



**The 2<sup>nd</sup> Meeting of the Project Steering Committee for  
the SEAFDEC/UNEP/GEF Project on Establishment and Operation of a Regional System of  
Fisheries *Refugia* in the South China Sea and Gulf of Thailand**

5<sup>th</sup> – 6<sup>th</sup> November 2019

Pullman Hotels and Resorts, MIRI, SARAWAK, MALAYSIA

**BEST PRACTICE FISHING GEARS AND METHODS  
AND WORKPLAN FOR DEMONSTRATION AND PROMOTION**

PCU FOR FISHERIES REFUGIA

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

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

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

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

Push netting and inshore trawl fishing causes habitat impacts and selectivity issues. Catches in these gear types from inshore waters are largely composed of juveniles, and at high fishing effort levels are

thought to contribute to growth over-fishing in South China Sea basin. Such a situation hinders fisheries management efforts which largely focus on development of sustainable livelihoods and is a key threat in inshore where push nets are used extensively over seagrass beds to take juveniles of the economically important species.

Digging and gleaning of seagrass beds and mangrove forests is an area of concern at a majority of the priority refugia sites in the South China Sea. Growing demand for seafood in local markets has resulted in a marked increase over recent years in the number of people digging for sipunculid worms, gastropods, and crustaceans in the seagrass beds, leading to damage of seagrass plants, destabilisation of sediments (and subsequent erosion), and the over-exploitation of benthic organisms. Intensive digging and grazing in some mangrove areas is considered to be contributing to the occurrence of dwarf, low-density mangrove stands at several sites due to disturbance of mangrove roots and seedlings.

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

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

Taking into accounts above concerns, this project entitled “Establishment and Operation of a Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand” has been developed to meet this need via implementation of the fisheries component of the Strategic Action Programme for the South China Sea. The project comprises of the following 4 components as;

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

Focusing to Component 2, the objective of this component is focused on strengthening the enabling environment for the formal designation and operational management of refugia. Additionally, the component will lead to considerable stress reduction. Specifically, the demonstrations of best practice fishing methods and practices aimed at addressing key threats to fish stock and critical habitat linkages, and the adoption of supporting laws, will result in a 20% increase in vessels applying improved gear/techniques to safeguard fish stock and critical habitat linkages at priority sites. This component has identified one important national level activities on Targeted demonstration activities which stated

in the component 2.9. This Activities will support, guide and building up the National Lead Agencies in establishing coastal fisheries management systems in priority fisheries refugia including create a trial approaches to reducing the effects of trawl and push net fishing on seagrass habitat, as well as to test the use of fishing gear and practices that reduce the capture of juveniles, pre-recruits and fish in spawning condition.

#### **IV. THE RESULT MATRIX OF THE CAUSAL CHAIN ANALYSIS AND POSSIBLE MANAGEMENT ACTION**

In year 2017-2018, The national lead agency of fisheries from 4 of 6 implementing countries have organized a series of multi-stakeholder consultation at the selected refugia sites including Kep province, Kampot province and Koh Kong province in Cambodia, Trat province and Surat Thani in Thailand, Bolinao, Mazinloc and Coron in Philippine, Kuala Baram and Tanjung Leman in Malaysia. The multi-stakeholder consultation at the local site was aimed to compiling the information, suggestion and issue on the coastal habitat from all local resource users. One objective of the consultations was focused on the threat to fish life cycle from fisheries base on the experiences from all stakeholders through casual chain analysis methodology. The result matrix of the causal chain analysis and possible management action solution is concluded as shown in **APPENDIX 1**.

#### **V. POSSIBLE SOLUTIONS ON THE BEST PRACTICES ON FISHING GEARS AND METHODS**

To support the achievements of the component 2 on Improving the management of critical habitats for fish stocks of transboundary significance via national and regional actions to strengthen the enabling environment and knowledge-based fisheries refugia management in the South China Sea and Gulf of Thailand, the SEAFDEC/PCU reviewed possible solutions of the best practices on fishing gears and methods for example the FAO technical guidelines for responsible fisheries No. 4 Suppl. 2: the Ecosystem Approach to Fisheries (FAO, 2003), where the matrix of the options to manage fishing was summarized as shown in the **APPENDIX 2**.

Additionally, the Southeast Asian Fisheries Development Center (SEAFDEC) have long experienced through implementing various activities on the innovation on improvement of fishing gear and practice for sustainable management of fisheries in Southeast Asia. The possible solutions on the best practices on fishing gears and methods developed by SEAFDEC are concluded as shown in **APPENDIX 3**.

#### **VI. PROMOTION AND DEMONSTRATIONS ON THE BEST PRACTICING GEAR/METHODS**

Reference to the proposed regional activities to support and promote the best practices on fishing gear and methods focusing not only in the refugia sites but vicinity nearby the site which aims to reduce the impact from fishing gears to fisheries resources and refugia site. The PCU in collaboration with the SEAFDEC/Training Department proposes to work closely with country on fishing gear modification and fishing practice improvement to support an Establishment of fisheries refugia at country levels. The objectives on these regional activities are: 1) to demonstrate the best practice fishing method such as JTEDs for demersal and small pelagic fishes, modification of Crab-trap, elongated collapsible trap for demersal fishes, and others requested by country; 2) to identify the trial approaches to reducing the effects of destructive fishing at priority refugia site especially on seagrass habitat, as well as to test the use of fishing gear and practices that reduce the capture of juveniles, pre-recruits and fish in spawning condition; and 3) to address key threats to fish stock and critical habitat linkages and provide capacity to the site-based management board and local fisher.

This matter has been addressed at the RSTC2 on the requested from country for promotion and demonstrations of best fishing practices based on the appendix 1, 2 and 3. The PCU is planning to conduct the survey and demonstration and provide the awareness capacity for improving of fishing gears and methods. The PCU will select another refugia sites to work with country on promotion of the best fishing practices in the participating countries. The activities

The tentative workplan for surveys and demonstration of best practices gear/methods is as follows:

Activity	Workplan by Country (from Q4/2019-Q3/2020)					
	CAM	ID	MY	PH	TH	VN
1. Workshop on demonstration of best Practice fishing gear and methods	Q4/19	TBC	TBC	TBC	TBC	TBC
2. Specific Research: Impacts of Elongated Collapsible Trap fishery in Kep Cambodia	Q1/20	TBC	TBC	TBC	TBC	TBC
3. Specific Research: Best practices for Blue swimming crab fisheries	TBC	TBC	TBC	TBC	Q4/19	TBC
4. Others (will be updated)						

Remarks: TBC : To be confirmed

Please be noted that the results of the specific research in requested country can be lesson learned for other country in near future. The Demonstration and promotion of best fishing gears and method including the promotion of the specific research program are depended upon the availability of regional budget for this program.

## VII. CONSIDERATION AND ADVISE FROM PSC

- The Committee is requested to take notes and apply the results mentioned in the Appendix 1, 2 and 3 for improving the existing fishing gears and methods that impact to environment and fisheries refugia site;
- The Committee is welcomed to provide the comments, suggestions, advise to the PCU on their required specific research to improve the specific fishing gear and methods to ensure that there is no irresponsible fishing gears in the sites;
- The committee is requested to endorse the revised tentative workplan by countries (if any amendment and/or proposed proposal by Country).

## APPENDIX 1. The Result Matrix of the Causal Chain Analysis and Possible Management Action

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

				<ul style="list-style-type: none"> <li>Over fishing</li> </ul>	<ul style="list-style-type: none"> <li>Use of inappropriate fishing gear</li> <li>Small Mesh elongated collapsible trap</li> <li>Purse seine trawlers</li> <li>Unsustainable fishing gears</li> </ul>	<ul style="list-style-type: none"> <li>High market demand</li> </ul>	<ul style="list-style-type: none"> <li>Strengthening law enforcement</li> <li>Fisheries law extension</li> <li>Creation of conservation area</li> <li>Strengthening patrolling and monitoring</li> </ul>
Kampot	Grouper ( <i>Epinephelus spp.</i> )	Adult	<ul style="list-style-type: none"> <li>Declining fish</li> <li>Habitat destruction</li> </ul>	<ul style="list-style-type: none"> <li>Mouse tailed trap</li> <li>Trawler with ball light</li> </ul>	<ul style="list-style-type: none"> <li>High demand</li> <li>High price in market</li> </ul>	<ul style="list-style-type: none"> <li>Strengthening law enforcement</li> <li>Strengthening patrolling group</li> <li>Strengthening cooperation with relevant stakeholders</li> <li>Establishing fisheries refugia</li> </ul>	
	Grouper ( <i>Epinephelus spp.</i> )	Fingerlings (October to December)	<ul style="list-style-type: none"> <li>Declining of fingerlings</li> <li>Habitat destruction such as sea grass, coral reef, and mangrove forest</li> </ul>	<ul style="list-style-type: none"> <li>Mosquito (Small) net fishing gear</li> <li>Push net fishing with electric</li> <li>Mouse tailed trap</li> <li>Trawler with ball light</li> <li>Hand Push net</li> </ul>	<ul style="list-style-type: none"> <li>High Demand from cage culture</li> <li>High price in market</li> </ul>	<ul style="list-style-type: none"> <li>Strengthening law enforcement</li> <li>Strengthening patrolling group</li> <li>Strengthening cooperation with relevant stakeholders</li> <li>Establishing fisheries refugia</li> <li>Strengthening the extension to fish seed traders</li> <li>Replanting flooded forest (Wetland)</li> </ul>	
Koh Kong	Mackerel	Spawning (November to January at Koh Kapi, Prek 3& 2, Boeung Kachang, Koh Yor, and Koh Nou)	<ul style="list-style-type: none"> <li>Habitat loss</li> <li>Over fishing</li> </ul>	<ul style="list-style-type: none"> <li>Illegal fishing</li> <li>Mackerel gill net with small mesh size</li> <li>Light Luring fishing</li> <li>Purse seine net and trawlers from neighboring country</li> <li>Trawlers with small mesh size net from 2.5 to 3cm</li> </ul>	<ul style="list-style-type: none"> <li>High market demand in neighboring country</li> <li>Destructive fishing gears</li> <li>Illegal fishing from outside area</li> </ul>	<ul style="list-style-type: none"> <li>Establishment of fisheries refugia</li> <li>Strengthening patrolling group to make MCS</li> <li>Strengthening law enforcement</li> <li>Extending fisheries law</li> <li>Making co-operation with relevant stakeholders</li> </ul>	

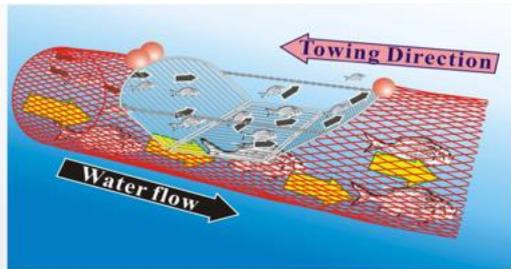
							<ul style="list-style-type: none"> <li>• Strengthening transboundary-bilateral operation</li> </ul>
Thailand	Trat	Indo-Pacific mackerel	Whole life cycle	<ul style="list-style-type: none"> <li>• Overfishing</li> <li>• Destructive fishing gears (e.g. giant trawls)</li> </ul>	<ul style="list-style-type: none"> <li>• Illegal fishing</li> <li>• Invasion of foreign fishing</li> <li>• Fishing by foreigner workers</li> <li>• High market demand</li> <li>• Needs of small size for processing</li> </ul>	<ul style="list-style-type: none"> <li>• Increasing number of small-scale fishing boats altered from the commercial ones</li> <li>• Non-cooperation of some fishing group</li> <li>• Lacking in fisheries conservation awareness</li> <li>• Insufficiency of public authority</li> <li>• Overlapped functions of relevant public authorities</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthening fisheries law enforcement</li> <li>• Creating conservation areas (restricted fishing gear)</li> <li>• Increasing awareness</li> <li>• Promoting participatory approach fisheries management</li> <li>• Empowering the communities on community base fisheries management</li> <li>• Promoting community regulations for fisheries management</li> <li>• Promoting fishing eco-tourism</li> <li>• Establishing aquatic animal banks</li> <li>• Rehabilitating and establishing fisheries habitat</li> <li>• Promoting mesh size restriction</li> </ul>
	Surat Thani	Blue swimming crab	Whole life cycle	<ul style="list-style-type: none"> <li>• Use of Unsustainable fishing gears</li> <li>• Overfishing</li> </ul>	<ul style="list-style-type: none"> <li>• Illegal fishing</li> <li>• Fishing of small-size crabs in seagrass bed</li> <li>• Small mesh-size nets</li> </ul>	<ul style="list-style-type: none"> <li>• Illegal fishing</li> <li>• High market demand</li> <li>• Lacking in fisheries conservation awareness</li> <li>• Low water quality</li> <li>• Climate change</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthening fisheries law enforcement</li> <li>• Establishing crab bank</li> <li>• Creating conservation areas</li> <li>• Creating awareness</li> </ul>

Philippine	Bolinao	Rabbit fish ( <i>Siganus spp.</i> )	juveniles	<ul style="list-style-type: none"> <li>Over harvesting of juveniles</li> </ul>	<ul style="list-style-type: none"> <li>high demand of fish paste</li> </ul>	<ul style="list-style-type: none"> <li>Easy source of income for marginal fisherman</li> </ul>	<ul style="list-style-type: none"> <li>Size regulation on the harvesting of Rabbit fish &amp; provision of supplemental livelihood</li> </ul>
	Mazilloc	Frigate tuna ( <i>Auxis spp.</i> )	Pre-recruits / Juvenile	<ul style="list-style-type: none"> <li>Overfishing, use of fine mesh nets</li> </ul>	<ul style="list-style-type: none"> <li>FADs fishing</li> </ul>	<ul style="list-style-type: none"> <li>Due to high demand</li> </ul>	<ul style="list-style-type: none"> <li>FAD Management plan, Mesh size regulation</li> </ul>
	Colon	Fusilier fish		<ul style="list-style-type: none"> <li>Decreasing of fish</li> <li>Loss of coral habitat</li> </ul>	<ul style="list-style-type: none"> <li>Unsustainable fishing practice:                             <ul style="list-style-type: none"> <li>Use of cyanide in the live reef fish industry</li> <li>Blast fishing</li> <li>Non-selective fishing gear and practices</li> <li>Collection of corals as sinker</li> <li>Solid waste pollution</li> </ul> </li> </ul>		
Malaysia	Kuala Baram, Sarawak	Tiger Prawn ( <i>P. monodon</i> )	Juvenile	<ul style="list-style-type: none"> <li>deforestation</li> </ul>			
			Pre-recruit	<ul style="list-style-type: none"> <li>Shrimp push net &amp; bag net</li> </ul>			
			Adult	<ul style="list-style-type: none"> <li>Trawl net</li> </ul>			
			Spawning	<ul style="list-style-type: none"> <li>Trawl net</li> </ul>			
	Tanjung Leman, Johor	Lobster ( <i>Panulirus spp.</i> )					

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

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

APPENDIX 3: Possible solution for best practices on fishing gear and methods promoted by SEAFDEC

<p><b>Juvenile and Trash Excluder Devices</b></p> <ul style="list-style-type: none"> <li>• Fishing Gear: Bottom Trawls</li> <li>• Methods: Filtering and releasing fish</li> <li>• Target: juvenile or small fishes</li> </ul>	 
<p><b>Turtle Excluder Devices:</b></p> <ul style="list-style-type: none"> <li>• Fishing Gear: Bottom Trawls</li> <li>• Methods: Filtering and releasing</li> </ul> <p>Target: marine turtle</p>	 