

**Annex 6A: Country Report of Brunei Darussalam**

By Mr. Matzaini Haji Juna



**INITIATIVES/PROGRAM ON DEEP-SEA  
FISHERIES RESOURCES EXPLORATION  
AND THE IMPACT OF FISHING TO DEEP-  
SEA ECOSYSTEM IN BRUNEI  
DARUSSALAM**

PRESENTED BY

**MATZAINI HAJI JUNA  
DEPARTMENT OF FISHERIES**

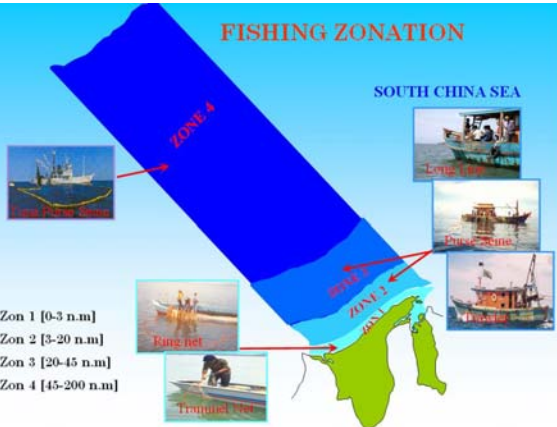
## CONTENT

- Introduction
  - Characteristic of offshore area
  - Fishing Zonation
  - Deep Sea Fishing Survey
- Objectives
- Methodologies
- Results
- Impacts
- Conclusion
- Recommendations

### CHARACTERISTIC OF OFFSHORE AREA

- Offshore area covers ~75% of the territorial Waters also known as Zone 4;
- Physical features: largely rough with plenty of deep troughs and depth of > 3,000m.
- The 100-200 meter depth is a very narrow strip (about 2 nm) forming the continental edge with an area of about 120 nm<sup>2</sup> and 40 nm from the shoreline. The bottom type is generally muddy on the western side, and rocky on the eastern side.
- The continental slope creeps sharply from the 200 m depth up to about 3,000 m depth of the sea floor towards the Palawan trough that ends in Brunei waters.

### FISHING ZONATION



SOUTH CHINA SEA

Zon 1 [0-3 n.m]  
Zon 2 [3-20 n.m]  
Zon 3 [20-45 n.m]  
Zon 4 [45-200 n.m]

### DEEP SEA FISHERIES SURVEY

- The survey is in line with the goal of the Department of Fisheries to assess and determine the fisheries potential of the offshore marine areas of Brunei Darussalam from the continental edge onwards for sustainable fisheries development.
- Aims to provide the most recent information on the deep sea demersal and pelagic marine resources of Brunei Darussalam
- The Survey is conducted using MV SEAFDEC 2.
- As a supplement information, DoF also engaged Japanese Commercial Fishing Vessel in 2000 and 2001. Gears used were tuna longline, bottom-set gillnet, squid jigs and pots;

### PROGRAMMES – MV SEAFDEC 2

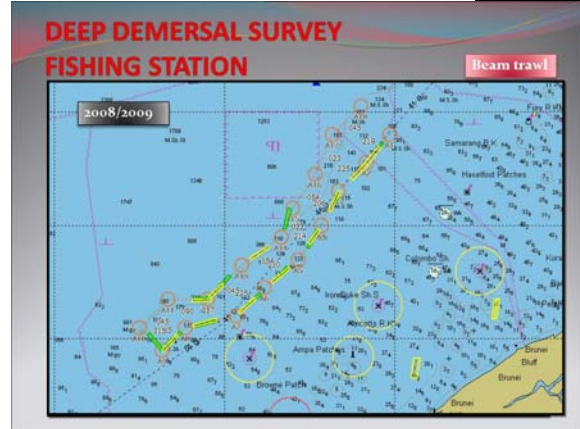
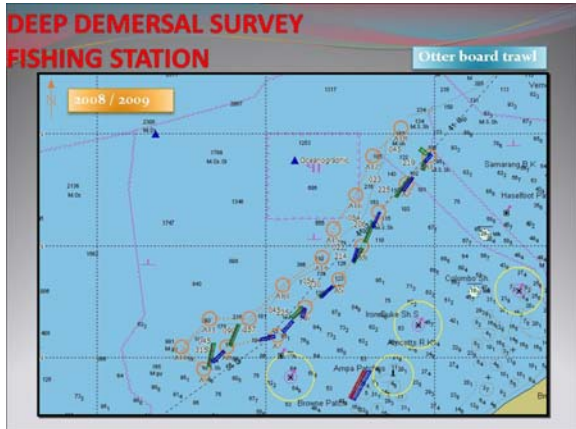
- Pelagic Fisheries Survey (Deep Sea)
  - 2004 – 2006
- Demersal Fisheries Survey (Deep Sea)
  - June, 2008
  - March – April, 2009
  - September – October, 2010
  - Overall analysis and finding from above survey

### OBJECTIVES

- To assess ecological resources including the **deep demersal and pelagic fisheries resources** in the area that covers zone 3 and 4.
- To assess the health of the marine environment of the demersal fish stocks by conducting oceanographic survey simultaneously with the demersal surveys

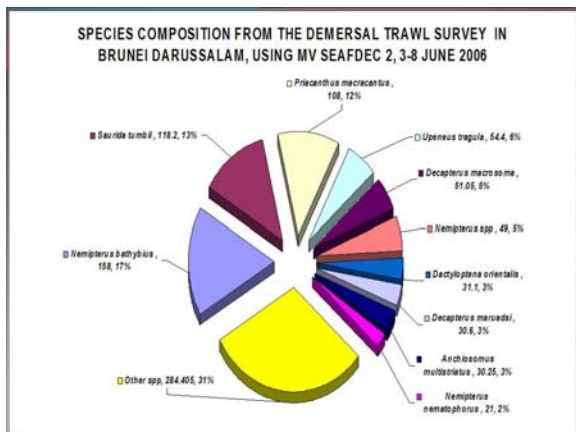
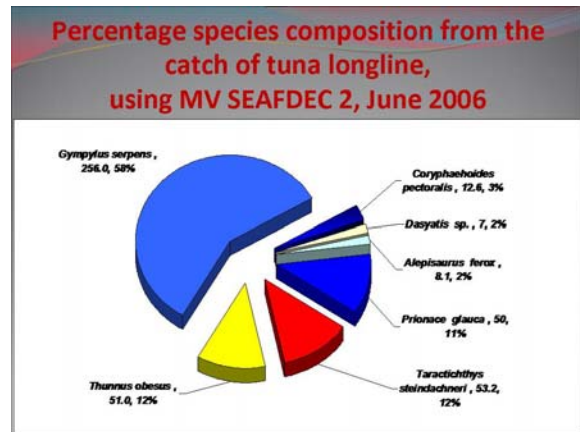
### METHODOLOGIES

- Oceanographic survey are as follows: iCTD, Bongo net, Neuston net, TSG- Fluorometer and IKMT net
- Demersal Fishes Resources in Zone 3, by using Otter board bottom trawl, Bottom beam trawl and Shrimp Traps.
- Acoustic survey by FQ 80



### RESULTS

- Oceanographic data reveals healthy and normal conditions of the marine environment.
- Acoustic data revealed the abundance of large pelagics and other benthic resources.



### Fishing operation results 2009

Otter board trawl	Bottom Beam trawl
<ul style="list-style-type: none"> <li>9(7) Fishing operations</li> <li>Sea depth 100 – 132 meter</li> <li>Towing time 30 minutes</li> <li>Ship speed 2.5 – 3.4 knot</li> <li>Towing distance 1.5 – 1.9 nm</li> <li>Total CPUE 95.65kg/ hrs.</li> </ul>	<ul style="list-style-type: none"> <li>11 Fishing operations</li> <li>Sea depth 100 – 350 meter</li> <li>Towing time 60 minutes</li> <li>Ship speed 2.4 – 3.3 knot</li> <li>Towing distance 2.3 – 2.6 nm</li> <li>Total CPUE 3.66 kg / hrs.</li> </ul>



Capture ( Otter trawl)



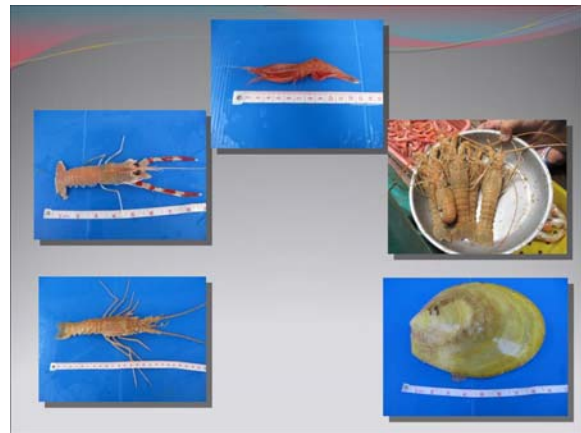
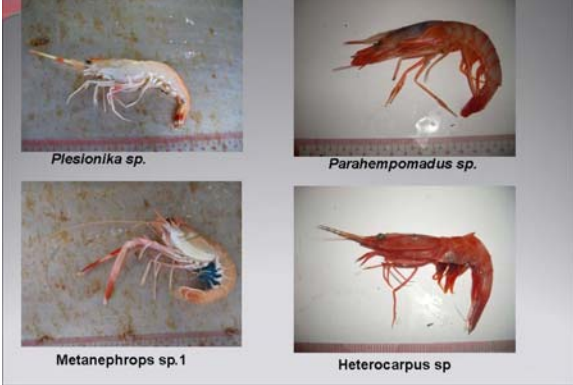
Result of Beam trawl



Result of Beam trawl



DEEP WATER SHRIMP

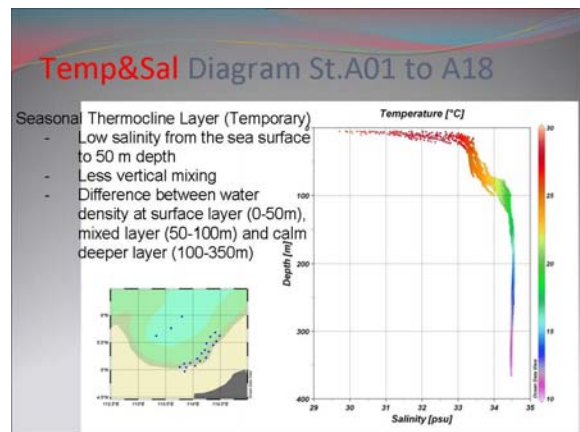
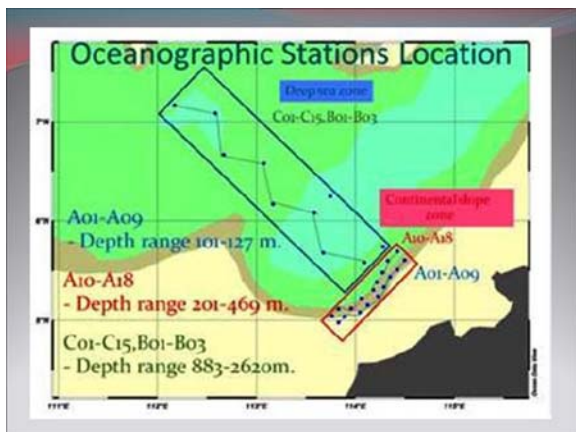


IMPACT OF BEAM TRAWL GEAR



IMPACT OF OTTER BOARD TRAWL GEAR





**CONCLUSION**

- Brunei Darussalam has a relatively short history of quantitative and systematic fisheries research especially in the offshore areas as evidenced by the paucity of published works. Therefore the surveys with MV SEFADEC 2 aim to provide the most recent information that is needed in the rational management of the deep sea resources.
- Valuable oceanographic data were generated to validate previous information collected in the past to determine any changes that can influence the plankton and fish biomass of the marine resources.

**CONCLUSION**

- The general conclusion based on the preliminary examination of the data shows a good potential for deep water-shrimps in the area. The new discovery poses a challenge to the research group and in view of this, a follow-up survey is recommended to verify the results of the survey.
- Valuable oceanographic data were generated to validate previous information collected in the past to determine any changes that can influence the plankton and fish biomass of the marine resources. Among these are the samples collected by IKMT that provides for the first time a sample of the **back scattering layer in Brunei Darussalam. Thick scattering layer will be further analysis for its potential to fisheries.**

**RECOMMENDATION**

- It is important to do resource assessment procedures together with oceanographic and marine environment assessment includes the use of hydroacoustic system, the ICTD oceanographic sampler and Bongo plankton net determine any changes that can influence the plankton and fish biomass of the marine resources.
- Any sample from otter board and beam trawl must be taken as a sample for assess the effect of fishing gear to the environment scientifically.



**Annex 6B: Country Report of Indonesia**

By Mr. Bram Setyadi

**DEVELOPMENT OF DEEP-SEA FISHERIES RESEARCH IN INDONESIA**



**BRAM SETYADJI**  
**RESEARCH INSTITUTE FOR MARINE FISHERIES**  
**JAKARTA, INDONESIA**

**INTRODUCTION**

- Approx. 2/3 of the region are covered by water
  - Deep sea research are so far limited
1. High Cost
  2. Lack of expert related
- One of the challenge and opportunity research on the fishery is the ability of science and technology for exploiting and developing of new commodities or frontier commodities as an alternative utilization of marine fishery resources in the future

**DEEP SEA RESEARCH (FROM TIME TO TIME)**

1. INDIAN OCEAN
  - 1972 and 1975 with the assistance from Fisheries Research and Development Agency Office of Fisheries, Busan, Korea (Indian ocean – Southern Java)
  - 1979-1981, Government of Indonesia, The Federal Republic of Germany, the Commonwealth of Australia and the FAO/UNDP as Coordinating Agency through the Jetindofish Project. (Indian Ocean - Southern Lombok Island to Eastern Timor)
  - 1980, Government of Indonesia and the FAO/SCSDEVPRO (Southern and Western Sumatera)
  - 2004-2005, Research Institute for Marine Fisheries (RIME) of the Government of Indonesia had in association with Overseas Fishery Cooperation Foundation (OFCF) of Japan (South of Java and West of Sumatera)

**DEEP SEA RESEARCH (FROM TIME TO TIME)**

2. BANDA AND ARAFURA SEA
  - 1992 and 1993, using RV Baruna Jaya-I (700 GT) of Agency for The Assessment and Application of Technology, Indonesia
  - 1993, Research on fishing technique of deep sea trap
  - 2000-2004, Investigation of bottom longline fishing of the Arafura Sea continental slope

**DEEP SEA RESEARCH (FROM TIME TO TIME)**

3. TIMOR SEA
  - 1993, RV Baruna Jaya-I (700 GT). The survey was conducted in slope waters between 200 m to 1000 m deep extending from Timor trench
4. SULAWESI SEA
  - 2010, INDEX SATAL 2010: Indonesia-USA Deep Sea Exploration of the Sangihe Talaud Region. It was a joint research between Indonesian and U.S. Government, involving 2 Research vessels, RV Baruna Jaya IV and Okeanos Explorer.

**T.E.R.I.M.A.K.A.S.I.H.**



**Annex 6C: Country Report of Malaysia**

By Mr. Jamil B. Musel

## DEEPSEA DEMERSAL EXPLORATION SURVEYS IN EEZ MALAYSIA, SABAH AND SARAWAK.

Jamil Musel

### INTRODUCTION

- The implementation of the Malaysia Exclusive Economic Zone (EEZ) in 1981, extended the fishing grounds beyond traditional area.
- The state of Sarawak, Sabah and Federal Territory Labuan are separated from Peninsular Malaysia by the South China Sea and have a combined EEZ of approximately 250,000 km<sup>2</sup>.
- This is 46% of the total EEZ area of Malaysia at 548,800km<sup>2</sup>.
- The EEZ of Sarawak is the largest within Sabah and Federal Territory Labuan, which is at 160,000km<sup>2</sup>.

- The first fisheries resources survey in the EEZ of Malaysia was conducted from 1985-1987 (R.V.RASTRELLIGER)
- The second survey was carried out from 1996-1997 (K.K.MANCHONG)
- The objectives of both survey is to estimate the demersal and semi pelagic/pelagic fish biomass and potential in the waters of the Malaysian EEZ,
- covering the west and east coast of Peninsular Malaysia, as well as in the South China Sea area off Sarawak and Sabah.
- The third survey was conducted in 2004-2005 off EEZ Sarawak water area also using K.K. Manchong.
- The main objective of the third survey was to assess the resource of the area more than 30nm offshore, which has been exploited by deep sea vessels.

- In the year 2005, a survey in the untrawlable area within 180 meter depth were conducted in Sarawak water and this survey was carried out using MV SEAFDEC 2,
- The objective of this survey is to assess the fish stock and resources in untrawlable area.
- Beside the EEZ survey, two tuna surveys in Sabah and Sarawak water were conducted in 2008 using the KP2 YELLOWFIN vessel owned by the National Agriculture Training Council (NATC).
- The latest survey was conducted in 2010 off EEZ Sarawak water area also using K.K. Manchong and MV SEAFDEC 2.

### OBJECTIVES

- The objective of the survey was to assess the resources of in Sabah and Sarawak Waters.
- To investigate species diversity and distribution of un-exploited resources i.e. demersal and pelagic fish resources by using beam trawl and the other gears.

### MATERIALS AND METHODS

- **1. Resource abundance**
  - MV SEAFDEC 2
  - KK Manchong
  - Beam trawl
  - Other gears
  - Swept area method & Other method

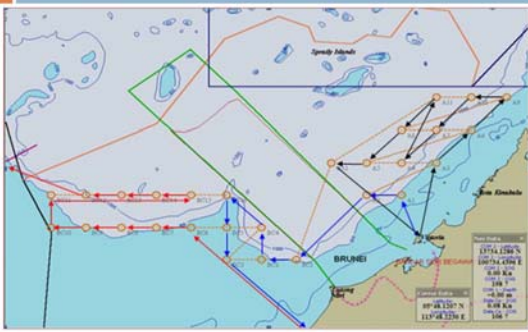
### MATERIAL AND METHOD

- **2. Biological research**
  - For dominant species in the catch, take 100 individuals randomly and measure their L-W
  - For potential target species, select 20 individuals randomly for detailed measurements (L-W, stomach cont., maturity stage)
  - Every species caught is to be recorded in an electronic media with a digital camera.

Survey area for demersal deepsea EEZ Malaysia, Sabah and Sarawak.



Survey stations for Beam Trawl



Sampling Equipment – Beam Trawl



Catch Composition - Beam Trawl



Sampling Equipment – Trap



Catch Composition - Trap



Sampling Equipment - PLL



Catch Composition - PLL



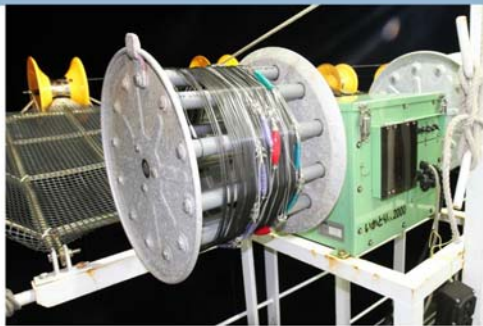
Sampling Equipment - BVL



Catch Composition - BVL



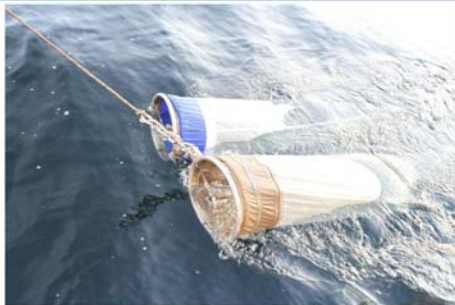
Sampling Equipment – Squids jigging



Catch Composition – Squids Jigging



Sampling Equipment – Bongo Net



Catch Composition – Bongo Net



RESULTS – Beam Trawl

□ SPECIES & CATCH COMPOSITION

- About 150 species of fish belonging of about 58 families were identified from the catches within 8 station of trawl operation.

Photos Activities (KK Manchong)



**Photos Activities  
(MV SEAFDEC 2)**



Beam trawl Gear



Sample Management



Family: Ophidiidae



Deep sea Shrimp



Batch Collection



Species: *Heterocarpus* sp



**Thank you  
For Your Attention**

**Annex 6D: Country Report of Myanmar**

By Mr. Han Win

**Country Report of DoF Myanmar  
for the Training Workshop on Research Methodologies  
for The study on Impact of Fisheries to Deep-sea  
Ecosystem**

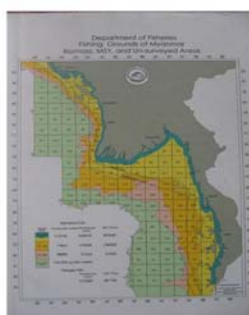
- Introduction
- Marine Fisheries resources
- Information of Deep-sea Fishing
- Commercial fishing in deep sea
- Present Survey in EEZ of Myanmar
- Conclusion

**Intoduction**



- The length of coastline (2832km)
- 3 Cosatal Region
- -Rakhine Coastal Region(740km)
- -Ayeyarwady Delta and Gulf ofMottama Coastal Region(460km)
- -Taninthari Coastal Region (1200 km)
- continental shelf -230,000sq km
- Territorial sea-12 nm from the base line
- EEZ-200 nm-from the base line
- Total area of marine fisheries waters(486-000 sq km)

**Marine Fisheries Resources**



- (Marine Fisheries Resources survey and Exploratory Fishing Project, assistance of FAO during197983, within200 meter depth )
- Acoustic experimental fishing survey
  - Trawl survey
  - Biomass
    - 1.0mmt of pelagic fish
    - 0.8mmt of demersal fish
  - MSY
    - 0.5mmt of pelagic fish
    - 0.55mmt of demersal fish
    - totaling 1.05 mmt

**Marine Fisheries Resources**

- Possesses a considerable diversity of habits
- A crucial role
  - in Marine fish production of foods
  - improvement of income
  - generating of employments and foreign exchange
- Third as in national economy
- Growing production in marine fish
- 1.17mmt in 1999-2000 to 1.37mmt in 2009-2010
  - Only from the coastal marine fisheries resources/within 100meter depth
- Resources in beyond 100m depth and EEZ (under utilize resources)
- To exploit gave permission to228 foreign fishing vessel in 2009-10
- For the long-term sustainable use of coastal fisheries
  - Aims to extent utilization of EEZ resources encouraging to national fishing industry/ vessels
  - hard to consider on impact of fishing to deep-sea ecosystem
  - But less information of deep-sea fishing / further studies will be needed

**Information of deep-sea fishing in Myanmar**

- Two experimental long line deep-sea shark fishing / off the Tenasserim coast (taninthari)/ depth zone of 200-600meter
  - In 1986 two species of deep sea shark were caught
  - The second, in 1987,23 species were collected
- In 1990 One joint survey, Thai Government and Myanmar Government, using FRTV-CHULABHORN, Research vessel of DoF thailand
  - Fishery Biological Survey
  - Acoustic Survey
  - Oceanographic Survey
- 12 Bottom Vertical Longline (7 days)
- 9696 hooks were used, total yield 709 kg- catch rate of 7.3kg/100hooks
- The deeper water, beyond 100m depth line (16kg/100hooks)showed a higher catch rate than in the shallow water
- Dominant species consisting of 59.70% *Lipochelus carnolabrum* and 24.67% *Epinephelus radiatus*
- A complete classification of 34 families and 63 species

**Information of deep-sea fishing in Myanmar**

- Some important commercial species
  1. *Lipochelus carnolabrum* (Yellow snapper)
    - Average catch rate 1.68kg/100hooks
    - Average size 38.0cm
    - At the depth of 130-140 meter
  2. *Carangoides spp.* (trevally)
    - Average catch rate 1.71kg/100hooks
    - Average size 54.0cm
    - At the depth of 50-100 meter
  3. *Epinephelus radiatus* (banded grouper)
    - Average catch rate 0.87kg/100hooks
    - Average size 43.0cm
    - At the depth of 100-400 meter

**Commercial fishing in deep-sea**

- Three foreign fishing vessel (longline fishing) in Rakhine Coastal Region in 2000, target fish Tuna
- The monthly catch of Tuna longline fishing

vessel	February(kg)	March (kg)	April (kg)	May (kg)
Vessel-1	-	10558	6070	-
Vessel-2	-	23534	26277	-
Vessel-3	7132	21561	23066	22061
total	7132	55653	55313	22061

**Present survey in EEZ of Myanmar**

- The National Research Survey in the EEZ of Myanmar, between SEAFDEC/TD and DoF, Myanmar, was conducted by MV.SEAFFDEC-2 in 1Feb to 15 March (43days) 2007
  - Covering along the eastern coast of Myanmar's continental shelf within EEZ
  - 74 station of Oceanographic survey
- 2 types of fishing gears namely BT, and PPL survey
  - BT Survey for demersal resources is separated into 2 part
  - Upper gulf of Mataban (Mottama), eastern central part of continental shelf/Catch composition from 17 station of BT
  - A total of 1,459.42 kg from16h 14min
  - 113 fish species
  - Highest catch rate of demersal fish species was *Saurida undosquimis* (20.03% by weight)
- The PPL Survey economic pelagic fish in the deeper zone, at the upper part of Andaman Sea, will be respond by SEAFDEC/TD

Expecting from the training workshop

- to be known and broadened in knowledge on the status of deep sea resources and condition of fishing ground in the Southeast Asia water, what kind of fishing methods and gears would be impacted to Vulnerable Marine Ecosystem.
  - to gain a chance to study on the ways fishing Gear operating method, and selecting and using it on the depth and bottom condition of fishing ground, and target species, and the facts which are consisted of data collecting of standard survey by lecture and practical work
  - To know related material which should be studied and involved in fisheries exploration and before exploitation of fisheries resources. (ecosystem, marine organism
  - To have an experience in the facts / steps of drawing are search plan
-

**Annex 6E: Country Report of the Philippines**

By Mr. Remar Asuncion

## Deep-Sea Fish: The BFAR Experience

"Training Workshop on Research Methodologies for the Study on  
Impact of Fishing to Deep - Sea Ecosystem"

16 - 20 October 2010  
Negara Brunei Darussalam

Remar Asuncion  
Master Fisherman, MV DA-BFAR  
Bureau of Fisheries and Aquatic Resources  
Philippines

### Outline:

- M/V DA-BFAR's Experiences with deep sea survey Collaborators  
Collection Gears  
Coverage  
Fish Species Collected (photos)
- References
- Retention/Preservation
- Network of Fish Taxonomist / Technical Support for ID

### Experience:

Three deep-sea exploration onboard M/V DA-BFAR conducted under the Project "Census of Marine Life" - Focused on Taxonomical and Morphological studies on the deep-sea benthic fauna.

Panglao Expedition (2005)  
 Aurora-Baler Expedition (2007)  
 LuMWan Expedition (2008)

- In May 2008, Survey for deep-sea survey with fisheries approach was conducted onboard with SEAFDEC Member Countries along the outskirts of Lingayen Gulf.

### Depth Covered:

- Panglao Expedition (May 22 - 31, 2005)  
62 - 2,217 meters  
77 collecting operations
- Aurora-Baler Expedition (May 18-June 5, 2007)  
42 - 2,253 meters  
112 collecting operations
- LuMWan Expedition (March 19 - April 02, 2008)  
105 - 2,249 meters  
68 collecting operations
- Lingayen w/ SEAFDEC (May 11 -25, 2008)  
358 - 882 meters  
14 operations

### Collaborators:

### Collection:

Gear	Dimensions	General Specifications
Beam Trawl	4 m (Beam) X 0.35 m (Height of shoe)	<ul style="list-style-type: none"> <li>Kept open by 6' X 6' heavy duty wooden Beam attached to iron runners at both ends</li> <li>Fine-meshed end capable of holding muddy substrates.</li> <li>Lead line-sinker line is also of chain to allow digging in the substrate.</li> <li>Towed for 30-60 min on the seafloor depending on the topography</li> </ul>
Otter Trawl	15 m. Lead line	<ul style="list-style-type: none"> <li>Kept open by two metal otter boards.</li> <li>With 4 ply cod end</li> </ul>

### Catch Pics...

### Interesting Species...

Interesting Species...



*Barathronus sp.*; this gelatinous specimen is probably undescribed. The genus falls under family Aphyonidae that lives below 700 meters.



*Bathypterois guntheri*; also known as tripod fish, eyes are very small and almost blind.



*Ipnops agassii*; only few specimens have been collected from Pacific. Almost blind, their eyes were degenerated and were covered with skin.

Ref. Aurora 2007 Cruise Rep. Kwang-Tsao Shao, Yun-Chih Liao, Academia Sinica, Taipei

Major References:



"Experiences and Thru Specimens Gathered During the deep-sea explorations conducted onboard the vessel"



Retention/Preservation of Specimens:



- Collected specimens of Deep Sea Fish, Crustaceans and other invertebrates for proposed BFAR-Museum are on display at BFAR-NMFDC Laboratory Building.
- This will serve as the Bureau's outreach material for Academic and research institutions.



Network of Fish Taxonomist / Technical Support for ID:

at National Level:

- Fisheries Academes
- BFAR Taxonomist – Coastal Fishes Only
- NGO's
  - Rudy Reyes, INCOFish, FishBase Project, Los Banos, Laguna, Philippines

Int'l Links:

- Dr. Tin-Yam CHAN, National Taiwan Ocean University, Keelung
- Mao-Yu LEE, Academia Sinica, Taipei
- Dr. Yun-Chih LIAO, Academia Sinica, Taipei
- Dr. Chia-Wei LIN, National Taiwan Ocean University, Keelung



Thank you very much...



**Annex 6F: Country Report of Thailand**

By Mr. Pirote Naimee

**Deep Sea Fishery in the Andaman Sea Thailand**

National paper prepared

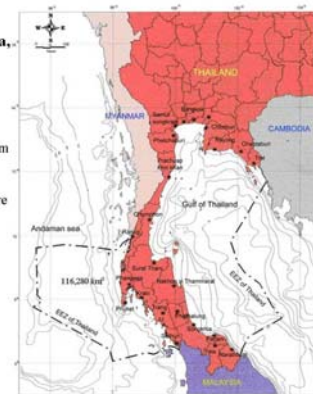
By

Pirote Naimee

Department of Fisheries, THAILAND

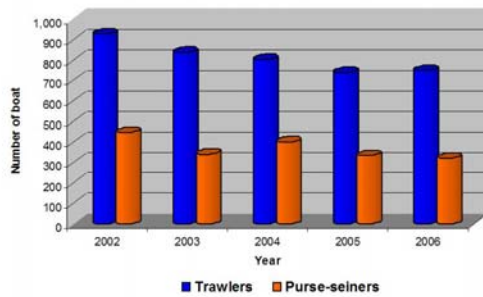
**Fishing ground in the Andaman Sea, Thailand**

- The coastline of Thailand along the Andaman Sea is approximately 945 km
- The EEZ of the country in this area are estimated 116,280 km<sup>2</sup>
- Marine fisheries comprise
  - inshore fisheries
  - offshore fisheries
  - oversea fisheries



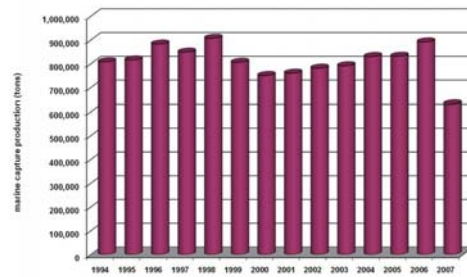
**Inshore Fishery Status in the Andaman Sea**

- Number of trawlers and purse-seiners in the Andaman Sea during 2002-2006



**Inshore Fishery Status in the Andaman Sea**

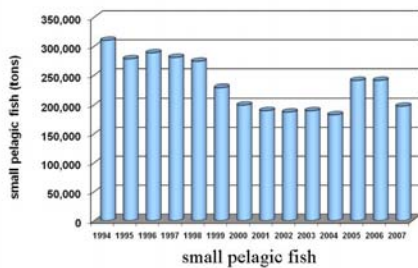
Marine capture production during 1994-2007



**Inshore Fishery Status in the Andaman Sea**

During 1994-2007, the main component of catch was

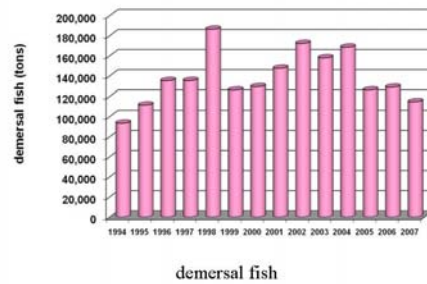
- small pelagic fish (22-38% of total catch)



**Inshore Fishery Status in the Andaman Sea**

During 1994-2007 the main component of catch was

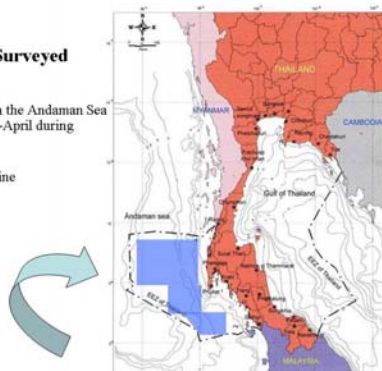
- demersal fish (12-21% of total catch)



**Offshore Fishery Surveyed**

The research survey area in the Andaman Sea were conducted in January-April during the year 1991-2008 with

- pelagic longline
- bottom vertical longline
- and deep sea trap

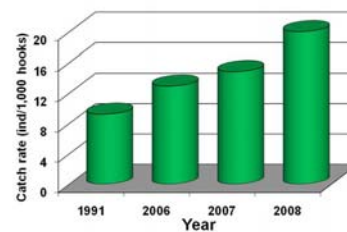


The research survey area in the Andaman Sea

**Offshore Fishery Surveyed**

**Pelagic Longline** Catch rate

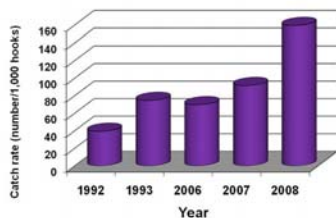
- 9.2 number/1,000 hooks in 1991
- 12.9 number /1,000 hooks in 2006
- 14.8 number/1,000 hooks in 2007
- 20.0 number/1,000 hooks in 2008



**Offshore Fishery Surveyed**

**Bottom Vertical Longline**

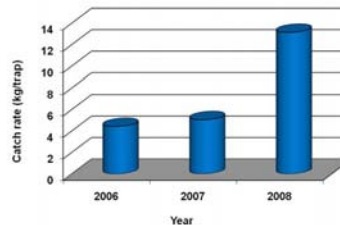
- Operate on rough bottom with rocky feature or else corral reef structure
- Sea depth was in the range of 70-200 m.
- The majority of fish caught were groupers and snappers



**Offshore Fishery Surveyed**

**Deep Sea Trap**

- Operated on the continental shelf of the Andaman Sea
- Catch rate
  - 4.42 kg/trap in 2006
  - 5.05 kg/trap in 2007
  - 13.14 kg/trap in 2008



**Annex 6G: Country Report of Vietnam**

By Mr. Nguyen Van Hung

## **Overview research on deep-sea in Vietnam**

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### **1. Overview**

- The research resources and ecosystem on deep-sea of Vietnam is very limitation
- It has not research topic on this issue, special impact of fishing on deep-sea marine ecosystem.
- Vietnam has about 16 thousand vessels capture fisheries on off-sea but the fishing grounds are normally distributes in shallow water around 50m

- It has not report on the biodiversity of benthic fauna on deep-sea
- Marine fish of Vietnam has the characteristics as being small. It found 2030 the salt – water fish species on Vietnam’s sea, including 1075 pelagic fish and 995 demersal fish
- Total marine fish biomass of Vietnam is at about 3.8-4.4 milion tons with the fishing capacity of 1.5 to 1.7 milion tons

### **2. Main gear used in Vietnam**

- The type of fishing gear used in Vietnam’s sea include: gills net, trawl net, push net, purse net, long line
- Capture on deep-sea: gills net and long line
- The trawl didn’t operate on deep-sea because fishing technology not allow gear operation at depth beyond 100 meter
- Bottom ecosystem of deep –sea hardly impact of fishing

### **3. Species of fishing**

- The species captured on deep-sea essential pelagic fish as tuna, mackerel, round scad, jach mackerel, billfish, marlin,...
- Average yield: 600 thousand tons/year

### **4. Direction development in the future**

- Have research topic on marine and ecosystem on deep-sea
- Development fishing technology on deep – sea
- Enhance collaboration capture fisheries with other country

**Thank you !**