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SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER

TIMETABLE OF SEAFDEC SEMINAR 2018

19 December 2018

ASEAFDEC-NACA Meeting room, SEAFDEC Secretariat, Bangkok

0830-0900	Registration
0900-0910	Opening Ceremony <i>by SEAFDEC Secretary-General</i>

Session I: Research

Moderator: Ms.Thanyaluk Suasi

0910-0930	The Review Situation on Port State Measures in Thailand, Myanmar and Vietnam (<i>by Mr. Kongpathai Saraphaivanich</i>)
0930-0950	Understanding of Gender situation in small-scale fisheries of Kep Province Cambodia (<i>by Ms. Jariya Sornkliang</i>)
0950-1010	The Survey of Fish Enhancing Devices (FEDs) in the Coastal Area, Thailand (<i>by Mr. Santipong Putsa</i>)
1010-1040	<i>Refreshment</i>
1040-1100	Large Parasites of Brown-Banded Bambooshark <i>Chiloscyllium punctatum</i> from the Gulf of Thailand (<i>by Ms. Wiriyā Chairōj</i>)
1100-1120	Density and Distribution of Fish Larvae in Gulf of Thailand (<i>by Ms. Patompon Putpipat</i>)
1120-1140	Comparison of the catch and income from the crab gillnet Fishery between summer and rainy season around the Laem Phak Bia coast, Petchaburi province (<i>by Mr. Narinchot Akompat</i>)
1140-1200	Survey of push net fishing targeting krill (Sergestidea) of a Samutsakhon province commercial boat (<i>by Mr. Kadpon Kumutjurai and Mr. Krittanat Sirinanunth</i>)
1200-1220	Study on tuna longline fishery in Phuket province (<i>by Ms. Rattanakorn Buranawanich</i>)
1220-1240	Sustainable Management of Blue Swimming Crab in Thailand (<i>by Ms. Praulai Nootmorn</i>)
1240-1330	<i>Lunch</i>

Session II: Project Implementation

Moderator: Ms. Saivason Klinsukhon

1330-1350	Human well-being development in Kampot province, Cambodia through applying EAFM process (<i>by Ms. Kanokwan Thobphuk</i>)
1350-1410	Co-management project implementation in Nam Xouang Reservoir (<i>by Ms. Rattana Tiaye</i>)
1410-1430	The Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand onboard M.V.SEAFFDEC2 (<i>by Ms. Siriporn Pangsorn</i>)
1430-1450	Activities onboard Umitaka Maru on the 21th Kaiyodai Antarctic Research Expedition (KARE21, UM-17-09) (<i>by Ms. Pontipa Luadnakrob</i>)
1450-1510	Introduction to SEAFDEC repository (<i>by Mr. Satana Duangsawasdi</i>)
1510-1540	Refreshment
1540-1555	Awards Presentations for Outstanding Presenters and Papers
1555-1600	Closing Ceremony <i>by Dr.Yuttana Theparoonrat</i>

Time Keeper: *Mr.Tanapat Sorragittayamate*

Master of Ceremony (MC): *Mr.Krit Phusirimongkol*

Situation on Port State Measures in Myanmar, Thailand, and Viet Nam

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Introduction

The importance of Port State Measures (PSM) is highlighted in the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA-IUU) adopted by the FAO Committee on Fisheries (COFI) in 2001. PSM has been identified as an effective means of combatting illegal, unreported and unregulated fishing, and the need to build capacity and develop human resources to implement port state measures had been emphasized. Later, the FAO Conference in 2009 adopted Resolution 12/2009 approving the FAO Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (PSM Agreement), as a legally binding instrument. The PSM Agreement aims to “prevent illegally-caught fish from entering international markets through ports.” To do so, port State needs to take actions on restriction of entry in port, use of port, access to port services, among others. In addition, inspection and other enforcement activities are also included in the PSM Agreement. At the regional scene, the importance of PSM in combating IUU fishing in the Southeast Asian region has been well recognized by the Senior Officials adopted the Plan of Operation on Sustainable Fisheries for Food Security for the ASEAN Region towards 2020 in June 2011, which includes a provision on the need to “build up capacity among Member Countries, including functions for regional and sub-regional cooperation, to meet effectively the requirements of Port State Measures and Flag State responsibilities.” SEAFDEC together with its collaborating partners, is therefore building up the capacity of the ASEAN countries to enable them to implement Port State Measures, and ultimately combat IUU fishing in their respective waters.

In support of the implementation of PSM for the Southeast Asian region, and in anticipation of the entry to enforce the PSM and the need for strengthened regional cooperation, the SEAFDEC Training Department (TD) implemented the project “Promotion of Countermeasures to Reduce IUU Fishing.”

Methodology

This paper was reviewed from the Experts Group Meeting on Port State Measures in Southeast Asia (2012), Expert Meeting on Regional Cooperation to Support the Implementation of Port State Measures in Southeast Asian Region (2016), Workshop on Regional Cooperation for Implementation of Port State Measures to Improve Fisheries Management and Reduce IUU Fishing in Southeast (2016), and The Regional Training on Port State Measures Implementation in Southeast Asia (2018).

Result

Under the project “Promotion of Countermeasures to Reduce IUU Fishing,” PSM Activities had been promoted in the ASEAN Member States (AMSs) through series of meetings and workshops organized by TD including the “Experts Group Meeting on Port State Measures in Southeast Asia” in November 2012, “Expert Meeting on Regional Cooperation to Support the Implementation of Port State Measures in Southeast Asian Region” in February 2016, and “Workshop on Regional Cooperation for Implementation of Port State Measures to Improve Fisheries Management and Reduce IUU Fishing in Southeast Asia” in November

2016. The Result of the preliminary assessment of the current status as shown in Table 1, Myanmar and Thailand signed the instrument of accession to the PSM Agreement.

Table 1: Status of implementation of PSM

Countries	Status
<ul style="list-style-type: none"> Myanmar 	<ul style="list-style-type: none"> - Signed for accession the FAO Agreement in 2010 - Designated five (5) ports for foreign fishing vessels which operate in Myanmar Exclusive Economic Zone (EEZ) - Decree laws and regulations to support PSM implementation - Local and foreign fishing vessels should be inspected in check points before entering landing sites - Implement check point as one stop service to inspect fishing vessels when they go to fishing ground and come back to the port - Implementation of catch certification scheme under EC regulation - Preparing NPOA-IUU linked to the PSM Agreement
<ul style="list-style-type: none"> Thailand 	<ul style="list-style-type: none"> - Signed instrument of Accession to the 2009 FAO PSM Agreement on 10 May 2016 - 22 ports have been designated for PSM - Implemented pilot project on PSM at Phuket in 2012-2014 - Significant enforcement activities - Requirements prior to port entry - Relevant activities to PSM (Traceability System, MCS, Processing Statement Validation) - Decree laws and regulations to support PSM implementation - Development of NPOA-IUU with support to PSM implementation - Developing “Processing Statement and PSM Linked System” (PPS) - Updated inspection manual based on information provided by MoU and NPCI
<ul style="list-style-type: none"> Viet Nam 	<ul style="list-style-type: none"> - No designated port for foreign fishing vessels - Required information prior to port entry - Law, decree and regulation to support PSM implementation - Development of NPOA-IUU with support to PSM Implementation

Moreover, Constraints/problems, challenges, and priority activities were identified to address the issues on the following: operational, legal, human resources, infrastructure, information, and measures related to PSM implementation (Table 2).

Table 2: Constraints/problems encountered of three (3) countries that hinder the implementation of PSM

Constraints/ Problems	M M	T H	V N	
Operational				
<ul style="list-style-type: none"> - Lack of Standard Operating Procedure (SOP) in implementing the PSM with any scale of foreign vessels 	X		X	Challenges <ul style="list-style-type: none"> - Revision and reorganization of fishing port operational procedures to support PSM - Development and updating of harmonized SOPs on vessel inspection at port for guidance of all AMSs - Identification of the needs and capacity building required for staff concerned on relevant aspects on PSM implementation

Constraints/ Problems	M M	T H	V N	
				<p>Difficulties in verification of vessel documentation and inspection</p> <p>Priority Activities</p> <ul style="list-style-type: none"> - Training and development of guidelines on how to come up with a robust PSM inspection and surveillance system (<i>e.g.</i> how to determine the high risk vessels and how many vessels to inspect) - Addressing specific request for training support for the whole set of SOPs on vessel inspection at port - National workshops that will pull together agencies involved in PSM to develop national SOPs for inter-agency coordination - Updating of existing SOPs on inspection of fishing vessels and fish carriers at port to harmonize with laws which support the implementation of PSM
<p>- Port management under different agencies leads to insufficient inter-agency cooperation for PSM implementation</p>	<p>X</p>		<p>X</p>	<p>Challenges</p> <ul style="list-style-type: none"> - Sharing of information on vessel entry permit among concerned agencies such as the Department of Fisheries (DOF), Harbor Department, Custom, Fisheries Market Organization (FMO), <i>etc.</i> - Establishment of ASEAN Fish Market Federation (AFMF) to promote and implement the ASEAN Catch Documentation Scheme (ACDS) <p>Priority Activities</p> <ul style="list-style-type: none"> - Establishment of good coordination between enforcement agencies and concerned agencies - Strengthening of cooperation between the government agencies and owners of private ports
Legal				
<p>- Challenges with regards to implementation of laws and regulations</p>		<p>X</p>	<p>X</p>	<p>Challenges</p> <ul style="list-style-type: none"> - Inconsistent interpretation of laws - Amendment on updating of existing regulations - Review and updating of Fishery Acts <p>Priority Activities</p> <ul style="list-style-type: none"> - Analysis to identify the gaps in current legislation - Food And Agriculture Organization of the United Nations (FAO) to provide technical assistance in reviewing legislative systems - National meeting on updating of laws and regulations to support PSM
<p>- Challenges in</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p>Challenges</p>

Constraints/ Problems	M M	T H	V N	
interpretation of the PSM Agreement				<ul style="list-style-type: none"> - Incomprehensive interpretation of non-fisheries stakeholders of laws and regulations - Need for Memorandum of Understanding (MOU) between concerned government agencies - Need for assistance for the law enforcement officers and managers from legal officers of FAO in the correct interpretation of the provisions of PSM - Need for assistance in the correct translation of PSM Agreement into local language <p>Priority Activities</p> <ul style="list-style-type: none"> - Review to clarify if the following are covered under the Agreement on the Port States Measures (PSMA). If they are, what are the expectations to do and provide workshops that cover inspections in these areas? <ul style="list-style-type: none"> o Are land and airport of entries included in the PSMA? o Are container ships included in the PSMA? - Training on implementation of PSMA which aims to acknowledge and understand the importance of implementation of PSMA
Human Resource				
- Limited capacity of implementation due to inadequate facilities and officers concerned	X	X	X	<p>Challenges</p> <ul style="list-style-type: none"> - None <p>Priority Activities</p> <ul style="list-style-type: none"> - Development of capabilities across all levels (<i>e.g.</i> policy makers, port managers, inspectors, <i>etc.</i>) - Technical support on how to operate communication equipment
Infrastructure				
- Insufficient infrastructure for upgrading infrastructures to support PSM	X	X	X	<p>Challenges</p> <ul style="list-style-type: none"> - None <p>Priority Activities</p> <ul style="list-style-type: none"> - Assistance to set-up or upgrade electronic databases and systems (<i>e.g.</i> electronic ASEAN Catch Documentation Scheme (eACDS), database to record catch, Vessel Monitoring System (VMS), Monitoring, Control and Surveillance (MCS), Global Positioning System (GPS), Automatic Identification System (AIS), and other communication systems) - Understanding on the requirements and criteria for appropriate designated ports
- Insufficient budget for	X		X	<p>Challenges</p> <ul style="list-style-type: none"> - None

Constraints/ Problems	M M	T H	V N	
upgrading infrastructures to support PSM				<p>Priority Activities</p> <ul style="list-style-type: none"> - Establishment of budget to set-up or upgrade electronic database and systems (<i>e.g.</i> eACDS, database to record catch, VMS, MCS, GPS, AIS, and other communication systems) - Request FAO to finance the development and implementation of port management system in respective AMS
Information				
- List of IUU fishing vessels from RFMOs is not updated	X	X	X	<p>Challenges</p> <ul style="list-style-type: none"> - Encouraging “traders” to cooperate with AMSs through information and education campaigns - Sharing of information such as catch, fishing vessels, and fishing gears through sharing of experience in PSM implementation among the AMSs - Information sharing on rules and regulations for inter-agencies collaboration and implementation - Creation of a “rapid alert system” for ASEAN (through mobile application if available) Establishment of the ACDS <p>Priority Activities</p> <ul style="list-style-type: none"> - Publication by FAO of a consolidated list of IUU fishing vessels on its website and removal of the need for countries to check various Regional Fisheries Management Organization (RFMO) of international organization websites
- Lack of awareness among stakeholders and concerned agencies about PSM	X	X	X	<p>Challenges</p> <ul style="list-style-type: none"> - Encouraging “traders” to cooperate with AMSs through information and education campaigns - Sharing of information such as catch, fishing vessels, and fishing gears through sharing of experience in PSM implementation among the AMSs - Information sharing on rules and regulations for inter-agencies collaboration and implementation - Creation of a “rapid alert system” for ASEAN (through mobile application if available) - Establishment of the ACDS <p>Priority Activities</p> <ul style="list-style-type: none"> - Capacity building and awareness raising among government agencies and relevant stakeholders

Constraints/ Problems	M M	T H	V N	
- Limited traceability of some imports of fish and fishery products	X		X	<p>Challenges</p> <ul style="list-style-type: none"> - Encouraging “traders” to cooperate with AMSs through information and education campaigns - Sharing of information such as catch, fishing vessels, and fishing gears through sharing of experience in PSM implementation among the AMSs - Information sharing on rules and regulations for inter-agencies collaboration and implementation - Creation of a “rapid alert system” for ASEAN (through mobile application if available) - Establishment of the ACDS
				<ul style="list-style-type: none"> - Priority Activities Development of the eACDS

Way Forward

Within its capability, SEAFDEC would continue to support the AMSs following the recommendation of regional cooperation on capacity building to support the PSM Agreement implementation.

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Understanding of Gender Situation in Small-scale Fisheries of Southeast Asia Through Fisheries Value Chain: Case Study in Cambodia, Myanmar and Thailand

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Gender aspect was promoted to integrate in to development program for archiving suitable development. Therefore, Gender role in fisheries sector is important to understand. At the present, men and women have been playing an important role in the fisheries sector, which both of them have different responses depending on the situations or tasks. Therefore, the gender study in fishing community would be shown the significant difference of role, participation, accession, control, and limitation in the decision making to develop the coastal area in their community. The study sites are the coastal fishing community in Cambodia, Myanmar, and Thailand. The results of the study found that there was equitability for men and women to access and control the use of fishery resources and right to fishing. Especially, men have been playing the role as majority in the fisheries sector on catching and processing of fish onboard; while women have taken a role in fish selling and processing. However, there was no significant difference between men and women because the responsibilities were identified by themselves accordingly with their gender.

Keywords : gender, roles, fisheries, value chain, and livelihood

I. Introductions

The simple approach to integrate gender is gender analysis. Gender analysis is a systematic methodology for examining the differences in roles and norms for women and men, girls and boys; the differences within social groups of men and women based on caste, class, age, race, *etc.*; the different levels of power they hold; their differing needs, constraints, and opportunities; and the impact of these differences in their lives (MFF, 2018). The objectives of this study are to improve understanding about the state of women and men in fisheries value chain and to generate information on current gender related differences in relation to fisheries resource management. Value Chain (VC) is the process or activities by which a company adds value to an article, including production, marketing, and the provision of after-sales service. It is the main paradigms in development thinking and practice and is now recognized as a key concept in the development of sustainable food systems (FAO, 2014a). All parties should recognize the role of women; often play in the post-harvest subsector and support improvements to facilitate women's participation in such work. There are hardly any authentic statistics available on the number of women involved in fisheries-related work, though it is well known that women played important roles in the sector. Women engaged in a wide range of activities in the fisheries and in fishing communities all around the world. Available data does not capture the multidimensional nature of work undertaken by women of fishing communities. Not surprisingly, few policies are formulated with these realities in mind. (ICFS, 2018)

The approach to emphasize that women and men are related in fisheries industry is gender analysis specially to show roles of women and men, then this study aimed to generate information on current gender related differences in relation to coastal and fisheries resource management and to document that women and men are important in fisheries.

II. Methodology and Area of study

Semi-structure interviews were used for data collecting to understand gender dynamic in fisheries value chain by identifying the division of labor in fisheries productive activities with accidentally choosing respondents.

2.1 Cambodia

The case study took place at the two (2) villages from two (2) communes, namely: Thmey village, Sangkat Prey Thom (commune), and Okra Sa village, Sangkat Okra Sa (commune), The municipality of Kep province was selected to be the study site. Interview was conducted with 60 coastal households from these two (2) communes. The sample size $n=60$, was drawn from the number of social group of respondents (class, religion, source of income, education, and age) in the two coastal villages. The 60 respondents (30 male and 30 female respondents) from each village were selected for individual interviews. There were 30 separate respondents for Thmey village and another 30 for Okra Sa village.



Fig 1: Study area in Kep province, Cambodia

1.2 Myanmar

Pu Lone Tone Tone village was selected to be the study site; it is an island located in the northwest of Kaw Thaug province connected to the main land by a wooden bridge. The population of the village is about 1,000 households. The main livelihoods of local people are fisheries and agriculture. Eighty percent of the villagers are engaged on exploiting fisheries and other natural resources along the coastal areas and marine waters. (Source: DoF, 2016). Hence, the number of data sampling size for data collecting is 80 persons, it means 10 percent from the fishing household.

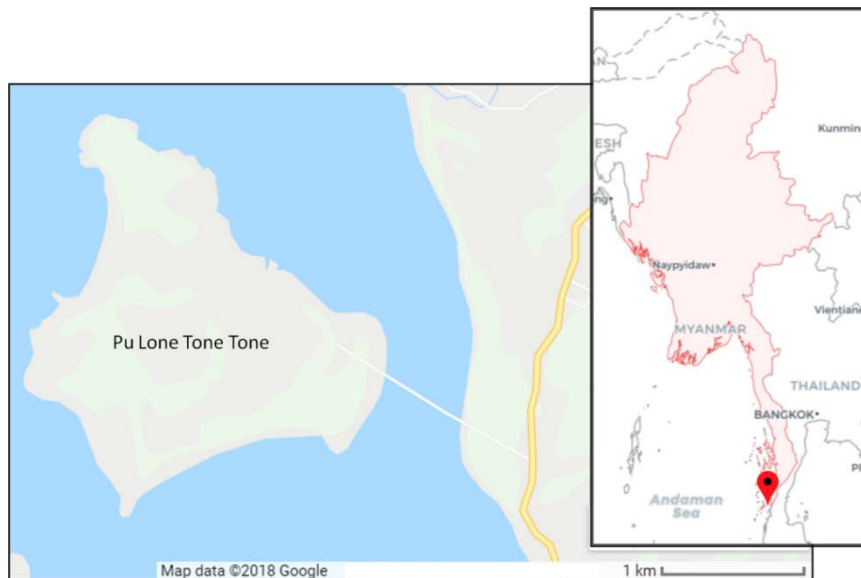


Fig 2: Study area in Kawthaung, Myanmar

1.3 Thailand

Mai Root Sub-district is located in Klong Yia district of Trat province in the eastern part of Thailand, it borders Cambodia, divided by Bunthad Mountain and close to the Gulf of Thailand. It is the pilot site for the gender study in Thailand and there were 83 respondents being interviewed.

The total population is about 4,680 persons; compose of 2,433 male and 2,247 females in 1,193 households. Most of the livelihoods here are Fishing, Coastal Aquaculture, Gardening of rambutan, durian, and coconut and Rice farming. The weather is characterized as tropical. The area is being influenced by southeast monsoon (Mairood Sub-district Administrative organization, 2018)

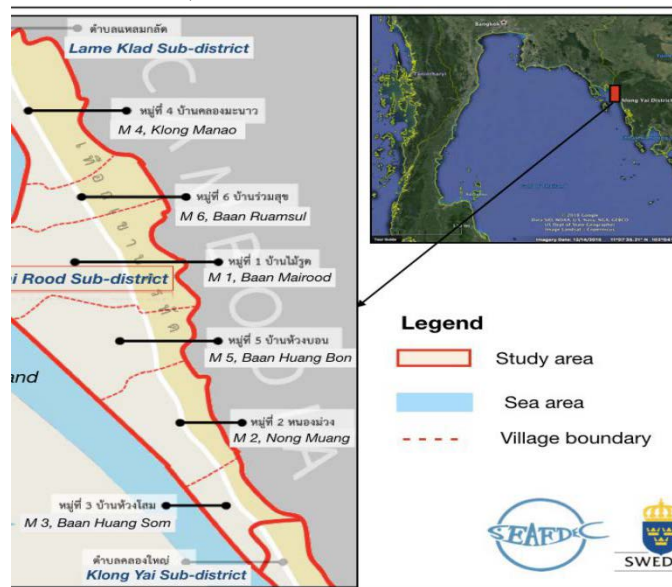


Fig 3: Study area in Trat Province, Thailand

III. Result of gender in Fisheries Value Chain

3.1 Kep province, Cambodia

Results from the “Case study on Gender in Fisheries Value Chain in Kep province, Cambodia” indicated that men and women do fishing for selling and household consumption. There were more women compared to men fish by hand from the shore. This

was because it was more convenient for them and no need to go to the sea. The study found that men prepared fishing gear before going to fish because they know what they need for fishing. After men returned from the sea, women sorted types of fish and clean the fishing materials as well. Women dried the fish and shrimp, soaked mangrove crabs in salt water, and peeled crabs from its flesh. In addition, the study showed that women sell the fish caught by their husbands together with their own catch.

VALUE CHAIN							
Pre-fishing		Fishing		Fish processing		Trading	
Women	Men	Women	Men	Women	Men	Women	Men
<ul style="list-style-type: none"> • Prepare food • Clean fishing gears 	<ul style="list-style-type: none"> • Prepare fishing gears and boat • Maintain engine 		<ul style="list-style-type: none"> • Catch fish on boat 	<ul style="list-style-type: none"> • Sort fish on land • Cut fish • Dry shrimp • Soak crabs in salt water • Peel crabs 	<ul style="list-style-type: none"> • Unload fish • Transport fish 	<ul style="list-style-type: none"> • Sell fish at local market 	
<ul style="list-style-type: none"> • Mend fishing gears 		<ul style="list-style-type: none"> • Catch fish by hand at the shore 					

Fig. 4. Roles of women and men in fisheries value chain in Okra Sa and Thmey Villages, Kep Province, Cambodia

3.2 Kawthaung, Myanmar

Results from the “Case study on Gender in Fisheries Value Chain at Pu Lone Tone Tone area” indicated that there is no women participation in fishing on board. Women have to go on board from one (1) week to one (1) month; therefore men have to do all activities in the sea, as the following: fixing fishing gear, repairing of engine and boat, fish sorting, fish processing, transporting and selling of fish to the carry boat event, and cook food. Women can do everything in land like fish sorting, selling and processing. Women and men were praying together before going to the sea.

VALUE CHAIN							
Pre-fishing		Fishing		Fish processing		Trading	
Women	Men	Women	Men	Women	Men	Women	Men
<ul style="list-style-type: none"> • Prepare food ingredients 	<ul style="list-style-type: none"> • Prepare fishing gears and boat • Maintain engine 		<ul style="list-style-type: none"> • Catch fish • Cook food 	<ul style="list-style-type: none"> • Sort fish on land • Cut fish • Dry fish • Make shrimp paste 	<ul style="list-style-type: none"> • Sort fish on-board • Unload fish • Transport fish • Dry fish 	<ul style="list-style-type: none"> • Sell fish at local market 	<ul style="list-style-type: none"> • Sell fish at sea • Transport fish from the sea to sell on land • Sell fish in Ranong, Thailand • Buy fish at sea
<ul style="list-style-type: none"> • Pray before fishing 						<ul style="list-style-type: none"> • Buy fish at land 	

Fig. 5. Roles of women and men in fisheries value chain in Pu Lone Tone Tone, Kawthaung, Myanmar

3.3 Trat Province, Thailand

Results from the “Case study on Gender in Fisheries Value Chain at Mairoot district” indicated that fishing and agriculture were dominant. In this area, some women go for fishing with their husband because fishing ground is not too far from home. Men and women can do mending fishing gear, clean fishing gear and sorting fish in land to process. For fish processing, both of them assist each other in making shrimp paste. As their family business,

husband is more powerful to do some process.. Both had performed selling of fish to the middleman. Activity that only women do is to cook food for fishers to eat while they go fishing. In this area, there is no activity that men can do alone.

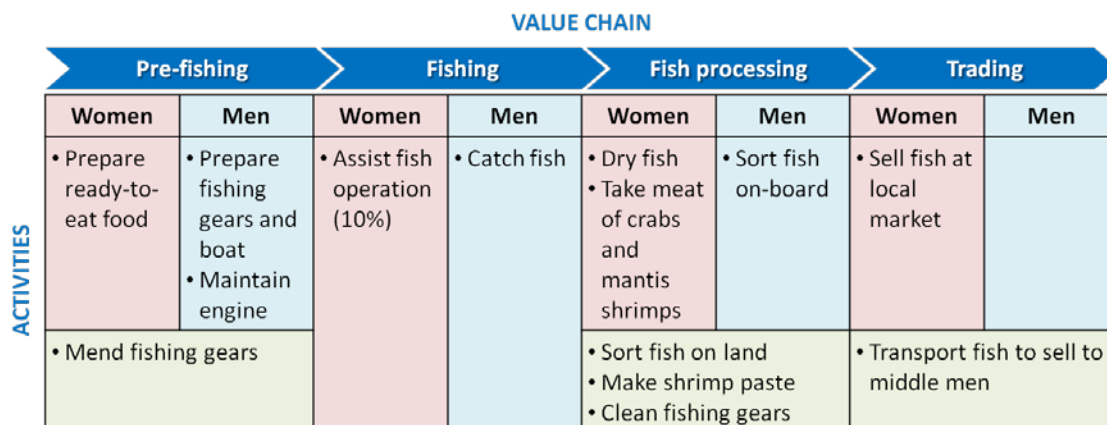


Fig. 6. Roles of women and men in fisheries value chain in Mairoot Sub-district, Klong Yai, Trat Province, Thailand

IV. Conclusion and Discussions

Results from the “Case study on Gender in Fisheries Value Chain” showed that men and women have different roles in fishing industry. It emphasizes that both are important and when we need to deal with stakeholder in fishing communities, women should not left behind. Gender analysis revealed that gender differentiated roles are based on characteristic of fishing and there is a strong stereotype of gender division of labor delineating tasks; men and women are significantly involved in various activities related to fisheries. Venturing into the sea for fishing is a male domain. Women support men in their fishing endeavor at the sea with onshore activities such as cleaning nets and vessels, cleaning and segregating the catch, and processing and marketing the catch, *etc.*

Gender is acknowledged as very important for generating income from fishing. In this study, it showed the importance of men and women in fisheries value chain. Therefore, it is evident that “we should stop stereotyping on women as just housewives;” while men identities were strongly associated with fisheries with reinforced masculinity. This study had expected on women who engaged in small-scale fisheries, their roles, contributions and perspectives can look into policy making on fisheries management. Fishery policy makers need to better recognize the diverse roles and perspectives of men and women in fisheries in order to achieve equitable outcomes and livelihood sustainability goals in fishing communities.

V. Acknowledgement

First, we would like to express our sincere thanks to the Embassy of Sweden and Southeast Asian Fisheries Development Center (SEAFDEC), IUCN/MFF, and Stockholm Environment Institute (SEI), to support this Gender study project and gave us an opportunity to survey in Cambodia, Myanmar, and Thailand. In addition, we would like to extend our heartfelt thanks to the Fisheries Administration (FiA) of Cambodia, Department of Fisheries (DOF) in Myanmar and Thailand, Sustainable Development Foundation (SDF), CORIN-Asia, Cambodia and all my colleagues on data collecting and advising on this report. And, most of all, to the villagers who are very kind to give us their valuable time for interview. Thank you.

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The Survey of Fish Enhancing Devices (FEDs) at the Coastal Areas of Thailand

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Introduction

Coastal waters of Southeast Asia are blessed with high productivity of fisheries resources because of rich ecosystems such as dense mangrove forests and sea grass beds, as well as extensive coral reefs with clean tropical sea environment. These areas are critical to a broad range of aquatic organisms during their life cycle from breeding, spawning, nursing and growing, hosting the feeding zones of aquatic species that are economically important, and serving as important source of recruitment of a wide diversity of fishery resources.

However, commercially important fishery resources in the region have declined due to many factors that include overfishing, illegal fishing, use of destructive fishing practices, and environmental degradation. The artificial reef has been the significant tool for fishing ground development and increasing fisheries production of the small scale fisheries. However, regarding the cost of artificial reef installation has high investment and managed by government agencies. Fishers only involve in the identification of fishing ground. The fishers' ownership on fishing ground could not be generated as well as management through community approaches has not been able to promote effectively.

One of the SEAFDEC's missions is to seek for the appropriate tools to enhance coastal fishery resources together with awareness building on the community management as well as promoting a shifting of resources user to be resource manager through the installation of Fish Aggregating Devices (FADs) that costs cheaper investment than artificial reef. SEAFDEC has promoted the new design of Fish Enhancing Device (FEDs) since year 2009 and Thailand was reported as the first to introduce the use of FEDs. Until now, the utilization of FEDs in Thailand has widely spread throughout the coastal province of Thailand and is used in various designs.

In order to update the information on the structure and design of FEDs and to seek for the significant factors of FEDs construction and design that different between local and fishing ground. Thus, SEAFDEC/TD in cooperation with Department of Fisheries, Thailand conducted survey on FEDs for small-scale fisheries covering the coastal provinces of Thailand.

Materials and Methods

SEAFDEC/TD in cooperation with Department of Fisheries, Thailand conducted the survey on FEDs for small-scale fisheries from October 2017 to January 2018. The study sites were 47 fishing communities covered of 15 provinces along the coastal of Thailand; both in the Gulf of Thailand and Andaman Sea (**Fig. 1**). This survey coordinated with the Fisheries Provincial Officer to obtain the general information on the FEDs installation in each provinces. The interview with the local fisheries officers and fishers was carried out to obtain the information. We investigated the designs, necessary materials used, construction, installation area, and utilization of FEDs. Photographs of the existing FEDs were taken and their dimensions were also measured during the survey and investigation. In this study, we consider on the materials used, construction and their designs to determine the types of FEDs.

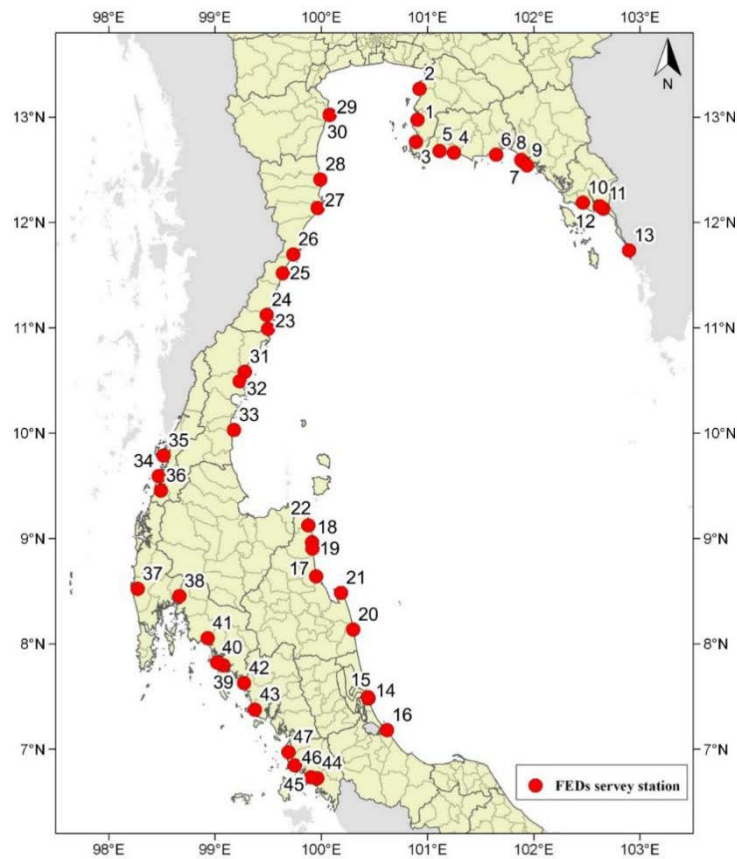


Fig. 1 The survey positions of FEDs along the coastal areas of Thailand (as indicates by red circles)

Results and Discussion

Recently, FEDs were used as an innovative fisheries management tool in the coastal communities of Thailand. In this survey, FEDs built from various materials and designs. The fisher groups choose pattern of FEDs based on their artisanal fishermen's wisdom, objective of installation, geography of the area, water depth and supporting agency. The fishing communities got their budget from supporting agencies including private company and government such as Petroleum Authority of Thailand (PTT), Erawan group, Amarin TV, Department of Fisheries (DOF), Department of Marine and Coastal Resources (DMCR), *etc.*

With reference to the survey and observation, the FEDs were mostly placed at the conservation area about 0.1 to 1.6 nm away from shoreline and the average water depth ranging from 2 to 17 m. Based on the material that the fishermen used, FEDs can be categorized into two types, as the following: traditional and modern. For traditional FEDs, the buoy and attractor sections were constructed by locally available materials such as bamboo, coconut or palm leaves were used. FEDs of this type are low cost, very effective to attract fishes and their useful life range between 3 to 6 months. However, Anna *et al.* (1999) reported that "*Palm leaf of the traditional FADs provided less effective shelter than rope.*" The result from Ali *et al.* (2004) indicated that the average lifespan of coconut leaf is 1 – 2 months; While the modern FEDs, instead of using the natural materials, polyethylene or fiberglass materials were used in their buoy sections which affects the cost but having longer useful life in comparison with traditional FEDs.

There are various characteristic of FEDs, which designs are different based on their local knowledge and supporting agencies. According to structure, design and installation inspected and found during the surveys along the coastal of Thailand, we categorized the FEDs into five (5) patterns, as following (**Fig. 2**):

1. Traditional FEDs; the attracting parts are made of natural materials such as coconut leaves, palm leaves and bamboo pole.
2. Rope FEDs; the attracting devices are synthetic rope
3. Mid-water rope FEDs; a kind of rope FEDs that is set up at mid-water layer or at a desired depth.
4. Pillar FEDs; attracting parts are made of synthetic rope tied up with a pillar and submerged when settled.
5. Concrete pipe FEDs; which can be either a single concrete pipe or multi-pipes, with or without attracting parts.

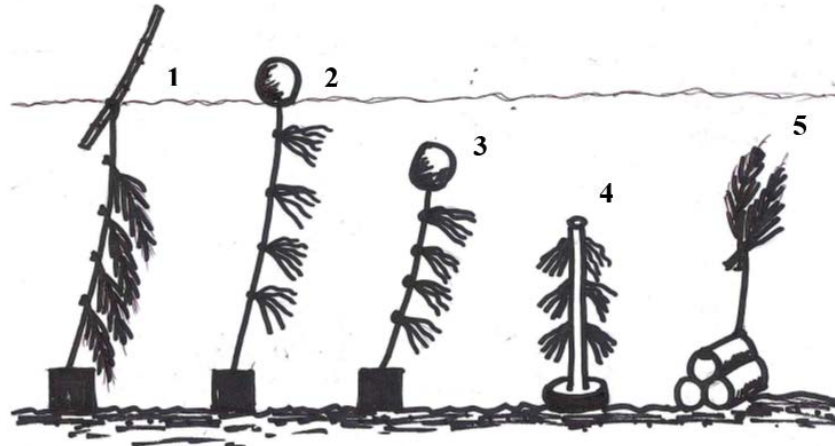


Fig.2 Types of FEDs found in Thailand

In this survey, Rope FEDs were mainly found both in the Gulf of Thailand and the Andaman Sea, covering 14 provinces (29 fisher groups). Following with the traditional FEDs spread over ten (10) provinces (19 fisher groups). The Concrete pipe FEDs was found only in 4 provinces (5 fisher groups) in the Andaman Sea. While the Mid-water FEDs was found in 3 provinces (4 fisher groups) and the Pillar FEDs which was only found in Trat province (3 fisher groups). In Trat province, fishers modified the design of FEDs for more suitable in the area. Moreover, the spirit house wrecks and used motorcycle tire were also deployed as FEDs in Chumphon and Ranong provinces, respectively.

Results from our interview found that, FEDs installation was accepted by fishermen as a tool to enhance fishery resources and to protect coastal resources from the encroachment of the destructive fishing gear into the coastal areas where the artisanal fishers exist. There are various species found after the FEDs installation; thus, the fishermen are able to catch more fish to increase their income. Similar to Ali *et al'* (2004) concluded that after a few years, deployment of new design of FADs called as "Artificial Reef Fish Aggregating Devices (ARFADs)." This FADs had turned into new habitats for many demersal fish species and sanctuaries of fish and other marine lives. Moreover, some fisher communities said that the making of FEDs could strengthen the cooperation among members of the fisher groups.

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A Survey of Gill and Digestive System Parasites of BrownBanded Bambooshark *Chiloscyllium punctatum* from the Gulf of Thailand

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Abstract

The species of benthic shark, BrownBanded Bambooshark (*Chiloscyllium punctatum*) were collected from Exclusive Economic Zone of the Gulf of Thailand. Fish samples were examined both of external and internal parasite. 15 samples of sharks found only 12 sharks that infected with parasites. Two family of endoparasites, family Onchobothriidae and family Phyllobothriidae of phylum platyhelminthes were found highest prevalence and mean intensity at gastrointestinal especially at the intestine that unidentified. Three genus of ectoparasites, *Eudactylina Gnathia* and *Caligus* were found at the gill area. They had prevalence and mean intensity follow by intestine and that also unidentified species.

Introduction

Brownbanded Bambooshark (*Chiloscyllium punctatum*) is the small benthic shark in family Hemiscyllidae and distributed mainly in Southeast Asian water. This species taken in inshore fisheries in Thailand and utilized for human food. Nowadays, their status recognized as “Near Threaten” (Tassapon *et al.*, 2560)

The Gulf of Thailand looks like a basin that is an area of sediment from several rivers makes seabed like mud and sand are spread everywhere. (Department of Marine and Coastal Resources, 2013) and benthic sharks are located in the sand or sand along the coast. (Tassapon *et al.*, 2560). In the Gulf of Thailand, the genus of benthic sharks *Chiloscyllium*, there are 5 species. *Chiloscyllium punctatum* is the most abundant species in this genus and found in this cruise of M.V.SEAFFDEC 2. (Tassanee *et al.*, 2560) that caught by the trawl.

Currently, Sharks is an another marine animal that is beginning to be consumed. Capture rates are increasing depend on human needs especially, the species *C. punctatum* according in IUCN Red List: NT (Tassapon *et al.*, 2560). The habitat of the shark is *C. punctatum* affected parasites to live inside and outside of the body. Some parasites can infected to human directly due to consumption of food that composed by shark (Chanya and Smarn, 2014).

There were some reviews of *C. punctatum*'s parasites. In Thailand, is relatively limited occurrence. The researches shows that many parasitic species of *C. punctatum* in the gastrointestinal that is classified as a flat worm or Platyhelminthes. In 2012, found a new species of cestode, discovered by Thai researchers (Watchariya, 2556).

In this study, investigated parasitics of *Chiloscyllium punctatum* in gastrointestinal and gill area. This research is a basic and can contribute with other researches related to parasite studies in benthic sharks *Chiloscyllium punctatum*.

Material and Methods

BrownBanded Bambooshark *Chiloscyllium punctatum* were caught by trawl in the Exclusive Economic Zone of the Gulf of Thailand (Lat.13°10.278'N - 06°44.219'N; Long.100°17.161'E - 102°14.323'E) in the period of August 2018. Identification this species was undertaken according to Kent E. and Volker H.(1998), FAO.

Parasites were collected from gill stomach and intestine and fixed in 70 % alcohol for protect condition 24 hr. They were used by a stereoscopic microscope and Identified family

as described by Parasitology of Aquatic animals based on Yamaguti (1963). The prevalence mean intensity and mean abundance of parasites were determined according to Bush *et al.*(1997).

Result and Discussion

The samples of *Chiloscyllium punctatum* were collected at the Exclusive Economic Zone of the Gulf of Thailand. 12 samples from 15 samples of sharks infected with parasites. Three genus of ectoparasites, *Eudactylina* *Gnathia* and *Caligus* were found at the gill area and two family of endoparasites, family Onchobothrithriidae and family Phyllobothriidae of phylum platyhelminthes were found at stomach and intestine that unidentified (Table 1).

Compared three sites of infection of *Chiloscyllium punctatum* sharks in the Gulf of Thailand, intestine is the highest site that found parasites follow by gill and stomach, respectively. So, that number of parasites depend on prevalence and Mean intensity in each group of parasites.

Table 1 Prevalence and Mean intensity of parasites from 13 *Chiloscyllium punctatum* sharks in the Gulf of Thailand

Host	Parasites	Site of Infection	Prevalence (%)	Mean intensity (ind./fish)
<i>Chiloscyllium punctatum</i>	<i>Eudactylina</i> sp.(co)	gill	73.33	16.46
	<i>Gnathia</i> sp. (iso)	gill	20.00	5.46
	<i>Caligus</i> sp. (ar)	gill	6.67	0.08
	Unidentified Onchobothrithriidae(c)	gastrointestinal	13.33	1.46
	Unidentified Phyllobothriidae (c)	gastrointestinal	40.00	24.69

c : cestode , co : copepod , iso : isopoda , ar : arthropoda

Cestode

Two family of cestode, Onchobothrithriidae and Phyllobothriidae are Phylum Platyhelminthes found in gastrointestinal.

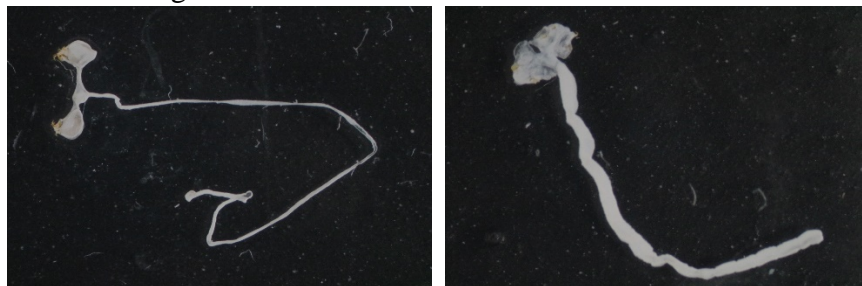


Fig 1. *Onchobothrithriidae*, Cestoda

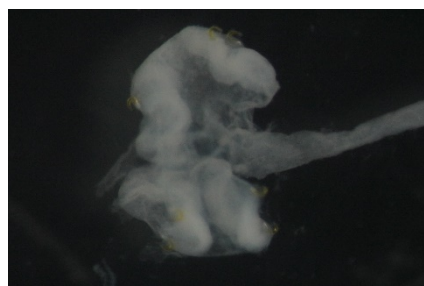


Fig 2. *Phyllobothriidae* Cestoda

Copepod

One genus of copepoda, *Eudactylina sp.* found in gill. It is the external parasite.



Fig 3. *Eudactylina sp.*(Female)



Fig 4. *Eudactylina sp.*(Male)

Isopod

Gills sometimes infested by larval isopods (Praniza-larva of the isopod *Gnathia*).



Fig 5. *Gnathia sp.*

Arthropod

One genus of arthropoda, *Caligus sp.* found in gill. It is the external parasite.



Fig 6. *Caligus sp.*

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Density and Distribution of Fish Larvae in Gulf of Thailand.

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1.Introduction

Fish larvae research is a important for understanding of the ecology and evolution of fish species and their populations. Research on density and distribution of fish larvae along with its relationships to physical parameters would let us estimate the size of a spawning stock from habitat and forecasting on future fish stocks. Gulf of Thailand is one of the most abundance in fisheries resources, however declining in fish stocks are now main problem. In order to know about future fish population, In this present work, the study of fish larvae is a part of the biological oceanographic survey aimed to know density and distribution of fish larvae. The understanding of abundance and distribution of fish larvae in conjunction with ecological conditions could fill up the gap in the study of fish life history.

2.Material and Methods

2.1 Study site

Samples of fish larvae were collected in Gulf of Thailand from 49 station during August 17 and September20, 2018 using the marine vessel SEAFDEC2.

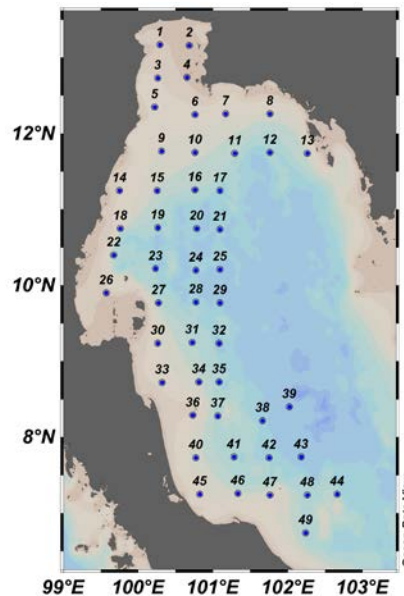


Figure1. Position of Neuston net operation

2.2 Sampling Procedures

Samples were collected using a Neuston net 100 cm x 70 cm at mesh size 1000 μm . and trawling with surface horizontal haul. A flow meter was attached to the mouth of net to determine the volume of sea water filtered during each tow. Collected specimens were preserved in 10 % formalin sea water buffered. Specimens were brought to the SEAFDEC laboratory for sorting and identified at family level. Identified specimens were changed to 70 % ethyl alcohol solution for reference specimens.

2.3 Laboratory Method

Fish larvae were identified at family level basing on description given in references textbook of larval fishes (Leis and Carson-Ewart, 2000 ; Chayakul, 2007).

Identified fish would be counted for density study.

2.4 Data Analysis

Density of fish larvae was calculated with following formula ;

$$T = \frac{1,000t}{V}$$

Where T is the number of fish larvae in the sample per 1,000 m³ of sea water volume
 t is number of fish larvae in the sample (collected number)
 V is sea water volume flow through plankton net (m³)

$$V = nMa$$

Where n is the number of revolution of the flow meter during the tow
 M is the calibration factor in number of revolutions of the flow meter per 1 meter
 a is the area of the mouth of the net in square meter

Results

Total 666 of fish larvae were found, which comprised of 21 families. Density is ranging from 0 to 1,057 larvae/1,000 m³ of sea water. Top five families is Terapontidae (70%), Mullidae (13%), Carangidae (5%), Engraulidae (3%) and Clupeidae 1% (Figure 2.) The highest density was observed from station 15 while no fish larvae was found from station 4, 19, 29, 33, 35, 36, 38 and 39.

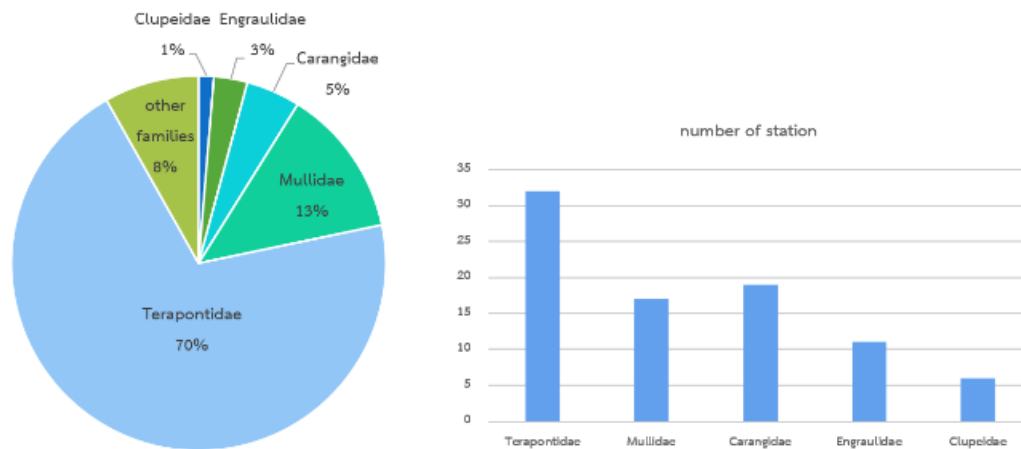


Figure 2. The top five families in number among sampling station.

Distribution of the top five fish larvae

Five families that found the most density were comprising of Terapontidae, Mullidae, Carangidae, Engraulidae and Clupeidae.

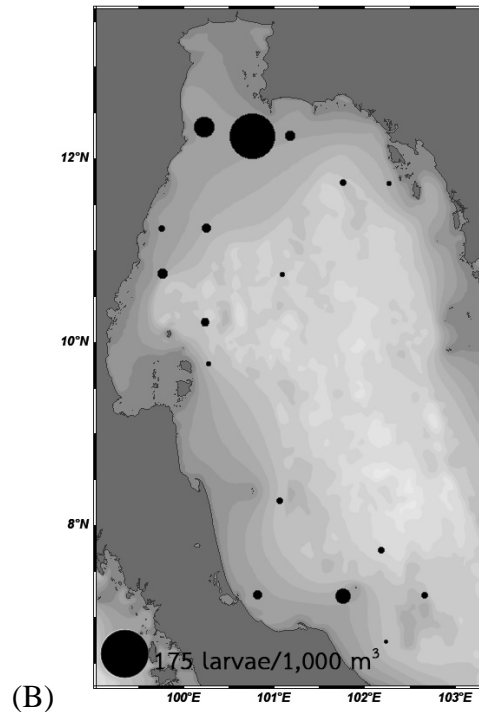
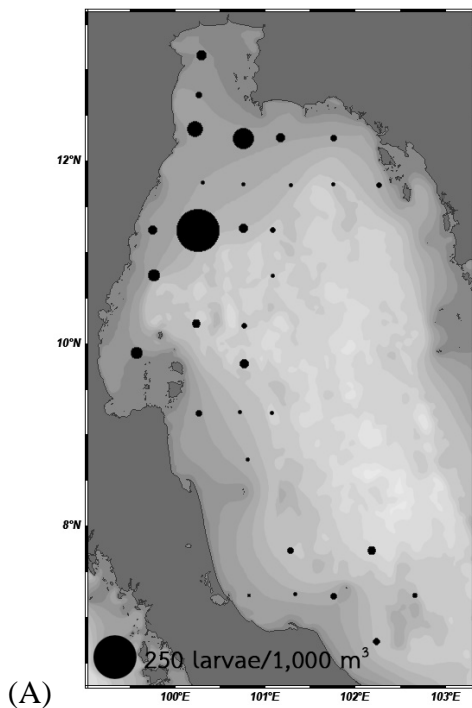
The most abundant family was Terapontidae which observed from 32 out of 49 sampling stations, the most of fish larvae number occurred at station 15. Range of density was 1 – 227 larvae/1000 m³ of seawater and also found distributed over the Gulf of Thailand and found most dense at Prachuap Khiri Khan Province.

The second abundant family was Mullidae which observed from 17 out of 49 sampling stations, the most of fish larvae number occurred at station 6. Range of density was 1 – 158 larvae/1000 m³ of seawater and found the most dense near shore at Chon Buri Province.

The third abundant family was Carangidae which observed from 19 out of 49 sampling stations, the most of fish larvae number occurred at station 41. Range of density was 1 – 11 larvae/1000 m³ of seawater and found the most dense at Songkhla Province.

The fourth abundant family was Engraulidae which observed from 11 out of 49 sampling stations, the most of fish larvae number occurred at station 14. Range of density was 2 – 13 larvae/1000 m³ of seawater and found the most dense near shore at Prachuap Khiri Khan Province.

The last abundant family was Clupeidae which observed from 6 out of 49 sampling stations, the most of fish larvae number occurred at station 9. Range of density was 2 – 14 larvae/1000 m³ of seawater and found the most dense at Prachuap Khiri Khan Province.



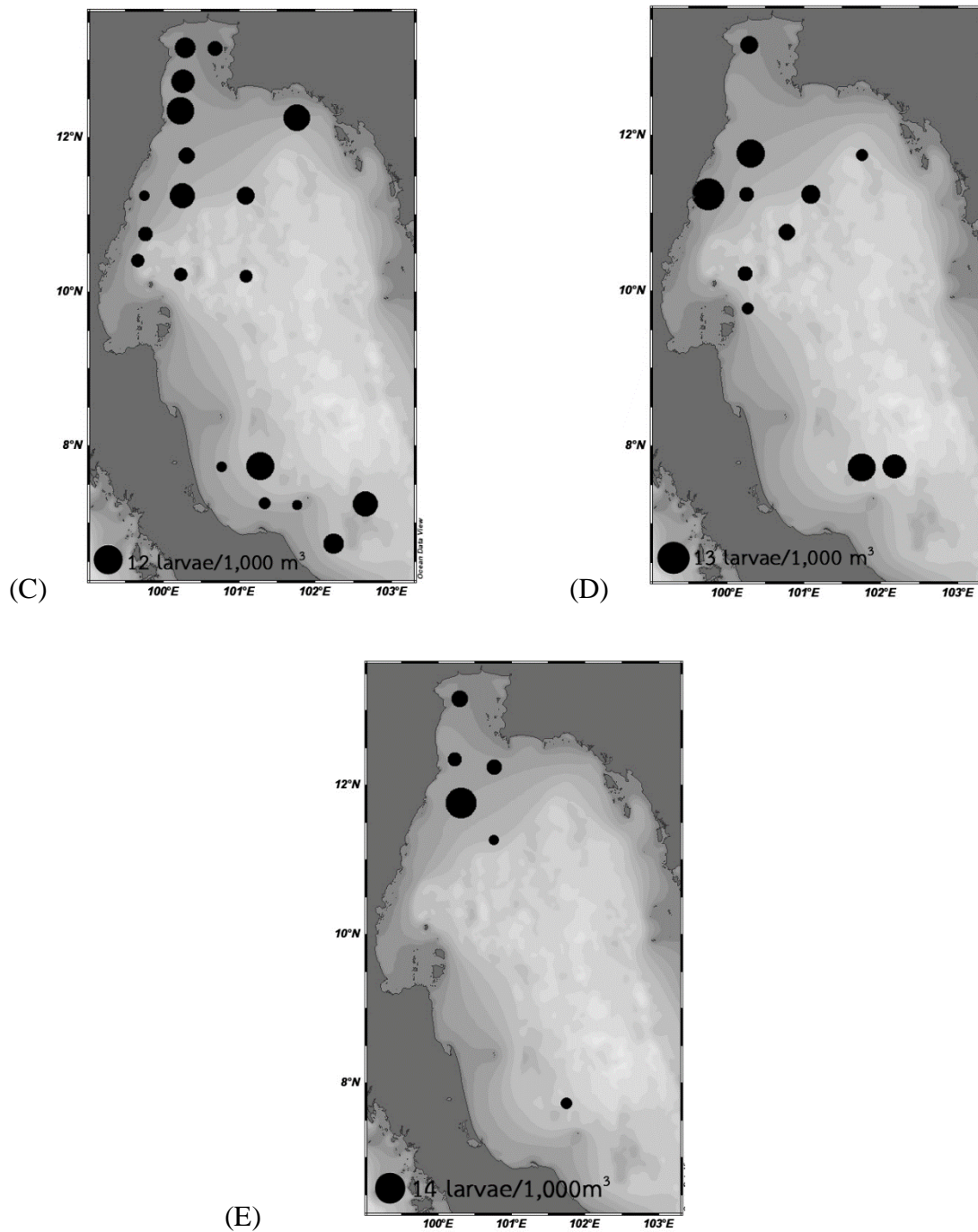


Figure 3. Top five distributed fish larvae A) Terapontidae B) Mullidae C) Carangidae D) Engraulidae and E) Clupeidae.

Discussion

From the study, the fish larvae from Terapontidae and Mullidae was the most density and widely distribution in The Gulf of Thailand which same result Niracha et.al.(2013). Because Terapontidae was common family that found the most abundance in coastal area of Thailand and this family can spawning all year. However some of different can be found such as in this study can not find family Gobiidae and Exocoetidae while in previous study find a number of Gobiidae and Exocoetidae. It might be said that this study not sampling at spawning season of

this to families and might be from different of sampling time because this study sampling at both day and night while the previous study sampling only day time.

Fish that high economic important species found in this study was Terapontidae, Mullidae, Carangidae, Engraulidae and Clupeidae.

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Comparison of the Catch and Income from the Crab Gillnet Fishery between Summer and Rainy Season around the Laem Phak Bia Coast, Petchaburi Province

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Introduction

Around the coastal area of Laem Phak Bia, Petchaburi province, bottom crab gillnet targeting blue swimming crab (*Portunus pelagicus*) is the typical fishing gear that conducted almost whole year in every season. The fishing boat mainly are small scale boat (< 10 GT). The gillnet made from nylon monofilament (PA), 10 cm mesh size, about 0.5 hanging ratio, 12 mesh depth, 450 m/set (1 set connected by 5 net panels). Fisher hauls the net 2-4 sets for 1-2 GT boat while 18-20 sets/operation day for 8-10 GT boat. The head rope made of polyethylene (PE) z twisted, diameter 4 mm, connected to the flag buoys. The plastic float size of 38x10mm, 2.0 m interval. The foot rope tied to anchor or stone weight 5-8 kg, made of polyethylene (PE) z twisted, diameter 3 mm. Sinker size was 10 g, 0.45m interval. A set of the net plan shown in Figure 1.

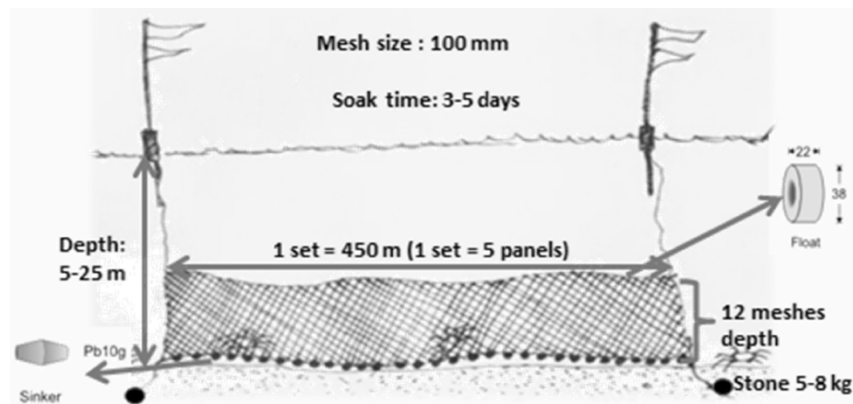


Fig. 1 A set of bottom gillnet around Laem Phak Bia, Petchaburi

Fishers (8-10 GT boat) usually operate the fishing at 2-7 am in the fishing ground of 18-25 m depth with the soaking time of 3-5 days. Some marketable bycatch are flathead lobster (*Thenus orientalis*), ray, flatfish and horseshoe crab. Statistics on Fishing community production survey by species of fish, shrimp, crab, shellfish, jellyfish, other aquatic animals, the crab species, highest value was 3,624.24 million baht at 21,570 ton. The crab is an important economic fish for Thai fishery. Thailand is under the influence of southwest and northeast monsoon those impact to the fishing activities. The rainy season (May-Oct) is influenced by southwest monsoon while the winter season (Nov-Jan) influenced by the northeast monsoon. This study aimed to compare the catch, income, operation days and fishing ground of a crab gillnet fisher (9 GT boat) between summer and rainy season.

Methodology

The fishers in the study site were interviewed. A logbook fisher was recorded daily in 2018 by a fisher (9 GT boat). The logbook provided the data of the fishing gear used, number of the set,

the catch species, the catch amount and prices, the reason why if the fisher did not go for fishing, etc. Onboard surveys with GPS tracking were conducted. The information and data were analyzed regarding the season and compare the results among the seasons particularly summer and winter

Results

It was different of catch amount and income of the fisher between the summer and rainy season. The crab price depends on the crab size. It categorized as 3 groups; small size with the price of 170-300 baht/kg (11-15 ind), medium size with the price of 270-400 baht/kg (6-10 ind) and large size with the price of 370-500 baht/kg, (4-5 ind). The catch amount and highest income were in April (summer), as 316.6 kg and 115,873 baht respectively. The lowest was in September (rainy) as 171.3 kg with the income of 48,441 baht respectively (Fig 2). The CPUE was highest in January (winter) as 29.0 kg/operation day with the income of 10,416 baht/operation day and lowest in September (rainy) as s 10.1 kg/day operation, 2,849 baht/operation day (Fig 3). The catch and income in summer were better than rainy season. Comparison of the numbers of operation day between summer and rainy was shown in the Fig 4. Future works and apply for sustainable resource management will be discussed.

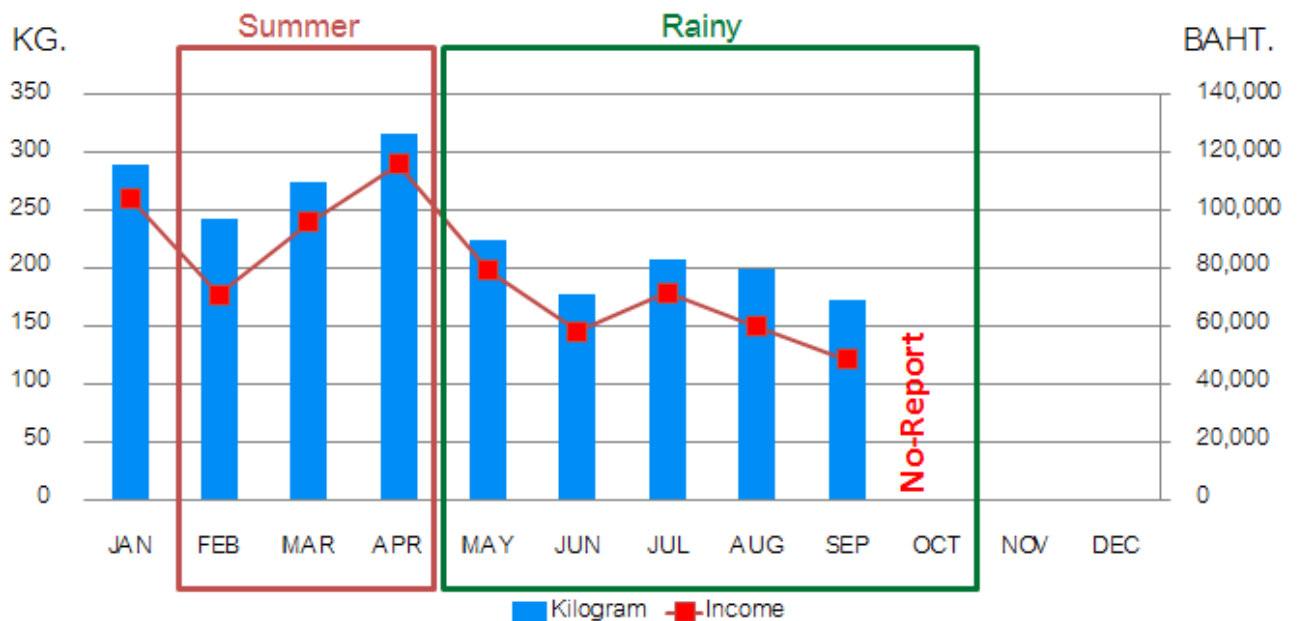


Fig. 2 The catch and Income of crab gillnet in 2018

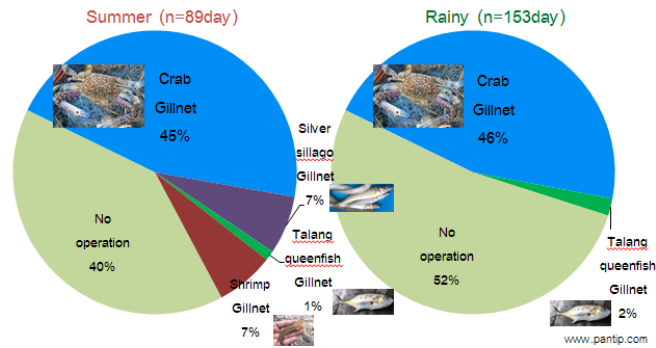
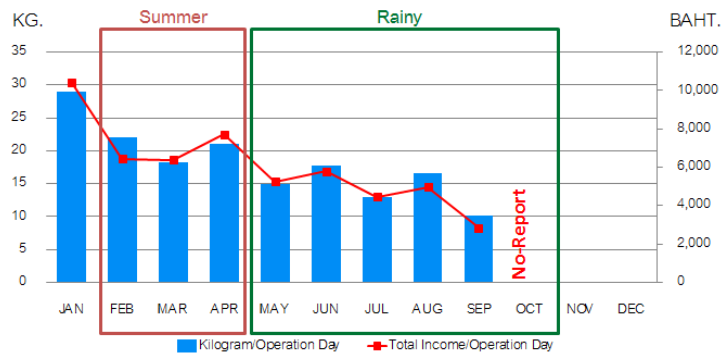


Fig. 3 CPUE (kg/operationday) and income Fig. 4 Compare of operation days between summer and rainy

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Survey of a commercial push net fishing targeting krill (*Sergestidea*) of a Samut Sakhon province boat

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Abstract

Push net targeting krill (*Sergestidae*) is a fishing gear that conducted, both small and commercial scale around the coastal province, in the gulf of Thailand including Samut Sakhon. The krill is very important material for producing the shrimp paste, a popular seasoning garnish for many Thai cuisines. The objectives of this study were examining the push net fishing such as the gear construction, fishing method, fishing ground, including expense and income of a commercial scale boat. The fishers at Ban Kum Phra, Samut Sakhon were interviewed. A commercial onboard survey was conducted on 27 Aug 2018. Some papers also were reviewed. The results found the net was bag-shaped, made from polyethylene (PE), blue mesh color with the mesh size of 2×2 mm. The net mount attached to the end of the both sides of the push fishing rods. The engine was diesel, 280-525 HP, with the speed of 1.2-1.7 knot while pushing. During the operation, the ground rope height was maintained 0.5 – 1.0 m above the seabed. The boat conducted about 5.4 km with the depth of 6-20 m. The important fishing grounds of the interviewed fishers boat are Samut Prakarn, Chonburi, Chachoengsao coastal areas, and some areas of Samut Sakhon province. The push net was understood and rumored, be a fishing gear type that destroy the fishing ground and associated to the discards problem but from our survey and studies, we found that they were not serious problems. Besides, from the fisheries statistics (DOF, 2018), in 2017, the push nets caught all aquatic animals 7,154 tons in total. The catch composed 83.56 % of the target species (krill) while other animals composed 16.44 % which most of these were marketable value fish. More field surveys and studies including the catch analysis are needed to understand how serious of the negative impacts of this fishing both to the species and environment.

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Study on tuna longline fishery in Phuket province

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Abstract

Tunas (*Thunnus* spp.) from longline fishery are important economic fish since the high price, tasty, and needed from oversea markets. The foreign tuna longliners landing in Phuket for transferring their catches to export the market. The catch of fish from tuna longliners unloaded in Phuket in 2011 was 4,318,743 kg (yellowfin tuna 88 % and bigeye tuna 12%) with the value of 690,990,400 baht. Besides tuna is the main material for canned manufactures in Thailand. This study aimed to assemble the information about tuna longline fishery (TLC) particularly in Phuket, such as fishing gear, vessel, fishing method, the catch, price, etc., by review the papers, books and internet searching. Longline can catch big size of tuna with high quality and value. TLF sets a long mainline (units of mainline called baskets), made of tarred rope or nylon monofilament which attached to branchlines, each with a single baited hook. The line is suspended in the water by floatlines that usually made from black or red vinyl tarred line attached to floats or buoys (hard plastic). The tuna longline is usually set in the morning and haul in the afternoon. There are three types of bait such as fresh milkfish, frozen squid and frozen mackerel scad. In the fisher opinions, each type of bait has different capture efficiency while the fresh milkfish is the best. Tuna longliner can categorize as the 3 groups; < 20, < 100 and > 100 gross ton. The cold storage is necessary for quality keeping of the caught tuna. Tuna longline is a passive and selective gear which not much destroy natural resources because size of hook and the bait are specific. However it can catch some bycatch species such as shark, turtle which cause to discards problem issue. As TLF earn high profit, hence giving a support to fishers to fish more tuna is essential. TLF may be a new option for Thai fisherman who are experiencing problems with overfishing in the country.

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Sustainable Management of Blue Swimming Crab in Thailand

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² World Wild Fund for Nature

Abstract

National Plan of Action on Sustainable Management of Blue Swimming Crab (BSC) of Thailand was developed through a series of participatory consultations among government, private sector, academics, fishers, and NGO. It applied the SWOT analysis and in line with indicators of Marine Stewardship Council (MSC) Fisheries Standard aiming at sustainable utilization of BSC in Thailand based on international principles. The 4-year implementation period of the Plan started from 2015 to 2018 covering 4 strategies, 8 measures, and 21 activities. The 4 strategies are (a) improving information on BSC fisheries and relevant resources, (b) establishment the direction on BSC restoration, (c) controlling inputs to BSC fishing and utilizing, and (d) promotion of local participation and responsible BSC fishing. All activity-level implementations were monitored and evaluated in the aspects of BSC stocks, environmental impacts, and management.

Keywords: sustainable management, blue swimming crab, Thailand

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1. Introduction

Blue Swimming Crab (BSC) has been regarded as the economic aquatic species of Thailand owing to its high domestic and international market demands, both fresh and processing products. It has been found that the products of crab in Thailand mostly come from natural catch, 70% of which is BSC, followed by 21% of other crabs and 9% of mud crab. From marine production statistics of Thailand during 1986 - 2013, the catch of BSC increased from 30,432 tons in 1986 to the peak of 46,678 tons in 1998, then decreased trend from 22,836 tons in 2010 to 28,790 in 2011, 33,464 in 2012, and 25,712 tons in 2013 (Department of Fisheries, 1987, 2001, 2016). From the stock assessment of BSC in Trang Province, Andaman Sea coast of Thailand, its exploitation rate was more than 0.5 showing excessive above its potential yield (Sawusdee and Songrak, 2009; Sanlee, 2012). The fishing efforts of BSC in the upper, eastern, and western coast of the Gulf of Thailand were found over its maximum sustainable yield, while its catch was decreased. Moreover, small crabs and berried female crabs were also caught which resulted in its small recruitment and decreased production (Jindalikit *et al.*, 2008).

The Department of Fisheries has been consistently paying attention on the restoration and management of BSC which was shown by a number of projects and activities on conservation and management of this resources, e.g. the activities for increase and management of aquatic resources under the Food Safety Project, the activities of crab bank (hatching and seed releasing), and the activities for promotion of community-based fisheries management under the Master Plan of Marine Fisheries Management of Thailand. In addition, there has been a large amount of crab bank, both in hatcheries and cages, in fishing communities sponsored by other related bodies, such as the Government Savings Bank, other public and private sectors, as well as their own communities (Marine Fisheries Research and Development Division, 2018). BSC conservation measures were also launched by the Department of Fisheries, i.e. Notification of the Ministry of Agriculture and Cooperatives on the prohibition of berried female crab fishing during October and December

yearly, and the prohibition of fishing by crab trap of under 2.5 inch-bottom mesh size, as well as creating 3,000 – 5,400 m coastal conservation area for nursery ground.

“National Plan of Action on Sustainable Management of Blue Swimming Crab of Thailand” was developed by “Thailand Blue Swimming Crab Sustainable Management Committee”, which consists of the members from Department of Fisheries, Department of Marine and Coastal Resources, Academics, Thai Frozen Foods Association, and World Wild Fund for Nature (WWF). The Plan aims to concrete conservation and restoration of BSC through the cooperation of all stakeholders which finally creates responsible and sustainable BSC utilization, fishery-sector potential development, cooperation promotion, and management network.

2. Methods

2.1 Conduct SWAT analysis on sustainable management of BSC in Thailand (SWOT Analysis, 2018).

2.2 Apply the indicators of Marine Stewardship Council (MSC) Fisheries Standard. It is acceptable to be the tool for worldwide fisheries conservation by means of creating economic motivation for sustainable fisheries (WWF, 2015). There are 3 principles of MSC: non-overfishing, non-ecosystem-effect fishing, and fishing management under local, national, and international rules.

2.3 The MSC pre-assessment process is the first official step in the MSC standardization process. For understanding fisheries in the context of deploying the MSC principles and criteria for sustainable fishing to help assess problems, identify the strengths and weaknesses of the fishery.

2.4 Conduct SWAT analysis participating with working group and Committee of Thailand BSC Sustainable Management.

3. Results

Strategies, Measures, and Activities

There are 4 strategies for “National Plan of Action on Sustainable Management of BSC of Thailand”, shown as follows:

- (1) Improvement of the information network of BSC resources and fisheries
- (2) Establishment of the direction for BSC restoration
- (3) Control of BSC fishing and utilizing
- (4) Promotion of local participation and responsible BSC fishing

The implementation period of the National Plan of Action on Sustainable Management of Blue Swimming Crab (NPOA) was 4 years from 2015 to 2018. All activity-level implementations are monitored and evaluated in the aspects of BSC stocks, environmental impacts, and management. Measures and activities in each strategy areas are as follows:

Strategy 1 Improvement of the information network of BSC fisheries and relevant resources

Information about BSC resources and fisheries is updated. It includes data of biology, habitats, distribution, and population characteristics. By-catch and Endangered, Threatened and Protected Species (ETP) from BSC fisheries, and market demand /situation are also assessed. The linkage and integration of such data are established. Monitoring and improving are carried out under committee agreement.

There are 2 measures with 6 activities in this strategy, shown as follows:

1.1 Update information of BSC resources and fisheries

1.1.1 Synthesize the status of BSC resources

1.1.2 Assess the status of BSC fisheries, including by-catch and ETP

resources

1.1.3 Assess the status of environment and ecosystem related to BSC

1.1.4 Assess BSC market situation and import-export statistics

Those 4 activities respond to the evaluation of BSC resources and environment.

1.2 Create BSC data linkage

1.2.1 Establish working groups/Task forces for monitoring and updating overall situation of BSC

1.2.2 Integrate BSC knowledge for its comprehensive fisheries management

Those 2 activities respond to the evaluation of BSC management.

Strategy 2 establishment of the direction for BSC restoration

BSC restoration activities are promoted by establishing community crab banks. Survival rates in crab banks, seed releasing, and appropriate method for BSC productivity in natural water are studied under cooperation and participation of the communities.

There is one measure with 3 activities in this strategy, shown as follows:

- 2.1 Promote BSC rehabilitation activities
 - 2.1.1 Establish community crab banks
 - 2.1.2 Study survival rates in crab banks
 - 2.1.3 Release BSC seeds/juveniles

Those 3 activities respond to the evaluation of BSC resources.

Strategy 3 control of BSC fishing and utilizing

Optimum BSC fishing effort is determined according to its reference point for sustainable utilization. Measures for spatial fisheries management are defined. Law enforcement is strengthened under cooperation of fishing communities via their monitoring and surveillance network.

There are 2 measures with 5 activities in this strategy, shown as follows:

- 3.1 Define optimum BSC fishing effort
 - 3.1.1 Define reference point for sustainable utilization
 - 3.1.2 Define optimum BSC fishing effort
 - 3.1.3 Define suitable measures for BSC spatial management in Ao Ban

Don, Suratthani Province

Those 3 activities respond to the evaluation of BSC resources.

- 3.2 Strengthen law enforcement
 - 3.2.1 Conduct monitoring and surveillance participated by communities
 - 3.2.2 Develop network for monitoring and surveillance of illegal fishing

Those 2 activities respond to the evaluation of BSC management.

Strategy 4 promotion of local participation and responsible BSC fishing

Fishing practice is regulated along with the cooperation of communities. Communities are educated in Fisheries law and the law related to marine resources management in order to understand and participate in monitoring and responsible utilizing of BSC resources.

There are 3 measures with 7 activities in this strategy, shown as follows:

- 4.1 Regulate destructive fishing practice in cooperation with communities
 - 4.1.1 Educate authorities/fishers in the content of “the Royal Ordinance on Fisheries B.E. 2558 (2015)” and “Act on the Promotion of Marine and Coastal Resources Management, B.E. 2558 (2015)”

4.1.2 Promote community-based fisheries management (creating community BSC conservation zones)

4.1.3 Strengthen fishing communities for coastal fisheries management

Those 3 activities respond to the evaluation of BSC resources and management.

4.2 Conduct the monitoring and surveillance of by-catch and ETP, participated by communities

4.2.1 Prepare fishing logbook for fishers

4.2.2 Disseminate the knowledge of by-catch and ETP, including how to save ETP from BSC fishing

Those 2 activities respond to the evaluation of BSC management and environment.

4.3 Monitor and publicize

4.3.1 Plan for communication and public relation

4.3.2 Assess the efficiency of the Plan, including BSC data base, community supporting sectors, and community agreement/regulation

Those 2 activities respond to the evaluation of BSC management.

4. Conclusion

National Plan of Sustainable Management of Blue Swimming Crab of Thailand was developed through a series of participatory consultations among government and private sectors. It applied the SWOT analysis and in line with indicators of Marine Stewardship Council (MSC) Fisheries Standard aiming at sustainable utilization of BSC in Thailand based on international principles. The Plan consists of 4 strategies, 8 measures, and 21 activities. The 4 strategies are (a) Improvement of the information network of BSC resources and fisheries, (b) Establishment of the direction for BSC rehabilitation, (c) Control of BSC fishing and utilizing, and (d) Promotion of local participation and responsible BSC fishing. All activity-level implementations were monitored and evaluated in the aspects of BSC stocks, environmental impacts, and management.

5. Acknowledgement

We would like to express our appreciation to “Thailand Blue Swimming Crab Sustainable Management Committee” and “the working group of National Plan of Action on Sustainable Management of Blue Swimming Crab” for their contribution in developing of this “National Plan of Sustainable Management of Blue Swimming Crab of Thailand”

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Applying EAFM Principle/Process on Human Well-being Development at Trapang Ropov area, Kampot province, Cambodia

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Background

The Human Resources Development (HRD) project aims to build-up and strengthen human capability especially the fisheries officers of SEAFDEC Member Countries for sustainable fishery development. SEAFDEC Training Department (TD) has been working for the HRD program continuously, under the Japanese Trust Fund (JTF 6) in collaboration with SWEDEN project and conducted the training courses on Essential- Ecosystem Approach to Fisheries Management (E-EAFM) and extension methodology as requested by Cambodia, as the following: 1) Training Course on Essential Ecosystem Approach to Fisheries Management, 5-10 September 2016, Siem Reap, Cambodia; 2) The Training Course on TOT-E-EAFM , 27 – 30 September 2016, Siam Reap, Cambodia; and 3) The Training Course on Essential-Ecosystem Approach to Fisheries Management (E-EAFM) 18-23 December 2017, Kampot, Cambodia. The course participants are expected to be the key officers to transfer and apply the knowledge on the lessons learnt through the fisheries management approaches to make use in Cambodia. However, under the umbrella of sustainable fishery development, not only the ecological, fishing activities and governance need to be managed but human beings are considered as the key players for sustainable fisheries development, so the project in this phase tried to focus more on the human well-being aspect, especially to increase the fishers income by adding value activities for their catches.

Activities

Under the JTF-SEAFDEC HRD Project-2018, there are several activities which were carried out in aiming to strengthen capability of the fisheries management team of Cambodia through the HRD project learning site and its implementation which is at Trapang Ropov area, Kampot province, Cambodia. The activities under this project were the following: 1) Inception Meeting with Key Persons on Intensive HRD for Sustainable Fisheries Development through the work implementation at the learning site from 18-20 April 2018, then follow up with 2) The Workshop on Key Stakeholders Engagement, to investigate the current situation which led to the low income of the fishers at the project site and The Specific Survey on the Appropriate Activities, to increase income in the Fishing communities, from 10-12 July 2018, and 3) Developed the fisheries management plan in focusing to increase the income of the community, including the study visit and observation program by giving initial idea to increase income for the communities as well as gain the methods and knowledge how to deal with responsible seafood processing especially fish source production, krill paste, crispy fish, packaging and marketing, from 4-7 September 2018, and the next step will be the revisit/finalize the existing fisheries management plan and develop the working plan. The mentioned training/workshop is planned to be conducted in the year 2019.

1). Initiative workshop with key persons for the sub-project learning site in the country Activities description

The Inception Meeting with Key Persons on Intensive HRD for Sustainable Fisheries Development through the work implementation at the learning site from 18-20 April 2018.

The SEAFDEC team was led by *Mr. Tetsuya Kawashima*, Deputy Secretary-General of SEAFDEC and SEAFDEC/TD paid a courtesy call for the Director- General of Fisheries Administration, His Excellency *Eng Cheasan*, and Deputy Director- General of the Fisheries Administration, *Mr. Buoy Roitana* of Fisheries Administration, Cambodia. The objectives of the visit were to inform the implementation of the project entitled “Human Resource Development for Sustainable Fisheries Management in Southeast Asia” under the funding of JTF, including discussion on the pilot-learning site selection for EAFM in Cambodia, and continuation of strengthening capacity of Cambodian EAFM trainees.

Objectives

- To meet with key officers for the HRD project implementation at a pilot- learning site in Cambodia
- Consultation and selection of the specific pilot-learning site
- Visit and observation to the selected pilot-learning site

Outputs

- Agreement on the work activities of the project learning site
- Agreement on the site that to be implemented for the country
- A group of national core team and key stakeholders for the sub-project learning site implementation

2). Workshop on key stakeholders engagement and investigate current situation for the fisheries management

Activities description

The three (3) days “Workshop on Key Stakeholders Engagement” was organized from 10-12 July 2018 in Kampot province, Cambodia, aimed to engage key stakeholders and identify and prioritize the real issues leading on the low income of fishers, and know the root cause of the issues and screening other current situation for the management plan to improve the income of fishers.

Objectives

- To strengthen skills and knowledge of the key officers and the key stakeholders of the project learning site on the issues identification, prioritize and find the solution,
- To ensure the importance of stakeholders’ engagement for the fisheries management activities, and
- To prepare in developing the fisheries management plan for community income improvement.

Outputs

- -List of real and specific issues and problems
- -Compilation of baseline information

3). Developed the fisheries management plan

Activities description

The activities include the study visit and observation program from 4-7 September 2018 in focusing to increase the income of the communities by giving initial idea as well as gain the methods and knowledge how to deal with responsible seafood processing especially fish source production, krill paste, crispy fish, packaging and marketing.

Objectives

- Strengthen the understanding on the working process to develop a management plan,
- Capacity building on the existing ways/methods to increase income of the fishing communities.

Output

- Draft of the fisheries management plan

Results

The results of all activities which have been conducted aimed to strengthen knowledge, experience and skill of the fisheries officers in Cambodia on the importance of fisheries resource management for sustainable fisheries through the use of EAFM concept to other fisheries management, promotion materials, including collaboration between the government and the community. Moreover, for the success of pilot-learning site on sustainable fisheries management in focusing with the improvement of income of fishers through the responsible fisheries activities and extension methodologies.

Monitoring and Facilitating the Community-based Resources Management/Co-management: Pilot site in Vientiane, Lao PDR

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Introduction

Co-management/Community-based fisheries management approach is being considered with inclusion of local fishing communities in managing the fishery as part of a participatory management body involving all stakeholders which should be applied to ensure participation by and empowerment of local fishing communities and other primary stakeholders in implementing management measures. The Department of Livestock and Fisheries (DLF) of Lao PDR had promoted the fisheries officials, fishing communities, and institutions as the leaders or core persons to encourage fishers and farmers through transferring knowledge and activities on sustainable fisheries development and Co-management in Inland fisheries.

In 2012-2016, SEAFDEC conducted the Training for Trainer (TOT) on Facilitating Fisheries Information Gathering through Introduction of Community-based Fisheries Management for Provincial officers in the Northern, Central and Southern part of Lao PDR to expand Co-management and Community-based Fisheries Management to expand the area of Lao PDR. Regarding to strengthen the sustainable fisheries management by Co-management and Community-based fisheries management, SEAFDEC will support to implement pilot project in Nam Xouang Reservoir, Vientiane Prefecture, Lao PDR. The three (3) years project (2017-2019) was developed and cooperates with SEAFDEC/Inland Fishery Resources Development and Management Department (IFRDMD).

Background of Nam Xouang Reservoir

The Nam Xouang reservoir was completely constructed since 1978 and located at the administrative area of Nasaythong district, Vientiane Prefecture (**Fig. 1**). The reservoir is used for irrigation, particularly for the rice paddy field. During the wet season, the area is up to 3,300 hectares and in dry season about 1,500 hectares (12.41 km²). The water storage capacity is about 255.5 million cubic meters. This reservoir covers two (2) Districts, namely: Phone Hong and Naxaythong. Phone Hong is located in the upper part of the reservoir and covers three (3) villages adjacent the reservoir (Ban Nathep, Ban Jangsavang, and Ban Phoxay), while Naxaythong is located in the lower part of the reservoir and covers five (5) villages (Ban Sriwilai, Ban Phothai, Ban Phosri, Ban Thum, and Ban Phothong). Nam Xouang reservoir has two (2) conservation zones. The first conservation zone is located at Phone Hong with the area of 0.7 km². The second is located at Naxaythong and the area was estimated as 0.4 km². The fishing gears mainly used by villagers in this area are: gill net, cast net, lift net, hook, spear, and others. Due to lack of strong enforcement and inappropriate fisheries management measures, as well as, lack of fund and budget for the management of this reservoir, illegal fishing gears existed such as blast fishing, poisoning, and electro-fishing.



Figure 1. Nam Xouang reservoir

Project Design Matrix for Nam Xouang Reservoir

The work plan for fisheries management in Nam Xouang reservoir was developed by conducting the meeting with the local fishers, local officers and DLF to identify the problems and needs. The work plan comprised of the goal, objectives, outputs, and activities by using the Project Design Matrix (PDM) as shown below.

Goal : Sustainable utilization of fishery resources and fishers' livelihood security in Nam Xouang reservoir.

Objectives : The abundance of fishery resources and improvement of fishers' livelihood in Nam Xoung reservoir.

Outputs : 1. Fisheries Management Committee (FMC) in 2 Districts were established,
 2. The fishery rules and regulations in Nam Xouang reservoir were improved and strengthened,
 3. The fisheries management in conservation zone was improved,
 4. Fishers' income was improved by promoting fish processing.

Activities : **1. Establishment of Fisheries Management Committee (FMC)**
 1-1 Conduct meeting for establishing FMCs at Phone Hong district,
 1-2 Develop the fisheries management rules and regulations in Nam Xouang reservoir.

2. Promote fisheries management rules and regulations

2-1 Conducts training/meeting for information and dissemination of fisheries management rule and regulation for fishermen by the local government staff,
 2-2 Produce extension media such as poster and booklet,
 2-3 Implement practical surveillance activities at the conservation zone.

3. Strengthen fishery resources management

3-1 Evaluate the fishery resources (CPUE, stock assessment) (implemented by IFRDMD),
 3-2 Demarcation and mapping fish conservation zone,
 3-3 Fish restocking program (*e.g.* releasing juvenile).

4. Improve of fish processing technique and value added

Project activities implemented



Fig. 2 FMC establishment at Phone Hong District

The FMC started to do the surveillance of their own area and have a meeting every month to discuss on the fishery situation, the illegal fishing and so on. However, there is no boundary of conservation zones; therefore, this was the big gap for the illegal fishing in the conservation zones. The fishers requested to make buoys for demarcation of conservation zones in both districts. Hence, the seven (7) and three (3) buoys were installed in Phone Hong and Naxaythong districts, respectively. Moreover, the conservation zone signboards were installed in the conservation zones to announce with fishers about the area of the zone. Furthermore, there are seasonal closings for the spawning area in the reservoir, so the seasonal signboards were installed at the river mouths with three (3) and four (4) signboards in Phone Hong and Naxaythong Districts, respectively (Fig. 3). Moreover, the rules and regulations signboards were installed at the points where fishers would enter around the reservoir..



Fig. 3 The conservation zones in Phone Hong District (upper) and Naxaythong District (lower)

SEAFDEC implemented the project step by step following the work plan. The first activity was the establishment of FMC in Phone Hone District (Fig. 2) while Naxaythong District had formed the FMC through the support of the Mekong River Commission (MRC). The 25 members of FMC from the five (5) villages of Phone Hong District were established including the position and responsibilities of the members were set up. After that, the FMC revised the fisheries rules and regulations to be more effective in both two (2) districts.

The FMC started to do the surveillance of their own area and have a meeting every month to discuss on the fishery situation, the illegal fishing and so on. However, there is no boundary of conservation zones; therefore, this was the big gap for the illegal fishing in the conservation zones. The fishers requested to make buoys for demarcation of conservation zones in both districts. Hence, the seven (7) and three (3) buoys were installed in Phone Hong and Naxaythong districts, respectively. Moreover, the conservation zone signboards were installed in the conservation zones to announce with fishers about the area of the zone. Furthermore, there are seasonal closings for the spawning area in the reservoir, so the seasonal signboards were installed at the river mouths with three (3) and four (4) signboards in Phone Hong and Naxaythong Districts, respectively (Fig. 3). Moreover, the rules and regulations signboards were installed at the points where fishers would enter around the reservoir..

In addition, the mobile hatchery system was set up in Phone Hong and Naxaythong District, as well as the training on mobile hatchery technique was introduced to the fishers and local officers for capacity building in order to increase their knowledge on fish hatchery. The fishers' learned the technique for artificial breeding, hatchery, and nursery. The mobile hatcheries were move to their respective district. The fishers could also use the mobile hatchery for fish releasing day in Lao PDR.

In addition, in order to know the fishery situation, fish composition, and socio-economic, the survey of fishery resources was started since June 2018 to December 2018 and it will probably extended to May 2019. This activity cooperated with IFRDMD and provided the data sheet, measurement boards, scale, one personal computer and the enumerator fees every month to collect the data on fisheries and socio-economic, fish species identification, and stock assessment. There were two (2) enumerators who conducted the fisheries biology survey, one (1) enumerator collected the data at Phone Hong, and the other one at Naxaythong. For the fisheries and socio-economic, there were a total of six (6) enumerators; four (4) enumerators in Phon Hong and they collected data from 60 fishers, while two (2) enumerators in Naxaythong, and collected data from

40 fishers. The local officers used to input all data from both districts and sent to central officer for English translation and rechecking, and then sent to SEAFDEC/TD and IFRDMD for data analysis.

Next activities in year 2019

There are two (2) main activities remaining for year 2019, namely: 1) Awareness building on fisheries co-management including the community rules and regulations to fishers and local authorities, and 2) Improvement of fish processing technique and value added fishery products. The first activity will focus to produce the publication such as booklet, poster, *etc.* for public announcement in the communities around the reservoir. The publication aims to encourage the local people to be aware on the fishery resources and co-management. The contents of the publication will be easy to understand and focus on the importance of fishery resources and management including the rules and regulations in Nam Xouang reservoir. The second activity aims to improve the fishers' livelihood especially the fisher's wife by introducing the techniques and sanitation for processed fish products. The processing group will be established and trained for fish processing techniques and household accounting.

Conclusion

Since the project on fisheries Co-management and Community-based fisheries management started at Nam Xouang reservoir, Lao PDR, many activities implemented with the active participation from both fishers and fishery officers of DLF. Now, the FMC was established in two (2) Districts with the revision of the fishery rules and regulations. Furthermore, the demarcation of conservation zone and regulations signboards set up including the strong surveillance activity by FMC led to reduce the illegal fishing at the conservation zone. The data analysis for fishery situation and socio-economic will be analyzed in year 2019 in order to evaluate the whole project. Finally, the proceeding of the project will be published within next year.

The Collaborative Research Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand Onboard M.V. SEAFDEC 2

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Introduction

The Southeast Asian Fisheries Development Center (SEAFDEC) in collaboration with Member Countries, fisheries agencies, universities and institutions carried out the “Survey on Marine Fisheries Resources and Marine Environment in the Gulf of Thailand.” The overall objectives of this collaborative research survey were as follows: to support SEAFDEC Member Countries to conduct marine fisheries and environmental data and information collection using the research vessel, and to promote the offshore fishery resources exploration through the research and human resources capacity by utilization of SEAFDEC’s Training and Research Vessel, M.V. SEAFDEC 2.

This collaborative research cruise survey started from 17 September to 18 October 2018, with 73 total number of survey stations (49 in Thailand and 24 in Cambodia). There were 43 research topics that had been proposed for this collaborative research survey.

The major envisage outputs of the survey were the following:

1. Baseline data on marine fishery resources and marine environmental situation for scientific reference as well as the status of marine fishery resources in the Gulf of Thailand;
2. Increasing the number of experienced researchers on marine fishery resources and marine environment of SEAFDEC Member Countries;
3. Strengthening the network of fisheries and oceanography for scientist/researcher in Southeast Asia; and
4. Maximizing the efficiency and benefits of the SEAFDEC research vessel and research equipment to support on marine fishery resources and marine environmental survey of SEAFDEC Member Countries.

Activities

The research activities onboard M.V. SEAFDEC 2 were divided into two (2) main types, namely: Marine Fishery Resources Survey and Marine Environmental Survey. For marine fishery resources survey, Scientific Echo Sounder and bottom trawl were used. While for marine environmental survey, various instruments were used to collect biological, chemical, and physical oceanographic parameters, *e.g.* Conductivity Temperature and Depth (CTD), water samplers, sediment samplers, plankton net samplers, together with other interested issues such as Marine Debris and Meteorology were also observed in this survey.

After collection of samples from the sea, all samples were stored and brought back for analysis at the responsible agencies for each research topic. The analysis process will take around six (6) months to one (1) year depending on the research topics. The results of all research topics will be presented at the technical seminar organized by SEAFDEC in the year 2020.

Activities Onboard Umitaka Maru on the 21st Kaiyodai Antarctic Research Expedition (KARE21, UM-17-09)

Pontipa Luadnakrob

Southeast Asian Fisheries Development Center

Introduction:

The Twenty-first Kaiyodai Antarctic Research Expedition (KARE21) was conducted during the leg from Fremantle (WA, Australia) to Hobart (TAS, Australia) from 31 December 2017 to 22 January 2018 (23 days) in the training voyage of the Advanced Course of Fisheries Science. There were twenty-five onboard researchers, consist of teachers, scientists and students from Tokyo University of Marine Science and Technology (TUMSAT), National Institute for Polar Research (NIPR), University of Tokyo, Shanghai Ocean University and The Southeast Asian Fisheries Development Center (SEAFDEC). In addition, there were three (3) technicians from Marine Works Japan Ltd. (MWJ). This voyage involved the following research subjects, namely: collaborative research project of TUMSAT and NIPR, collaborative research project of physical oceanography groups TUMSAT, University of Tokyo and Shanghai Ocean University, Prioritized Research Project, Ordinary Research Project, Routine Observation Project (physical and chemical oceanography monitoring), and Monitoring Observation Project (biological oceanography).

Objectives:

1. TUMSAT and NIPR Collaborative Study Project: “Impacts of Environmental Changes on Marine Ecosystem in the Southern Ocean;”
2. JARE’s (Japanese Antarctic Research Expedition) Research Project;
 - Ordinary Research Project: “Impacts of Environmental Changes on Planktonic Community Structure in the Southern Ocean”
 - Ordinary Research Project: “Elucidation on Transfiguration of the Deep Global Circulation in the Warming and Freshening Age of Antarctic Bottom Water”
 - Routine Observation: “Long-term Monitoring for Physical and Chemical Oceanography”
 - Monitoring Observation (marine ecosystem)
3. TUMSAT and University of Tokyo Collaborative Study Project: “Turbulence and Mixing in the Southern Ocean;” and
4. Collaborative Project of Physical Oceanography Mooring (supported by the grant of TUMSAT’s president and KAKENHI) “Evaluation of the Production Volume of Antarctic Bottom Water, and Elucidation of Modification Mechanism of its Water Property.”

Activities:

The survey was conducted in the Southern Ocean covering an area of latitude 32°03.08 S - 66°12.80 S and longitude 106°43.91 E - 143°48.05 E. There are various depths from 595 m to deeper than 4000 m. Activities onboard Umitaka Maru are the following:

1. Physical oceanographic survey using Conductivity, Temperature and Depth measuring instrument (CTD), LADCP/RMS with Micro Rider, and XCTD and long-term mooring.
2. Turbulent mixing in the deep ocean by using eXpendable Vertical Microstructure Profiler (VMP-X).

3. Nutrients in sea water along 110° E transect.
4. Biological sampling for plankton by using NORPAC net, RING net, ORI net, CPR, and Vertical Multilayer Plankton Sampler (VMPS).
5. Water sampling for zooplankton, chlorophyll a, nutrients, POC/N, stable isotopes, light microscopy, and DNA.
6. Underway sampling for HPLC, POC/N isotope, and microscopic analysis of small zooplankton species.
7. Sea ice sampling.
8. Phytoplankton and zooplankton grazing experiments.
9. Deploying drifter buoys
10. Visual observation of marine litters and collect microplastics by using neuston net.

Introduction to SEAFDEC Repository

Satana Duangsawasdi

Secretariat, Southeast Asian Development Center

I. INTRODUCTION

Since 1998, SEAFDEC information-related activities have been intensified through the formulation of program on Center-wide Information Network. The program aims to provide a platform for the implementation of organization information-related activities. In order to harmonize these activities toward the organizational goal, the Information Strategies for Enhancing SEAFDEC Visibility and Communication has been formulated.

With this regards, SEAFDEC Repository has been developed under Information Strategy number two which objective is to raising SEAFDEC image at national, regional and international levels.

II. WHAT IS REPOSITORY AND DSPACE?

“Repository” from the view of Information Technology (IT) is a central place which the data is kept and maintained in an organized method.

SEAFDEC Institutional Repository (SIR) is developed under Dspace framework. SIR is a web-based repository which is an achieve collecting, preserving and disseminating digital copies of SEAFDEC publications.

“Dspace” is one of open source repository software which developed by Massachusetts Institute of Technology (M.I.T), HP Labs.

III. SEAFDEC INSTITUTIONAL REPOSITORY

SEAFDEC Institutional Repository (SIR) is a web-based repository which the url (uniform resource locator) is <http://repository.seafdec.org>

The structure of SIR is categorized by

- Journal Articles, Conference Papers by SEAFDEC Staff
- Magazine and Newsletter Articles by SEAFDEC Staff
- Audio-Visual Materials
- Books
- Brochures and Flyer
- Conference Proceeding
- Cross-cutting Issues
- Fishery Statistics and Information
- Institutional and Annual Meeting Reports
- Journal/Magazines
- Newsletters
- Policy Framework and Guidelines
- Posters
- SEAFDEC Collaborative Projects
- Stakeholder-oriented Manuals
- Technical Publication and Reports on Aquaculture
- Technical Publication and Reports on Fish Handling and Post-harvest Practices
- Technical Publication and Reports on Fishery Management
- Technical Publication and Reports on Fishery Resources

- Technical Publication and Reports on Fishing Technologies and Practices
- Technical Publication and Reports on Socio-economics

Figure 1. SEAFDEC Institutional Repository (SIR) Web Page

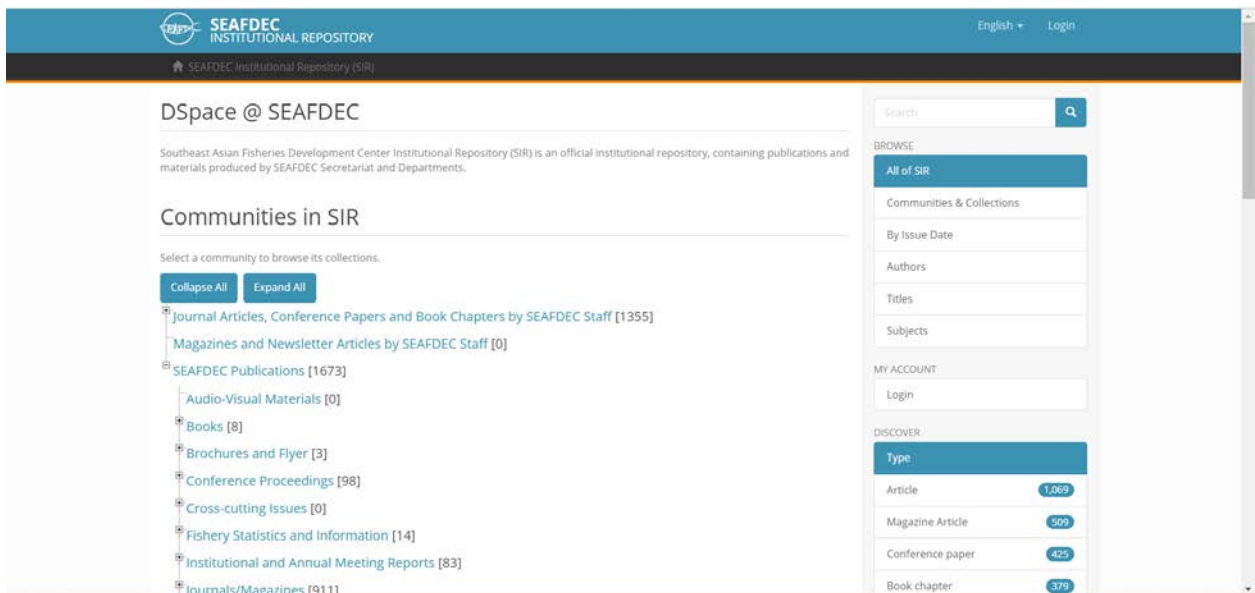
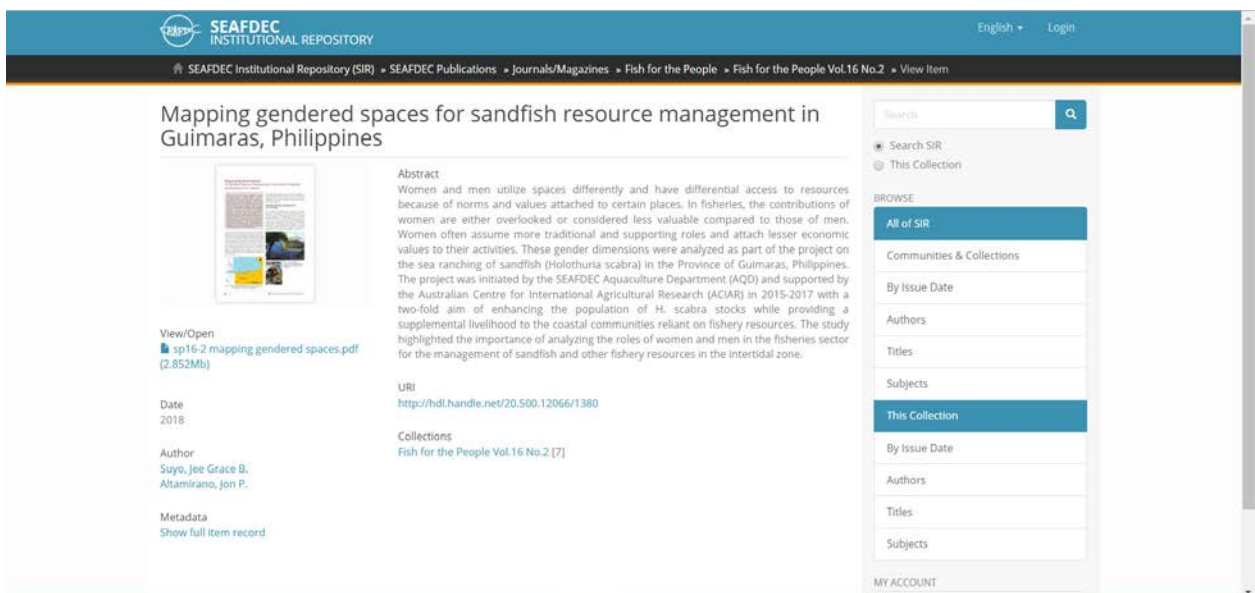


Figure 2. Item View Page

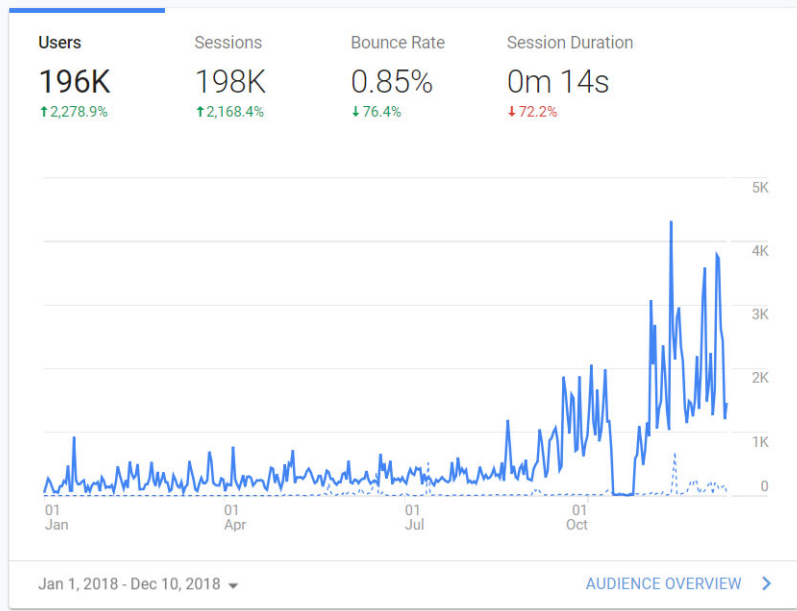


IV. MONITORING SEAFDEC INSTITUTIONAL REPOSITORY

Users/Visitors

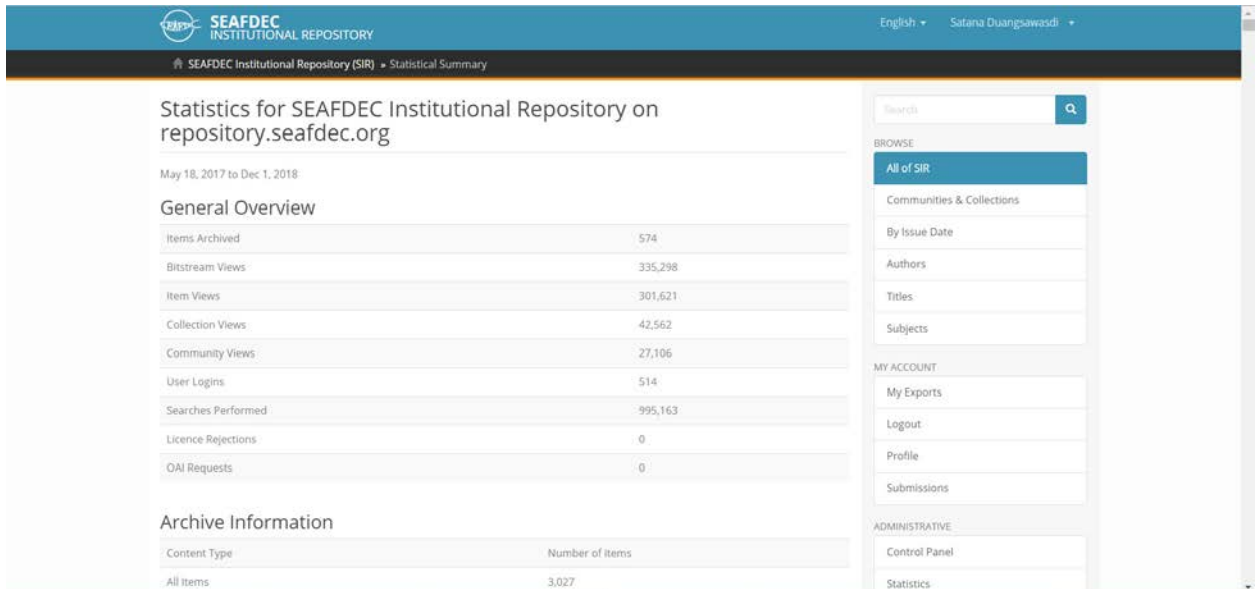
There are increasing numbers of visitors between 1 January to 10 December 2018. SIR has about 196,000 visitors (from Google Analytics)

Google Analytics Home



Items Downloaded

SIR has 574 downloadable items with 335,298 download times between 18 May and 1 December 2018



All Time Top Item Viewed

Items Viewed (more than 20 times)	
Item/Handle	Number of views
Preserving a critical fishery resource in Inle lake, Myanmar for sustainable fisheries and food s...	2,382
SEAFDEC Annual Report 2017 (20.500.12066/1344)	896
Fish for the People Vol.16 No.2 (20.500.12066/1381)	792
Report of the Fiftieth Meeting of the Council of the Southeast Asian Fisheries Development Center...	707
Mapping gendered spaces for sandfish resource management in Guimaras, Philippines (Suyo, Jee Grac...	574
Fishery Statistical Bulletin of Southeast Asia 2016 (20.500.12066/1818)	565
Technical Compilation of Heavy Metals, Pesticide Residues, Histamine and Drug Residues in Fish an...	545
Joint ASEAN-SEAFDEC Declaration on Regional Cooperation for Combating Illegal, Unreported and Unr...	520
Fish for the People Vol.16 No.1 (20.500.12066/1361)	486
Utilizing alternative ingredients in aquafeeds for sustainable aquaculture (Aya, Frolan A.) (20.5...	454

Groups

- Authorizations
- Content Administration**
- Items
- Withdrawn Items
- Private Items
- Import Metadata
- Batch import (ZIP)
- Registries**
- Metadata
- Format

MONTHLY REPORTS

V. REFERENCES

DuraSpace <https://duraspace.org/dspace/>

Google

Analytics https://analytics.google.com/analytics/web/#/home/a44117572w146421548p151189716/_u.date00=20180101&_u.date01=20181210/

SEAFDEC Institutional Repository <http://repository.seafdec.org>