## Sampling Gears Selection For Fisheries Resources Survey



Training Department Southeast Asian Fisheries Development Center

Photo by Somchai Munanuntsab/DOMCR

#### Presenter

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Presently, serving public as a special instructor in fishing gear technology for University students and advisor for the Thai Fishing gear Revisional Working group of the Department of Fisheries, Thailand.

When we design to conduct Fisheries resources survey;

• What would we like to know about fisheries resources in the expected area?

•How do we do?

• What should we know for the survey design?

•What types and size of vessels will be suitable to the survey?

•What kinds and size of fishing gears should be fitted with the designed survey?

#### Topics we should know for the fisheries resources survey designing ;

- Survey area

- Targeted fisheries resources

- Survey vessels

- Sampling fishing gears

- Operation time and periods

- Experienced survey examples

Tropical, subtropical, temperate, and polar, whereby the poleward part of temperate and the more temperate part of polar could be distinguished as subpolar



Fig.7.2 Climatic zonation of the open oceans. Zone boundaries tend to follow latitudes and line up with climatic belts on land. Temperature, seasonality, and budget (evaporation-precipitation balance) are the most important descriptors. Approximate temperatures of surface waters in °C shown at the boundaries.

#### Survey Area (Habitat)

Climatic zonation of the open ocean

- Tropical zone (latitude  $30^{\circ}$ S to  $30^{\circ}$ N)
- Subtropical zone ( Lat. 30°-45°N&S)
- Temperate zone ( Lat.  $45^{\circ} 55^{\circ}N\&S$ )
- Polar zone ( 60° up to the pole N&S)

Southeast Asia is located in the tropical zone and in the monsoon effective area.

Climatic zonation on Marine sediments.., slideplayer.com







#### • Type of water in the world

There are various places where usually fisheries resources is living;

- Ice at the polar both North & South
- Fresh water
- Brackish water (Estuary)
- Sea water (Marine), Sea and Ocean









#### Survey Area (Habitat)

#### Geography of the survey area

Roughly, sea and Ocean can be separated to two main parts;

- Neritic zone (on Continental shelf ),
- Shelf break (roughly ~ 200 m. depth)
- **Oceanic zone** (from Continental slope and further ).





#### **Survey Area** (Habitat) Geography of the survey area

- Neritic zone (on continental shelf)
- Oceanic zone ( beyond continental slope)



study blue.com



Southeast Asia is located in the tropical zone and in the monsoon effective area



Survey Area (Habitat)

#### Sea chart

• Check and confirm location of the survey area

Provide geographic information for example;

- Gulf of Thailand is a part of South China Sea and Pacific ocean,
  - Bottom depth contour, Bottom sediment





Survey Area (Habitat)

- Check and confirm location of the survey area
- Provide geographic information for example;
  - Andaman sea is a part of Indian ocean, Sea depth, Bottom depth contour,

Bottom sediment,

Coastal current, Current rip

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- Survey Area (Habitat)
- Sea chart
  - Check and confirm location of the survey area
  - For examples;
    - -Gulf of Thailand or
    - - Andaman sea
  - Set up grid for survey station is more useful, for examples;
    - 15 x 15 miles or smaller for near-shore waters and
      - 30 x 30 miles or larger for off-shore waters
  - Size of grid should be designed according to the survey area and target fisheries resources.



#### Survey Area (Habitat)

#### **Oceanographic factors;**

Current

Tidal

Range

Tidal

Amplidude=

1/2 Range

- **Coastal current/Tidal current**
- Semidiurnal tide / high & low 2 time in a day
- **Mixed tide** / mix of above and below
- **Diurnal tide** / high & low 1 time in a day
- Oceanic current /seasonal
- **Special Oceanographic phenomena** such as Internal soluton or soliton wave in Andaman sea and Sulu sea,



#### North-east North-teast Monsoon (October - February)





Overlaid drifting route of FADs and model of surface current during Oct. - Nov. in 1994 -96 and 1998



#### Survey Area (Habitat)

#### **Oceanographic factors;**

- Current
- Oceanic current /seasonal

Result from Tuna resources survey by M.V. SEAFDEC in 1994 – 1997.

Year 1997 was the year of EL-NIÑO







Andaman sea paper-esa publication / earth.esa.int



- Survey Area (Habitat)
- Oceanographic factors;
  - Current
  - Special Oceanographic phenomena

such as Internal soluton or soliton wave in Andaman sea and Sulu sea,



Internal soliton in the Andaman sea / science. sciencemag.org



Ocean layer & Time scavenger; timescavengers.blog

The Andaman sea



- Survey Area (Habitat)
- Oceanographic factors;
  - Water transparency

Transparency of sea water is related to the sun light, particles and nutrient in the water, which it could be related to fisheries resources too.



#### Survey Area (Habitat) Oceanographic factors;

- Water color
- Sea water near river mount is usually have discoloration at the front between fresh water from the river and sea water.

It show nutrient rich area in the coastal water.









#### Salinity; biol140m.weebly.com

#### • Survey Area (Habitat)

- Oceanographic factors;
  - Water salinity

Salinity is one of the most important factors that affects organisms and demonstrates a wide variation within estuaries, for examples ; spawning ground of sea bass (*Lates calcarifer*)and giant fresh water pawn (*Macrobranchium rosenbergii*).

Salinity Status	Salinity (%)	Salinity (ppt)	Use					
Fresh	< 0.05	< 0.5	Drinking and all irrigation					
Marginal	0.05 – 0.1	0.5 – 1	Most irrigation, adverse effects on ecosystems become apparent					
Brackish	0.1 – 0.2	1 – 2	Irrigation certain crops only; useful for most stock					
Saline	0.2 – 1.0	2 – 10	Useful for most livestock					
Highly Saline	1.0 – 3.5	10 – 35	Very saline groundwater, limited use for certain livestoo					
Brine	> 3.5	> 35	Seawater; some mining and industrial uses exist					

Source: Department of Water. Government of Western Australia.



- Survey Area (Habitat)
- Habitat and Ecosystems;
  - Neritic zone
    - Mangrove
    - Brackish water/ Estuaries
    - Rocky and sandy shore
    - Sea grass bed
    - Coral reef
    - Open sea (pelagic)









- Survey Area (Habitat)
- Habitat and Ecosystems;
  - Neritic zone
    - Open sea (pelagic)







- Survey Area (Habitat)
- Habitat and Ecosystems;
  - Neritic zone
    - Open sea (pelagic)

Schooling of feeding juvenile Indo-Pacific mackerel on surface of near shore open sea





• Survey Area (Habitat)

#### Habitat and Ecosystems;

Oceanic zone

•

- Open water
- Schooling of feeding Tuna on the surface in the Ocean









Depleted seamount near Hawaii; Phys.org





NUTRIENT-RICH WATERS and concentrations of plankton



Oceanexplorer.noaa.gov

- Survey Area (Habitat)
- Habitat and Ecosystems;
  - Oceanic zone
    - Shoal and Bank
    - Seamount



Policy & Ecosystem Restoration Sites.google.com



The mountain of the deep sea; awesomeocean.com



- Survey Area (Habitat)
- Habitat and Ecosystems;
  - **Oceanic zone** 
    - Deep sea



Most deep sea animals; upi.com Deep sea angler fish; montereybayaguarium.org







- Fisheries Resources
  - Pelagic resources
  - Demersal resources
  - Benthic resources



Open ocean diagram and zone; pinterest.com



#### **Fisheries Resources**

Pelagic resources













Fisheries Resources
Demersal resources













#### • Fisheries Resources

• Benthic resources



วงศ์หอยซองพลู Family Pinnidae หอยจอบ Flag pen shell Atrina vexillum











หอยคราง Rudder ark Scapharca indica



หอยตลับ Asiatic hard clam Meretrix meretrix



#### Survey vessel

(Type and size of survey vessel)

- Outboard motorized vessel
- Coastal fishing boat
- Governmental research vessel
- Organization research vessel













Survey vessel
(Type and size of survey vessel)
Outboard motorized vessel









Survey vessel
(Type and size of survey vessel)
Coastal fishing boat







#### • Survey vessel

(Type and size of survey vessel)

- Governmental research
   vessel
  - Coastal research vessel
  - High sea research vessel



กองสารวาจแหล่งประมงนอกน่านน้ำ กรมประมง





• Survey vessel

(Type and size of survey vessel)

Regional organization
 research vessel























#### Sampling fishing gears

#### General fishing gears

- Surrounding net
- Seine net
- Trawl net
- Lift net
- Falling net
- Gill net
- Trap
- Hook and lines
- Push net
- Dredge













#### Sampling fishing gears

Various kinds of fishing gear could be designed for the survey such as;

• Pelagic fishes resources should be

surrounding net, seine net, gill net, hook & lines

- Demersal fishes resources should be trawl net, bottom gill net, trap, hook & lines, push net
- Benthic resources should be

#### trap, dredges





North-east Monsoon (October - February)



10-

10.

20-

South-west Monsoon (May-October)

Southeast Asia is located in the tropical zone and in the monsoon effective area



- **Operation time and period of the survey** 
  - **Seasonal** (up to latitude location)

Dry or winter (~Nov.-Feb.) Summer (~Mar.-May.) Rainy (~Jun.-Sept.)

Monsoon; NE monsoon (Oct.-Feb.) SW monsoon (May-Oct.) Month;

1-12 month



- 24 hours
- Day and night
- Twilight



#### • Conclusion

The process to select sampling fishing gear for fisheries resources survey could be consider along the various information which have been mentioned from the beginning.







#### **Experiences survey samples**

 Fishes resources survey in and around coral reef and Artificial reef area, by trap, hand lines, bottom gill net and diving, SEAFDEC/TD.











- Experiences survey samples
  - Trap, hand lines, bottom gill net and diving were used to collected fishes samples from the survey area, because most of resources are demersal species which stay close to bottom of the sea and reef.

แหล่งทำประมงทะเลของประเทศไทย





#### **Experiences survey samples**

• A result from the collaborative research survey on **Fisheries Resources and Marine Environment in the Central Gulf** of Thailand in 2013 by M.V. SEAFDEC cruise No. 93-2/2013, SEAFDEC/TD.

A high potential area for Indopacific mackerel spawning ground was observed at latitude 10°-30.0'N to 11°-00'N and longitude 99°-50.0'E to 100°-20.0' E.

It is 55-60 meters depth of rough muddy bottom, off-shore of Chumporn Province, 45-60 miles away from shore.





#### **Experiences survey samples**

To collect fishes samples of Indopacific mackerel spawner from that fishing ground character,
 monofilament bottom gill net,
 day time operation should be designed for the survey.





SEAFDEC Interdepartmental Collaborative Research Program



## • Experiences survey samples

 Fishes resources survey in South China sea and the Gulf of Thailand 1995 – 2000 by M.V.
 SEAFDEC, SEAFDEC/TD.





- Experiences survey samples
  - Squid jigging, trap and bottom vertical long line were used to collected fishes samples of the survey.











#### **Experiences survey samples**

• Generally the Department of Fisheries, Thailand conduct demersal fishes resources survey in the Gulf of Thailand and Andaman sea by **Bottom trawl**.









#### **Experiences survey samples**

 The Department of fisheries, Thailand has conducted large pelagic fishes resources survey in the Andaman sea and Indian ocean by **Tuna long line (Pelagic long line),** also shore survey from commercial long liners was conducted too.







#### **Experiences survey samples**

 Large pelagic fishes resources survey in the Andaman sea and Indian ocean was conducted by Tuna long line (Pelagic long line), Department of Fisheries, Thailand.











#### **Experiences survey samples**

 Large school pelagic fishes resources survey in the Indian ocean was conducted by **Tuna purse seine** on board **Nippon-Maru**, JAMARC/Japan in 1992.







#### **Experiences survey samples**

Large school pelagic fishes resources survey in the Indian ocean was conducted by **Tuna purse seine** on board **Nippon-Maru**, JAMARC/Japan in 1992.





1975 – 1995									
Month/Year	Survey Vessel	Depth (m)	Location	Survey Fishing Gear	Objective	Result			
March 1975	R.V. Fisheries Research No. II/DOF GT - 380 T Hp - 1,000 Ps	200 – 500	6° N – 12° N	Bottom trawl net 22/32 m. Head rope and Ground rope, mesh size 30 mm. at cod end. 21 survey stations were conducted.	Demersal Fisheries Resources Survey	Average catch 175 kgs/hrs. Max. 586 kgs/hrs. 75 species of fish – 12-15 unknown samples 30 species of Shrimp 5-6 species of Squid and Crab Main catch Fish – Chloropthalmus Corniger – Synagrops malaynus Shrimp – Heterocapus laevigatus – H. ensifer Spiny lobster – Puerulus sewelli			
February 1976	R.V. Fisheries Research No. II/DOF GT - 380 T Hp - 1,000 Ps	300 – 500	7° N – 10° N	Deep Sea Pot Rectangular, Prism shape 60 x 60 x 120 cm. mesh size 15 mm. 58 pots, Emersion time - 8 hrs. (6 - 18 hrs.)	Deep Sea Shrimp Resources Survey	Catch Total Max. 8.8 kg./p Shrimp 0.9 kg./p H. loseigatus H. ensifer Good fishing gruond – 400 m.			
August – September 1987	M.V. Paknam/SEAFDEC GT - 386.82 T Hp - 1,000 Ps	400 m. (200 – 1,000 m.)	7º N	Bottom trawl net 30 – 40 m. Head rope and ground rope mesh size 40 mm. at cod end	Training Cruse Demersal resources survey, Bottom topography survey of Andaman Sea	Catch 150 - 300 kg./hrs. Topography - 200 - 350 slope - 350 - 500 smooth (flab) - 500 over slope - 350 - 450 most appropriate for bottom trawl			
January - March 1988	M.V. Platoo/SEAFDEC GT - 67 T Hp - 500 Ps	100 - 250	6° N – 7° N	Bottom Vertical Long line (BVL)	Resource Survey and Training Cruise	Snapper, Grouper, Spiny dogfish (Squalus spp.)			
February 1990	M.V. Paknam/SEAFDEC GT - 386.8 T Hp - 1,000 Ps	200 - 400	6° N – 9° N	Deep Sea Pot Hemispherical shape Dia. 100 cm. mesh size 30 mm. 30 – 90 pic/1 ET. 12 – 14 hrs.	Resource Survey and Training Cruise	Catch Shrimp caught at most appropriate 300-400 m. Heterocapus siboge H. lepidus			
March 1994	$\begin{array}{l} \textbf{M.V. SEAFDEC/SEAFDEC} \\ \textbf{GT} = 1,178 \text{ T} \\ \textbf{Hp} = 2,800 \text{ P}_5 \end{array}$	150 - 250	6° N – 9° N	BVL and Deep Sea Pot Hemispherical shape Dia. 80, 150 cm. mesh size 30, 120 mm.	Resources Survey and Training Cruise	Deep Sea shrimp - Hag fish. - Rat tail - Conzer eel			

Deep Sea Fisheries Survey Experience in Andaman Sea

# Experiences survey samples

• Deep sea fisheries resources survey in the Andaman sea.







#### • Experiences survey samples

Deep sea Fishes resources survey in the Andaman sea was conducted by **Bottom trawl** on board M.V. Paknam in 1987 and M.V.SEAFDEC II in 2012, SEAFDEC/TD.











#### **Experiences survey samples**

 Deep sea Fishes resources survey in the Andaman sea was conducted by Bottom trawl on board M.V. SEAFDEC II in 2012, SEAFDEC/TD.











THE GOOD BOTTOM TOPOGRAPHY FOR BOTTOM VERTICAL LONGLINF



- Experiences survey samples
  - Deep sea Fishes resources survey in the Andaman sea at the continental shelf break was conducted by bottom vertical long line(BVL) on board M.V. Platoo in1988, SEAFDEC/TD.





#### Experiences survey samples

Bottom long line Operation

Bottom vertical long line and their accessories

 Deep sea Fishes resources survey in the Andaman sea at the continental shelf break, bottom vertical long line(BVL) is suitable for the sampling fishing gear.

> - J hook/Circle hook - Pressure resistant Plastic Float - Sinker 500-700 g - Wooden box - 3 branch line / box - 6 hook / branch line

CONSTRUCTION AND GEAR DEVELOPMENT





#### **Experiences survey samples**

#### Survey from Stationary Fishing gear

 Coastal fishes resources survey, development and management through Set-Net fishing , SEAFDEC/TD.











#### • Experiences survey samples

• Set-Net is a stationary fishing gear which is good for coastal fishes resources survey on migratory species and develop further fisheries resources study programs, SEAFDEC/TD.









#### • Experiences survey samples

- Coastal fishes resources survey, development and management through **Set-Net fishing**, SEAFDEC/TD.
  - To study biology of fishes, further programs could be extended such as;
    - Fish migration by Tagging program
    - Fishes artificial breeding, hatchery and nursery care programs could be done.



#### **Experiences survey samples**

- Coastal fishes resources survey, development and management through **Set-Net fishing**, SEAFDEC/TD.
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