

**REPORT OF THE**  
**TRAINING WORKSHOP ON IDENTIFICATION OF DEEP-SEA**  
**BENTHIC MACROINVERTEBRATE VULNERABLE TO FISHING**  
**GEAR**

**Samutprakarn, Thailand, 11-15 July 2011**





### **Preparation and distribution of this document**

The Report of the Training Workshop on Identification of Deep-sea Benthic Macroinvertebrate Vulnerable to Fishing Gear was prepared by the Coastal Fisheries Technology Division of the Training Department of the Southeast Asian Fisheries Development Center (SEAFDEC). The Document is distributed to the participants and resource persons of the Training, SEAFDEC Member Countries, SEAFDEC Departments and concerned institutions/organizations.

### **BIBLIOGRAPHIC CITATION**

SEAFDEC. 2011. Training Workshop on Identification of Deep-sea Benthic Macroinvertebrate Vulnerable to Fishing Gear. Southeast Asian Fisheries Development Center, Training Department, Thailand, TD/RP/149: 132pp.

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**Training Workshop on Identification of Deep-sea Benthic Macroinvertebrate  
Vulnerable to Fishing Gear**

11-15 July 2011, Samutprakarn, Thailand

**PART I**

**Report of the  
Training Workshop on Identification of Deep-sea Benthic Macroinvertebrate  
Vulnerable to Fishing Gear, 11-15 July 2011  
SEAFDEC/Training Department, Thailand**

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**I. Introduction**

1. The training workshop on identification of deep-sea benthic macroinvertebrate vulnerable to fishing gear was organized by the SEAFDEC Training Department (SEAFDEC/TD) and financed by SEAFDEC through the Japanese Trust Fund. The Training Workshop was held at the SEAFDEC Training Department in Samut Prakan, Thailand from 11 to 15 July 2011.
2. The workshop was attended by researchers and specialists in the fields of marine biology, taxonomy, and benthic invertebrate identification from the SEAFDEC Member Countries. Support was provided by a benthic ecologist from UK, a professor, lecturer, graduate students, and undergraduate students from Kasetsart University (Bangkok, Thailand) and Burapha University (Chonburi, Thailand). The list of participants and resource persons appears as **Annex 1**.
3. This training provided knowledge on the identification of deep-sea benthic macroinvertebrates with emphasis on the species found during the fishery resources survey conducted from M.V. SEAFDEC 2 on the continental shelf and slopes of Southeast Asian waters. The training attempted to build the capacity of the participants to identify species captured at water depths between 100 and 400 m. The Workshop had the following specific objectives;
  - To enhance, through practical work the participants's ability to identify deep-sea benthic macroinvertebrate.
  - To identify to the lowest practical taxon benthic macroinvertebrate specimens collected from the fisheries resource survey by MV.SEAFDEC 2.

**II. Opening and Introduction of the Training Workshop**

4. The workshop was officially opened on July 11, 2011 at SEAFDEC/TD, Samutprakarn, Thailand. On behalf of the SEAFDEC Secretary-General, Mr. Bundit Chokesanguan, welcomed the participants and resource persons to the training workshop. He underlined the need to build human resources capacity in the region to support SEAFDEC member countries deep-sea fishery resources exploration efforts. He also expressed the wish of SEAFDEC for all participants to have strong interest in gaining knowledge and experiences in benthic macroinvertebrate identification. His Message appears as **Annex 2**.

5. The workshop was introduced by Mrs. Penjan Laongmanee, Fishing Ground and Fishery Oceanography Section Head of the SEAFDEC/TD. She provided the background of the project “Deep-Sea Fisheries Resources Exploration in the Southeast Asian Waters” including the progress of various activities particularly those conducted under the program since 2007. In order to respond the international concern on the impact of fishing on deep - sea ecosystem, the program of activity has been developed in line with the ecosystem - based approach. Within that approach, the “Training Workshop on Identification of Deep - Sea Benthic Macroinvertebrate Vulnerable to Fishing Gear” is a part of SEAFDEC’s commitment to assist the Member Countries in building their capability to support their deep-sea fishery resources exploration efforts. Her presentation appears as **Annex 6**.
6. The brief on workshop program and arrangement of the activities was made by Dr. Natinee Sukramongkol which appears as **Annex 7**.

### **III. Resource Person Presentations**

7. The workshop was facilitated by six resource persons who professional in benthic macroinvertebrate identification and marine macrobenthic survey. The presentations made by resource persons provided the basic knowledge to guide participants identifying the group/species commonly captured in the South China Sea and Andaman Sea at the depths between 100 and 400 m. The presentations of the resource persons included;
  - 7.1 Dr. Mike Kendall, benthic ecologist and a consultant for Plymouth Marine Laboratory Applications at Plymouth, United Kingdom. His presentation consist of;
    - Patterns in the benthos (**Annex 8**)
    - Sampling the benthos (**Annex 9**)
    - Collection and identification of polychaete worms (**Annex 10**)
    - Analysis and synthesis (**Annex 11**)
  - 7.2 Mr. Teerrapong Duangdee, Assistant Professor at Department of Marine Science, Faculty of Fisheries, Kasetsart University, Bangkok, Thailand, gave a presentation on;
    - Introduction to the taxonomy of Gastropods and Bivalves (**Annex 12**)
  - 7.3 Dr. Sumaitt Putchakarn, Senior Scientist at Biodiversity Research Unit, Institute of Marine Science, Burapha University, Chonburi, Thailand, lectured on the topic;
    - Introduction to the taxonomy of Deep-Sea Echinoderm and Porifera (**Annex 13**)
  - 7.4 Dr. Suriyan Tunkijjanukij, Dean of Faculty of Fisheries, Kasetsart University, Bangkok, Thailand, gave a presentation on;
    - Introduction to the taxonomy of Deep-Sea Shrimps and Lobsters (**Annex 14**)



7.5 Ms. Puntip Wisespongpan, Assistant Professor at Department of Marine Science, Faculty of Fisheries, Kasetsart University, Bangkok, Thailand, lecture on three topics including;

- Guideline to identification of deep-sea crab (**Annex 15**)
- Classification of deep-sea crab (**Annex 16**)
- Deep-sea crab fisheries (**Annex 17**)

#### **IV. Laboratory Practice on Macroinvertebrate Identification**

8. During four days of practical work in laboratory, the participants worked in groups of 3-5 people. Each group was provided with specimens collected by beam trawl and otter-trawl from Brunei Darussalam Waters at depths between 100 and 400 m during the collaborative surveys aboard M.V. SEAFDEC 2 conducted between 2008 and 2010. The specimens for identification (both preserved in 70% ethanol and frozen were separated into five groups, i.e. Polychaete, Gastropods and Bivalves, Echinoderm and Porifera, Shrimps and Lobster, Crabs, for laboratory practice.
9. Participants were requested to identify the specimens up to family level or the lowest taxa. They practiced counting, measuring, and examining the pertinent external anatomical structures those necessary for identifying the specimens. All laboratory practice was supervised by the resource persons and assistant resource persons who are professionals in benthic macroinvertebrate identification and marine macrobenthic survey.
10. During the laboratory work (11-14 July), participants were able to; describe the family characteristic of Gastropods and Bivalves specimens under the supervision of Assist. Prof. Teerrapong Duangdee, identified the Polychaete specimens to the lowest taxa under the supervision of Dr. Mike Kendall and Assoc. Prof. Dr. Chittima Aryuthaka; identify echinoderms (i.e. sea cucumber, sea urchin, sea feathers, brittle stars, sea stars) and Porifera (sponges) under the supervision of Dr. Sumaitt Putchakarn, identified on a group of deep-sea shrimps and lobster to the lowest taxa under the supervision of Dr. Suriyan Tunkijjanukij and Assoc. Prof. Dr. Chittima Aryuthaka, and identified the crab specimens to the lowest taxa under the supervision of Assist. Prof. Puntip Wisespongpan.
11. Moreover, participants were also given experience on resin techniques for the preservation of crab specimens and the preparation of tissue (dermis) extracts technique using sodium hypochlorite (Clo- rox bleach) to observe the spicule forms that most important of the diagnostic characters for identifying holothurians.
12. All specimens identified by participants were photographed each group made a presentation on the results of their identification. Subsequently discussion and clarification, including

advice on the results was made among the resource person and participants. The results presentation appears as **Annex 18/1- 18/5**.

## **V. Discussion and Recommendations**

13. Based on the discussion, the workshop suggested further activities for the “Deep-Sea Fishery Resources Exploration in the Southeast Asian Waters” program at the Regional/National levels for 2012 and beyond. There were;

- SEAFDEC should continue the deep-sea resource survey in the region and disseminate the information collected to the SEAFDEC member countries
- SEAFDEC should collaborate with the member countries on both exploration and identification (can be via an internet)
- Exploration/study should not only focus on species that potentially be fishery resources but also the sustainability of invertebrate resources
- Further study on both nutrition and marketable value (consider cost-effective) should be considered
- A multi-language field guide for the identification of deep-sea benthic macroinvertebrates suitable for use by non-experts should be developed. Such a guide might be in either print, CD or on-line format
- Information and dissemination on the results of the deep-sea survey should be shared through the website and database.

## **VI. Summary of Workshop Evaluation**

14. The workshop evaluation was summarized based on seventeen evaluations from participants and appear as **Annex 4**.

## **VII. Closing of the Training Workshop**

15. Certificates of achievements were presented to the participants and resource persons by Mr. Bundit Chokesanguan on behalf of SEAFDEC Deputy Secretary-General. After expressed his appreciation to the participants for their active participated and willingness to apply and contribution what the participants have learned from the workshop, he declared the workshop closed. His Message appears as **Annex 5**.

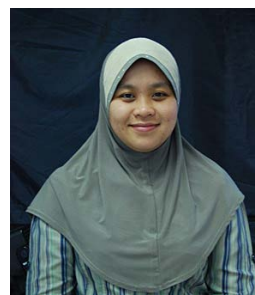
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**OPENING SPEECH**

**By Mr. Bundit Chokesanguan on behalf of SEAFDEC Secretary - General**

Distinguished Resources Persons, participants and staffs of the SEAFDEC Training Department,  
A very good morning!

First of all, on behalf of SEAFDEC, I would like to welcome all of you to the SEAFDEC/Training Department. Following the information provided by the Course Director of this Training, Dr. Worawit Wanchana on the background, you may know that this Training/Workshop is one of the regional initiatives implemented under the Japanese Trust Fund program on “Deep Sea Fisheries Resources exploration in the Southeast Asian Waters”. Various activities have been conducted under this program since in 2007. However, there is still a need to build human resources capacity in our region with regards to marine invertebrate biodiversity. This is part of our commitment to assist the SEAFDEC Member Countries in building their capabilities to support their deep-sea fishery resources exploration efforts.

During this training program, I am pleased to inform you that we have invited well known experts as our resource persons. We have with us Dr. Mike Kendal, senior expert from England, Dr. Sumaitt Puchakarn, senior scientist from Institute of Marine Science, Burapha University, Assistant Professor Dr. Suriyan Tunkijjanukij, Associate Professor Dr. Chittima Aryuthaka, Assistant Professor Puntip Wisespongpan and Assistant Professor Teerapong Duangdee from Faculty of Fisheries, Kasetsart University. We are sure that with their expertise could provide our participants with the best knowledge in identification of benthic macroinvertebrate found in Southeast Asian water. Our resource persons are very pleased to share their knowledge and experiences with all of you during this training program.

So, even if you will have a hectic schedule during the next 5 days, I am sure you will enjoy the training with our experts and the staff concerned.

Ladies and Gentlemen, I wish to take this opportunity to express the wish of SEAFDEC for all participants to have strong interest in gaining knowledge and experiences in benthic macroinvertebrate identification. With that note ladies and gentlemen, I now declare this training/workshop on Identification of Deep-Sea Benthic Macroinvertebrate Vulnerable to Fishing Gear, open. Thank you and Good Day!

TIME TABLE

Date/Program	Details of Activity/Topic	Facilitator
<b>Day 1, (Sunday 10 July)</b>		
	<ul style="list-style-type: none"> <li>Arrival of resource persons and participants</li> </ul> Airport pick up arrangement will be provided	SEAFDEC personnel
<b>Day 2, (Monday 11 July): Opening, Introduction, and Lecture</b>		
0900-0930 0930-0945 0945-1000	<ul style="list-style-type: none"> <li>Opening ceremony/Group photo</li> <li>Introduction to the workshop</li> <li>Workshop program and arrangement of activities</li> </ul>	Mr. Bundit Chokesanguan (on behalf of the SEAFDEC Secretary-General) SEAFDEC personnel & Participants
1000-1015	<i>Break</i>	
1015-1230	Lecture on: <ul style="list-style-type: none"> <li><b>Distribution and structure</b> of benthic macroinvertebrate assemblages on the continental shelf and slopes</li> <li><b>Sampling methodologies</b></li> </ul>	Dr. Mike Kendall
1230-1330	<i>Lunch break</i>	
1330-1730	Lecture and practice on: <ul style="list-style-type: none"> <li>Introduction to the taxonomy of <b>Gastropods and Bivalves</b> (emphasis on those found in the South China Sea and the Andaman Sea)</li> <li>Identification practice on Deep-sea <b>Gastropods and Bivalves</b> specimens in laboratory</li> </ul>	Mr. Teerapong Duangdee
<b>Day 3, (Tuesday 12 July)</b>		
0900-1230	Lecture and practice on: <ul style="list-style-type: none"> <li>Introduction to the taxonomy of deep-sea <b>Polychaete</b></li> <li>Identification practice on <b>Polychaete</b> specimens in laboratory (emphasis on those found in the South China Sea and the Andaman Sea)</li> </ul>	Dr. Mike Kendall and Dr. Chittima Aryuthaka
1230-1330	<i>Lunch break</i>	
1330-1730	Lecture and practice on: <ul style="list-style-type: none"> <li>Introduction to the taxonomy of Deep-sea <b>Echinoderm and Porifera</b> specimens</li> <li>Identification practice on <b>Echinoderm and Porifera</b> specimens in laboratory</li> </ul>	Dr. Sumaitt Putchakarn
<b>Day 4, (Wednesday 13 July)</b>		
0900-1230	Lecture on:	Dr. Suriyan

Date/Program	Details of Activity/Topic	Facilitator
	<ul style="list-style-type: none"> <li>Introduction to the taxonomy of Deep-sea <b>Shrimps and Lobsters</b> (emphasis on those found in the South China Sea and the Andaman Sea)</li> </ul>	Tunkijjanukij
1230-1330	<i>Lunch break</i>	
1330-1730	<ul style="list-style-type: none"> <li>Identification practice on <b>Shrimps and Lobsters</b> specimens in laboratory</li> </ul>	Dr. Suriyan Tunkijjanukij
<b>Day 5, (Thursday 14 July)</b>		
0900-1230	Lecture on: <ul style="list-style-type: none"> <li>Introduction to the taxonomy of deep-sea <b>Crabs</b> (emphasis on those found in the South China Sea and the Andaman Sea)</li> </ul>	Ms. Puntip Wisessongpand
1230-1330	<i>Lunch break</i>	
1330-1730	<ul style="list-style-type: none"> <li>Identification practice on <b>Crabs</b> specimens in laboratory</li> </ul>	Ms. Puntip Wisessongpand
<b>Day 6, (Friday 15 July)</b>		
0900-1000	Lecture on: <ul style="list-style-type: none"> <li>Detecting change due to fishing</li> </ul>	Dr. Mike Kendall
1000-1100	<ul style="list-style-type: none"> <li>Results presentation of the works from laboratory practice</li> </ul>	Participants and Resource person
1100-1130	<ul style="list-style-type: none"> <li>Discussion and conclusion</li> </ul>	Participants and Resource person
1130-1200	Closing ceremony	Mr. Bundit Chokesanguan (on behalf of the SEAFDEC Secretary- General) SEAFDEC personnel & Participants
<b>Day 7, (Saturday 16 July)</b>		
	Participants leave for their home countries	SEAFDEC Personnel

## Evaluation Summary

### Training Workshop on Identification of Deep-sea Benthic Macroinvertebrate Vulnerable to Fishing Gear, 11-15 July 2011, SEAFDEC/TD

This summary is based on the 17 evaluations received comprising of;

10 Biologists, 1 Administrator, 1 Student, 1 Researcher, 1 Officer, 1 Biologist/Policy Maker, 2 Non-specified

Highly favorable will rates = 5. Not so favorable will rates from 4 to 1;

Rating: 1 ( <i>lowest</i> ) to 5 ( <i>highest</i> ):	1	2	3	4	5	Comments
I. The training met my expectations			2	6	9	
II. I will be able to apply the knowledge learned			2	12	3	- Need more integrated info. To manage fishing gear
III. Do you have a better understanding of						
• Distribution of benthic animal, disturbance and benthic diversity			7	8	2	- Structure of distribution is very important
• Sampling the benthos	1		2	8	4	- Methods and gears maybe better if done actual
• Introduction to the taxonomy of Gastropod and bivalve		1	4	8	4	- Need more time - Should elaborate more during presentation
• Collection and identification of Polychaete worms	1		2	9	5	- Interesting with online identification
• Introduction to the taxonomy of Echinoderm and Porifera		2	3	6	5	- Should elaborate more during presentation
• Introduction to the taxonomy of Shrimps and Lobsters				11	3	
• Introduction to the taxonomy of Crabs				10	6	
• Biological and analysis decisions for detecting change due to fishing (on 15 July)		1	1	7	3	
IV. Overall, how would you rate the course?				12	4	
V. How much you can transfer knowledge gain from this training course?			3	11	1	- 75% - To be used as the basis to develop database and species identification

#### A. What did you like most about the course?

1. Diversification of specimens
2. The impact of fishing gears operation to benthic organism
3. The basis to identify the shrimp, lobster, crab, polychaete, gastropod
4. To improved knowledge and practical ability about identification of benthic macroinvertebrate
5. New subject for study the deep-sea specimens
6. The laboratory/actual works was very much helpful in learning process
7. The keys provided for shrimps and lobster as well as online key for annelids/polychaete were good

#### B. What presentations or topics were you expecting to hear, but were not presented?

1. Octopus identification
2. Taxonomy of marine fishes
3. Other group of Crustacean such as Isopod
4. Introduction to sensory organs of the animals in correspond to responsible fishing technology application
5. Corals (deep-sea) particularly endangered species under CITES
6. The existing deep-sea fisheries (shrimps and crabs) of the world (e.g. Alaska king crab fishing), the example on sustainable utilization

**C. What would you recommend changing about the course?**

1. Need more time (e.g. 2 weeks for the course or more than 5 days)
2. Technical terms is very important in taxonomy studies, should give priority and more time to this aspect
3. Morning session lecture and evening laboratory
4. Training materials should be collected earlier and distributed electronically to participants before the training course
5. More samples to practice will be better and the program will be perfect if participants can join during the collecting sample
6. Since time was limited in identification practice for five taxa groups. More emphasize may give to taxa groups w/c have fisheries potential/economic importance

**D. Other comments, observations, suggestions for this course and the “Deep-Sea Fishery Resources Exploration in the Southeast Asian Water” program:**

1. Deep-sea fishery resources exploration should be conducted to explore new resources and more information on deep-sea animals. Collaborative work among member countries is much helpful
2. The program should divided into 3 session;
  - Lecture
  - Identification of specimens together with the lecture use the same specimens
  - Self identification (sample provided by the lecturer)
3. Poor English ability may the problem to gained and transfer knowledge
4. Number of participants for this training should be at least two or three person/country
5. The exploration/study should focus on taxa/species with fishery potential. Palatability study, nutritional value, and other related experimentation on deep-sea shrimps, lobsters and crabs in comparison to market-available equivalents may be considered

**CLOSING REMARKS**

**By Mr. Bundit Chokesanguan on behalf of SEAFDEC Secretary - General**

Distinguished Resource Persons, participants, and staff of SEAFDEC Training Department,  
Good afternoon!

First of all, I wish to inform you that I am most impressed by your active participation during the 5-day training workshop, especially your strong sense of interest and the efforts you exerted in both lecture and laboratory practice. I am wish this event is a first step of you to share/exchange and update the progress of macro invertebrate study that support future scientific base management in our region especially for deep-sea fishery.

As this regional training workshop comes to a close today, I would like to thank our resource persons and experts: Dr. Mike Kendal, Dr. Sumaitt Puchakarn, Assistant Professor Dr. Suriyan Tunkijjanukij, Associate Professor Dr. Chittima Aryuthaka, Assistant Professor Puntip Wisespongpan and Assistant Professor Teerapong Duangdee for sharing their knowledge and skills with the participants. We are also thankful to the organizing team for your efforts in providing the best support to this training workshop. We are also grateful for the continued financial support from the Japanese Trust Fund through SEAFDEC, for making this training workshop possible.

Ladies and gentlemen, our work does not end here. Please keep in mind that the realization of your respective activities on Deep Sea Fisheries Resources Exploration depends on your willingness and intention to apply what you have learned from this training workshop. On our part, SEAFDEC will make effort to provide you with the necessary support to ensure the success and sustainability of this important collaborative effort in the near future.

Finally, I wish you all the best and every success in your future challenges. May you have a safe journey back home. With that Ladies and Gentlemen, I now declare the Regional Training Workshop closed. Thank you very much.