SEAFDEC/UNEP/GEF Project on Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and the Gulf of Thailand

Provisional Prospectus
Regional Training Course on Fish Larvae
Phase I: Larval Fish Identification and Fish Early Life History Science

16–27 November 2022,
SEAFDEC Training Department, Samut Prakan, Thailand

I. INTRODUCTION

Larvae of marine fishes termed ichthyoplankton usually are pelagic, drifting in the sea and interacting with pelagic predators and planktonic prey. Most fish larvae, even species that ultimately are herbivores as juveniles or adults, are primarily carnivorous during the larval stage, feeding smaller planktonic organisms. In turn, larval fishes prey on larger nektonic and planktonic organisms. Escape from the precarious larval stage is accomplished via growth and ontogeny. Only a few individuals from thousands of newly hatched larvae survive the ever-present threats of starvation and predation during planktonic life. Surveys at sea generally estimate distributions, abundance, diversity, and structure of 'ichthyoplankton' communities, including associations of larvae with their predators and prey. Such surveys sometimes are a component of stock assessments used in fisheries management. Furthermore, many developed countries have long used ichthyoplankton data in stock identification to indicate spawning locations and times and as an index of spawning stock biomass (Heath, 1993; Richardson *et al.*, 2010).

In Southeast Asia, early life stages in stock identification studies have been regionally conducted in the South China Sea (SCS) and the Gulf of Thailand (GoT) by the Southeast Asian Fisheries Development Center (SEAFDEC) in collaboration with its Member Countries since 1997 by M.V. SEAFDEC and since 2004 by M.V. SEAFDEC 2. At the Regional Training Program on larval fish identification held in 2007, 2008, and 2016 supported by the GEF/UNEP project on "Reversing Environment Degradation Trends in the SCS and GoT," some larval fish samples from the survey have been identified. Later a team of ichthyologists and fisheries biologists led by Dr. Yoshinobu Konishi reanalyzed the findings from the series of trainings and published the Larval Fish Identification Guide for the South China Sea and the Gulf of Thailand in 2008 and Scombridae Larvae Identification Guide for Southeast Asian Countries in 2022.

In this connection, the SEAFDEC/UNEP/GEF project entitled "Establishment and Operation of a Regional System of Fisheries Refugia in the South China Sea and the Gulf of Thailand" has been implemented since 2016 has the aim to improve the understanding and management of the links between fish stocks and critical fisheries habitats. The Project focuses on sustainable use by implementing the fisheries refugia concept as "Spatially and geographically defined, marine or coastal areas in which specific management measures are applied to sustain important species during critical stages of their life-cycle." To achieve such objective, identifying fisheries refugia sites, including the samplings and species identified for fish eggs and larvae, is one of the essential activities. In addition, the results from larval fish identification would further support the local knowledge to develop a critical science-based management policy for sustainable management of fisheries refugia.

Nevertheless, the knowledge and human resources on ichthyoplankton studies, particularly larval fish identification, are limited in many countries implementing the FR project. Many fish eggs and larvae were identified at family and genus levels, but not at the species level. Considering the long-term sustainable management of fisheries, capacity building on larval fish identification and early life history science is also critical.

With regard to the above circumstance, the Regional Scientific and Technical Committee, at its third meeting (RSTC3) held in Hai Phong, Viet Nam, in 2020, requested the Project Coordination Unit (PCU) of the SEAFDEC Training Department (SEAFDEC/TD) to arrange another regional training course on larval fish identification. Accordingly, the PCU, with the support from the Research and Development Division (RDD) of SEAFDEC/TD, proposes to conduct the Regional Training Course on Larval Identification and Fish Early Life History Science before the Project's termination by the end of 2022. The Training Course focuses on six (6) fish groups related to the fisheries refugia target species, namely: Scombridae, Carangidae, Engraulidae, Lutjanidae, Siganidae, and Serranidae. Also, the Training Course includes sharing of experience on country plan/strategy for fisheries resources survey and fish stock identification, including science-based management to protect the critical stages of the fish life cycle.

II. OBJECTIVES

- Improve the knowledge and skills of scientists and fisheries biologists on fish early life history science and identify the larval fish of six (6) targeted groups at family, genus, and some species levels.
- Strengthen the networking among the scientists and fisheries biologists on early life history of fishes.
- Compile photographs and illustrations of morphological characters of marine fish larvae from the training

III. EXPECTED OUTCOMES

- Improved understanding of the trainees of fish early life history and skills in larval fish identification for managing the fish stock at national and sub-regional levels.
- Strengthened regional cooperation on fish stock identification and management through networking.
- Awareness of the importance of the early life history science study for fish stock identification and management is built for long-term sustainable fisheries management.

IV. EXPECTED OUTPUTS

- A network of scientists and fish biologists on larval fish identification and early life history science in the Southeast Asian region.
- Reports and training materials are published and shared online.
- Photographs and illustrations of morphological characteristics of the marine fish larvae are compiled and published online.

V. DATE AND VENUE

The Regional Training Course is tentatively scheduled on 16–27 November 2022 at SEAFDEC/Training Department, Samut Prakan, Thailand. Accommodation and meals (breakfast and lunch) for participants and resource persons will be arranged at the TD Dormitory.

VI. ORGANIZER AND FUNDING

The Regional Training Course will be convened by the Research and Development Division (RDD) of the SEAFDEC Training Department with funding support from the Regional Program of the SEAFDEC/UNEP/GEF Project on Establishment and Operation of a Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand.

VII. EXPECTED TRAINEES

- Two scientists/fisheries biologists from each of the six participating countries, namely: Cambodia, Indonesia, Malaysia, Philippines, Thailand, and Viet Nam to be supported by the SEAFDEC/UNEP/GEF Fisheries *Refugia* Project
- Two scientists/fisheries biologists from other SEAFDEC Member Countries including Brunei Darussalam, Lao PDR, Myanmar, and Singapore to be supported by the SEAFDEC/UNEP/GEF Fisheries *Refugia* Project
- A scientist/fisheries biologist each from the academe and SEAFDEC/MFRDMD who are actively involved in larval fish identification studies to fill in two extra quotas that the SEAFDEC/UNEP/GEF Fisheries *Refugia* Project would support
- Considering the gender mainstreaming and gender equality policy under SEAFDEC, UNEP, and GEF in establishing and managing fisheries *refugia*, the Project encourages a minimum of 30 % of female trainees to attend the Training Course.

VIII. RESOURCE PERSONS AND SUPPORTERS

Resource Persons	Position/Institution
1) Dr. Yoshinobu KONISHI	Former staff of the Seikai National Fisheries Research Institute, Japan
2) Mr. Rangsan CHAYAKUL	Former staff of the Department of Fisheries, Thailand
3) Dr. Teerapong DUANGDEE	Lecturer, Kasetsart University, Thailand
4) Dr. Keita KOEDA	Lecturer, University of the Ryukyus, Japan
5) Dr. Cecilia CHU	Researcher, University of Nottingham Malaysia
Technical and Administrative Support	**SEAFDEC/TD**
1) Mr. Sukchai ARNUPAPBOON	Fisheries Oceanographer, Head of Research and Development Division (RDD)
2) Ms. Siriporn PANGSORN	Fishing Ground Information scientist, RDD
3) Ms. Nathacha CHANGPHETPHOL	Fishery Oceanographer, RDD

4) Ms. Nathacha SORNVAREE	Administrative Officer, RDD

IX. LANGUAGE

The English language will be used throughout the Training Course. Therefore, proficiency in English of the trainees is required.

X. CERTIFICATE OF COMPLETION

SEAFDEC Training Department will award trainees a Certificate of Completion at the end of the training Course.

XI. SYLLABUS

Date/Time	Activity/topic	Responsibility
15 Nov. 22 – Tuesday		
	Participants arrive at SEAFDEC Training Department, Samut Prakan, Thailand	SEAFDEC Staff
16 November 22 (Wednesday)		
0830–0900	Registration	All Participants
0900–0920	Opening Ceremony & group photo	SEAFDEC/TD FR/PCU Staff
0920–0940	Brief on schedule and anticipated outputs	SEAFDEC Staff
0940–1000	Coffee break	SEAFDEC Staff
1000–1200	Country report on the research plan for fisheries resources survey and study on fish stock identification (15 minutes for each country)	Trainees from each country (10 Countries)
1200–1330	Lunch break	SEAFDEC Staff
1330–1430	Keynote Address: Early life history studies of the subtropical marine fishes in Okinawa, Japan (online)	Dr. Keita KOEDA
1430–1450	Coffee break	SEAFDEC Staff
1450–1600	Lecture: Utilization of DNA barcodes for the identification of tropical larval fishes in Klang Strait, Straits of Malacca	Dr. Cecilia CHU
1600–1700	Practice: DNA barcode collecting and preserving technique	Dr. Cecilia CHU
17 November 22 (Thursday)		
0900–1000	Lecture: Review of morphological development of larval fish characters	Dr. Yoshinobu KONISHI
1000–1020	Coffee break	SEAFDEC staff
1020–1200	Lecture: Identification methods of the Scombridae larvae and juveniles in the Southeast Asian region	Dr. Yoshinobu KONISHI
1200–1330	Lunch break	SEAFDEC Staff
1330–1500	Practice: Species identification and morphological description of the Scombridae larvae and juveniles (1)	Instructor Team Dr. Yoshinobu KONISHI, Mr. Rangsan CHAYAKUL Dr. Teerapong DUANGDEE
1500–1520	Coffee break	SEAFDEC Personnel

1520–1700	Practice: Species identification and morphological description of the Scombridae larvae and juveniles (1)(cont.)	Instructor Team
18 November 22 (Friday)		
0900–1000	Practice: Species identification and morphological description of the Scombridae larvae and juveniles (2)	Instructor Team
1000–1020	Coffee break	SEAFDEC Staff
1020–1200	Practice: Species identification and morphological description of the Scombridae larvae and juveniles (2) (cont.)	Instructor Team
1200–1330	Lunch break	SEAFDEC Staff
1330–1500	Practice: Species identification and morphological description of the Scombridae larvae and juveniles (3)	Instructor Team
1500–1520	Coffee break	SEAFDEC Staff
1520–1700	Practice: Species identification and morphological description of the Scombridae larvae and juveniles (3) (cont.)	Instructor Team
19 November 22 (Saturday)		
0900–1000	Lecture: Identification methods of the Carangidae larvae in the Southeast Asian region	Dr. Yoshinobu KONISHI
1000–1020	Coffee break	SEAFDEC Staff
1020–1200	Practice: Species identification and morphological description of the Carangidae larvae (1)	Instructor Team
1200–1330	Lunch break	SEAFDEC Staff
1330–1500	Practice: Species identification and morphological description of the Carangidae larvae (2)	Instructor Team
1500–1520	Coffee break	SEAFDEC Staff
1520–1700	Practice: Species identification and morphological description of the Carangidae larvae (2) (cont.)	Instructor Team
20 November 22 (Sunday)		
	Refreshment/Excursion	SEAFDEC Staff
21 November 22 (Monday)		
0900–1000	Practice: Species identification and morphological description of the Carangidae larvae (3)	Instructor Team
1000–1020	Coffee break	SEAFDEC Staff
1020–1200	Practice: Species identification and morphological description of the Carangidae larvae (3) (cont.)	Instructor Team
1200–1330	Lunch break	SEAFDEC Staff
1330–1430	Lecture: Identification methods of the Engraulidae larvae in the Southeast Asian region	Dr. Yoshinobu KONISHI
1430-1500	Practice: Species identification and morphological description of the Engraulidae larvae (1)	Instructor Team
1500–1520	Coffee break	SEAFDEC Staff
1520–1700	Practice: Species identification and morphological description of the Engraulidae larvae (1) (cont.)	Instructor Team
22 November 22 (Tuesday)		
0900–1000	Practice: Species identification and morphological description of the Engraulidae larvae (2)	Instructor Team
1000–1020	Coffee break	SEAFDEC Staff
1020–1200	Practice: Species identification and morphological description of the Engraulidae larvae (2) (cont.)	Instructor Team
1200–1330	Lunch break	SEAFDEC Staff
1330–1500	Practice: Species identification and morphological description of the Engraulidae larvae (3)	Instructor Team

1500–1520	Coffee break	SEAFDEC Staff
1520–1700	Practice: Species identification and morphological description of the Engraulidae larvae (3) (cont.)	Instructor Team
23 November 22 (Wednesday)		
0900–1000	Presentation of case study on early life history science based on the references for planning of future working subjects in country	Country Representative (10 Countries)
1000–1020	Coffee break	SEAFDEC Staff
1020–1200	Presentation of case study on early life history science based on the references for planning of future working subjects in country (cont.)	Country Representative (10 Countries)
1200–1330	Lunch break	SEAFDEC Staff
1330–1430	Lecture: Identification methods of the Lutjanidae, Siganidae and serranid Epinephelinae larvae in the Southeast Asian region	Dr. Yoshinobu KONISHI
1430–1500	Practice: Species identification and morphological description of the Lutjanidae, Siganidae and serranid Epinephelinae larvae (1)	Instructor Team
1500–1520	Coffee break	SEAFDEC Staff
1520–1700	Practice: Species identification and morphological description of the Lutjanidae, Siganidae and serranid Epinephelinae larvae (1) (cont.)	Instructor Team
24 November 22 (Thursday)		
0900–1000	Practice: Species identification and morphological description of the Lutjanidae, Siganidae and serranid Epinephelinae larvae (2)	Instructor Team
1000–1020	Coffee break	SEAFDEC Staff
1020–1200	Practice: Species identification and morphological description of the Lutjanidae, Siganidae and serranid Epinephelinae larvae (2) (cont.)	Instructor Team
1200–1330	Lunch break	SEAFDEC Staff
1330–1500	Practice: Species identification and morphological description of the Lutjanidae, Siganidae and serranid Epinephelinae larvae (3)	Instructor Team
1500–1520	Coffee break	SEAFDEC Staff
1520–1700	Practice: Species identification and morphological description of the Lutjanidae, Siganidae and serranid Epinephelinae larvae (3) (cont.)	Instructor Team
25 November 22 (Friday)		
0900–1000	Practice: Species identification and morphological description of the Lutjanidae, Siganidae and serranid Epinephelinae larvae (4)	Instructor Team
1000–1020	Coffee break	SEAFDEC Staff
1020–1200	Practice: Species identification and morphological description of the Lutjanidae, Siganidae and serranid Epinephelinae larvae (4) (cont.)	Instructor Team
1200–1330	Lunch break	SEAFDEC Staff
1330–1500	Preparation of presentation on species identification and morphological descriptions of examined larvae and juveniles, and on future working subjects to be planned	Country Representative (10 Countries)
1500–1520	Coffee break	SEAFDEC Staff
1520–1700	Preparation of presentation on species identification and morphological descriptions of examined larvae and juveniles, and on future working subjects to be planned (cont.)	Country Representative (10 Countries)
26 November 22 (Saturday)		
0900–1000	Presentation on results of species identification and morphological descriptions of examined larvae and juveniles, and on future working subjects to be planned	Country Representative (10 Countries)
1000–1020	Coffee break	SEAFDEC Staff
1020–1200	Presentation on results of species identification and morphological descriptions of examined larvae and juveniles, and on future working subjects to be planned (cont.)	Country Representative (10 Countries)
1200–1330	Lunch break	SEAFDEC Staff

1330–1430	Training course evaluation	FR/PCU
1430–1500	Closing Ceremony for Phase I	SEAFDEC/TD FR/PCU Staff
	Free	
1700–2200	Farewell Dinner	
27 November 22 (Sunday)		
	Refreshment/Excursion	SEAFDEC Staff