UNESCO/IOC
Regional Training and Research Center
For Marine Biodiersity and Ecosystem Health

Research Center for Oceanography
Indonesian Institute of Sciences
2021

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

WESTPAC

LIPI

RTRC MarBEST

Evaluation REPORT

2016-2020

UNESCO/IOC
Regional Training and Research Center
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Prepared by
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Indonesian Institute of Sciences
2021


WESTPAC
WESTPAC Advisory Group Meeting 2016
13-15 January 2016, Yogyakarta, Indonesia
Hosted by
Research Center for Oceanography
Indonesian Institute of Sciences
LIPI


LIPI

RTRC MarBEST wish to express special gratitute to the following initiatiors, for their hardwork and support in establishing RTRC MarBEST:

1. Prof. Dr. Iskandar Zulkarnaen (Chairman of LIPI , 2014-2017)
2. Prof. Dr. Zainal Arifin (Deputy for Earth Sciences, LIPI, 2015-2019)
3. Dr. Dirhamsyah (Director of Research Center for Oceanography LIPI/Director RTRC MarBEST, 2015-2019)
4. Prof. Dr. Suharsono (Vice Director of RTRC MarBEST, 2016-2018)
5. Indra Bayu Vimono, M. App.Sc (Vice Director of RTRC MarBEST, 2018-2019)
6. Sofia Yuniar Sani (Executive Secretary of RTRC MarBEST, 2016-2020)

CONTENT

Introduction

UNESCO/IOC Regional Training and Research Center on Marine Biodiversity and Ecosystem Health (RTRC MarBEST) was officially endorsed through Advisory Working Group Meeting of UNESCO/IOC WESTPAC in Yogyakarta, 13-15 January 2016, and then inaugurated on 17 October 2016 by then the Chairman of Indonesian Institute of Sciences (LIPI), Prof. Iskandar Zulkarnain. In the following year, the formal agreement between the Chairman of LIPI and the Executive Secretary of UNESCO/IOC was signed at the 11th Intergovernmental Session in Qingdao, China, concerning the establishment of a Regional Training and Research Center on Marine Biodiversity and Ecosystem Health (RTRC-MarBEST). Furthermore, the training is carried out by the Research Center for Oceanography (RCO) LIPI that has a role in marine research within the LIPI.

The agreement between The Chairman of LIPI and the Executive Secretary of UNESCO/IOC above was signed on 22 April 2017 for the period of three years and should be renewed. According to Article XV in mentioned agreement, the Agreement may be renewed through an exchange letter between LIPI and the UNESCO/IOC after the evaluation of the RTRC MarBEST is being conducted (Agreement between the Intergovernmental Oceanographic Commission of UNESCO and the Indonesian Institute of Sciences regarding the Establishment of RTRC participating in the UNESCO/IOC regional network in training and research center in oceanography, 2017).

The evaluation will be conducted by the IOC Sub-Commission for the Western Pacific (WESTPAC) in cooperation with the National Committee of Indonesia for IOC/UNESCO, on the performance of the RTRC MarBEST for the period of 2016-2020, in considerations of the need to maintain the momentum established over the last five years in serving the capacity development needs of IOC Member States particularly in the region and beyond, the implementation of the IOC/UNESCO Capacity Development Strategy (2015-2021), and the UN Decade of Ocean Science for Sustainable Development (2021- 2030).

Accomplishments have been made in the past 5 years since RTRC MarBEST conducted the first activities. This report will further describe detailed achievements as well as evaluations of the activities.

Dr. Augy Syahailatua
Director of RTRC MarBEST

I. Background

'IOC has a long tradition of capacity development coordination and implementation through its Sub-Commissions and Regional Committees'. (Page 27, IOC Capacity Development Strategy (2015-2021).)Following up on the IOC Principles and Strategy for Capacity Building (IOC/INF-1211, adopted at the 23rd Session of IOC Assembly, 21–30 June 2005) and its concept of 'self-directed capacity-building' that leads to autonomous development cycles, the IOC Sub-Commission for the Western Pacific (WESTPAC) established a region specific capacity development program entitled 'IOC Regional Network of Training and Research Centers (RTRCs) on Marine Science' at its seventh Intergovernmental Session (IOC/SC-WESTPAC-VII/3s, Sabah, Malaysia, 26-29 May 2008).

The initiative aims to improve and sustain national and regional research capacity of IOC Member States in the region that are vital to sustainable development, through the establishment of Regional Training and Research Centers (RTRCs) in national oceanographic institutes or universities, and provision of regular training and research opportunities in RTRCs on their specialized areas to young scientists mainly from developing countries particularly in the region.

WESTPAC initiated one regional capacity building program in 2008 entitled "UNESCO/IOC Regional Network of Training and Research Centers on Marine Science", aiming to improve regional capability and capacity on marine science in a sustainable and systematic manner, through the establishment of Regional Training and Research Centers (RTRCs) in national oceanographic institutes or universities, and regular provision in these Centers of training and research opportunities on their domains of focus to young scientists mainly from developing countries within and outside the region. The initiative has been adopted by the Sub-Commission at its Seventh Intergovernmental Session (WESTPAC-VII, 26-29 May 2008, Sabah, Malaysia) and endorsed by the Intergovernmental Oceanographic Commission at its forty-first session of Executive Council (24 June- 1 July 2008, Paris, France) (http://iocwestpac.org/rtrc/49.html). WESTPAC has been continuing its efforts in the development of IOC Regional Network of Training & Research Centers on Marine Science. Consultations have been ongoing with potential hosts for other Regional Training and Research Centers (RTRCs) with positive feedback received from Thailand, Malaysia, and Vietnam. It is recommended the experience of WESTPAC in the development of Regional Training and Research Centers (RTRCs) could be shared with and replicated in other regions to generate more benefits[1].

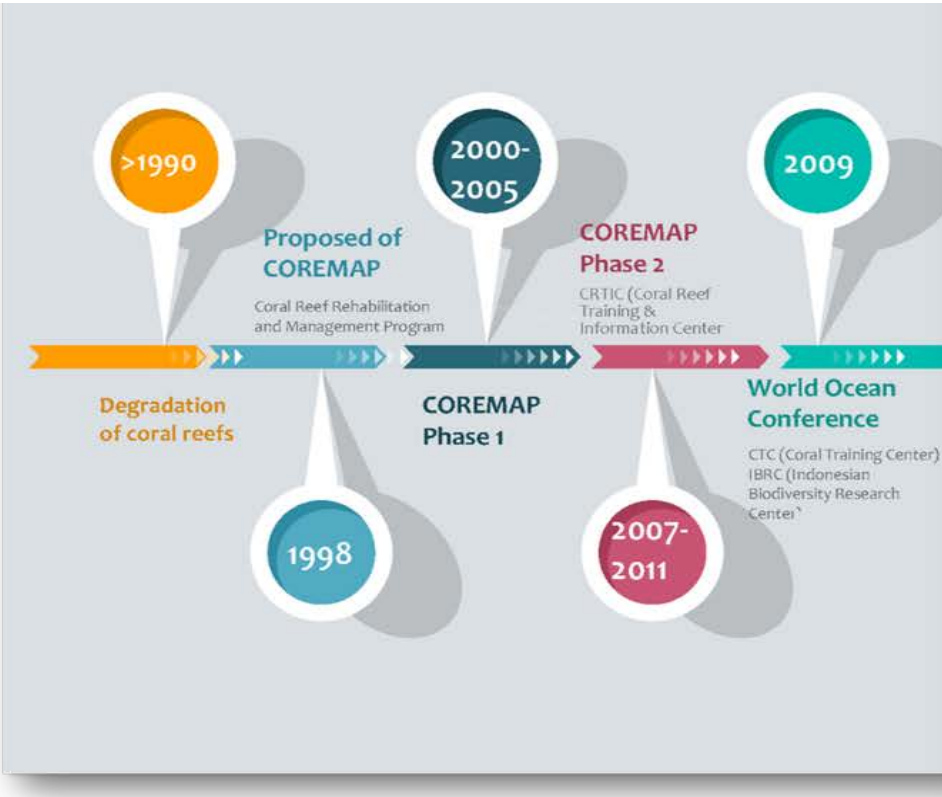
Since its establishment, the RTRC network has been co-developed and co-implemented with the Member States in the region. It builds on Member States' strong ownerships and the host institutions' widely recognized areas of specialization, cross-fertilizes the global-wide knowledge and expertise, links training closely to research, and suits national and regional priorities for ocean sustainability.

I. Background

Indo-West Pacific and ASEAN are the centers of the highest biodiversity in the world. Our life depends on biodiversity, however, knowledge and information concerning biodiversity in this region are still limited especially in the capacity and capability of human resources. Biological information and the taxonomic capability to recognize and identify various species of marine life are needed to secure the rich biodiversity in this region. It is very diverse needs of taxonomy experts from various taxa of marine life. A lack of human resources in the field of taxonomy has allegedly caused minimum awareness of the importance of taxonomy, lack of funding, and lack of employment opportunities for taxonomists. Taxonomists generally only work in museums or universities but an increase in capacity and capability and competence of young researchers and lecturers through training activities is expected to stimulate researchers to pursue the field of taxonomy. Several problems in numerical taxonomy and taxonomy-based morphology can be resolved through a genetic and molecular taxonomy approach. A molecular taxonomic approach is currently very popular, not only because it can solve the problems of morphology-based taxonomy but also because it can open new horizons on the phylogeny and kinship of species. For example, using the advanced technology of molecular biology and genetics, the speed of new discovery in fish alone has reached a rate of about 150 species per year. Increased training in molecular taxonomy and genetics is expected to enable better understanding and recognition of a variety of marine species and their origins and kinship.

The Research Center for Oceanography has a long-term program to monitor the health of marine ecosystems, especially coral reefs. The program referred to as the Coral Reef Rehabilitation and Management Program started in 1998 and has continued until the present. Long experience in managing and developing methods to monitor the health of coral reefs and related ecosystems would be very useful if it can be shared and transferred to young researchers and lecturers in the Asia- Pacific countries through training activities. The participants who have been trained are expected to assess the health of ecosystems and track diversity, distribution, and abundance changes. This will assist in the development of human resources, institutions, and information-sharing networks and dissemination in the region.

LIPI through RCO has considerable experience in improving human resource capacity for monitoring the health of the coral reefs and associated ecosystems. Therefore, LIPI aims to achieve recognition not only as a national but also the regional center of excellence/training center, with human resource development in a specific area on marine and biodiversity. As shown in Figure 1, RCO LIPI has a long history to achieve that recognition in the form of the endorsement of RTRC MarBEST by the Advisory Working Group Meeting of the IOC UNESCO Western Pacific (WESTPAC) in 2016.



Under **endorsement** and guidance from IOC-UNESCO Sub Commission for the Western Pacific (IOC-WESTPAC), RTRC MarBEST aims to share experiences and knowledge amongst academia and researchers in the West Pacific area, particularly, via targeted training in biodiversity and ecosystem health management. As a regional-scale training provider, the sustainability of the program and the funding are urgently needed, especially in relation to the strategy to increase the Human Resources (HR) of marine and fisheries research in maritime management and marine development.

As said in the beginning, RTRC MarBEST is officially endorsed through the Advisory Working Group Meeting of UNESCO/IOC WESTPAC in Yogyakarta, 13-15 January 2016, and inaugurated on 17 October 2016 by then the Chairman of Indonesian Institute of Sciences (LIPI)) (figure.1)

Based on the Agreement between UNESCO/IOC signed in 2017, the establishment of RTRC MarBEST objectives is developing regional human resource capacity through training, establish a regional platform in the assessment on ecosystem health, and also facilitate the dissemination of biodiversity and ecosystem (figure 2).

Figure 2. RTRC MarBEST main focus

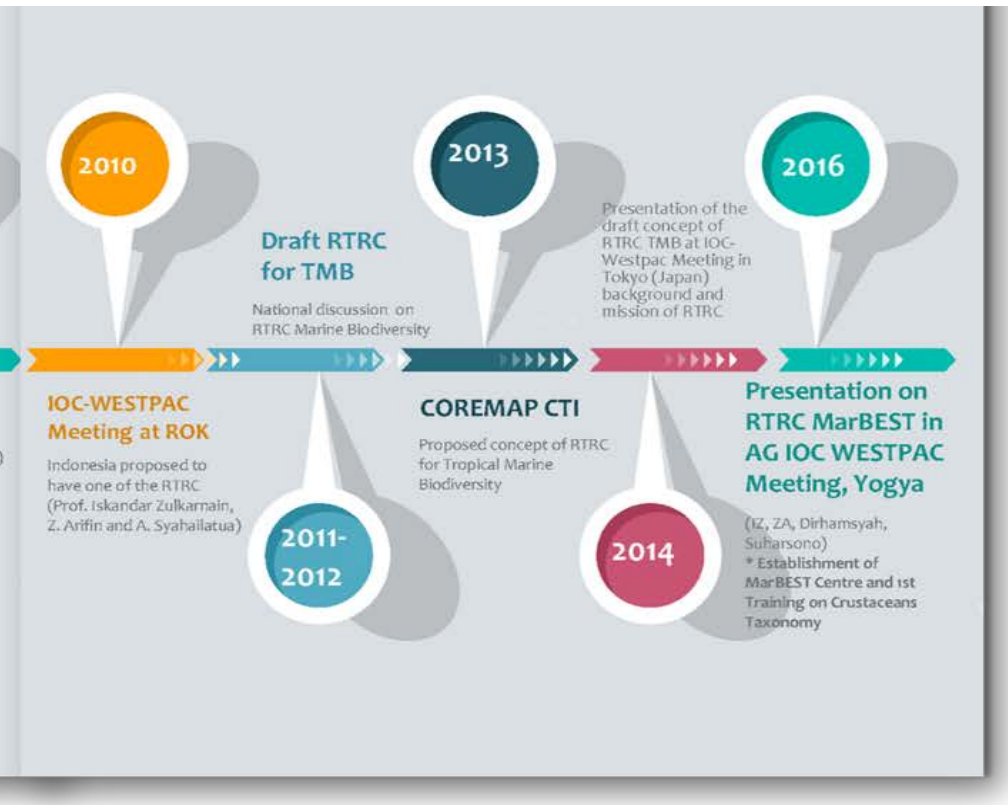


Figure 1.
Histography of RTRC MarBEST

Those objectives implemented in RTRC MarBEST's main business process as follows:

- Develop and strengthen the capacity and capabilities of human resources, particularly young researchers and lecturers from member countries in the West Indo-Pacific region through training related to Marine Biodiversity and Ecosystems.
- Establish and develop a common platform for methodologies in marine ecosystems, health monitoring especially coastal ecosystems such as coral reefs, seagrass, and mangroves.
- Promote scientific collaboration among experts in this region and beyond, on long-term marine ecosystems health monitoring.
- Facilitate the transfer of knowledge and technologies related to biodiversity, assessment, ecosystem health status, and trend for policy applications.
- Provision of laboratory for molecular taxonomy, classic taxonomy, and marine ecosystem health
- Exchange visiting scholar in the spirit of capacity building

II. A Brief About

RTRC MarBEST's Activities Summary in 2016-2020

In accordance with its function, RTRC MarBEST has been conducting several activities during 2016-2020. RTRC MarBEST so far conducted all the activities effectively as an integral part of the international collaboration framework in the region. The following are the main activities conducted during 2016-2020.

Activities conducted during 2016-2020

1. 5 International Training
2. 15 National Training
3. 2 Workshops

II.1. International Training activities

From 2016 until 2020, RTRC MarBEST already conducted 5 international trainings. Dedicated to the region and beyond, young scientists and practitioners, each year, RTRC MarBEST provides training that meets current issues and also other important topics that is useful for the science development in the field of marine biodiversity and ecosystem health. Following is summary of activities from each training:

International Training activities

1. Crustacean Taxonomy Training
2. Molecular Taxonomy Training (Based On Single DNA Barcoding and Metabarcoding)
3. Coral Health Index Training
4. Carbon Sequestration Training
5. Mangrove Health Index Training

II.1.1. Crustacean Taxonomy Training

The Purpose of this training was to introduce a crustacean taxonomy, to enhance biosystematics sharpening capabilities in the sea, particularly crustacean taxa, and also to develop techniques crustacean taxonomy (identify, know the characteristics, character and be able to write to be published taxonomic publications, both national and international). With the Crustacean Taxonomu Training, it is expected that participants improved their understanding about taxonomic research of tropical marine biota, especially in crustacean taxonomy.

There were 4 main activities conducted in the training, such as Lecture sessions, Field works, Laboratory works, and also presentation session. Two keynote speakers are invited to give their lectures in the beginning of the training: Prof. Dr. Suharsono from Research Center for Oceanography, Indonesian Institute of Sciences; presented "Biogeography of Marine Biota in Southeast Asia Region" and the invited speaker, Prof. Dr. Shuhei Nishida from the Atmosphere and Ocean Research Institute The University of Tokyo Japan presented "Marine Biodiversity in Southeast Asia: Efforts for Research / Education and Recent Advances".

- 17 October- 28 October 2016
- Training conducted in MarBEST CENTER (Lecturer session), Pari Island (Field Session), RCO LIPI (Lab & Analysis Work)

In the training, there were five topics that were discussed in the Crustacean training concerning definition, characteristhic, as well as classification from the following biota:

- Plankton (Zooplankton)
- Barnacle
- Shrimp
- Hermit crab: general biology (life cycle, reproduction, growth).
- Brachyura: general biology (life cycle, reproduction, growth).

- FIELD WORK

Field work was conducted in Pari Islands (at the Seribu Islands, Jakarta), especially at Burung and Burung Islands. The fieldwork was conducted on 20-22 October 2016. Due to there being no low tide during day time, the collection sessions were conducted in the evening (about 6.00 PM) when the tide started to recede.

- LABORATORY WORK

All collected samples were preserved using 70% alcohol, except for plankton that need to be preserved in 40% formalin. Samples were transported to the laboratory in Oceanography Research Center for identification. All samples in each group were observed using a microscope, photographed and then identified.

- PRESENTATION AND WRITING

A session of presentation was presented by each participant by selecting one of crustacean in each group. Each participant had 10 minutes for their presentation, including questions and answers

PARTICIPANTS

Total 23 Participants from various countries: Bangladesh (2), Cambodia (1), China (4), Indonesia (10), Iran (1), Malaysia (2), Thailand (1), Vietnam (2)

PARTNERS

Indonesian National Commission for UNESCO (KNIU) , Ministry of Education and Culture, Republic of Indonesia. , Ministry of Science, Technology and Higher Education., L'Institut de Recherche pour le développement (IRD), France , National Museum of Natural History-Smithsonian Institution, USA , South African Institute of Aquatic Biodiversity, South Africa , Korean Institute of Ocean Science and Technology-Korea , Japan Society for the Promotion of Sciences , Research Center for Biology LIPI , KEHATI Foundation Indonesia

11.1.2. Molecular Taxonomy Training

Based On Single DNA Barcoding And Metabarcoding

OBJECTIVES

- To enhance the knowledge molecular taxonomy through single DNA Barcoding and metabarcoding
- To enhance the capability of the participants on sampling and sample management for single DNA barcoding and metabarcoding
- To improve the skill of the participants on molecular taxonomy analysis, especially on single DNA barcoding and metabarcoding

TARGET GOAL

The participants are expected to improve their understanding about molecular taxonomic research of tropical marine biota, especially in DNA Barcoding and Metabarcoding

Training Topics

There were 13 general lectures topics that were discussed in the training:

1. Taxonomy and Nomenclature
2. Molecular Taxonomy in Marine Invertebrate
3. Genetic data analysis in single DNA barcoding study of marine invertebrate
4. Single DNA barcoding in Vertebrate (Fish)
5. Single DNA sequence
6. Single DNA barcoding in Invertebrate (Crustacea)
7. Metabarcoding in Invertebrate (Marine Plankton)
8. Molecular Phylogenetic & Evolution
9. Total DNA extraction and Gel Electrophoresis
10. PCR
11. Practical guide for reference collection
12. Practical guide for Next Generation Sequencing Procedure
13. Data Management system in RCO LIPI

Expected Outcomes

- To validating, reviewing, and completing the taxonomy and systematic status of various marine organisms in the tropic
- To support conservation plan and strategy for a certain species/taxon
- To understand scientific status of marine food web and community structure in a certain ecosystem including estuaries, seagrass, mangrove, coral reef, pelagic, and deep sea ecosystem
- To help support marine environmental management plan and strategy in a certain ecosystem

• Participants

21 participants, consists of Bangladesh (1), China (1), Malaysia (1), Pakistan (1), the Philippines (1), Singapore (1), Thailand (1), Vietnam (2) and Indonesia (12).

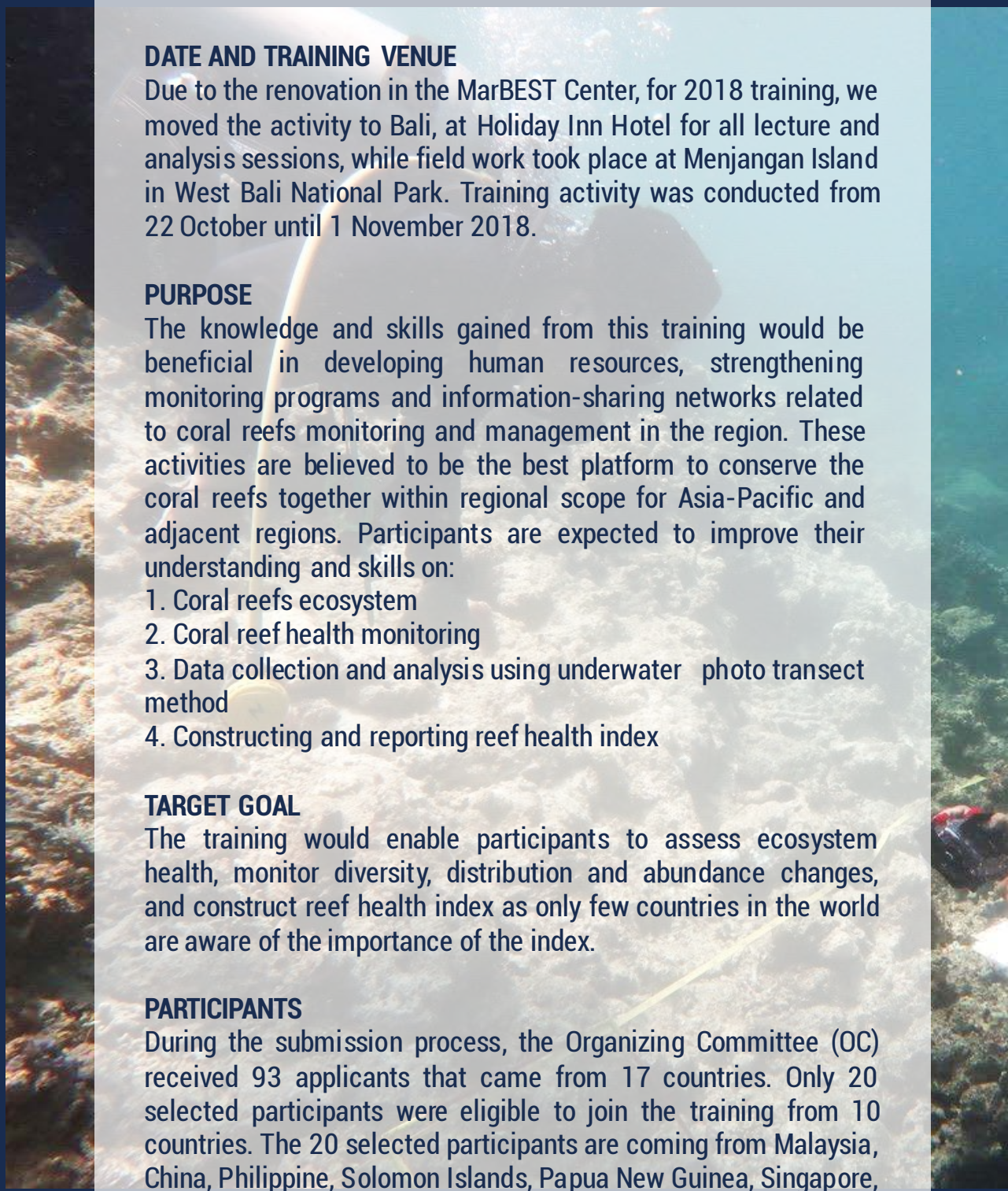
• Date and Venue

- Jakarta, Indonesia, 25th September – 6th October 2017
- MarBEST CENTER (Lecturer session), Pari Island (Field Session), RCO LIPI (Lab & Analysis Work), RCB LIPI

• Partners

- Indonesian National Commission for UNESCO (KNIU)
- Ministry of Education and Culture, Republic of Indonesia.
- Ministry of Science, Technology and Higher Education, Indonesia
- Chulalongkorn University, Thailand
- KIOST, South Korea
- South African Institute for Aquatic Biodiversity, South Africa
- Kobe University, Japan
- Fudan University, China
- Pattimura University, Indonesia
- Institut de Recherche pour le Développement, France
- Core to core Program of the Japan Society for the Promotion of Science, Japan
- Research Center for Biotechnology-LIPI, Indonesia

II.1.3. Coral Health Index Training



DATE AND TRAINING VENUE

Due to the renovation in the MarBEST Center, for 2018 training, we moved the activity to Bali, at Holiday Inn Hotel for all lecture and analysis sessions, while field work took place at Menjangan Island in West Bali National Park. Training activity was conducted from 22 October until 1 November 2018.

PURPOSE

The knowledge and skills gained from this training would be beneficial in developing human resources, strengthening monitoring programs and information-sharing networks related to coral reefs monitoring and management in the region. These activities are believed to be the best platform to conserve the coral reefs together within regional scope for Asia-Pacific and adjacent regions. Participants are expected to improve their understanding and skills on:

1. Coral reefs ecosystem
2. Coral reef health monitoring
3. Data collection and analysis using underwater photo transect method
4. Constructing and reporting reef health index

TARGET GOAL

The training would enable participants to assess ecosystem health, monitor diversity, distribution and abundance changes, and construct reef health index as only few countries in the world are aware of the importance of the index.

PARTICIPANTS

During the submission process, the Organizing Committee (OC) received 93 applicants that came from 17 countries. Only 20 selected participants were eligible to join the training from 10 countries. The 20 selected participants are coming from Malaysia, China, Philippine, Solomon Islands, Papua New Guinea, Singapore, Myanmar, Srilanka, Bangladesh, Italy, and Indonesia. Comparison between men and women in this year's training is 6 women and 14 men.

PARTNERS

1. Marine Spatial Ecology Laboratory, University of Queensland, Australia
2. Nadaoka Lab, Tokyo Institute of Technology, Japan
3. Coral Reef Ecology Laboratory, University of Queensland, Australia
4. Faculty of Science, Rhamkamhaeng University, Thailand
5. Global Change Institute, University of Queensland, Australia
6. Gadjah Mada University
7. Maritime University of Raja Ali Haji , Bintan
8. LINI – Indonesia
9. Archipelagic and Island State (AIS) Forum
10. Coordinating Ministry of Maritime Affairs

ACTIVITIES

The Lecture Session was initiated by Dr. Dirhamsyah as the director of the RTRC MarBEST delivering detailed information on RTRC MarBEST. Three Guest Speaker were giving lecture during the session: 1) Dr. Wexi Zhu as the Program Specialist of ICC WESTPAC delivering topic on Advanced Marine Science Cooperation for sustainability, 2) Dr. Salvatore Arico as Head of the Ocean Science Section IOC and) 3 Prof. Dr. Vladimir Ryabinin as the The Executive Secretary IOC UNESCO was delivering Decade of Ocean Science. The lecture session was enriched by the session of keynote speakers: 1) Prof. Dr. Suharsono was delivering Introduction to West Pacific coral reefs ecosystem, 2) Prof. Thamasek Yeemin was delivering Coral bleaching and future challenges for coral reefs management, 3) Prof. Dr. Nadaoka was delivering Climate change and ecosystem health, how to properly adapt and mitigate climate change, 4) Prof. Dr. Ove Hoegh Guldberg was delivering Future Research and Global Monitoring, and 5) Prof. Dr. Peter Mumby was delivering Management and conservation of coral reefs.

The main lecture session about Coral Reefs Health Index was delivered by the lecturers on certain topics, such as: Coral Taxonomy, Introduction to Coral Reefs Health, Coral Reefs Health Index, Data analysis from Seaview Survey, Technique on monitoring survey using underwater photo transect method, Technique on monitoring survey using underwater Visual Census for Coral Reefs Fishes, CPCE Introduction, sampling simulation and analysis simulation. For field activities, participants conducted CHI practised in Menjangan Islands, Bali.

II.1.4. Assessment of Carbon Stock and sequestration in the Seagrass ecosystem training

DATE AND TRAINING VENUE

All training activities conducted in Bintan due to accessibility was easier for several participants abroad, compared to Jakarta. Another reason is that Bintan has the largest seagrass community in Indonesia, and we would like to share an example to all participants how well managed the seagrass ecosystem is in the Bintan coast. Training activity conducted from 4-12 November 2019.

PURPOSE

The objective of the fourth training course was to develop and strengthen the capacity and capability of young researchers from member states in the Western Pacific, in the field of carbon stock and sequestration in seagrass ecosystems. More specifically, the training course discussed methods on carbon stock and sequestration estimation in seagrass ecosystem, promote collaborations on the long-term monitoring of carbon stock and sequestration in seagrass ecosystem, and facilitate access and dissemination of information related to carbon stock and sequestration.

TARGET GOAL

Trainees were expected to improve their capability of sampling, analyzing and assessing the carbon stock and sequestration in seagrass ecosystem based on provided methodology. The knowledge and skills gained from this training would be beneficial in understanding the role of seagrass ecosystems in climate change mitigation, strengthening coordination and information-sharing networks related to marine biodiversity and conservation in the region.

EXPECTED OUTCOME

Participants were expected to improve their understanding and skills on:

1. Seagrass bioecology and blue carbon
2. Measurement carbon stock and carbon sequestration in seagrass ecosystem
3. Application of remote sensing on seagrass mapping
4. Blue carbon and policy framework

PARTICIPANTS

21 participants from 8 countries had successfully passed the selection to take part in the training on the Coral Reef Health Index, out of total 64 registrants from various countries. Those 8 countries were Indonesia, Bangladesh, China, Malaysia, Myanmar, Singapore, Thailand and Vietnam. The selection of the Participants was based on some requirements, such as basic knowledge of seagrass ecosystems and related current activities from each participant.

PARTNERS

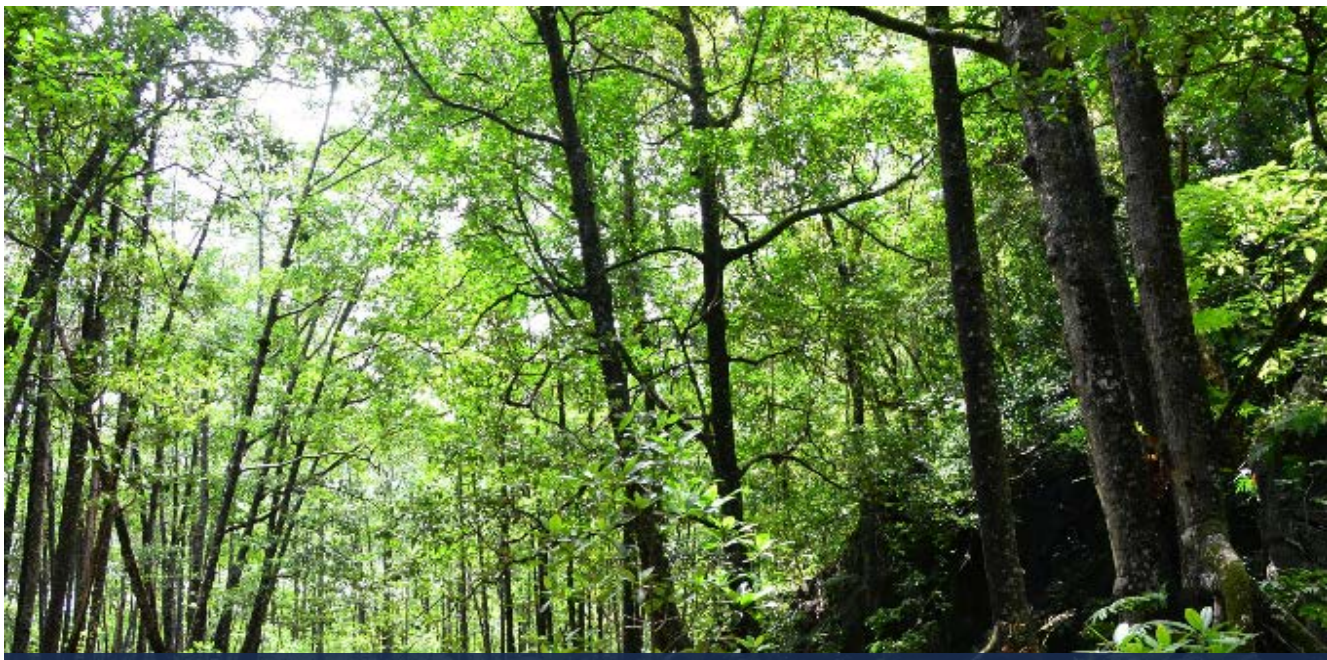
1. The Commonwealth Scientific and Industrial Research Organization (CSIRO) Australia
2. Nadaoka Lab, Tokyo Institute of Technology, Japan
3. Edith Cowan University-Australia
4. Ministry of Marine Affairs and Fisheries, Indonesia
5. Maritime University of Raja Ali Haji, Bintan

ACTIVITIES

While seagrass meadows are experiencing high rates of degradation in the region, basic information on this blue carbon habitat is still lacking (Fortes et al. 2018). There is a growing concern for managers across national borders in managing this blue carbon ecosystem for climate change mitigation. Management across national boundaries requires standardized methods so data and information from different parties or countries are comparable. In regard to carbon stock measurement, a standardized guideline accepted by ASEAN countries is needed, so that it can be used as an accepted reference in the study of the region's carbon in seagrass ecosystems.

Carbon stock and accumulation by seagrasses is well studied in other areas, and some guidelines have been developed at a global level for blue carbon assessment, e.g. the Blue Carbon Initiative (Howard et al. (eds.) 2014). Despite its global scope, these guidelines may not be able to be applied in the field throughout Southeast Asia due to resource limitation. Currently seagrass research capacity (including carbon assessment) is geographically unbalanced among members of ASEAN countries (Fortes et al. 2018) due to gaps in expertise, facilities, and availability of funding. Thus, simpler and more affordable procedures are needed in the context of ASEAN countries.

RCO LIPI through RTRC MarBEST training course shared the mentioned guidelines that have been developed, and practised it among selected ASEAN as well as WESTPAC countries's seagrass researcher. The eleven days of training went successfully, even though very few participants needed to learn more compared to others. Overall, considering the basic knowledge of seagrass and carbon stock measurement from all participants, they gained a lot of skills related to collecting and analyzing the data of carbon stock and sequestration in the seagrass ecosystem. The new networking between seagrass researchers also developed well since the training ended. It showed from the active communication in the mobile group among them, informing each participant's activity related their new knowledge of developing the training material in particular as well as to provide general concepts and specific instructions for collecting and analyzing the data of carbon stock and sequestration in seagrass ecosystems for West Pacific countries.



II.1.5. Mangrove Health Index Training

Due to the Pandemic Covid 19, The training conducted online from 16-21 November 2020, using the Learning Management System (LMS) through http://elearning.lipi.go.id . It adopted two training methods as Asynchronous (self-learning through video tutorials, modules, and other training materials) and Synchronous (online class meeting activities in live video conferences). For this year's training, RTRC MarBEST was fortunate to have several eminent people in supporting the event. During the opening ceremony of the MHI training, we invited Prof. Dr. Ocky Karna Rajasa, Deputy for Earth Sciences LIPI, on behalf of Focal Point of IOC Indonesia, Prof. Arief Rahman of KNIU UNESCO,

OBJECTIVES

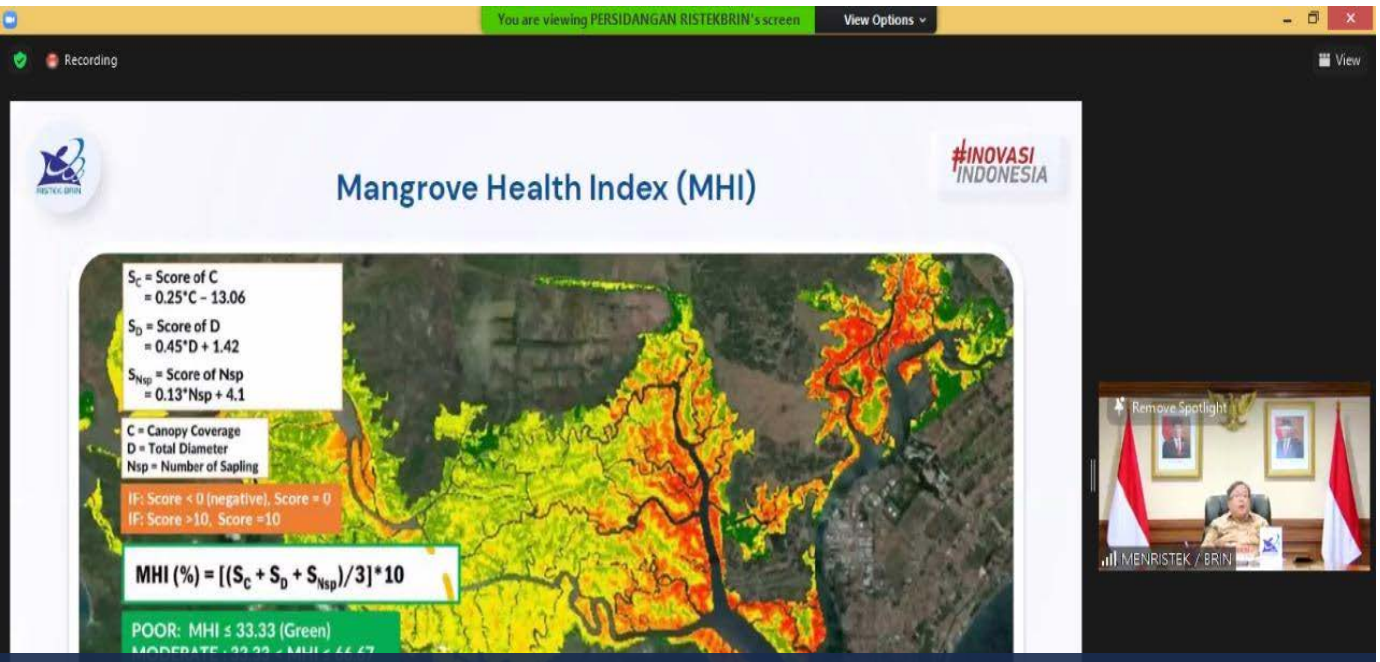
To develop and strengthen the capacity and capability of human resources, especially young researchers and lecturers from member states in the Indo West Pacific through training activities in the field of mangrove ecosystem and To apply methods on mangrove Health Index on regional Protocol

TARGET GOAL

Participants of Mangrove Health Index (MHI) Training 2020 were expected to improve their skill and knowledge in mangrove monitoring concept, identifying study area, conducting data collection through field survey, analyze and interpret data, as well as to apply Mangrove Health Index (MHI).

PARTICIPANTS

28 participants from 12 countries had successfully passed the selection to take part in the training on the Mangrove Health Index, out of total 99 registrants from various countries. Those 11 countries were Indonesia, Bahrain, Bangladesh, Malaysia, Myanmar, Sri lanka, Philippines, PRC, Singapore, Thailand, USA, and Vietnam. The selection of the participants was based on some requirements, such as basic knowledge of Mangrove ecosystems and related current activities from each participant.



Dr. Wenxi Zhu, program Officer, Program Officer of IOC West Pacific (WESTPAC) and Dr. Laksana Tri Handoko, Chairman of Indonesian Institute of Sciences (LIPI) to gave remarks. RTRC MarBEST also have an honored to have Keynote Speech and Formal Opening of the MHI Training by Prof. Bambang Permadi Brodjonegoro, Ph.D., Indonesian Minister for Research and Technology, and Keynote from Dr. Vladimir Ryabinin, Executive Secretary of Intergovernmental Oceanographic Commission (IOC) UNESCO.

The Mangrove Health Index Training conducted in 16-21 November 2020
MonMang, the newly IoT for Monitoring Mangrove can be dowloaded through the Android's Play Store
All Training materials can be downloaded through https://bit.ly/RTRCMarBEST-MHITraining2020

PARTNERS

Indonesian Ministry of Science &Technology/ National Research and Innovation Agency, National Commission for UNESCO (KNIU), Ministry of Education and Culture, Republic of Indonesia, Coordinating Ministry of Maritime Affairs, Ministry of Foreign Affairs, Indonesia, United Nation for Development Program (UNDP), Archipelagic and Island States Forum (AIS), Center for Marine Tropical Research (ZMT) University of Bremen- Germany, Universiti Putra Malaysia UPM Serdang Malaysia, Department of Geography National University of Singapore, Faculty of Math and Natural Science IPB University

LECTURERS

Top experts in Mangrove ecosystems was invited to become lecturer in the training, such as Prof. Dr. Martin Zimmer from Center for Marine Tropical Research (ZMT) University of Bremen- Germany, Dr. Mat Vanderklift from CSIRO Australia, Prof. Dr. Faridah Hanum from Universiti Putra Malaysia UPM Serdang, Malaysia, Dan Freiss Ph.D. from National University of Singapore, Singapore. Indonesian experts were also invited to become speakers. Among others are Dr. Anwar Fitrianto from IPB University, I Wayan Eka Dharmawan, Dr. Yaya Ihya Ulumuddin, Bayu Prayuda, and Suyarso from RCO LIPI.

basic diving

Technology Use on MonMang

training on the management of the marine life collection

Training on Shark's enumerator

training on drone and GIS

training on marine debris

training on sea cucumber data stock

Integrated Coastal Management Training

Marine Spatial Training

GIS Training

website and database for beginner

reef fishes training

coral monitoring

megabenthos monitoring

mangrove monitoring

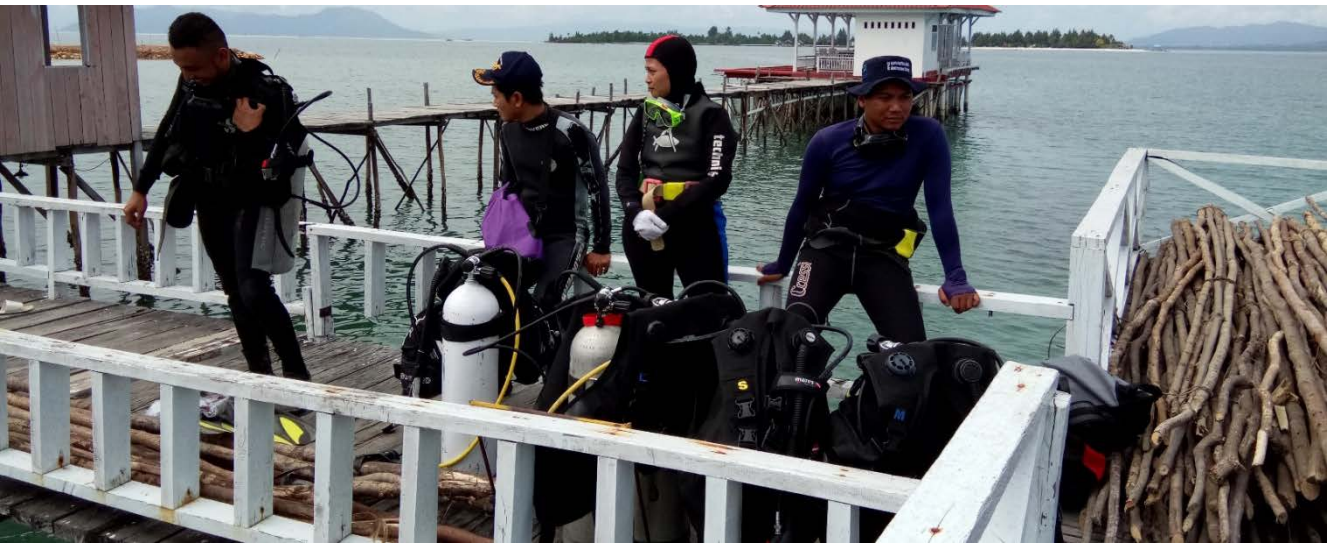
seagrass monitoring

II.2 NATIONAL TRAINING Activities

Research and Monitoring activities of coral reefs and associated ecosystems could not be covered solely by RCO LIPI. Especially as a National data custodian for coral reefs and seagrass ecosystems, we have to provide up to date data and information concerning the condition of the above ecosystem regularly to both local government and national authority. Therefore, besides enlarging our network through joint collaboration with local universities and local institutions, RCO LIPI through RTRC MarBEST also trained personnel from those universities, institutions, and also NGOs in order to meet the standard requirement to conduct the monitoring activities.

During 2017-2019, RTRC MarBEST already conducted about 15 kinds of training on a national scale with a total of 473 participants (see figure 3). Training alumni also strengthen with a license from National Standard Certification of Lembaga Sertifikasi Profesi (LSP) P2O.

Figure 3. number of national training and participants from MarBEST activities in 2017-2019



II.3 WORKSHOPS

to accommodates the latest and important issues on marine biodiversity and ecosystem health

Training is not the only activity that has been conducted through RTRC MarBEST (see figure 2). In order to update the topics of the training, RTRC MarBEST accommodates the latest and important issues on diversity and ecosystem health. The research activities of RTRC MarBEST adopt the result from Research Center for Oceanography-LIPI as the Indonesian national institution which is legitimate to conduct marine and coastal research in Indonesia and act as the UNESCO/IOC partner in the establishment of RTRC MarBEST.

RTRC MarBEST supported and endorsed the High impact research to be a common platform regionally through workshops involving countries in the region. In 2018-2019, RTRC MarBEST promoted collaboration among ASEAN researchers and decision-makers that had been established in the ASEAN workshop on carbon sink and sequestration in the coastal ecosystem: from science to policy. As a result, a common platform on Carbon Stock and Sequestration in Seagrass Beds was drafted and already agreed in the Sub-Committee on Marine Science and Technology (SCMSAT) of ASEAN COST (Committee on Science and Technology) meeting to become the ASEAN Platform.

The ASEAN workshop on carbon sink and sequestration in a coastal ecosystem: from science to policy In November conducted in 2 years.

The first workshop is held on 2-5 October 2018, While the Second workshop is conducted 5-9 September 2019. Both workshops are located in Jakarta. The background of the workshop was concerning climate change mitigation.

Climate change is not only a topic of scientific interest but also an environmental problem of worldwide concern. While there are pros and cons to whether climate change is a natural or anthropogenic phenomenon, scientific studies mostly believe that elevated levels of greenhouse gasses especially carbon dioxide (CO 2) in the atmosphere, is the main driver of climate change. Since the beginning of the industrial revolution, the global monthly mean of atmospheric CO 2 has changed from 280 ppm to 411 ppm as of May 2019. In the future, the level will be rising at an alarming rate if global action is not taken to combat the accelerating anthropogenic CO 2 emissions.

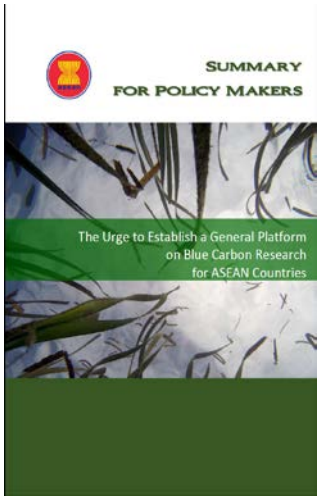
It is fortunate that the world is aware of climate change and the compulsion of reducing CO 2 emission in order to avoid more severe climate impacts. The global awareness is underlined on goal 13 of the Sustainable Development Goals (SDGs) set by the United Nations General Assembly in 2015 for the year 2030. Since achieving the SDGs requires the partnership of governments, private sector, civil society and citizens, collaboration among countries is essential for the fruitfulness of global climate action.

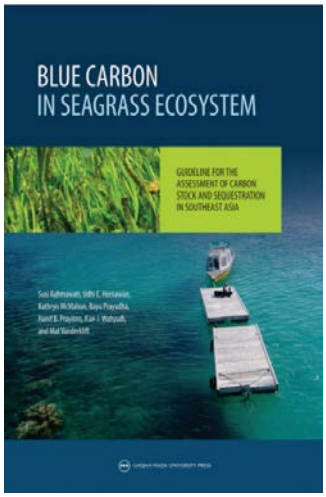
The ocean, including the water and its vegetation, is indicated to have capacity to absorb about 25% of anthropogenic CO 2 emission.

Accordingly, marine aquatic ecosystems such as seagrasses and mangroves have an important role in mitigating greenhouse gas effects and/or climate change. However, the capacity of seagrass in carbon sequestration is barely assessed. It is an opportunity for us to discuss how to quantify them.

Indonesia and other countries that signed the United Nation Framework Convention on Climate Change (UNFCCC) commit to reduce greenhouse gas emissions through their National Determined Contributions (NDCs). Unfortunately, the action plans for reducing greenhouse gasses in the NDCs are sometimes lacking in calculating contributions from marine sectors such as coastal vegetation (subjected to seagrass). However, convincing policy makers to include contribution from coastal vegetation in the action plans is challenging. It requires provision of valid and comprehensive information as well as reliable data.

The workshop is therefore awarded as one of the ways to fulfill the requisite. It aimed to share knowledge on the importance of coastal vegetation especially seagrass in climate mitigation and how to quantify its contribution using a simple standard method. This workshop was an initial step in developing ASEAN blue carbon network Accordingly, the output of this workshop were protocol for calculating carbon sequestration in seagrass ecosystem (https://play.google.com/books/reader?id=KbO-DwAAQBAJ&printsec=frontcover&pg=GBS.PR1) and also a summary for policymakers concerning the urge to establish a common platform on Blue Carbon Research for ASEAN Countries. The collaboration that was formed during the workshop essential for global climate action and become a good starting point to strengthen our partnership in developing any programs related to regional climate action.





III. EVALUATION

The evaluation on RTRC MarBEST will be based on its achievement in the capacity building events, participants, and other output

III.1.CAPACITY BUILDING EVENTS

The capacity building events are mainly held via training in the field of Marine Biodiversity and Ecosystem health. The number of training sessions held by RTRC MarBEST as seen in Figure….. During 2016 until 2020, RTRC MarBEST already conducted 5 International and 16 National Trainings. RTRC MaRBEST accommodated to conduct all training based on the current issues as well as the needs from our stakeholders.

Director of RTRC MarBEST, together with the program planning team, usually decides the 3 year training planning ahead based on the current issues, the needs from stakeholders, and other necessities. Training plans can also come from the intention to disseminate new methods that have been developed by RCO LIPI research groups. New methods or techniques in the field of Marine Biodiversity and Ecosystem Health should passed the peer reviewing before we decide to implement it in the training.

For example, RTRC MarBEST held the first and second training focusing on the Taxonomy (morphology and molecular). Biological information and the taxonomic capability to recognize and identify various species of marine life are needed to secure the rich biodiversity in the region. Nowadays, not many researchers, especially young researchers are interested in becoming a Taxonomist, while the biodiversity loss occurs as a regional threat. A lack of human resources in the field of taxonomy has allegedly caused minimum awareness of the importance of taxonomy, lack of funding and lack of employment opportunities for taxonomists.

This is one of the reasons why RTRC MarBEST needs to open the taxonomy training in order to increase the capacity and capability and competence of young researchers and lecturers through training activities. The training is expected to stimulate researchers to pursue the field of taxonomy that is really needed in the field of marine biodiversity.

The third to fifth training focus on ecosystem health, where Coral Health Index (2018), Carbon Sequestration in Seagrass Ecosystem (2019) and Mangrove Health Index (2020) were not only take part in the regional capacity building, but were also play role to provide the common platform that applicable in the region to support the sustainability of the coastal ecosystems. However, the platform of the Carbon Sequestration in the Seagrass Ecosystem was being recognized and adopted as ASEAN guidelines after the research and training were combined with two workshops in 2018-2019. It means that RTRC MarBEST supports the delivery of the coastal research into policy implementation at the regional level. The details as provided in the subsection about the workshop in 3.3.

Beside 5 regional training, RTRC MarBEST held 16 topics of training, and some topics were regularly held every year. The national trainings were held based on mandate to RTRC MarBEST that is a National Center Participating in the UNESCO/IOC Regional Network of Training and Research Center in the WESTERN Pacific, as mentioned in the Article III Establishment in the Agreement of UNESCO/IOC and LIPI in 2017. The national training also became a good opportunity to get inputs on needed topics and the updates on the research in marine science.

Figure 4.
Number of International trainings and National trainings that has been conducted by RTRC MarBEST

III. 2. PARTICIPANTS

RTRC MarBEST received around 417 applicants from 2016-2020 for the International training (Figure 5). Not only from the West Pacific Countries, but from around the world, were interested to join the training. Each training, we only accommodated around 20 to 23 participants that were selected from all applicants. Since we combined blended training from lecture sessions and exercises (field session), limited participants are necessary to maintain the effectiveness of the training. Only in 2020, RTRC MarBEST received around 28 participants in Mangrove Health Index Training. Due to the Covid 19 Pandemic , we could add several more participants, because we conducted the training virtually through LIPI LMS (Learning Management System).

RTRC MarBEST has a technical team whose duty is to review all received applications and chose eligible candidates to become the selected participants. Informations such as CV, List of Publication, current works and also their short essay have become important parameters to review the incoming applications. We expect that the training would be beneficial for all selected participants and post training, the knowledge that they received can be implemented in their daily works. List of selected participants then reported to the Director of RTRC and IOC WESTPAC Program Offices to gain the final approval.

The trends from applicants that were interested to join the training are increasing each year (Figure 5). It showed that RTRC MarBEST are well known and provide interesting topics for young scientists and practitioners. We are aware that RTRC MarBEST shall fulfill the needs of the capacity development in the field of marine biodiversity and ecosystem health, so the interesting topics were planned, proposed and held in proper preparation, including the selection of the relevant scientist as the speaker/trainer.

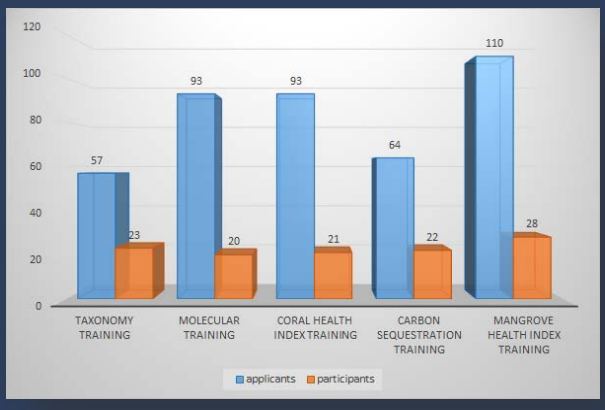


Figure 5. Number of applicants and participants for each regional training from 2016 to 2020

Figure 6. Participating country in RTRC MarBEST Regional Training

Distribution from the participating country in RTRC MarBEST training can be shown at Figure. 6, 18 countries (including Indonesia as the host country) participated in 5 International Training that RTRC MarBEST conducted. Participant's home country were very varied, and not limited only in WESTPAC member countries, because The training also had participants from Italy and the USA. The map distribution showed each training that has been developed by RTRC MarBEST indeed attracted your researchers from all over the world. Since 2018, RTRC MarBEST in collaboration with AIS (Archipelagic and Island States) Forum, UNDP and also the Ministry of Maritime Affairs and Investments of Indonesia, regularly sends representatives from AIS member states to join the training. The AIS Forum acknowledged RTRC MarBEST International Training as highlighted capacity development activities from Indonesia.

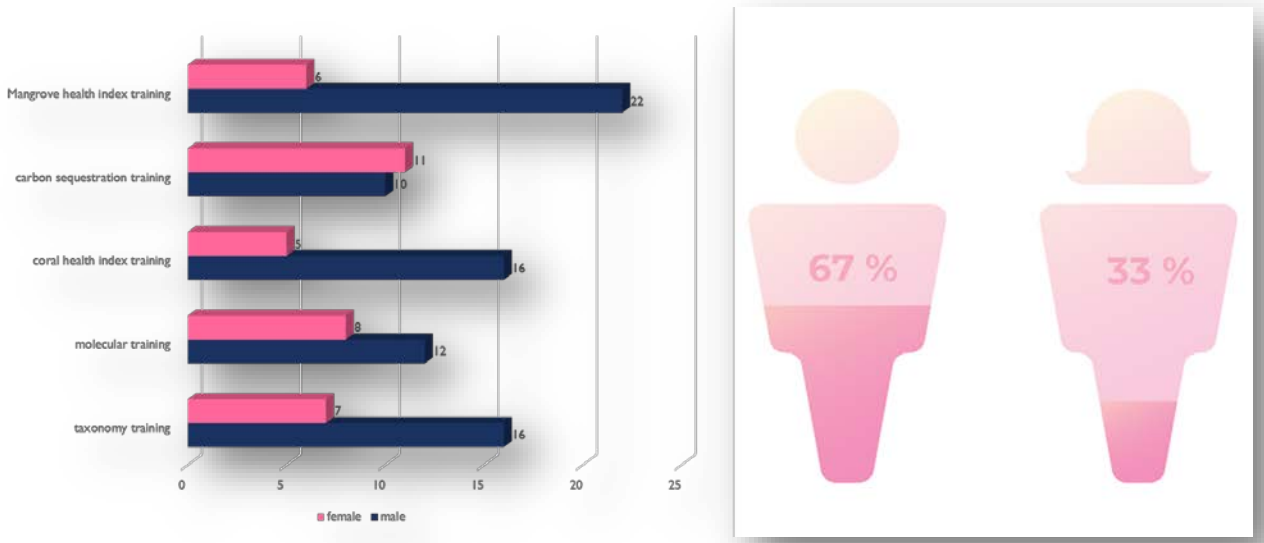


Figure 7. Number of participants for each regional training based on gender (left) and gender comparison for overall participants (right).

RTRC MarBEST supports gender equality as stated in the UN SDGs No. 5. We ensure that women participants have equal opportunities to participate in all RTRC MarBEST training. At least one third from the total participants are women, although we are fully aware that not many women researchers are working in the field of Marine Biodiversity and Ecosystem Health.

As seen in (Figure 7, right) from the five international training that RTRC MarBEST had conducted, only in Carbon Sequestration Training had the number of women participants are above men participants (11 women participants compared to 10 participants). The training that needed more hard skill competency such as diving (the requirement needs the licensed and dive log book,

which was reviewed carefully by the reviewing team) the number of women participants were less than men participants. It can be seen in Figure 7 (left) subjected to Coral Health Index Training. The number of Women participants is only 5 compared to men participants, which is 16 participants

III. 3. Number of Lecturers/Researchers participation

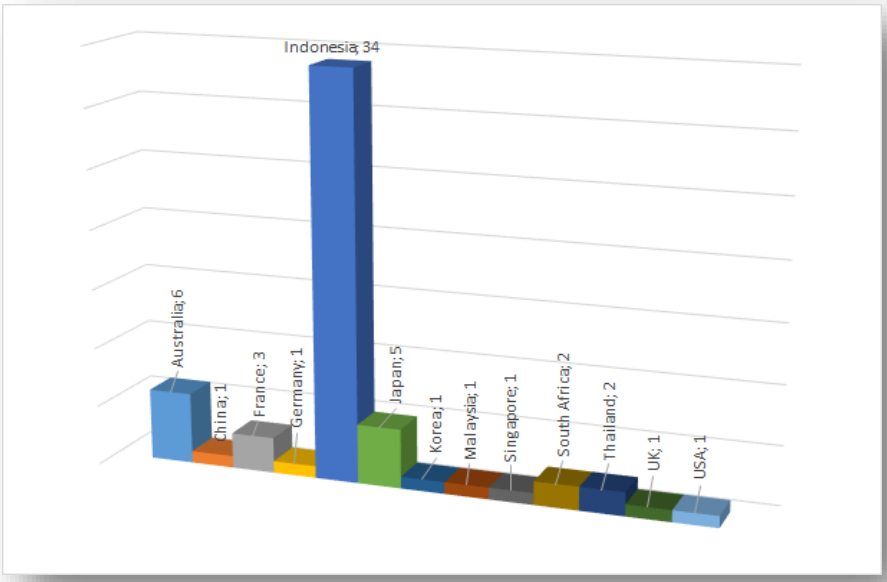


Figure 8. Number of lecturing scientist based on home country

Both RCO LIPI, as well as UNESCO/IOC-WESTPAC hold long term networking and collaboration between researchers in the field of marine biodiversity and ecosystem health. With this connection, it was very fortunate to invite eminent persons/ researchers in the subject training to become the lecturers for the training. The only constraint when inviting certain experts would have to be the time schedule. It is often that we have to approach the experts a year before the due date to meet their schedule.
There are 13 countries, including Indonesian experts that joined all training on RTRC MarBEST (figure 8) with the total around 58 researchers. The most number of lecturers was from Indonesia around 34 lecturers.
As We need to give opportunities to Indonesian researchers in disseminating the new methods and techniques gained from long experience in managing and monitoring the coastal ecosystems as stated in the beginning of this report.

As seen in the above figure 8, Australia contributed 6 researchers, and become the second largest contributors in accepting RTRC MarBEST invitation to become the lecturers. The following list are Japan with 5 lecturers, France with 3 Lecturers, Thailand and South Africa with 2 lectures, and last but not least there are China, Germany, Korea, Malaysia, Singapore, UK, and USA that contribute 1 lecture.

RTRC MarBEST highly appreciates the above lecturers that contributed their valuable time and knowledge that they shared during the training. Due to our great collaboration, each lecturer was willing to fund their own travel across the world to attend their commitment as RTRC MarBEST lecturers.

Beside lecturers, RTRC MarBEST invited very important persons to give special lectures/keynotes. Most of our keynote speakers highly appreciate what RTRC MarBEST achieved so far to support capacity development activities in the field of marine biodiversity and ecosystem health on an international scale. Several our Keynotes are listed below:

1. HE. Prof. Dr. Bambang Brodjonegoro, Minister for Research and Technology of the Republic of Indonesia who became our keynote speaker in the Mangrove Health Index Training in 2020.
2. Dr. Vladimir Ryabinin, UNESCO/IOC Executive Secretary, RTRC MarBEST Keynote Speaker at two of our training, which are in Coral Health Index in 2018, and Mangrove Health Index Training in 2020.
3. Prof. Arif Rahman, the Indonesian Commission for UNESCO, RTRC MarBEST Keynote Speaker at two of our training, which are in Molecular Taxonomy Training in 2017 and Carbon Sequestration Training in 2019.
4. Dr. Salvatore Arico, Head of the Ocean Science Section IOC, RTRC MarBEST Keynote Speaker at Coral Health Index Training in 2018
5. Dr. Wenxi Zhu, Head and program Specialist of UNESCO/IOC-WESTPAC, RTRC MarBEST Keynote Speaker at Crustacean Taxonomy Training in 2016 and Coral Health Index Training in 2018.
6. Prof. Dr. Youn Ho Lee of KIOST, Korea as well as vice chair of Advisory Working Group of UNESCO/IOC-WESTPAC, RTRC Keynote Speaker at Molecular Taxonomy Training in 2017
7. Prof. Dr. Suharsono, Coral Ecologist from RCO LIPI, RTRC MarBEST Keynote Speaker at Coral Health Index Training in 2018
8. Prof. Dr. Zainal Arifin, vice chair of Advisory Working Group of UNESCO/IOC-WESTPAC, RTRC Keynote Speaker at Carbon Sequestration Training in 2019.

III.4. Presentation Materials

Training materials whether VDO's, tutorial or even PowerPoint Presentation are commonly needed in each training. During the 5 years conducting the training between the period 2016-2020, RTRC MarBEST produced quite a number of training materials. We divided the material into VDO activities, VDO tutorial and PowerPoint Presentation. VDO activities contained a summary of activities that has been conducted throughout the training. As for the VDO tutorial, we made documentation containing research activities/methods/ tutorials on a certain lecture. In Figure 9 There were a number of VDO that we produced.

The most number came from the Mangrove Health Index Training.The training was using the online system, so we need to replace all activities, particularly field activities in several tutorials. For about 20 VDOs tutorials we prepared for the training, and uploaded it in LIPI LMS, so that whenever participants felt needed to see the tutorial post training session, they could self-learn the materials. As for the PowerPoint Presentation that we gathered from all lecturers, we usually compiled it into a zip file, and sent it all to participants (we sent the PPT's with consent from the lecturers).

	VDO Activities	VDO Tutorial	Ppt. Files
Crustacean Taxonomy	5		22
Molecular Taxonomy	1		20
Coral Health Index	2	1	18
Carbon Sequestration	1	1	23
Mangrove Health Index	1	20	19

Figure 9. Training materials provided for the participants from all regional training

III. 5. Workshop

RTRC MarBEST held two workshops involving neighbouring countries in order to support and endorse the result of carbon research in the seagrass ecosystem to be acknowledged at the regional level, involving the regional scientists and decision-makers. Two workshops in 2018 and 2019 having the same topic, which was "ASEAN workshops on carbon sink and sequestration in the coastal ecosystem: from science to policy". This workshop drafted a common platform on Carbon Stock and Sequestration in Seagrass Beds and continued to the RTRC MarBEST's regional training in 2019. As a result, the platform already agreed in the Sub-Committee on Marine Science and Technology (SCMSAT) of ASEAN COST (Committee on Science and Technology) meeting to become the ASEAN Platform.

The workshops and training held by RTRC MarBEST were necessary to provide deep insight for the need for a common platform for the regional countries as an act to fight climate change together. RTRC MarBEST is aware that Research and Capacity building is the base of a mutual understanding between countries to overcome a common thread, especially thread to biodiversity and coastal ecosystem health, such as climate change. The establishment of the regional common platform also fulfills the mandate of the agreement between UNESCO/IOC and LIPI as the objective of the RTRC MaRBEST, beside to establish and maintain the networking of scientists regionally.

III.6. OUTCOME

To find out about the outcome/impact from RTRC MarBEST training, we had been distributing questionnaires to all RTRC MarBEST Alumni through https://docs.google.com/forms/d/1QBg5uDlCrpPLtNr5owhK0JfhZfGKWsrAlV64BPgmWkI/edit?gxids=7628 with key questions as below:

1. Usefulness of the training with respondents current activities
2. List of related research activities that have been conducted after receiving the training that is relevant to the training topic
3. List of scientific Publication (i.e. Journal, proceeding, scientific books, etc.) that have been produced after receiving the training (relevant to the training topic)
4. List of non-scientific (Popular) Publication that has been produced after receiving the training (relevant to the training topic) (i.e. news article, policy recommendation, external report, books/book content, etc.)
5. List of other documents that have been produced after receiving the training (relevant to the training topic) (i.e. lecture module, hand out, presentation, media content, press release, etc)
6. Do you have collaboration activities with fellow participants from the training? if Yes, please state with whom and what kind of activities that have been conducted (i.e. join publication, join research, etc.)
7. Do you have collaboration activities that are related to the training, with colleagues/partners (non-alumni)? if Yes, please state with whom and what kind of activities have been conducted (i.e. join publication, join research, etc.)
8. Input/suggestion for improvement of RTRC MarBEST activities in the future

We limited the questionnaire to only for International training due to the limited time of questionnaire distribution. From the total of 114 participants, we received feedback for about 49 respondents (43% feedback). We limited the time for submission of the questionnaire in a week length of time (16 January-23 January 2021). The number of these respondents is quite reliable as the samples to represent the population of all participants in the international training in 2016 to 2020. Data analysis was carried out by compiling respondents' answers and tabulating the incoming answer as the data.

The data that has been tabulated are then analyzed in the form of a percentage for several questions. For other questions, because the questionnaire is an open question, then they are grouped for the same respondent's answer. All analysis results are changed in graphical form, with the aim of making it easier to read the results, so that, it is expected to provide direction for further study. The below figure 11 showed around 98% of respondents said that the RTRC MarBEST's training they have followed are very useful for their daily work. Only 2% express their uncertainty by choosing the option "maybe".

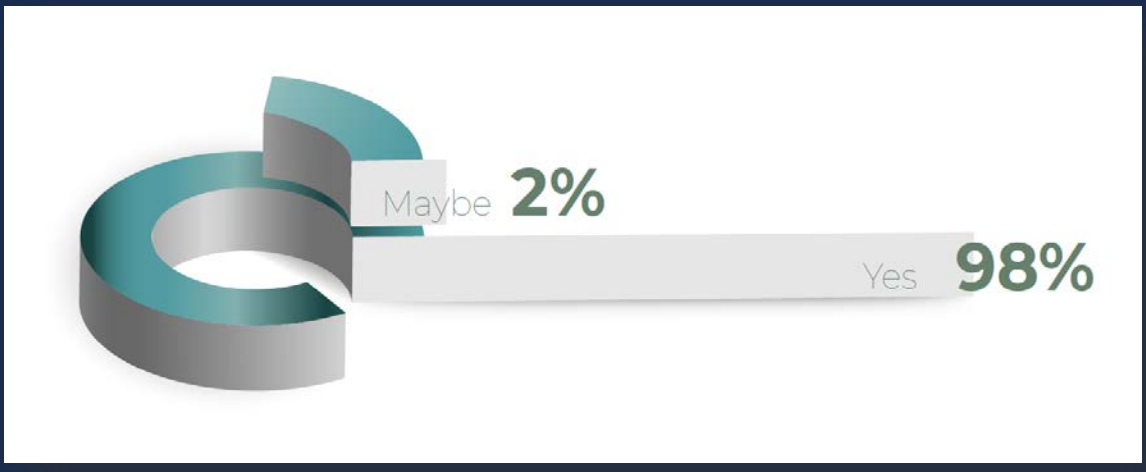


Figure 10. Graphics indicated whether or not the training useful for respondent's current works

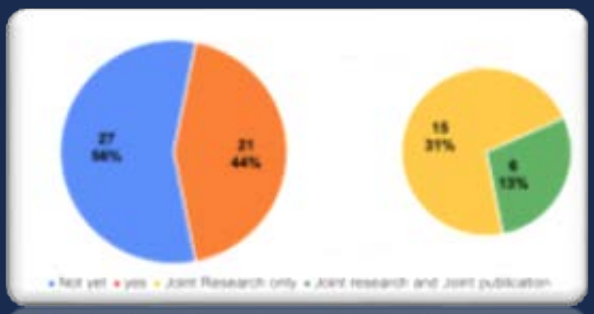


Figure 11. Graphics indicated collaboration activities with fellow alumni/lecturers across training (from not the same training)

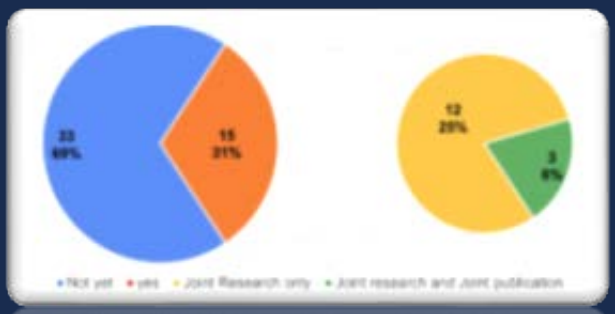


Figure 12. Graphics indicated collaboration activities with fellow alumni/lecturers within the same training

The chart on the Figure 11 indicated collaboration activities with fellow alumni and lecturers from different training within RTRC MarBEST. Around 30% respondents said that they do have the collaboration with the fellow alumni. 27 % already conducted joint research and 9 % of the respondents claimed that they have both joined collaboration and published joint publication. Two publication and joint collaboration between alumni from across the training between alumni of Molecular Training (Neogi) and Crustacean Taxonomy alumni (Habib), and as well as with Coral Health Index training alumni (Islam, MD):

1. Habib, Kazi & Islam, Md & Nahar, Najmun & Neogi, Amit & Mishra, Subhrendu. (2020). New records of two parrotfish (Perciformes: Scaridae) from Saint Martin's Island of the Bay of Bengal, Bangladesh. 17. 32-38.
2. Islam, Md & Neogi, Amit & Nahar, Najmun & Sathi, Jasmin & Kim, Choong-Gon & Habib, Kazi. (2020). Two new records of dragonet fish, Callionymus sagitta Pallas, 1770 and Callionymus erythraeus Ninni, 1934 from Bangladesh. Records of the Zoological Survey of India. 120. 221-224. 10.26515/rzsi/v120/i3/2020/152055.

For collaboration that have been developed with fellow alumni/lecturers within the same training, as seen in Figure 12, we could see that around 24% respondents said they have developed the collaboration.

But only for about 19% implemented into join research, and around 5% implemented the collaboration in join research and produced join publication. While 52% respondent said they have not yet conducted the collaboration among alumni within the same training. Below are two of outputs from the collaboration within the same training between Melissa Martin, alumni of Molecular training with Dr. Albert Chakona, former lectures from Molecular training:

1. MB Martin, A Chakona (2019) Designation of a neotype for Enteromius pallidus (Smith, 1841), an endemic cyprinid minnow from the Cape Fold Ecoregion, South Africa. ZooKeys 848, 103.
2. Albert Chakona, Roger Bills, Emmanuel Vreven, Melissa B. Martin (draft) Revalidation of Enteromius hondeensis (Määr, 1962) (Cypriniformes: Cyprinidae) from the Eastern Zimbabwe Highlands freshwater ecoregion


SAIAB Seminar Series 2021

Thursday 1 April 2021 09:00 AM (Johannesburg)

Dr Melissa Martin, Azwarina Mohd Azmi, Juariah Muhamad
Universiti Malaysia Terengganu

Linking citizen science and natural history specimens through effective education & displays

Natural history museums and curated specimen collections are vital scientific infrastructure. Given their multiple benefits, there is need for developing innovative ideas to bridge the gap between science and society to maintain and further increase the relevance of this critical scientific resource moving forward.

The presenters (a researcher, a curator and a creative officer) will take us on their journey of tackling the above by designing a course that mentors and trains undergraduate students regarding the fundamentals of taxonomy and curatorial management, leading up to designing their own exhibition for the public. The presenters will also discuss how their innovation, ExpoXonomy©, could be used as a platform to bring together various stakeholders and engage in the importance of museum specimens.

Join Zoom Meeting http://bit.ly/2NOFRxk
Meeting ID: 964 6974 0357
Passcode: 567215

NRF SAIAB UMT

Figure 13. Recent Activity, Melissa had a chance to conduct seminar series at Dr. Chakona's institute

Because acknowledgment of the respondents to the usefulness of the training by RTRC MarBEST for their current work, we also included another important parameter for the outcome of the training to find out whether RTRC MarBEST Alumni are able to produce publications after receiving certain knowledge from the training. Their publications on the relevant training topics showed their consent on those topics, although the training might not always become the main factor of their inspiration and productivity. In this report, we divided publication into two major part; which is Scientific Publication and non-scientific publication. For the scientific publication category, as seen in Figure 13 , we include papers, dissertation, proceeding, and also book/book chapter. From 49 respondents giving feedback, there are 19 papers that are divided into 17 papers that have already been published (both national scale and international scale journal), and 2 PhD dissertations. There are also 2 proceedings and 3 book/book chapters that have been produced by the respondents.

For the non-scientific publication or output, as seen in Figure13, there are 3 modules, 1 policy recommendation (shown at figure 13concerning participation testimony) , 2 articles in the news paper, and 1 proposal for building the laboratory that has been granted The list of some of these outputs can be find in the next page.

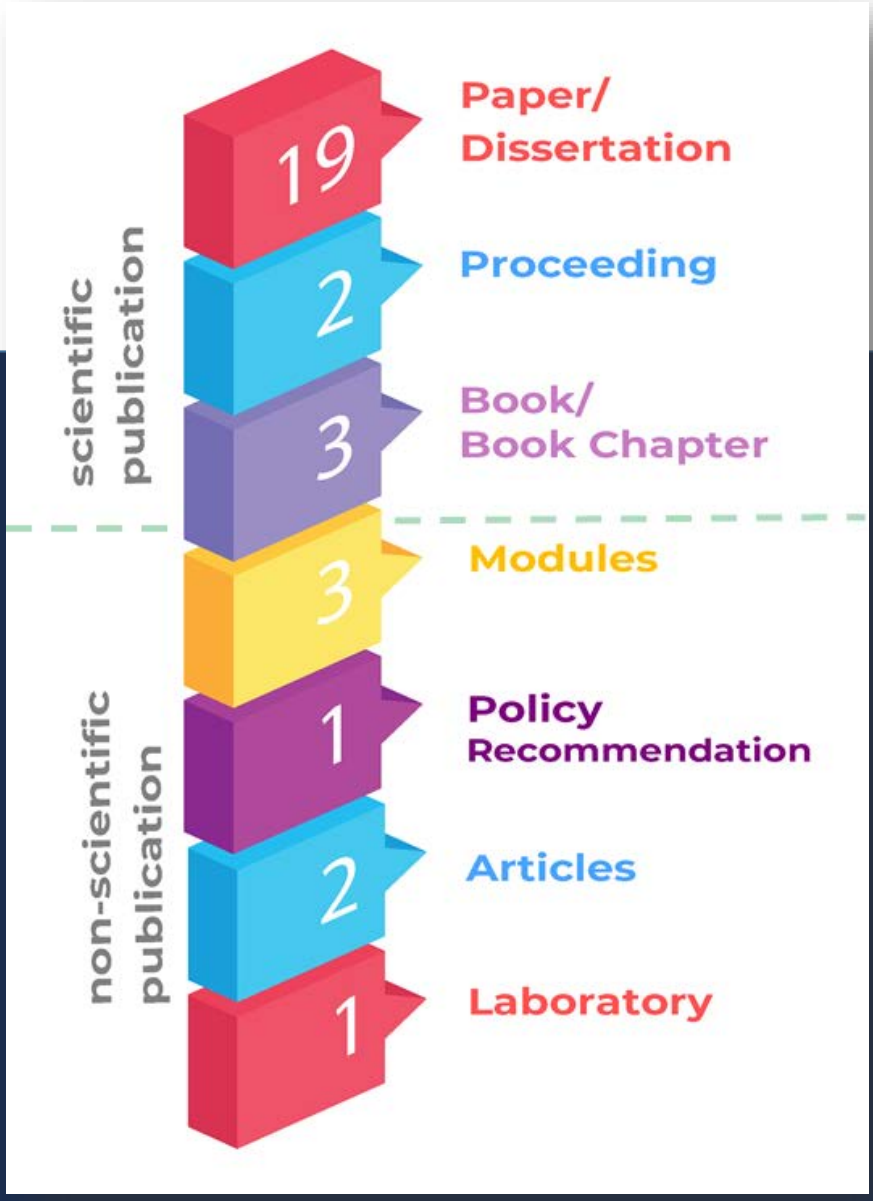


Figure 13. Number of publications from RTRC MarBEST

PAPERS

1. Schaduw, J. N. W., Kondoy, K. I. F., Manoppo, V. E. N., Luasunaung, A., Mudeng, J., Pelle, W. E., ... Kojongian, S. (2020). Data On Percentage Coral Reef Cover In Small Islands Bunaken National Park. Data in Brief, 105713. doi:10.1016/j.dib.2020.105713
2. Pieters, Jansonz. Potency of mangrove Community on Tial Coastal Waters, Central Maluku Regency, Triton Journal, vol 16. 2. 2020, P-ISSN 1693-6493.
3. Ghafari et al. 2019. Al-Kauniyah, 12(2). STRUKTUR KOMUNITAS ECHINODERMATA DI KAWASAN INTERTIDAL GILI MENO, LOMBOK UTARA. doi: 10.15408/kauniyah.v12i2.10871
4. Ghafari et al. 2020. in Bachtiar & Jufri (eds): Kesehatan Terumbu Karang dan Ekosistem Terkait Lainnya di Teluk Sekotong Kabupaten Lombok Barat. Mataram: Unram Press. ISBN 978-623-7608-40-0
5. Apriliyanti, M. S., Sutanti, S., & Utomo, D. S. C. (2019). IDENTIFICATION OF PLANKTON IN SEAWEED CULTIVATION AREA DISTRICT BANTAENG, SOUTH SULAWESI WITH DNA BARCODING METHOD. Jurnal Teknologi Perikanan Dan Kelautan, 9(1), 65-72. https://doi.org/10.24319/jtpk.9.65-72
6. Hidayani AA, Fujaya Y, Trijuno DD, Rukminasari N, Alimuddin A. 2020. Genetic diversity of blue swimming crab (Portunus pelagicus Linnaeus 1758) from Indonesian waters (Sunda and Sahul Shelf, Wallacea region): Phylogenetic approach. Biodiversitas 21: 2097-2102
7. Andriyono, S., Damora, A., A. Hidayani, A. (2020). Genetic diversity and phylogenetic reconstruction of grouper (Serranidae) from Sunda Land, Indonesia. Egyptian Journal of Aquatic Biology and Fisheries, 24(3), 403-415. doi: 10.21608/ejabf.2020.92320
8. MB Martin, A Chakona (2019) Designation of a neotype for Enteromius pallidus (Smith, 1841), an endemic cyprinid minnow from the Cape Fold Ecoregion, South Africa. ZooKeys 848, 103.
9. Albert Chakona, Roger Bills, Emmanuel Vreven, Melissa B. Martin (draft) Revalidation of Enteromius hondeensis (Määr, 1962) (Cypriniformes: Cyprinidae) from the Eastern Zimbabwe Highlands freshwater ecoregion
10. Neogi, Amit. 2020. Two new records of snapper, Lutjanus fulvus Forster, 1801 and Lutjanus erythropterus Bloch, 1790. Journal of the Ocean University of China. (Accepted)
11. Neogi, Amit. 2020. DNA Barcoding of Brackish and Marine Water Fishes and Shellfishes of Sundarbans, the World's Largest Mangrove Ecosystem and UNESCO Natural Heritage Site in Bangladesh (In review)
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DISSERTATION

18. TAXONOMICAL STUDY OF HERMIT CRAB (ANOMURA) IN INTERTIDAL AREA OF PENANG BY ARINA AMIRA BINTI AHMAD FAUDZI, BSc (Hons), Final Year Dissertation, Universiti Sains Malaysia, Penang 2019.
19. Andi Aliah Hidayani. Genetic variation and reproductive productivity of blue swimming crab (Portunus sp.) from three sub region of Indonesian waters as a basic hybridization (Dissertation)

BOOK/BOOK CHAPTER

1. Reef Fishes of Saint Martin's Island, Bangladesh: An identification book with DNA barcodes (Book)
2. Aquatic Biodiversity of Sundarbans, Bangladesh (Book)
3. Next Generation Sequencing and Its Potentials in Fisheries Management (Book Chapter)

MODULES

1. Jillian Ooi for Lecture module in Blue Carbon Ecosystems, undergraduate course "Systems Analysis in Geographical Systems", Faculty of Arts and Social Sciences, Universiti Malaya
2. Jillian Ooi for Public presentation dealing with Blue Carbon issues, "Ask A Seagrass Specialist" Session, Sayang Sayang Seagrass Festival, organized by the MareCet Research Organization, 26 Nov 2020
3. Video Presentation :TAXONOMICAL STUDY OF HERMIT CRAB (ANOMURA) IN INTERTIDAL AREA OF PENANG" by ARINA AMIRA BINTI AHMAD FAUDZI

POLICY RECOMMENDATION

1. Rickson Lis.2020. Preliminary report for the Government of PNG to suspend Mining Company

NEWS ARTICLE

1. http://www.beritanusantara.co.id/mantehage-pulau-berbasis-penelitian-dan-pengabdian-masyarakat-untuk-peningkatan-kapasitas-dan-ekonomi-penduduk-pulau-kecil/
2. INFOKUS: VOYAGES OF DISCOVERY_MELISSA BEATA MARTIN https://issuu.com/penerbitumt/docs/final-vod-2018

LABORATORY PROPOSAL

1. Aneel shaheen. Based on the training and further need based, lab was established funded by R&D fund of NIO . all necessary equipments, kits, reagents etc were bought.

IV. FINANCIAL SUPPORT

Throughout the training implementation, a support fund for all activities came from several sources. Since the first training until the last that have been conducted, RTRC MarBEST received financial support from the World Bank through Coral Reef Rehabilitation and Management Program- Coral Triangle Initiative (COREMAP- CTI) LIPI. RTRC MarBEST also received funding from the GOI, particularly for financing the inauguration ceremony of MarBEST in 2016. The UNESCO/IOC WESTPAC also showed tremendous support in co-financing RTRC MarBEST activities. Not only financial support, we also received in-kind support in implementing RTRC MarBEST activities. Below are the list of several institution that gave in-kind support:

1. UNDP-AIS FORUM-KEMENKOMARVES: United Nation Development Program (UNDP), along with the Archipelagic and Island States (AIS) Forum, and Indonesian Coordinating Ministry for Maritime and Investments (KEMENKOMARVES) since 2018 supporting the training activities by sending several selected participants from AIS member countries to join the trainings and support travel for AIS member countries participants.
2. UMRAH: Raja Ali Haji Maritim University (UMRAH) provided snorkeling equipment and also their laboratories during the field and analyzing activities during the Carbon Sequestration Training in 2019.

The overall budget for 2015-2020 activities can be seen at table1.

	Government of Indonesia (GOI)	The World Bank through COREMAP Program	The UNESCO/IOC WESTPAC
Crustacean Taxonomy Training	15.384	46.153	4.330
Molecular Taxonomy Training		53.033	14.200
Coral Health Index Training		54.271	10.528
Carbon Sequestration Training		54.271	6.000
Mangrove Health Index Training		25.100	
TOTAL (in USD)	15.384	232.828	35.058

Table 1. Total budget for RTRC MarBEST International training period of 2015-2020

V. RTRC MarBEST FACILITIES

As stated in the agreement between UNESCO/IOC and LIPI, in the Article V (Objectives) and Article X (Contribution of the Host Institution), LIPI provided the in kind facilities to implement the training activities. The implementation of training activities certainly cannot be separated from the infrastructure for training activities. LIPI through Research Center for Oceanography has international scale training facilities to carry out the above training activities. Herewith facilities that supported RTRC MarBEST:

RTRC MarBEST Center

Post endorsement of RTRC MarBEST by the UNESCO-IOC/WESTPAC, LIPI dedicated the office building located at Raden Saleh 43, Jakarta as the center for RTRC MarBEST activities. Funded by the World Bank through COREMAP CTI, In 2019, the RTRC MarBEST building had been renovated in order to fulfil the needs for future training. Lecture rooms and facilities provided in the building to run the RTRC-TMB activities. There are main meeting/lecture room (3rd floor, capacity 70 persons, 183.5 m^2), Computer center and server (4th floor, 97.6 m^2) ,small meeting/lecture room (5th floor, 12 persons, 25.5 m^2), mini theatre (8th floor, 100.8 m^2), library (1st floor), all room equipped with electricity, air conditioner, telephone, internet connection, and sufficient parking place.

Pulau Pari Research Station

Since 1976, Governor of Jakarta, the late Prof. Ali Sadikin granted the western part of Pulau Pari, to be managed by LIPI for development of Marine science education in Indonesia under Development Unit for Competency of Oceanographic Human Resources. Pulau Pari is only an hour away from Jakarta, and can be reached from Marina Ancol or Kaliadem traditional port or Muara Angke. Pulau Pari is considered one of the ideal locations for field activity due to its complete ecosystem. In 2019, RCO-LIPI through COREMAP CTI improved the infrastructure capacity of Pulau Pari, to meet international standards in conducting the training. The newly renovated buildings have not been equipped with proper furniture and other facilities yet, such as a reverse osmosis unit as the main source of clean water in the small island. Hopefully in the near future, all the facilities are to be completed and ready to use as RTRC MarBEST field observation center.

RCO LIPI Laboratories

Classical classroom teaching method and field activity during the training, occasionally not enough. Participants some times need to learn new method or analysis in the laboratory. Several RCO LIPI Laboratories already equip with proper instruments to conduct the training.

VI. RTRC MarBEST
SUSTAINABLE STRATEGY

Being the National and International scale training provider for capacity development in the coastal ecosystem, particularly in the field of marine biodiversity and ecosystem health, RTRC MarBEST needs to be sustained in terms of program and funding. Especially, when the program could be matched or related to SDG's 14, Decade of Ocean Sciences, and also Indonesian medium national development plan (RPJMN) 2020-2024 as the base of the strategy to increase the Human Resources (HR) of marine and fisheries research in maritime management and marine development. Managing marine training centers and becoming reference in both national and regional scale needed long term commitment from LIPI. During the past five years, RTRC MarBEST already acknowledged as a world class training center in marine biodiversity and ecosystem health.

The activity of RTRC MarBEST shall provide mutual benefit for the regional stakeholder as well as national stakeholder. On the side of regional stakeholders, the sharing of knowledge and capacity building strengthen the regional capacity and provide updates on marine science that might be useful for the scientists and governments to address the solutions on marine/coastal biodiversity and ecosystem health in each country based on the platforms supported by RTRC MarBEST. It means that the opportunity to collaborate and compare the best interest on marine/coastal biodiversity and ecosystem health in the region is getting higher, so the problem solving on the common threat of marine biodiversity and ecosystem health in the region will become a regional interest and based on an intergovernmental approach.

On the national level, being acknowledged as the regional training provider is also beneficial for Indonesia. Not only support the national capacity building for Indonesian scientists, RTRC MarBEST also contributes diplomacy through science by enhancing regional capacity development. In the end, this will support Indonesia as the global maritime fulcrum. On the national side, LIPI through RTRC MarBEST provides a positive contribution to Indonesian foreign diplomacy through enhancing national and regional human capacity to support Indonesia as the global maritime fulcrum.

Next page is the roadmap that are made in order to sustained the program: marine biodiversity and ecosystem health.

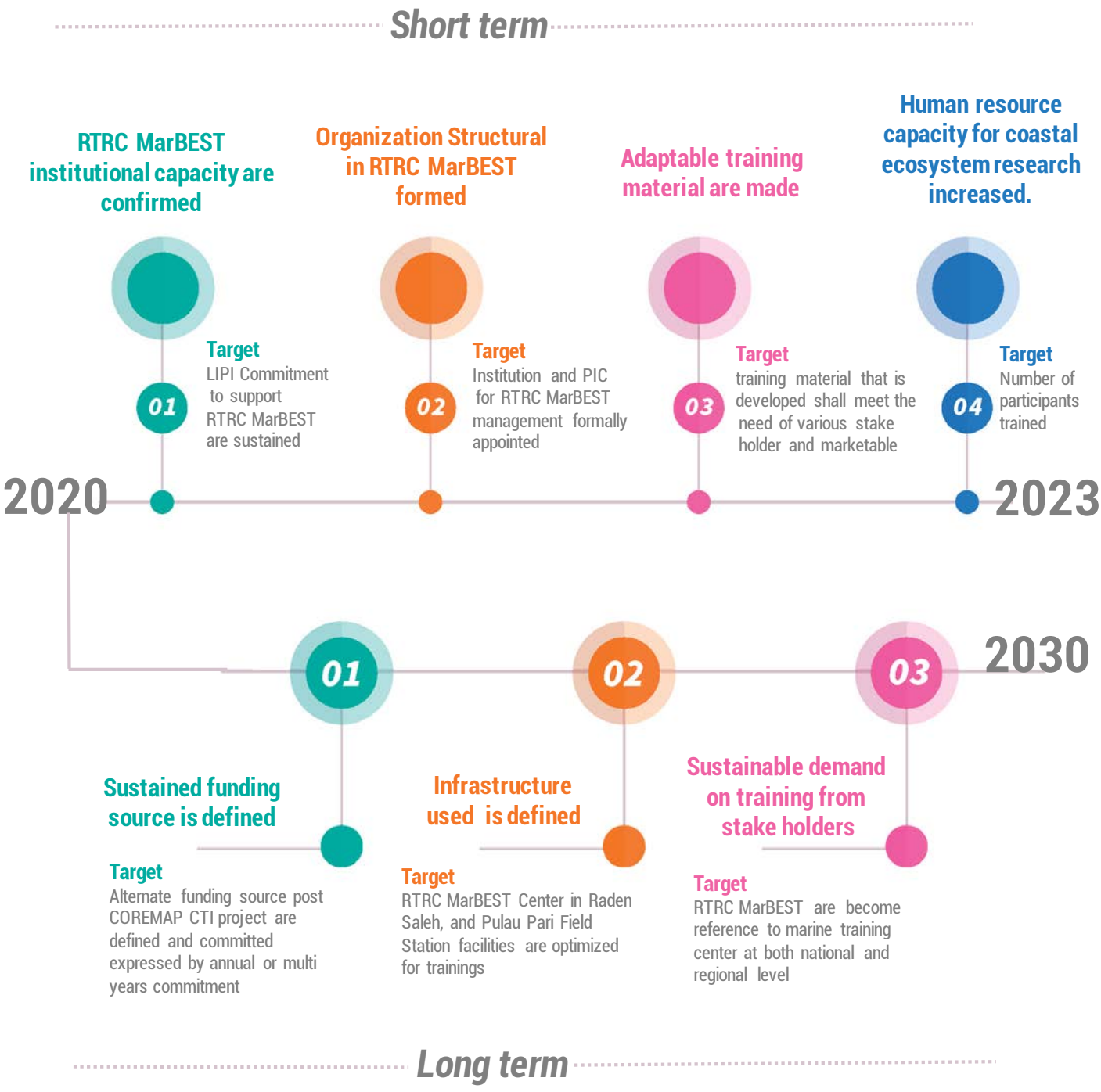

Figure 14. RTRC MarBEST Sustainable Strategy

VII. CONCLUSION and RECOMMENDATION

From the evaluation results, we conclude several key facts to summarize the activities that has been conducted during the past 5 years (2016-2020) from the RTRC MarBEST, as below:

1. RTRC MarBEST conducted 5 International trainings and several national trainings related to Marine Biodiversity and Ecosystem health as the contribution in increasing regional and national capacity building.
2. RTRC MarBEST's training is beneficial for the alumni, especially for their daily work as young researchers or practitioners in the field of marine biodiversity and ecosystem health.
3. RTRC MarBEST Alumni are able to produce scientific and popular publications after receiving certain knowledge from the training. Their publications on the relevant training topics showed their consent on those topics. Although the training might not always become the main factor of their inspiration and productivity, however the knowledge and experiences gained from the training increased their capacity in the respected topic of the publication.
4. RTRC succeeded to promote scientific collaboration among experts in the region and beyond, based on the number of the collaboration activities and joint publication with fellow alumni and lecturers from different training and within the same training.
5. Throughout the training implementation, a support fund for all activities came from several sources. Since the first training until the last that have been conducted, RTRC MarBEST received financial support from the World Bank through Coral Reef Rehabilitation and Management Program- Coral Triangle Initiative (COREMAP- CTI) LIPI. RTRC MarBEST also received funding from the GOI, particularly for financing the inauguration ceremony of MarBEST in 2016. The UNESCO/IOC WESTPAC also showed tremendous support in co-financing RTRC MarBEST activities.

Not only financial support, we also received in-kind support in implementing RTRC MarBEST activities. We could assume that there are many funding sources that are available to make the RTRC MarBEST activities sustain.

6. LIPI have dedicated training centers building and also a field station at Pari Island that have already been renovated to meet the international standard requirement to host and cater people, particularly for training and field activities of RTRC MarBEST. Therefore, the budget planning for each training, will be more efficient and focus on the quantity and the quality of the training activities.

7. RTRC MaBEST also supports the establishment of the regional common platform to fulfill one of its objectives as mandated in the agreement betweenUNESCO/IOC and LIPI, beside to establish and maintain the networking of scientists regionally. The support on the establishment of the regional platform was shown by the arrangement of workshops and training to provide deep insight on the need for a common platform for the regional countries as an act to fight climate change together and also to build a mutual understanding between countries in the region to overcome a common thread, especially thread to biodiversity and coastal ecosystem health.

Based on the conclusions above, there are several recommendations to conclude this report:

1. During the past five years, RTRC MarBEST already acknowledged as a world class training center in marine biodiversity and ecosystem health. The activity of RTRC MarBEST provided mutual benefit for the regional stakeholder as well as national stakeholder. Due to the fact that LIPI, through RTRC MarBEST has fulfilled the commitment as specified in the Agreement between UNESCO/IOC and LIPI, **it is considered that the Agreement be renewed between UNESCO/IOC and LIPI for the next five years to ensure a continued contribution of the RTRC MarBEST** to the implementation of the IOC Capacity Development Strategy and the coming UN Decade of Ocean Science for Sustainable Development (2021-2030).

2. **The Sustainable strategy that already been developed, need to be implemented in order securing the long term sustainability of the RTRC MarBEST,** for the benefit of both IOC member states and also Indonesia. This is due to RTRC MarBEST provides a positive contribution to Indonesian science diplomacy through enhancing national and regional human capacity to support Indonesia as the global maritime fulcrum

VIII. ACKNOWLEDGEMENTS

RTRC MarBEST wish to acknowledged the following partners who supported all activities frim the beginning

RTRC MarBEST also very grateful to the following colleagues for their endless support in all activities that has been conducted:

Dr. Vladimir Ryabinin, Dr. Wenxi Zhu, Prof.Dr. Arief Rahman Hakim, Prof. Dr. Somkiat Khokiattiwong, Dr. Vo Si Tuan, Dr. Fangli Qiao, Dr. Kentaro Ando, Dr. Youn Ho Lee Dr. Andre Aquino, Dr. David Kaczan, Ms. Ina B. Pranoto, Dr. Laksana Tri Handoko, Prof.Dr. Zainal Arifin, Prof. Dr. Suharsono, Dr. Dirhamsyah, Dr. AA Lelono, Dr. Abdul Situmorang, Dr. Sora Lokita, Indra Bayu Vimono, Nachapa Saransuth, Ms. Rini Modaso, Dr. Rianta Pratiwi, Dr. Hagi Yulia Sugeha, Dr. Giyanto, Dr. Udhi E. Hernawan, I Wayan Eka Dharmawan, Prof. Dr. Dwi Listyo Rahayu, Drs. Susetiono M.Sc, Deny Sutisna, Beben Hidayat, Deni Sutansyah, Tri Aryono Hadi, Triyono, Bayu Prayudha, Hilda Novianti, Dr. Yaya Ihya Ulumuddin, Yani Rostini, Yeti Mintarsih, Siti Sulha, Novita Fitrianti, Hesti ARS, Mugie Rahayu, Emiliana, M. Yunus Zulkifli, Mia Amelia, Tamie, TB Budhi, M. Furqon, Agnes Febriani, Dwi Sekar Asih, Meifina, and all staffs from RCO LIPI, LPKSDMO LIPI and Training Center LIPI whom without their support and assistants, RTRC MarBEST would not go this far. Thank you very much

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Regional Training and Research Center-Marine Biodiversity and Ecosystem Health. 2017. Laporan Kegiatan RTRC MarBEST Sub Component 2.2: Strengthen Technical Capacity for Coastal Ecosystem Research

Regional Training and Research Center-Marine Biodiversity and Ecosystem Health. 2017. REPORT on The Molecular Taxonomy Training: Based On Single DNA Barcoding And Metabarcoding

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Regional Training and Research Center-Marine Biodiversity and Ecosystem Health. 2019. Laporan Kegiatan RTRC MarBEST Sub Component 2.2: Strengthen Technical Capacity for Coastal Ecosystem Research

Regional Training and Research Center-Marine Biodiversity and Ecosystem Health. 2019. REPORT on The Assessment Of Carbon Stock And Sequestration In The Seagrass Ecosystem Training

Regional Training and Research Center-Marine Biodiversity and Ecosystem Health. 2020. Laporan Kegiatan RTRC MarBEST Sub Component 2.2: Strengthen Technical Capacity for Coastal Ecosystem Research

Regional Training and Research Center-Marine Biodiversity and Ecosystem Health. 2020. REPORT on The Mangrove Health Index Training

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Research Center for Oceanography-Indonesian Institute of Sciences. 2019. Report on The 2nd ASEAN Workshop on “Carbon Sink and Sequestration in Coastal Ecosystem: from Science to Policy”

ANNEXES

RTRC MarBEST
Logo and Philosophy

RTRC MarBEST

RGB 17.100.216

The Logo of the RTRC MarBEST was proposed by the RTRC MarBEST's initiator team. The logo is simple as the abbreviation from Regional Training and Research Center for Marine Biodiversity and Ecosystem Health (RTRC MarBEST) is showed on a wavy line. RTRC MarBEST on a wavy line act as Logo without any logotype, so it is clearly visible and easily read. The coice of it's shape and color are represent several meaning and hope, as follows:

- Blue (and white) color represents the official color of United Nation[1&2] as UNESCO/IOC is part of the UN organisation
- Blue represent water and sea (and the sky) as RTRC MarBEST main domain is Marine Science. The blue color refer to R.G.B: 17.100.216 (Inauguration date was 17 October 2016), or other blue to matched any background color.
- As representing the sea and the sky, the blue color means borderless in the transfer of knowledge and capacity building and united under the same sky
- Wavy line looks like water surface, where water element represent the essential resources and the origin of the biodiversity. If the absence the blue color occur when it printed or stamped other than blue, the wavy line is still showing the water symbol
- Wavy line act as water surface also represent the dynamic and move toward achievable goals.
- The wavy line pointed downward at the left and pointed upward at the right end, represent process and logic following universal alphabetic and number that were arranged from left (initial writing, smaller number) to right (writing direction, bigger number).
- RTRC MarBEST letters on the water surface represent the base of the RTRC MarBEST are research and capacity building on marine science.
- RTRC MarBEST letters on the water surface, letters and wavy lines slightly separated represent the international transport connection as water (floating) or air transportation (fly) in the spirit of cooperation where all members support each other
- The whole logo represent the main business of the RTRC MarBEST in marine research and capacity building, from the BEST resources for the BEST possibilities in the future
-

Source

1. United Nation Flag Code
2. https://www.un.org/en/sections/about-un/un-logo-and-flag/index.html

LIST of RTRC MarBEST
International Training Instructors

- Crustacean Taxonomy Training

NO	NAME	COUNTRY ORIGIN	AFFILIATION
1	Prof. Dr. Suharsono	Indonesia	RCO LIPI
2	Prof.Dr. Dwi Listyo Rahayu	Indonesia	RCO LIPI
3	Rianta Pratiwi M.Sc	Indonesia	RCO LIPI
4	Prof. Dr. Mulyadi	Indonesia	RC Biology LIPI
5	Dr. Daisy Wowor	Indonesia	RC Biology LIPI
6	Dr. Romanus Edy Prabowo	Indonesia	Jend. Soedirman University
7	Dr. Teguh Triono	Indonesia	KEHATI
8	Bayu Prayudha	Indonesia	RCO LIPI
9	Indra Bayu Vimono	Indonesia	RCO LIPI
10	Prof. Dr. Shuhei Nishida	Japan	Atmosphere and Ocean Research Institute, The University of Tokyo,
11	Dr. Nicholas Hubert	France	Institut de recherche pour le développement (IRD)
12	Dr. Gavin Gouws	South Africa	South African Institute of Aquatic Biodiversity, South Africa
13	Dr. Christopher Meyer	US	Research Zoologist & Curator Dept of Invertebrate Zoology National Museum of Natural History Smithsonian Institution 10th & Constitution Ave NW Washington DC

- The Molecular Taxonomy Training: Based On Single DNA Barcoding And Metabarcoding

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1	Prof. Dr. Youn-Ho Lee	South Korea	KIOST-South Korea
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6	Dr. Nicholas Hubert	France	Institut de recherche pour le développement (IRD)
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- The Coral Health Index Training

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4	Dominic Bryant	Australia	Global Change Institute University of Queensland
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- The Assessment Of Carbon Stock And Sequestration In The Seagrass Ecosystem Training

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4	Dr. Mat Vanderklift	Australia	Commonwealth Scientific and Industrial Research Organization (CSIRO)
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- Mangrove Health Index Training

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8	Bayu Prayudha	Indonesia	RCO LIPI

LIST of RTRC MarBEST
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21	Werachart Pengchumrus	Thailand	Phuket Marine Biological Center, Department of Marine and Coastal Resources. Ministry of Natural Resources and Environment, Thailand
22	Tan Hoc Dao	Vietnam	Researcher, Living Marine Resources Department Institute of Oceanography, Department of Marine Ecology and Animal Resource
23	Thao Dau Van	Vietnam	Researcher, Institute of Marine Environment and Resources Department of Marine Ecology and Animal Resources

- The Molecular Taxonomy Training: Based On Single DNA Barcoding And Metabarcoding

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5	Apollo Marco Lizano	Philippines	Marine Science Institute, University of the Philippines Diliman
6	Hoc Tan Dao	Vietnam	Institute of Oceanography, Vietnam Academy of Science and Technology
7	Pham Thi Mien	Vietnam	Institute of Oceanography, Vietnam Academy of Science and Technology
8	Li Ying Wong	Singapore	University of Plymouth UK
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11	Varian Fahmi	Indonesia	Indonesian Institute of Sciences (LIPI)
12	Ludi Parwadani Aji	Indonesia	Indonesian Institute of Sciences (LIPI)
13	Indyaswan Tegar Suryaningtyas	Indonesia	Indonesian Institute of Sciences (LIPI)
14	Sutanti	Indonesia	The Agency for the Assessment and Application of Technology (BPPT)
15	Aradea Kusuma	Indonesia	Bengkulu University
16	Andi Aliah Achsan	Indonesia	Faculty of Marine and Fisheries- Hasanuddin University (UNHAS)
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