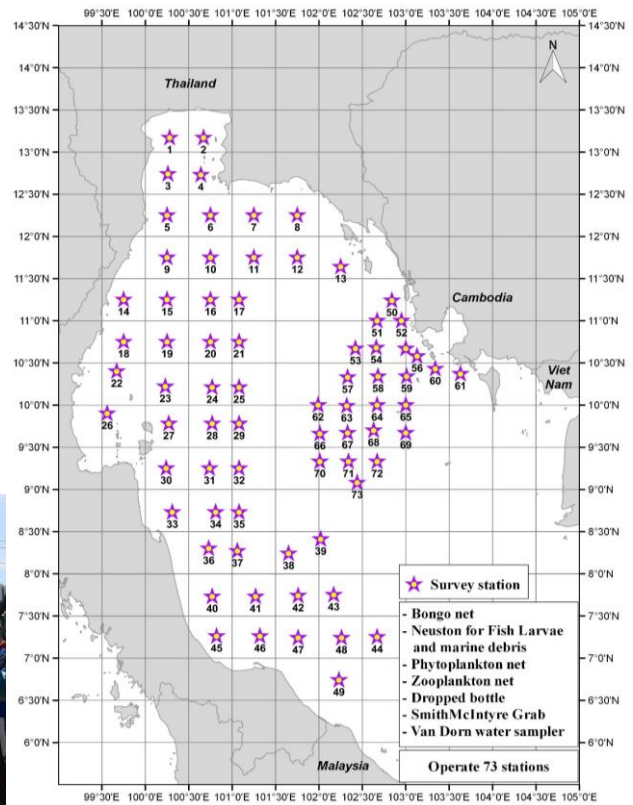




REPORT ON THE REGIONAL TECHNICAL MEETING THE EVALUATION OF THE COLLABORATIVE RESEARCH SURVEY ON MARINE FISHERIES AND MARINE ENVIRONMENT IN THE GULF OF THAILAND

SEAFDEC Training Department, Thailand

8-9 January 2019



SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER
TRAINING DEPARTMENT
2019





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2019**



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BACKGROUND

Currently, attempts of countries in the Southeast Asia have increasingly focused to expand their fishing activities to the offshore areas in their Exclusive Economic Zones where fisheries resources are still under-utilized as alternative marine fisheries resources. With the Resolution and Plan of Action No. 18 describes that “*Investigate the potential of under-utilized fisheries resources and promote their exploitation in a precautionary manner based upon analysis of the best available scientific information*”, SEAFDEC has duties to provide technical support to the Member Countries to explore these under-utilized offshore fisheries resources through various programs, e.g. Technical meetings, Workshops, and Trainings course in related to fisheries resource exploration, fisheries abundance, as well as stock assessment.

In order to fulfill the needs of the SEAFDEC Member Countries on the exploitation of marine fisheries resources and study on marine environment in the specific offshore areas, SEAFDEC/TD works in close collaboration with these Member Countries and other relevant partners at national, sub-regional, and regional levels, to conduct marine fisheries resources and study on marine environment by utilizing SEAFDEC research vessels, M.V. SEAFDEC and M.V. SEAFDEC 2 with two (2) major specific areas: (i) Fisheries research and oceanographic survey; (ii) Human resource development on fisheries and oceanographic research survey, onboard navigation, and marine engineering training. Since 2004, SEAFDEC has technically supported to Member Countries by utilization M.V. SEAFDEC 2 for the survey the fisheries resources in EEZs of these Member Countries. The outputs from the survey include cruise reports of the survey, technical documents related to fisheries, marine environment and other specific requirements.

Recently, SEAFDEC has increasingly strengthened on the sub-regional cooperation of marine fisheries resource management. Data collection by shipboard survey has become important to support the sub-regional fisheries resource management in particular pelagic fisheries resources as share stock and transboundary fisheries resources. The envisage success example on the collaboration of SEAFDEC Member countries presented by the Joint Research Program for Tuna Research Survey in Sulu-Sulawesi Sea (SSSs) that has been collaboratively initiated by SEAFDEC in collaborate with SEAFDEC Member Countries around Sulu and Sulawesi Seas, *i.e.* Indonesia, Malaysia, and Philippines (IMP-Countries) since 2013.

With the significant recommendation of SEAFDEC Council Directors, during the 44th Council Meeting of SEAFDEC Meeting in year 2012, and a reiterated recommendation of the 45th SEAFDEC Council Meeting in following year, tuna research studies and two (2) cruise surveys on the Joint program on tuna resource were carried out in collaboration among IMP-Countries and SEAFDEC by M.V. SEAFDEC 2 in year 2014 and 2015. Training Department (TD) and Marine Fisheries Resource Development and Management Department (MFRDMD) is implementing departments under Offshore Fisheries Resources Exploration in Southeast Asia with the support from Japanese Government through Japanese Trust Fund for SEAFDEC.

In 2017, the 40th Program Committee Meeting of SEAFDEC has adopted the Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand under the SEAFDEC Project Offshore Fisheries Resources Exploration in Southeast Asia with the support from Japanese Government through Japanese Trust Fund for SEAFDEC. The technical consultation, Regional Technical Meetings and cruise survey on marine fisheries resources and marine environment has been developed by SEAFDEC Training Department in close collaboration with the relevant SEAFDEC Member Countries, *i.e.* Cambodia, Thailand and Viet Nam. The overall objectives of collaborative research survey are to support SEAFDEC Member Countries to conduct marine fisheries and environment data and information collection by research vessel, and to promote the offshore fisheries resources exploration through the research and human resources capacity by utilization of SEAFDEC’s Training and Research Vessel, M.V. SEAFDEC 2. The major envisage outputs of the survey are (i) Baseline data on marine fisheries resources and marine environmental situation for scientific reference as well as the status of marine fisheries resources in the Gulf of Thailand, (ii) Increasing number of experience researchers on marine fisheries resources and marine environment of SEAFDEC Member



Countries, (iii) Strengthen network of fisheries and oceanography scientist/researcher in Southeast Asia, and (iv) Maximizing the efficiencies and benefit of the SEAFDEC research vessel, research equipment to support on marine fisheries resources and marine environment survey of SEAFDEC Member Countries.



Series of publication on the Collaborative Research Survey on the Marine Fisheries Resources and Marine Environment Survey in the Gulf of Thailand since 1996

Source: <http://www.seafdec.or.th>



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**REPORT ON THE REGIONAL TECHNICAL MEETING ON THE
EVALUATION OF THE COLLABORATIVE RESEARCH SURVEY ON
MARINE FISHERIES AND MARINE ENVIRONMENT
IN THE GULF OF THAILAND
SEAFDEC Training Department,
Samut Prakarn Thailand
8-9 January 2019**

INTRODUCTION

1. The Regional Technical Meeting (RTM) on the Evaluation of the Collaborative Research Survey on Marine Fisheries and Marine Environment in the Gulf of Thailand was organized at the SEAFDEC Training Department from 8 to 9 January 2019 as supported by the Japanese Trust Fund VI under the Project Offshore Fisheries Resources Exploration in Southeast Asia.

2. The RTM was attended by the representatives from the fisheries agencies of SEAFDEC Member Countries namely: the Department of Fisheries, Thailand (DoF Thailand), the Fisheries Administration of Cambodia (FiA), the Directorate of Fisheries (D-FISH) and the Research Institute for Marine Fisheries (RIMF) of Viet Nam, the representatives from the environment agencies namely: the Department of Marine and Coastal Resources (DMCR) of Thailand, the Office of Atoms for Peace of Thailand (OAP), researchers and scientists from the local institutions in Thailand namely: Chulalongkorn University (CU), Burapha University (BUU), Kasetsart University (KU) as well as the SEAFDEC Secretary-General, Deputy Secretary-General, and the Staffs of SEAFDEC Training Department. The list of participants appears as Annex 1.

AGENDA 1 Opening of the Meeting

3. The Secretary-General of SEAFDEC, Dr. Kom Silapajarn welcomed the participants and observers to the Meeting and thanked for their great effort to take part in this Meeting. He further stated the aims of this Meeting to provide a platform to report and summarize the findings as a result of the survey on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand. Furthermore, this meeting would provide a platform for setting up a timeframe and to follow-up actions for samples and data analysis and further preparation for the publication and presentation in the future and to discuss on other matters regarding the information and data sharing schemes and the HRD program to support the Member Countries. His Opening Remarks appears as Annex 2.

AGENDA 2 Adoption of the Agenda of the Meeting

4. The Agenda which appears as Annex 3 was adopted. The Meeting cordially invited Dr. Pavarot Noranartragoon, representative from the Department of Fisheries, Thailand to serve as the Chairperson of the Meeting and also Mr. Isara Chanrachkij, representative from the SEAFDEC to assist the Chairperson as a facilitator of the Meeting.

AGENDA 3 Review on the Collaborative Survey onboard M.V. SEAFDEC 2

5. The Meeting was briefly presented by the representative from SEAFDEC-Training Department (SEAFDEC/TD) on the background and timeline of the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand, which had been adopted



at the Fortieth SEAFDEC Program Committee Meeting in 2017. The survey proposal was then drafted and developed by the SEAFDEC/TD in close collaboration through a series of consultation meetings with National Agencies of three (3) Participating Countries namely: the Department of Fisheries-Thailand (DoF Thailand), the Fisheries Administration-Cambodia (FiA), the Directorate of Fisheries (D-FISH), and the Research Institute for Marine Fisheries (RIMF)-Viet Nam, the environmental organizations in Thailand e.g. the Department of Marine and Coastal Resources, the Office of Atoms for Peace and academic institutions in Thailand namely: Burapha University (BU), Chulalongkorn University (CU) and Kasetsart University (KU). Finally, the collaborative survey has been successfully carried out by the Research and Training Vessel of SEAFDEC/TD, *i.e.* M.V. SEAFDEC 2 in close collaboration among all organizations and institutions during 17 August to 18 October 2019, It is noted that due to time constraint for administrative arrangement and survey equipment preparation of M.V. SEAFDEC 2, therefore the resource survey in Vietnamese waters has been officially cancelled. The Review on the Collaborative Survey onboard M.V. SEAFDEC 2 appears as Annex 4, and the Summary Report on the Regional Technical Meeting on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (Cambodia, Thailand, and Viet Nam Waters), SEAFDEC Training Department, organized by SEAFDEC/TD, from 24 to 26 July 2018, at SEAFDEC/TD Samut Prakarn Thailand, appears as Annex 5.

AGENDA 4: Report on the cruise survey, activities, and preliminary information and sample collection from the cruise survey

6. SEAFDEC/TD, the Department of Fisheries, Thailand and the participating academic institutions and agencies were requested to report to the Meeting on the over-all research activities carried out on M.V. SEAFDEC 2 during the cruise survey. The report also included the number of stations, number of collected sample, progress of the data analysis (if any) and all information that primarily obtained from the cruise survey. The Meeting expected to have updates and to be reported at the mid-term evaluation meeting, tentatively scheduled in June 2019.

1. Southeast Asian Fisheries Development Center (SEAFDEC)
2. Department of Fisheries Thailand (DoF Thailand)
3. Department of Marine and Coastal Resources, Thailand (DMCR)
4. Office of Atoms for Peace, Thailand (OAP)
5. Burapha University, Thailand (BUU)
6. Chulalongkorn University, Thailand (CU)
7. Kasetsart University, Thailand (KU)

The information on the collected samples, primary results and other related information appears as Annex 4 (4.2).

AGENDA 5: Revision/Updates of the proposed research topics and appointment on the contact persons/focal points for each research topic category

7. The Meeting revised and updated the proposed research topics and provided the contact persons/focal points for each research topic and category for further communication and follow-up. The updated list of research topics and contact persons appears as Annex 6 and Annex 8

AGENDA 6: Time frame and follow-up actions for samples and data analysis and further preparation for the publication and presentation (tentatively to be presented at the 7th Marine Science Conference, 2020



8. The representative from SEAFDEC Training Department informed the Meeting on the SEAFDEC's proposed schedule to monitor and follow up the data/sample analysis as a result of the collaborative survey in the Gulf of Thailand 2018 as follows;

- a. The First Follow up Meeting to update the data/sample analysis will be tentative le organized in June - July 2019;
- b. The Second Follow up Meeting to update the data/sample analysis will be tentative le organized in December 2019 to January 2020;

9. The meeting agree on the presenting of final result of each research study that should be presented at the Seventh Marine Science Conference, hosted by Ram-kham-haeng University, Bangkok, Thailand. The meeting also request SEAFDEC to facilitate coordination with Ram-kham-haeng University to arrange the meeting room to present the Collaborative Research Survey survey session.

10. The meeting suggested to SEAFDEC coordinate with responsible person of the Seventh Marine Science Conference. Separate session on the Collaborative Research Survey to participate in the said conference.

AGENDA 7: Agreement upon the information and data sharing schemes among participating countries and agencies

11. The representative from SEAFDEC Training Department reiterated the Meeting on the agreements upon the information and data sharing schemes among participating countries and agencies. Two references are currently used and agreed as follows;

Reference 1: The Report on the Regional Technical Meeting on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (Cambodia, Thailand, and Viet Nam Waters) as Annex 5

- a. The copies of the analyzed data as well as raw data that will be stored at Countries, SEAFDEC/TD and scientists who analyze the sample or data.
- b. Copyright to publish scientific report of sample and data in national waters is under the Government consideration.
- c. In case SEAFDEC and academic institutions and agencies in Thailand would like to publish or present the research paper, SEAFDEC or academic institutions and agencies will submit the proposal to publish the scientific report of sample and data in the regional perspective.
- d. SEAFDEC follows the data sharing scheme referred to the original Survey Proposal on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand.
- e. The Meeting agreed in principle on the data sharing scheme.
- f. All Participating Countries suggested SEAFDEC to develop the Technical Working Group (TWG) from each country that will help support focal point on the monitoring of data analysis and facilitate coordination between scientists and countries.

Reference 2: Survey Proposal Survey Proposal on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand as Annex 5.5

- a. Copyrights of the results/outputs from the survey
- b. At national level, copyrights of the outputs from the survey in each national waters (including data, samples, technical papers, etc.) will be under authorization by national cooperative agency. However, SEAFDEC may request to collect some outputs for further analysis upon an approval by national agency.



- c. At regional level, joint authors of the technical papers on specific research based on the research activity of the survey could also be done.
- d. SEAFDEC will organize the Regional Technical Meeting on the Collaborative Research Survey on Fisheries Resources and Marine Environment of the Gulf of Thailand to identify the topic of research study and responsible researcher before starting of the cruise (period will be considered).
- e. SEAFDEC in collaboration with Participating Countries will develop the policy data sharing in the region select technical working group to report the final results.

12. The Meeting considered and agreed upon the statements described above.

13. In addition the meeting considered and agreed upon the submitting on the research article from the survey to research bulletin or journals with peer review. However Cambodia representative informed the meeting that in case of researcher of each topic would like to submit research articles which use the data from Cambodia. Researchers need sending draft of research article to countries coordinator for checking before sending to the editor of the research bulletin or journals.

14. Mr. Isara Chanrachkij informed the meeting that SEAFDEC Training Department will act as coordinator between researchers and Participating Countries. He also suggested to Participating Countries to submit list of countries as national focal points of each research topic. It is not only support countries coordinator to coordinate with SEAFDEC, and researchers of each research topic, but also they can develop capacity on the each research study.

AGENDA 8: Information on the human resource development program on samples and data analysis

15. The representative of SEAFDEC/TD presented the results of the feedback as accommodated from the questionnaire on the Needs Assessment on the Human Resource Development Program required by the Participating Countries in the collaborative survey namely: Cambodia, Thailand and Viet Nam. Based on the results, SEAFDEC would prioritize the fields of requirements (considering its score), and further exerts its efforts to seek for funding support on the HRD program to the Member Countries. The result of questionnaire on the Needs Assessment on the Human Resource Development Program is presented in Annex 9.

16. Representative of Cambodia reiterated the needs of FiA Cambodia to develop human resource on the fisheries resource survey in particular the identification of marine animal caught by trawling.

17. Mr. Isara Chanrachkij informed that meeting that HRD program need technically support from all researcher that involve with the collaborative research survey. He informed meeting that if there is funding support, SEAFDEC may requested to professor and researcher in the university or academic institute to accept researcher from Participating Countries to train at their institutes.

AGENDA 9: Other matters

18. The representative from SEAFDEC Training Department updated the Meeting on the following SEAFDEC activities concerning the research activities;

- a. Updated and re-activated the Facebook of the Gulf of Thailand (GOT SEEDs) for the promotion of the information obtained from the previous surveys and strengthening the network of all researchers regarding the survey in the Gulf of Thailand. SEAFDEC representative encourage all colleagues keep monitor and update the website <https://www.facebook.com/GOT-SEEDs-161151174050150/> as Annex 10
- b. Updated information on the proposed activities of M.V. SEAFDEC 2 on marine fisheries resource research survey in 2019 as follows;



- i. A national resources survey based on cost sharing scheme between SEAFDEC and the Government of Viet Nam on the Fisheries and Environmental Research Survey in Vietnamese waters, tentatively scheduled in July to August 2019, the preparation is in progress
- ii. A national resources survey based on cost sharing scheme between SEAFDEC and the Department of Fisheries Malaysia on the Fisheries and Environmental Research Survey in Malaysian waters, tentatively scheduled in September 2019, the preparation is in progress
- c. Updated information on the project proposal on “Survey Proposal the Collaborative Research Survey on Marine Debris in the Gulf of Thailand” as prepared by Research and Development Division, Southeast Asian Fisheries Development Center, Training Department, which to be proposed and submitted to the National Geographic for a grant. The preparation is in progress.

AGENDA 10: Closing session

19. The Deputy Secretary-General of SEAFDEC, Mr. Akito Sato, expressed his appreciation to all participants of the Meeting and the Secretariat of the Meeting for making the Meeting a great success. He further encouraged all researchers of this collaborative project to work closely on the data analysis and discussion and SEAFDEC would also follow up the progress of the research work as well. His Closing Remarks appears as Annex 11.







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- Annex 3:** Prospectus, Agenda and Timetable
- Annex 4:** The Review on the Collaborative Survey onboard M.V. SEAFDEC 2
- Annex 4.1:** Timeline of the Survey Preparation
- Annex 4.2:** Presentation on the Report on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand onboard M.V. SEAFDEC 2
- Annex 5:** Report on the Regional Technical Meeting on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (Cambodia, Thailand, and Viet Nam Waters) SEAFDEC Training Department, 24-26 July 2018
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- Annex 5.4:** Comments and recommendations on 43 Research Topics Agenda 3 (24-25 July 2018)
- Annex 5.5:** Survey Proposal on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand
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- Annex 6:** Update List and Title of Research Topic
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- Annex 9:** Result of the Need Assessment on Human Resources Development
- Annex 10:** Facebook GOT SEEDs
- Annex 11:** Closing Remarks



Annex 1: List of Participants of the Regional Technical Meeting on the Evaluation of the Collaborative Research Survey on Marine Fisheries and Marine Environment in the Gulf of Thailand, SEAFDEC Training Department, Thailand, 8 - 9 January 2019

Name of Agency	Name of Participant
Fisheries Administration (FiA) Cambodia	Mr. Suy Serywath Mr. Ly Kunthy
Directorate of Fisheries (DFISH) Viet Nam Research Institute for Marine Fisheries (RIMF) Viet Nam	Mr. Nguyen Van Minh Mr. Vu Viet Ha
Department of Fisheries (DoF) Thailand	Dr. Pavarot Noranarttragoon Mr. Sakol Pheaphabrattana Mrs. Niracha Songkaew Mr. Chalerm Pusirit
Department of Marine and Coastal Resources, (DMCR) Thailand	Mr. Supawat Kan-atireklarp Ms. Suthida Kan-atireklarp
Burapha University, Chonburi Campus (BUU) Thailand	Dr. Anukul Buranapratheprat Ms. Siraporn Tong-u-dom Ms. Sujitra Boonjum
Burapha University, Chantaburi Campus (BUU) Thailand	Dr. Wirote Laongmanee Ms. Penchan Laongmanee Dr. Rachanimuk Hiransuchalert
Chulalongkorn University (CU) Thailand	Dr. Penjai Sompongchaiyakul Dr. Sujaree Bureekul Mr. Tanakorn Ulbonyaem (Observer) Ms. Suparat Srisaard (Observer)
Kasetsart University, Faculty of Fisheries (KU) Thailand	Dr. Jitraporn Phaksopa Dr. Nissara Thawonsode Mr. Songpao Samuchchanon (Observer) Ms. Sonthaya Phuynoi (Observer)
Kasetsart University, Faculty of Science (KU) Thailand	Dr. Koraon Wongkamhaeng
Office of Atoms for Peace (OAP) Thailand	Dr. Yutthana Tomnoi Ms. Supattra Visetpotjanakit Mr. Chitsanupong Khrautongkieo (Observer)
Southeast Asian Fisheries Development Center, Training Department (SEAFDEC/TD)	Dr. Kom Silapajarn Mr. Akito Sato Mr. Isara Chanrachkij Mr. Nobphadol Somjit Mr. Vudthirat Vudthipanyo Dr. Taweekiet Amornpiyakrit



Name of Agency	Name of Participant
Southeast Asian Fisheries Development Center, Training Department (SEAFDEC/TD)	Dr. Nopporn Manajit
	Mr. Sukchai Arnupapboon
	Mr. Nakaret Yasuk
	Mr. Rakkiet Punsri
	Mr. Santiphong Putsa
	Ms. Siriporn Pangsorn
	Ms. Pontipa Luadnakrob



Annex 2: Opening Remarks

Opening Remarks

**The Regional Technical Meeting on the Evaluation of the
Collaborative Research Survey on Marine Fisheries Resources
and Marine Environment in the Gulf of Thailand
SEAFDEC Training Department, 8-9 January 2019**

Dr. Kom Silapajarn

SEAFDEC Secretary-General and Chief of the Training Department

8 January 2018 (Tuesday)

Mr. Akito Sato-Deputy Secretary-General and Deputy Chief of the Training Department, Distinguished Representatives from the Department of Fisheries of Thailand, Representatives from the Fisheries Administration of Cambodia (FiA), Representatives from the Directorate of Fisheries (D-Fish) and Research Institute for Marine Fisheries (RIMF) of Viet Nam, Representatives from the Department of Marine and Coastal Resources (DMCR), Thailand, Representatives from the Office of Atoms for Peace, Thailand (OAP), Representatives from Thailand's academic institutions, namely: Burapha University, Chulalongkorn University and Kasetsart University,
My Colleagues from SEAFDEC Training Department.
Ladies and Gentlemen, Good Morning!

I am so grateful for your valuable time and efforts to come overseas and take part in this **Regional Technical Meeting on the Evaluation of the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand**, organized by SEAFDEC/TD, from 8 to 9 of January 2018, at the SEAFDEC Training Department.

This meeting aims to report and summarize the findings as a result of the survey on the **Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand**, which has been successfully carried out by M.V. SEAFDEC 2 during 17 August to 18 October 2018. Furthermore, this meeting would provide a platform for setting up a timeframe and to follow-up actions for samples and data analysis and further preparation for the publication and presentation in the future and to discuss on other matters regarding the information and data sharing schemes and the HRD program to support the Member Countries.

Once again, I would like to express my appreciation to those who have supported the Collaborative Survey specifically the crews of M.V. SEAFDEC 2, the Researchers onboard and all Participating Countries, for the unceasing and great efforts to have made the survey successfully and safely.

Last but not least, I hope that you would have a nice stay with us at the SEAFDEC Residence. Let us hear from you if you have any recommendations during your stay and for future our development.

Ladies and Gentlemen, without further ado, please allow me declare this Regional Technical Meeting open.

Thank you and have a very good day.



Annex 3: Prospectus, Agenda and Timetable



Regional Technical Meeting on the Evaluation of the Collaborative Research
Survey on Marine Fisheries Resources and Marine Environment
in the Gulf of Thailand
8-9 January 2019, SEAFDEC Training Department

Prospectus

The Regional Technical Meeting on the Evaluation of the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand 8-9 January 2019, SEAFDEC Training Department

Rational

The Southeast Asian Fisheries Development Center-Training Department in collaboration with the government agencies involving in fisheries, namely: Department of Fisheries, Thailand, Fisheries Administration, Cambodia, Directorate of Fisheries, Viet Nam, Local Academic Institutions, namely: Chulalongkorn University, Kasetsart University, Burapha university and other universities, including the environmental agencies in Thailand such as Department of Marine and Coastal Resources and the Office of Atoms for Peace, has successfully completed the collaborative research resources survey entitled “Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand”, specifically in Cambodian and Thai waters, by using the SEAFDEC’s Training and Research Vessel-M.V. SEAFDEC 2 under the support by the Government of Japan through the Japanese Trust Fund from 17 August to 18 October 2018.

In this connection, to follow up the post-survey activities, which include sample and data analysis, revision of the proposed research topics, time frame set up and other necessary arrangements for the presentations and publications of the survey results in the future, SEAFDEC would like to call all Participating Agencies in this collaborative project to report the preliminary findings as a result of the survey, to discuss and prepare for the process of samples and data analysis and future presentation and publication of the research works accordingly.

Objectives

The Regional Technical Meeting on the Evaluation of the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand is envisaged to:

- 1) Report the cruise survey, activities, and preliminary information and sample collection as a result of the survey;
- 2) Revision/Updates of the proposed research topics (if necessary);
- 3) Timeframe for samples and data analysis and further preparation for the publication and presentation;
- 4) Appointment on the contact persons for each research topic category;
- 5) Agreement upon the information and data sharing schemes among participating countries and agencies;
- 6) Information on the human resource development program on samples and data analysis, and;
- 7) Discussion on other necessary matters in relation with the post-survey.



Expected Outputs:

- 1) Updated information on the preliminary findings and results of the survey;
- 2) An agreement upon the revision of the proposed research topics;
- 3) Set-up timeframe for the samples and data analysis and its follow up actions in the future;
- 4) Contact persons for each research topic category for the follow-up action;
- 5) An agreement upon the information and data sharing schemes among participating countries and agencies.

Participating Countries/Agencies:

The Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand has been successfully carried out by the Southeast Asian Fisheries Development Center, Training Department in cooperation with the concerned government authorities and the academic institutions in Thailand, as follows:

- 1) Fisheries Administration, Cambodia (FiA)
- 2) Directorate of Fisheries, Viet Nam (D-Fish)
- 3) Research Institute for Marine Fisheries (RIMF)
- 4) Department of Fisheries, Thailand (DoF)
- 5) Department of Marine and Coastal Resources, Thailand (DMCR)
- 6) Office of Atoms for Peace, Thailand (OAP)
- 7) Burapha University, Thailand (BUU)
- 8) Chulalongkorn University, Thailand (CU)
- 9) Kasetsart University, Thailand (KU)

Expected participants of the Meeting

Core researchers and researchers of the Collaborative Project or representatives from the concerned government authorities and the academic institutions, 40 persons

Date and Venue:

The two-day Meeting will be organized on 8-9 January 2019, at SEAFDEC Training Department, Samut Prakan, Thailand.



Agenda and Timetable

Time	Agenda
8 January 2019 (Tuesday)	
08:30 - 09:00	Registration
09:00 - 09:15	Agenda 1: Opening session
09:15 - 09:30	Agenda 2: Adoption of the Agenda
09:30 – 09:45	Agenda 3: Review on the Collaborative Survey onboard M.V. SEAFDEC 2
09:45-12:00	<p>Agenda 4: Report on the cruise survey, activities, and preliminary information and sample collection from the cruise survey</p> <p>General results of the samples collection by institutes</p> <ul style="list-style-type: none"> ▪ Department of Fisheries Thailand (DoF) ▪ Fisheries Administration, Cambodia (FiA) ▪ Department of Marine and Coastal Resources, Thailand (DMCR) ▪ Office of Atoms for Peace, Thailand (OAP) ▪ Burapha University, Thailand (BUU) ▪ Chulalongkorn University, Thailand (CU) ▪ Kasetsart University, Thailand (KU)
13:00-15:00	Agenda 4: Report on the cruise survey, activities, and preliminary information and sample collection from the cruise survey (continued)
15:00-17:00	Agenda 5: Revision/Updates of the proposed research topics and appointment on the contact persons/focal points for each research topic category
18:00	Welcome Dinner
9 January 2019 (Wednesday)	
08:30-10:00	Agenda 5: Revision/Updates of the proposed research topics and appointment on the contact persons/focal points for each research topic category (continued)
10:00 - 11:00	Agenda 6: Time frame and follow-up actions for samples and data analysis and further preparation for the publication and presentation (tentatively to be presented at the 7 th Marine Science Conference, 2020)
11:00-11:30	Agenda 7: Agreement upon the information and data sharing schemes among participating countries and agencies
11:30-12:15	Agenda 8: Information on the human resource development program on samples and data analysis
12:15-12:30	Agenda 9: Other matters
12:30	Agenda 10: Closing session
12:40	Lunch

Remark:

1030-1045 Refreshment break
 1200-1300 Lunch break
 1500-1515 Refreshment break



Annex 4: The Review on the Collaborative Survey onboard M.V. SEAFDEC 2

Annex 4.1: Timeline of the Survey Preparation

Date	Progress
November 2017	<p>The 40th PCM of SEAFDEC has adopted the Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand under the SEAFDEC Project “Offshore Fisheries Resources Exploration in Southeast Asia” with the support from the Government of Japan through the Japanese Trust Fund.</p> <p>Accordingly, the Regional Technical Meetings and cruise survey on marine fisheries resources and marine environment has been developed by SEAFDEC Training Department in close collaboration with the relevant SEAFDEC Member Countries through the Department of Fisheries, <i>i.e.</i> Cambodia, Thailand and Viet Nam</p>
20 March 2018	<p>General information and discussion on the Survey with the concerned agencies in Thailand <i>e.g.</i> DoF, DMCR, OAP, and Academic Institutions (KU, CU, BUU)</p>
2 April 2018	<p>Detailed discussion on the Survey with the Department of Fisheries, Thailand</p>
7 March 2018	<p>Consultation Meeting with the Research Institute for Marine Fisheries Research (RIMF), Viet Nam</p>
8 March 2018	<p>Consultation Meeting with the Directorate of Fisheries (D-FISH), Viet Nam</p>
9 March 2018	<p>Consultation Meeting with the Fisheries Administration (FiA), Cambodia</p>
30 April 2018	<p>Consultation Meeting with the Department of Fisheries (DoF) -Thailand and Academic Institutions and Agencies, SEAFDEC/TD</p>
24-26 July 2018	<p>SEAFDEC Training Department organized the Regional Technical Meeting on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (Cambodia, Thailand, and Viet Nam Waters)</p> <p>The meeting discuss on the survey detailed and finalize research topics. Participants is representative from national fisheries agencies of three (3) Participating Countries and Relevant Agencies, academic institutes and SEAFDEC/TD. Cruise order of M.V. SEAFDEC 2 No.51-1/2018 was drafted and agree in meeting.</p>
10 August 2018	<p>Pre-Survey Meeting for Thai Scientists on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand, SEAFDEC/TD</p> <p>Follow-up report on the Regional Technical Meeting on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (Cambodia, Thailand, and Viet Nam Waters)</p> <p>Summary report on the discussion made during the Regional Technical Meeting on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (Cambodia, Thailand and Viet Nam waters) on 24-26 July 2018 at SEAFDEC Training Department</p> <p>Discussion on survey device/equipment preparation</p> <ul style="list-style-type: none"> ▪ List of scientists onboard ▪ List of equipment ▪ Series of sampling ▪ Sample management ▪ Loading/unloading of device/equipment/tool and samples



Date	Progress
<p>10 August 2018 (Continue)</p>	<p>Discussion on cruise plan</p> <ul style="list-style-type: none"> ▪ Updated cruise order ▪ Living conditions ▪ Safety onboard ▪ etc. <p>Other matters</p> <ul style="list-style-type: none"> ▪ Standard Operating Procedure-SOP for sampling ▪ Information and data sharing schemes among participating countries and agencies
<p>17 August - 18 October 2018</p>	<p>Shipboard Survey Operation on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand by M.V. SEAFDEC 2, in Thai and Cambodian waters</p>



Annex 4.2: Presentation on the Report on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand onboard M.V. SEAFDEC 2



(1)

Outline

- Introduction
- Collaborative agencies
- Objectives
- Survey Activities



(2)

Introduction

- SEAFDEC in collaboration with Member Countries, fisheries agencies, universities and institutes carried out the **Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand.**



(3)

Collaborative agencies

- SEAFDEC Training Department
- **Cambodia:**
 - Fisheries Administration (FIA)
- **Viet Nam:**
 - Directorate of Fisheries (D-fish),
 - Research Institute for Marine Fisheries (RIMF)
- **Thailand:**
 - Department of Fisheries (DoF-Thailand),
 - Burapha University (BUU),
 - Chulalongkorn University (CU),
 - Kasetsart University (KU),
 - Department of Marine and Coastal Resources (DMCR),
 - Office of Atoms for Peace (OAP)



(4)

Objectives

- **Update situation** of marine fisheries resources, oceanography and marine environment in the **Gulf of Thailand**
- **Technical supports on the human resources capacity building programs**
 - ❖ Collaborative marine research survey among **researchers from difference research agencies**
 - ❖ Capacity building programs for the **junior scientist and university students** to conduct and practices onboard marine research



(5)

Objectives

- **Strengthen fisheries and oceanography researcher network** in regard to marine fisheries resources and marine environmental in the Gulf of Thailand sub-region
- **Promote on utilization of research equipment and SEAFDEC research vessel** for maximizing it efficiencies and benefit for Southeast Asia region

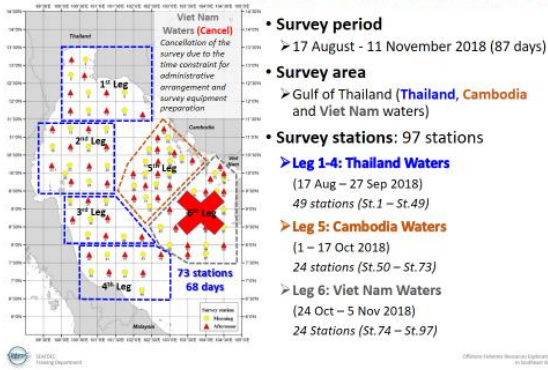


(6)





Survey Activities: Cruise Plan and Survey Area



(7)

Survey Activities: Research Vessels

M.V. SEAFDEC 2

M.V. SEAFDEC2 Specification

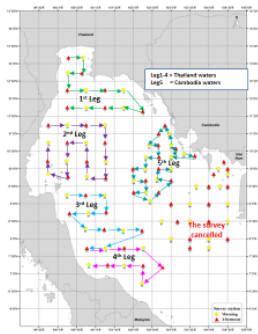
1. Fishing Research and Training
2. Oceanographic Survey
3. On-board Navigation and Engine Training

- LOA 32.50 m
- Breadth 7.20 m
- Depth 3.00 m
- Gross tonnage 211 tons
- Main engine 736 kW
- Service speed 12.0 knots
- Complement 37 persons

(8)

Survey Activities: Ship Route

- Total survey stations conducted**
- **Thailand waters**
17 August - 27 September 2018
49 stations operated (St.1 - St.49)
 - **Cambodia waters**
1 - 17 October 2018
24 Stations operated (St.50 - St.73)



(9)

Survey Activities: Oceanographic and Sampling Gear

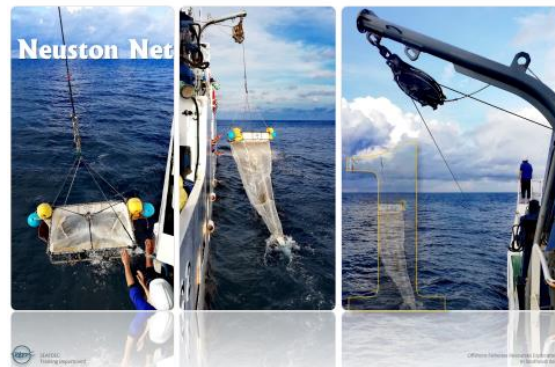
1. Neuston Net
2. Bongo Net
3. CTD
4. Van Dorn
5. Smith McIntyre Grab
6. Dropped Bottle Water Sample
7. Phytoplankton
8. Zooplankton
9. Secchi Disk
10. Box Core
11. Gravity Core
12. Structure Scan
13. Trawl Fishing Operation
14. Marine Debris Visual Observation
15. Dust Measurement Photo Meter

(10)

Survey Activities: Working Locations on M.V. SEAFDEC 2

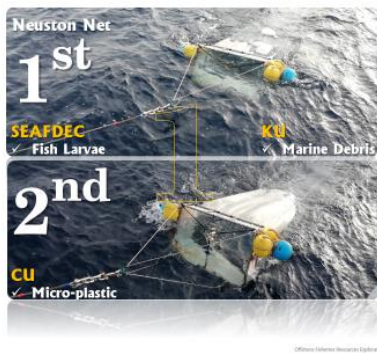


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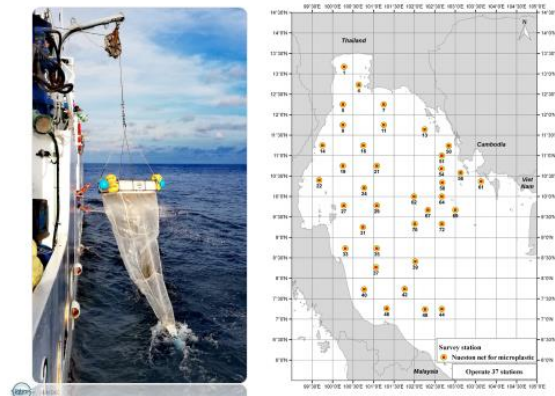


(12)

- Neuston Net for Fish Larvae**
 ✓ Surface
 ✓ Speed 2.5 kts.
 ✓ Distance 75 m.
- Neuston Net for Micro-plastic**
 ✓ Surface
 ✓ Speed 2.5 kts.
 ✓ Distance 40 m.



(13)



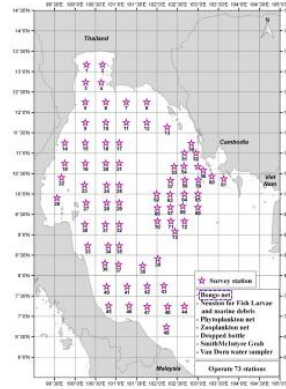
(14)



Bongo Net

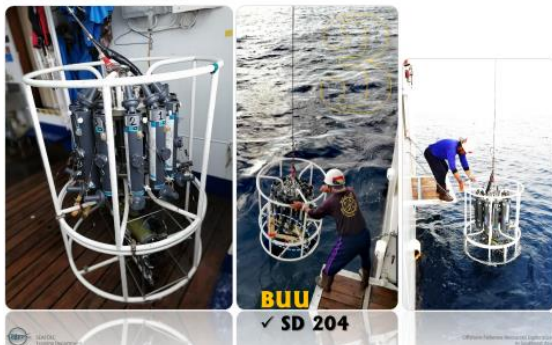


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(16)

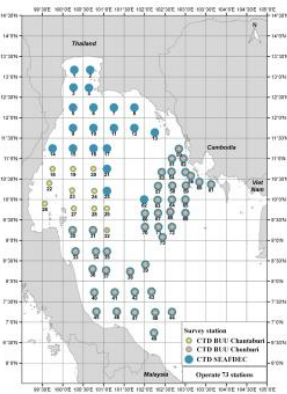
SEAFDEC SeaBird SBE-911+



(17)



(18)



Van Dorn

KU
✓ Chlorophyl-max-Layer
✓ CDOM
✓ Nutrient



(19)

Phytoplankton

Dropped Bottle



(20)

Zooplankton and Phytoplankton (Vertical)

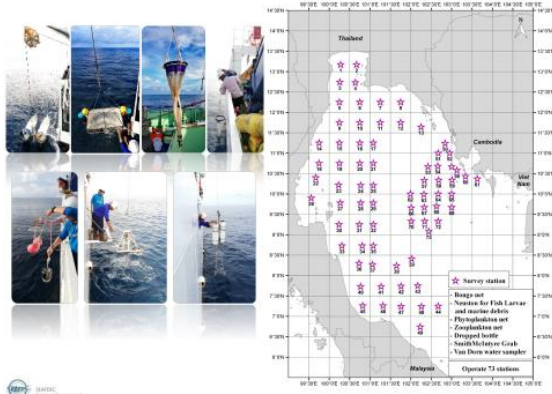


(21)

Secchi disk and Forel scale



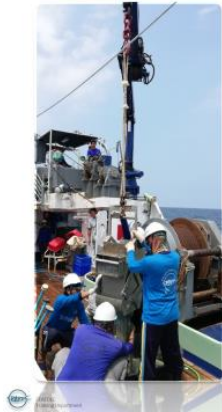
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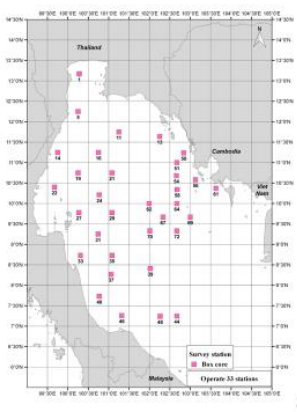
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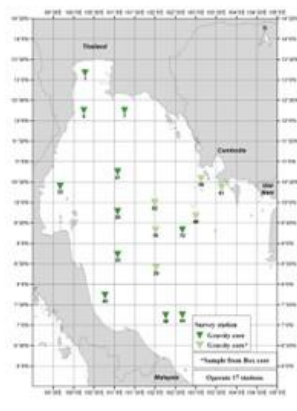
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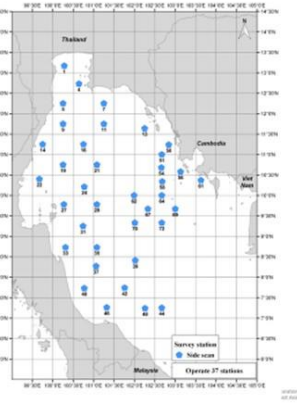
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(28)



(29)



(30)



Trawl Fishing Operation



(31)

Checking for the Net Mouth Opening



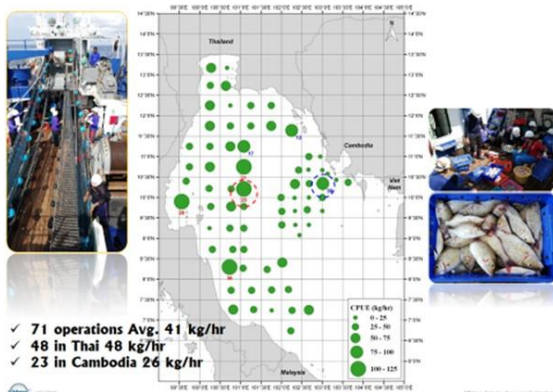
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(33)



(34)



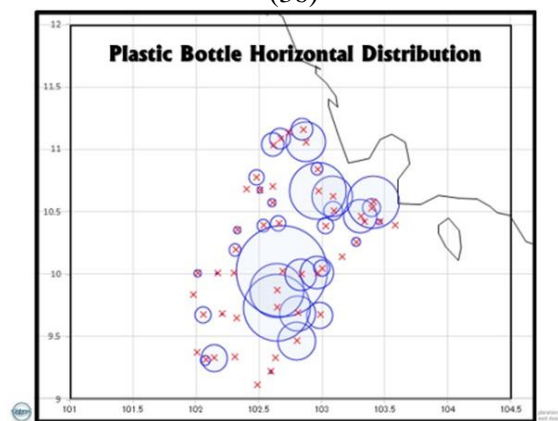
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(36)



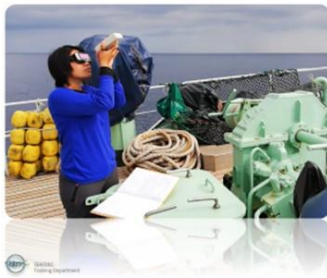
(37)



(38)



Hand-held Sun Photometer
✓ Dust measurement



(39)

Survey Activities: Summary Activities

Leg survey	Number of survey station	Trawl Fishing	CTD with Rosette	Vindom	Drop Bottle	Smith McIntyre	Box core	Gravity core	Bongo Net	Neuston Net	Zooplankton net	Structure scan	Bucket surface	Hand-held sun photometer	Marine Debris
1 st	13	13	13	13	13	13	6	3	13	13	13	13	13		
2 nd	16	15	5	16	16	16	8	3	16	16	16	16	16		
3 rd	12	12	11	12	12	12	6	3	12	12	12	12	12		
4 th	8	8	8	8	8	8	3	8	8	8	8	4	8		
5 th	24	23	24	24	24	24	12	1	24	24	24	12	24	★	★

★ ; Operated every one hour during the day time (8:00 a.m. to 5 p.m.)
 ★ ; The observation conducted when the ship sailing during the day time

(40)





Annex 5: Report on the Regional Technical Meeting on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (Cambodia, Thailand, and Viet Nam Waters) SEAFDEC Training Department, 24-26 July 2018



Regional Technical Meeting on the Evaluation of the Collaborative Research
Survey on Marine Fisheries Resources and Marine Environment
in the Gulf of Thailand
8-9 January 2019, SEAFDEC Training Department

Summary Report

The Regional Technical Meeting on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (Cambodia, Thailand, and Viet Nam Waters) SEAFDEC Training Department 24-26 July 2018

INTRODUCTION

Currently, attempts of countries in the Southeast Asia have increasingly focused to expand their fishing activities to the offshore areas in their Exclusive Economic Zones where fisheries resources are still under-utilized as alternative marine fisheries resources. With the Resolution and Plan of Action No. 18 describes that “Investigate the potential of under-utilized fisheries resources and promote their exploitation in a precautionary manner based upon analysis of the best available scientific information”, SEAFDEC has duties to provide technical support to the Member Countries to explore these under-utilized offshore fisheries resources through various programs, e.g. Technical meetings, Workshops, and Trainings course in related to fisheries resource exploration, fisheries abundance, as well as stock assessment.

In order to fulfill the needs of the SEAFDEC Member Countries on the exploitation of marine fisheries resources and study on marine environment in the specific offshore areas, SEAFDEC/TD works in close collaboration with these Member Countries and other relevant partners at national, sub-regional, and regional levels, to conduct marine fisheries resources and study on marine environment by utilizing SEAFDEC research vessels, M.V. SEAFDEC and M.V. SEAFDEC 2 with two (2) major specific areas: (i) Fisheries research and oceanographic survey; (ii) Human resource development on fisheries and oceanographic research survey, onboard navigation, and marine engineering training. Since 2004, SEAFDEC has been technically supporting Member Countries on the utilization M.V. SEAFDEC 2 for the survey on the fisheries resources in EEZs of these Member Countries. The outputs from the survey include cruise reports of the survey, technical documents related to fisheries, marine environment and other specific requirements.

Recently, SEAFDEC has increasingly strengthened the sub-regional cooperation in marine fisheries resource management. Data collection by shipboard survey has become important to support the sub-regional fisheries resource management in particular share resources, and trans-boundary resources. The envisage successful example on the sub-regional collaboration of SEAFDEC Member Countries presented by the Joint Research Program for Tuna Research Survey in Sulu-Sulawesi Sea that has been collaboratively initiated by SEAFDEC in collaborate with SEAFDEC Member Countries around Sulu and Sulawesi Seas, e.g. Indonesia, Malaysia, and the Philippines, since 2013. With reference to the significant recommendation of SEAFDEC Council Directors, during the 44th SEAFDEC Council Committee Meeting in year 2012, and a reiterated recommendation of the 45th SEAFDEC Council Committee Meeting in following year, Joint Research Program for Tuna Research Survey in Sulu-Sulawesi Sea and two (2) cruise of tuna resource research survey in Sulu-Sulawesi Sea were carried out in collaboration among Indonesia, Malaysia, the Philippines, and SEAFDEC Training Department (TD)



and Marine Fisheries Resource Development and Management Department (MFRDMD) by using M.V. SEAFDEC 2, during year 2014 to 2015. The surveys had been implemented under the Project Offshore Fisheries Resources Exploration in Southeast Asia that supported by Japanese Government through Japanese Trust Fund for SEAFDEC.

In 2017, the 40th Program Committee Meeting of SEAFDEC has adopted the Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand under the SEAFDEC Project Offshore Fisheries Resources Exploration in Southeast Asia with the support from the Government of Japan through the Japanese Trust Fund for SEAFDEC. The overall aims of collaborative research survey are to encourage SEAFDEC Member Countries to strengthen marine fisheries and environment information collection by research vessel, and to promote the offshore fisheries resources exploration through the research and human resources capacity by utilization of SEAFDEC's Training and Research Vessel, M.V. SEAFDEC 2.

In response to Member Countries' needs and requirements, in early 2018, the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand has been drafted by the SEAFDEC Training Department. Recently, a series of consultation meetings on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand has been successfully organized by SEAFDEC/TD in collaboration with Fisheries Administration (FiA), Cambodia on 9 March 2018, with the Directorate of Fisheries (D-FISH) and Research Institute for Marine Fisheries (RIMF), Viet Nam on 7-8 March 2018, and with the Department of Fisheries (DoF), Thailand and local academic institutions and agencies on 30 April 2018. The meetings discussed and came up with the research topics, draft cruise plan, and concerned details on the Collaborative Research Survey for further discussion, development and preparation prior to the survey.

To ensure the preparedness and success of this collaborative survey in the Gulf of Thailand, it is therefore necessary for Participating Countries and agencies to technically and administratively discuss and agree on the survey cruise plan and all concerned arrangements prior to the cruise survey which is scheduled from 17 August to 9 November 2018, starting by Thailand, Cambodia and Viet Nam waters respectively, SEAFDEC Training Department plans to organize the Regional Technical Meeting on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (Cambodia, Thailand, and Viet Nam Waters), from 24 to 26 July 2018, at SEAFDEC Training Department. The overall aims of the Meeting is to finalize the research activities, cruise plan of M.V. SEAFDEC 2, onboard researchers, and administrative matters e.g. port entry, logistics arrangement, and supply of provisions.

OBJECTIVES:

The Regional Technical Meeting on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (Cambodia, Thailand, and Viet Nam Waters) was envisaged to:

- 1) Finalize the research activities, cruise plan, , areas, and stations, cruise by utilizing M.V. SEAFDEC 2 for the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand;
- 2) Finalize the sampling methods and time management, Standard operational procedure;
- 3) Appoint the representatives and researchers from participating countries, namely: Cambodia, Thailand, and Viet Nam to be onboard M.V. SEAFDEC 2;
- 4) Agree upon the information and data sharing schemes among Participating Countries and agencies;
- 5) Discuss on responsibilities of researchers onboard at each station through the cruise survey;
- 6) Discuss on administration, customs, immigration and port clearance including logistics arrangement (researchers, equipment, samplings loading/unloading) and supply of provisions; and
- 7) Discuss on other necessary matters in relation with the resources survey.



EXPECTED OUTPUTS:

- 1) The proposed research topics which agreed by all Participating Countries;
- 2) List of responsible researchers on each proposed research topics;
- 3) The tentative cruise plan of M.V. SEAFDEC 2 to conduct Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (Cambodia, Thailand, and Viet Nam Waters);
- 4) Agreed protocol to administrate the port entry, i.e. customs, immigration, port clearance including logistics arrangement (researchers, equipment, samplings loading/unloading) and supply of provisions.
- 5) Update the survey permission of each Participating Countries
- 6) Identify issues and constraints on the fisheries resources survey and their solutions:
- 7) Researchers of Cambodia, Thailand and Viet Nam have opportunity to exchange idea on fisheries resources and marine environmental

RESPONSIBLE AGENCIES:

The Meeting was hosted by the Training Department of Southeast Asian Fisheries Development Center (SEAFDEC/TD) in cooperation with concerned government authorities and academic institutions with budgetary support from the Government of Japan through the Japanese Trust Fund for SEAFDEC under the project entitled Offshore Fisheries Resources Exploration in Southeast Asia.

COLLABORATIVE AGENCIES:

The Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand was carried out by the SEAFDEC/TD in cooperation with concerned Government Authorities and academic institutions as follows:

1. Fisheries Administration (FiA), Cambodia
2. Directorate of Fisheries (D-FISH), Viet Nam
3. Research Institute for Marine Fisheries (RIMF) Viet Nam
4. Department of Fisheries (DoF), Thailand
5. Department of Marine and Coastal Resources (DMCR), Thailand
6. Office of Atoms for Peace (OAP), Thailand
7. Burapha University (BUU), Thailand
8. Chulalongkorn University (CU), Thailand
9. Kasetsart University (KU), Thailand

DATE AND VENUE:

1. The Meeting had been organized from 24 to 26 July 2018,
2. The venues at SEAFDEC Meeting Room, the 2nd floor of Fishing Workshop Building, SEAFDEC Training Department, Samut Prakan, Thailand.

SUMMARY OF MEETING

AGENDA 1: Opening session

The Meeting was warmly welcomed by Mr. Akito Sato SEAFDEC Deputy Secretary General and Deputy Chief of Training Department. DSG reiterated the main objective of the collaborative survey is to strengthening the marine fisheries and environment and to promote the offshore fisheries resources exploration collection by using SEAFDEC Training and Research Vessel; M.V. SEAFDEC 2. He expressed his appreciation to all participants and observers on their kind supporting the Meeting including all project Participating Countries *i.e.* Cambodia Viet Nam and Thailand, for the unceasing and great efforts to make the survey plan complete.



AGENDA 2: Introduction, objectives, outputs, outcomes and adoption of the agenda

1. Dr. Taweekiet Amornpiyakrit representing SEAFDEC, presented the background of the survey started since 2007 and 2013 in the Gulf of Thailand (GOT) (as a follow up action on the recommendation on the result of marine fisheries resources and environmental research survey in the GOT), main objectives, expected output, and agenda of meeting. Prospectus, Agenda and Timetable is presented in Annex 1
2. The Meeting nominated Mr. Isara Chanrachkij, Head of Research and Development Division to serve the meeting as chairman of the meeting.
3. All Participating Countries adopted the agendas of the Meeting and organizer requested a group photo.
4. List of Participant is presented in the Annex 2.

AGENDA 3: Discussion on Research Programs

5. SEAFDEC researchers presented 43 topics from 45 proposed research topics and requested for comments and suggestion from the Participating Countries.
6. In this connection, SEAFDEC also requested Participating Countries to nominate list of researcher to collaborate with responsible researcher of these topics.
7. The Meeting agreed on the proposed topics and further suggested the responsible researchers to revise the sampling protocols and its activities to avoid the duplication of the works. The secretariat of the Meeting took note the comments, recommendation made by Participating Countries and relevant agencies and to consolidate and revise as necessary upon agreement among the researchers and reconsider research topics that are not clear on proposal. Comments and suggestions of all 43 topics are presented in Annex 3.
8. In response to SEAFDEC's requests on the nomination of researcher to collaborate with responsible researchers of these topics;
 - 8.1 Cambodia will nominate the researchers to join the research groups. Cambodia requested support on human resource capacity building and enhancement (marine fisheries resources survey). This request includes SEAFDEC to speed up data and sample analysis of the previous surveys;
 - 8.2 Thailand will nominate the researchers to join the research groups;
 - 8.3 Viet Nam will nominate the researchers to join the research groups. Viet Nam is willing to contribute the human resources to the region by sharing knowledge and experiences, specifically the hydro-acoustic survey techniques and its analysis
9. Participating Countries suggested SEAFDEC to produce the Standard Operational Procedure (SOP) to survey in the Gulf of Thailand
10. SEAFDEC informed the Meeting that in preparation for the Hydro-acoustic survey to be carried out in the Gulf of Thailand, SEAFDEC will send an official letter for requesting a permission from the D-FISH of Viet Nam on the utilization of the Hydro-acoustic equipment of the RIMF installed onboard M.V. SEAFDEC 2. In this connection, SEAFDEC also would like to invite RIMF Staff(s) to set up the system and its accessories and to introduce the instruction and Operation to scientists onboard in Thailand prior to the survey cruise in the GOT.
11. In this regards, representative of D-FISH and RIMF of Viet Nam responded the request of SEAFDEC that Viet Nam is willing to contribute the human resources to the region by sharing knowledge and experiences, specifically the hydro-acoustic survey techniques and its analysis.
12. RIMF of Viet Nam informed the Meeting that Viet Nam has a constraint on the budget support on the data analysis since the survey is not a regular annual activity of RIMF and budget will not be allocated to support any activities related to the survey. Representative of RIMF and D-



FISH of Viet Nam requested financial support for sample and data analysis, and report of search study.

13. Representative of Cambodia informed the Meeting that FiA of Cambodia has the constraint on the budget support on the data analysis and less human resources capacity. Cambodia requested to SEAFDEC support both constraint. Cambodia also sought support from all Participating Countries on the collaborative survey.
14. SEAFDEC has informed to all Participating Countries, universities and agencies that SEAFDEC cannot provide financial support for expenditure of the sample and data analysis, and report of search study. SEAFDEC will issue an official letter to FiA of Cambodia and D-FISH and RIMF of Viet Nam requesting for supporting for sampling and data analysis and report expenditure.

AGENDA 4: Discussion on tentative cruise plan

15. Mr. Nobphadol Somjit, Ship and Fleet Operation Section Head and Captain M.V. SEAFDEC presented the Ports of call, administration (Customs, Immigration and Port clearance including Logistics and Supply of provisions) to the Meeting.
16. Mr. Isara Chanrachkij presented the drafted cruise plan, and number of researcher onboard remain unchanged as agreed as shown in the Annex 4: Survey Proposal on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand
17. Participating Countries agreed in principle on the following issues;
 - 17.1 Cruise plan: The Meeting discussed on the tentative cruise plan that can be separated into four (4) legs of the cruise survey in Thai waters starting from 17 August to 28 September 2018 and then proceed to Sihanoukville of Cambodia. The survey in Cambodia waters will start from 5 October to 17 October 2018. The survey in Viet Nam waters starts from 25 October to 5 November 2018 and supposed to arrive at SEAFDEC/TD on 11 November 2018 tentatively;
 - 17.2 Port of call: The Meeting discussed on Port of call, arrangement for port entry to Cambodia and Viet Nam. Port of call are namely; Prachuab Khirikan province and Songkhla province of Thailand, Sihanoukville of Cambodia and Phu Quoc Island of Viet Nam;
 - 17.3 Number of researcher onboard remains unchanged as agreed and stated in the working paper is 10 researchers from the host countries. However SEAFDEC may request to reduce the quota of Cambodia researchers and increase the taxonomist onboard M.V. SEAFDEC 2;
 - 17.4 Viet Nam and Cambodia will send ship agency names to SEAFDEC;
 - 17.5 SEAFDEC representative informed the Meeting that the administration process e.g. customs, immigration and port clearance including logistics of sampling and supply of provisions at the Port of call of Thailand will be conducted by SEAFDEC;
 - 17.6 Representative of Viet Nam and Cambodia informed the Meeting that both countries have constraint on the budget support for local transportation due to the survey that is not a regular annual activity. Representative of both countries requested financial support for local transportation;
 - 17.7 Representative of Cambodia additionally informed the Meeting that the accommodation and living cost in Port of call, Sihanoukville is very high. He requested SEAFDEC to provide living space on M.V. SEAFDEC 2 while Cambodia researchers come to embark the ship. Captain of M.V. SEAFDEC 2 responded to representative of Cambodia that he will appropriately prepare for the requests from Cambodia;



- 17.8 SEAFDEC reiterated the difficulties on the financial support for local transportation and accommodation to national researchers and scientists and researchers from the universities and agencies.
18. Representative of Thailand recommended SEAFDEC to modify the stations survey by reducing nine (9) stations around Moo Koh Angthong Archipelago to one (1) station, and reducing six (6) stations around Koh Chang Archipelago to one (1) station. She informed the Meeting that these stations are able to conduct the survey by Department of Fisheries Research Vessel(s). In addition, she also suggested to SEAFDEC to reduce the survey stations can reduce days and cost of survey.
19. Viet Nam delegate suggested SEAFDEC to reroute the Hydroacoustic track survey in the Viet Nam waters.
20. Status of the permission to conduct the survey in all Participating Countries was concluded on the following issues;
- 20.1 Thailand issued the permission document and allowed SEAFDEC to carry out a survey in Thai waters.
- 20.2 SEAFDEC will send an official letter to Cambodia and Viet Nam for receiving a permission to carry out a survey in Cambodia and Viet Nam waters as soon as possible.
21. Regarding to the numbers of research topic, Participants of the Regional Technical Meeting concerned and suggested SEAFDEC prepare the information of onboard working. To respond this concern, Mr. Sukchai Arnupapboon, SEAFDEC researcher, presented the list of sampling gear that is the tool to collect sample in for each research topics. Series of activities of each research topic is also listed in order to understand the process of the sample after processing onboard M.V. SEAFDEC2. He also presented the list of sampling activities separated in morning session and afternoon session. List of Sampling Gear and Research Topic and Sample Handling Procedure is presented in Annex 5.

AGENDA 5: Discussion on data sharing schemes

22. Chairman reiterated that the copies of the analyzed data as well as raw data that will be stored at Countries, SEAFDEC/TD and scientists who analyze the sample or data. Copyright to publish scientific report of sample and data in national waters is under the Government consideration. In case SEAFDEC and academic institutions and agencies in Thailand would like to publish or present the research paper, SEAFDEC or academic institutions and agencies will submit the proposal to publish the scientific report of sample and data in the regional perspective.
23. SEAFDEC follows the data sharing scheme referred to the original Survey Proposal on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (page 8) enclosed herewith the Annex 4: Survey Proposal on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand;
24. The Meeting agreed in principle on the data sharing scheme.
25. All Participating Countries suggested SEAFDEC to develop the Technical Working Group (TWG) from each country that will help support focal point on the monitoring of data analysis and facilitate coordination between scientists and countries.
26. Representative of Viet Nam expressed the concern and informed Meeting on the national regulations to export the samples/specimens out of the country. Viet Nam will conduct the analysis works by country scientists but still encountering budget constraint. Viet Nam requested SEAFDEC to consider financial support on the analysis works.
27. SEAFDEC responded the concerns of Viet Nam and other Participating Country, universities and agencies that SEAFDEC cannot provide financial support for expenditure of the sample



and data analysis, and report of search study. SEAFDEC, however, informed the Meeting that in case countries have constraint on the budget of the expenditure of the sample and data analysis, and report of research study, SEAFDEC will try to identify the competent academic institutions and agencies in Thailand to conduct the sample and data analysis for Participating Countries without any expenditure. SEAFDEC/TD will be responsible for coordination and oversight the analysis of sample and data by all these institutions and agencies in Thailand. In this regards, TWG of each countries will help support focal point on the monitoring of data analysis and facilitate coordination between scientists and countries.

28. Representatives of Cambodia reiterated that the FiA of Cambodia has a limitation for this research study and sought assistance from SEAFDEC and all countries to write the reports, after grouping the research topics. In this regards, Cambodia will keep in touch with the group by assigning researchers to join and dispatch.

AGENDA 6: Other matters (e.g. Human Resource Development (HRD) Program, Way forward)

29. Chairperson requested all participants to provide recommendations on the preparation for the space onboard M.V. SEAFDEC2 after having an observation. He summarized over-all results of discussion, needs re-grouping of research topics, constraints occurred in Viet Nam on budget constraint, SEAFDEC will develop the Term of Reference (TOR), TWG, requested the researchers to serve the TWG. In addition, he also proposed the Meeting to consider the following issues;
30. HRD program on pre-survey cruise and post-survey cruise, to consider the following issues;
 - 30.1 The pre-survey cruise of the HRD on the hydro-acoustic survey introduction and practices, how to store, transfer obtained data, Representative of Viet Nam agreed to provide technical support analyzing the data (partial data), how to interpret, and may not be complete for the whole survey, SEAFDEC will seek funding support for the HRD program;
 - 30.2 Regarding the hydro-acoustic survey, Representative of Viet Nam reminded that country must prepare the researchers to dispatch the Vietnamese hydro-acoustic team, needs 10 hours per day to continuously monitor the echogram, Representative of Viet Nam suggested SEAFDEC to assign 3 persons, rotating in a day, sought assistance to install a screen on the navigation bridge for the crews to monitor, Vietnamese researcher will bring the display to install onboard, so that this will require two (2) computers, one is mainly used the other one for spare;
 - 30.3 Regarding the training on hydro-acoustic, Representative of Viet Nam is willing to share the experience, for the first leg of the survey, the pre-survey training is needed, to make sure to follow the protocols, processing of the echogram, it consumes much time;
 - 30.4 Representatives of Viet Nam realizes that Thailand uses LSSS application program to for processing the obtained hydro-acoustic data, they do not have any software (expensive), with that Representatives of Viet Nam encouraged the SEAFDEC and Participating Countries to establish the hydro-acoustic group among 3 countries, to confirm the smooth operation of the post-survey processing. In addition, this hydro-acoustic group among three (3) Participating Countries should be expanded to the SEA region;
 - 30.5 Regarding the hydro-acoustic survey, Representatives of Thailand is undertaking the collaborative project with Food and Agriculture Organization on the Fridtjof Nansen Project in the Andaman Sea, specifically in Myanmar and Thai waters. The project welcomes to collaborate with researchers on the hydro-acoustic, offering a chance to work and share the information, data in the future;



- 30.6 Representatives of Thailand also informed the Meeting that the project of Fridtjof Nansen will hold a seminar on hydro-acoustic as a platform to share the information, and she is willing to share information on this collaborative survey to the Fridtjof Nansen Project; and
- 30.7 Representatives of Cambodia agreed on the HRD program on the hydro-acoustic survey.
31. Regional Seminar/Conference to report the results of the survey, to consider the following issues;
- 31.1 Representatives of Viet Nam supported the Regional Seminar/Conference to report the results of the survey, to be presented. However in some cases, research studies cannot be completely fulfill in all research topics, alternatively, a specific seminar can be another choice in order to launch as soon as possible before the result is out of date to the public;
- 31.2 Chairman clarified the timeframe of Regional Seminar/Conference which was asked by the representative from the Office of Atoms for Peace. He informed the Meeting that regional seminar/conference should link with the timeframe appear in the survey proposal. He also commented that in practical, it may be delayed; However SEAFDEC will follow up through the focal point (to monitor as well). The Regional Seminar/Conference will be tentatively organized in 2020; and
- 31.3 In consistent with Regional Seminar/Conference, Representatives of Viet Nam encouraged all researchers to launch the publications, journal, of article in international bulletin.
32. Representatives of Cambodia and Viet Nam suggested SEAFDEC to present a certificate of participation to all researchers who join the survey cruise.
33. Representatives of Cambodia reiterated the concern on the survey results of Koyo Maru carried out previously in Cambodia waters (3-year project on the marine resources survey in the areas jurisdiction of Cambodia by the National Fisheries University, Japan) through the support by the Government of Japan), Cambodia requested the progress of the report in the previous years. Cambodia requires the results to report to the high fisheries authorities or the cabinet.
34. In response to Cambodia's concerns, Chairperson as Research and Development Division Head of SEAFDEC will speed up the partial report and send to Cambodia as much as possible without any anticipation from the National Fisheries University, Japan.
35. Representatives of Thailand reiterated that a total of 43 proposed research topics exist at the moment, some topics may be combined, regrouped, then the report will be finished by the specific researchers, SEAFDEC will try to combine as appropriate in one for all.
36. In additional, chairperson informed the Meeting that SEAFDEC requested the representatives from the countries (national researchers) to develop the scientific report, when the scientific report is finished, SEAFDEC encourages the invited researchers to write the report in a regional view. Before making the regional view report, *e.g.* hydro-acoustic, SEAFDEC must inform the country through the focal point and SEAFDEC will not touch upon the national report.
37. Representatives of Thailand sought clarification on the levels or scientific reporting, *e.g.* national level (in national jurisdiction) and regional level. If the national researchers wish to submit the papers for promotion, we can use the final report under the Department of Fisheries, Thailand or not. Chairman reiterated the data sharing scheme that partial data must be stored at SEAFDEC, SEAFDEC will focus only for regional report, in case the country wishes to publish, SEAFDEC will not intervene, even though the process expense are responsible by the professors/universities, writing a national report is under consideration by the country (somehow in respectful manner to the owner of the research topics).
38. Representatives of Viet Nam commented on the 43 topics in total and to be discussed and combined later. They require more detail for the document, prepare the protocol as well. Researchers should have proposal of each research topics, and should circulate to all for



comments. Chairman responded the comment from representatives of Viet Nam that due to the time constraint, the researchers cannot guarantee to make it in time or not, researchers will try having proposal for each research topic. Nevertheless SEAFDEC will request some information to prepare a SOP but not requesting the full proposal.

39. Chairman reiterated that the survey cruise cannot be postponed, the funding must be spent within this year according to the policy of the JTF, Japan and the restoration of M.V. SEAFDEC 2 supported by JICA, Japan is also to be carried out by the end of 2018, SEAFDEC will try to coordinate the get the proposals and SOPs, will coordinate with the professors, to make grouping of the research topics.
40. Representatives of Viet Nam concurred by Thailand suggested SEAFDEC to identify common concerned/interests on the marine fisheries and marine environmental research studies in the Gulf of Thailand *e.g.* fisheries resources (pelagic, demersal), marine debris, and etc., that is the concern for all Participating Countries. Chairman responded to suggestion made by Viet Nam and Thailand that these common concerned/interests discussion may take another day. He proposed to discuss through the email, to prepare a ranking score, common interest assessment, and need each country's focal point to help facilitate. SEAFDEC will send out the research works and request the country fulfill the list of common concerned/interests and to score them. This process would be communicated through the internet and email. Even though this may take time, it is a cost and effectiveness.
41. Representatives of Viet Nam agreed with chairman's proposal and suggestion but requested to add up with the information on capacity of the country that can do or cannot do research works.

AGENDA 7: Conclusion

42. Chairman presented the summary key point of for 2-day meeting in brief to the Meeting. The Meeting consider the 43 research topics (referred to PPT file) Participating Countries agreed in principle to conduct the proposed research topics but need to Re-arrange categories of research topic, Combine some research topics and Reconsider research topics. Standard Operational Procedure (SOP) is one of the significant publications that is needed as reference for the survey.
43. Chairman concluded that collaborative work between all parties of collaborative research survey. SEAFDEC will established Technical Working Group (TWG) and consider to develop TOR of such TWG. All Participating Countries should nominate the researchers to join the research groups or technical working group as requested during the meeting. Cambodia Thailand and Viet Nam agreed to nominate the researchers to join the technical working group. Technical Working Group (TWG) from each country will help support focal point on the monitoring of data analysis and facilitate coordination between scientists and countries.
44. In addition, Cambodia requested support on human resource capacity building and enhancement (marine fisheries resources survey). Viet Nam is willing to contribute the human resources to the region by sharing knowledge and experiences, specifically the hydro-acoustic survey techniques and its analysis.
45. Representatives of Cambodia requested SEAFDEC to consider to technical support on the analysis works.
46. Representatives of Viet Nam expressed the concern and informed the Meeting on the National regulations to export the samples/specimens out of the country. Viet Nam will conduct the analysis works by countries scientists but still encountering budget constraint.
47. All Participating Countries agreed in principle on cruise plan, port of call, and number of researcher on board. In addition, Viet Nam and Cambodia will send ship agency names to SEAFDEC.
48. The Meeting agreed in principle on the data sharing scheme.



49. Technical Working Group (TWG) from each country will help support focal point on the monitoring of data analysis and facilitate coordination between scientists and countries.
50. Thailand issued the permission document and allowed SEAFDEC to carry out a survey in Thai waters. SEAFDEC will send an official letter to Cambodia and Viet Nam for receiving a permission to carry out a survey in Cambodia and Viet Nam waters as soon as possible.
51. Additional information to be added to the letter sent to Viet Nam SEAFDEC will support DSA, Foods, and requests D-FISH to support for sample and data analysis and report, as well as local transportation for implementing the cruise survey. Otherwise SEAFDEC will request both countries to consider the sample analysis which will be done by researchers of Thailand under the collaboration and oversight by SEAFDEC without any expenditure.
52. Participating Countries agreed in principle on the Human Resource Development on the Fisheries Resource Survey by using Hydro-acoustic Equipment and Regional Seminar/conference to report the result of the survey.
53. Regarding large amount of research topics, Viet Nam and Thailand suggested the Meeting to consider the identification and prioritization of common interest on research topics that can help prioritize research works.



Annex 5.1 Prospectus, Agenda and Timetable of the Regional Technical Meeting on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (Cambodia, Thailand, and Viet Nam Waters), SEAFDEC Training Department, 24-26 July 2018



**Provisional Prospectus
The Regional Technical Meeting on the
Collaborative Research Survey on Marine Fisheries Resources and
Marine Environment in the Gulf of Thailand
(Cambodia, Thailand, and Viet Nam Waters)
SEAFDEC Training Department
24-26 July 2018**

BACKGROUND

In 2017, the Fortieth Program Committee Meeting of SEAFDEC has adopted the Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand under the SEAFDEC Project Offshore Fisheries Resources Exploration in Southeast Asia with the support from the Government of Japan through the Japanese Trust Fund for SEAFDEC. The overall aims of collaborative research survey are to encourage SEAFDEC Member Countries to strengthen marine fisheries and environment information collection by research vessel, and to promote the offshore fisheries resources exploration through the research and human resources capacity by utilization of SEAFDEC's Training and Research Vessel, M.V. SEAFDEC 2.

In response to Member Countries' needs and requirements, in early 2018, the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand has been drafted by the SEAFDEC Training Department. Recently, a series of consultation meetings on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand has been successfully organized by SEAFDEC/TD in collaboration with Fisheries Administration (FiA), Cambodia on 9 March 2018, with the Directorate of Fisheries (D-FISH) and Research Institute for Marine Fisheries (RIMF), Viet Nam on 7-8 March 2018, and with the Department of Fisheries (DoF), Thailand and local academic institutions and agencies on 30 April 2018. The meetings discussed and came up with the research topics, draft cruise plan, and concerned details on the Collaborative Research Survey for further discussion, development and preparation prior to the survey.

To ensure the preparedness and success of this collaborative survey in the Gulf of Thailand, it is therefore necessary for participating countries and agencies to technically and administratively discuss and agree on the survey cruise plan and all concerned arrangements prior to the cruise survey which is scheduled from 17 August to 9 November 2018, starting by Thailand, Cambodia and Viet Nam waters respectively, SEAFDEC Training Department plans to organize the Regional Technical Meeting on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (Cambodia, Thailand, and Viet Nam Waters), from 24 to 26 July 2018, at SEAFDEC Training Department. The overall aims of the Regional Technical Meeting is to finalize the research activities, cruise plan of M.V. SEAFDEC 2, onboard researchers, and administrative matters e.g. port entry, logistics arrangement, and supply of provisions.

In 2017, the 40th Program Committee Meeting of SEAFDEC has adopted the Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand under the SEAFDEC Project Offshore Fisheries Resources Exploration in Southeast Asia with the support from the Government of Japan through the Japanese Trust Fund for SEAFDEC. The overall aims of collaborative research



survey are to encourage SEAFDEC Member Countries to strengthen marine fisheries and environment information collection by research vessel, and to promote the offshore fisheries resources exploration through the research and human resources capacity by utilization of SEAFDEC’s Training and Research Vessel, M.V. SEAFDEC 2.

In response to Member Countries’ needs and requirements, in early 2018, the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand has been drafted by the SEAFDEC Training Department. Recently, a series of consultation meetings on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand has been successfully organized by SEAFDEC/TD in collaboration with Fisheries Administration (FiA), Cambodia on 9 March 2018, with the Directorate of Fisheries (D-FISH) and Research Institute for Marine Fisheries (RIMF), Viet Nam on 7-8 March 2018, and with the Department of Fisheries (DoF), Thailand and local academic institutions and agencies on 30 April 2018. The meetings discussed and came up with the research topics, draft cruise plan, and concerned details on the Collaborative Research Survey for further discussion, development and preparation prior to the survey.

To ensure the preparedness and success of this collaborative survey in the Gulf of Thailand, it is therefore necessary for participating countries and agencies to technically and administratively discuss and agree on the survey cruise plan and all concerned arrangements prior to the cruise survey which is scheduled from 17 August to 9 November 2018, starting by Thailand, Cambodia and Viet Nam waters respectively, SEAFDEC Training Department plans to organize the Regional Technical Meeting on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (Cambodia, Thailand, and Viet Nam Waters), from 24 to 26 July 2018, at SEAFDEC Training Department. The overall aims of the Regional Technical Meeting is to finalize the research activities, cruise plan of M.V. SEAFDEC 2, onboard researchers, and administrative matters e.g. port entry, logistics arrangement, and supply of provisions.

AGENDA AND TIMETABLE

Time	Agenda
	17 July 2018 (Tuesday)
09:00 – 09:15	Agenda 1: Opening session
09:15 – 09:30	Agenda 2: Introduction, objectives, outputs, outcomes and adoption of the agenda
09:30 – 12:00	<p>Agenda 3: Discussion on Research Programs (referred to the list of proposed 44 research topics, within 10 min for each presentation)</p> <ul style="list-style-type: none"> ❖ Title ❖ Objective ❖ Expected output ❖ Standard Operating Procedure-SOP on data collection onboard (including sampling material/equipment and method) ❖ Responsible researcher <p>Expectation: Participating countries agree on the proposed research topics</p>
13:00 – 16:45	Agenda 3: Discussion on Research Programs (<i>Continued</i>)
16:45 – 17:00	Wrap up Day 1
	18 July 2018 (Wednesday)
09:00 – 12:00	Agenda 3: Discussion on Research Programs (Continued)
13:00 – 17:00	Agenda 3: Discussion on Research Programs (Continued)
16:45 – 17:00	Wrap up Day 2



Time	Agenda
19 July 2018 (Thursday)	
09:00 – 12:00	Agenda 4: Discussion on tentative cruise plan <ul style="list-style-type: none"> ❖ Finalized cruise plan ❖ Port of call ❖ Number of researcher onboard ❖ Administration, customs, immigration and port clearance including logistics and supply of provisions (Note: local transportation will not be supported)
13:00 – 14:00	Agenda 5: Discussion on data sharing schemes
14:00 – 15:00	Agenda 6: Other matters (<i>e.g.</i> Human resource development program, Way forward)
15:00 – 16:00	Agenda 7: Conclusion
16:00	Agenda 8: Closing session

Remark:
 10:30-10:45 Refreshment break
 12:00-13:00 Lunch break
 15:00-15:15 Refreshment break



Annex 5.2: List of research topics identified in the Regional Technical Meeting on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (Cambodia, Thailand, and Viet Nam Waters), SEAFDEC Training Department, 24 - 26 July 2018

- 1) Some biological data of pelagic and demersal fish in the Gulf of Thailand by using bottom trawl
- 2) Demersal fish survey using hydro-acoustic instrument
- 3) Demersal fisheries resources survey in Viet Nam EEZ
- 4) Small pelagic resource survey by hydro-acoustic instrument, i.e. scientific echo-sounder Simrad EK-60
- 5) Biomass estimation by Hydro-acoustic method in the Gulf of Thailand
- 6) Marine Species Identification
- 7) Water Column Condition and Near-Bottom Water Hypoxia in the Gulf of Thailand
- 8) Residual current from ship ADCP
- 9) Geostrophic current in the Gulf of Thailand
- 10) Three dimensional circulation in the Gulf of Thailand during southwest monsoon
- 11) Water and material exchanges at the mouth of the Gulf of Thailand
- 12) Relationship Between Chlorophyll-a Concentration in the Gulf of Thailand and Ocean Color from Remote Sensing
- 13) Inherent Properties of Sea Water in Gulf of Thailand
- 14) Sedimentary properties and sedimentation rate of sediment in the Gulf of Thailand
- 15) Temporal distribution of mercury and trace metals in sediment
- 16) Integrates Low-cost Sonar Imagery and GIS to Map Underwater Habitat
- 17) Microplastics Accumulations in Fish, Sediment, and Seawater
- 18) Distribution of Total Organic Matter in Marine Sediments of the Gulf of Thailand
- 19) Mercury and arsenic in seawater
- 20) Flux of nutrient and nutrient pool in sediment
- 21) Iron-sulfur-phosphorus cycling
- 22) Mercury and trace elements contamination in the surface sediment
- 23) Spatial sedimentology and source area composition of sediment in the Gulf of Thailand
- 24) Petroleum hydrocarbon)as chrysene (and polycyclic aromatic hydrocarbon)PAHs
- 25) Total Petroleum Hydrocarbons)TPHs (in surface seawater)as chrysene)
- 26) Mercury accumulation in tissues and risk assessment for consumption
- 27) Radiation Dose and Radiological Risk Assessment in Marine Biota and Seafood Consumers
- 28) Carbon dioxide flux and primary productivity in The Gulf of Thailand Nutrient and nutrient pool in seawater
- 29) Collection of Hydrographic In-situ Data for Validation in the Gulf of Thailand to Compare with Multi-satellite and Model Products
- 30) Zooplankton Diversity in the Gulf of Thailand)BU
- 31) Density and diversity of phytoplankton in the Gulf of Thailand
- 32) Species and Distribution of Palalarvae and Cephalopods in the Gulf of Thailand



- 33) Composition and distribution of fish larvae in the Gulf of Thailand
- 34) Fish larvae distribution of Scombridae and Engrulidae in the Gulf Thailand
- 35) Some Biological Aspects for Elasmobranch in Gulf of Thailand
- 36) Distribution and abundance of parasite in bony fish in the Gulf of Thailand
- 37) Diversity of benthic microcrustaceans and micromollusks in the Gulf of Thailand
- 38) Meiofauna abundance and distribution in surface sediment
- 39) Microbiome composition and function in sediment
- 40) Microbiome composition and function in seawater
- 41) Attached living organism on floating garbage in Thai waters
- 42) Genetic Diversity and Population Genetic Structure of Three-Banded Mantis Shrimp *Miyakellanea* caught by Trawl Nets Fisheries in the Gulf of Thailand
- 43) Distribution of Bottom Plastic Debris in the Gulf of Thailand
- 44) Investigation of stock of marine debris in Gulf of Thailand
- 45) Composition and potential source of aerosol



Annex 5.3 Number and List of Participant in the Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (Cambodia, Thailand, and Viet Nam Waters), SEAFDEC Training Department, 24-26 July 2018

a) Number of Participants

Participant	Number	Remark
SEAFDEC Participating Countries	12	<ul style="list-style-type: none"> ▪ Four (4) Participants from Department of Fisheries of Participating Countries (Cambodia, Thailand, and Viet Nam)
SEAFDEC Training Department	12	<ul style="list-style-type: none"> ▪ Ten (10) Researcher of Research and Development Division ▪ Two (2) Training and Research Supporting Division (Ship and Fleet Operation Section Head / Acting Captain of M.V. SEAFDEC and Captain of M.V. SEAFDEC 2)
SEAFDEC Secretariat	1	<ul style="list-style-type: none"> ▪ Deputy Secretary General of SEAFDEC
Resource Person	10	<ul style="list-style-type: none"> ▪ Two (2) Department of Coastal Marine and Resources ▪ Two (2) Office of Atoms for Peace ▪ Burapha University ▪ Two (2) Chulalongkorn University ▪ Two (2) Kasetsart University
Administrative staff	1	Ms. Rada Radma
Observers	7	<ul style="list-style-type: none"> ▪ One (1) RFPN of SEAFDEC ▪ One (1) Department of Fisheries of Thailand ▪ Four (4) Ship and Fleet Operation Section
Total	43	(35 Participants, 7 Observers and 1 Administrative staffs)

b) List of Participants in the Regional Technical Meeting on the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand (Cambodia, Thailand, and Viet Nam Waters), SEAFDEC Training Department, 24-26 July 2018

CAMBODIA

<p>Mr. Suy Serywath Director</p>	<p>Marine Fisheries Research and Development Institute (MaFReDI) No. 186 Preah Norodom Boulevard, Sangkat Tonle Basak, Khan Chamka Mon, Phnom Penh, Cambodia Tel: (855) 23 215470, Fax: (855) 232215970 E-mail: serywath@gmail.com</p>
<p>Mr. Kao Monirith Deputy Director</p>	<p>Marine Fisheries Administration Inspectorate, Fisheries Administration No. 186 Preah Norodom Boulevard, Sangkat Tonle Basak, Khan Chamka Mon, Phnom Penh, Cambodia Tel: (855) 23 215470, Fax: (855) 232215470 E-mail: kaomonirith@yahoo.com</p>



CAMBODIA

Mr. Ly Seyha
Chief of Marine Biology Officer

Marine Fisheries Research and Development Institute (MaFReDI)
No. 186 Preah Norodom Boulevard, Sangkat Tonle Basak, Khan Chamka Mon, Phnom Penh, Cambodia
Tel: (855) 077767763
E-mail: SharkandrayCambodia@gmail.com

Mr. Hom Radong
Staff of Marine Fisheries Research and Development Institute, FiA

Marine Fisheries Research and Development Institute (MaFReDI)
No. 186 Preah Norodom Boulevard, Sangkat Tonle Basak, Khan Chamka Mon, Phnom Penh, Cambodia
Tel: (855) 69578227
E-mail: h.radong@yahoo.com

THAILAND

Mr. Theerawat Samphawamana
Fisheries Biologist

Fisheries Foreign Affairs Division
Department of Fisheries
Kaset Klang, Chatuchak, Bangkok 10900, Thailand
Tel.: (669) 54164777, Fax: (662) 5797941
E-mail: theerawatdof@gmail.com

Ms. Praulai Nootmorn
Senior Expert in Marine Fisheries

Department of Fisheries
Kaset Klang, Chatuchak, Bangkok 10900, Thailand
Tel: (668) 50706589, Fax: (662) 5797941
E-mail: nootmorn@yahoo.com

Ms. Anyanee Yamrungrueng
Fisheries Biologist

Marine Fisheries Research and Development Division
Department of Fisheries
Kaset Klang, Chatuchak, Bangkok 10900, Thailand
Tel: (668) 94593479, Fax: (662) 9406148
E-mail: anyanee549@gmail.com

Mr. Worakit Lerdprasert
Fisheries Biologist

Eastern Gulf Fisheries Research and Development Center (Rayong), Department of Fisheries
2 Moo 2 Tambon Pae, Amphoe Muang, Rayong Province 21160, Thailand
Tel: (668) 55013666
E-mail: w.lerdprasert@gmail.com

VIET NAM

Mr. Vu Duyen Hai
Deputy Director

Department of Science, Technology and International Cooperation
Directorate of Fisheries (D-FISH)
No. 10 Nguyen Cong Hoan Street, Ba-Dinh Hanoi, Viet Nam
Tel: (84) 913 364925
E-mail: vuduyenhai10@gmail.com

Mr. Nguyen Viet Nghia
Vice Director

Research Institute for Marine Fisheries
224 Le Lai street, Hai Phong City, Viet Nam
Tel: (84) 982728365, Fax: (84) 2253836812
E-mail: nvnghia@rimf.org.vn

Mr. Nguyen Hoang Minh
Researcher Institute

Research Institute for Marine Fisheries
224 Le Lai street, Hai Phong City, Viet Nam
Tel: (84) 989085715
E-mail: nhminh@rimf.org.vn, nhminh10@gmail.com



Mr. Vu Viet Ha
Head of Marine Fisheries Resources
Research Department

Research Institute for Marine Fisheries
224 Le Lai street, Hai Phong City, Viet Nam
Tel: (84) 936576599, Fax: (84) 225 3836812
E-mail: vvha@rimf.org.vn, havuviet@gmail.com

DEPARTMENT OF MARINE AND COASTAL RESOURCES

Mr. Supawat Kan-atireklap
Senior Professional Level of Fisheries
Biologist

Department of Marine and Coastal Resources
309 Moo 1, Paknam Prasae,
Klaeng, Rayong Province 21170, Thailand
Tel: (66) 38 661693, Fax: (66) 38 661694
E-mail: supawat-kan@yahoo.com

Ms. Suthida Kan-atireklarp
Fisheries Biologist

Department of Marine and Coastal Resources
309 Moo 1, Paknam Prasae,
Klaeng, Rayong Province 21170, Thailand
Tel: (66) 38 661693, Fax: (66) 38 661694
E-mail: cartoonjumping@gmail.com

BURAPHA UNIVERSITY

Dr. Wirote La-ongmanee
Lecturer

Faculty of Marine Technology
Burapha University, Chanthaburi Campus
57 Moo.1 Chon Pratan Road,
Kamong Sub-district, Tha Mai District,
Chanthaburi 22170, Thailand
Tel: (668) 67760330, Fax: (66) 39 310128
E-mail: wirotele@gmail.com

CHULALONGKORN UNIVERSITY

Dr. Kornrawee Aeumsomboon (Ms.)
Assistant Professor

Department of Marine Science, Faculty of Science
Chulalongkorn University
254 Phayathai Road, Wangmai, Patumwan
Bangkok 10330, Thailand
Tel: (662) 2185402, (668) 39416551, Fax: (662) 2550780
E-mail: kornrawee.a@gmail.com

Dr. Sujaree Bureekul
Lecturer

Chulalongkorn University, Faculty of Science
Department of Marine Science
254 Phayathai Road, Wangmai, Pratumwan
Bangkok 10330, Thailand
Tel: (666) 17092929, Fax: (662) 2550780
E-mail: bsujaree@gmail.com

KASETSART UNIVERSITY

Dr. Koraon Wongkamhaeng
Lecturer

Department of Zoology, Faculty of Science
Kasetsart University
50 Ngam Wong Wan Road, Lad Yao, Chatuchak,
Bangkok 10900, Thailand
Tel: (662) 5625555 ext. 3222, 3256
Fax: (662) 5625555 ext. 3202
Mobile phone: (668) 96794697
E-mail: fscikaw@ku.ac.th, koraon@gmail.com



OFFICE OF ATOMS FOR PEACE (OAP)

Dr. Yuttana Tumnoi
Radiobiologist (Senior Level)

Office of Atoms for Peace
No. 16 Vibhavadi Rangsit Road, Ladyao, Chatuchak,
Bangkok 10900, Thailand
Tel: (662) 5967622 ext. 2425, Fax: (662) 5620093
E-mail: tommynoi@yahoo.com

OFFICE OF ATOMS FOR PEACE (OAP)

Ms. Darunwan Chuenbubpar
Nuclear Chemist

Office of Atoms for Peace
16 Viphavadi Rangsit Road, Lad Yao, Chatuchak,
Bangkok 10900, Thailand
Tel: (662) 5967600 ext. 2425
E-mail: darunwan.c@oap.go.th

SEAFDEC TRAINING DEPARTMENT (TD)

Mr. Akito Sato
Deputy Secretary General and Deputy
Chief of Training Department

SEAFDEC/TD
P.O. Box 97 Phrasamutchedi,
Samut Prakan
Tel: 66 2 4256100 ext. 198 Fax: 66 2 4256110
E-mail: sato@seafdec.org

Mr. Isara Chanrachkij
Research and Development Division
Head

SEAFDEC Training Department
P.O. Box 97 Phrasamutchedi,
Samut Prakan 10290, Thailand
Tel: (662) 4256100 ext. 140, Fax: (662) 4256110
E-mail: isara@seafdec.org

Dr. Taweekiet Amornpiyakrit
Senior Program Officer

SEAFDEC Training Department
P.O. Box 97 Phrasamutchedi,
Samut Prakan 10290, Thailand
Tel: (662) 4256100 ext. 168, Fax: (662) 4256110
E-mail: taweekiet@seafdec.org

Dr. Nopporn Manajit (Mr.)
Fishing Technology Section Head

SEAFDEC Training Department
P.O. Box 97 Phrasamutchedi,
Samut Prakan 10290, Thailand
Tel: (662) 4256100 ext. 146, Fax: (662) 4256110
E-mail: nopporn@seafdec.org

Mr. Sukchai Arnupapboon
Fishing Ground & Oceanography
Section Head

SEAFDEC Training Department
P.O. Box 97 Phrasamutchedi,
Samut Prakan 10290, Thailand
Tel: (662) 4256100 ext. 143, Fax: (662) 4256110
E-mail: sukchai@seafdec.org

Mr. Nobphadol Somjit
Ship and Fleet Operation Section Head
(acting) and Captain M.V. SEAFDEC

SEAFDEC Training Department
P.O. Box 97 Phrasamutchedi,
Samut Prakan 10290, Thailand
Tel: (662) 4256100 ext. 175, Fax: (662) 4256110
E-mail: nobphadol@seafdec.org

Mr. Montien Paewsakul
Technical Expert

SEAFDEC Training Department
P.O. Box 97 Phrasamutchedi,
Samut Prakan 10290, Thailand
Tel: (662) 4256100 ext. 175, Fax: (662) 4256110
E-mail: montien@seafdec.org



Mr. Vudthirat Vudhipanyo
Captain of M.V. SEAFDEC 2

SEAFDEC Training Department
P.O. Box 97 Phrasamutchedi,
Samut Prakan 10290, Thailand
Tel: (662) 4256100 ext. 177, Fax: (662) 4256110
E-mail: vudthirat@seafdec.org

Mr. Nakaret Yasook
Fishing Gear Technologist

SEAFDEC Training Department
P.O. Box 97 Phrasamutchedi,
Samut Prakan 10290, Thailand
Tel: (662) 4256100 ext. 141, Fax: (662) 4256110
E-mail: nakaret@seafdec.org

SEAFDEC TRAINING DEPARTMENT (SEAFDEC/TD)

Ms. Siriporn Pangsorn
Fishing Ground Information Scientist

SEAFDEC Training Department
P.O. Box 97 Phrasamutchedi,
Samut Prakan 10290, Thailand
Tel: (662) 4256100 ext. 142, Fax: (662) 4256110
E-mail: psiriporn@seafdec.org

Mr. Santiphong Putsa
Fishing Gear Technologist

SEAFDEC Training Department
P.O. Box 97 Phrasamutchedi,
Samut Prakan 10290, Thailand
Tel: (662) 4256100 ext. 141, Fax: (662) 4256110
E-mail: santiphong@seafdec.org

Mr. Supapong Pattarapongpan
Fishery Oceanographer

SEAFDEC Training Department
P.O. Box 97 Phrasamutchedi,
Samut Prakan 10290, Thailand
Tel: (662) 4256100 ext. 139, Fax: (662) 4256110
E-mail: supapong@seafdec.org

Ms. Pontipa Luadnakrob
Fishery Oceanographer

SEAFDEC Training Department
P.O. Box 97 Phrasamutchedi,
Samut Prakan 10290, Thailand
Tel: (662) 4256100 ext. 138, Fax: (662) 4256110
E-mail: tipa@seafdec.org

OBSERVERS

Ms. Nirucha Udomwongyont
Fisheries Biologist

Marine Fisheries Research and Development Division
Department of Fisheries
Kaset Klang, Chatuchak, Bangkok 10900, Thailand
Tel: (668) 51244719, Fax: (662) 9406558
E-mail: nicha9@hotmail.com

Ms. Tasawan Khawsejan
Fisheries Biologist

Department of Fisheries
Kaset Klang, Chatuchak, Bangkok 10900, Thailand
Tel: (662) 5620533, Fax: (662) 5620533
E-mail: tasawan1907@gmail.com

Mr. Thuch Panha
RFPN for Cambodia

SEAFDEC Secretariat
P.O. Box 1046, Kasetsart Post Office, Bangkok 10903,
Thailand
Tel: (662) 9406326, Fax: (662) 9406336
E-mail: panha@seafdec.org



ADMINISTRATIVE

Ms. Rada Radma

SEAFDEC Training Department
P.O.Box 97, PhraSamutchedi Post Office
SamutPrakan 10290 – THAILAND
Direct Line: +66-2425 6124 Fax: +66-2425 6110-1
Email: rada@seafdec.org

**Annex 5.4:** Comments and recommendations on 43 Research Topics Agenda 3 (24-25 July 2018)

a) Summary in general

There are currently a total of 43 research topics as proposed by all Participating Countries for the current collaborative research survey in the Gulf of Thailand. Some topics are needed to be re-arranged and grouped, SEAFDEC will re-group and discuss with the concerned researchers for better arrangement.

Viet Nam

Viet Nam generally provided comments on sampling, technical requirements of sampling, volume and capacity of space onboard M.V. SEAFDEC 2, time frame, time consumption and space for 43 topics. Currently, 2 stations a day (day time/night time) is quite a difficult task. It would be great, if we can make prioritization by selecting some possible stations. We should consider also on the interference when working with the device that emits frequencies. An alternative way/choice is needed to avoid the interference.

As for other arrangements like the involvement of the countries, encouragement should be made to the country to involve all topics. We should also utilize the full capacity of the agencies, discuss the way to work together. After the cruise, we would have huge works for laboratory, processing, analysis of the samples, publication, scientific papers, journal and so on. The findings and results will contribute to the science and management of the resources in the region. Finally, Viet Nam encouraged all scientists concerned to join the research group.

Cambodia

Cambodia is willing to learn the past research survey results as carried out by M.V. SEAFDEC 2 and the new entries of the research topics. Cambodia requested SEAFDEC to rectify the group of the research topics in order that Cambodia can assign the researchers to join the group.

Regarding the past research survey carried out by SEAFDEC in Cambodia waters, an accident occurred during the conduct of the survey, finally damaged fishermen's gear and the compensation for such loss was paid to fishermen (insurance, gear lost, gear damage). To avoid such unwanted incidence, the Fisheries Administration will cooperate with the high authorities e.g. navy or military which can help solve or reduce this problem. Cambodia suggested SEAFDEC to minimize the work load. Cambodia also sought technical support from the Government of Japan in the future continuously.

b) Comments made regarding the operation of sampling gear

Viet Nam

Viet Nam requested a detailed plan for each country for all topics including the SOP. Otherwise it would be difficult to combine data and the sequence of the survey. Viet Nam strongly suggested that the bottom trawl survey for demersal species should be carried out at daytime while the demersal species disperse to the surface.

Regarding the hydro-acoustic survey (110 stations), the bottom trawl sampling must be done to check and confirm the species composition for processing with the echograms. Spare time is also required for this activity as well. Viet Nam further suggested to select the common topic for 3 countries and to give the priority to the common topic first. A transect line is an alternative way to cover all sampling and survey if possible.

DoF Thailand

Thailand generally agreed on the comments and recommends made by Viet Nam and Cambodia. Since the country has their ultimate goals for the survey, therefore the objectives may vary from country to country. DoF Thailand suggested to have a SOP for a particular survey to harmonize the obtained data from the survey.



SEAFDEC

SEAFDEC informed and reiterated the purpose of this collaborative survey that focuses on the regional level for 3 Participating Countries (Cambodia, Thailand and Viet Nam). If a common understanding and intention do not meet the requirements of the countries' needs, SEAFDEC will separately conduct the survey considering country to country. The survey activity would exclusively planned to suit each country's requirement.

c) Comments and recommendations on 43 Research Topics

No.	Research Topic	Comments and recommendations
1	Some biological data of pelagic and demersal fish in the GOT	Cambodia sought assistance from Thailand and Viet Nam on this issue to enhance human capacity and to update the information on marine resources through these research activities and will be taken into consideration by SEAFDEC.
2	Demersal fish survey using hydro-acoustic instrument	
3	Demersal fisheries resources survey in Viet Nam EEZ	Viet Nam refer to the resources survey on pelagic and demersal species, Viet Nam shared the experiences that demersal species are usually collected by bottom trawl and used only for resource assessment. Practically, using the hydro-acoustic technique is difficult for assessment. As for the small pelagic resources, distributed at the surface and mid water levels, it's also difficult to use the bottom trawl, therefore, using the hydro-acoustic is suggested in this case. While for the demersal species, the survey should focus on using the bottom trawl but how can the findings be linked together. Care on the ship speed during cruising along the survey track will be carefully taken as appropriate. Viet Nam also suggested that a transection route track can be made as an alternative way of the cruise survey track or re-routing the survey track. Viet Nam expressed a willingness to contribute the experiences and knowledge on the hydro-acoustic techniques for human resources capacity building to the region.
4	Small pelagic resource survey by hydro-acoustic instrument, e.g. scientific echosounder simrad EK-60	
5	Biomass estimation by hydro-acoustic method in the GOT	
6	Marine species identification	
7	Water column condition and near-bottom water hypoxia in the GOT	SEAFDEC was requested to revise the content of the sampling method (missing information). SEAFDEC requested a nomination of scientists from Cambodia and Viet Nam who are interested in participating this research activity. Cambodia expressed its willingness to participate this research activity specifically, the water condition for supplying the aquaculture.
8	Residual current from ship ADCP	SEAFDEC was requested to revise the content of the sampling method (missing information).
9	Geostrophic current in the GOT	No comments



No.	Research Topic	Comments and recommendations
10	Three dimensional circulation in the GOT during southwest monsoon	SEAFDEC was requested to revise the content of the sampling method (missing information).
11	Water and material exchanges at the mouth of the GOT	SEAFDEC reconfirmed the meeting that the research area covers the whole Gulf of Thailand and probably the title of the research topic may be renamed later by the responsible researchers (the opening of the Gulf of Thailand).
12	Relationship between chlorophyll-a concentration in the GOT and ocean color from remote sensing	<p>Viet Nam requested to consider reducing the number of sampling in order to reduce the time consumption.</p> <p>BUU informed the Meeting that attempts have been made many time as suggested to reduce the number of sampling but to obtain the value of chlorophyll-a and fluorescent chlorophyll-a. It requires more protocol and not easy to do so practically.</p> <p>DMCR informed the meeting that if time is not constraint, then the vertical distribution sampling can be possibly made. Then the variations can be seen if the equipment is available.</p> <p>SEAFDEC informed the Meeting that the TSG will be also carried out to examine the chlorophyll-a, 6 second interval along the cruise track.</p>
13	Inherent properties of sea water in the GOT	<p>SEAFDEC was requested to revise the content of the sampling method (missing information).</p> <p>BUU clarified the definition of the area of the research that focusing on the coastal waters not for the ocean or any involvement by the people.</p>
14	Sedimentary properties and sedimentation rate of sediment in the GOT	No comments
15	Temporal distribution of mercury and trace metals in sediment	<p>Viet Nam suggested to extend the study to the entire water column as well. Viet Nam expressed its willingness to participate this research activity (analysis work is possibly made by Viet Nam).</p> <p>DoF Thailand suggested to continuously take the sample annually to monitor the annual variation of the trace metal.</p> <p>CU clarified that surface sediment sampling will be carried out separately, using the core sampler that can be traced back to the past so called “depth profile sediment”.</p> <p>DMCR clarified that the nuclear technology ‘gamma count’ will be used to analyze to date back to the accumulation and to re-establish the particular area, DMCR will provide more information in the future.</p>



No.	Research Topic	Comments and recommendations
16	Integrated low-cost sonar imagery and GIS to map underwater habitat	<p>Viet Nam suggested to combine this research topic with 14 and 15 in order to see the whole picture of the mapping.</p> <p>SEAFDEC informed the Meeting that this activity will be only operated at night time 3-4 kt since the emitted frequency from the device may interfere with others <i>e.g.</i> hydro-acoustic equipment.</p> <p>BUU responded the query made by the Meeting that the final product of this research study is the habitat mapping by using the structure scan, using the image process to identify and to compare with other methods like core sampling.</p>
17	Microplastics accumulations in fish, sediment and seawater (Pontipa)	<p>DMCR had 2 suggestions as follows;</p> <ol style="list-style-type: none"> 1) Regarding the objective, determine the accumulation rate is linked with time, but sampling only once 2) Regarding the transportation in the food chain, the top level of the chain is not mentioned, also the selection on food chain and level is required.
18	Distribution of total organic matter in marine sediments in the GOT	<p>SEAFDEC informed the Meeting that this research activity is envisaged to follow up the survey carried out 2004 and possible traced back to 1998. Different sampling method will be used to collect sampling only at night time (once a day). SEAFDEC will provide a reference on how to analyze the total organic matters as requested by CU.</p> <p>DoF Thailand suggested the Meeting to consider extending the study onto the marine mammals <i>e.g.</i> the abundance of whale, dolphin and dugong.</p> <p>DMCR informed the Meeting that DMCR would like to carry out this research <i>e.g.</i> whale sighing (also was previously carried out by SEAFDEC) but time requirement is the major concern. To identify the species of found whale, pictures are needed to help identify the species, vessel must stop to examine closely, and then the smooth cruising may be interrupted. Therefore a separated cruise is required.</p>
19	Mercury and arsenic in seawater	Withdrawn by the responsible researchers (no container, device is out of order)
20	Flux of nutrient and nutrient pool in sediment	20, 22, 23, 24 combined and discussed
21	Iron-sulfer-phosphorus cycling	Withdrawn by the responsible researchers (no container, device is out of order)
22	Mercury and trace elements contamination in the surface sediment	Viet Nam expressed its willingness to participate this research activity.
23	Spatial sedimentology and source area composition of sediment in the Gulf of Thailand	SEAFDEC requested Cambodia and Viet Nam to provide the name list of researchers who wish to work with this research activity.



No.	Research Topic	Comments and recommendations
24	Petroleum hydrocarbon (as chrysene) and Polycyclic aromatic hydrocarbon (PAHs)	<p>DoF Thailand is interested in learning through this research activity.</p> <p>Cambodia is interested in learning through this research activity.</p>
25	Total petroleum hydrocarbons (TPHs) in surface seawater (as chrysene)	<p>DMCR suggested that the samples must be extracted immediately otherwise no space onboard to keep the samples. Space is required. DMCR will check the availability of the storage with SEAFDEC.</p>
26	Mercury accumulation in tissues and risk assessment for consumption	<p>SEAFDEC reiterated the importance of this concern to all participating countries since it involves the seafood safety in the region.</p> <p>Viet Nam would consider nominating some scientists to collaborate with this study. Viet Nam offers assistance on sample analysis.</p> <p>Cambodia: Cambodia expressed its concerns and would consider allocating scientists to participate this research activity.</p>
27	Radiation dose and radiological risk assessment in marine biota and seafood consumers	<p>SEAFDEC was requested take into consideration on the storage of the samples. SEAFDEC further requested the participating countries to coordinate with the concerned agencies in the respective countries to work on this closely.</p> <p>OAP responded question of SEAFDEC on the main outputs of this research study that the establishment of national and regional database can be made with reference to the nuclear accident occurred in Japan. In close collaboration with Cambodia, Thailand and Viet Nam, the establishment of the risk database, radioactive database can be made. A technical working group can be established. Obtained data will be shared at regional database maintained by the Philippines. Data sharing depends on the country's decision as well. OAP further requested the focal points from Cambodia and Viet Nam to work closely with to ensure the transparency of the research work.</p>
28	Carbon dioxide flux and primary productivity in the Gulf of Thailand nutrient and nutrient pool in seawater	<p>SEAFDEC requested the responsible researchers (KU) to check whether the portable ADCP is available onboard or need an installation. SEAFDEC further suggested KU to consider the emitted frequency from the ADCP that may interfere the functions of hydro-acoustic equipment when operating simultaneously.</p>
29	Collection of hydrographic in-situ data for validation in the Gulf of Thailand to compare with multi-satellite and model products	
30	Zooplankton diversity in the GOT presented	<p>Viet Nam expressed its willingness to participate this research activity and suggested if this research topic can be applied to all participating countries in this survey. Viet Nam further suggested that the researchers should consider</p>



No.	Research Topic	Comments and recommendations
		<p>collecting the sample above the bottom 2 m to all ranges of the depth to the surface, not only 20 m from the surface.</p> <p>Cambodia: Cambodia expressed its willingness to participate this research activity (with support from SEAFDEC on HRD) and will nominate researchers to cooperate and to work with.</p> <p>Thailand: DoF Thailand expressed its willingness to participate this research activity. DoF Thailand further suggested to rename the word “marine aquatic” instead of fisheries.</p>
31	Density and diversity of phytoplankton in the GOT	<p>Viet Nam agreed on this research topic and further suggested to apply for the whole Gulf of Thailand. Regarding the sampling method, Viet Nam suggested to collect the sample as same as the whole water column made with the study on zooplankton. Viet Nam will nominate researchers to work with this research activity.</p> <p>Cambodia will nominate researchers to work with this research activity (HRD program).</p> <p>SEAFDEC responded to the query made by Viet Nam that the method to collect the zooplankton, not using the vertical trawl since it will clog up easily by its nature and leads to error. So it is not to be used for the whole column of the water in this survey. However, SEAFDEC took note the suggestion made by Viet Nam.</p>
32	Species and distribution of paralarvae and cephalopods in the GOT	<p>Viet Nam suggested to carry out the sampling for the same method as 32, 33 and 34</p>
33	Composition and distribution of fish larvae in the GOT	
34	Fish larvae distribution of scombridae and engraulidae in the GOT	<p>Viet Nam suggested to carry out the sampling for the same method as 32, 33 and 34 and combine the research topics 32-33-34 as one topic.</p> <p>Study on shrimp was also raised by Viet Nam (needs another sampling gear). Regarding this, Viet Nam will contribute for the identification for shrimp larvae.</p>
34	Fish larvae distribution of scombridae and engraulidae in the GOT (Cont.)	<p>Viet Nam will nominate researchers to work with this research activity. Viet Nam further suggested on the sampling made by the bongo net that, 3 m from the bottom to the surface would be better.</p> <p>KU responded the query made by the DoF Thailand on the sampling method that topic 33 focuses on fish larvae group (family level) but 34 focuses on species level (trans-boundary species for the region).</p> <p>SEAFDEC will coordinate with RIMF of Viet Nam how to study the shrimp larvae.</p>



No.	Research Topic	Comments and recommendations
35	Some biological aspects for elasmobranch in the GOT	Viet Nam suggested to combine with topics 1 (biology) and 36 (parasite) and to include some commercial species and demersal species and sharks.
36	Distribution and abundance of parasite in bony fish in the GOT	<p>Cambodia will participate this research activity.</p> <p>DoF Thailand suggested that regarding the study on elasmobranch, the ectoparasite and endoparasite are the original intention to study. It requires further discussion to come up with composition and distribution.</p> <p>Viet Nam suggested to group all parasite topics in one. It is acceptable to study the endo-parasite for all species. The study should extend to some other species. Viet Nam suggested to add endo-parasite to be a sub-topic and to include the shark study to topic 1.</p> <p>SEAFDEC took note that topic 36 is similar to that of topic 1 and will discuss with the researchers how to cover all studies. Practically, the study on age is identified by the vertebrae.</p>
37	Diversity of benthic microcrustaceans and micromollusks in the GOT	Viet Nam suggested to merge topics 37 and 38 as a benthos study and to macro-benthos as well. Viet Nam will participate the study, having researchers on meiofauna.
38	Meiofauna abundance and distribution in surface sediment	<p>Cambodia quite disagreed with Viet Nam to merge topics 37 and 38 since the sampling method is different and can greatly impact to the whole study,</p> <p>SEAFDEC would work on this comment and further discuss with the responsible researchers on how to combine and merge the works as appropriate.</p>
39	Microbiome composition and function in sediment	CU invited all participating countries to participate these research activities, not only for Thai waters.
40	Microbiome compositions and function in seawater	<p>Cambodia expressed an interest in participating these research works and requested resource persons to share the knowledge and experiences.</p> <p>Viet Nam expressed its willingness to participate these research activities and will nominate scientists to take part in (not from RIMF).</p>
41	Attached living organism on floating garbage in Thai waters	<p>Viet Nam and Cambodia suggested to combine topics 43 and 44 with 41.</p> <p>CU would discuss on the research topic once again with the responsible researchers whether it can be expanded the area of study to Cambodia and Viet Nam or not since this study is important for the region as well.</p>



No.	Research Topic	Comments and recommendations
41	Attached living organism on floating garbage in Thai waters (Cont)	BUU agreed upon the suggestion to combine those topics together. However, the sampling methods may vary and the reporting also can be done separately depending on topic with specific interest.
42	Genetic diversity and population genetic structure of three-banded mantis shrimp <i>Miykellanepa</i> caught by trawl nets fisheries in the GOT	<p>DoF Thailand suggested to consider to cluster/group the existing research topics e.g. larvae, parasite, plankton, benthos, debris.</p> <p>SEAFDEC took note the suggestions made by DoF Thailand for better clarification.</p> <p>BUU: the main researcher's intention, proposed to do all area, will be the new database for the region.</p>
43	Distribution of bottom plastic debris in the Gulf of Thailand	BUU responded to the query made by Thailand on the sampling method to collect the bottom plastic debris, BUU clarified that the bottom trawl will be use commonly. The plastic debris is considered as by-catch product sampling and this is to be done simultaneously with the fish sampling when operating the bottom trawl. Collected debris sample represents the demersal debris, not the whole water column. BUU further explained that the calculation of the area will be based on the swept area of the bottom trawl (referred to FAO's method). Obtained information will be shared.
44	Investigation of stock of marine debris in the Gulf of Thailand	<p>SEAFDEC informed the Meeting that the Neuston net will be used to collect the debris apart from the bottom trawl.</p> <p>Viet Nam shared the experiences regarding the utilization of hydro-acoustic technique to obtain more information on marine debris that it's possible to detect the debris by an echosounder but the target strength of plastic debris varies depending the type of plastic (which bubbles can lead to difficulties to identify). This may need a trial to estimate the target strength of the debris and it concerns on time consumption. In fact, the composition of the debris is unknown and it is necessary to know the type of the debris. This issue can be taken into consideration in the future.</p>
45	Composition and potential source of aerosol	<p>Viet Nam expressed its concern on the contamination by unwanted factors during cruising e.g. exhausted gas. Normally, to carry out this experiment, a fixed buoy is used.</p> <p>BUU explained that the researchers would avoid any contamination by setting up the equipment at the bow of the vessel during cruising. Care will be taken on the wind direction when collecting data. Data collection will not be carried out throughout 24 hrs. Previously in 2013, a hand-held sun photo meter was used and the current research will also use the same method.</p>



Acronyms used to describe in this matrix

SEAFDEC: Southeast Asian Fisheries Development Center

BUU: Burapha University, Thailand

CU: Chulalongkorn University, Thailand

KU: Kasetsart University, Thailand

DoF Thailand: Department of Fisheries, Thailand

DMCR: Department of Marine and Coastal Resources, Thailand

OAP: Office of Atoms for Peace, Thailand

GOT: The Gulf of Thailand

**Annex 5.5** Survey Proposal on the Collaborative Research Survey on Marine Fisheries Resources and
Marine Environment in the Gulf of Thailand**Survey Proposal**
The Collaborative Research Survey on Marine Fisheries Resources and
Marine Environment in the Gulf of ThailandPrepared by
Research and Development Division
Southeast Asian Fisheries Development Center
Training Department**INTRODUCTION**

Currently, attempts of countries in the Southeast Asia have increasingly focused to expand their fishing activities to the offshore areas in their Exclusive Economic Zones where fisheries resources are still under-utilized as alternative marine fisheries resources. With the Resolution and Plan of Action No. 18 describes that “Investigate the potential of under-utilized fisheries resources and promote their exploitation in a precautionary manner based upon analysis of the best available scientific information”, SEAFDEC has duties to provide technical support to the Member Countries to explore these under-utilized offshore fisheries resources through various programs, e.g. Technical meetings, Workshops, and Trainings course in related to fisheries resource exploration, fisheries abundance, as well as stock assessment.

In order to fulfill the needs of the SEAFDEC Member Countries on the exploitation of marine fisheries resources and study on marine environment in the specific offshore areas, SEAFDEC/TD works in close collaboration with these Member Countries and other relevant partners at national, sub-regional, and regional levels, to conduct marine fisheries resources and study on marine environment by utilizing SEAFDEC research vessels, M.V. SEAFDEC and M.V. SEAFDEC 2 with two(2) major specific areas: (i) Fisheries research and oceanographic survey; (ii) Human resource development on fisheries and oceanographic research survey, onboard navigation, and marine engineering training. Since 2004, SEAFDEC has technically supported to Member Countries by utilization M.V. SEAFDEC 2 for the survey the fisheries resources in EEZs of these Member Countries. The outputs from the survey include cruise reports of the survey, technical documents related to fisheries, marine environment and other specific requirements.

Recently, SEAFDEC has increasingly strengthened on the sub-regional cooperation of marine fisheries resource management. Data collection by shipboard survey has become important to support the sub-regional fisheries resource management in particular pelagic fisheries resources as share stock and transboundary fisheries resources. The envisage success example on the collaboration of SEAFDEC Member countries presented by the Joint Research Program for Tuna Research Survey in Sulu-Sulawesi Sea (SSSs) that has been collaboratively initiated by SEAFDEC in collaborate with SEAFDEC Member Countries around Sulu and Sulawesi Seas, i.e. Indonesia, Malaysia, and Philippines (IMP-Countries) since 2013.

With the significant recommendation of SEAFDEC Council Directors, during the 44th Council Meeting of SEAFDEC Meeting in year 2012, and a reiterated recommendation of the 45th SEAFDEC Council Meeting in following year, tuna research studies and two (2) cruise surveys on the Joint program on tuna resource were carried out in collaboration among IMP-Countries and SEAFDEC by M.V. SEAFDEC 2 in year 2014 and 2015. Training Department (TD) and Marine Fisheries Resource Development and Management Department (MFRDMD) is implementing departments under Offshore



Fisheries Resources Exploration in Southeast Asia with the support from Japanese Government through Japanese Trust Fund for SEAFDEC.

In 2017, the 40th Program Committee Meeting of SEAFDEC has adopted the Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand under the SEAFDEC Project Offshore Fisheries Resources Exploration in Southeast Asia with the support from the Government of Japan through Japanese Trust Fund for SEAFDEC. The technical consultation, Regional Technical Meetings and cruise survey on marine fisheries resources and marine environment has been developed by SEAFDEC Training Department in close collaboration with the relevant SEAFDEC Member Countries, i.e. Cambodia, Thailand and Viet Nam. The overall objectives of collaborative research survey are to support SEAFDEC Member Countries to conduct marine fisheries and environment data and information collection by research vessel, and to promote the offshore fisheries resources exploration through the research and human resources capacity by utilization of SEAFDEC's Training and Research Vessel, M.V. SEAFDEC 2. The major envisage outputs of the survey are (i) Baseline data on marine fisheries resources and marine environmental situation for scientific reference as well as the status of marine fisheries resources in the Gulf of Thailand, (ii) Increasing number of experience researchers on marine fisheries resources and marine environment of SEAFDEC Member Countries, (iii) Strengthen network of fisheries and oceanography scientist/researcher in Southeast Asia, and (iv) Maximizing the efficiencies and benefit of the SEAFDEC research vessel, research equipment to support on marine fisheries resources and marine environment survey of SEAFDEC Member Countries.

OBJECTIVE

1. Update situation of marine fisheries resources, oceanography and marine meteorology in the Gulf of Thailand
2. Technical supports on the human resources capacity building programs
 - a. Collaborative marine research survey among researchers from difference research agencies and among SEAFDEC MCs in particular Cambodia, Thailand and Viet Nam
 - b. Capacity building programs for the junior scientist and university students to conduct and practices on board marine research
3. Strengthen fisheries and oceanography scientist/researcher network marine fisheries resources and marine environmental scientists in the Gulf of Thailand sub-region.
4. Promote on utilization of research equipment and SEAFDEC research vessel for maximizing it efficiencies and benefit for Southeast Asia region.

EXPECTED OUTPUT

1. Baseline data on marine fisheries resources and marine environmental situation for scientific reference
2. Status of marine fisheries resources in the Gulf of Thailand
3. Skill and experience on marine fisheries resources and marine environmental of the researchers of SEAFDEC Member Countries
4. Promoting and developing the marine science study in Thailand, Cambodia and Viet Nam
5. Network on the marine fisheries resources and marine environmental scientists in the Gulf of Thailand sub-region.
6. Maximizing the efficiencies and benefit of the SEAFDEC research vessel, research equipment through the collaborative research cruise survey of M.V. SEAFDEC 2



PARTICIPATING COUNTRIES

1. Cambodia (Fisheries Administration or FiA, Cambodia)
2. Thailand (Department of Fisheries or DoF, Thailand)
3. Viet Nam (Directorate of Fisheries of D-FISH, Viet Nam)

Remark: Relevant agencies and academic institutes/universities (under consideration by FiA of Cambodia, DoF of Thailand, and D-FISH of Viet Nam)

RESPONSIBLE DEPARTMENT

Southeast Asian Fisheries Development Center, Training Department (SEAFDEC/TD)

PERIOD

Survey period is planned to conduct 17 August 2018 to 11 November 2018 (87 days)

SURVEY AREA

1. Survey area is cover with the Gulf of Thailand, in the Exclusive Economic Zoe of 1) Cambodia, 2) Thailand, and 3) Viet Nam. Station survey is excluded the dispute area or the area in the Gulf of Thailand. Total numbers of stations survey are 110 stations covered EEZ of Cambodia, Thailand and Viet Nam. Overall survey stations are shown in the table 1 below;
 - a. 24 Stations in Cambodia waters
 - b. 62 Stations in Thailand waters
 - c. 24 Stations in Viet Nam waters
2. Arrangement of survey station is presented in Table 1. Survey map and station is presented in Figure 1. Latitude, Longitude and distance of all positions are presented in Annex 2;

Day	Survey Station	Port of Call
D1-D9	St.1-17 (17 St.)	Prachuap-khirikhan province Thailand
D10-D21	St.18-29, 33, 37-39 (17 St.)	Songkhla, Thailand
D22-D32	St. 49 - 62 (14 St.)	Songkhla, Thailand
D33-D43	St.30-32, 34-36, 40-48 (15 St.)	Songkhla, Thailand
D 44- D48	Voyage from Songkla (Thailand) to Sihanoukville	Sihanoukville, Cambodia
D49- D61	St.63-86 (24 St.) Stop at Sihanoukville (Cambodia)	Sihanoukville, Cambodia
D62-D67	Voyage from Sihanoukville to Phu Quoc	Phu Quoc, Viet Nam
D68- D81	St.87-110 (24 St.) Stop at Phu Quoc (Viet Nam)	Phu Quoc, Viet Nam
D82-D84	Voyage from Phu Quoc to SEAFDEC/TD	

Table 1 Survey stations in the Collaborative Research Survey on Fisheries Resources and Marine Environment of the Gulf of Thailand

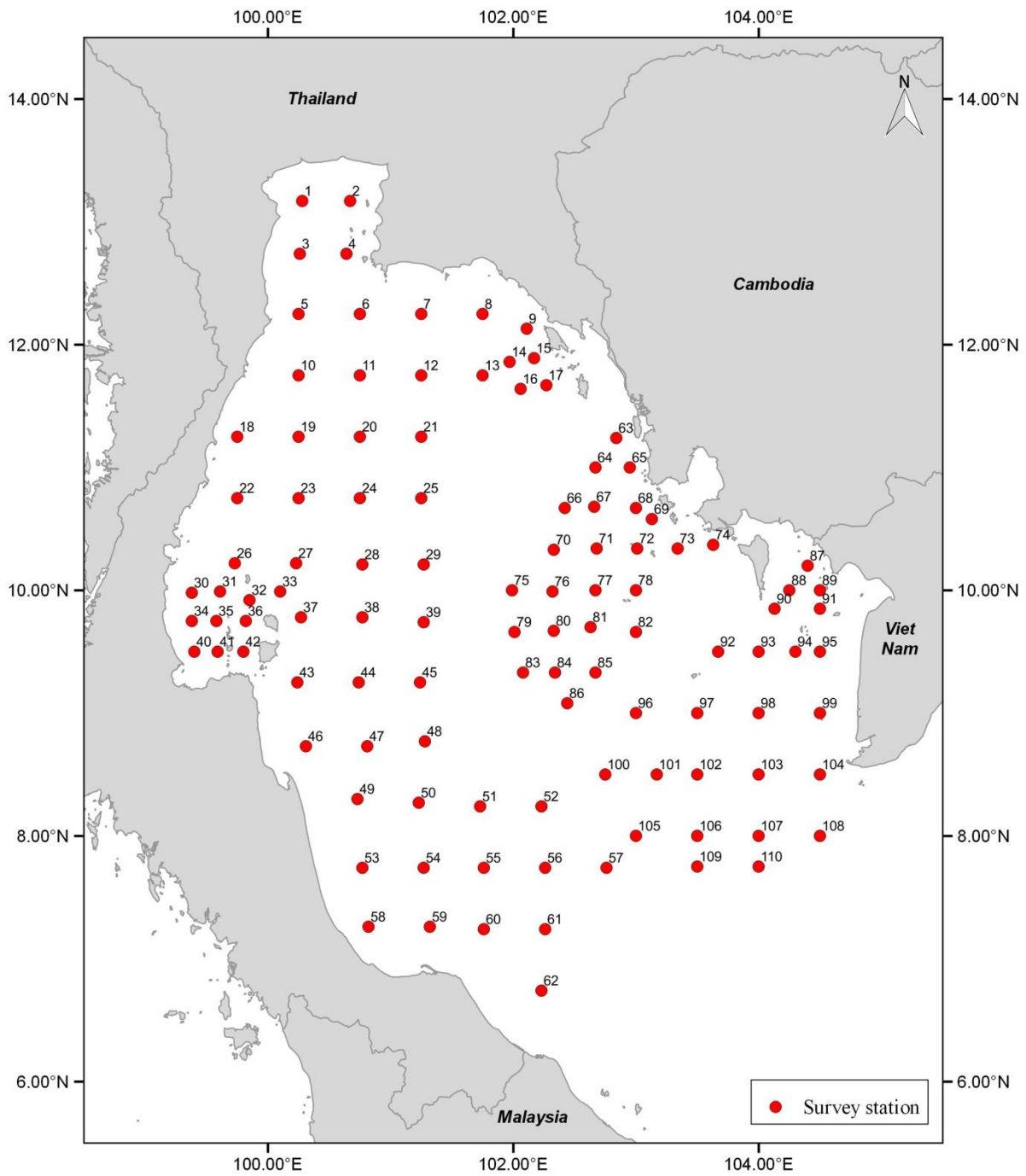


Figure 1 Survey station of the Collaborative Research Survey on Fisheries Resources and Marine Environment of the Gulf of Thailand

Note: No survey stations in the Dispute area, Historic waters and JDA Thailand- Malaysia



PERSONNEL ONBOARD

1. Number of personnel onboard is thirty-four (34)
 - a. SEAFDEC Crew (15)
 - b. SEAFDEC Researcher (5)
 - c. Invited researcher under SEAFDEC management (4)
 - d. Researcher of host countries (10)
2. There will be no other countries to join the country survey other than host researcher/observer. However, SEAFDEC will invite 5 researchers to work for SEAFDEC (not for country). In addition, all Participating Countries and SEAFDEC agreed to have additional trainees from Member Countries to join the cruise with the objective of human resource development on marine fisheries resource survey. It was further noted that these trainees have no authorization to publish research paper.
3. Managing the number of additional trainee from Member Countries is one (1) person for one (1) leg.
4. Quota of these additional trainees is under SEAFDEC Researcher.

SURVEY MATERIAL AND METHOD

Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand will be undertaken by dividing in to three (3) main activities, *i.e.*

1. Regional Technical Meeting on the Collaborative Research Survey on Fisheries Resources and Marine Environment of the Gulf of Thailand. The meeting will be organized by SEAFDEC Training Department to prepare research cruise plan. In the meeting, researcher from all Participating countries will meet and discuss on the research topics, scientific working group, and responsible person for facilitate the research activities. Expected output is the detail and schedule of cruise survey, list of working group, and working, mechanism of the survey. Standard Operation Procedure for the survey will be drafted and circulate to all members.

2. The shipboard survey
 - a. Research Vessel

The Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand will be conducted by using a SEAFDEC research vessel, M.V. SEAFDEC 2, 211 GT, of SEAFDEC Training Department (See Annex 3)

- b. Research Equipment

Research survey will be carried out with the operations of CTD, Current Indicator, Thermo-Salino Graph (TSG) system, Temperature and Depth Recorder (TDR), Weather information. Plankton and larvae survey will be composed with phytoplankton net, zooplankton net, bongo net and Neuston net. Sediment and benthos sampling will be carried out by using core and grab. SEAFDEC will prepare the oceanographic winches to operate during Marine environment and oceanographic survey. Concerning the demersal fisheries resources survey, it is necessary to carry out bottom trawling in order to update the present status of fisheries resources in the GOT specifically the demersal species. FiA Cambodia and RIMF of Viet Nam suggested SEAFDEC applying the bottom trawl in the collaborative survey, in all 3 participating countries. In this connection SEAFDEC/TD will select trawl net design and prepare the trawl nets and their fishing accessories to operate during the collaborative research survey.



c. Small pelagic resource survey by hydro-acoustic instrument

Scientific echo-sounder, Simrad EK-60, is required to conduct the small pelagic resource survey due to bottom trawl has less efficiency to collect small pelagic fisheries samples. In addition, Viet Nam is capable of conducting the hydro acoustic survey by itself while willing to contribute and supporting the resource persons/experts and equipment for the survey to the region.

d. Standard Operation Procedure (SOP)

Recommendation provided by RIMF of Viet Nam that SOP will be the effective tool for the study on the marine fisheries resource, marine environment, and meteorological. SOP will be agreed among scientists of Participating Countries and disseminated to all participating countries prior to the collaborative research survey.

e. Oceanographic equipment calibration

The calibration of the oceanographic equipments is necessary to standardize (inter-calibration) prior to the collaborative research survey.

f. Partial detail of oceanographic equipment

List of Oceanographic and sampling gears use in the cruise survey are appeared in Table 2 and Annex 4. Specifications and pictures of some oceanographic equipment are presented in Annex 4. The proposed research topics are presented in Annex 5.

3. The second Regional Technical Meeting on the Collaborative Research Survey on Fisheries Resources and Marine Environment of the Gulf of Thailand. The meeting will be organized by SEAFDEC Training Department in collaboration with RIMF of Viet Nam to summarize the research cruise. In the meeting, preliminary result of the cruise survey will be presented and follow up activities will be discussed and reported.

Oceanographic and sampling gear	Responsibility
Trawl nets and accessories	M.V. SEAFDEC 2
Scientific Echo sounder SIMRAD EK-60	M.V. SEAFDEC 2 and RIMF Viet Nam
CTD	M.V. SEAFDEC 2
Current Indicator	M.V. SEAFDEC 2
Temperature and Depth Recorder (TDR)	M.V. SEAFDEC 2 and RIMF Viet Nam
Weather information	M.V. SEAFDEC 2
Thermo Salino Graph (TSG) system	M.V. SEAFDEC 2
Phytoplankton and zooplankton net	M.V. SEAFDEC 2
Bongo net	M.V. SEAFDEC 2
Neuston net	M.V. SEAFDEC 2
Sediment sampler (Core and grab)	M.V. SEAFDEC 2
Benthos (grab)	M.V. SEAFDEC 2
Sample store (Bottles, bags, etc.)	M.V. SEAFDEC 2
Oceanographic winch	M.V. SEAFDEC 2

Table 2 List of Oceanographic and sampling gears use in the cruise survey



REPORTING

1. Cruise report - SEAFDEC
2. Preliminary survey report - SEAFDEC and Researchers
3. Technical paper - SEAFDEC and Researcher in collaborative agencies
4. Seminar - SEAFDEC

Remark: Copyrights of the results/outputs from the survey

- a. At national level, copyrights of the outputs from the survey in each national waters (including data, samples, technical papers, etc.) will be under authorization by national cooperative agency. However, SEAFDEC may request to collect some outputs for further analysis upon an approval by national agency.
- b. At regional level, joint authors of the technical papers on specific research based on the research activity of the survey could also be done.
- c. SEAFDEC will organize the Regional Technical Meeting on the Collaborative Research Survey on Fisheries Resources and Marine Environment of the Gulf of Thailand to identify the topic of research study and responsible researcher before starting of the cruise (period will be considered)
- d. SEAFDEC in collaboration with Participating Countries will develop the policy data sharing in the region select technical working group to report the final results.

Project Director

1. Dr. Kom Silapajarn (SEAFDEC Secretary and Chief of Training Department)

Project Advisor

1. Mr. Sutee Rajruchithong
2. Dr. Yuttana Theparoonrat

Project Coordinator

1. Mr. Isara Chanrachkij Research and Development Division Head
2. Dr. Taweekiet Amornpiyakrit Senior Program Officer
3. Mr. Sukchai Anupapboon Fishing Ground and Fishery Oceanography Section Head

Cruise Coordinator

1. Mr. Isara Chanrachkij Research and Development Division Head
2. Mr. Sukchai Arnupapboon Fishing Ground and Fishery Oceanography Section Head
3. Mr. Vudthirat Vudthipanyo Captain of M.V. SEAFDEC 2



Annex 5.6: Draft Cruise Plan

- 1. CRUISE NO.** : M.V. SEAFDEC 2 No. XX-X/2018
- 2. PERIOD** : (87 Days)
- 3. AREA OF OPERATION** : Gulf of Thailand (Cambodia waters, Thailand waters and Vietnam waters)
- 4. Port of Call** :
 1. Prachuap-khirikhan province (Thailand)
 2. Songkhla province (Thailand)
 3. Sihanoukville (Cambodia)
 4. Phu Quoc Island (Viet Nam)
- 5. Objectives** : To carry out fisheries resources survey by using following equipments and sampling gears;
 1. Fisheries resources survey sampling by bottom trawl and Hydro-acoustic survey by using multi acoustic frequency (38, 120 and 200 KHz.) Simrad EK-60
 2. Oceanographic survey by using CTD, Current Indicator, Thermo Salino Graph (TSG) system, Temperature and Depth Recorder (TDR), Weather information. Plankton and Larvae survey will be composed with phytoplankton net, zooplankton net, Bongo net, and Neuston net.

6. Tentative schedule

M.V. SEAFDEC 2 Tentative schedule (87 days)

17 August 2018 (Fri.)

- 0900 hrs. : Leave SEAFDEC/TD for the Research survey station.2.
- 1300 hrs. : Arrive station 2.
- 1300-1800 hrs. : Bottom trawl and Oceanographic survey St.2.
- 1800 hrs. : Start Hydro-acoustic survey then proceed to St.1.

18 August 2018 (Sat.)

- 0600-1900 hrs. : Bottom trawl and Oceanographic survey St.1, 3.
- 1900 hrs. : Sailing to St.4.

19 August 2018 (Sun.)

- 0600-1900 hrs. : Bottom trawl and Oceanographic survey St.4, 5.
- 1900 hrs. : Sailing to St.6.

20 August 2018 (Mon.)

- 0600-1900 hrs. : Bottom trawl and Oceanographic survey St.6, 7.
- 1900 hrs. : Sailing to St.8.

21 August 2018 (Tue.)

- 0600-1900 hrs. : Bottom trawl and Oceanographic survey St.8, 9.
- 1900 hrs. : Sailing to St.14.

22 August 2018 (Wed.)

- 0600-1900 hrs. : Bottom trawl and Oceanographic survey St.14, 15.
- 1900 hrs. : Sailing to St.17.



23 August 2018 (Thu.)

0600-1900 hrs. : Bottom trawl and Oceanographic survey St.17, 16.
1900 hrs. : Sailing to St.13.

24 August 2018 (Fri.)

0600-1900 hrs. : Bottom trawl and Oceanographic survey St.13, 12.
1900 hrs. : Sailing to St.11.

25 August 2018 (Sat.)

0600-1900 hrs. : Bottom trawl and Oceanographic survey St.11, 10.
1900 hrs. : Sailing to Prachuap-khirikhan Province.
2200 hrs. : Arrive Prachuap-khirikhan Province.

26-27 August 2018 (Sun.-Mon.)

0800-1700 hrs. : Replenish fresh water and provision.
: Unloading all samples.

28 August 2018 (Tue.)

0800-1800 hrs. : Researchers embark the ship.
1900 hrs. : Leave Prachuap-khirikhan Province or St.10.
2200 hrs. : Arrive St.10 then start Hydro-acoustic survey to St.18.

29 August 2018 (Wed.)

0600-1900 hrs. : Bottom trawl and Oceanographic survey St.18, 19.
1900 hrs. : Sailing to St.20.

30 August 2018 (Thu.)

0600-1900 hrs. : Bottom trawl and Oceanographic survey St.20, 21.
1900 hrs. : Sailing to St.25.

31 August 2018 (Fri.)

0600-1900 hrs. : Bottom trawl and Oceanographic survey St.25, 24.
1900 hrs. : Sailing to St.23.

1 September 2018 (Sat.)

0600-1900 hrs. : Bottom trawl and Oceanographic survey St.23, 22.
1900 hrs. : Sailing to St.26.

2 September 2018 (Sun.)

0600-1900 hrs. : Bottom trawl and Oceanographic survey St.26, 27.
1900 hrs. : Sailing to St.28.

3 September 2018 (Mon.)

0600-1900 hrs. : Bottom trawl and Oceanographic survey St.28, 29.
1900 hrs. : Sailing to St.39.

4 September 2018 (Tue.)

0600-1900 hrs. : Bottom trawl and Oceanographic survey St.39, 38.
1900 hrs. : Sailing to St.37.

5 September 2018 (Wed.)

0600-1900 hrs. : Bottom trawl and Oceanographic survey St.37, 33.
1900 hrs. : Sailing to Songkhla Province.



6 September 2018 (Thu.)

1700 hrs.

: Arrive Songkhla Province.

7-8 September 2018 (Fri.-Sat.)

0800-1700 hrs.

: Replenish fresh water and provision.

: unloading all samples.

: Loading the fuel.

9 September 2018 (Sun.)

0800-1600 hrs.

: Researchers embark the ship.

1700 hrs.

: Leave Songkhla for the Research survey St.49.

10 September 2018 (Mon.)

0600-1900 hrs.

: Bottom trawl and Oceanographic survey St.49, 50.

1900 hrs.

: Sailing to St.51.

11 September 2018 (Tue.)

0600-1900 hrs.

: Bottom trawl and Oceanographic survey St.51, 52.

1900 hrs.

: Sailing to St.57.

12 September 2018 (Wed.)

0600-1900 hrs.

: Bottom trawl and Oceanographic survey St.57, 56.

1900 hrs.

: Sailing to St.55.

13 September 2018 (Thu.)

0600-1900 hrs.

: Bottom trawl and Oceanographic survey St.55, 54.

1900 hrs.

: Sailing to St.53.

14 September 2018 (Fri.)

0600-1900 hrs.

: Bottom trawl and Oceanographic survey St.53, 58.

1900 hrs.

: Sailing to St.59.

15 September 2018 (Sat.)

0600-1900 hrs.

: Bottom trawl and Oceanographic survey St.59, 60.

1900 hrs.

: Sailing to St.61.

16 September 2018 (Sun.)

0600-1900 hrs.

: Bottom trawl and Oceanographic survey St.61, 62.

1900 hrs.

: Sailing to Songkhla Province.

17 September 2018 (Mon.)

0900 hrs.

: Arrive Songkhla Province.

1000-1700 hrs.

: Unloading all samples.

18-19 September 2018 (Tue.-Wed.)

0800-1600 hrs.

: Replenish fresh water and provision.

: Researchers embark the ship.

1700 hrs.

: Leave Songkhla Province for St. 49.

20 September 2018 (Thu.)

0200 hrs.

: Arrive St.49 then start Hydro-acoustic survey to St.46.

0600-1900 hrs.

: Bottom trawl and Oceanographic survey St.46, 47.

1900 hrs.

: Sailing to St.48.



21 September 2018 (Fri.)

0600-1900 hrs. : Bottom trawl and Oceanographic survey St.48, 45.
1900 hrs. : Sailing to St.44.

22 September 2018 (Sat.)

0600-1900 hrs. : Bottom trawl and Oceanographic survey St.44, 43.
1900 hrs. : Sailing to St.42.

23 September 2018 (Sun.)

0600-1900 hrs. : Bottom trawl and Oceanographic survey St.42, 36.
1900 hrs. : Sailing to St.35.

24 September 2018 (Mon.)

0600-1900 hrs. : Bottom trawl and Oceanographic survey St.35, 41.
1900 hrs. : Sailing to St.40.

25 September 2018 (Tue.)

0600-1900 hrs. : Bottom trawl and Oceanographic survey St.40, 34.
1900 hrs. : Sailing to St.30.

26 September 2018 (Wed.)

0600-1900 hrs. : Bottom trawl and Oceanographic survey St.30, 31.
1900 hrs. : Sailing to St.32.

27 September 2018 (Thu.)

0600-1200 hrs. : Bottom trawl and Oceanographic survey St.32.
1200 hrs. : Sailing to Songkhla.

28 September 2018 (Fri.)

0800 hrs. : Arrive Songkhla Province.
0900-1700 hrs. : Replenish fresh water and provision.

29-30 September 2018 (Sat.-Sun.)

0800-1700 hrs. : Loading the fuel.
: Unloading all samples.
: Immigration and Custom clearance.

1 October 2018 (Mon.)

0800-1400 hrs. : Preparation for departure.
1500 hrs. : Leave Song Khla for Sihanoukville, Cambodia.

3 October 2018 (Wed.)

0800 hrs. : Arrive Sihanoukville, Cambodia.
0900-1700 hrs. : Immigration and Custom clearance.

4 October 2018 (Thu.)

0800-1700 hrs. : Replenish fresh water and provision.
: Researchers embark the ship.

5 October 2018 (Fri.)

0800 hrs. : Leave Sihanoukville for the Research survey.
1300-1900 hrs. : Bottom trawl and Oceanographic survey start St.63.
1900 hrs. : Sailing to St.65.



- 6 October 2018 (Sat.)**
0600-1900 hrs. : Bottom trawl and Oceanographic survey St.65, 64.
1900 hrs. : Sailing to St.66.
- 7 October 2018 (Sun.)**
0600-1900 hrs. : Bottom trawl and Oceanographic survey St.66, 67.
1900 hrs. : Sailing to St.68.
- 8 October 2018 (Mon.)**
0600-1900 hrs. : Bottom trawl and Oceanographic survey St.68, 69.
1900 hrs. : Sailing to St.73.
- 9 October 2018 (Tue.)**
0600-1900 hrs. : Bottom trawl and Oceanographic survey St.73, 74.
1900 hrs. : Sailing to St.72.
- 10 October 2018 (Wed.)**
0600-1900 hrs. : Bottom trawl and Oceanographic survey St.72, 71.
1900 hrs. : Sailing to St.70.
- 11 October 2018 (Thu.)**
0600-1900 hrs. : Bottom trawl and Oceanographic survey St.70, 75.
1900 hrs. : Sailing to St.76.
- 12 October 2018 (Fri.)**
0600-1900 hrs. : Bottom trawl and Oceanographic survey St.76, 77.
1900 hrs. : Sailing to St.78.
- 13 October 2018 (Sat.)**
0600-1900 hrs. : Bottom trawl and Oceanographic survey St.78, 82.
1900 hrs. : Sailing to St.81.
- 14 October 2018 (Sun.)**
0600-1900 hrs. : Bottom trawl and Oceanographic survey St.81, 80.
1900 hrs. : Sailing to St.79.
- 15 October 2018 (Mon.)**
0600-1900 hrs. : Bottom trawl and Oceanographic survey St.79, 83.
1900 hrs. : Sailing to St.84.
- 16 October 2018 (Tue.)**
0600-1900 hrs. : Bottom trawl and Oceanographic survey St.84, 85.
1900 hrs. : Sailing to St.86.
- 17 October 2018 (Wed.)**
0600-1200 hrs. : Bottom trawl and Oceanographic survey St.86.
1200 hrs. : Leave for Sihanoukville.
- 18 October 2018 (Thu.)**
0700 hrs. : Arrive Sihanoukville, Cambodia.
0900-1700 hrs. : Immigration and Custom clearance.
: Unloading all sample.



19-20 October 2018 (Fri.-Sat.)

0800-1700 hrs.

: Replenish fresh water and provision.
: Researchers disembark the ship.

21 October 2018 (Sun.)

1000 hrs.

: Leave Sihanoukville for Phu Quoc, Viet Nam.

1700 hrs.

: Arrive Phu Quoc pilot station.

22 October 2018 (Mon.)

0800 hrs.

: Alongside Phu Quoc port, Viet Nam.

0900-1700 hrs.

: Immigration and Custom clearance.

23 October 2018 (Tue.)

0800-1700 hrs.

: Replenish fresh water and provision.

: Loading the fuel.

: Researchers embark the ship.

24 October 2018 (Wed.)

0800 hrs.

: Leave Phu Quoc for the Research survey.

1400-1900 hrs.

: Bottom trawl and Oceanographic survey St.87.

1900 hrs.

: Sailing to St.88.

25 October 2018 (Thu.)

0800-1900 hrs.

: Bottom trawl and Oceanographic survey St.88, 89.

1900 hrs.

: Sailing to St.90.

26 October 2018 (Fri.)

0800-1900 hrs.

: Bottom trawl and Oceanographic survey St.90, 91.

1900 hrs.

: Sailing to St.95.

27 October 2018 (Sat.)

0800-1900 hrs.

: Bottom trawl and Oceanographic survey St.95, 94.

1900 hrs.

: Sailing to St.93.

28 October 2018 (Sun.)

0800-1900 hrs.

: Bottom trawl and Oceanographic survey St.93, 92.

1900 hrs.

: Sailing to St.96.

29 October 2018 (Mon.)

0800-1900 hrs.

: Bottom trawl and Oceanographic survey St.96, 97.

1900 hrs.

: Sailing to St.98.

30 October 2018 (Tue.)

0800-1900 hrs.

: Bottom trawl and Oceanographic survey St.98, 99.

1900 hrs.

: Sailing to St.104.

31 October 2018 (Wed.)

0800-1900 hrs.

: Bottom trawl and Oceanographic survey St.104, 103.

1900 hrs.

: Sailing to St.102.

1 November 2018 (Thu.)

0800-1900 hrs.

: Bottom trawl and Oceanographic survey St.102, 101.

1900 hrs.

: Sailing to St.100.



- 2 November 2018 (Fri.)**
 0800-1900 hrs. : Bottom trawl and Oceanographic survey St.100, 105.
 1900 hrs. : Sailing to St.106.
- 3 November 2018 (Sat.)**
 0800-1900 hrs. : Bottom trawl and Oceanographic survey St.106, 107.
 1900 hrs. : Sailing to St.108.
- 4 November 2018 (Sun.)**
 0800-1900 hrs. : Bottom trawl and Oceanographic survey St.108, 110.
 1900 hrs. : Sailing to St.109.
- 5 November 2018 (Mon.)**
 0800-1200 hrs. : Bottom trawl and Oceanographic survey St.109.
 1200 hrs. : Sailing to Phu Quoc.
- 6 November 2018 (Tue.)**
 0800 hrs. : Arrive Phu Quoc, Viet Nam.
 0900-1700 hrs. : Immigration and Custom clearance.
- 7-8 November 2018 (Wed.-Thu.)**
 0800-1700 hrs. : Replenish fresh water and provision.
 : Researchers disembark the ship.
 : Loading the fuel.
 : Unloading all samples and equipments.
- 9 November 2018 (Fri.)**
 1000 hrs. : Leave Phu Quoc for SEAFDEC/TD.
- 11 November 2018 (Sun.)**
 0800 hrs. : Arrive SEAFDEC/TD.

7. PERSONNEL

Personnel onboard

1. Number of personnel onboard is thirty-four (34)
 - a. SEAFDEC Crew (15)
 - b. SEAFDEC Researcher (5)
 - c. Invited researcher under SEAFDEC management (4)
 - d. Researcher of host countries (10)
2. There will be no other countries to join the country survey other than host researcher/observer. However, SEAFDEC will invite 5 researchers to work for SEAFDEC (not for country). In addition, all Participating Countries and SEAFDEC agreed to have additional trainees from Member Countries to join the cruise with the objective of human resource development on marine fisheries resource survey. It was further noted that these trainees have no authorization to publish research paper.
3. Managing the number of additional trainee from Member Countries is one (1) person for one (1) leg.
4. Quota of these additional trainees is under SEAFDEC Researcher



Annex 5.7: Survey Station

Leg 1 (Thai waters)

To Station	Lat.			Long.			Depth (m.)	Course	Distance (Nm)	Remarks
SEAFDEC TD	-			-			-	-	28.0	TD to St.2
2	13	10.08	N	100	40.02	E	18	270	23.1	2
1	13	10.02	N	100	16.50	E	18	181	25.8	1
3	12	44.28	N	100	15.84	E	24	090	22.0	3
4	12	44.10	N	100	38.28	E	35	219	39.1	4
5	12	15.00	N	100	15.00	E	28	090	30.0	5
6	12	15.00	N	100	45.00	E	27	090	30.0	6
7	12	15.00	N	101	15.00	E	32	090	30.0	7
8	12	15.00	N	101	45.00	E	27	105	30.0	8
15	12	7.56	N	102	6.36	E	20	165	15.0	15
17	11	53.10	N	102	10.38	E	40	156	14.4	17
16	11	39.96	N	102	16.26	E	42	263	12.5	16
14	11	38.40	N	102	3.66	E	45	338	14.2	14
13	11	51.54	N	101	58.26	E	50	-	30.0	13
Ko Chang	-			-			Total distance		344.1	Ko Chang

Leg 2 (Thai waters)

To Station	Lat.			Long.			Depth (m.)	Course	Distance (Nm)	Remarks
	-			-			-	-	50.0	Thailand Leg 2
13	11	45.00	N	101	45.00	E	50	270	29.7	13
12	11	45.00	N	101	15.00	E	45	270	29.7	12
11	11	45.00	N	100	45.00	E	38	270	29.7	11
10	11	45.00	N	100	15.00	E	35	225	42.2	10
18	11	15.00	N	099	45.00	E	42	090	29.7	18
19	11	15.00	N	100	15.00	E	45	090	29.7	19
20	11	15.00	N	100	45.00	E	50	090	29.7	20
21	11	15.00	N	101	15.00	E	53	180	30.0	21
25	10	45.00	N	101	15.00	E	60	270	29.8	25
24	10	45.00	N	100	45.00	E	57	270	29.7	24
23	10	45.00	N	100	15.00	E	47	270	29.7	23
22	10	45.00	N	099	45.00	E	45	138	42.9	22
27	10	13.02	N	100	13.80	E	50	090	32.0	27
28	10	12.54	N	100	46.08	E	60	090	29.7	28
29	10	12.54	N	101	16.08	E	70	180	28.1	29
39	09	44.46	N	101	16.14	E	65	274	30.0	39
38	09	46.56	N	100	46.08	E	55	-	60.0	38
Ko Samui.							Total distance		570.1	Ko Samui



Leg 3 (Thai waters)

To Station	Lat.			Long.			Depth (m.)	Course	Distance (Nm)	Remarks
	–			–			–	–	50.0	Thailand Leg 2
42	09	30.00	N	099	48.24	E	12	004	15.3	
36	09	45.24	N	099	49.44	E	15	270	14.3	
35	09	45.18	N	099	35.04	E	23	178	15.2	
41	09	30.00	N	099	35.64	E	4	269	11.6	
40	09	29.88	N	099	24.00	E	5	356	15.4	
34	09	45.24	N	099	22.92	E	17	001	13.3	
30	09	58.50	N	099	23.04	E	22	085	13.7	
31	09	59.64	N	099	36.78	E	30	027	15.0	
26	10	13.02	N	099	43.80	E	45	158	19.0	
32	09	55.38	N	099	50.82	E	34	076	15.3	
33	09	59.16	N	100	5.76	E	48	141	16.2	
37	09	46.56	N	100	16.08	E	25	183	31.5	
43	09	15.12	N	100	14.28	E	29	090	29.8	
44	09	15.18	N	100	44.22	E	38	090	29.8	
45	09	15.18	N	101	14.22	E	65	175	29.1	
48	08	46.14	N	101	16.68	E	60	266	28.1	
47	08	44.04	N	100	48.48	E	32	270	29.9	
46	08	44.04	N	100	18.48	E	24	136	36.3	
49	08	17.70	N	100	43.62	E	25	176	33.7	
53	07	44.10	N	100	46.08	E	30	–	40.0	
Ko Samui							Total distance		570.1	Ko Samui

Leg 4 (Thai waters)

To Station	Lat.			Long.			Depth (m.)	Course	Distance (Nm)	Remarks
Songkhla to St.58	–			–			–	–	15.0	Thailand Leg 4
58	07	15.54	N	100	49.20	E	20	090	30.0	
59	07	15.54	N	101	19.20	E	40	092	26.6	
60	07	14.52	N	101	45.78	E	50	137	41.0	
62	06	44.52	N	102	13.68	E	50	004	30.0	
61	07	14.52	N	102	15.78	E	50	045	42.3	
57	07	44.46	N	102	45.66	E	80	270	29.9	
56	07	44.46	N	102	15.66	E	75	357	30.2	
52	08	14.58	N	102	13.92	E	75	270	29.9	
51	08	14.58	N	101	43.92	E	55	177	30.2	
55	07	44.46	N	101	45.66	E	65	269	29.5	
54	07	44.10	N	101	16.08	E	40	356	32.1	
50	08	16.08	N	101	13.62	E	40	–	80.0	
Songkhla Province							Total distance	446.7	Songkhla Province	



Total distance from Songkhla, Thailand to Sihanoukville, Cambodia is 280 Nm

Leg 5 (Cambodia waters)

To Station	Lat.			Long.			Depth (m.)	Course	Distance (Nm)	Remarks
Sihanoukville to St.74	-			-			-	-	40.0	Cambodia waters
74	10	22.20	N	103	37.60	E	25	281	17.3	
73	10	20.50	N	103	20.50	E	25	308	15.6	
69	10	35.00	N	103	08.00	E	28	303	9.8	
68	10	40.40	N	102	59.70	E	35	352	19.7	
65	10	59.90	N	102	57.00	E	28	335	15.7	
63	11	14.20	N	102	50.40	E	28	216	17.4	
64	11	0.10	N	102	40.00	E	45	217	25.0	
66	10	40.10	N	102	25.00	E	60	088	14.5	
67	10	40.50	N	102	39.70	E	50	178	20.1	
71	10	20.40	N	102	40.50	E	55	269	20.4	
70	10	20.00	N	102	19.90	E	65	182	20.5	
76	09	59.50	N	102	19.20	E	65	272	19.7	
75	10	00.20	N	101	59.30	E	70	177	20.6	
79	09	39.60	N	102	00.50	E	70	089	19.3	
80	09	39.90	N	102	20.00	E	70	179	20.2	
84	09	19.70	N	102	20.50	E	65	271	20.0	
83	09	20.00	N	102	04.80	E	70	120	29.6	
86	09	05.00	N	102	26.20	E	70	043	20.4	
85	09	20.00	N	102	40.10	E	70	354	21.8	
81	09	41.70	N	102	37.90	E	60	095	22.1	
82	09	39.80	N	103	0.10	E	50	316	28.3	
77	10	0.00	N	102	40.10	E	55	090	19.8	
78	10	0.00	N	103	00.10	E	40	001	20.5	
72	10	20.50	N	103	00.50	E	35	-	40.0	
Sihanoukville Cambodia							Total distance	538.3	Sihanoukville Cambodia	

Total distance from Sihanoukville, Cambodia to Phu Quoc Island, VN is 70.0 NM



Leg 6 (Viet Nam waters)

To Station	Lat.			Long.			Depth (m.)	Course	Distance (Nm)	Remarks
87	10	12.00	N	104	24.00	E	8	201	15.0	87
88	10	00.00	N	104	15.00	E	10	089	15.0	88
89	10	00.00	N	104	30.00	E	10	241	23.8	89
90	09	51.00	N	104	07.80	E	15	090	22.0	90
91	09	51.00	N	104	30.00	E	13	156	21.0	91
95	09	30.00	N	104	30.00	E	15	276	12.0	95
94	09	30.00	N	104	18.00	E	20	266	17.9	94
93	09	30.00	N	104	00.00	E	23	265	19.7	93
92	09	30.00	N	103	40.20	E	35	224	50.0	92
96	09	00.00	N	103	00.00	E	40	086	29.8	96
97	09	00.00	N	103	30.00	E	45	091	29.8	97
98	09	00.00	N	104	00.00	E	30	090	29.8	98
99	09	00.00	N	104	30.00	E	20	190	30.0	99
104	08	30.00	N	104	30.00	E	23	269	29.9	104
103	08	30.00	N	104	00.00	E	25	270	29.9	103
102	08	30.00	N	103	30.00	E	30	269	19.7	102
101	08	30.00	N	103	10.20	E	45	271	25.1	101
100	08	30.00	N	102	45.00	E	50	271	33.4	100
105	08	00.00	N	103	00.00	E	75	089	29.9	105
106	08	00.00	N	103	30.00	E	50	094	29.9	106
107	08	00.00	N	104	00.00	E	30	097	29.9	107
108	08	00.00	N	104	30.00	E	30	247	33.5	108
110	07	45.00	N	104	00.00	E	40	251	29.9	110
109	07	45.00	N	103	30.00	E	50	–	140.0	109
Phu Quoc Island		–			–		Total distance	789.9		

Total distance from Phu Quoc Island, Viet Nam to SEAFDEC/TD is 330.0



Annex 5.8: M.V. SEAFDEC 2 ship particular

Main Dimensions

Length Overall (Loa)	33.24 m
Breadth, Molded (B)	7.2 m
Design draft, Molded (D)	2.7 m
Gross tonnage	211 t (international)

Machinery

Main Engine Output 1000 Ps	1 Unit
Electric Generator 120 KVA	2 Unit

Speed and endurance

Maximum speed at sea trial	12.5 knot
Service speed	12.0 knot
Fuel oil consumption (24 hours)	3.83 ton/day
Endurance about	39,000 nautical miles

Complement

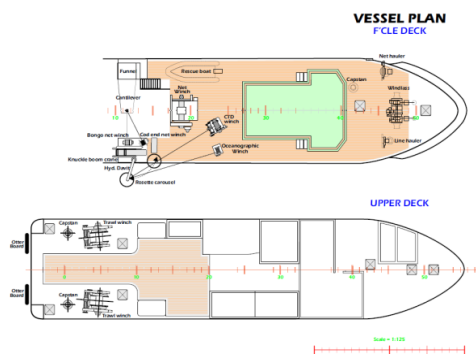
Crew	15 persons
Instructor/scientist/participants	22 persons
Total	37 persons

Ship Builder

Niigata, Japan

Delivery

2004






Nautical and electronics equipment: Magnetic compass, Gyro Compass and Auto Pilot, GPS navigator, Radar, Digital sea water/Ambient thermometer.

Oceanographic Equipment: Conductivity Temperature and Depth System, Thermo-salinograph and Fluormeter, Expandable Bathythermograph, Profiling Reflectance Radiometer System. Temperature and Depth Recorder, Water Sampler, Core sampler, Bottom Sediment Sampler, and Plankton Net System

Fishing Equipment: Direction finder, Color fish finder, Scanning sonar, Trawl monitor, Underwater television, Fishing gear: Bottom trawl, Midwater trawl, Pelagic longline, Bottom longline, Drifting gillnet, and Automatic squid jigging



Annex 5.9: Research Equipment

No.	Equipment	Details	Picture
1	Conductivity, Temperature and Depth (CTD)	The system (Seabird 911 plus equipped with accessory sensors) is designed for real-time data acquisition and control to measure in situ temperature, salinity, Oxygen, pH, fluorescence and depth. The system is able to operate until 1,500 meter deep.	
2	Profiling Reflectance Radiometer System (PRR)	The system includes an underwater radiometer (PRR-2600), on deck references radiometer (PRR-2610) and software for operation and data acquisition.	
3	Temperature/Depth Sensor	The instrument is designed for measuring and recording temperature and depth. Maximum depth 500 m.	


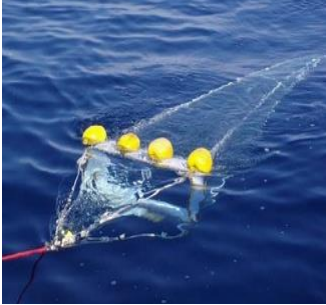



No.	Equipment	Details	Picture
Water sampler			
4	Van Dorn 10 L	Van Dorn water sampler is suited for collecting large volume of water in middle layer. The tube is made of polyethylene.	
5	Rosette Multi-bottle Arrays with 12 Niskin 1.7 L	Rosette Multi-bottle arrays with 12 Niskin 1.7 L can be remotely actuate either independently, or in conjunction with CTD system.	
Sediment sampler			
6	Piston Core	The piston core sampler is a kind of gravity type free drop system core sampler with pilot bottom sampler. It is used for collecting a depth profile of sediment (dia. approx. 40 mm, length 0.5m).	



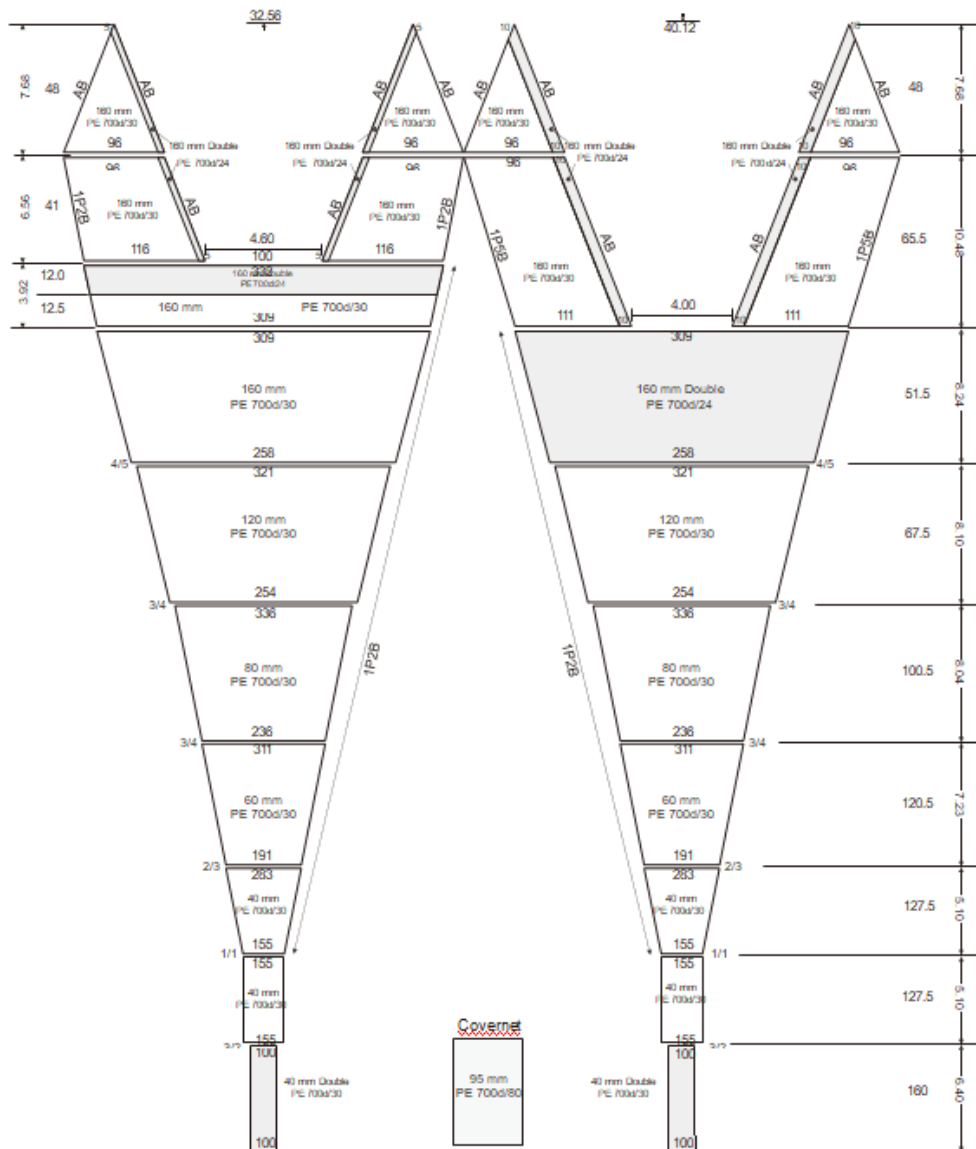
No.	Equipment	Details	Picture
Sediment sampler			
7	Gravity Core	The gravity core sampler is a free drop system core sampler. It is used for collecting a depth profile of sediment. (Dia. approx. 50 mm, length 1 m).	
8	Box Core	The box core sampler is used for collecting soft sediment. Size 30 × 30 × 60 cm.	
9	Smith McIntyre Grab	The Smith McIntyre bottom sampler is designed to take samples ranging from soft mud to hard bottom ground. Size 33 × 33 cm.	



No.	Equipment	Details	Picture
Plankton net			
10	Bongo Net	<p>The Bongo net is designed for long oblique tows. It consists of two stainless steel frames (cylindrical shape with 45 cm. inside diameter) and 1 set of bongo net, which includes a zooplankton net 330μm and larvae net 500 μm. Towing depth is observed/monitored by using Net SONDE (depth meter).</p>	
11	Neuston Net	<p>Rectangular mouthed Neuston net with mesh size of upper part 1,000 μm and lower part 600 μm is used for the juvenile fish collection at the surface layer.</p>	
12	Phytoplankton Net	<p>Plankton net, mesh size 20 μm is used for vertical towing or filtrate phytoplankton from sea water.</p>	



Bottom Trawl Net



Bottom Trawl net, which are operated by dragging or towing the flexible net through the water by fishing craft. In particular otter board is operated from the stern of the vessel. Bottom trawl is operated by drawing the net along the sea bed to scoop up fish on or near the bottom, depending on manner in which the gear is constructed and rigged, its operating characteristic can be altered for use on various types of bottom and for many species of fish. Bottom trawl net used in the survey has specification as follow;

- | | |
|-----------------------|----------|
| 1) Ground rope length | 40.12 m. |
| 2) Head rope length | 32.56 m. |
| 3) Total net length | 58.11 m. |
| 4) Codend length | 6.40 m. |
| 5) Wing net mesh size | 160 mm. |
| 6) Codend mesh size | 40 mm. |


Annex 5.10: Proposed Research Topics

Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
Fisheries Resource						
1) Some Biological Data of Pelagic and Demersal Fish in the Gulf of Thailand by Using Bottom Trawl	<ul style="list-style-type: none"> - To study catch rate, species composition and size composition - To study fish abundance and distribution - To study length-weight relationship 	<ul style="list-style-type: none"> - Capture rate, species and size composition of pelagic and demersal fish in the Gulf of Thailand - Abundance and distribution of pelagic and demersal fish in the Gulf of Thailand - Relationship between the length and weight of pelagic and demersal fish in the Gulf of Thailand 	- Bottom trawl	<ul style="list-style-type: none"> - Fish samples will be collected by using trawl operated during daytime. - Trawling time will be one hour for each station. - Sample will be divided into seven groups, i.e. pelagic fish, demersal fish, cephalopods, shrimps, crabs, true trash fish, and miscellaneous species including shell, mantis shrimp, and flathead lobster. - After identification, sample will be weighted and measured the length by using 0.5 cm. interval punching paper. - Total length will be applied for fishes, mantle length for cephalopods, total length for shrimps and mantis shrimp, and carapace width for crabs. 	6 months	1. Mr. Tanut Srikhum 2. Mr. Nirun Chusuan (DoF Thailand)
2) Demersal Fish Survey Using Hydro-acoustic Instrument	<ul style="list-style-type: none"> - To study species and composition by using trawl - To study catch per unit effort and catch per unit area - To analyze density and distribution at different depth. 	<ul style="list-style-type: none"> - Biomass and density of demersal fish can be estimated by integrating traditional trawling and acoustic survey. 	- Scientific echo-sounder	<ul style="list-style-type: none"> - Fish sample will be collected by trawling at the trawling speed of 2.5 knot. - Species will be identified and size will be measured by punching on punching paper. - Acoustic data will be collected by scientific echo-sounder at the speed of 8 knot. 	6 months	1. Mr. Pavarot Noranarttragoon 2. Ms. Anyanee Yamrungrueng 3. Mr. Sakol Pheaphabattana 4. Mr. Sichon Hoimuk (DoF Thailand)



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
3) Demersal Fisheries Resources Survey in Viet Nam EEZ	- To assess the demersal fisheries resources, in the marine waters of Vietnam by trawl net and using hydro-acoustic survey	- Report on the Biomass of the Demersal Fisheries Resource of the Southern Viet Nam	- Scientific echosounder - Bottom trawl	- Hydro-acoustic survey: Simrad EK-60 by using multi acoustic frequency (38, 120, and 200 kHz), average cruise speed of the vessel is 5 knots (more or less depending on the sea condition) - Demersal fish sampling by otter board trawl		1. Mr. Nguyen Viet Nghia (Team leader of Viet nam) (RIMF-Viet Nam)
4) Small pelagic Resource Survey by hydro-acoustic Instrument, i.e. Scientific Echosounder Simrad EK-60	- To assess the small pelagic fisheries resources, including: anchovy, herring, mackerel, hairtail, scad, yellow-tail scad, etc in the marine waters of Vietnam by using hydro-acoustic survey	- Report on the Biomass of the Small Pelagic Fisheries Resource of the Southern Viet Nam	- Scientific echosounder - Bottom trawl	- Hydro-acoustic survey: Simrad EK-60 by using multi acoustic frequency (38, 120, and 200 kHz), average cruise speed of the vessel is 5 knots (more or less depending on the sea condition) - Small pelagic sampling by otter board trawl		1. Mr. Nguyen Viet Nghia (Team leader of Viet nam) (RIMF-Viet Nam)
5) Biomass Estimation by Hydro-acoustic Method in the Gulf of Thailand	- Biomass estimation in the Gulf of Thailand	- Distribution of biomass in the Gulf of Thailand	- Scientific echosounder - ADCP - CTD - Total biomass - Duration	- The reflection signal of scientific echosounder could be interpreted the distribution of biomass		1. Dr. Monton Anongponyoskun (KU)
6) Marine Species Identification			- Bottom trawl	- Demersal fish sampling by otter board trawl		Wait for leader (FiA Cambodia)



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
Environment (Physical)						
7) Water Column Condition and Near-Bottom Water Hypoxia in the Gulf of Thailand	<ul style="list-style-type: none"> - To investigate water column condition during the cruise survey and the relationship between water column condition and the development of near-bottom hypoxic water - To investigate the influence of the South China Sea on water column condition and near-bottom hypoxic water 	<ul style="list-style-type: none"> - Status of water column condition in the Gulf of Thailand and the influence of water mass from the South China Sea will be clarified. - The development of near-bottom hypoxic water and related oceanographic condition will be elucidated. 	- CTD 911 plus	- Using CTD 911 plus collect the environment data from the surface to bottom at all survey station	6 months	<ol style="list-style-type: none"> 1. Dr. Anukul Buranapratheprat (Burapha University) 2. Mr. Sakda Arbsuwan (DoF Thailand) 3. Mr. Sukchai Arnupapboon 4. Ms. Pontipa Luadnakrob (SEAFDEC)
8) Residual Current from Ship ADCP	<ul style="list-style-type: none"> - To investigate the residual surface current pattern based on the ship drift data 	<ul style="list-style-type: none"> - Residual current pattern based on ship drift data 	- Onboard ADCP	- Record position of ship during stationed for the whole period and record Current data at several depths in every one hour throughout the cruise survey	6 month	<ol style="list-style-type: none"> 1. Dr. Suriyan Saramul 2. Dr. Patama Singhruck (CU) 3. Dr. Anukul Buranapratheprat (BU)
9) Geostrophic Current in the Gulf of Thailand	<ul style="list-style-type: none"> - To investigate the geostrophic current based on temperature, salinity, and pressure data 	<ul style="list-style-type: none"> - Geostrophic current in the Gulf of Thailand 	- CTD 911 plus	- Temperature, salinity, and pressure recorded by CTD		<ol style="list-style-type: none"> 1. Dr. Suriyan Saramul 2. Dr. Patama Singhruck 3. Dr. Pramot Sojisuporn (CU)



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
10) Three Dimensional Circulation in the Gulf of Thailand During Southwest Monsoon	- To study 3-D circulation model in the Gulf of Thailand	- Circulation pattern based on tide, wind, and density forcing	- CTD 911 plus - Onboard wind speed and direction	- Temperature, salinity, and pressure recorded by CTD - Wind speed and direction during the cruise - Recorded sampling position	6 months	1. Dr. Suriyan Saramul 2. Dr. Patama Singhruck (CU)
11) Water and Material Exchanges at the Mouth of the Gulf of Thailand	- To estimate the exchange of water mass between the Gulf Of Thailand (GOT) and South China sea (SC)	- The amount of seawater & freshwater being transferred between the two water bodies.	- CTD 911 plus	- Temperature, salinity, and pressure recorded by CTD	12 months	1. Dr. Pramot Sojisuorn 2. Dr. Suriyan Saramul (CU)
12) Relationship Between Chlorophyll- <i>a</i> Concentration in the Gulf of Thailand and Ocean Color from Remote Sensing	- To explain chlorophyll- <i>a</i> concentration distribution in the Gulf of Thailand - To find out relationship between Chlorophyll- <i>a</i> concentration of the Gulf of Thailand and ocean color from remote sensing with ESA case2 algorithm (coastal area)	- To introduce the ESA case2 algorithm to monitor or estimate chlorophyll- <i>a</i> in the Gulf of Thailand	- GFF filter paper - Acetone - 100 um to 150 um mesh size plankton net - Aluminum foil - Magnesium carbonate - Vacuum pump	- Collect surface water - Pre-filtering through a nylon net of 100 um to 150 um mesh size to remove zooplankton (some species have chlorophyll) - Filter 1 liter of water sample through GFF filter paper (Vacuum pump ~0.5 bar) - Added on the filters, with Magnesium carbonate to preventing acid degradation of chlorophyll - Fold the filters and keep in Aluminum Foil (label properly) - Keep in -20°C (up to eight weeks) for storage and transfer to lab	6 months	1. Dr. Wirote Laongmanee 2. Ms. Penchan Laongmanee 3. Dr. Prasarn Intacharoen (BU) 4. Ms. Siriporn Pangsorn (SEAFDEC) 5. Dr. Penjai Sompongchaiyakul (CU)



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
13) Inherent Properties of Sea Water in Gulf of Thailand	<ul style="list-style-type: none"> - To estimate the inherent optical properties 	<ul style="list-style-type: none"> - Understanding bio-optical properties of coastal waters to improve the accuracy of derived water constituents from ocean color data 	<ul style="list-style-type: none"> - PRR 2600 - Van Dorn - Filter set 	<ul style="list-style-type: none"> - Using PRR 2600 collect the upwelling radiance and down-welling irradiance of sea water from the surface to bottom at all survey station - Collect water sample about 5 l. at surface layer using Van Dorn <p>To collect sample for measuring Chlorophyll-a</p> <ul style="list-style-type: none"> - Filtered 100 ml of water sample through Whatman GF/F 25 mm - Rinse the funnel and filtered filter with 0.2 µm filtered seawater <p>Collect the filtrated water in 7ml of N,N-Dimethyl formamide (DMF) and store at -20°C until processing in the laboratory</p> <p>To collect sample for measuring phytoplankton absorption coefficient</p> <ul style="list-style-type: none"> - filtered 1-2 l. of water sample through - Whatman GF/F 25 mm - Rinse the funnel and filtered filter with 0.2 µm filtered seawater <p>- Collect the filtrated water in a dark container and store at -80°C until processing in the laboratory</p> <p>To collect sample for measuring Total Suspended Matter – TSM</p> <ul style="list-style-type: none"> - Water samples (≈ 0.5 – 1L) collected from sea surface are filtered under low vacuum (<5 in Hg) through 47 mm, 0.2 µm Whatman Nucleopore polycarbonate filters. 	6 months	<ol style="list-style-type: none"> 1. Dr. Jitraporn Phaksopa 2. Ms. Jutarak Luang-on (KU)



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
13) Inherent Properties of Sea Water in Gulf of Thailand (Cont.)				<ul style="list-style-type: none"> - Rinse the filtered filter with 0.2 µm filtered seawater. - Wash the filtered filter at least 50 ml of Milli-Q through the filtration apparatus to remove any salt. Repeat this procedure three times. - With the vacuum pressure still on, carefully remove the filtration cup and using a pipet gently wash the outer edge (unfiltered area) of the filter. - Stop the vacuum pressure and store the filtrated filter in plastic petri dish at -20°C (-80°C, if available) until processing in the laboratory. - <i>To collect sample for measuring Colored Dissolved Organic Matter – CDOM (m-1)</i> Water samples collected from sea surface are directly used to wash the glass brown bottles and caps three times and collect 200 ml of seawater in the bottles. - Filtered the water sample through 47 mm, 0.2 µm Whatman Nuclepore polycarbonate filters at a vacuum pressure of 120 mm Hg, - Wash the glass brown bottle and cap with the small volume of filtered water three times. The bottles and filtered - water should not be contaminated with any phytoplankton cells, - Store the last 100ml of filtered water in the washed glass brown bottles. Cap the bottles and store in a refrigerator (-4°C). 		



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
14) Sedimentary Properties and Sedimentation Rate of Sediment in the Gulf of Thailand	<ul style="list-style-type: none"> - To document and interpret primary and secondary sedimentary structures - To correlate synchronous laminations between different cores 	<ul style="list-style-type: none"> - Understanding of sedimentary properties and the processes of sediment redistribution and sediment accumulation 	<ul style="list-style-type: none"> - Gravity corer - Freezer 	<ul style="list-style-type: none"> - Sediment core-samples keep frozen/cooled to bring back to CU's laboratory - Analysis by X-ray radiography will be performed in the laboratory 		<ol style="list-style-type: none"> 1. Dr. Penjai Sompongchaiyakul 2. Dr. Supitcha Chanyotha 3. Dr. Budsawan Bidorn 4. Dr. Sujaree Bureeku (CU) 5. Dr. Yuttana Toomnoi (OAP)
15) Temporal Distribution of Mercury and Trace Metals in Sediment	<ul style="list-style-type: none"> - To investigate spatial distribution and annual variations of mercury and trace metals - to investigate pollution status for mercury and trace metals from surrounding watershed 	<ul style="list-style-type: none"> - Understanding historical development in the watershed surrounding the Gulf of Thailand 	<ul style="list-style-type: none"> - Gravity corer - Freezer 	<ul style="list-style-type: none"> - Sediment core-samples keep frozen/cooled to bring back to CU's laboratory - Sub-sample will be done after analysis by X-ray radiography in the laboratory 		<ol style="list-style-type: none"> 1. Dr. Penjai Sompongchaiyakul 2. Dr. Sujaree Bureeku (CU) 3. Dr. Yuttana Toomnoi (OAP)
16) Integrates Low-cost Sonar Imagery and GIS to Map Underwater Habitat	<ul style="list-style-type: none"> - To describe the characteristic of bottom habitat - To identification the underwater habitat - To produce the important underwater habitat mapping of Gulf of Thailand 	<ul style="list-style-type: none"> - Important underwater habitat mapping of Gulf of Thailand 	<ul style="list-style-type: none"> - Lawrence structure scan system - Data storage - Portable GPS connect to structure scan system 	<ul style="list-style-type: none"> - Data recorded as 3-4 knots speed of vessel with GPS operation by zigzag track for 10 minute of each station. - 	6 months	<ol style="list-style-type: none"> 1. Dr. Wirote Laongmanee 2. Ms. Penchan Laongmanee (BU) 3. Ms. SiripornPangsong (SEAFDEC)



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
Environment (Chemical)						
17) Microplastics Accumulations in Fish, Sediment, and Seawater	<ul style="list-style-type: none"> - To determine the accumulation rates of microplastics in dominant and economically important fish - To determine the accumulation rates of microplastics in seawater - To determine the accumulation rates of microplastics in sediment - To estimate to possibility of microplastics transportation in food chains in the sea 	<ul style="list-style-type: none"> - Information on the microplastics accumulation in fish, sediment, and in seawater 	<ul style="list-style-type: none"> - Otter board trawl - Neuston net - Smith McIntyre grab 	<p>To collect fish</p> <ul style="list-style-type: none"> - Six species of fish will be collected by trawl net. Three species will be from dominant groups and three species will be from the economically important fish group - At least 15 individuals of each species will be collected - All fish will be kept at -20°C for further investigation <p>To collect seawater</p> <ul style="list-style-type: none"> - Towed Neuston net at surface layer at least 20 minutes at each station - All water samples will be transferred to plastic bottle and kept at -20°C for further investigation - At least 10 stations will be investigated <p>To collect sediment</p> <ul style="list-style-type: none"> - Smith McIntyre grabs will be operated - At least 1 kg of sediments will be collected at each station - All sediment samples will be transferred into plastic bag and kept at -20°C for further investigation - At least 10 stations will be investigated 	10 months	<ol style="list-style-type: none"> 1. Ms. Pontipa Luadnakrob (SEAFDEC) 2. Dr. VoranopViyakarn 3. Dr. SuchanaChavanich (CU)



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
18) Distribution of Total Organic Matter in Marine Sediments of the Gulf of Thailand	- Study on Total Organic Matter in sediment of the Gulf of Thailand	- Changing of total organic matter of sediment indicated the enrichment status of sediment and reflecting the sufficient organic food source for organism in sediment	- Box core - CTD 199 plus	Sediment samples from box corer. - Cut the sediment samples by cut plate. - Cut vertically into 10 depth ranges as 0-0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9 and 9-10 cm. - Keep the samples in plastic bag (zip lock bag). - Study on sediment characteristic such as size, color, composition and smell of sediment samples. Then, keep the sediment samples at -20°C until analysis. - The method for Total Organic Matter apply by loss-on-ignition techniques (Verardo <i>et al.</i> , 1990)	6 months	1. Dr. Shettapong Meksumpun (KU)
19) Mercury and Arsenic in Seawater	- To determine Hg and As concentration in seawater	- Baseline of Hg and As in seawater of the Gulf of Thailand	- Rosette - CU - Acid prewashed bottles	- Clean handed sampling techniques Water samples keep frozen to bring back to CU's laboratory		1. Dr. Penjai Sompongchaiyakul 2. Dr. Sujaree Bureekul (CU)
20) Flux of Nutrient and Nutrient Pool in Sediment	- To investigate nutrient concentration in overlying water, porewater and sediment	- Understanding of sediment's roles in contribution of nutrient of the water column	- Box corer	Overlying water 4 short core sediment samples Core 1 - sub-section and keep frozen to bring back for grain size, readily oxidizable organic matter, total organic carbon, carbonate content, mercury and trace metals analysis at CU's laboratory		



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
21) Iron-sulfer-phosphorus Cycling	- To investigate iron and sulfur concentration in porewater of sediment	- Understanding of sediment's roles in controlling trace metals availability under reducing condition	- Box corer	<p>Core 2</p> <ul style="list-style-type: none"> - Measuring of for vertical profile of iron and sulfur in sediment on-board using <p>Core 3</p> <ul style="list-style-type: none"> - electrochemical technique - Pore water squeezing on-board and analysis for nutrients on-board - After pore water extraction, sub-section and keep frozen to bring back for nutrient analysis at CU's laboratory 		1. Dr. Penjai Sompongchaiyakul 2. Dr. Sujaree Bureekul (CU)
22) Mercury and Trace Elements Contamination in the Surface Sediment	- To determine Hg and trace elements concentration in surface sediment	- Identification of potential sources of pollutants accumulated in sediment		<p>Core 4</p> <ul style="list-style-type: none"> - Sediment will be sub-section and keep frozen to bring back for petroleum and PAHs analysis at CU's laboratory 		
23) Spatial Sedimentology and Source Area Composition of Sediment in the Gulf of Thailand	- To investigate sediment properties including size fraction, readily organic matter, total organic matter, carbonate and nutrients.	- Identification of potential sources of sediment				
24) Petroleum Hydrocarbon (as chrysene) and Polycyclic Aromatic Hydrocarbon (PAHs)	- To determine total PHCs (as chrysene equivalent) and PAHs accumulated in sediment	Identification of potential sources of PAHs and risk area		- Similar with No. 23		1. Dr. Penjai Sompongchaiyakul 2. Dr. Sujaree Bureekul (CU) 3. Dr. Danai Tipmanee (PSU)
25) Total Petroleum Hydrocarbons (TPHs) in Surface Seawater (as chrysene)	- To determine concentration of TPHs in surface seawater	- Contamination and distribution of TPHs in surface seawater of the Gulf of Thailand	- Dropped bottle system	<ul style="list-style-type: none"> - 3 L of seawater sample of each station will be collected and preserved by 50 ml. of n-hexane until analytical procedure (IOC/UNESCO, 1988) - Seawater samples will be extracted by 150 ml. of n-hexane. - Remove water from extracted samples by using anhydrous sodium sulphate. 	6 months	1. Ms. Suthida Kan- atireklap 2. Mr. Supawa tKan- atireklap (DMCR)



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
25) Total Petroleum Hydrocarbons (TPHs) in Surface Seawater (as chrysene)				- Samples will be concentrated to 10 ml. by rotary evaporator and analyze by Fluorescence spectroscopy technique, Luminescence (Perkin-Elmer, model LS-55B, using Chrysene as standard, Excitation wavelength = 310 nm. And Emission wavelength = 360 nm. (Farrington <i>et al.</i> , 1988)		
26) Mercury Accumulation in Tissues and Risk Assessment for Consumption	<ul style="list-style-type: none"> - To determine Hg accumulated in demersal fish - To determine trace metal in demersal fish - To compare the amount of trace metal accumulating in each species - To assess risk of obtaining trace metal from consumption 	<ul style="list-style-type: none"> - Hg and trace metal in demersal fish - Estimation of trace metal accumulation from seafood consumption - Suggested amount of seafood for safe consumption 	- Otter board trawl	<ul style="list-style-type: none"> - Fish samples, 3 individuals for each species of each station - Fish samples keep frozen to bring back to CU's laboratory 		1. Dr. Penjai Sompongchaiyakul 2. Dr. SujareeBureekul (CU) 1. Ms. Tasawan Khawsejan 2. Mr. Somchai Vibunpant 3. Ms. Thitiporn Suppanirun 4. Mr. Patinya Sreesamran (DoF Thailand)
27) Radiation Dose and Radiological Risk Assessment in Marine Biota and Seafood Consumers	<ul style="list-style-type: none"> - To determine radio activity from both natural and artificial radio nuclides in seawater and sediment - To calculate radiation doses and risks in marine biota and seafood consumers 	<ul style="list-style-type: none"> - High quality scientific data to be used for setting up the national radiological safety guideline values of the local marine organisms and the seafood consumers - The national marine environmental radioactivity and 	<ul style="list-style-type: none"> - Smith McIntyre Grab - Van Dorn - NaI detectors 	<i>To collect Seawater</i> <ul style="list-style-type: none"> - 25 Liters of surface seawater is collected and acidified to be 1.6 using 14 M HCl to avoid an absorption of radionuclides on a container - <u>Natural radionuclide measurement</u> <ul style="list-style-type: none"> ▪ 5 L of the seawater is dried to 1 L and is then placed into a 1 L bottle ▪ The bottle containing 1 L of the sample is gamma-counted using a gamma 	6 month	1. Dr. YutthanaTumnoi 2. Dr. Suputra Visetpotjanakit 3. Ms. Darunwan Chuenbubpar 4. Ms. Prannicha Hongpitakpong 5. Mrs. Natchakan Nakkaew 6. Mr. Chitsanupong Khrautongkieo (OAP)



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
<p>27) Radiation Dose and Radiological Risk Assessment in Marine Biota and Seafood Consumers</p>	<ul style="list-style-type: none"> - To establish the national safety guideline values for protecting local marine organisms and seafood consumers from possible radiological hazards - To establish the national marine environmental radioactivity database and mapping to be used as a reference in future nuclear and radiological emergencies - To share obtained data with the regional and the international databases 	<p>radiation dose database and mapping</p> <p>-</p>		<ul style="list-style-type: none"> ▪ Spectrometry for 3 hours or longer followed by calculation of radioactivity from the natural radionuclides - <u>Cs-137 measurement</u> <ul style="list-style-type: none"> ▪ 0.26 grams of CsCl is added into 20 L of the stirred seawater ▪ 4 grams of Ammonium Phosphomolybdate (AMP) is then added followed by 1 hour stirring ▪ The solution is then left overnight prior to a filtration using 5B filter paper ▪ 1 M HNO₃ is used to rinse all residual and the prepared sample is placed into a plastic pettish disc with a diameter of 5 cm and a thickness of 0.5 cm prior to overnight dryness at the room temperature ▪ The sample is then placed into a gamma spectrometry for 3 hours or longer followed by calculation of Cs-137 radioactivity in the sample <p><i>To collect Sediment</i></p> <ul style="list-style-type: none"> - 1 kg of surface sediment is collected using a sediment grab and placed into a sealed plastic bag - The sediment is then dried at the room temperature for few days prior to grinding - The ground sample is placed into a cylinder container followed by a 3 hour (or longer) measurement using a gamma spectrometry and calculation of radioactivity from natural and artificial radionuclides 		



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
27) Radiation Dose and Radiological Risk Assessment in Marine Biota and Seafood Consumers				<p>To collect Biota</p> <ul style="list-style-type: none"> - 1 kg of individual marine biota is sampled and frozen prior to a sample preparation - Only edible parts are taken from the biota to be dried in an oven at 150°C for 8 hours - Prior to grinding, the sample is ashed in a furnace at 400-430°C for 16 hours - The ground sample is dried in an oven at 80°C for 24 hours or until a constant weight is achieved - The prepared sample is gamma-counted using a gamma spectrometry for 3 hours or longer prior to calculation of radioactivity from natural and artificial radionuclides <p>Real-time and online gamma radiation dose measurement</p> <ul style="list-style-type: none"> - NaI detectors is installed on the research vessel and gamma radiation dose at the surface seawater is measured <p>Gamma radiation dose rate data is real-time transmitted to a computer for generating a gamma radiation dose mapping for the entire expedition</p>		
28) Carbon Dioxide Flux and Primary Productivity in The Gulf of Thailand Nutrient and Nutrient Pool in Seawater			<ul style="list-style-type: none"> - Rosette - CTD 911 plus Filtering set 	<p>Water samples from each depth for analyses of</p> <p>On board</p> <ul style="list-style-type: none"> - DO - Alkalinity - Dissolved Inorganic nutrients <p>In the laboratory</p> <ul style="list-style-type: none"> - Suspended solids - Dissolved organic nutrient - Particulate nutrients 		<ol style="list-style-type: none"> 1. Dr. Penjai Sompongchaiyakul 2. Dr. Sutaporn Bunyajetpong 3. Dr. Sujaree Bureekul (CU)



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
29) Collection of Hydrographic In-situ Data for Validation in the Gulf of Thailand to Compare with Multi-satellite and Model Products	- Validate the models by collection of hydrographic in-situ data	- The good validation of these data in the Gulf of Thailand will conduce us very useful information about the environmental condition and fishing ground in GOT.	- CTD - TSG - ADCP	- Using CTD 911 plus collect the environment data from the surface to bottom at all survey station - Using TSG collect temperature and salinity along cruise tract	6 months	1. Dr. Monton Anongponyoskun (KU) 2. Dr. Hiroji Onishi (HU) 3. Ms. Siriporn Pangorn (SEAFDEC)
Environment (Biological Oceanography)						
30) Zooplankton Diversity in the Gulf of Thailand (BU)	- Investigation to describe zooplankton diversity in the Gulf of Thailand, - To provide an estimation of zooplankton community structure; abundance, composition, and their distribution.	- Relationship of fisheries and zooplankton abundance in the Gulf of Thailand	- Plankton net mesh size 300 μ m - Flow meter	- Tows a Zooplankton net with 300 μ m mesh size from 20 meters below the water surface to the surface - If the station depth is less than the specified depth, the tow is taken from two meters above the bottom - The sample is concentrated into the sample bucket and is transferred to a sample storage bottle - Preserve in 10% buffered formalin immediately	9 months	1. Dr. Vichaya Gunbua (BU) 2. Dr. Kornrawee Aeumsomboon 3. Dr. Porntep Pannarak (CU)
31) Density and Diversity of Phytoplankton in the Gulf of Thailand	- To study density and diversity of phytoplankton in the Gulf of Thailand.	- Density and diversity of phytoplankton in the Gulf of Thailand - Structure and composition of phytoplankton according to the depth and area in the Gulf of Thailand	- Van Dorn - Phytoplankton net (20- μ m mesh size)	- 40 l of Water sample will be collected by 10-L Van Dorn at the surface and chlorophyll Maximum - Seawater will be filtered through net (20- μ m meshed) and preserved with buffered formalin.	12 months	1. Ms. Nirucha Udomwongyont (DoF Thailand) 2. Dr. Shettapong Meksumpun (KU)



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
32) Species and Distribution of Palalarvae and Cephalopods in the Gulf of Thailand				<ul style="list-style-type: none"> - To collect Cephalopod sample - Bottom trawl surveys for 1 hr. - Sampling Cephalopod and keep in refrigerator for identification in laboratory - To collect palalarvae sample - Bongo net with 330 um mesh size and 45 in diameter will be used to collect palalarvae by oblique towing from the surface to 5 m above bottom. - The speed of wire release is 0.3m/s and retrieve is 0.6 m/s. - The palalarvae sample will be transferred to plastic bottom and preserve with 10% of buffered formalin. 	6 months	<ol style="list-style-type: none"> 1. Dr. Charauy Sukhsangchan 2. Ms. Sonthaya Phuynoi (KU)
33) Composition and Distribution of Fish Larvae in the Gulf of Thailand	<ul style="list-style-type: none"> - To study composition of fish larvae in the Gulf of Thailand - To study distribution of economic fish larvae in the Gulf of Thailand - To build capacity of young scientists in the field of fish larvae research 	<ul style="list-style-type: none"> - Fish larvae composition and distributions map in the Gulf of Thailand - An up-to-date fish larvae database in the Gulf of Thailand - Capacity building of young scientists in the field of fish larvae research 	<ul style="list-style-type: none"> - Bongo net diameter 55 cm with mesh size of 330 and 500 μm - Neuston net size 100 x 70 cm with mesh size of 1,000 μm - T.S-flow meter 	<ul style="list-style-type: none"> - Bongo net with flow meter attached at the net mouth will be used as a larvae sampler. - Oblique tow upward from 10 m from sea floor to the surface will be done (Bongo net). - Neuston net with 1,000 μm mesh size attached with flow meter will be used for surface horizontal tow. - Samplings will be preserved in 10% buffer formalin in plastic containers - Fish larvae identification will be done in laboratory to family level by professional biologists together with young scientists for capacity building. 	6 months	<ol style="list-style-type: none"> 1. Mrs. Niracha Songkaew 2. Mrs. Piyawan Hussadee 3. Mr. Patinya Srisumran 4. Mr. Somkiart Ketnarai (DoF Thailand) 5. Dr. Teerapong Duangdee (KU) 6. Mr. Rakkiet Punsri (SEAFDEC) 7. Dr. Kornrawee Aeumsomboon (CU)



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
34) Fish larvae Distribution of Scombridae and Engrulidae in the Gulf of Thailand	<ul style="list-style-type: none"> - To study distribution of fish larvae of Scombridae and Engraulidae in the Gulf of Thailand 	<ul style="list-style-type: none"> - An up-to-date Scombridae and Engraulidae larvae database in the Gulf of Thailand 	<ul style="list-style-type: none"> - Bongo net diameter 55 cm with mesh size of 330 and 500 μm - Neuston net size 100 x 70 cm with mesh size of 1,000 μm - T.S- Flow meter 	<ul style="list-style-type: none"> - Bongo net with flow meter attached at the net mouth will be used as a larvae sampler. - Oblique tow upward from 10 m from sea floor to the surface will be done (Bongo net). - Neuston net with 1,000 μm mesh size attached with flow meter will be used for surface horizontal tow. - Samplings will be preserved in 10% buffer formalin in plastic containers - Fish larvae identification will be done in laboratory to family level by professional biologists together with young scientists for capacity building. 	6 months	<ol style="list-style-type: none"> 1. Mrs. Niracha Songkaew 2. Mrs. Piyawan Hussadee 3. Mr. Patinya Srisumran 4. Mr. Somkiart Ketnarai (DoF Thailand) 5. Dr. Teerapong Duangdee (KU) 6. Mr. RakkietPunsri (SEAFDEC) 7. Dr. Kornrawee Aeumsomboon (CU)
35) Some Biological Aspects for Elasmobranch in Gulf of Thailand	<ul style="list-style-type: none"> - To study on catch composition of elasmobranches in the Gulf of Thailand - To study on age determination of shark using vertebrae - To study on the diversity of ecto and/or endoparasites in the elasmobranches 	<ul style="list-style-type: none"> - Base line study and update on catch composition and bio diversity of elasmobranches in Gulf of Thailand - Diversity of ecto and/or endoparasites found in elasmobranches in Gulf of Thailand 	<ul style="list-style-type: none"> - Trawl net 	<p>Catch composition sample will be obtained by trawl survey,</p> <ul style="list-style-type: none"> - Elasmobranches sample will be separated and taking photograph with scale - Sample will be separated roughly and measuring the length – weight individually and preserved in 10% formalin solution before move to identification in laboratory - Species will be identified using FAO species identification guide for fishery purpose “The Living Marine Resources of the Western Central Pacific” (FAO, 2001) as a main document together with other references - Vertebrae will be taken using field surgical equipment before clean with brush carefully and dried before further used for age determination 	6 months	<ol style="list-style-type: none"> 1. Dr. Thanitha Darbanandana (KU) 2. Dr. Thungtong Jutagate (URU) 3. Mr. Supapong Pattarapongpan (SEAFDEC)



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
35) Some Biological Aspects for Elasmobranch in Gulf of Thailand				Sample for parasites will be separated after measuring the length and weight, the whole body will be checked for ectoparasites while the endoparasite will be observed by cross section. - Parasites sample will be preserved in 10% formalin or 70% ethanol before moved for identification in laboratory		
36) Distribution and Abundance of Parasite in Bony fish in the Gulf of Thailand	- To examine external and internal parasite of bony fish.			- Collect bony fish from field and record data - Placed into plastic bags (1 fish/a bag) and then kept directly on ice - When the fish carried into laboratory, it should be kept in -20°C until examination		1. Molruedee Sonthi 2. Penchan Laongmanee 3. Worrawit Maneepitaksanti (BU) 4. Supanee Leethochawalit (CMU)
37) Diversity of Benthic Microcrustaceans and Micromollusks in the Gulf of Thailand	- To establish a preliminary checklist of microcrustaceans and micromollusks in the Gulf of Thailand	- Species list and description of microcrustaceans and micromollusks which provide taxonomic and biological data on these group	- Smith McIntyre Grab	- The material will be collected Using Smith McIntyre Grab - Each sample will be first decanted using filtered seawater into a plastic container - The residue then will be stirred slowly in water to loosen any clinging macrobenthic organism and sieved through a 500 μm mesh until all sediment has been removed and preserved in 70% alcohol - On board, macrobenthic specimens will be partly sorted to taxa in clean water and preserved for microscopic study in 70% ethanol.	6 months	1. Dr. Koraon Wongkamhaeng (KU)



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
38) Meiofauna Abundance and Distribution in Surface Sediment	- To determine composition and abundance of meiofauna in the Gulf of Thailand	- Composition and abundance of meiofauna in the Gulf of Thailand	- Smith McIntyre Grab/Box core - Plastic core tube (syringe with 3 cm internal diameter)	- Mass of sediment sample will be collected by using Smith McIntyre grab or Box core - The sediment samples will be carefully brought on the ship preventing the disturbance on the surface sediment as much as possible - Meiofauna samples (3 replicates) will be collected by using a plastic core tube (~3 cm internal diameter) take undisturbed surface sediment to a depth of 5 cm - The sediment samples will be transferred into a container (plastic bottle or Zip-lock bag) and preserved in 4% formalin, stained with Rose Bengal		1. Ms. Itchika Sivaipram (CU)
39) Microbiome Composition and Function in Sediment	- To investigate microbial community in surface sediment	- Obtain information on microbiome and its functions	- Smith McIntyre Grab	- Approximately 50 gram sediment keep in plastic zipped-lock bag and store at 4°C - Approximately 2 kg of sediment in selected stations (2-3 stations) store at 4°C		1. Dr. Onruthai Pinyakong 2. Dr. Penjai Sompongchaiyakul (CU)
40) Microbiome Composition and Function in Seawater	- To investigate microbial community in seawater	- Obtain information on microbiome and its functions	- Rosette - Bucket - CTD 911 plus	- Filter 5 L of sample - 0.5 L filtered seawater samples store at 4°C - Filters store at 4°C		1. Dr. Onruthai Pinyakong 2. Dr. Penjai Sompongchaiyakul (CU)
41) Attached Living Organism on Floating Garbage in Thai Waters	- The floating marine garbage can travel far away from its origin and can be a vector for the planktonic alien species to be established in other waters. This study aims to identify species composition	- The dispersion of plankton via the floating garbage.	- Handy scoop ne -	- At all stations, the observed floating garbage nearby research vessel will be collected by scoop net - All collected garbage will be took the photograph with the scale for estimating the surface area. - Preparing sample for analysis - Some garbage will be sampled and cut into small pieces and shaken them with filtered seawater in the plastic bottle for 3 minutes	12 months	1. Dr. Thaithaworn Lirdwitayaprasit 2. Dr. Kornrawee Aemsomboon (CU)



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
41) Attached Living Organism on Floating Garbage in Thai Waters	and abundance of plankton attached on the floating garbage.			<ul style="list-style-type: none"> - Pouring the shaken water sample through 20 μm. mesh and then transfer the sample remained sample on the filter net into a small plastics bottle, make volume with filter seawater to 100 ml. preserved with final formalin concentration of 2%. - The preserved plankton sample will be identified and enumerated under light microscope. - Species diversity, density per garbage area and statistical test will be analyzed. 		
42) Genetic Diversity and Population Genetic Structure of Three-Banded Mantis Shrimp <i>Miyakallanepa</i> Caught by Trawl Nets Fisheries in the Gulf of Thailand	- To identify genetic variation and population structure in <i>M. nepa</i> populations by using Amplified Fragment Length Polymorphism (AFLP) and novel microsatellites markers	- DNA markers are useful for identification of species with same species and similar morphology. They could be also applied for investigation of species authentication in food products. In this study, AFLP and microsatellites analysis were used to determine the genetic diversity and the relationship among <i>M. nepa</i> populations. The results will be useful to provide a scientific basis for protection and rational development and utilization of its germplasm resources.	- Bottom trawl	<ul style="list-style-type: none"> - Bottom trawl surveys for 1 hr. - The body weight and total body length of each mantis shrimp were measured - Specimens were kept at -30°C until required. - DNA extraction Total DNA was extracted from a piece of pleopod of each shrimp using a phenol-chloroform-proteinase K method (Sambrook and Russell, 2001) - The concentration of extracted DNA was spectrophotometrically estimated. - DNA was stored at 4 °C until used. - In order to get the best effectiveness of AFLP amplification, the conditions will be optimize following by the previous research (Voset al., 1995) - Novel Microsatellites marker will be optimize as described in Na-Nakornet al. (2010). 	12months	<ol style="list-style-type: none"> 1. Dr. Rachanimuk Hiransuchalert 2. Ms. Penchan Laongmanee 3. Dr. Wirote Laongmanee 4. Dr. Anyalak Wachirachaikarn 5. Ms. Patchari Yocawibun (BU and CU)



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
Environment (others)						
43) Distribution of Bottom Plastic Debris in the Gulf of Thailand	<ul style="list-style-type: none"> - To analyze local and regional density of plastic marine debris in the Gulf of Thailand - To identify types and sizes of marine litter 	<ul style="list-style-type: none"> - Study result will be baseline of bottom marine debris of the Gulf of Thailand - Information for responsible agency to manage the bottom marine debris 	<ul style="list-style-type: none"> - Bottom trawl 	Follow "Methodology for Monitoring Marine Litter on the Seafloor (continental shelf)" <ul style="list-style-type: none"> - Bottom trawl surveys for 1 hr. - Record haul position & orientation - Record haul speed & duration - Record haul start and end - Collect all plastic marine debris in the bag with label - Weighting in laboratory 	6 months	<ol style="list-style-type: none"> 1. Ms. Penchan Laongmanee 2. Dr. Wirote Laongmanee (BU) 3. Mr. Nakaret Yasook (SEAFDEC) 4. Mr Chalerm Phusririt (DoF Thailand) 5. Dr. Tanuspong Pokavanich (KU)
44) Investigation of Stock of Marine Debris in Gulf of Thailand	<ul style="list-style-type: none"> - To preliminary assess the stock of marine debris in the Gulf of Thailand that includes floating debris, buoyant debris and sunk debris at the seafloor. 		<ul style="list-style-type: none"> - Neuston net - Bottom trawl 	Assessing the stock of the marine debris using data from direct debris collection from the sea and echo-sounder signal post-processing corrected with fish abundance data and sea sediment character. To Collect Surface debris <ul style="list-style-type: none"> - Collect the sample by Neuston net - All non-living sample move to the black plastic bag and store in cool and dark environment. The sample will be sorted, dry and weight at laboratory on land. To Collect buoyant debris <ul style="list-style-type: none"> - Trawling using normal bottom net. Collect all non-living sample to the black plastic bag and store in cool and dark environment. The sample will be sorted, dry and weight at laboratory on land. 		<ol style="list-style-type: none"> 1. Dr. Monton Anongponyoskun 2. Dr. Jitraporn Phaksopa (KU)



Title	Objectives	Output	Sampling material	Sampling method	Expected report	Researcher
44) Investigation of Stock of Marine Debris in Gulf of Thailand (Cont.)				<p><i>To collect sunk debris</i></p> <ul style="list-style-type: none"> - Collection of any debris collected during Trawling. <p><i>To Collect Buoyant and sunk debris measurement</i></p> <ul style="list-style-type: none"> - In-direct measurement using scientific echo-sounder 		
Meteorology						
45) Composition and Potential Source of Aerosol (CU)			<ul style="list-style-type: none"> - High volume air samplers - Cascade for aerosol - Teflon and Quartz filters - Filter discs - Samples containers 	<ul style="list-style-type: none"> - Air pumping at the set position (away from the exhaust of the ship) during sailing. 		<ol style="list-style-type: none"> 1. Dr. SujareeBureekul 2. Dr. Penjai Sompongchaiyakul (CU) 3. Dr. Wirote Laongmanee (BU)

BU: Burapha University; CU: Chulalongkorn University; CMU: Chiang Mai University; DMCR: Department of Marine and Coastal Resources, Thailand; DoF: Department of Fisheries, Thailand; FiA Cambodia: Fisheries Administration, Cambodia; HU: Hokkaido University; KU: Kasetsart University; OAP: Office of Atoms for Peace; PSU: Prince of Songkla University; RIMF: Research Institute of Marine Fisheries, Viet Nam; URU: Ubon Ratchathani University



Annex 5.11: List of Sampling Gear and Research Topic and Sample Handling Procedure

Sampling gear	Relevant research topic	Sample Handling Procedure
Trawl net / SEAFDEC	<ul style="list-style-type: none"> - Some biological data of pelagic and demersal fish in the Gulf of Thailand by using bottom trawl (DoF Thailand) - Demersal Fish Survey using Hydro-acoustic instrument (DoF Thailand) - Small pelagic resources survey by hydro-acoustic Instrument, <i>e.g.</i> Scientific echo-sounder Simrad EK-60 (RIMF Viet Nam) - Marine species identification (Cambodia) - Microplastics accumulations in fish, sediment, and seawater (SEAFDEC & CU) - Mercury accumulation in tissues and risk assessment for consumption (CU) -Radiation dose and radiological risk assessment in marine biota and seafood consumers (OAP) - Species and distribution of paralarvae and cephalopods in the Gulf of Thailand (KU) - Some biological aspects for elasmobranch in Gulf of Thailand (SEAFDEC & KU) - Distribution and abundance of parasite in bony fish in the Gulf of Thailand (BUU) -Genetic diversity and population genetic structure of three-banded mantis shrimp <i>Miyakella nepa</i> caught by trawl nets fisheries in the Gulf of Thailand (BUU/C) - Distribution of bottom plastic debris in the Gulf of Thailand (BUU/C & SEAFDEC) - Investigation of stock of marine debris in Gulf of Thailand (KU) 	<ul style="list-style-type: none"> -Sorting for marine debris and marine organisms Marine debris -Specimens for debris will be dried and kept into the bag for weighing at BUU Marine organisms -Identify at species level -Sampling and length-weight measuring -Specimens for microplastics will be kept into a freezer for analyzing at CU -Specimens for mercury will be kept into a freezer for analyzing at CU -Specimens for radiation will be kept into a freezer for analyzing at OAP -Specimens for cephalopod will be kept into a freezer for identifying at KU -Specimens for elasmobranch will be kept into a freezer for aging study and identifying parasite at SEAFDEC -Specimens for parasite in bony fish will be kept into a freezer for identifying parasite at BUU -Specimens for DNA of mantis shrimp <i>Miyakella nepa</i> will be kept into a freezer for analyzing at BUU
Bongo net / SEAFDEC	<ul style="list-style-type: none"> -Species and distribution of paralarvae and cephalopods in the Gulf of Thailand (KU) (330um) - Composition and distribution of fish larvae in the Gulf of Thailand (DoF & SEAFDEC & KU & CU) (330 + 500um) - Fish larvae distribution of Scombridae and Engraulidae in the Gulf Thailand (DoF & SEAFDEC & KU & CU) (330+500um) 	<ul style="list-style-type: none"> -Transfer sample into plastic container and preserve with 10% buffered formalin -Specimens will be transferred to SEAFDEC for further arrangement, fish larvae will be identified by SEAFDEC and DoF Thailand and paralarvae will be identified by KU -Shrimp <i>Check with responsible researcher</i>



Sampling gear	Relevant research topic	Sample Handling Procedure
Neuston Net / SEAFDEC (1+1 times)	<ul style="list-style-type: none"> - Composition and distribution of fish larvae in the Gulf of Thailand (DoF & SEAFDEC & KU & CU) - Fish larvae distribution of Scombridae and Engraulidae in the Gulf of Thailand (DoF & SEAFDEC & KU & CU) -Investigation of stock of marine debris in Gulf of Thailand(KU) -Attached living organism on floating garbage in Thai Waters (CU) -Microplastics accumulations in fish, sediment, and seawater 	<p>1st Neuston net operation</p> <ul style="list-style-type: none"> -Remove all marine debris from the Neuston net <p>Marine debris</p> <ul style="list-style-type: none"> -Take photograph of marine debris and shaken in filtered seawater -Filter seawater by 20 um mesh filter and preserve in 2% formalin/ specimen will be transferred to CU for identifying attached living organisms -Marine debris will be dried and kept in a bag for weighing at KU
Neuston Net / SEAFDEC (1+1 times) (Cont.)		<p>Fish larvae</p> <ul style="list-style-type: none"> -Transfer seawater form inside Neuston net into plastic bottle and preserve with 10% buffered formalin -Seawater Specimen will be transferred to SEAFDEC for identifying fish larvae by SEAFDEC and DoF-Thailand <p>2nd Neuston net (only evening station)</p> <ul style="list-style-type: none"> -Transfer seawater from the Neuston net to a plastic bottle and keep in a freezer -Specimen will be transferred to CU for analyzing the micro-plastic
CTD with Rosette / SEAFDEC	<ul style="list-style-type: none"> -Water column condition and near-bottom water hypoxia in the Gulf of Thailand (BUU & SEAFDEC) - Geostrophic current in the Gulf of Thailand (CU) - Three dimensional circulation in the Gulf of Thailand during southwest monsoon (CU) - Water and material exchanges at the mouth of the Gulf of Thailand - Relationship between Chlorophyll-a concentration, primary production of the Gulf of Thailand and ocean color from remote sensing (CU) - Distribution of Total Organic Matter in marine sediments of the Gulf of Thailand (KU) 	<p>-All water sample collected by rosette will be responsible by <i>Dr. Penjai Sompongchaiyakul</i> in order to study as follows;</p> <ul style="list-style-type: none"> - Microbiome -DO (on board) -Alkalinity (on board) <ul style="list-style-type: none"> -Dissolved Inorganic nutrient (on board) -Suspended solid -Dissolved organic nutrient



Sampling gear	Relevant research topic	Sample Handling Procedure
CTD with Rosette / SEAFDEC (Cont.)	<ul style="list-style-type: none"> - Mercury and arsenic in seawater (CU) - Carbon dioxide flux and primary productivity in The Gulf of Thailand Nutrient and nutrient pool in seawater (CU) - Collection of hydrographic in-situ data for validation in the Gulf of Thailand to compare with multi-satellite and model products (Japan) - Microbiome composition and function in seawater (CU) - Biomass Estimation by hydro-acoustic method in the Gulf of Thailand (KU) - Relationship between Chlorophyll-a concentration, primary production of the Gulf of Thailand and ocean color from remote sensing (CU) -Carbon dioxide flux and primary productivity in the Gulf of Thailand nutrient and nutrient pool in seawater (CU) 	-Particulate nutrient
PRR 2600 / SEAFDEC	-Inherent properties of sea water in the Gulf of Thailand (KU)	-PRR data will be transferred to KU
Dropped Bottle / DMCR	- Total Petroleum Hydrocarbons (TPHs) in surface seawater (as chrysene) (DMCR) (3L)	-Sample will be kept in a brown glass bottle and transferred to DMCR for analyzing TPHs
Zooplankton net / BUU	- Zooplankton diversity in the Gulf of Thailand (BUU & CU)	-Preserve sample in 10% buffer formalin and transfer to BUU and/or CU for identifying zooplankton
Vandorn / DoF Thailand	- Density and diversity of phytoplankton in the Gulf of Thailand (DoF, KU) (at chlorophyll max layer)	-Filter 40 L of water sample by 20 um mesh and preserve by XXX % buffered formalin and transfer to KU and/or DoF-Thailand for identification (Check concentration with responsible researchers)
Smith McIntyre / SEAFDEC (2+1 times)	<ul style="list-style-type: none"> - Diversity of benthic microcrustaceans and micromollusks in the gulf of Thailand -Investigation of stock of marine debris in Gulf of Thailand(KU) - Meiofauna abundance and distribution in surface sediment (CU) - Microbiome composition and function in sediment (CU) - Spatial sedimentology and source area composition of sediment in the Gulf of Thailand (CU) - Radiation dose and radiological risk assessment in marine biota and seafood consumers (OAP) (1kg) -Microplastics accumulations in fish, sediment, and seawater (SEAFDEC&CU) 	<p>1st Smith McIntyre operation</p> <p>-Specimen will be sieved and stirred slowly by sea water</p> <p>Marine debris</p> <p>-Remove marine debris and dry and keep in a bag and transfer to KU for weighing</p> <p>Benthos</p> <p>-Residual sediment remained on the sieve will be kept in the plastic container and preserve with10% formalin and transfer to KU</p>



Sampling gear	Relevant research topic	Sample Handling Procedure
Smith McIntyre / SEAFDEC (2+1 times) (Cont.)		<p>2nd Smith McIntyre operation</p> <p>Meiofauna -3 replicate will be sampled by plastic core tube and kept in the plastic bottle preserved with 4% formalin and stained in rose Bengal, transferring to CU for identifying Meiofauna</p> <p>Microbiome -50 to 2,500 g of sediment will be sampled and kept in a plastic zip-lock bag and stored at 4°C, transferring to CU for Microbiome study</p> <p>Sedimentology -500 g of sediment will be sampled and kept in plastic zip-lock and stored at 4°C, transferring to CU for spatial sedimentology</p> <p>3rd Smith McIntyre operation</p> <p>Micro-plastic -1 kg of sediment will be sampled and kept in plastic zip-lock bag and stored at -30 °C, transferring to CU for micro-plastic study</p> <p>Radiation -1 kg of sediment will be sampled and dried at room temperature then kept it a plastic container and transferred to OAP for radiation study</p>
Box Core / SEAFDEC	<ul style="list-style-type: none"> - Distribution of Total Organic Matter in marine sediments of the Gulf of Thailand (KU) - Flux of nutrient and nutrient pool in sediment (CU) - Mercury and trace elements contamination in the surface sediment (CU) - Petroleum hydrocarbon (as chrysene) and polycyclic aromatic hydrocarbon (PAHs) (CU) 	<p>-4 tubes will inserted into box core for sampling sediment profile</p> <p>- First tube of sediment profile will be vertically cut into 10 cm thickness ranges as 0-0.5,0.5-1,1-2,2-3,3-4,4-5,5-6,6-7,7-8,8-9,9-10. All specimens will be recorded on size, color, composition and smell. Then, keep in a zip-lock bag and stored at -40°C, transferring to KU for study on TOM.</p>



Sampling gear	Relevant research topic	Sample Handling Procedure
Box Core / SEAFDEC (Cont.)		<ul style="list-style-type: none"> - Second tube of sediment profile will be cut sub-section and kept frozen to bring back for grain size, readily oxidizable organic matter, total organic carbon, carbonate content, mercury and trace metals analysis at CU's laboratory - Third tube of sediment profile will be analyzed as follows; <ul style="list-style-type: none"> > Electrochemical technique > Pore water squeezing onboard and analysis for nutrients on-board > After pore water extraction, sub-section and kept frozen to bring back for nutrient analysis at CU's laboratory - Fourth tube of sediment profile will be cut sub-section and kept frozen to bring back for petroleum and PAHs analysis at CU's laboratory
Gravity Core / SEAFDEC (2-3 stations per leg)	<ul style="list-style-type: none"> - Sedimentary properties and sedimentation rate of sediment in the Gulf of Thailand (CU) - Temporal distribution of mercury and trace metals in sediment (CU) 	<ul style="list-style-type: none"> - Remove inner tube, cap at top and bottom. The specimen will be kept in a freezer and transferred to CU for sediment properties, sedimentation rate, mercury and trace metal studies.
Lawrence structure scan/ SEAFDEC	<ul style="list-style-type: none"> - Integrates low-cost sonar imagery and GIS to Map underwater habitat 	<ul style="list-style-type: none"> - Data recorded as 3-4 knots speed of vessel with GPS operation by zigzag track for 10 minutes at each station.
Bucket surface	<ul style="list-style-type: none"> - Relationship between Chlorophyll-a concentration of the Gulf of Thailand and ocean color from remote sensing (BUU/C & SEAFDEC) - Inherent properties of sea water in Gulf of Thailand (KU) - Radiation dose and radiological risk assessment in Marine biota and seafood consumers (OAP) - Density and diversity of phytoplankton in the Gulf of Thailand (DoF, KU) (at surface layer) 	<ul style="list-style-type: none"> Sea surface sampling will be collected for measuring as follows; <ul style="list-style-type: none"> - Filter (GFF) 1-10L for chlorophyll-a analysis done by CU and BUU - Filter (GFF) 0.5-2L for absorption of particle analysis done by KU - Filter (0.2 um) 0.3L for colored dissolved organic matter analysis done by KU - Filter (0.2um) 0.5-1L for total suspended matter analysis done by KU - 5L of sea water will be dried to 1L for Gamma Spectrometry analysis done by OAP - Filter (5B) 20L for Cs-137 analysis done by OAP - Filter 40 L of water sample by 20 um mesh and preserve by ???% buffered formalin and transfer to KU and/or DoF-Thailand for identification



Sampling gear	Relevant research topic	Sample Handling Procedure
Scientific echo-sounder, TSG, high volume air samplers and NaI detectors		Continuous recording

Acronyms:

BU: Burapha University; CU: Chulalongkorn University; CMU: Chiang Mai University; DMCR: Department of Marine and Coastal Resources, Thailand; DoF: Department of Fisheries, Thailand; FiA Cambodia: Fisheries Administration, Cambodia; HU: Hokkaido University; KU: Kasetsart University; OAP: Office of Atoms for Peace; PSU: Prince of Songkla University; RIMF: Research Institute of Marine Fisheries, Viet Nam; URU: Ubon Ratchathani University



Annex 6: Update List and Title of Research Topic

Original Title	Update Title
Fisheries Resources	
1) Some Biological Data of Pelagic and Demersal Fish in the Gulf of Thailand by Using Bottom Trawl	1) Fisheries Resource Survey and Some biological data of pelagic and demersal fish in the Gulf of Thailand by using bottom trawl
2) Demersal Fish Survey Using Hydro-acoustic Instrument	Cancelled
3) Demersal Fisheries Resources Survey in Viet Nam EEZ	Cancelled
4) Small pelagic Resource Survey by hydro-acoustic Instrument, i.e. Scientific Echo-sounder Simrad EK-60	Cancelled
5) Biomass Estimation by Hydro-acoustic Method in the Gulf of Thailand	Cancelled
6) Marine Species Identification	2) Marine Species Identification
Environment (Physical)	
7) Water Column Condition and Near-Bottom Water Hypoxia in the Gulf of Thailand	3) Water Column Conditions in the Gulf of Thailand during 17 Aug - 11 Oct 2018
	4) Water circulation in the Gulf of Thailand (GoT) and water exchange with the South China Sea
8) Residual Current from Ship ADCP	Cancelled
9) Geostrophic Current in the Gulf of Thailand	5) Geostrophic current and 3-D circulation in the Gulf of Thailand
10) Three Dimensional Circulation in the Gulf of Thailand During Southwest Monsoon	
11) Water and Material Exchanges at the Mouth of the Gulf of Thailand	6) Water and material exchanges at the mouth of the Gulf of Thailand
12) Relationship Between Chlorophyll- <i>a</i> Concentration in the Gulf of Thailand and Ocean Color from Remote Sensing	7) Relationship between Chlorophyll- <i>a</i> concentration of the Gulf of Thailand and ocean color from remote sensing
13) Inherent Properties of Sea Water in Gulf of Thailand	8) Inherent Properties of Sea Water in Gulf of Thailand
14) Sedimentary Properties and Sedimentation Rate of Sediment in the Gulf of Thailand	9) Sedimentary properties and sedimentation rate of sediment in the Gulf of Thailand
15) Temporal Distribution of Mercury and Trace Metals in Sediment	10) Temporal distribution of mercury and trace metals in sediment
16) Integrates Low-cost Sonar Imagery and GIS to Map Underwater Habitat	11) Mapping of underwater habitat from low-cost sonar imagery and GIS
Environment (Chemical)	
17) Microplastics Accumulations in Fish, Sediment, and Seawater	12) Microplastics Accumulations in Fish, Sediment, and Seawater
18) Distribution of Total Organic Matter in Marine Sediments of the Gulf of Thailand	13) Distribution of Total Organic Matter in Marine Sediments of the Gulf of Thailand
19) Mercury and Arsenic in Seawater	Cancelled
20) Flux of Nutrient and Nutrient Pool in Sediment	14) Nutrient and nutrient pool in seawater of Gulf of Thailand



Original Title	Update Title
21) Iron-sulfer-phosphorus Cycling	Cancelled
22) Mercury and Trace Elements Contamination in the Surface Sediment	15) Mercury and Trace Elements Contamination in the Surface Sediment
23) Spatial Sedimentology and Source Area Composition of Sediment in the Gulf of Thailand	16) Spatial Sedimentology and Source Area Composition of Sediment in the Gulf of Thailand
24) Petroleum Hydrocarbon (as chrysene) and Polycyclic Aromatic Hydrocarbon (PAHs)	17) Petroleum hydrocarbon (as chrysene) and Polycyclic Aromatic Hydrocarbon (PAHs)
25) Total Petroleum Hydrocarbons (TPHs) in Surface Seawater (as chrysene)	18) Total Petroleum Hydrocarbons (TPHs) in Surface Seawater
26) Mercury Accumulation in Tissues and Risk Assessment for Consumption	19) Mercury accumulation in tissues and risk assessment for consumption
27) Radiation Dose and Radiological Risk Assessment in Marine Biota and Seafood Consumers	20) Radiation Dose and Radiological Risk Assessment in Marine Biota from the Gulf of Thailand and in Seafood Consumers
28) Carbon Dioxide Flux and Primary Productivity in The Gulf of Thailand Nutrient and Nutrient Pool in Seawater	21) Sources and Sink of CO ₂ in the Gulf of Thailand
29) Collection of Hydrographic In-situ Data for Validation in the Gulf of Thailand to Compare with Multi-satellite and Model Products	Cancelled
Environment (Biological Oceanography)	
30) Zooplankton Diversity in the Gulf of Thailand	22) Zooplankton Diversity in the Gulf of Thailand
31) Density and Diversity of Phytoplankton in the Gulf of Thailand	23) Density and diversity of phytoplankton in the Gulf of Thailand
32) Species and Distribution of Palalarvae and Cephalopods in the Gulf of Thailand	24) Species and Distribution of Palalarvae and Cephalopods in the Gulf of Thailand
33) Composition and Distribution of Fish Larvae in the Gulf of Thailand	25) Composition and distribution of fish larvae in the Gulf of Thailand
34) Fish larvae Distribution of Scombridae and Engrulidae in the Gulf of Thailand	26) Fish larvae distribution of Scombridae and Engraulidae in the Gulf Thailand
35) Some Biological Aspects for Elasmobranch in Gulf of Thailand	27) Age structure of Brownbanded bamboo shark (<i>Chiloscyllium punctatum</i>) in the Gulf of Thailand
	28) Food Selective and Preference of Brownbanded Bamboo Shark (<i>Chiloscyllium punctatum</i>) in the Gulf of Thailand
	29) Structure of Demersal Fish Assemblages in the Gulf of Thailand and Their Stress Condition
36) Distribution and Abundance of Parasite in Bony fish in the Gulf of Thailand	30) Parasites in Marine Fish
	31) Distribution and Abundance of Parasite of <i>Chiloscyllium punctatum</i> in the Gulf of Thailand
37) Diversity of Benthic Microcrustaceans and Micromollusks in the Gulf of Thailand	32) Diversity of Benthic Microcrustaceans and Micromollusks in the Gulf of Thailand
	33) Macrofuana in the Gulf of Thailand
38) Meiofauna Abundance and Distribution in Surface Sediment	34) Meiofauna Abundance and Distribution in Surface Sediment



Original Title	Update Title
39) Microbiome Composition and Function in Sediment	35) Microbiome Composition and Function in Sediment
40) Microbiome Composition and Function in Seawater	36) Microbiome Composition and Function in Seawater
41) Attached Living Organism on Floating Garbage in Thai Waters	37) Attached Living Organism on Floating Garbage in Thai Waters
42) Genetic Diversity and Population Genetic Structure of Three-Banded Mantis Shrimp <i>Miyakellanea</i> Caught by Trawl Nets Fisheries in the Gulf of Thailand	38) Genetic Diversity and Population Genetic Structure of Three-Banded Mantis Shrimp <i>Miyakella nepa</i> caught by Trawl Nets Fisheries in the Gulf of Thailand
Environment (others)	
43) Distribution of Bottom Plastic Debris in the Gulf of Thailand	39) Distribution of Bottom Plastic Debris in the Gulf of Thailand
44) Investigation of Stock of Marine Debris in Gulf of Thailand	Cancelled
Meteorology	
45) Composition and Potential Source of Aerosol	40) Composition and Potential Source of Aerosol


Annex 7: Check list of collected samples (as of 8 January 2019)

The Collaborative Research Survey on Marine Fisheries Research and Marine Environment in the Gulf of Thailand 2019 by M.V. SEAFDEC 2, carried out during 17 August to 18 October 2018

Note: The indicated number of collected samples and stations are the preliminary information and will be updated in the next follow up meeting.

Institution/Organization	Research Topics	Responsible Researchers	Collected samples	Stations
Burapha University, Chantaburi Campus	1) Distribution of bottom plastic debris in the Gulf of Thailand	Ms. Penchan Laongmanee	856 pcs of plastic debris	71
	2) Genetic Diversity and Population Genetic Structure of Three-Banded Mantis Shrimp <i>Miyakella nepa</i> caught by Trawl Nets Fisheries in the Gulf of Thailand	Dr. Rachanimuk Hiransuchalerta, Ms. Penchan Laongmanee, Dr. Wirote Laongmanee, Ms. Anyalak Wachirachaikarn, Ms. Patchari Yocawibun Mr. Narongsak Puangla	79 samples of mantis shrimp	71
	3) Parasites in Marine Fish	Dr. Molruedee Sonthi, Ms. Penchan Laongmanee Dr. Worrawit Maneepitaksanti Dr. Supanee Leethochawalit	5 fish from each species were examined	73 (21 stations have been completed)
	4) Mapping of underwater habitat from low-cost sonar imagery and GIS	Dr. Wirote Laongmanee	N.A.	N.A.
	5) Relationship Between Chlorophyll- <i>a</i> Concentration in the Gulf of Thailand and Ocean Color from Remote Sensing	Dr. Wirote Laongmanee Ms. Penchan Laongmanee Dr. Prasarn Intacharoen Ms. Siriporn Pangsorn Dr. Penjai Sompongchaiyakul	N.A.	N.A.
Burapha University, Chonburi Campus	6) Water Column Conditions in the Gulf of Thailand	Dr. Anukul Buranapratheprat Mr. Sakda Arbsuwan Mr. Sukchai Arnupapboon, Ms. Pontipa Luadnakrob	N.A.	N.A.
	7) Water Stratification near the GoT mouth, DO along the main GoT axis	Dr. Anukul Buranapratheprat Mr. Sakda Arbsuwan Mr. Sukchai Arnupapboon, Ms. Pontipa Luadnakrob	N.A.	N.A.



Institution/Organization	Research Topics	Responsible Researchers	Collected samples	Stations
Chulalongkorn University	8) Geostrophic current and 3 D circulation in the Gulf of Thailand	Dr. Suriyan Saramul Dr. Patama Singhruck Dr. Pramot Sojisuporn	To be identified in the laboratory	N.A.
	9) Water and material exchanges at the mouth of the Gulf of Thailand	Dr. Pramot Sojisuporn Dr. Suriyan Saramul Dr. Patama Singhruck	To be identified in the laboratory	N.A.
	10) Sedimentary properties and sedimentation rate of sediment in the Gulf of Thailand	Dr. Penjai Sompongchaiyakul Dr. Supitcha Chanyotha Dr. Nares Chankow Dr. Yuttana Tumnoi Dr. Sujaree Bureekul	To be identified in the laboratory	N.A.
	11) Temporal distribution of mercury and trace metals in sediment	Dr. Penjai Sompongchaiyakul Dr. Sujaree Bureekul	To be identified in the laboratory	N.A.
	12) Mercury and trace elements contamination in the surface sediment	Dr. Penjai Sompongchaiyakul Dr. Sujaree Bureekul	To be identified in the laboratory	N.A.
	13) Mercury accumulation in tissues and risk assessment for consumption	Dr. Penjai Sompongchaiyakul Dr. Sujaree Bureekul Ms. Tasawan Khawsejan Mr. Somchai Vibunpant Ms. Thitiporn Suppanirun Mr. Patinya Sreesamran	No sample from station 20 and 50 (bottom trawl cancelled)	N.A.
	14) Spatial sedimentology and source area composition of sediment in the Gulf of Thailand	Dr. Penjai Sompongchaiyakul Dr. Sujaree Bureekul	To be identified in the laboratory	N.A.



Institution/Organization	Research Topics	Responsible Researchers	Collected samples	Stations
Chulalongkorn University	15) Petroleum hydrocarbon (as chrysene) and polycyclic aromatic hydrocarbon (PAHs) in sediment	Dr. Penjai Sompongchaiyakul Dr. Sujaree Bureekul Dr. Danai Tipmanee	To be identified in the laboratory	N.A.
	16) Source and sink of CO ₂ in Gulf of Thailand	Dr. Penjai Sompongchaiyakul Dr. Sujaree Bureekul Mr. Ly Kunthy	To be identified in the laboratory	N.A.
	17) Nutrient and nutrient pool in seawater of Gulf of Thailand	Dr. Penjai Sompongchaiyakul Dr. Sujaree Bureekul Mr. Ly Kunthy	To be identified in the laboratory	N.A.
	18) Zooplankton Diversity in the Gulf of Thailand	Dr. Vichaya Gunbua Dr. Itchika Sivaipram Dr. Porntep Pannarak	To be identified in the laboratory	N.A.
	19) Meiofauna abundance and distribution in surface sediment	Dr. Itchika Sivaipram	To be identified in the laboratory	N.A.
	20) Microbiome composition and function in sediment	Dr. Onruthai Pinyakong Dr. Penjai Sompongchaiyakul	To be identified in the laboratory	N.A.
	21) Microbiome composition and function in seawater	Dr. Onruthai Pinyakong Dr. Penjai Sompongchaiyakul	To be identified in the laboratory	N.A.
	22) Attached living organism on floating garbage in Thai waters	Dr. Thaithaworn Lirdwitayaprasit Dr. Kornrawee Aiemsomboon	To be identified in the laboratory	N.A.
Chulalongkorn University	23) Composition and potential source of aerosol	Dr. Sujaree Bureekul Dr. Penjai Sompongchaiyakul Dr. Wirote Laongmanee	6 aerosol samples (24-hour collection) were collected while sailing (1-2 sample for each leg) Sun photometer measurement data (every hour) by BU team	



Institution/Organization	Research Topics	Responsible Researchers	Collected samples	Stations
Department of Marine and Coastal Resources	24) Total Petroleum Hydrocarbons (TPHs) in surface seawater	Ms. Suthida Kan-atireklap Dr. Supawat Kan-atireklap	3 L of seawater sample of each station collected, 146 seawater samples from 73 stations were collected from gulf of Thailand and Cambodia waters	73
			58 seawater samples from 29 stations (1-29) were extracted and waiting for analyzed by Fluorescence spectrometer	29
Department of Fisheries, Thailand	25) Composition and distribution of fish larvae in the Gulf of Thailand	Mrs. Niracha Songkaew Mrs. Piyawan Hussadee Mr. Patinya Srisumran Mr. Somkiet Ketnarai Dr. Teerapong Duangdee Mr. Rakkiet Punsri Dr. Kornrawee Aeumsomboon	1. Bongo net with 330 and 500 µm mesh size net attached with a flow meter, Total number of sample from bongo net: 146 samples - Gulf of Thailand 98 samples - Cambodian Water 48 samples 2. Neuston net with 1,000 µm mesh size net attached with a flow meter, Total number of sample from neuston net: 73 samples. - Gulf of Thailand 49 samples - Cambodian Waters 24 samples	73



Institution/Organization	Research Topics	Responsible Researchers	Collected samples	Stations
Department of Fisheries, Thailand	26) Fish larvae distribution of Scombridae and Engraulidae in the Gulf Thailand	Mrs. Niracha Songkaew Mrs. Piyawan Hussadee Mr. Patinya Srisumran Mr. Somkiet Ketnarai Dr. Teerapong Duangdee Mr. Rakkiet Punsri Dr. Kornrawee Aeumsomboon	1. Bongo net with 330 and 500 µm mesh size net attached with a flow meter, Total number of sample from bongo net: 146 samples - Gulf of Thailand 98 samples - Cambodian Waters 48 samples 2. Neuston net with 1,000 µm mesh size net attached with a flow meter, Total number of sample from neuston net: 73 samples. - Gulf of Thailand 49 samples - Cambodian Water 24 samples	73
	27) Fisheries Resource Survey and Some biological data of pelagic and demersal fish in the Gulf of Thailand by using bottom trawl	Mr. Sichon Hoimuk Mr. Sakol Pheaphabrattana Mr. Worrakit Lerdprasert Mr. Kwanchai Pankaew Mr. Chalermchart Arunrojprapai Mr. Prapat Keawmanee Mr. Kritsada Tongvila Dr. Pavarot Noranarttragoon	71 trawl operations	73
Kasetsart University (Faculty of Fisheries)	28) Inherent Properties of Sea Water in Gulf of Thailand	Dr. Jitraporn Phaksopa Ms. Jutarak Luang-on Mr. Sukchai Arnupapboon	CDOM 145 samples, APH 73 samples, TSS 145 samples	N.A.



Institution/Organization	Research Topics	Responsible Researchers	Collected samples	Stations
Kasetsart University (Faculty of Fisheries)	29) Species and Distribution of Palalarvae and Cephalopods in the Gulf of Thailand	Dr. Charuay Sukhsangchan (KU) Ms. Sonthaya Phuynoi (KU)	4 Family 10 Genus and 16 species, 1) Family Loliginidae 1. <i>Uroteuthis (Photololigo) chinensis</i> (N=492) 2. <i>U. duvaucelii</i> (N=2,353) All station collected 3. <i>Sepioteuthis lessoniana</i> (N=45) 4. <i>Loliolus</i> sp. (861) 2) Family Sepiolidae 5. <i>Sepiola</i> sp. (N=14) 3) Family Sepiidae 6. <i>Sepia aculeata</i> (N=165) 7. <i>S. recurvirostra</i> (N=179) 8. <i>S. pharaonis</i> (N=2) Station 9 9. <i>S. brevimana</i> (N=517) 10. <i>S. kobeensis</i> (N=81) 11. <i>Sepiella inermis</i> (N=2) Station 33 12. <i>Metasepia</i> sp. (N=3) Station 46, 62, 63 4) Family Octopodidae 13. <i>Amphioctopus aegina</i> (N=26) 14. <i>A. neglectus</i> (N=119) 15. <i>Hapalochlaena maculosa</i> (N=1) Station 6 16. <i>Cistopus indicus</i> (N=2) Station 30-31	73



Institution/Organization	Research Topics	Responsible Researchers	Collected samples	Stations
Kasetsart University (Faculty of Fisheries)	30) Distribution of Total Organic Matter in Marine Sediments of the Gulf of Thailand	Dr. Shettapong Meksumpun Mr.Songpao Samachchanon Mr. Nattaworn Kantikul Ms. Pontipa Luadnakrob	N.A.	72
	31) Density and diversity of phytoplankton in the Gulf of Thailand	Dr. Shettapong Meksumpun Ms.Nissara Thawonsode Ms.On-ing Veschasit Ms.Nirucha Udomwongyont Mr.Sukchai Arnupapboon	N.A.	73
	32) Water circulation in the Gulf of Thailand(GoT) and water exchange with the South China Sea	Dr. Monton Anongponyoskun Dr. Minobu Higuchi Dr. Jitraporn Phaksopa Dr. Hiroji Onishi Dr. Siriporn Phangsong	N.A.	N.A.
Kasetsart University (Faculty of Science)	33) Macrofuana in the Gulf of Thailand	Dr. Koraon Wongkamhaeng Dr. Pongrat Dumrongrojwattana Dr. Itchika Sivaipram Dr. Kornrawee Aeumsomboon	72 samples	72
	34) Diversity of benthic microcrustaceans and micromollusks in the Gulf of Thailand	Dr. Koraon Wongkamhaeng Dr. Pongrat Dumrongrojwattana Dr. Itchika Sivaipram Dr. Kornrawee Aeumsomboon	72 samples	72
Office of Atoms for Peace	35) Radiation Dose and Radiological Risk Assessment in Marine Biota from the Gulf of Thailand and in Seafood Consumers	Dr.Yutthana Tumnoi	40 Seawater samples 72 Sediment samples 69 Fish specimens N/A Gamma radiation dose rate (uSv/hr)	40 72 69 N/A



Institution/Organization	Research Topics	Responsible Researchers	Collected samples	Stations
SEAFDEC	Combination of research works	Mr. Sukchai Arnupapboon		
	Brownbanded bamboo shark (<i>Chiloscyllium punctatum</i>)		56 specimens (males 33, females 23)	23
	Microplastics - Fish samples - Sediment samples		N.A.	N.A.
	Fish larvae		N.A.	N.A.
	Water sample		37	N.A.



Annex 8: List of Research Topic and Contact Researchers of the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand 2018 (Updated and revised as of 18 January 2019)

No.	Title	Researcher	Phone	Email Address
1	Fisheries Resource Survey and Some biological data of pelagic and demersal fish in the Gulf of Thailand by using bottom trawl	Mr. Sichon Hoimuk (DoF Thailand) Mr. Sakol Pheaphabrattana (DoF Thailand) Mr. Worrakit Lerdprasert (DoF Thailand) Mr. Kwanchai Pankaew (DoF Thailand) Mr. Chalermchart Arunrojprapai (DoF Thailand) Mr. Prapat Keawmanee (DoF Thailand) Mr. Kritsada Tongsil (DoF Thailand) Dr. Pavarot Noranarttragoon (DoF Thailand)	085-496-4559	pavarotn@gmail.com
2	Marine Species Identification	Mr. Suy Serywath (Waiting for the list of Thai Team)		serywath@gmail.com
3	Water Column Conditions in the Gulf of Thailand during 17 Aug - 11 Oct 2018	Dr. Anukul Buranapratheprat (BU) Mr. Sakda Arbsuwan (DoF Thailand) Mr. Sukchai Arnupapboon (SEAFDEC) Ms. Pontipa Luadnakrob (SEAFDEC)	086-159-4567 081-658-5926 089-167-1742	anukul@buu.ac.th sakdaarbsuwan@gmail.com sukchai@seafdec.org tipa@seafdec.org
4	Geostrophic current and 3-D circulation in the Gulf of Thailand	Dr. Suriyan Saramul (CU) Dr. Patama Singhruck (CU) Dr. Pramot Sojisuporn (CU)	094-498-5894 084-322-1024 089-699-9963	
5	Water and material exchanges at the mouth of the Gulf of Thailand	Dr. Pramot Sojisuporn (CU) Dr. Suriyan Saramul (CU) Dr. Patama Singhruck (CU)	089-699-9963 094-498-5894 084-322-1024	
6	Relationship between Chlorophyll- <i>a</i> concentration of the Gulf of Thailand and ocean color from remote sensing	Dr. Wirote Laongmanee (BU) Ms. Penchan Laongmanee (BU) Dr. Prasarn Intacharoen (BU) Ms. Siriporn Pangsorn (SEAFDEC) Dr. Penjai Sompongchaiyakul (CU)	086-776-0330 081-494-9580 089-204-5069 085-099-3039	wirotela@gmail.com penchan@gmail.com psiriporn@seafdec.org spenjai@hotmail.com
7	Inherent Properties of Sea Water in Gulf of Thailand	Dr. Jitraporn Phaksopa (KU) Ms. Jutarak Luang-on (NU) Mr. Sukchai Arnupapboon (SEAFDEC)	099-320-7766 081-658-5926	jitraporn133@gmail.com sukchai@seafdec.org



No.	Title	Researcher	Phone	Email Address
8	Sedimentary properties and sedimentation rate of sediment in the Gulf of Thailand	Dr. Penjai Sompongchaiyakul (CU) Dr. Supitcha Chanyotha (CU) Dr. Nares Chankow (CU) Dr. Yuttana Toomnoi (OAP) Dr. Sujaree Bureeku (CU)	085-099-3039 081-697-4481 061-709-2929	spenjai@hotmail.com tommynoi@yahoo.com bsujaree@gmail.com
9	Temporal distribution of mercury and trace metals in sediment	Dr. Penjai Sompongchaiyakul (CU) Dr. Sujaree Bureeku (CU)	085-099-3039 061-709-2929	spenjai@hotmail.com bsujaree@gmail.com
10	Mapping of underwater habitat from low-cost sonar imagery and GIS	Dr. Wirote Laongmanee (BUU) Ms. Penchan Laongmanee (BU) Ms. Siriporn Pangsong (SEAFDEC)	086-776-0330 081-494-9580 089-204-5069	wirotela@gmail.com penchan@gmail.com psiriporn@seafdec.org
11	Microplastics Accumulations in Fish, Sediment, and Seawater	Dr. Voranop Viyakarn (CU) Ms. Pontipa Luadnakrob (SEAFDEC) Dr. Suchana Chavanich (CU)	089-772-9090 089-167-1742 081-811-2700	Voranop.V@chula.ac.th tipa@seafdec.org Suchana.C@chula.ac.th
12	Distribution of Total Organic Matter in Marine Sediments of the Gulf of Thailand	Dr. Shettapong Meksumpun (KU) Mr. Songpao Samachchanon (KU) Mr. Nattaworn Kantikul (KU) Ms. Thanchanok Jindasre (KU)	085-446-1459 089-167-1742	samuchchanon@gmail.com tipa@seafdec.org
13	Mercury and trace elements contamination in the surface sediment	Dr. Penjai Sompongchaiyakul (CU) Dr. Sujaree Bureeku (CU)	085-099-3039 061-709-2929	spenjai@hotmail.com bsujaree@gmail.com
14	Spatial sedimentology and source area composition of sediment in the Gulf of Thailand	Dr. Penjai Sompongchaiyakul (CU) Dr. Sujaree Bureeku (CU)	085-099-3039 061-709-2929	spenjai@hotmail.com bsujaree@gmail.com
15	Petroleum hydrocarbon (as chrysene) and polycyclic aromatic hydrocarbon (PAHs)	Dr. Penjai Sompongchaiyakul (CU) Dr. Sujaree Bureeku (CU) Dr. Danai Tipmanee (PSU, Phuket)	085-099-3039 061-709-2929	spenjai@hotmail.com bsujaree@gmail.com
16	Total Petroleum Hydrocarbons (TPHs) in surface seawater	Ms. Suthida Kan-atireklap Dr. Supawat Kan-atireklap (DMCR)	086-151-3809 038-661-693	cartoonjumping@gmail.com supawat_kan@yahoo.com
17	Mercury accumulation in tissues and risk assessment for consumption	Dr. Penjai Sompongchaiyakul (CU) Dr. Sujaree Bureeku (CU) Ms. Tasawan Khawsejan (DoF Thailand) Mr. Somchai Vibunpant (DoF Thailand) Ms. Thitiporn Suppanirun (DoF Thailand) Mr. Patinya Sreesamran (DoF Thailand) Mr. Sakol Pheaphabrattana (DoF Thailand)	085-099-3039 061-709-2929	spenjai@hotmail.com bsujaree@gmail.com tasawan1907@gmail.com



No.	Title	Researcher	Phone	Email Address
18	Radiation Dose and Radiological Risk Assessment in Marine Biota from the Gulf of Thailand and in Seafood Consumers	Dr. Yutthana Tumnoi (OAP) Dr. Suputra Visetpotjanakit (OAP) Ms. Darunwan Chuenbubpar (OAP) Ms. Prannicha Hongpitakpong (OAP) Mrs. Natchakan Nakkaew (OAP) Mr. Chitsanupong Khrautongkieo (OAP)	081-697-4481, 02-579-5230	tommynoi@yahoo.com
19	Sources and sink of CO ₂ in the Gulf of Thailand	Dr. Penjai Sompongchaiyakul (CU) Dr. Sujaree Bureekul (CU) Mr. Ly Kunthy (FiA-Cambodia)	085-099-3039 061-709-2929	spenjai@hotmail.com bsujaree@gmail.com kunthyly88@gmail.com
20	Nutrient and nutrient pool in seawater of Gulf of Thailand	Dr. Penjai Sompongchaiyakul (CU) Dr. Sujaree Bureekul (CU) Mr. Ly Kunthy (FiA-Cambodia)	085-099-3039 061-709-2929	spenjai@hotmail.com bsujaree@gmail.com kunthyly88@gmail.com
21	Water circulation in the Gulf of Thailand (GoT) and water exchange with the South China Sea	Dr. Minobu Higuchi (HU) Dr. Monton Anongponyoskun (KU) Dr. Hiroji Onishi (HU) Dr. Jitraporn Phaksopa (KU) Ms. Siriporn Pangsorn (SEAFDEC)	090-197-1030 099-320-7766 089-204-5069	fismta@ku.ac.th onishi@fish.hokudai.ac.jp jitraporn133@gmail.com psiriporn@seafdec.org
22	Zooplankton Diversity in the Gulf of Thailand	Dr. Vichaya Gunbua (BU) Dr. Itchika Sivaipram (CU) Dr. Porntep Pannarak (CU)	089-602-2898 086-621-9458	vichaya@buu.ac.th itchika.s@chula.ac.th
23	Density and diversity of phytoplankton in the Gulf of Thailand	Dr. Shettapong Meksumpun (KU) Dr. Nissara Thawonsode (KU) Dr. On-ing Veschasit (KU) Ms. Nirucha Udomwongyont (DoF Thailand) Ms. Phornphisut Senpradit (KU)	086-689-5322 081-658-5926	sea_sand_sun_sky@hotmail.com nicha9@hotmail.com
24	Species and Distribution of Palalarvae and Cephalopods in the Gulf of Thailand	Dr. Charaay Sukhsangchan (KU) Ms. Sonthaya Phuynoi (KU) Ms. Nipa Kulanujaree (DoF Thailand)	081-554-4221 082-161-1374	charuay44@hotmail.com sonteyany@gmail.com nipadao@hotmail.com
25	Composition and distribution of fish larvae in the Gulf of Thailand	Mrs. Niracha Songkaew (DoF Thailand) Mrs. Piyawan Hussadee (DOF Thailand) Mr. Patinya Srisumran (DOF Thailand) Mr. Siwasak Kongchim (DoF Thailand) Dr. Teerapong Duangdee (KU)	089-198-6457	sniracha@gmail.com t.duangdee@gmail.com



No.	Title	Researcher	Phone	Email Address
		Mr. Rakkiet Punsri (SEAFDEC) Dr. Kornrawee Aeumsomboon (CU)	087-395-1685 083-941-6551	rakkiet@seafdec.org kornrawee.a@gmail.com
26	Fish larvae distribution of Scombridae and Engraulidae in the Gulf Thailand	Mrs. Niracha Songkaew (DoF Thailand) Mrs. Piyawan Hussadee (DoF Thailand) Mr. Patinya Srisumran (DoF Thailand) Mr. Siwasak Kongchim (DoF Thailand) Dr. Teerapong Duangdee (KU) Mr. Rakkiet Punsri (SEAFDEC) Dr. Kornrawee Aeumsomboon (CU)	089-198-6457 087-395-1685 083-941-6551	sniracha@gmail.com t.duangdee@gmail.com rakkiet@seafdec.org kornrawee.a@gmail.com
27	Age structure of Brownbanded bamboo shark (<i>Chiloscyllium punctatum</i>) in the Gulf of Thailand	Dr. Thanitha Darbanandana (KU) Dr. Thungtong Jutagate (URU) Dr. Sontaya Koolkalya (RBRU) Mr. Supapong Pattarapongpan (SEAFDEC) (Mr. Sukchai Arnupapboon (SEAFDEC) is the contact person but not included in the group of authors)		ffistnt@ku.ac.th tuantong.j@ubu.ac.th supapong@seafdec.org sukchai@seafdec.org
28	Food selective and preference of Brownbanded bamboo shark (<i>Chiloscyllium punctatum</i>) in the Gulf of Thailand	Dr. Thanitha Darbanandana (KU) Dr. Tuantong Jutagate (URU) Dr. Sontaya Koolkalya (RBRU) Mr. Supapong Pattarapongpan (SEAFDEC) (Mr. Sukchai Arnupapboon (SEAFDEC) is the contact person but not included in the group of authors)		ffistnt@ku.ac.th tuantong.j@ubu.ac.th supapong@seafdec.org sukchai@seafdec.org
29	Structure of demersal fish assemblages in the Gulf of Thailand and their stress condition	Dr. Thanitha Darbanandana (KU) Dr. Thungtong Jutagate (URU) Dr. Sontaya Koolkalya (Rambhai Barni Rajabhat University) Mr. Supapong Pattarapongpan (SEAFDEC) (Mr. Sukchai Arnupapboon (SEAFDEC) is the contact person but not included in the group of authors)		ffistnt@ku.ac.th tuantong.j@ubu.ac.th supapong@seafdec.org sukchai@seafdec.org
30	Distribution and Abundance of Parasite of <i>Chiloscyllium punctatum</i> in the Gulf of Thailand	Dr. Patcharee Khrukkhayan (KU)		



No.	Title	Researcher	Phone	Email Address
31	Parasites in Marine Fish	Dr. Molruedee Sonthi (BU) Ms. Penchan Laongmanee (BU) Dr. Worrawit Maneepitaksanti (CMU) Dr. Supanee Leethochawalit (BIM, BU)	086-156-9561 081-494-9580 080-813-4453 086-154-4235	mamsonthi@gmail.com penchan@gmail.com worawitmm.4453@gmail.com supanee@buu.ac.th
32	Macrofuana in the Gulf of Thailand (CU)	Dr. Koraon Wongkamhaeng (KU) Asst. Prof. Pongrat Dumrongrojwattana (BU) Dr. Itchika Sivaipram (CU) Dr. Kornrawee Aeumsomboon (CU)	089-679-4697 086-621-9458 083-941-6551	koraon@gmail.com Itchika.S@chula.ac.th kornrawee.a@gmail.com
33	Diversity of benthic microcrustaceans and micromollusks in the Gulf of Thailand	Dr. Koraon Wongkamhaeng (KU) Asst. Prof. Pongrat Dumrongrojwattana (BU) Dr. Itchika Sivaipram (CU) Dr. Kornrawee Aeumsomboon (CU)	089-679-4697 086-621-9458	koraon@gmail.com Itchika.S@chula.ac.th
34	Meiofauna abundance and distribution in surface sediment	Dr. Itchika Sivaipram (CU)	086-621-9458	Itchika.S@chula.ac.th
35	Microbiome composition and function in sediment	Dr. Onruthai Pinyakong (CU) Dr. Penjai Sompongchaiyakul (CU)	085-099-3039	spenjai@hotmail.com
36	Microbiome composition and function in seawater	Dr. Onruthai Pinyakong (CU) Dr. Penjai Sompongchaiyakul (CU)	085-099-3039	spenjai@hotmail.com
37	Attached living organism on floating garbage in Thai waters	Dr. Thaithaworn Lirdwitayaprasit (CU) Dr. Kornrawee Aiemsomboon (CU)	081-254-1383 083-941-6551	Thaithaworn.L@chula.ac.th kornrawee.a@gmail.com
38	Genetic Diversity and Population Genetic Structure of Three-Banded Mantis Shrimp <i>Miyakella nepa</i> caught by Trawl Nets Fisheries in the Gulf of Thailand	Dr. Rachanimuk Hirsansuchalert (BU) Ms. Penchan Laongmanee (BU) Dr. Wirote Laongmanee (BU) Dr. Anyalak Wachirachaikarn(CU) Ms. Patchari Yocawibun (CU)	086-905-1333 081-494-9580 086-776-0330	rachanimuk@buu.ac.th penchan@gmail.com wirotela@gmail.com
39	Distribution of bottom plastic debris in the Gulf of Thailand	Ms. Penchan Laongmanee (BU) Dr. Wirote Laongmanee (BU) Mr. Nakaret Yasook (SEAFDEC) Mr. Chalerm Phusririt (DoF Thailand) Dr. Tanuspong Pokavanich (KU)	081-494-9580 086-776-0330 093-584-9388 090-972-7129 062-546-1999	penchan@gmail.com wirotela@gmail.com nakaret@seafdec.org cpusririt2012@gmail.com pokavanich.t@gmail.com
40	Composition and potential source of aerosol (CU)	Dr. Sujaree Bureekul (CU) Dr. Penjai Sompongchaiyakul (CU) Dr. Wirote Laongmanee (BU)	061-709-2929 088-099-3039 086-776-0330	bsujaree@gmail.com spenjai@hotmail.com wirotela@gmail.com



Remarks: Contact researchers for the individual research topics in the list above are written in the **BOLD** text.

Acronyms:

Institute/Agency/University	Contact Person
BU: Burapha University, Thailand	Dr. Wirote Laongmanee (BU-Cholburi: BUU: Chantaburi)
BIM, BU: The Institute of Marine Science, Burapha University	Dr. Supanee Leethochawalit
CMU: Chiang Mai University, Thailand	Dr. Worrawit Maneepitaksanti
CU: Chulalongkorn University, Thailand	Dr. Penjai Sompongchaiyakul
DMCR: Department of Marine and Coastal Resources, Thailand	Dr. Supawat Kan-atireklap
DoF Thailand: Department of Fisheries, Thailand	Mr. Pavarat Noranarttragoon
FiA: Fisheries Administration, Cambodia	Mr. Suy Serywath
HU: Hokkaido University, Japan	HU: Dr. Hiroji Onishi
KU: Kasetsart University, Thailand	Dr. Jitraporn Phaksopa
NU: Nagoya University, Japan	Ms. Jutarak Luang-on
OAP: Office of Atoms for Peace, Thailand	Dr. Yutthana Tumnoi
PSU: Prince of Songkla University, Thailand	(PSU: -)
RBRU: Rambhai Barni Rajabhat University, Thailand	Dr. Sontaya Koolkalya
SEAFDEC: Southeast Asian Fisheries Development Center	Dr. Taweekiet Amornpiyakrit and Mr. Sukchai Arnupapboon
URU: Ubon Ratchathani University, Thailand	Dr. Tuantong Jutagate (URU)


Annex 9: Result of the Need Assessment on Human Resources Development

No.	Research Topic	Level		
		Low	Fair	High
1	Some Biological Data of Pelagic and Demersal Fish in the Gulf of Thailand by Using Bottom Trawl	XXX		
2	Demersal Fish Survey Using Hydro-acoustic Instrument	XX	X	
3	Demersal Fisheries Resources Survey in Viet Nam EEZ	XX		
4	Small pelagic Resource Survey by hydro-acoustic Instrument, i.e. Scientific Echo-sounder Simrad EK-60	XX		X
5	Biomass Estimation by Hydro-acoustic Method in the Gulf of Thailand	XX		X
6	Marine Species Identification	X	X	X
7	Water Column Condition and Near-Bottom Water Hypoxia in the Gulf of Thailand	X	XX	
8	Residual current from ship ADCP	XX	X	
9	Geostrophic current in the Gulf of Thailand		XXX	
10	Three dimensional circulation in the Gulf of Thailand during southwest monsoon	X	XX	
11	Water and material exchanges at the mouth of the Gulf of Thailand	X	XX	
12	Relationship Between Chlorophyll- <i>a</i> Concentration in the Gulf of Thailand and Ocean Color from Remote Sensing		XXX	
13	Inherent Properties of Sea Water in Gulf of Thailand	XX	X	
14	Sedimentary properties and sedimentation rate of sediment in the Gulf of Thailand	XX	X	
15	Temporal distribution of mercury and trace metals in sediment	X	XX	
16	Integrates Low-cost Sonar Imagery and GIS to Map Underwater Habitat	XX		X
17	Microplastics Accumulations in Fish, Sediment, and Seawater	X	X	X
18	Distribution of Total Organic Matter in Marine Sediments of the Gulf of Thailand	XXX		
19	Mercury and arsenic in seawater	X	XX	
20	Flux of nutrient and nutrient pool in sediment	X	XX	
21	Iron-sulfur-phosphorus cycling	XX	X	
22	Mercury and trace elements contamination in the surface sediment	X	XX	
23	Spatial sedimentology and source area composition of sediment in the Gulf of Thailand	XX	X	
24	Petroleum hydrocarbon (as chrysene) and polycyclic aromatic hydrocarbon (PAHs)	XX	X	
25	Total Petroleum Hydrocarbons (TPHs) in Surface Seawater (as chrysene)	XX		
26	Mercury accumulation in tissues and risk assessment for consumption	X	X	
27	Radiation Dose and Radiological Risk Assessment in Marine Biota and Seafood Consumers	XX		
28	Carbon dioxide flux and primary productivity in The Gulf of Thailand Nutrient and nutrient pool in seawater	X	X	
29	Collection of Hydrographic In-situ Data for Validation in the Gulf of Thailand to Compare with Multi-satellite and Model Products	XX		
30	Zooplankton Diversity in the Gulf of Thailand	X		XX
31	Density and Diversity of Phytoplankton in the Gulf of Thailand	X		XX
32	Species and Distribution of Palalarvae and Cephalopods in the Gulf of Thailand		X	XX
33	Composition and distribution of fish larvae in the Gulf of Thailand	X	X	X



No.	Research Topic	Level		
		Low	Fair	High
34	Fish larvae distribution of Scombridae and Engraulidae in the Gulf Thailand	X	X	
35	Some Biological Aspects for Elasmobranch in Gulf of Thailand	X	X	
36	Distribution and Abundance of Parasite in Bony fish in the Gulf of Thailand	X	X	
37	Diversity of Benthic Microcrustaceans and Micromollusks in the Gulf of Thailand	X	X	X
38	Meiofauna abundance and distribution in surface sediment	XX		
39	Microbiome composition and function in sediment	XX		
40	Microbiome composition and function in seawater	XX		
41	Attached living organism on floating garbage in Thai waters	XX		
42	Genetic Diversity and Population Genetic Structure of Three-Banded Mantis Shrimp <i>Miyakellanea</i> caught by Trawl Nets Fisheries in the Gulf of Thailand	X	X	X
43	Distribution of Bottom Plastic Debris in the Gulf of Thailand	X	X	X
44	Investigation of Stock of Marine Debris in Gulf of Thailand		XX	
45	Composition and potential source of aerosol	XX		



Annex 10: Facebook GOT SEEDs

Website <https://www.facebook.com/GOT-SEEDs-161151174050150/>

The screenshot shows the Facebook profile for 'GOT SEEDs'. The profile picture is a white research vessel on the water. The main post is from 'GOT SEEDs' dated 9 มกราคม (January 9th) and features a large circular image of the same vessel. The right sidebar contains a 'Groups' section with 'Sayon Promjinda' and 'MarineScience6', a 'Pages' section with 'Marine technolog...' and 'DoDisplays', and a language selector at the bottom.



Annex 11: Closing Remark

Closing Remarks

**The Regional Technical Meeting on the Evaluation of the
Collaborative Research Survey on Marine Fisheries Resources
and Marine Environment in the Gulf of Thailand
SEAFDEC Training Department, 8-9 January 2019
Mr. Akito Sato**

SEAFDEC Deputy Secretary-General and Deputy Chief of the Training Department

9 January 2018 (Wednesday)

Distinguished Representatives from the Department of Fisheries of Thailand, Representatives from the Fisheries Administration of Cambodia (FiA), Representatives from the Directorate of Fisheries (D-Fish) and Research Institute for Marine Fisheries (RIMF) of Viet Nam,

Representatives from the Department of Marine and Coastal Resources (DMCR), Thailand, Representatives from the Office of Atoms for Peace, Thailand (OAP),

Representatives from Thailand's academic institutions, namely: Burapha University, Chulalongkorn University and Kasetsart University,

My Colleagues from SEAFDEC Training Department. Ladies and Gentlemen, Good afternoon.

On behalf of SEAFDEC, I would like to extend my sincere gratitude and appreciation to all of you for making this meeting a great success. I would also wish to thank all those who have worked hard for the smooth arrangements of this meeting.

Through this 2-day Meeting, we have reported and discussed on the findings and collected samples as a result of the Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand by M.V. SEAFDEC 2. We have also discussed on the way forward and time frame for following up the analysis, the data sharing schemes and its necessary preparations for future presentation and publishing of such results to the public as well as the HRD program on data analysis to support the Member Countries. After this, we would like to encourage all researchers to continue to work closely on the data analysis and discussion on the results and we would follow up the progress of the research work periodically. Please keep in touch with each other with email and telephone. We look forward to receiving your full cooperation and assistance toward the success of the project.

Finally, once again, I would like to express our gratitude for your active participation in providing valuable recommendations, comments and information for this meeting. We are looking forward to collaborate and pursue this mission with you again in the future.

Ladies and Gentlemen, I now declare this Meeting closed. I wish to thank you once again for the good cooperation that we all had during the Meeting. Good luck and I do wish that you would have a very safe journey back home. Have a good day.

Thank you very much.

