

## The progress report on Coral Reef Resilience to Climate Change and Human Impacts

### 1. Introduction and justification

Coral reefs are one of the most important ecosystems and represent areas rich in marine biodiversity in tropical and subtropical seas, especially in the Western Pacific countries. They play major roles in a range of ecosystem services, such as sea food products, tourism and coastal protection, that contribute to the well-being of coastal communities. However, coral reefs have been impacted under severe pressure from human activities altering ecological processes and climate change. The knowledge of coral reefs is well recognized around the globe and considerable research efforts have been made to improve our understanding of the geological, physical, chemical and ecological processes in coral reef ecosystems. These researches have provided information and knowledge essential for enhancing coral reef resilience as well as the sustainable management of coral reef ecosystems. The research achievement needs multidisciplinary approach and international collaboration.

The previous WESTPAC program, the Coral Reefs under Climate and Anthropogenic Perturbations (CorReCAP) Project, was established in 2008 and provided significant outcomes from various activities which were conducted to facilitate greater regional cooperation among research programs, training of young marine researchers, international workshops and publishing research articles in a special issue of the Deep Sea Research II and a book on Coral Reefs of the Western Pacific Ocean in a Changing Anthropocene (Coral Reefs of the World, Volume 14).

This WESTPAC program will support the Sustainable Development Goals, particularly the SDG 14, for conservation and sustainable use of the ocean, seas and marine resources, the United Nations Decade of Ocean Science for Sustainable Development (2021-2030), especially the decade outcome for a healthy and resilient ocean. This program will also contribute to the post-2020 Global Biodiversity Framework under the Convention on Biological Diversity (CBD), and the legal and policy for the UN Framework Convention on Climate Change (UNFCCC).

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### 2. Timeframe and objectives

- May 2021-April 2029 (8 years)

- Objectives:

- o To Establish a network for research on coral reefs and collaborative coordination with 6 projects in the region by 2029,
- o To promote capacity building in the WESTPAC through enhancing networks of 80 young marine scientists by 2029,

- To develop coral reef monitoring guideline for managing marine protected areas in the WESTPAC in accordance with the UN Decade of Ocean Science for Sustainable Development by 2024,
- To publish 2 training materials for coral reef researches in the WESTPAC by 2025

### **3. Major activities, outputs & outcomes over the last intersessional period (May 2021-April 2023)**

- Participated the workshop and training course on marine scientific research in the South China Sea, 14 - 15 September 2021(online).
- Organized the Incubator 6: Save Our Corals: a partnership programme catalyzing knowledge and ocean science solutions to enhancing coral reef resilience in UN Decade of Ocean Science for Sustainable Development (2021-2030) Regional Kickoff Conference for the Western Pacific and its Adjacent Areas, 25 – 26 November 2021 (online).
- Presented at the Incubator 14: Towards Ocean Sustainability: Direction of science and technology we need for the blue economy we want in UN Decade of Ocean Science for Sustainable Development (2021-2030) Regional Kickoff Conference for the Western Pacific and its Adjacent Areas, 25 – 26 November 2021 (online).
- Organized the Marine Science Virtual Conference to Support the United Nations Decade of Ocean Science for Sustainable Development, 2021 – 2030, 1 – 3 December 2021.
- Organized the meeting on coral reef monitoring for managing marine protected areas (IOC/WESTPAC), 28 April 2022, (online).
- Organized the ASEAN Biodiversity Session under the International Academic Conference on Multidisciplinary ASEAN+ in the Age of Disruptive Society, 25 – 26 May 2022, Ramkhamhaeng University and online.
- Presented at the 15th International Coral Reef Symposium (ICRS 2022), 3 – 8 July 2022 Bremen, Germany (online).
- Participated the national PPG inception workshop of the UNDP-GEF Project: Effectively Managing Networks of Marine Protected Areas in Large Marine Ecosystems in the ASEAN Region (ASEAN ENMAPS), 7 July 2022, Bangkok, Thailand.
- Organized the workshop on coral reef monitoring for managing marine protected areas at the 7th Marine Science Conference, 5 – 7 September 2022, the Berkeley Hotel Pratunam, Bangkok and online.
- Organized the seminar on coral reefs to improve ecosystem services and citizen science at the 7th Marine Science Conference, 5 – 7 September 2022, the Berkeley Hotel Pratunam, Bangkok and online.
- Organized the workshop on the 30x30 target of marine protected areas at the 7th Marine Science Conference, 5 – 7 September 2022, the Berkeley Hotel Pratunam, Bangkok and online.
- Organized the seminar on climate change and carbon neutrality at the 7th Marine Science Conference, 5 – 7 September 2022, the Berkeley Hotel Pratunam, Bangkok and online.
- Organized the seminar on carbon neutral marine tourism at the 7th Marine Science Conference, 5 – 7 September 2022, the Berkeley Hotel Pratunam, Bangkok and online.
- Participated at the First Meeting of the Regional Scientific and Technical Committee (RSTC) of the UNEP/GEF Project Implementing the Strategic Action Programme for the South China Sea and Gulf of Thailand (SCS SAP Project), 17 – 19 October 2022, Bangkok, Thailand.
- Co-organized the National Capacity Building Workshop on EBSA and OECMs Areas in conjunction with International Experts (SEA SCAPE) and CBD Secretariat, 24 – 25 November 2022, Century Park Hotel, Bangkok.
- Presented at the 2nd project steering committee meeting of the Increasing resilience to climate change impacts in marine and coastal areas along the Gulf of Thailand project, 24-25 November 2022, Petchaburi Province.
- Published “Coral Reefs of the Western Pacific Ocean in a Changing Anthropocene (Coral Reefs of the World, Volume 14)”, 2022, Springer Nature Switzerland.

#### **4.A summary of key achievements since its establishment**

- Established a network for research on coral reefs and collaborative coordination with GCRMN-East Asia, International Coral Reef Initiative (ICRI), International Coral Reef Society (ICRS), Coral Triangle Initiative (CTI), Wildlife Conservation Society (WCS), ASEAN Centre for Biodiversity (ACB), Asia Pacific Coral Reef Society (APCoRS), United Nations Development Programme (UNDP), the German Agency for International Cooperation (GIZ).
- Supported capacity building in the WESTPAC through enhancing networks of young marine scientists
- Information concerning the guideline of coral reef monitoring and managing marine protected areas in the WESTPAC
- Publication “Coral Reefs of the Western Pacific Ocean in a Changing Anthropocene (Coral Reefs of the World, Volume 14)”.
  - o Jing Zhang, Thamasak Yeemin, R. John Morrison, Gi Hoon Hong (Editors). 2022. Coral Reefs of the Western Pacific Ocean in a Changing Anthropocene, (Coral Reefs of the World, 14), Springer, 212 pp.
  - o The book is based on the research and training activities in the Western Pacific Ocean Region within the umbrella of UNESCO/IOC-Sub-Commission for the Western Pacific Region. The results of these activities are compared to cases from other tropical and subtropical regions to make the knowledge applicable to global aspects of sustainability of coral reef ecosystems.
    - Chapter 1: Introduction/Background
    - Chapter 2: Anthropogenic Environmental Impacts on Coral Reefs in the Western and South-Western Pacific Ocean
    - Chapter 3: Advances in Coral Biology
    - Chapter 4: Reef Ecology in the Western Pacific for Adaptation to Global Change
    - Chapter 5: Biogeochemical Dynamics of Coral Reef Systems
    - Chapter 6: Environmental and Climate Proxies Embedded in Coral Skeletons
    - Chapter 7: Synthesis and Future Perspectives on the Coral Reefs in the Western Pacific Region

#### **5. Self-assessment on implementation against objectives**

Objective 1: To Establish a network for research on coral reefs and collaborative coordination with 6 projects in the region by 2029,

Implementation: Conducted initial phase of collaboration with GCRMN-East Asia, International Coral Reef Initiative (ICRI), Coral Triangle Initiative (CTI), ASEAN Centre for Biodiversity (ACB), Asia Pacific Coral Reef Society (APCoRS), the Strategic Action Programme for the South China Sea and Gulf of Thailand (SCS SAP Project), the German Agency for International Cooperation (GIZ).

Objective 2: To promote capacity building in the WESTPAC through enhancing networks of 80 young marine scientists by 2029,

Implementation: About 20 young marine scientists participated in seminars, workshops, meetings and conferences.

Objective 3: To develop coral reef monitoring guideline for managing marine protected areas in the WESTPAC in accordance with the UN Decade of Ocean Science for Sustainable Development by 2024,

Implementation: Conducted two workshops for brainstorming to develop coral reef monitoring guideline for managing marine protected areas in the WESTPAC.

Objective 4: To publish 2 training materials for coral reef researches in the WESTPAC by 2025

Implementation: Published a book:

Jing Zhang, Thamasak Yeemin, R. John Morrison, Gi Hoon Hong (Editors). 2022. Coral Reefs of the Western Pacific Ocean in a Changing Anthropocene, (Coral Reefs of the World, 14), Springer, 212 pp.

#### **6. Problems encountered and recommended actions**

- The long-term impacts of the COVID-19 pandemic in terms of socio-economic and logistic problems
- The project will do proposed activities both on site and online.

#### **7. Objectives to be achieved, if applicable, over the next intersessional period (May 2023- April 2025)**

- To Establish a network for research on coral reefs and collaborative coordination with 3 projects in the region by 2025,
- To promote capacity building in the WESTPAC through enhancing networks of 40 young marine scientists by 2025,
- To develop coral reef monitoring guideline for managing marine protected areas in the WESTPAC in accordance with the UN Decade of Ocean Science for Sustainable Development by 2024,
- To publish 2 training materials for coral reef researches in the WESTPAC by 2025

#### **8. Planned activities for May 2023- April 2025**

[provide, in tabular form, the action items that should be included in the work plan and budget]

Program	Activities	Objectives	Expected outputs/outcomes	Date and place	Funding Required		Remark
					IOC	Other sources (i.e., from national or international)	
Coral Reef Resilience to Climate Change and Human Impacts	1. Symposium on Coral Reef Ecotourism: Toward Carbon Neutral Destination	<ul style="list-style-type: none"> <li>- To present current knowledge from scientific research, monitoring, management, and conservation with focusing on ecotourism and carbon-neutral destinations</li> <li>- To promote capacity building related to management and conservation of coral reefs</li> </ul>	<ul style="list-style-type: none"> <li>- Lessons learned from the WESTPAC concerning capacity enhancement for monitoring and research, community-based management, and carbon-neutral tourism</li> <li>- 30 participated researchers/managers</li> <li>- Support the UN Decade of Ocean Science</li> </ul>	June 19 – 23, 2023, Singapore		US\$ 5K	In collaboration with the 7th Asia Pacific Coral Reef Symposium, 19 – 23 June 2023, the National University of Singapore (NUS), Singapore
	2. Summer School on “Impact of Anthropogenic Forcing on Coral Reefs and Consequence at Ecosystem Level”	<ul style="list-style-type: none"> <li>-To gain knowledge on consequence of impacts of climate change and human activities on the coral reef health and interventions to reduce reef stressors,</li> <li>- To use a book of Coral Reefs of the Western Pacific Ocean in a Changing Anthropocene and relevant materials for the trainees,</li> <li>- To promote capacity building related to research</li> </ul>	<ul style="list-style-type: none"> <li>- 20 trained young marine scientists</li> <li>- Report on capacity building of the project</li> <li>- Support the UN Decade of Ocean Science</li> </ul>	December 2023, Penang, Malaysia	-	US\$ 10K	This activity was postponed from December 2019 because of the COVID-19 pandemic

<b>Program</b>					<b>Funding Required</b>		<b>Remark</b>
	<b>Activities</b>	<b>Objectives</b>	<b>Expected outputs/outcomes</b>	<b>Date and place</b>	<b>IOC</b>	<b>Other sources (i.e., from national or international)</b>	
		and managing coral reefs in the WESTPAC.					
	3. Workshop on Coral Reef Resilience-based Management	-To review case studies on coral reef resilience-based management for applying in the WESTPAC - To promote capacity building related to research and managing coral reefs in the WESTPAC	- Good case studies on coral reef resilience-based management in the WESTPAC - 30 participated researchers - Support the UN Decade of Ocean Science	March 2024 Bangkok, Thailand		US\$ 10K	
	4. Workshop on collaboration of regional young scientists for coral reef resilience research	- To review coral reef studies in the WESTPAC for determining research collaboration on coral reef resilience - To enhance network for research on coral reefs and coordination with other projects in the region - To promote capacity building related to young scientist research on coral reefs in the WESTPAC	- 20 participated young scientists - A collaborative research proposal on coral reef resilience - Support the UN Decade of Ocean Science	March 2024 Bangkok, Thailand		US\$ 10K	

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	<b>Activities</b>	<b>Objectives</b>	<b>Expected outputs/outcomes</b>	<b>Date and place</b>	<b>IOC</b>	<b>Other sources (i.e., from national or international)</b>	
	5. Workshop to finalize a coral reef monitoring guideline for managing marine protected areas in the WESTPAC	-To brainstorm and discuss on finalizing a coral reef monitoring guideline for managing marine protected areas - To promote capacity building on coral reef monitoring and managing marine protected areas	- 20 participated scientists/managers - Coral reef monitoring guideline for managing marine protected areas - Support the UN Decade of Ocean Science	August 2023 Bangkok, Thailand		US\$ 5K	
	6. Workshop for training users of a coral reef monitoring guideline for managing marine protected areas in the WESTPAC	- To train users of a coral reef monitoring guideline for managing marine protected areas - To promote capacity building on coral reef monitoring and managing marine protected areas	- 20 trainees for coral reef monitoring and managing marine protected areas in the WESTPAC - Support the UN Decade of Ocean Science	March 2024 Bangkok, Thailand		US\$ 5K	