Integrated Investigation in Indo-Pacific Convergence Center: Marine Ecosystem Ranching Working Group(I3PCC-MER WG)

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Guidelines

What

To take stock of the **implementation status** and further catalyze ocean science solutions for sustainable development, this ppt template is designed to:

- Gather information on the **current development status** of the WESTPAC Programme/Project/Working Group, particularly since the Fourteenth Session of the IOC Sub-Commission for the Western Pacific (WESTPAC-XIV) in *April 2023*.
- More importantly, assess its **future development**, along with **potential action plans** for future implementation, i.e., for the period of *2025-2026 and beyond*.

Why

- The Information will facilitate considerations concerning how to harness, stimulate and empower interdisciplinary ocean research that can increase our understanding and inform policy and decision-making.
- It will also aid in improving programme efficiency and effectiveness that will serve the requirement of Member States and the Sub-Commission as a whole.

How

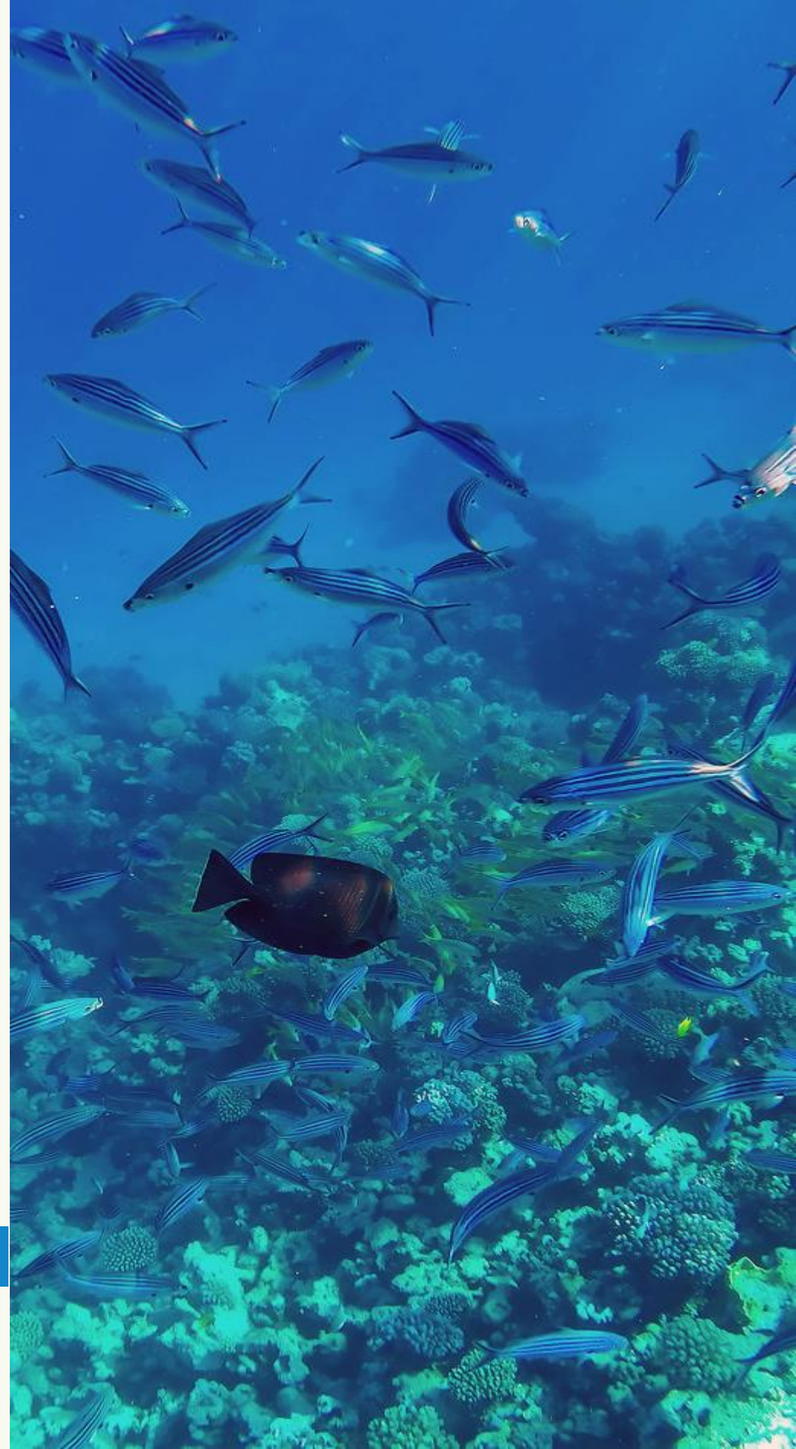
Filling out the following slides, which should not take much time, and return the completed slides to *iocwestpac@unesco.org* by **20 September 2024**. We appreciate your kind cooperation.

Note:

- *Feel free to use a different slide layout if it better suits your summary content.*
- *Failure to submit will be considered as a lack of substantive activity and may indicate difficulties in continuing the project.*

Summary Outline

1. Justification
2. Objectives
3. Major activities, outputs & outcomes (particular those accomplished during 2023-2024)
4. Problems encountered and recommended actions
5. Strategic considerations/thoughts for future development
6. Potential action plans for 2025-2026 and beyond

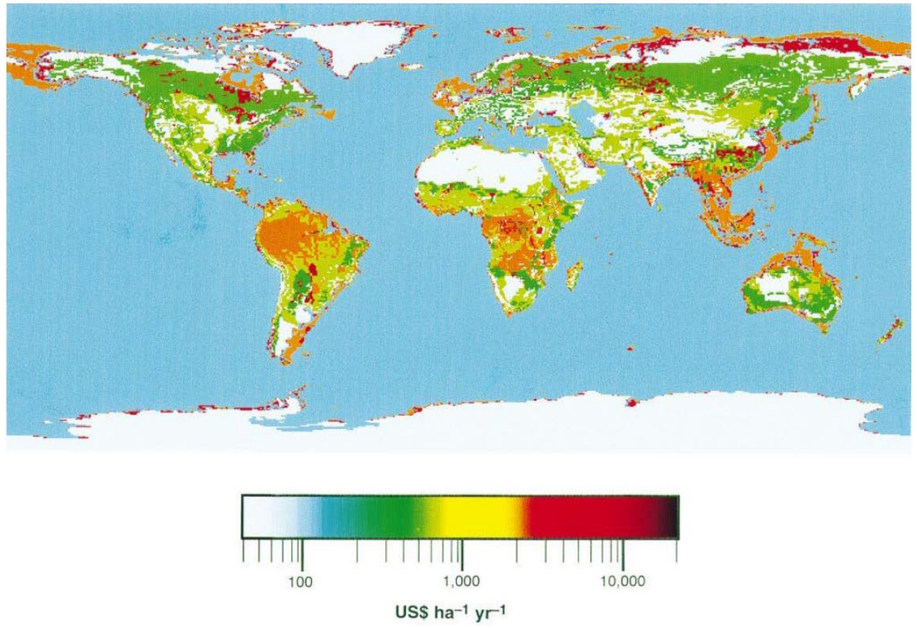


1. Justification

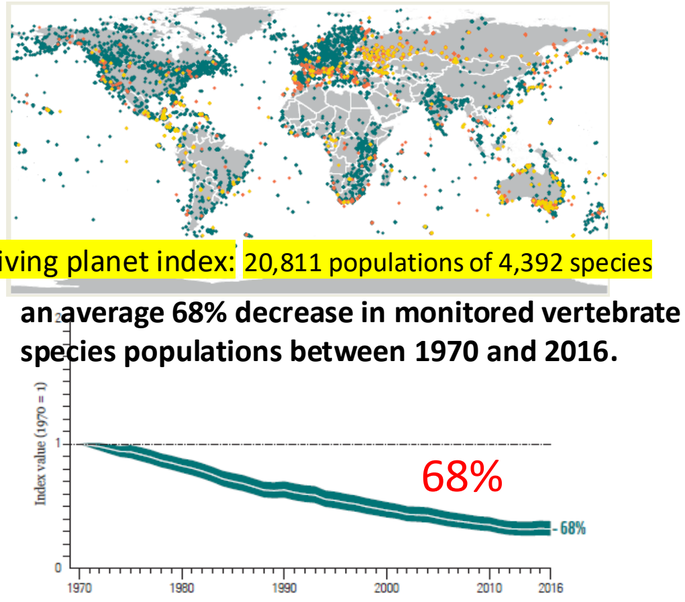
Significance of global ecosystems and biodiversity

Significance of global ecosystems and biodiversity: a life-supporting system for humanity.

The health and stability of marine ecosystems depend on biodiversity.



Global map of values of estimated ecosystem services in 1997. (Costanza et al., 1997)



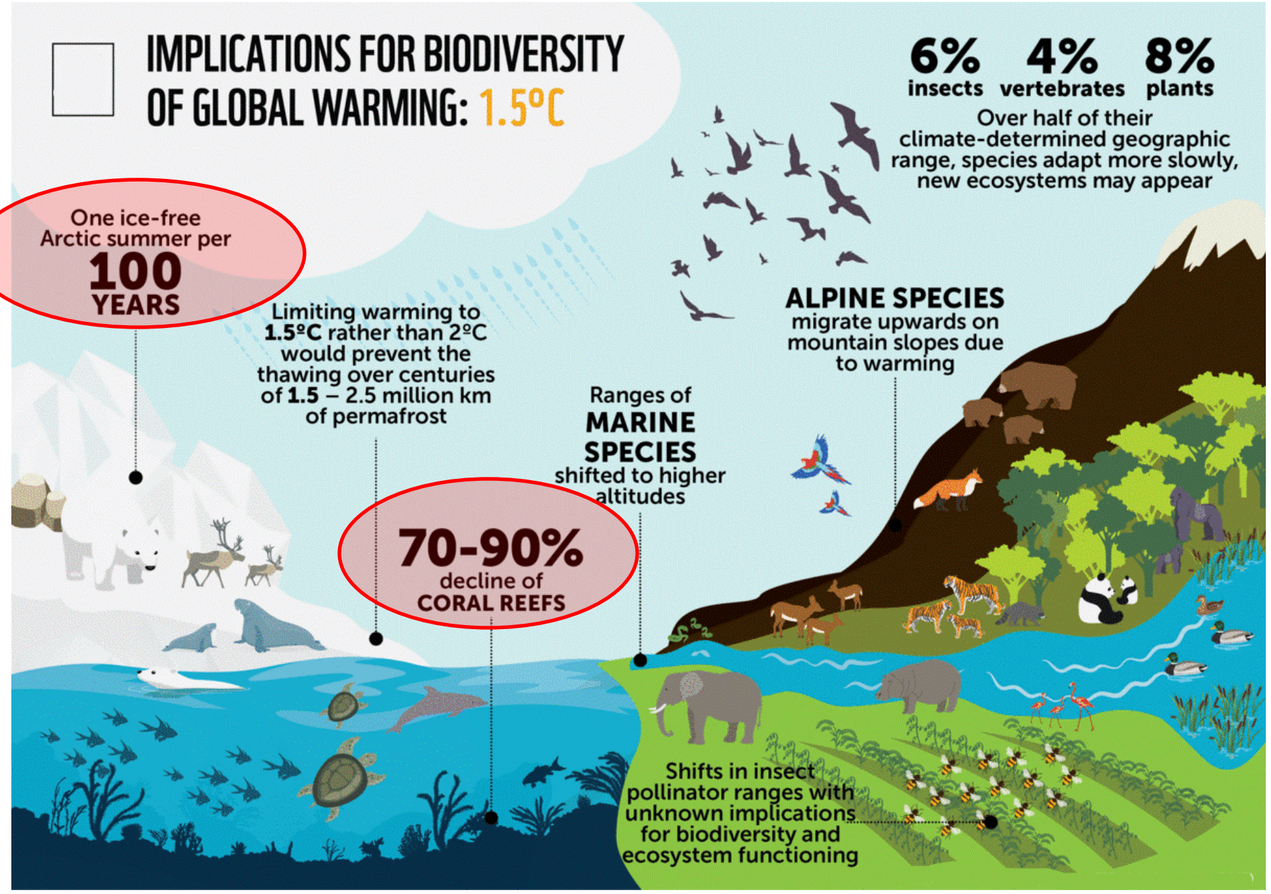
Decline of biodiversity as indicated by global living Planet Index (WWF, 2020)

The decline of marine biodiversity will result in negative impacts on marine ecosystem structure, function and the ecosystem services: fishery, recreation, gene resources, food safety…

1. Justification

Threats of climate change and human activities

Marine ecosystems and biodiversity are under threats of climate change and human activities



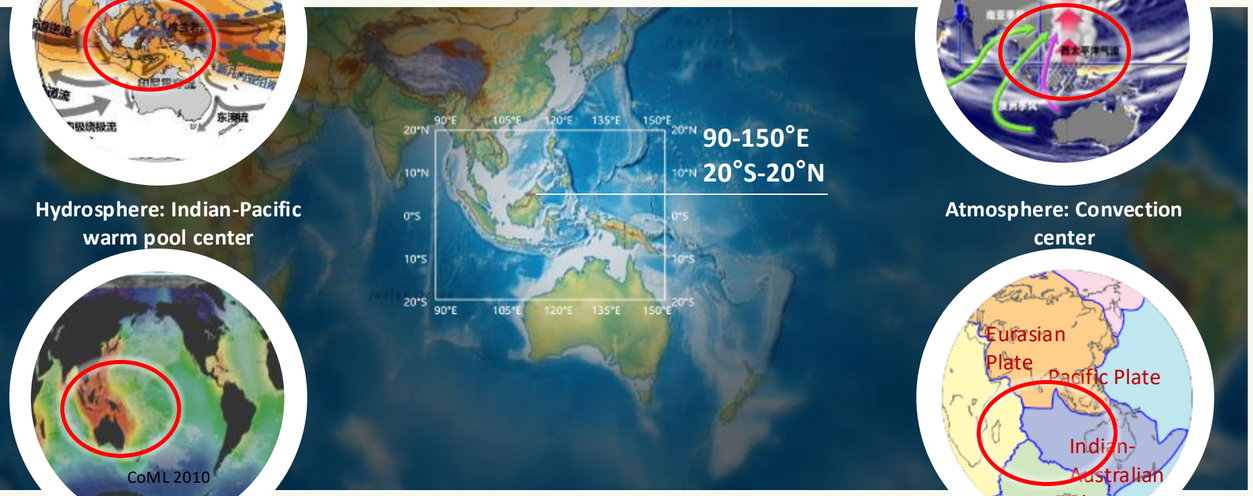
- Human activities are estimated to have caused approximately 1.0° C of global warming above pre-industrial levels. Global warming is likely to reach 1.5° C between 2030 and 2052.
- Global warming of 1.5° C is projected to shift the ranges of many marine species to higher latitudes as well as increase the amount of damage to many ecosystems.

1. Justification

(West Pacific region)

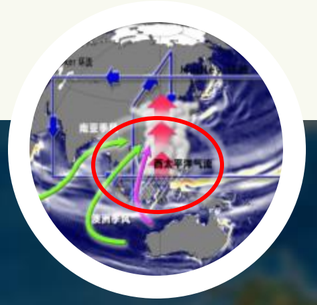
The WESTPAC region includes the land of Asia, thousands of islands of Japan and India as well as the Pacific oceans. As one of the world's largest fishing areas, the WESTPAC region supports the livelihoods of countless fishermen.

Indo-Pacific Convergent Center (IPCC)



Hydrosphere: Indian-Pacific warm pool center

Biosphere: Biodiversity center

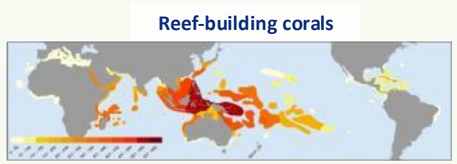


Atmosphere: Convection center

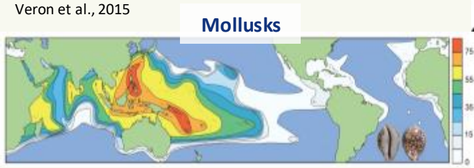
Lithosphere: Plate convergence

Complex interactions between different spheres (hydrosphere, atmosphere, lithosphere, and biosphere)

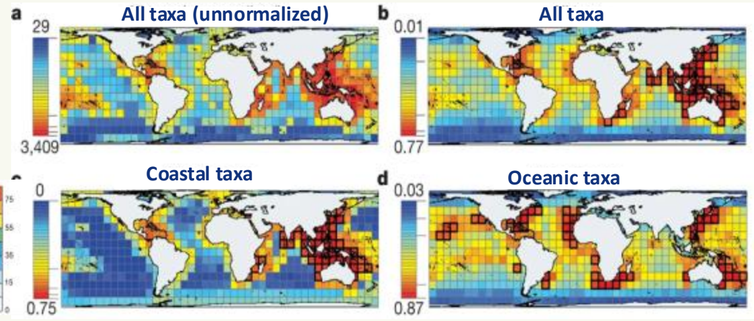
Importance of marine ecosystems in the IPCC region



Veron et al., 2015

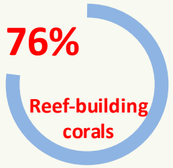


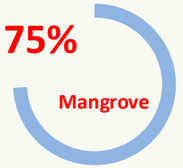
Bellwood et al., 2009

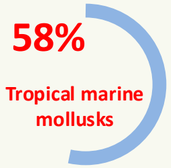


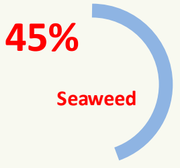
Tittensor et al., 2010

Global species richness and hotspots across taxa





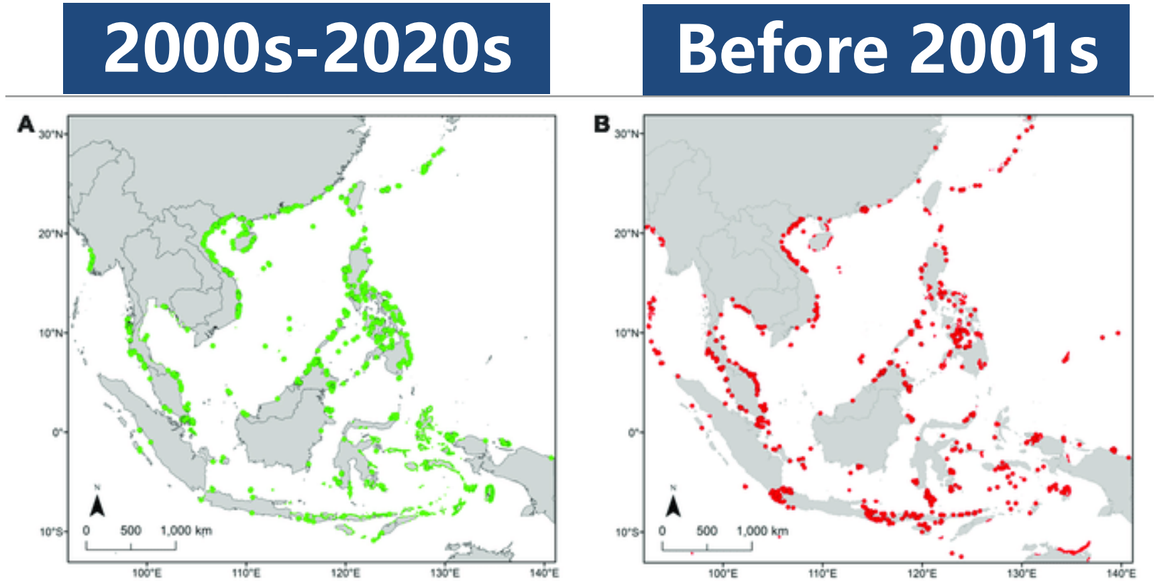




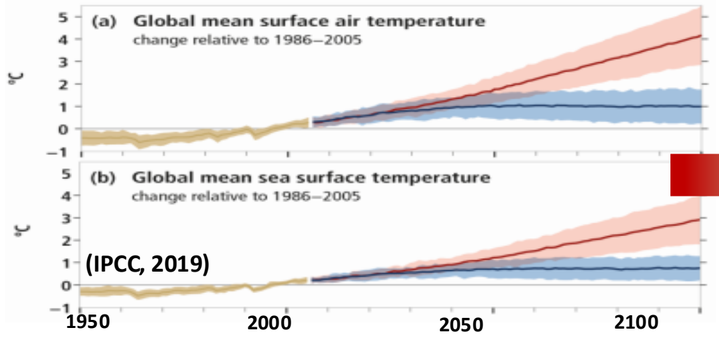
Global Center of Marine Biodiversity

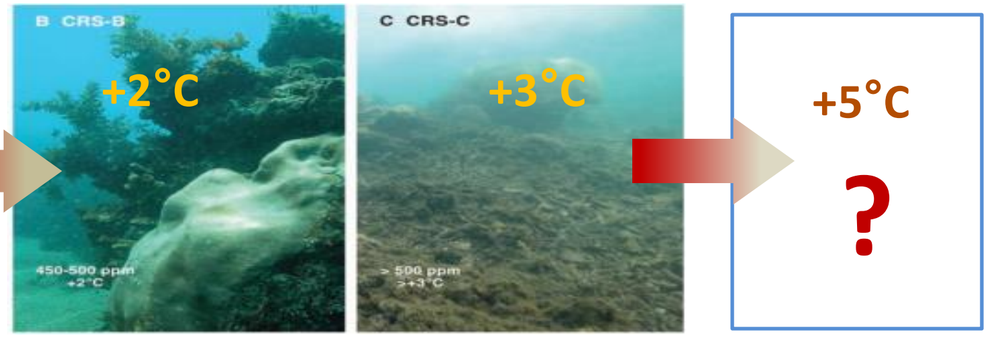
1. Justification

(Habitat deterioration)



Degradation of seagrass beds



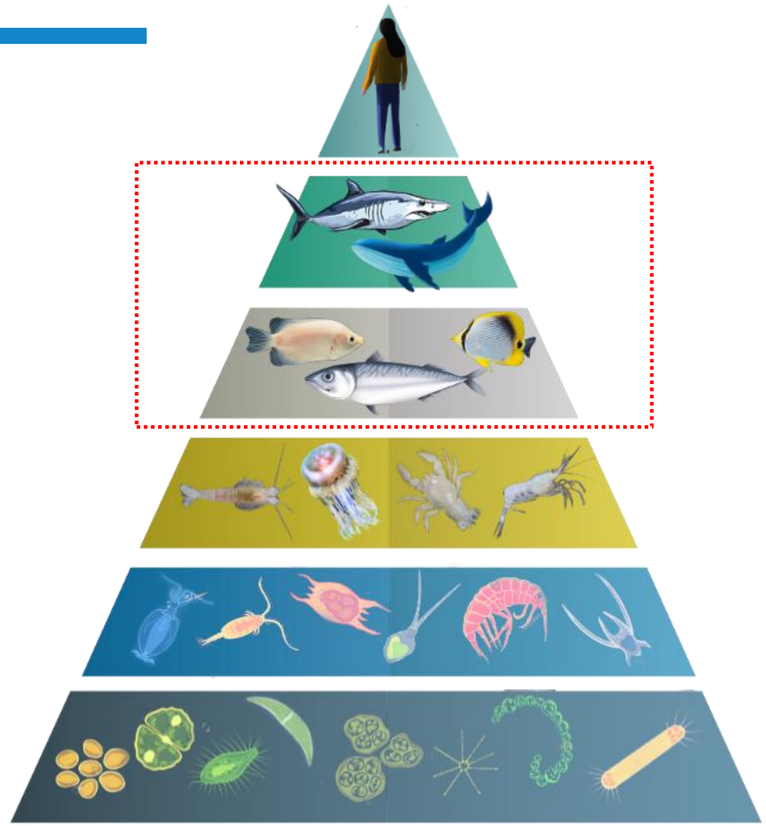


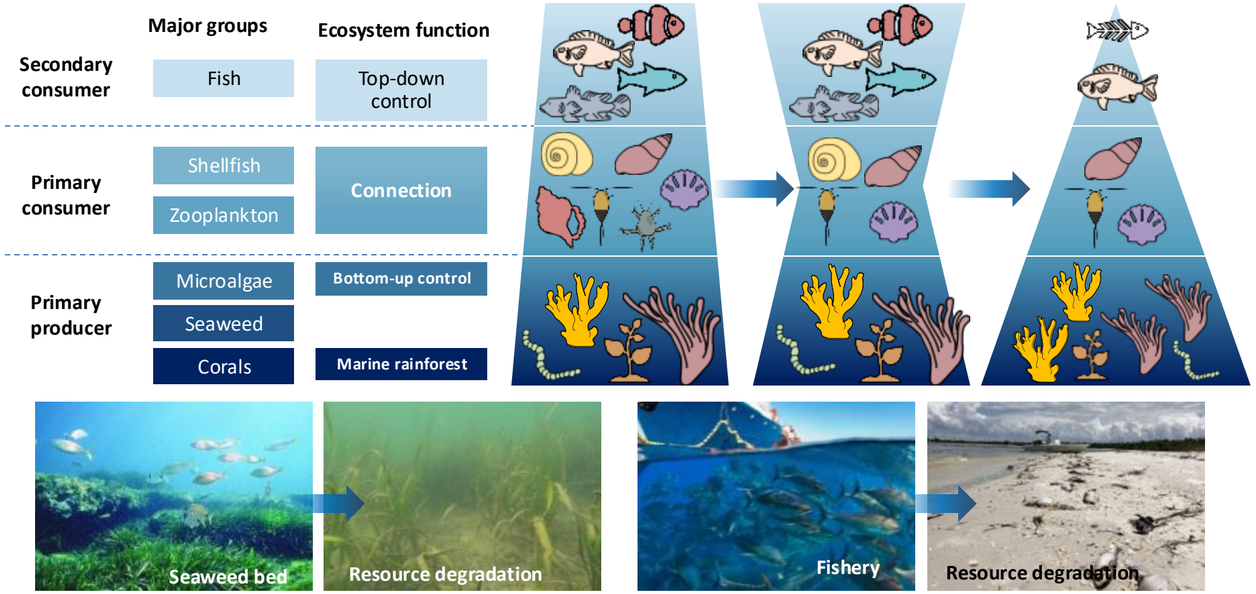
Coral reef bleaching

Deterioration of coral reef

1. Justification

(Decrease of marine resources)





- Overfishing
- Trophic structure simplification
- Low age and miniaturization

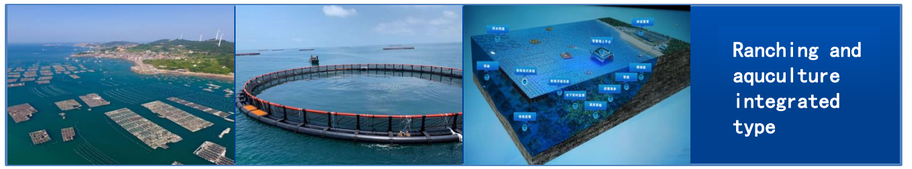
- **Coastal marine resources are running out.**
- **Ecological consequence of climate change remains unknown in the IPCC region.**

1. Justification

(Marine Ecological Ranching (MER))

MER, based on the principles of marine ecosystems, involves the construction or restoration of habitats for marine organisms to breed, grow, seek food, or avoid predators in specific marine areas through measures such as artificial reefs and stock enhancement.

Thus enhancing and conserving fisheries resources and improving marine ecological environments, achieving sustainable utilization of fisheries resources.



1. Justification

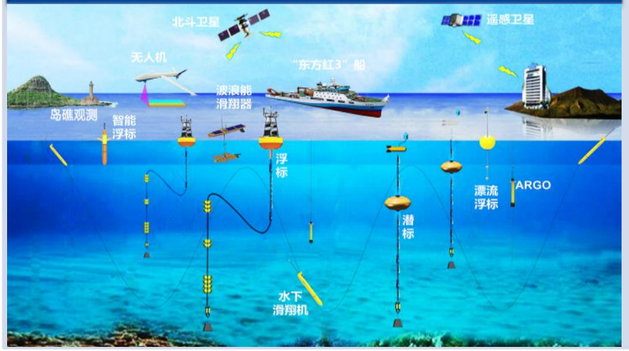
The construction of MER around the world

- So far, there are **189** national marine ranching demonstration in **China**

Ecologicalization

Precision

Intellectualization



Integration

1. Justification

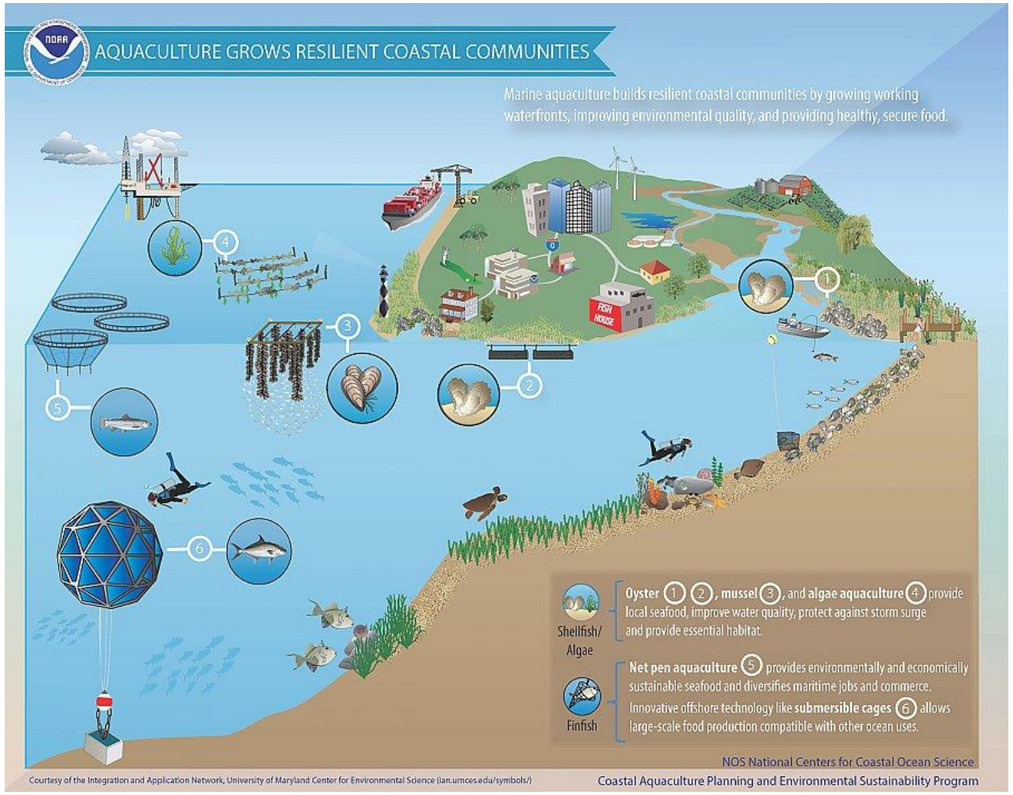
The construction of MER around the world

- **Japan** has implemented coastal fishery improvement projects, constructing marine ranches primarily focused on deploying artificial reefs in offshore areas along the coastal waters.

1. Justification

The construction of MER around the world

- **The United States is developing the diving and recreational fishing industries in marine ranches, effectively promoting the integrated development of various industries.**



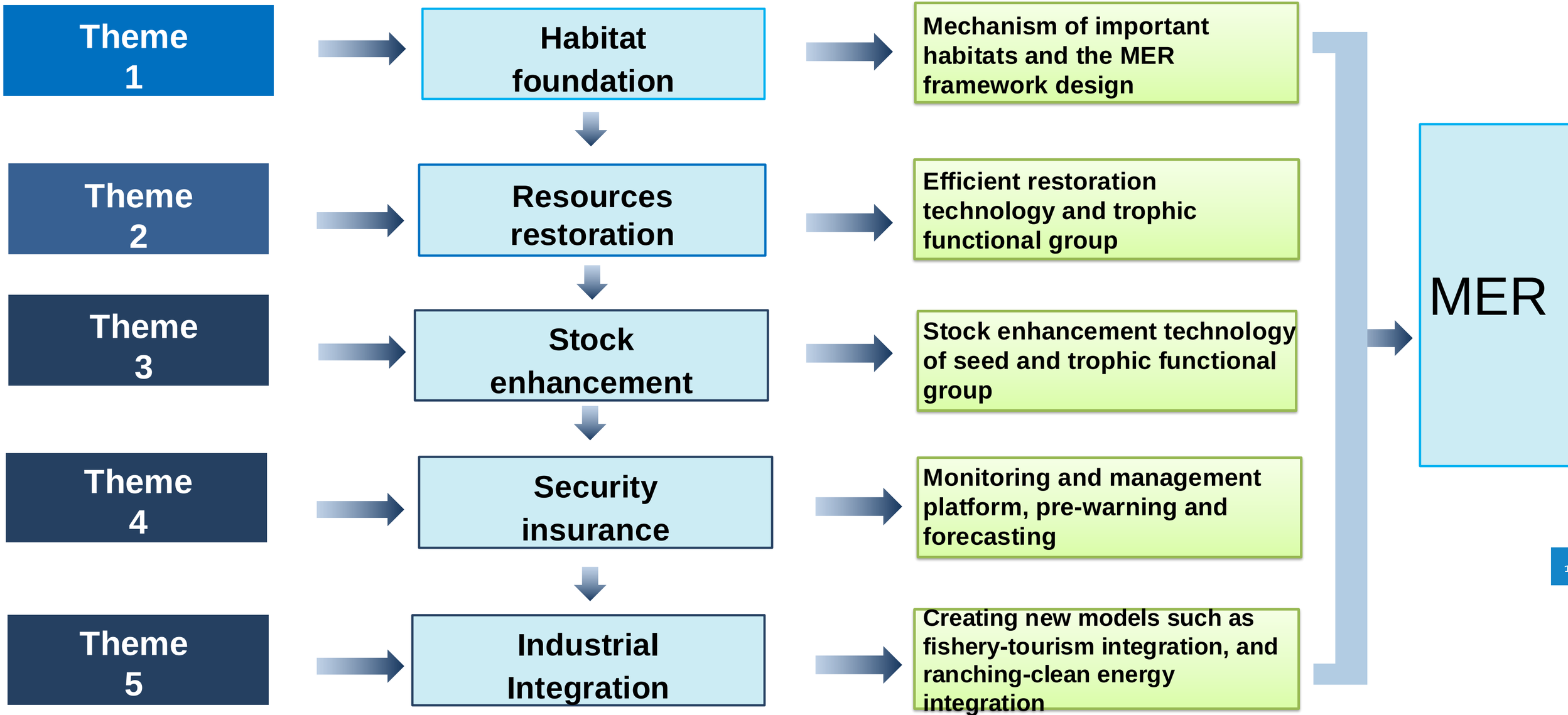
2. Objectives

Five themes of MER Science Plan

1. *Degradation of typical fisheries habitats and marine ecological ranching planning*
2. *The precise construction and functional enhancement technology of typical marine habitats*
3. *Optimization of population structure and bioresource conversation technology*
4. *The monitoring and harvest equipment & intelligent management technology*
5. *The integrated development of marine ecological ranching, tourism, and food processing*

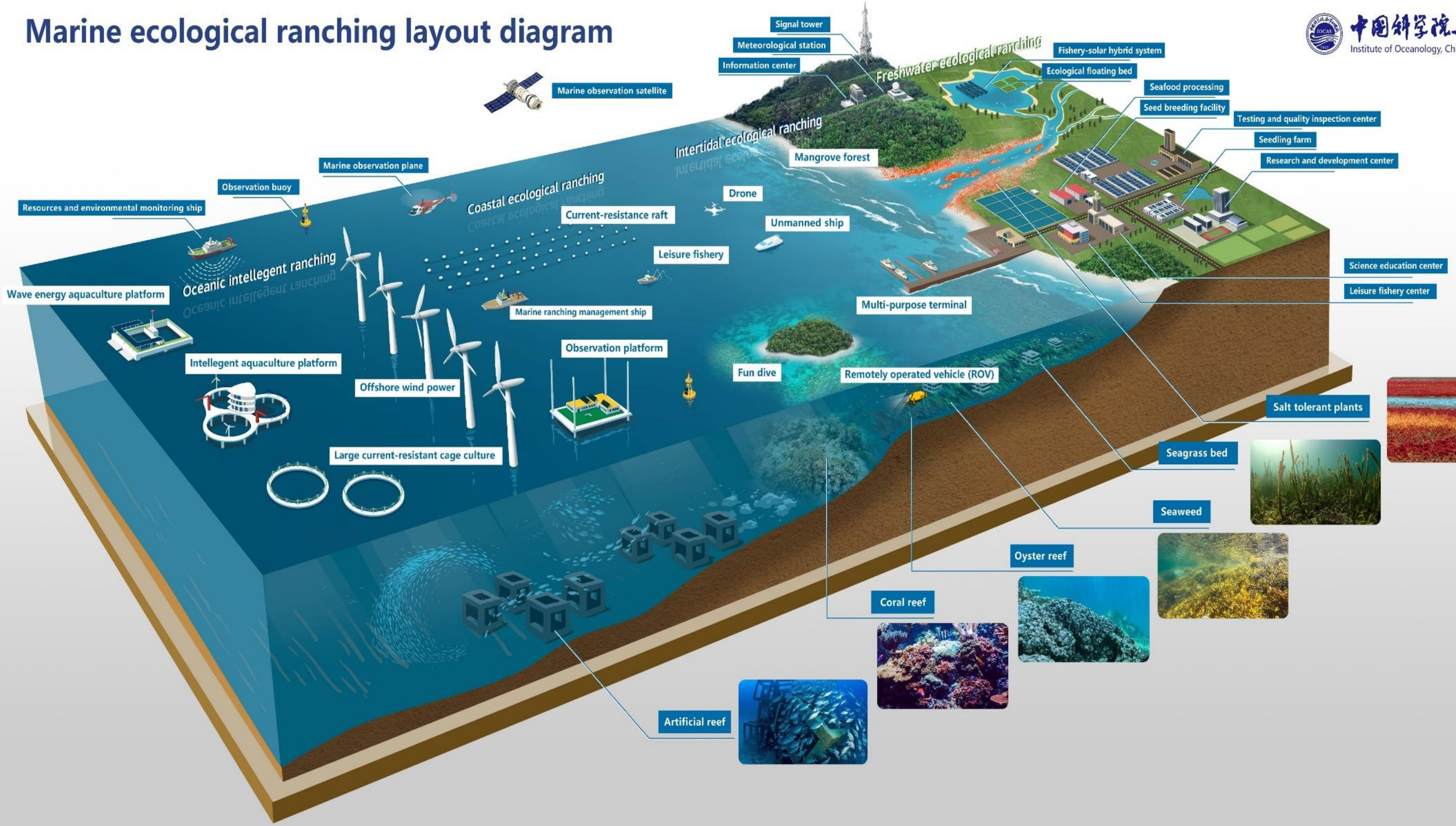
2. Objectives

Linkages between programme themes



Marine ecological ranching layout diagram

中国科学院海洋
Institute of Oceanology, Chinese Aca



3. Major activities, outputs & outcomes

Latest accomplishment, particular those during 2023 to 2024

Major activities

- Activity 1: New Programme was endosed
- Activity 2: Academic exchange
- Activity 3: Joint Cruise
- Activity 4: Training
- Activity 5: Platform and resources

Outputs & Outcomes

Timeframe

Project start year: 20XX

Activity 1: New Programme was endorsed

Health of Ocean under Multiple Ecosystem Stressors (HOMES) has been endorsed as a project of the UN Decade of Ocean Science for Sustainable Development 2021-2030 in 1 February, 2024.

This initiative is pivotal in revealing both the contemporary conditions and evolving tendencies of marine biodiversity. Utilizing state-of-the-art oceanographic tools, collaborative cruises, and cross-disciplinary inquiries, we aim to unearth both large-scale patterns and intricate micro-interactions that dictate the health and functionality of marine ecosystems in Maritime Continent. We endeavor to craft feasible solutions for marine biodiversity conservation.

Start Date: 01/01/2024
End Date: 31/12/2028

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BRIN BADAN RISET DAN INOVASI NASIONAL

USM UNIVERSITI SAINS MALAYSIA

東京大学 THE UNIVERSITY OF TOKYO

University of the Philippines

University of Papua New Guinea

Activity 2: -Academic exchange

- Organized the side event-Marine Ecological Ranching in the 2nd UN Ocean Decade Regional Conference & 11th WESTPAC International Marine Science Conference in Bangkok. (23 April, 2024)
- Visited and communicated with Burapha University, Fisheries Department of Ministry of Agriculture and Cooperatives of Thailand, Department of Marine and Coastal Resources (DMCR) of Thailand, disseminating the I^{3}PCC-MEB project to expand collaborations.
- Attended the First International Scientific Symposium of CSK-2 and introduced the I^{3}PCC-MEB initiative to engage more partners.

Activity 3: Joint Cruise

- From September 19 to November 4,2023, scientists from Indonesia, Papua New Guinea, and China successfully completed the Western Pacific Joint Scientific Expedition.
- From October 15 to December 18,2023, the China-Indonesia Joint Scientific Expedition in the Indonesian Sea was successfully concluded.

Western Pacific Joint Scientific Expedition

China-Indonesia Joint Scientific Expedition

Activity 4: Training

- July 16-22, 2023 International Training Course on Subsurface Mooring Observation was successfully held, with 60 participants from 22 countries/regions around the world.
- July 20-21, 2023 International Online Symposium and Training on Seaweed was successfully held by in Jakarta, with 220 participants from more than 10 countries/regions.
- September 3-14, 2024 Training Course on Subsurface Mooring Observations was successfully held, with 50 participants from 14 countries/regions around the world.

Activity 5: Platform and resources

- Established the China-Indonesia Joint Laboratory for Marine Science, using this joint laboratory as a platform to further enhance cooperation in marine aquaculture, processing and utilization of marine products, and the study of ocean and climate change.
- Utilizing various resources such as the ANSO Visiting Fellowship, PIFI , International Talent Exchange Program, etc., we aim to promote collaborative training of young professionals through activities such as joint postgraduate projects and training courses.

A Summary of major outputs

- ✓ Health of Ocean under Multiple Ecosystem Stressors (HOMES) has been endorsed as a project of the UN Decade of Ocean Science for Sustainable Development 2021-2030 in 1 February, 2024.
- ✓ Successfully organized the Side Event “Marine Ecological Ranching” at the 2nd UN Ocean Decade Regional Conference & 11th WESTPAC International Marine Science Conference in Bangkok, which broadly advertised the I3PCC-MER initiative and attracted more potential partners.
- ✓ Identified a list of priority issues during several rounds of discussion and co-design process, which also well integrated the interests of different countries in this region.
- ✓ Improved awareness of the idea of the I^3PCC-MER initiative among early career ocean professionals.
- ✓ Developed the I^3PCC-MER Science Action Plan.
- ✓ Improved the artificial breeding technology, and Increased the understanding of the cultivation of the sea cucumber(Holothuria scabra)

4. Problems encountered & recommended actions

Problems encountered

- Problem 1: The mechanisms of habitat degradation are unknown, and its evolution under the backgroud of global climate change is unknown.
- Problem 2 : Decreasing and degradation of fishery resources lead to unstable and imbalanced.
- Problem 3: The foundation of aquaculture industry is weak, and the research and development of technical models are insufficient.

Actions

- Action 1: Strengthening the construction of marine protected areas and habitat restoration.
- Action 2: Exploring the population structure optimization and precise conservation technology of fishery resources.
- Action 3: Integrating information automatic monitoring technology and building intelligent information control equipment service system
- ...

5. Strategic considerations/thoughts for future development

- Theory: elucidating the degradation mechanism and driving factors of typical ecosystem, revealing the evolution process of ecosystem and the pathway of carbon sequestration, and putting forward the optimization strategy of marine food web.
- Technology: breakthrough in the technology of accurate construction and function improvement of typical marine habitats, population structure optimization and resource conservation, and intelligent monitoring and automatic harvesting.
- Pattern: integrating equipment and technologies of intelligent farming and control platform and aquatic product intensive processing, creating new models of integration of fishing, tourism and new energy resources, and achieving integrated development of the industrial chain.

6. Potential action plans for future implementation

for the period of 2025-2026 and beyond

- Focus on theoretical innovation and obtain new insights into the mechanisms and drivers of habitat degradation and resource decline.
- Focus on technological breakthroughs, digital and intelligent empowerment helping ecological marine ranching full industrial chain development.
- Emphasizing pattern upgrades and innovate practices to develop new models for the integration of marine ranching industries.
- Strengthening international cooperation and exchanges, and better realize the comprehensive development of the region.

Planned activities

Program	Plan				Funding Required		Remark
	Activities	Objectives	Expected outputs/outcomes	Date and place	IOC	Other sources (i.e. from national or international)	
	1. Typical habitat restoration	Identify the typical mechanisms of habitat degradation, and develop habitat restoration and creation technologies that combine natural habitats with artificial habitats.	5 Techniques for marine ranching habitatrestoration and creating.	the South China Sea 2022-2025		national	
	2. Population structure optimization and resource conservation	Investigate the mechanisms of decline of wild resources, and build a resource conservation technology that combines self-reproduction populations and artificial breeding.	6 key technologies of seedling breeding, wild acclimation and domestication, safe transportation, and efficient propagation for keyfunctional species	the South China Sea 2022-2025		national	
	3. Intelligent monitoring and management	Upgrade and transform the marine ranch monitoring system, develop automatic harvesting equipments, and build an intelligent management and decision-making system for marine ranching.	1 comprehensive information management and control system for intelligent fishery, along with equipment and service support.	the South China Sea 2022-2025		national	
	4. Model innovation and integrated development	Addressing the problem of a single model in the marine ranching industry and helping to	Develop 3 new models of marine ranching that integrates fishery and	the South China Sea 2022-2025		national	

ThankYou

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