III. FISHERIES COMPONENT OF STRATEGIC ACTION PROGRAMME FOR THE SOUTH CHINA SEA

Taking into accounts above concerns, this project entitled “*Establishment and Operation of a Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand*” has been developed to meet this need via implementation of the fisheries component of the Strategic Action Programme for the South China Sea. The development of the fisheries component of the South China Sea SAP recognised that the achievement of the SAP targets depends on successful national management of fisheries *refugia*. In support of this, priority national level actions for SAP implementation were identified as: (1) the designation and operational management of priority fisheries *refugia* sites; (2) development of the enabling environments for fisheries *refugia* management at national and provincial levels, including policy reforms and enhancement of the science and information base for *refugia* management; (3) capacity development through improved information management and dissemination; and (4) strengthened national coordination for fisheries *refugia* management. Therefore, the project entitled “*Establishment and Operation of a Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand*” was developed by comprise of the following 4 project components as follow;

- Component 1. Identification and management of fisheries and critical habitat linkages at priority fisheries *refugia* in the South China Sea and Gulf of Thailand
- Component 2. Improving the management of critical habitats for fish stocks of transboundary significance via national and regional actions to strengthen the enabling environment and knowledge-base for fisheries *refugia* management in the South China Sea and Gulf of Thailand Which including 9 sub components.
- Component 3. Information Management and Dissemination in support of national and regional-level implementation of the fisheries *refugia* concept in the South China Sea and Gulf of Thailand
- Component 4 National and regional cooperation and coordination for integrated fish stock and critical habitat management in the South China Sea and Gulf of Thailand

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<sup>2</sup> Piyachoke and team, 2012. Anchovy Fisheries in the Gulf of Thailand, Technical Paper of Department of Fisheries Thailand, 18, 56 p.

<sup>3</sup> Ogunola, O. S., Onada, O. A., 2016. Fishing with Light: Ecological Consequences for Coastal Habitats. International Journal of Fisheries and Aquatic Studies 2016, 4(2), 474-483.

Focusing to Component 2, the objective of this component is focuses on strengthening the enabling environment for the formal designation and operational management of *refugia*. Additionally, the component will lead to considerable stress reduction. Specifically, the demonstrations of best practice fishing methods and practices aimed at addressing key threats to fish stock and critical habitat linkages, and the adoption of supporting laws, will result in a 20% increase in vessels applying improved gear/techniques to safeguard fish stock and critical habitat linkages at priority sites. This component has identified one important of national level activities is Targeted *demonstration activities* which stated in the component 2.9. This Activities will support, guide and building up the National Fisheries Departments in establishing coastal fisheries management systems in priority fisheries *refugia* including create a trial approaches to reducing the effects of trawl and push net fishing on seagrass habitat, as well as to test the use of fishing gear and practices that reduce the capture of juveniles, pre-recruits and fish in spawning condition.

#### **IV. SUPPORTS TO FISHING GEAR MODIFICATION AND FISHING PRACTICE IMPROVEMENT FOR SUSTAINABLE FISHERIES RESOURCE UTILIZATION**

In year 2017-2018, The national lead agency of fisheries from participating country were organized a series of multi-stakeholder consultation at the local site including Kep province, Kampot province and Koh Kong province in Cambodia, Trat province and Surat Thani in Thailand, Bolinao, Mazinloc and Coron in Philippine, Kuala Baram and Tanjung Leman in Malaysia. The multi-stakeholder consultation at the local site was aimed to compiling the information, suggestion and issue on the coastal habitat from all local resource users. One part of the consultations was focus on the threat to fish life-cycle from fisheries base on the experiences from all stakeholders through casual chain analysis methodology. The results of the threat to fish life-cycle from the multi-stakeholder consultation were shown in Table 1.

To supporting the achievement of component 2, The demonstrations of best practice fishing methods and practices including test the use of fishing gear and practices to addressing key threats from fisheries will implementing at priority *refugia* sites. The site level management board will be establishing a coastal fisheries management system including create a trial approaches to reducing the effects of threat to coastal habitat and fisheries resources. Many options of fisheries management including fishing management were guide in the FAO technical guidelines for responsible fisheries No. 4 Suppl. 2 (FAO, 2003)<sup>4</sup>. The summarized of the option to manage the fishing was shown in the Table 2.

The Southeast Asian Fisheries Development Center(SEAFDEC) have long-time experience through implementing various project concerning the improvement of fishing gear and practice for sustainable coastal fisheries management in Southeast Asia country for example; 1. Juvenile and Trash Excluders Devices (JTEDs) to reduce capture of juvenile and small fish in Trawl fisheries, 2. Turtle Excluders Devices(TEDs) to release a sea turtle which incidental catch by trawl fishing, 3. Circle Hook(C-Hook) to prevent captures a sea turtle by longline fishing, 4. Voluntary approach on releasing the gravid blue swimming crab which catch by gillnet and trap fisheries, 5. Crab Bank project, 6. Assess the impacts of enlarging the trawl cod end *mesh size* from 2.5 cm - 4 cm, 5. Nursery/Spawning ground protection by various kinds of tools, and etc.

In this connection, the PCU in collaboration with the SEAFDEC/Training Department proposes to work on fishing gear modification and fishing practice improvement to support a Establishment of fisheries *refugia* at country levels. Workplans and selected country will be discussed during the RSTC2.

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<sup>4</sup> FAO Fisheries Department. The ecosystem approach to fisheries. FAO Technical Guidelines for Responsible Fisheries. No. 4, Suppl. 2. Rome, FAO. 2003. 112 p.



**Table 1.** The result matrix of the causal chain analysis from multi-stakeholder consultation workshop at the fisheries *refugia* site in Cambodia, Thailand, Philippine and Malaysia.

Country	Site Name	Target Species	Stage of life-cycle	Threat	Immediate Cause	Root Cause	Management Action
Cambodia	Kep	Blue swimming crab	Juvenile	<ul style="list-style-type: none"> <li>• Loss of habitat (i.e. sea grass)</li> <li>• Illegal fishing</li> <li>• Habitat destruction</li> <li>• Over fishing</li> </ul>	<ul style="list-style-type: none"> <li>• Use of unsustainable fishing gear/practice (i.e. Small Mesh elongated collapsible trap)</li> <li>• Destructive fishing gear</li> <li>• Purse seine net trawlers</li> </ul>	<ul style="list-style-type: none"> <li>• High market demand</li> <li>• High price</li> <li>• Unsustainable fishing gear using</li> <li>• Destructive fishing gear</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthening fisheries law enforcement</li> <li>• Fisheries law extension</li> <li>• Establishment of conservation area</li> <li>• Creating crab bank</li> <li>• Alternative livelihood provision</li> </ul>
		Blue swimming crab	Spawning (December to January)	<ul style="list-style-type: none"> <li>• Destruction of spawning habitat</li> <li>• Loss of seagrass</li> <li>• Over fishing</li> </ul>	<ul style="list-style-type: none"> <li>• Illegal fishing</li> <li>• Trawlers with small mesh size net</li> <li>• Use of inappropriate fishing gear</li> <li>• Small Mesh elongated collapsible trap</li> <li>• Purse seine trawlers</li> <li>• Unsustainable fishing gears</li> </ul>	<ul style="list-style-type: none"> <li>• Effort fishing to catch more fish</li> <li>• High price</li> <li>• High market demand</li> </ul>	<ul style="list-style-type: none"> <li>• Conservation area development</li> <li>• Strengthening law enforcement</li> <li>• Fisheries law extension</li> <li>• Creation of conservation area</li> <li>• Strengthening patrolling and monitoring</li> </ul>
	Kampot	Grouper ( <i>Epinephelus spp.</i> )	Adult	<ul style="list-style-type: none"> <li>• Declining fish</li> <li>• Habitat destruction</li> </ul>	<ul style="list-style-type: none"> <li>• Mouse tailed trap</li> <li>• Trawler with ball light</li> </ul>	<ul style="list-style-type: none"> <li>• High demand</li> <li>• High price in market</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthening law enforcement</li> <li>• Strengthening patrolling group</li> </ul>

							<ul style="list-style-type: none"> <li>• Strengthening cooperation with relevant stakeholders</li> <li>• Establishing fisheries refugia</li> </ul>
		Grouper ( <i>Epinephelus spp.</i> )	Fingerlings (October to December)	<ul style="list-style-type: none"> <li>• Declining of fingerlings</li> <li>• Habitat destruction such as sea grass, coral reef, and mangrove forest</li> </ul>	<ul style="list-style-type: none"> <li>• Mosquito (Small) net fishing gear</li> <li>• Push net fishing with electric</li> <li>• Mouse tailed trap</li> <li>• Trawler with ball light</li> <li>• Hand Push net</li> </ul>	<ul style="list-style-type: none"> <li>• High Demand from cage culture</li> <li>• High price in market</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthening law enforcement</li> <li>• Strengthening patrolling group</li> <li>• Strengthening cooperation with relevant stakeholders</li> <li>• Establishing fisheries refugia</li> <li>• Strengthening the extension to fish seed traders</li> <li>• Replanting flooded forest (Wetland)</li> </ul>
	Koh Kong	Mackerel	Spawning (November to January at Koh Kapi, Prek 3& 2, Boeung Kachang, Koh Yor, and Koh Nou)	<ul style="list-style-type: none"> <li>• Habitat loss</li> <li>• Over fishing</li> </ul>	<ul style="list-style-type: none"> <li>• Illegal fishing</li> <li>• Mackerel gill net with small mesh size</li> <li>• Light Luring fishing</li> <li>• Purse seine net and trawlers from neighbouring country</li> <li>• Trawlers with small mesh size net from 2.5 to 3cm</li> </ul>	<ul style="list-style-type: none"> <li>• High market demand in neighbouring country</li> <li>• Destructive fishing gears</li> <li>• Illegal fishing from outside area</li> </ul>	<ul style="list-style-type: none"> <li>• Establishment of fisheries refugia</li> <li>• Strengthening patrolling group to make MCS</li> <li>• Strengthening law enforcement</li> <li>• Extending fisheries law</li> <li>• Making co-operation with relevant stakeholders</li> <li>• Strengthening transboundary-bilateral operation</li> </ul>
Thailand	Trat	Indo-Pacific mackerel	Whole life cycle	<ul style="list-style-type: none"> <li>• Over fishing</li> <li>• Destructive fishing gears (e.g. giant trawls)</li> </ul>	<ul style="list-style-type: none"> <li>• Illegal fishing</li> <li>• Invasion of foreign fishing</li> <li>• Fishing by foreigner workers</li> <li>• High market demand</li> </ul>	<ul style="list-style-type: none"> <li>• Increasing number of small-scale fishing boats altered from the commercial ones</li> <li>• Non-cooperation of some fishing group</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthening fisheries law enforcement</li> <li>• Creating conservation areas (restricted fishing gear)</li> <li>• Increasing awareness</li> <li>• Promoting participatory approach fisheries management</li> </ul>

					<ul style="list-style-type: none"> <li>Needs of small size for processing</li> </ul>	<ul style="list-style-type: none"> <li>Lacking in fisheries conservation awareness</li> <li>Insufficiency of public authority</li> <li>Overlapped functions of relevant public authorities</li> </ul>	<ul style="list-style-type: none"> <li>Empowering the communities on community base fisheries management</li> <li>Promoting community regulations for fisheries management</li> <li>Promoting fishing eco-tourism</li> <li>Establishing aquatic animal banks</li> <li>Rehabilitating and establishing fisheries habitat</li> <li>Promoting mesh size restriction</li> </ul>
	Surat Thani	Blue swimming crab	Whole life cycle	<ul style="list-style-type: none"> <li>Use of Unsustainable fishing gears</li> <li>Over fishing</li> </ul>	<ul style="list-style-type: none"> <li>Illegal fishing</li> <li>Fishing of small- size crabs in seagrass bed</li> <li>Small mesh-size nets</li> </ul>	<ul style="list-style-type: none"> <li>Illegal fishing</li> <li>High market demand</li> <li>Lacking in fisheries conservation awareness</li> <li>Low water quality</li> <li>Climate change</li> </ul>	<ul style="list-style-type: none"> <li>Strengthening fisheries law enforcement</li> <li>Establishing crab bank</li> <li>Creating conservation areas</li> <li>Creating awareness</li> </ul>
Philippine	Bolinao	Rabbit fish ( <i>Siganus spp.</i> )	juveniles	<ul style="list-style-type: none"> <li>Over harvesting of juveniles</li> </ul>	<ul style="list-style-type: none"> <li>high demand of fish paste</li> </ul>	<ul style="list-style-type: none"> <li>Easy source of income for marginal fisherman</li> </ul>	<ul style="list-style-type: none"> <li>Size regulation on the harvesting of Rabbit fish &amp; provision of supplemental livelihood</li> </ul>
	Mazinloc	Frigate tuna ( <i>Auxis spp.</i> )	Pre-recruits / Juvenile	<ul style="list-style-type: none"> <li>Overfishing, use of fine mesh nets</li> </ul>	<ul style="list-style-type: none"> <li>FADs fishing</li> </ul>	<ul style="list-style-type: none"> <li>Due to high demand</li> </ul>	<ul style="list-style-type: none"> <li>FAD Management plan, Mesh size regulation</li> </ul>
	Colon	Fusilier fish		<ul style="list-style-type: none"> <li>Decreasing of fish</li> <li>Loss of coral habitat</li> </ul>	<ul style="list-style-type: none"> <li>Unsustainable fishing practice:</li> <li>Use of cyanide in the live reef fish industry</li> <li>Blast fishing</li> </ul>		

					<ul style="list-style-type: none"> <li>• Non-selective fishing gear and practices</li> <li>• Collection of corals as sinker</li> <li>• Solid waste pollution</li> </ul>		
Malaysia	Kuala Baram, Sarawak	Tiger Prawn ( <i>P. monodon</i> )	Juvenile	• deforestation			
			Pre-recruit	• Shrimp push net & bag net			
			Adult	• Trawl net			
			Spawning	• Trawl net			
	Tanjung Leman, Johor	Lobster ( <i>Panulirus spp.</i> )					



**Table 2.** The matrix of the options to manage the fishing that summarized from the FAO technical guidelines for responsible fisheries volume 4 Suppl. 2. The Ecosystem Approach to Fisheries (FAO, 2003)

1. Technical measures	Gear modifications that improve selectivity	<ul style="list-style-type: none"> <li>• Gear restriction</li> <li>• Mesh size restrictions</li> <li>• Fishing method control</li> <li>• Non-target species selectivity (TEDs, JTEDs, C-hook, etc)</li> </ul>
	Other gear issues	<ul style="list-style-type: none"> <li>• Environmental conditions (light level, temperature, current speed, etc).</li> <li>• Ghost fishing control</li> </ul>
	Spatial and temporal controls on fishing	<ul style="list-style-type: none"> <li>• Seasonal closure</li> <li>• Fisheries <i>Refugia</i></li> <li>• MPA</li> </ul>
	Control of the impact from fishing gear on habitats	<ul style="list-style-type: none"> <li>• Prohibition of certain gear in some habitats (trawling in coral reef and seagrass areas)</li> <li>• Replace a high-impact fishing method with one with less impact on the bottom, e.g. trapping, longlining or gillnetting.</li> </ul>
	Energy efficiency and pollution	<ul style="list-style-type: none"> <li>• Reduce of CO2 emissions.</li> <li>• Energy optimization</li> </ul>
2. Input (effort) and output (catch) control	Controlling overall fishing mortality	<ul style="list-style-type: none"> <li>• Capacity limitation spatial/temporal</li> <li>• Access limitations</li> <li>• Effort limitation</li> </ul>
	Catch controls	<ul style="list-style-type: none"> <li>• By-catch controls (such as quotas)</li> </ul>
3. Ecosystem manipulation	Habitat modifications	<ul style="list-style-type: none"> <li>• Preventing habitat degradation</li> <li>• Prohibition of destructive fishing methods in ecologically sensitive habitats (such as seagrass beds);</li> <li>• Prohibition of intentional cleaning of the seafloor to facilitate fishing; and</li> <li>• Reduction of the intensity of fishing in some fishing grounds to ensure that non-target</li> <li>• Providing additional habitat</li> </ul>
	Population manipulation	<ul style="list-style-type: none"> <li>• Restocking and stock enhancement</li> </ul>
4. Rights-based management approaches		<ul style="list-style-type: none"> <li>• User rights</li> <li>• Effort rights</li> <li>• Catch rights</li> <li>• Effort management</li> </ul>

## ANNEX 15

### GIS MAPPING AND EXISTING OCEAN MODELLING: PROGRESS IN OCEAN FORECASTING SYSTEM IN THAILAND

#### I. BEGINNING OF OFS ON THE PLATFORM OF IOC/WESTPAC AND OFFICIALLY LAUNCHED IN THAILAND

Ocean Forecasting Demonstration System (OFDS) was officially launched for the first time during the 8<sup>th</sup> IOC-WESTPAC Meeting in Bali, Indonesia in May 2010. The system was developed by the First Institute of Oceanography (FIO) based on wave-tide-circulation model. In Phase I of the project in 2010-2012, the first version of OFS covers only the southern South China Sea and was operated by Dr. Wendy Watson-Wright, Executive Secretary of IOC, Assistant Director General of UNESCO. Then, the system has provided ocean forecast through the website: [http://221.0.186.5/IOC\\_WESTPAC/OFS](http://221.0.186.5/IOC_WESTPAC/OFS) beginning since the 9th Intergovernmental Session of the IOC/WESTPAC on 9-12 May 2012, in Busan, Republic of Korea.

During Phase II in 2013-2015, the domain was extended to cover entire Southeast Asian area including northwest Pacific, South China Sea, and the northeastern Indian Ocean. The breakthrough of the OFS happened on 9 October 2013 when Chinese Premier Keqiang Li proposed to initiate the China-ASEAN Cooperation Fund and announced to subsidize the first 17 projects which included the OFS in the 16th China-ASEAN Summit. Later in 2014, Department of Marine and Coastal Resources (DMCR) has got the budget for in setting up the OFS system in Thailand, and Dr. Wijarn Simachaya, the Permanent Secretary of Ministry of Natural Resources and Environment, Thailand, and Mr. Chen Lianzeng, Deputy Administrator of State Oceanic Administration (SOA), presided over the opening ceremony of project under joint research projects to name the project "Ocean Forecasting and Marine Disasters Mitigation System for Southeast Asia Seas" during the 4<sup>th</sup> Thailand-China Joint Committee Meeting on Marine Cooperation on 17 July 2015.

Since 2015, the DMCR in collaboration with the FIO installed the OFS system at Phuket Marine Biological Center (PMBC), Phuket, Thailand and also organize workshops instructing the DMCR to operate the system routinely. This was considered an official launch of the OFS Thailand. Meanwhile, PMBC linked the OFS website, [http://ofs.dmcr.go.th/thai\\_land/result.jsp](http://ofs.dmcr.go.th/thai_land/result.jsp), to the Central Database System and Data Standard for Marine and Coastal Resources webpage, <https://marinegiscenter.dmcr.go.th>, to distribute the forecast product to the public. So far, more than five training courses have been organized in Qingdao, China, yearly in order to train the DMCR colleagues and other scientists to analyze and interpret the data. Moreover, both parties have constantly conducted joint cruise observations both in the Gulf of Thailand, the Andaman Sea, as well as the Bay of Bengal to obtain observed data for validating the model and further updating it into high resolution. Presently, four buoys have been deployed in Andaman Sea constantly giving measurements such as temperature, current, and wave height.

#### II. OCEAN FORECASTING SYSTEM FRAMEWORK

OFS is based on wave-circulation coupled model, MASNUM: Laboratory of Marine Sciences and Numerical Modeling, State Oceanic Administration, China. The circulation part is based on POM (Princeton Ocean Model) and the wave component is based on MASNUM-WAM model. The model is forced by forcing obtained from NCEP products. An advancement of this model is a way to couple wave and circulation model through the so-called wave-induced viscosity  $B_v$  by introducing it into the Mellor-Yamada scheme (Mellor and Yamada, 1982) in POM. A nested scheme from the quasi-global to Southeast Asian area is used to obtain the open boundary conditions (figure 1).

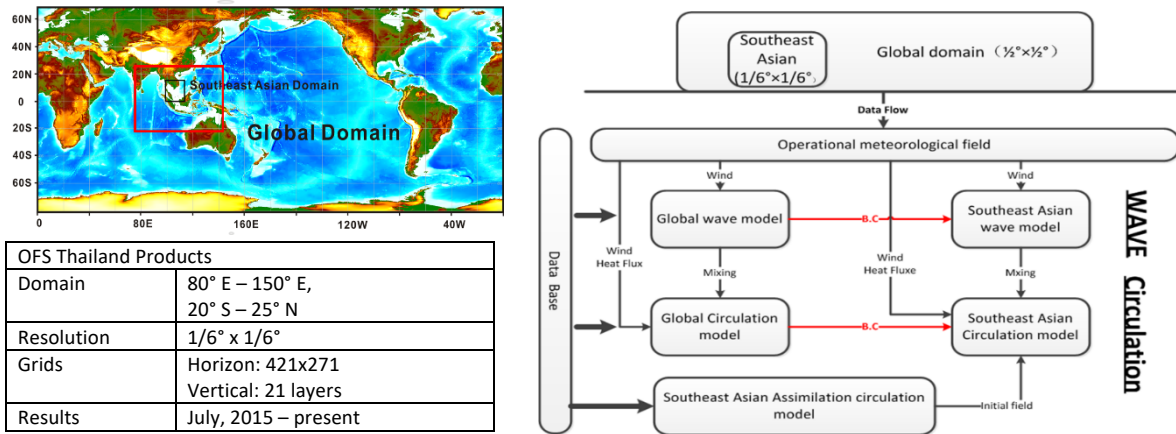


Figure 1: OFS simulation domain (Left) and framework (right)

The half-century challenge of ocean circulation model is that simulated sea surface temperature is overestimated while the sub-surface temperature is underestimated especially in summer time. Qiao *et al.* (2004, 2010, and 2016) proposed that the non-breaking surface wave could generate turbulence through wave-turbulence interaction and developed the wave-induced mixing theory, which agreed to both laboratory experiments and in situ observations. Validated by ocean circulation models from different research group; i.e., GFDL (Fan and Griffies, 2014), Uppsala University of Sweden (Wu et al., 2015), LEGOS of France (Malek and Babanin, 2014), Budapest University of Technology and Economics of Hungary (Péter and Krámer, 2016), Ocean University of China (Lin et al, 2006); the non-breaking wave-induced vertical mixing, *Bv*, is proven to dramatically improve the simulating capacity of the different ocean circulation models.

### III. OFS AND BEST PRACTICES IN THAILAND

OFS Thailand has run since July 2015 providing output in five parameters; i.e., wind, wave height, sea level, current and temperature, the last two of which are in 21 layers. The forecast results can be shown the vertical profiling which are beneficial for capturing the mixed-layer depth. The data archives are available for downloading at <http://ofs.dmcr.go.th/thailand/archives.jsp>. (details in figure 2)

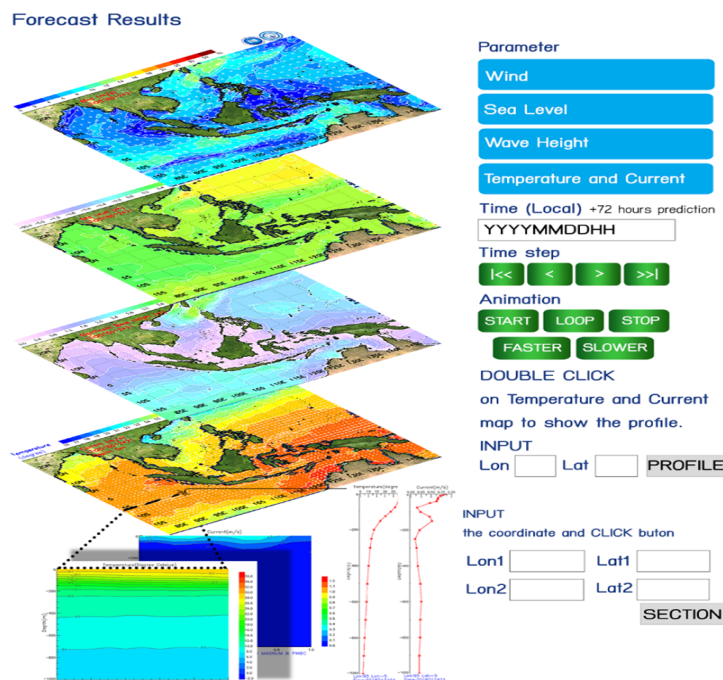


Figure 2 OFS visualization and tools for extracting specific results

During past three years, there were many contributions from the OFS. For example, it was used as boundary condition along the coast for sediment transport and coral dispersion model. Moreover, it was also used as one of products acquired to monitor and forecast the next level of events like coral bleaching in 2016, sunken boat in Phuket due to heavy storm and strong surface wave in 2018 causing 47 missing, and Pabuk typhoon moving across the Gulf of Thailand to the Andaman Sea in 2019 inundating many coastal areas for a couple of weeks.

Considering sunken ship case, both parties, Mr. Wannakiat Thubthimsang, Dr. Somkiat Khokiattiwong, and Prof. Fangli Qiao, had serious discussion and energetically to give support by providing the forecasting products to those in charge. An emergency technical support team from FIO and PMBC was immediately established. Within 24h after the accident, the OFS team successfully provided the first forecasting report of surface currents, wave heights and suggested search area of missing people. Totally 7 forecast reports were provided to the Thailand rescue team and forecasting results are confirmed by the following rescue, which is a new success for practical applications.

#### IV. ESTABLISHING HIGH RESOLUTION AND ITS APPLICATION

With OFS breakthroughs during the 2<sup>nd</sup> phase, the first surface wave-tide-circulation coupled model of FIO-COM was established in 2013, and then adopted as the core to produce reanalysis dataset for the period Jan., 2014 to April, 2016. It became in the operational OFS since May, 2016. Highly efficient parallel scheme is designed to use full-scale of Taihu-Light with 10,649,600 CPU cores (Qiao et al., 2016), which was on the finalist of the international ACM Gordon Bell Prize. The forecasting products can be easily accessed both through website <http://221.215.61.118:2018/#/> and cell phone APP of “Global Ocean on Desk” (GOOD). To cite this dataset this dataset, please quote the version number and cite Qiao *et al*, (2019) (figure 3)

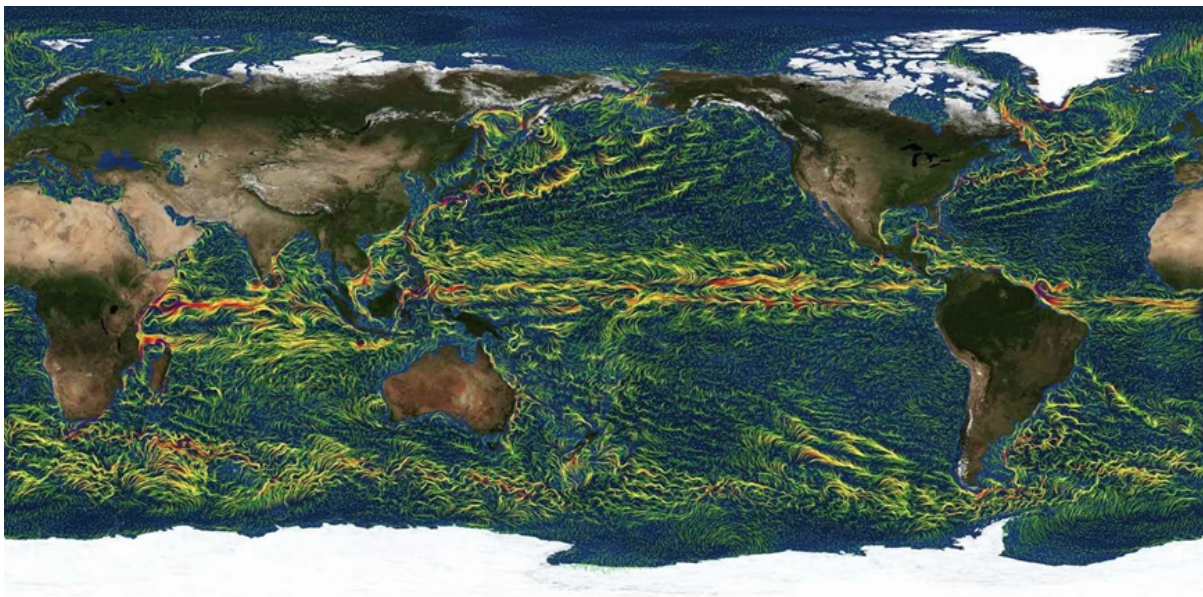


Figure 3 The snapshot of the OFS for 21st Century Maritime Silk Road published on 10 December, 2018 through <http://221.215.61.118:2018/#/>

Thailand now prepares for an extended basement to upgrade the new system which the smallest grid will be re-fined down to less than 200 meters near the coasts. Including the simulation results, it is going to include tide and salinity which related to processes in mixed-layer depth and to the primary productivity and fisheries products. Visualization will also be upgraded to be more user-friendly, and tracer module will be included into new webpage for prediction of floating in the sea.

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## ANNEX 16

### BASELINE SURVEY DATA

#### I. INTRODUCTION

It is indicated that in support the achievement of the SAP Target for establishment of a regional system of fisheries refugia, the priority national level actions were identified into 4 levels as: (1) the designation and operational management of priority fisheries refugia sites; (2) development of the enabling environments for fisheries refugia management at national and provincial levels, including policy reforms and enhancement of the science and information base for refugia management; (3) capacity development through improved information management and dissemination; and (4) strengthened national coordination for fisheries refugia management. This paper focuses on the baseline survey data where its objectives are to emphasize the importance of baseline study and baseline data to support, monitoring and evaluation of the project implementation at country levels.

#### II. WHAT IS THE IMPORTANCE OF BASELINE DATA?

A *baseline study* is data collection and analysis that defines the “pre-operation exposure” condition for the set of indicators that will be used to assess achievement of the outcomes and impact expressed in the program’s logical framework (*WFP, How to Plan a Baseline Study*).

*Baseline data* (or simply baseline) is data that measures conditions before the project starts for later comparison (*IFRC, Baseline Basics, 2013*). In other words, baseline provides the historical point of reference/benchmarks for the next steps of project monitoring and evaluation. Baseline data helps to:

- set realistic goals and to measure the progress towards them;
- maintain accountability, informing what difference the project is making;
- inform and motivate stakeholders to pay attention to certain issues and increase their participation;
- provide justification for policy makers and donors for a project intervention;
- shape expectations and communication strategies (*IFRC, Baseline Basics, 2013*).

#### III. IDENTIFIED KEY DELIVERABLE AND BENCHMARKS

Baseline study and data should be designed in alignment with the identified key deliverable and benchmarks for the project as shown in the Appendix 4 of the Project Document, especially for the project Component 1, 2, and 3:

#### IV. RSTC2 ARE REQUESTED TO:

- *Provide a scientific and technical recommendations and comments on the baseline data for each component of the project..*

## Summary of the Results framework in the Appendix 4 of the project documents:

Component	Outcomes	Indicator	Baseline	Targets End of Project	Source of Verification	Risks and Assumptions
1. Identification and management of fisheries and critical habitat linkages at priority fisheries refugia in the South China Sea and Gulf of Thailand	<b>1. Reduced stress</b> on fish stocks and coastal habitats via improved national management of key anthropogenic threats to fisheries and critical habitat linkages in the South China Sea and Gulf of Thailand	Status of formal designation, management plan adoption, and community engagement in implementation of agreed management measures, including enforcement, for priority sites	Rate of coastal habitat loss from SCS basin is high (e.g., 30% per decade for seagrass) Fishing identified as a key threat to coastal habitats	Effective management of key threats to 14 fisheries refugia sites [269,500 ha], including <b>~50 percent reduction in fishing pressure</b> within sites at times critical to the life-cycles of fished species of transboundary significance	Adopted management plans Regular reports of meetings of national and regional project management bodies Reports of independent mid-term and terminal project evaluations	Adequate local cooperation to compile and analyze information to establish baselines and standardized procedures to measure and monitor the effectiveness of agreed stress reduction measures
2. Improving the management of critical habitats for fish stocks of transboundary significance via national and regional actions to strengthen the enabling environment and knowledge-base for fisheries refugia management in the South China Sea and Gulf of Thailand	<b>2. Increased institutional capacity</b> in the 6 participating countries for the designation and operational management of fisheries refugia via the transformation of enabling environments and the generation of knowledge for planning	Status of enabling environment reform, including extent of behavioural change among small-scale fisherfolk at priority sites Extent of use of available environmental state and socio-cultural information in policy and planning frameworks	Weak enabling environments and limited knowledge within national fisheries and environment departments and ministries with respect to the implementation of measures aimed at managing threats to fish stock and critical habitat linkages	National and regional policy, legal and planning frameworks for demarcating boundaries and managing fisheries refugia, resulting in, inter alia, a 20 percent increase in small-scale fishing vessels using fishing gear and practices designed to safeguard fish stock and critical habitat linkages at priority sites	Endorsed policies and plans Regular reports of meetings of national and regional project management bodies Reports of independent mid-term and terminal project evaluations	Willingness of fisheries and environment sectors to agree on guidelines promoting cross-sectorial cooperation and make joint commitments to the reform of national policy, legal and regulatory frameworks governing the management of fisheries refugia
3. Information Management and Dissemination in support of national and regional-level implementation of the fisheries refugia concept in the South China Sea and Gulf of Thailand	<b>3. Strengthened knowledge management and information sharing and access</b> for enhanced uptake of good practice in integrating fisheries management and biodiversity conservation in the design and implementation of fisheries and environmental management systems, including Marine Spatial Planning	Extent of demonstrable use of examples of good practice in guiding the replication, scaling-up and mainstreaming of good practices	Low-level ability of stakeholders to engage in meaningful dialogue regarding how broader multiple use planning can best contribute to improving the state of fisheries and biodiversity conservation	National and regional systems for knowledge management and sharing, including the development of indicator sets and standardized statistics to guide the replication, scaling-up and mainstreaming of good practices in the use of fisheries refugia as a spatial planning tool	Routine communications on progress and lessons learned prepared and shared Annual results reports published and disseminated National and regional web portals for knowledge management and information exchange accessible online	If insufficient good practices are documented and shared regionally, awareness building initiatives will be based on a limited number of local examples and may not be effective in engaging community members and resource users in the wider region
4. National and regional cooperation and coordination for integrated fish stock and critical habitat management in the South China Sea and Gulf of Thailand	<b>Cost-effective and efficient</b> coordination of national and regional level cooperation for integrated fisheries and environmental management	Extent and continuity of stakeholder participation in meetings of project management bodies, including the scope and uptake of joint management and planning decisions	Lack of national and regional-level mechanisms to facilitate integration of fisheries management and biodiversity conservation	Effective multi-lateral and intergovernmental communication and joint decision-making, including the use of a consensual knowledge-base in planning ecologically and cost-effective management actions	Regular reports of meetings of national and regional project management bodies Reports of independent mid-term and terminal project evaluations	Consultative processes will elicit adequate stakeholder input and commitment of support from national networks to enable integrated management

## ANNEX 17

### PROJECT WEB-SITES AT COUNTRY AND REGIONAL PROGRAMS

#### I. INTRODUCTION

Taking into accounts one of the goals of this project, as mentioned in the Project Component 3 on the Information Management and Dissemination in support of national and regional-level implementation of the fisheries refugia concept in the South China Sea and Gulf of Thailand, one of the target, is to share nationally, regionally, and globally the Knowledge generated and experiences from establishing and operating fisheries refugia. It is expected that the project could come-up with one Regional website of the fisheries refugia with 6 online national web portals on fisheries refugia.

This matter has been discussed at the PSC1 held in December 2018 mentioned that “Regarding the national web portal development, the PCU with inputs from the RSTC, will create a content template, design and share among member countries for translation into their respective national languages” in this this the PCU have developed as well as improved the regional webpage of fisheries refugia that include the country web portals for consideration ( see link of Cambodia activity-Web (as a sample) at <https://fisheries-refugia.org/refugia-country-activities/refugia-cambodia> )

The Country activity webpages are created under the Regional Webpage with aims to share the national activities to the public. Based on this web-portal, the country can translate into their own languages.

#### II. Structure of Regional Webpage and Country Web Portal

Regional webpage for fisheries refugia project included 9 main menus on top (see Figure 1) as follows:

- 1) Home: there are information appeared on this page such as a) Meet our stakeholders, b) Upcoming event, c) social media links, d) download of key documents, e) Links to films, etc.
- 2) About us: Introduce more details of the Project, and introduce the institutions developed for the project such as National Lead Agency, Project Steering Committee, Regional Scientific and Technical Committee, National Focal Point, Regional Experts, Project Coordinating Unit, and TORS of those institutions.
- 3) Events: share the Regional events including all working papers and presentation files for downloading
- 4) Country Activities: This is a country web-portal
- 5) GIS Map: This menu aims to share the GIS mapping for selecting of the Fisheries refugia and Mapping of environmental/habitats information. It is under improvement.
- 6) Publications: This part make link to the SEAFDEC Repository, to ensure that all publications from the project will be shared to the Regions and global
- 7) News: This menu will highlights all regional and national activities in details
- 8) Partners: Provide link to the partners such as GEF, UNEP, IW Learn, etc.
- 9) Contact us



Figure 1: Regional Webpage of Fisheries Refugia Project

The country web portal is developed under the Regional webpage. The structure of this country web portal are tentatively drafted as showed in Figure 2.



Figure 2: Contents of the Country Web portal





## ANNEX 18

# FISHERIES REFUGIA CENTER(S) AT NATIONAL LEVEL: LESSONS LEARNED FROM MALAYSIA



SEAFDEC/UN  
ENVIRONMENT/GEF  
Fisheries Refugia Project

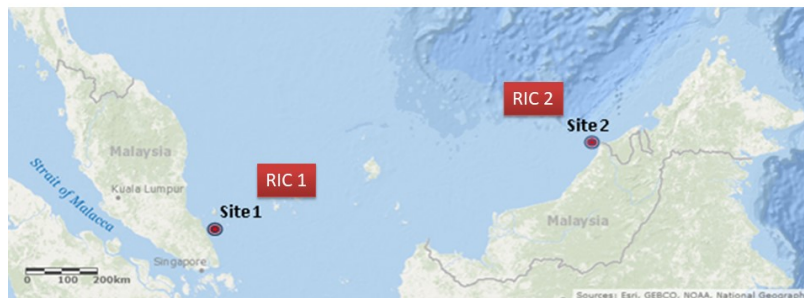
Fisheries Refugia Centers  
at National Level: Lessons  
Learned from Malaysia

By  
Department of Fisheries  
Malaysia







The 2<sup>nd</sup> Regional Scientific and Technical Committee Meeting for the SEAFDEC/UN Environment/GEF Project on Establishment and Operation of a Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand, 21-23 May 2019,

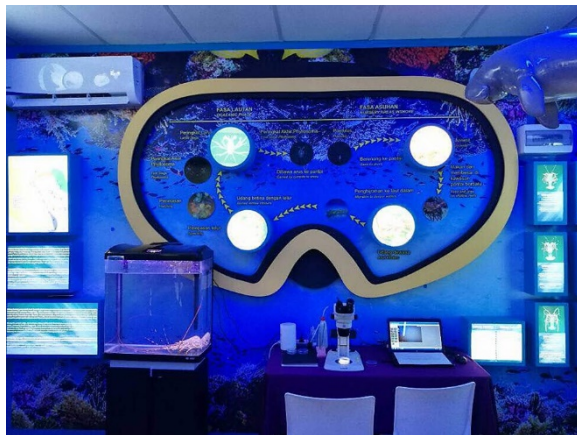
### Refugia Information Center (RIC) in Malaysia



Site 1: Tanjung Leman, Johor – Lobster (*Panulirus* spp.)  
Site 2: Kuala Baram, Sarawak – Tiger Prawn (*P. monodon*)

## RIC 1: Tanjung Leman, Johor

- 01**  DOF has set up a RIC at Tanjung Leman Ferry Jetty to facilitate the dissemination of Information about the Fisheries Refugia Project in Malaysia.
- 02**  The setup and maintenance of RIC were funded using national fund and GEF fund, in collaboration with Johor Corporation (under state government).
- 03**  RIC was officiated by DOF DG on the 20th of November 2017.
- 04**  Officiating ceremony was also attended by local fishermen and representatives from the SEAFDEC/UN Environment/GEF, Dr. Kom Silapajarn and Dr. Christopher Patterson.

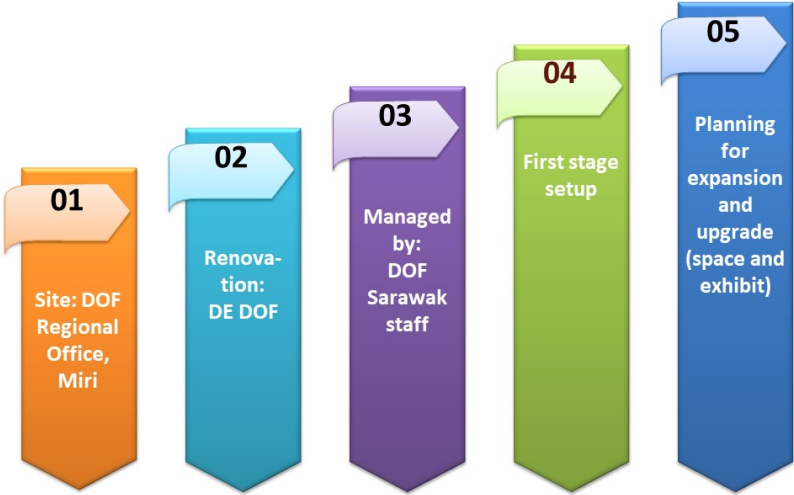




### Tanjung Leman RIC

Requirement	Example Tanjung Leman RIC
Site selection must be strategic	Ferry terminal – tourist attraction
Consultation with location owner for rental/CSR	CSR by Johor Corporation (facility owner)
Renovation cost	DE DOF and GEF
Workers	On contract basis
Plan for space expansion	Adjacent lot
Exhibit material	Interesting and informative

### Kuala Baram RIC









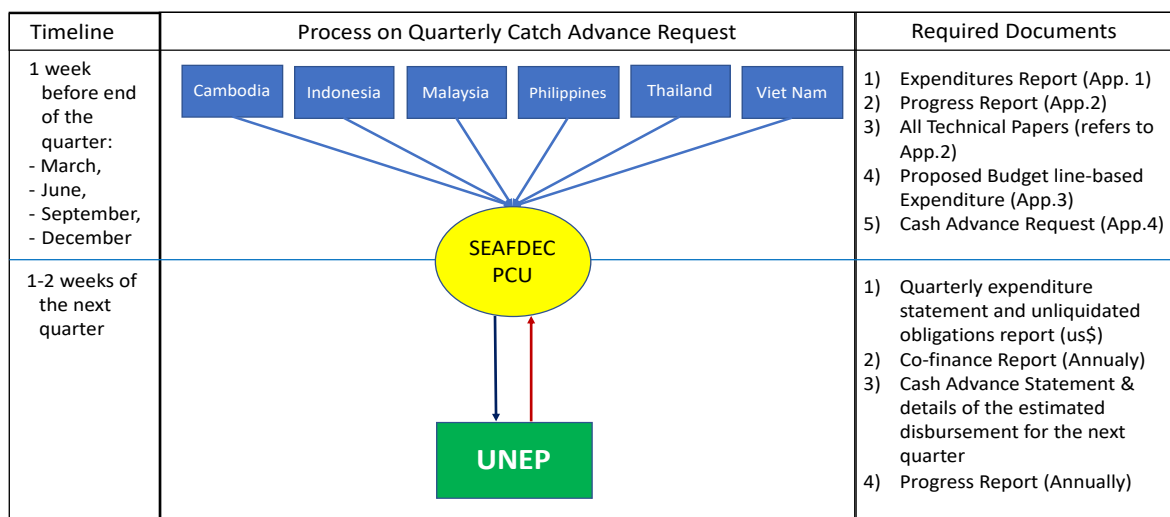
## ANNEX 19

### FINANCIAL REPORT

#### I. INTRODUCTION

This paper aims to guide the country on the quarterly reporting of expenditure and request for Cash advance as well as the timeline for submission of the said report to ensure that budget transferring from the PCU will be reached country in time. As the process for requesting the Cash advance from country to PCU is linked to the request from PCU to UNEP, therefore delay of reporting at country level may affect to delay of transferring budget from the UNEP to the PCU. In this connection, the PCU will better service and monitor the activity-based expenditures as well as ensuring the smooth operation to the project. Please be noted that some countries has already done and followed the guide, but in case some countries also need to follow the processes as guide in this paper.

#### II. Process of Quarterly Request for Cash Advance



Refers to the process on quarterly catch advance request as appeared on above, the relevant countries are requested to submit the request **at least one week** before end of the quarter ( in March, June, September, December).

The documents required for Cash Advance request that the relevant countries have to submit to the PCU are as follows:

- a. Expenditures Report (Appendix. 1)
- b. Progress Report (Appendix.2)
- c. All Technical Papers (refers to Appendix.2) using the covered page template as Appendix. 3
- d. Proposed Budget line-based Expenditure (Appendix.4)
- e. Cash Advance Request (Appendix.5)

The PCU will consolidate all expenditures reports that have been submitted by countries and preparing for all required documents: such as 1) Quarterly expenditure statement and unliquidated obligations report, 2) Cash Advance Statement & details of the estimated disbursement for the next quarter, 3) Progress Report (Annually), and 4) Co-finance Report (Annually) to the UNEP for overall Cash Advance for the following quarter.

Regarding these above mentioned, the PCU requests for all cooperation from Country to understand the process for requesting the Cash Advance.

Appendix 1: Expenditures Report

THREE-MONTH PROJECT EXPENDITURE ACCOUNT FOR NATIONAL LEAD AGENCIES							
Project Statement of allocation (Budget), expenditure and balance (Expressed in US\$) covering the period from MM to MM / YYYY							
National Lead Agency:			Directorate of Fisheries				
MoU:			SEAFDEC/UNEP/GEF/Viet Nam				
Project Title:			South China Sea Fisheries Refugia Initiative				
Project commencing:			January 2017				
Project ending:			December 2020				
<b>NB: The expenditures should be reported in line with the specific object of expenditures as per project budget</b>					Project budget allocation	Expenditure incurred	Unspent balance of budget
Object of Expenditure in accordance with UNEP Budget codes					for the 3-month period	for the 3-month period	for the 3-month period
					Amount (1)	Amount (2)	Amount (1-2)
Code	Description	Component/Activity	MM - MM/YYYY	MM - MM/YYYY	MM - MM/YYYY		
<b>10 PROJECT PERSONNEL COMPONENT</b>							
1100	Project Personnel w/m						
1101						0	
1199	Sub-Total		0	0		0	
1200	Consultants w/m						
1201						0	
1202						0	
1299	Sub-Total		0	0		0	
1600	Travel on official business (above staff)						
1601						0	
1602							
1603						0	
1604						0	
1605						0	
1606						0	
1607						0	
1608						0	
1699	Sub-Total		0	0		0	
Component Total			0	0		0	
<b>20 SUB-CONTRACT COMPONENT</b>							
2100	Sub-contracts (MoU's/LA's for UN cooperating agencies)						
2101	N/A						
2199	Sub-Total					0	
2200	Sub-contracts (MoU's/LA's for non-profit supporting organizations)						
2201						0	
2299	Sub-Total		0	0		0	
2300	Sub-contracts (commercial purposes)						
2301	N/A						
2399	Sub-Total					0	
Component Total			0	0		0	
<b>30 TRAINING COMPONENT</b>							
3200	Group training (study tours, field trips, workshops, seminars, etc)						
3201							
3202						0	
3203						0	
3204						0	
3205							
3299	Sub-Total		0	0		0	
3300	Meetings/conferences (give title)						
3301	N/A						
3399	Sub-Total					0	
Component Total			0	0		0	
<b>40 EQUIPMENT &amp; PREMISES COMPONENT</b>							
4100	Expendable equipment (Items under \$1,500 each, for example)						
4101						0	
4199	Sub-Total		0	0		0	
4200	Non-expendable equipment (computers, office equip, etc)						
4201						0	
4299	Sub-Total		0	0		0	
4300	Premises (office rent, maintenance of premises, etc)						
4301	N/A						
4399	Sub-Total					0	
Component Total			0	0		0	
<b>50 MISCELLANEOUS COMPONENT</b>							
5100	Operation and maintenance of equip.						
5101	N/A						
5199	Sub-Total					0	
5200	Reporting costs (publications, maps, newsletters, printing, etc)						
5201							
5299	Sub-Total		0	0		0	
5300	Sundry (communications, postage, freight, clearance charges, etc)						
5301						0	
5399	Sub-Total		0	0		0	
5400	Hospitality and entertainment						
5401	N/A						
5499	Sub-Total					0	
5500	Evaluation (consultants fees ETC)						
5501	N/A						
5599	Sub-Total					0	
Component Total			0	0		0	
<b>TOTAL COSTS</b>			<b>0</b>	<b>0</b>		<b>0</b>	
Prepared by XXXXXXXXXXXXXXXXX Position: As Project Accountant Date: DD/MM/YYYY Sign:			Approved by XXXXXXXXXXXXX Position: As NFP for Viet Nam Date: DD/MM/YYYY Sign:				

**Appendix 2 :Three Monthly Progress Report**

**SECTION 1 - BACKGROUND INFORMATION**

- 1.1 Project Title:
- 1.2 Agreement: SEAFDEC/UNEP/GEF/Country
- 1.3 Responsible Office: UNEP/GEF Project Coordinating Unit, SEAFDEC
- 1.4 Lead Agency (Supporting Organization): Name of Lead Agency
- 1.5 Reporting Period: Quarterly Period
- 1.6 Focal Point Name: Name of Focal Point

**SECTION 2 - PROJECT STATUS**

**2.1 Status of the Implementation of the Activities and Outputs Listed Under the Workplan in the Memorandum of Understanding** (check appropriate box)

- Project activities and outputs listed in the Project workplan for the reporting period have been materially completed and the responsible Office is satisfied that the project will be fully completed on time (give reasons for minor variations as Section 3 below).
- Project activities and outputs listed in the Project Workplan for the reporting period have been altered (give reasons for alterations: lack of finance; project reformulated; project revisions; other at Section 3 below).
- Project activities and outputs listed in the Project Workplan for the reporting period have not been fully completed and delays in project delivery are expected (give reasons for variations in Section 3.1 and new completion date in Section 3.2 below).
- Insufficient detail provided in the Project Workplan.

**2.2 List Actual Activities/Outputs Achieved in the Reporting period:** (check appropriate box)

(a) **MEETINGS** (Duplicate this box for each meeting individually)

- Committee Mtg.     Consultation Mtg.     Training Seminar/Workshop     Others

Title \_\_\_\_\_

Venue and dates \_\_\_\_\_

Convened by \_\_\_\_\_ Organized by \_\_\_\_\_

Report issued as doc. No/Symbol \_\_\_\_\_ Languages \_\_\_\_\_ Dated \_\_\_\_\_

Please indicate: No. of participants' \_\_\_\_\_ and attach **annex** giving names, gender of participants and meeting summary.

**Please indicate co-financing as follows:**

Source \_\_\_\_\_

Cash (US\$) \_\_\_\_\_

In-Kind (person days) \_\_\_\_\_

(b) **PRINTED MATERIALS** (Duplicate this box for each printed item)

Committee Report     Technical Publication     Technical Report     Others

Title \_\_\_\_\_  
Author(s)/Editor(s) \_\_\_\_\_  
Publisher \_\_\_\_\_  
Symbol (ISBN/I \_\_\_\_\_  
Date of publication \_\_\_\_\_

(When technical reports/publications have been distributed, **attach distribution list**)

**Please indicate co-financing as follows:**

Source \_\_\_\_\_  
Cash (US\$) \_\_\_\_\_  
In-Kind (person days) \_\_\_\_\_

(c)  **TECHNICAL INFORMATION**     **PUBLIC INFORMATION** (posters, leaflets, broadcasts etc.)  
(Duplicate this box for each item)

Description \_\_\_\_\_  
Dates \_\_\_\_\_

**Please indicate co-financing as follows:**

Source \_\_\_\_\_  
Cash (US\$) \_\_\_\_\_  
In-Kind (person days) \_\_\_\_\_

(d) **SERVICES** (surveys, technical assistance etc.) (Duplicate this box for each item)

Description \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Dates \_\_\_\_\_

**Please indicate co-financing as follows:**

Source \_\_\_\_\_  
Cash (US\$) \_\_\_\_\_  
In-Kind (person days) \_\_\_\_\_

(e) **OTHER OUTPUTS** (Duplicate this box for each item)

Description: \_\_\_\_\_  
Dates \_\_\_\_\_

**Please indicate co-financing as follows:**

Source: \_\_\_\_\_  
Cash (US\$): \_\_\_\_\_  
In-Kind (person days): \_\_\_\_\_

**SECTION 3 - PROJECT DELIVERY**

**3.1 Summary of the Problems Encountered in Project Delivery (if any)**

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**3.2 Actions Taken or Required to Solve the Problems (identified in Section 3.1 above)**

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**SECTION 4 - PROJECT COORDINATING UNIT ASSISTANCE REQUIRED**

**4.1 Describe specific assistance you would like the PCU to provide in the next quarter.**

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**Signed:** \_\_\_\_\_

**Name:** \_\_\_\_\_

**Designation:** \_\_\_\_\_



Appendix 3: Heading of Technical Paper for Each Country



FOR CAMBODIA



FOR INDONESIA



FOR MALAYSIA



FOR PHILIPPINES



FOR THAILAND



FOR VIET NAM

Appendix 4: Proposed Budget-line Expenditures for Next Quarter

THREE-MONTH PROJECT EXPENDITURE ACCOUNT FOR NATIONAL LEAD AGENCIES  
Project Statement of proposed allocation (Budget), (Expressed in US\$) covering the period  
from MM to MM / YYYY

National Lead Agency: Directorate of Fisheries  
MoU: SEAFDEC/UNEP/GEF/Viet Nam  
Project Title: South China Sea Fisheries Refugia Initiative  
Project commencing: January 2017  
Project ending: December 2020

NB: The expenditures should be reported in line with the specific object of expenditures as per project budget			Proposed Project budget allocation
Object of Expenditure in accordance with UNEP Budget codes			for the 3-month period
Code	Description	Component/ Activity	Amount (1)
			MM - MM/YYYY
<b>10</b>	<b>PROJECT PERSONNEL COMPONENT</b>		
1100	Project Personnel w/m		
1101			
1199	Sub-Total		0
1200	Consultants w/m		
1201			
1202			
1299	Sub-Total		0
1600	Travel on official business (above staff)		
1601			
1602			
1603			
1604			
1605			
1606			
1607			
1608			
1699	Sub-Total		0
Component Total			0
<b>20</b>	<b>SUB-CONTRACT COMPONENT</b>		
2100	Sub-contracts (MoU's/LA's for UN cooperating agencies)		
2101	N/A		
2199	Sub-Total		
2200	Sub-contracts (MoU's/LA's for non-profit supporting organizations)		
2201			
2299	Sub-Total		0
2300	Sub-contracts (commercial purposes)		
2301	N/A		
2399	Sub-Total		
Component Total			0
<b>30</b>	<b>TRAINING COMPONENT</b>		
3200	Group training (study tours, field trips, workshops, seminars, etc)		
3201			
3202			
3203			
3204			
3205			
3299	Sub-Total		0
3300	Meetings/conferences (give title)		
3301	N/A		
3399	Sub-Total		
Component Total			0
<b>40</b>	<b>EQUIPMENT &amp; PREMISES COMPONENT</b>		
4100	Expendable equipment (items under \$1,500 each, for example)		
4101			
4199	Sub-Total		0
4200	Non-expendable equipment (computers, office equip, etc)		
4201			
4299	Sub-Total		0
4300	Premises (office rent, maintenance of premises, etc)		
4301	N/A		
4399	Sub-Total		
Component Total			0
<b>50</b>	<b>MISCELLANEOUS COMPONENT</b>		
5100	Operation and maintenance of equip.		
5101	N/A		
5199	Sub-Total		
5200	Reporting costs (publications, maps, newsletters, printing, etc)		
5201			
5299	Sub-Total		0
5300	Sundry (communications, postage, freight, clearance charges, etc)		
5301			
5399	Sub-Total		0
5400	Hospitality and entertainment		
5401	N/A		
5499	Sub-Total		
5500	Evaluation (consultants fees ETC)		
5501	N/A		
5599	Sub-Total		
Component Total			0
<b>TOTAL COSTS</b>			<b>0</b>

Prepared by  
XXXXXXXXXXXXXXXXXX  
Position:  
As Project Accountant

Date: DD/MM/YYYY

Sign:

Approved by  
XXXXXXXXXXXX  
Position:  
As NFP for Viet Nam

Date: DD/MM/YYYY

Sign:

**Appendix 5: Cash Advance Request Form**

<b>CASH ADVANCE REQUEST</b>					
Statement of cash advance as at		<b>31/3/2019</b>			
And cash requirements for the three month period ending		<b>30/6/2019</b>			
Name of National Lead Agency		<b>Directorate of Fisheries</b>			
MoU No.		<b>SEAFDEC/UNEP/GEF-VIET NAM/LOI DATE 3 MAY 2019</b>			
Project title :		<b>ESTABLISHMENT AND OPERATION OF A REGIONAL SYSTEM OF FISHERIES REFUGIA IN South China Sea and Gulf of Thailand</b>			
<b>I Cash Statement :</b>					
1	Opening Cash Balance as at	<b>3-May-19</b>	US\$	0	
2	Cash advances received			-	
3	<b>Total cash advanced to date</b>		<b>US\$</b>	<b>-</b>	
4	Less : total cumulative expenditures incurred Period:		US\$	-	
	<b>Total expenditure as at</b>		<b>US\$</b>	<b>-</b>	
5	<b>Closing cash balance as at</b>	<b>30/6/2019</b>	<b>US\$</b>	<b>-</b>	
<b>II Cash requirements forecast</b>					
6	Estimated disbursements for period ending	June 30, 2019	US\$	34,800.00	
7	Less : closing cash balance (item 5, above)		US\$	-	
8	<b>Total cash requirements for the period ending</b>	<b>June 30, 2019</b>	<b>US\$</b>	<b>34,800.00</b>	
Prepared by		Request approved by :			
Name : <b>Insert Name</b>		<b>Insert Name</b>			
<b>Insert Role</b>		National Focal Point			
Date:		Date:			
Remark :					

## ANNEX 20

### COSTED WORKPLAN FOR 2019/Q3 and Q4

#### I. OBJECTIVE OF THIS PAPER AND REQUEST FOR ACTION

This paper aims to compile the costed workplan for Q3 and Q4 of 2019 for in advance calculation for the budget requirements from each country within 2019. In addition, it is useful for PCU to monitor the budget for each activity to avoid the overspent in each budget lines.

Country is requested to provide an estimation of the activity-based budget for quarterly 3 and 4 of the 2019 for proper planning the budget needs for country implementation.

#### II. COSTED WORKPLAN

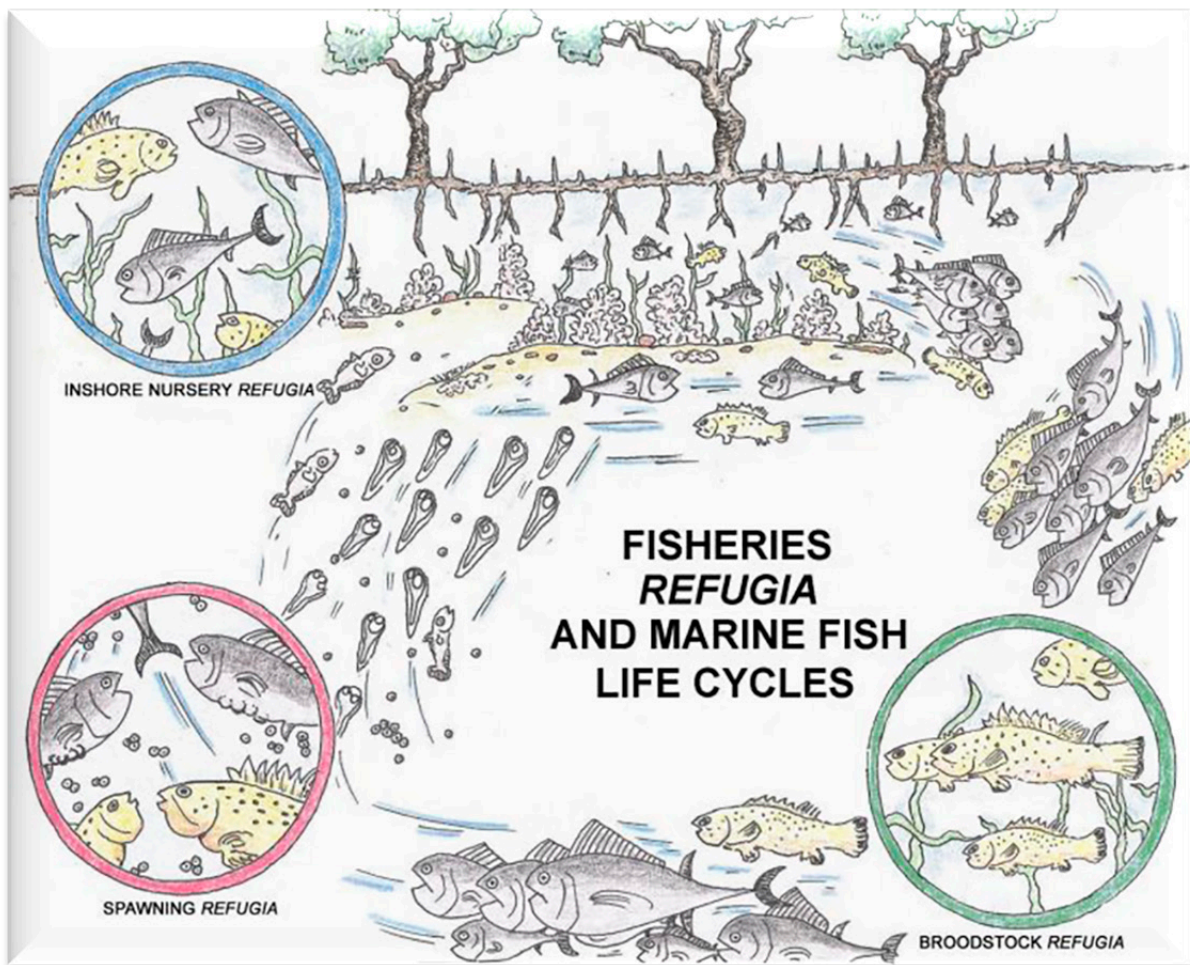
Based on the inputs from 4 countries namely Cambodia, Malaysia, Philippines and Thailand, Table 1 shows the budget requirements from each country

The inputs from Viet Nam and Indonesia will be compiled later.

Table 1: the budget requirements from each country:

Component	Cambodia		Indonesia		Malaysia		Philippines		Thailand		Viet Nam		Grand Total
	Q3	Q4	Q3	Q4	Q3	Q4	Q3	Q4	Q3	Q4	Q3	Q4	Q3+Q4
C1	18,500.00	15,500.00	58,294.00		39,711.38	32,500.00	5,000.00	5,000.00	8,000.00	21,000.00	34650		238,155.38
C2	14,500.00	20,500.00	1,470.00		2,406.75		16,730.77	9,855.77					65,463.29
C3	-	2,000.00	1,300.00		4,813.50	17,400.00	-	6,400.00					31,913.50
C4	2,000.00	2,000.00	3,500.00		10,214.34	19,253.38	860.58	860.58	100.00	4,700.00	4000		47,488.87
sub-Total	35,000.00	40,000.00	64,564.00	50,000.00	57,145.97	69,153.38	22,591.35	22,116.35	8,100.00	25,700.00	38,650.00	50,000.00	483,021.04
<b>Total</b>	<b>75,000.00</b>	<b>75,000.00</b>	<b>114,564.00</b>	<b>50,000.00</b>	<b>126,299.35</b>	<b>126,299.35</b>	<b>44,707.69</b>	<b>44,707.69</b>	<b>33,800.00</b>	<b>33,800.00</b>	<b>88,650.00</b>	<b>88,650.00</b>	<b>483,021.04</b>

Remarks: Budget for Q4 reuested by Indonesia and Viet Nam will be updated in details later



### What are Fisheries *Refugia*?

The term 'refugia' is the plural form of the noun of refugium, which in ecology is commonly referred to as an area that has escaped ecological changes experienced elsewhere and so provides suitable habitat for given species. The meaning of fisheries refugia is defined as: "Spatially and geographically defined marine or coastal areas in which specific management measures are applied to sustain important species [fisheries resources] during critical stages of their lifecycle, for their sustainable use."





The Establishment and Operation of A Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand is a part of the Strategic Action Programme for the South China Sea