

Smart Watershed, Al-Driven Innovation

智慧流域AI領航

International Forum 2025



UPSCALING NATURE-BASED APPROACHES

Liliane Geerling Programme coordinator Partners for Water



Taiwan-Netherlands Dialogue
The Relationships between Nature-based Solutions
and Environmental, Social, and Economic Systems
28-10-2025

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Delta country approach

Partners for Water supports delta countries worldwide with the adoption of sustainable and integrated approaches to water management. During the Partners for Water 2022 – 2027 Programme, we focus on seven countries: Bangladesh, Colombia, Egypt, India, Indonesia, Mozambique and Vietnam.

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Subsidy scheme

Partners for Water grants subsidies to Dutch companies, knowledge institutions and NGOs for conducting feasibility studies or pilot projects that aim to enhance water security abroad. During the Partners for Water 2022 – 2027 Programme, there will be seven subsidy rounds.

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Promotion & Communication

Thematic approach

Partners for Water facilitates and promotes sustainable approaches to solve global water challenges. During the Partners for Water 2022 – 2027 Programme, we do so by concentrating on two themes: Nature-based Solutions (NBS) and Water-Biodiversity-Food (WBF). In addition, we place particular emphasis on promoting social inclusion.

READ MORE 📝



Knowledge building & sharing







Assignment Partners for Water

- Contribute to the international uptake and implementation of NBS and the Water-Biodiversity-Food nexus.
- Support interventions that are an integral part of an international project, programme or transition process. These interventions are aimed at implementation or change at scale and contribute to the objectives of the Netherlands International Waterambition (NIWA).
- An intervention refers to the contribution that PfW5 financing assists in realising the project or transformative process, which could include a pilot project, capacity building, or a study.





The thematic approach allows us to:

- Develop and prototype innovative approaches, gain insights into their effectiveness and pitfalls
- Keep putting nature & biodiversity on the agenda
- Engage in value chains, with high potential for SDG impact
- Form valuable partnerships with IFI's, nature organizations and sector parties
- Position NL water expertise with a large number of partners









Nature-Based approaches

NBS are 'Actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits.'

United Nations Environment Assembly, 2022





Nature-Based approaches

While Nature-based Solutions have demonstrated their potential, their implementation remains limited in scale compared to traditional,

concrete infrastructure.

Upscaling these solutions is vital for several reasons!



Building with Nature







1. Cost-Effectiveness:

in many situations, NBS provide more economical long-term benefits compared to traditional engineered solutions, reducing the financial burden on communities and governments.

Avoidance and removal types

:: senken

	Nature-based avoidance	Nature-based removals			Technology-based removals		
							- alti-
Method	Conservation	Peatland restoration	Soil Carbon	Reforestation and Afforestation	Blue carbon management	Biochar	Enhanced Weathering
Description	Preserving natural habitats and ecosystems, to sequester carbon and mitigate climate change impact. (Eg. protecting forests and wetlands, or promoting sustainable land management practices)	The process of returning degraded peatlands to their undisturbed state in order to absorb and store more CO2.	A natural process where CO2 is removed from the atmosphere and stored in the soil in a stable form.	The process of planting trees in deforested or never-forested land to remove atmospheric CO2.	Carbon that is captured by the world's oceanic and coastal ecosystems (Eg. mangroves, seagrasses, and kelp forests).	A form of charcoal produced from plant matter that can be intentionally stored in soil as a means of removing CO2 from the atmosphere.	Rocks and minerals are broken down to increase surface area, speeding up processes that enable them to store carbon from the atmosphere.
Permanence (years)	<100	< 100	< 100	< 100	< 1000	< 1000	< 1000
Cost 2023 (\$/tC02)	10 - 30	15 - 40	25 - 50	25 - 45	25 - 50	100 - 250	180 - 500





2. Resilience to Climate Change:

NBS are inherently adaptive and can evolve with changing environmental conditions (e.g. wetlands can adjust to varying water levels, helping to manage floods and store water during droughts), making them crucial in mitigating and adapting to climate impacts on water resources.







3. Co-Benefits:

Beyond water security, nature-based solutions enhance biodiversity, support livelihoods, and improve overall ecosystem health.

Drivers of Change

© IUCN/ADPC

Climate change Cultural Loss and degradation of Services forests and wetlands More than 125 Sacred **Provisioning** Regulating Services groves in Meghalaya (India) Services Services are protected by Indigenous communities based on Invasive alien species cultural beliefs and value system. 1600 km long Western Ghats Hilsha (Tenualosa ilisha) Nutrients and sediment mountain chain helps capture fishery contributes 1% to are transported down moisture-laden clouds from the the Bangladesh. rivers like the Brahmaputra, Arabain Sea. Ganges, and Indus NTFPS (bamboo, honey, Sundarbans in India and mushrooms) collected by Production of Bangladesh regulate coastal Indigenous and rural atmospheric oxygen Illegal trade in wildlife flooding. communities across the by Forest and Himalayas. Mangroves.

Examples of Ecosystem Services





4. Built-in redundancy:

Unlike rigid engineered solutions, many NBS have built-in redundancy that enhances resilience (e.g. a restored watershed with diverse vegetation is better equipped to maintain water flows and quality than a single-purpose dam that may fail under extreme conditions).







5. Climate mitigation:

Many NBS for water security also contribute to climate mitigation by sequestering carbon (e.g. forest restoration and afforestation help regulate water cycles while capturing carbon dioxide, reducing the overall impact of climate change.







6. Alignment with Global Goals:

Upscaling NBS contributes to the achievement of international objectives such as the Sustainable Development Goals, particularly SDG 6 (Clean Water and Sanitation), SDG 13 (Climate Action), and SDG 15 (Life on Land).











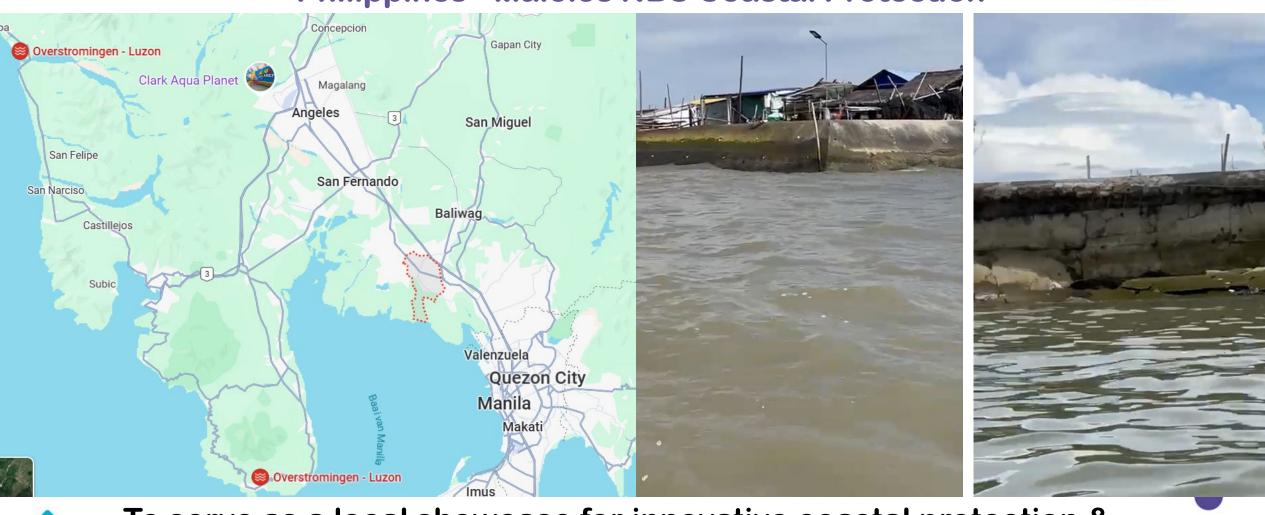
List of ongoing initiatives Nature-based approaches

	Project	Country	Partners	Duration
	Malolos NBS Coastal Protection	Philippines	City of Malolos, Rijkswaterstaat, RHDHV, ABBBP	2022-2026
	Kathmandu Ecological Urban Renewal	Nepal	Asian Development Bank, Deltares, Ooze	2023 – 2026
	Coastal Resilience for the Eastern Ghanaian Coast	Ghana	Government of Ghana, WACA (World Bank), Blue Deal, Ecoshape, Invest International, NCEA	2024 – 2026
	Bintan Resilient Horizons	Indonesia	Ecoshape, Witteveen+Bos, Safe Water Gardens and Universitas Maritim Raja Ali Haji	2024 - 2026
ı	Siphandone Riverscape Laos + Goot Thing Wetland Thailand	Laos/Thailand	WWF Asiapacific, RHDHV, (ADB?)	2024 – 2026
	Integrated Mangrove Aquaculture Quelimane	Mozambique	VE-R, HKV, Weathermakers, Van Oord (Invest International)	2024 - 2026



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Philippines - Malolos NBS Coastal Protection





To serve as a local showcase for innovative coastal protection & halt the current practice of Build-Neglect-Rebuild





NBS Pilot Malolos Philippines 1

SOLUTIONS

Construction of green embankments/dikes with re-used and/or locally available materials to provide a more sustainable/cheaper alternative to typical sheet pile/concrete embankments;

Establishment of sediment traps to prove that sediment deposition can be restored and can be a catalyst to mangrove reforestation; and

Shellfish reefs to protect the sediment traps and provide new substrate for ecological purposes.

Erosion Malolos Situation Sediment washes out directly into the ocean **Gray Embankments** Transport Deposition **Natural** Sediment nourishment



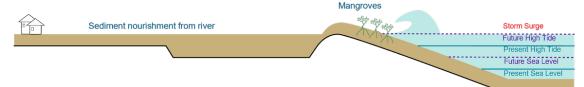
is distributed into

the floodplain

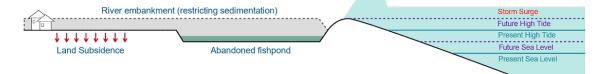
Sediment

Deposition

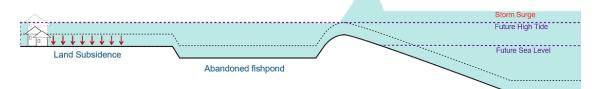
Pre-development North Manila Bay (Ideal Natural Sedimentation)



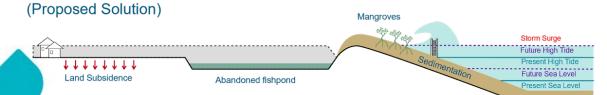
Baseline (Current Situation)

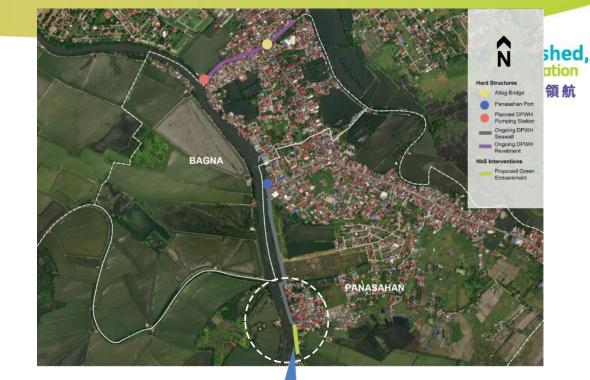


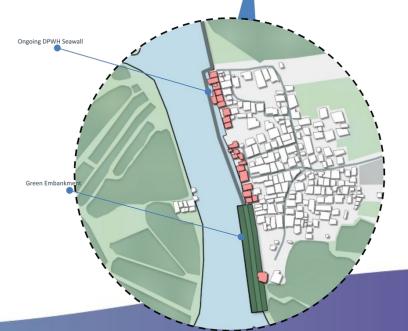
No Action (Future Scenario)



Sediment Trapping at Foreshore









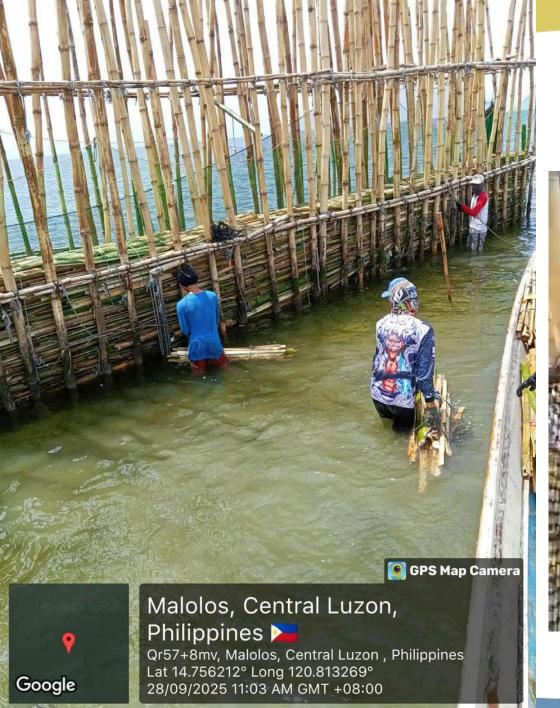


USP's:

- -Direct cooperation with the City of Malolos
- -Support with the entire project cycle: stakeholders, pre-FS, design, tendering,
- -construction support, monitoring and maintenance
- -Implementation funded by the city, tender was publicized in March 2025















Kathmandu Ecological Urban Renewal

- cooperation between Partners for Water and the ADB
- incorporate systemic thinking on a watershed level in ADB's project design, with specific focus on NBS

Key driver(s) for success:

- Trust, regular dialogue and time to create alignment is essential.
- Co-writing a TOR with the local ADB team, which makes sure it is a mutually supported intervention.
- Finding the right experts, who can be effective in a relatively short amount of time, is essential for an effective intervention.





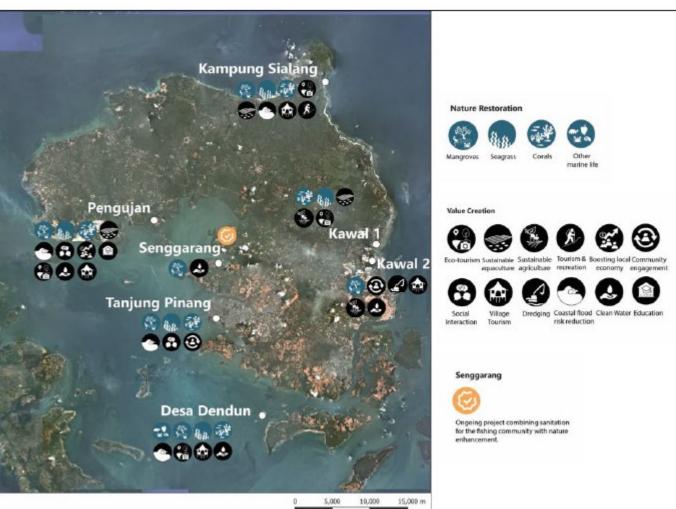


Bintan Resilient Horizons

- Develop insights on what makes a sound business case for small-scale nature restoration, illustrating how value creation can align with restoration efforts.
- Include engaging possible funding options to ensure the project's financial viability.
- Capacity building and raising awareness among local stakeholders on the benefits of ecosystems and NBS.
- Efforts to generate positive ecosystem impacts, such as promoting eco-tourism and sustainable economic activities that align with conservation goals.











First reflections on various NBS approaches within PfW

- Mainstreaming NBS on institutional level still a challenge (lacking supporting policies, knowledge, etc.).
- NBS could be very innovative: what if a solution fails? Monitoring!
- Process of implemention of NBS is complex and to make NBS designs in a socially inclusive manner takes time; IFI's aim for (too) short processes.
- Difficult to get the maintenance part of NBS into the budget for the project implementation
- More knowledge/data needed on long term (cost) benefits of NBS.





- 1. NbS have long-term payoffs investors need to understand that early
- NbS benefits (flood mitigation, biodiversity, carbon storage, recreation) often take years to fully materialize.
- If investors are not involved from the start, they may later view these timeframes as "too slow" or uncertain.
- Early engagement allows them to understand ecological timescales, risk profiles, and develop patient capital structures.





- 2. Financing influences design, scale, and monitoring
- The type of investor (public fund, private equity, green bond, development bank, insurer) determines what metrics and returns they need.
- Engaging investors early let designers:
 - Align project KPIs with investor expectations (e.g., flood loss reduction, carbon credits, tourism revenue).
 - Build monitoring systems from the start to capture those financial and environmental returns.
 - Choose scales and co-benefits that make the project investable, not just ecologically sound.



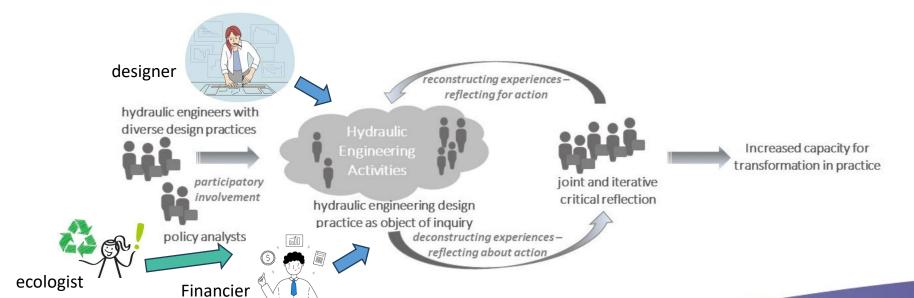


- 3. Early investor input helps clarify ownership and revenue models
- NbS often sit on public land and/or involve multiple stakeholders.
- Investors want clarity on who owns, operates, and benefits from the project. Early dialogue helps define:
 - Revenue sources (e.g., water tariffs, eco-tourism, carbon credits, ecosystem service payments).
 - Maintenance responsibilities and long-term cash flow.
- Early involvement can also shape blended finance structures (mix of public, private, and philanthropic funds) that reduce risk for all partners.





- 4. Builds shared language between ecologists, engineers, and financiers
- co-development = faster scaling
- funding for maintenance and monitoring is more likely to be built into contracts.









https://partnersforwater.nl/news/waterproof-podcast-launch-21-november-2024/

Episode 1: Let Nature do it

Episode 6: From Financing Green to Greening Finance



Nature-based Solutions for Climate and Sustainable Development



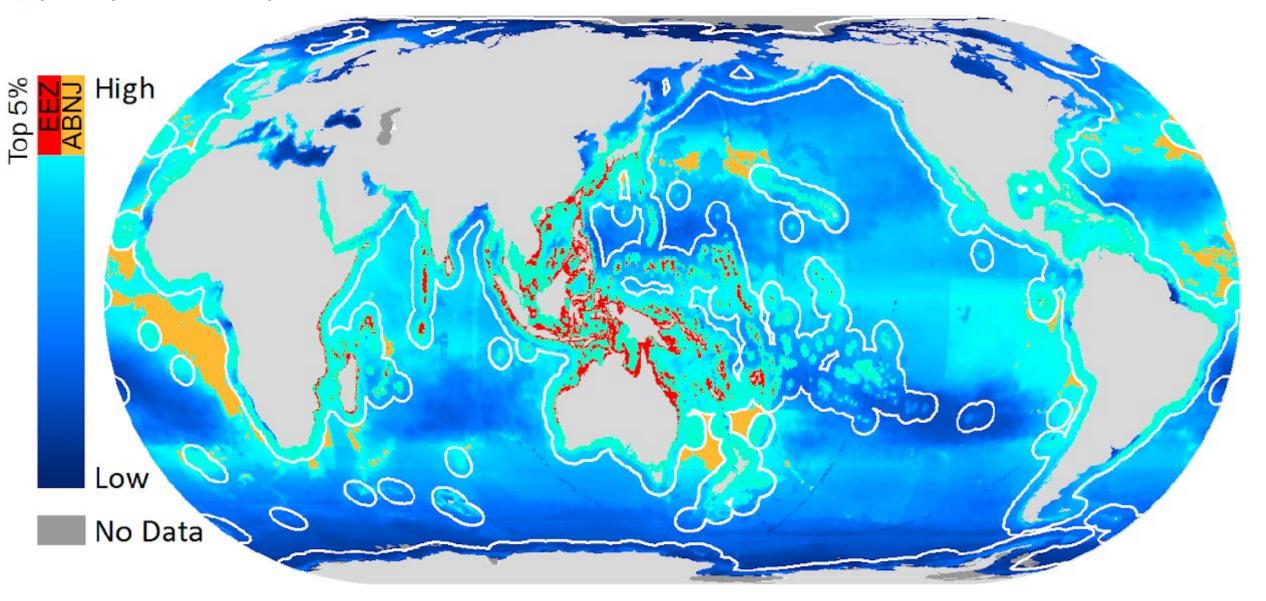
Climate Resilience and Marine Conservation Strategies

Chin-Ming Lo

Director
Ocean Conservation Administration
Ocean Affairs Council
Oct. 2025



Spatial patterns for species richness



Selig ER, Turner WR, Troëng S, Wallace BP, Halpern BS, et al. (2014) Global Priorities for Marine Biodiversity Conservation. PLOS ONE 9(1): e82898. https://doi.org/10.1371/journal.pone.0082898; https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0082898

How much do we know bout our Marine Biodiversity?

我們對海的認識有多少?

臺灣海洋生物物種知多少?

core concept

From Species to Ecosystem



Biodiversity 15,000+



Marine Ecosystem
Hotspots

海洋與生物多樣性 面對氣候挑戰

Oceans and Biodiversity Face Challenges from Climate Change



Taiwan's Extreme Marine Disasters



CBD COP15 昆明-蒙特婁生物多樣性框架 Kunming-Montreal Global biodiversity framework

Global

Biodiversity

Framework

3K

23. Ensure gender equality

確保性別平等

22. Respecting rights and cultures of Indigenous peoples and local communities

尊重原住民族及在地社區的權利和文化

 Ensure data, information and knowledge, are accessible to decision makers, practitioners and the public

確保決策者、執行者及大眾可取得資料、資訊和知識

 Strengthen capacity-building and technical and scientific cooperation

強化能力建構和技術科學合作

 Substantially and progressively increase the level of financial resources

循序提升財務資源

 Identify, and eliminate, phase out or reform incentives, including subsidies

認定、消減或重整激勵措施(含補貼)

 Establish, strengthen capacity for, and implement biosafety measures as set out in Article 8(g)

建立及強化執行生物安全措施之能力

 Encourage and enable sustainable consumption choices

鼓勵和促進永續消費

 Integrate legal, administrative or policy measures within business and financial institutions

整合企業及金融機構之法律、行政或政策措施

 Integrate biodiversity and its multiple values into policies, regulations, planning and development processes

將生物多樣性與其多重價值納入政策、法規、規劃和發展進程

Reducing land- and sea-use change

避免改變土地及海洋

Restoration of degraded ecosystems

恢復退化生態系

3. Protect and conserve areas

保護及保育區域

 Halting species extinctions and reducing extinction risk

停止和減少物種滅絕風險

5. Harvesting and trade of wild species

野生物種利用及貿易

6. Managing invasive alien species
外來入侵種管制

Reducing negative impact of pollution on biodiversity

減少污染對生物多樣性衝擊

8. Minimize impacts of climate change

減緩氣候變遷衝擊

9. Management of wild species

野生物種管理

 Agriculture, aquaculture, fisheries, and forests are sustainably managed

農漁林業永續管理

 Restore, maintain and enhance nature's contributions to people, including ecosystem functions and services

復育、維持及增進自然對人類的貢獻

Urban blue and green spaces

都市藍帶與綠帶空間

13. Fair and equitable sharing of genetic resources and DSI

公平公正分享遺傳資源和數位基因序列資訊

Challenge for 30% by 2030

CBD COP15 Kunming-Montreal Global biodiversity framework

Global Goals for 2050 Global Targets for 2030 (Related to OCA)

A

Restore Ecosystem Functionality by 2050

B

Biological Resources Sustainable Use

C

Related to Genetic Resources Fair and Equitable Sharing of Benefits

D

Financial and
Technical Assistance
to Developing
Countries

Target 1~3 30x30

Target 4 Effective Actions to Prevent Species Extinction

Target 5 Sustainable Use of Wild Species

Target 6 Prevention and Control of Invasive Species

Target 8 Mitigating the Impacts of Climate Change and Ocean Acidification

Target 9~12

Mainstreaming Biodiversity and Ensuring Sustainable Use by Indigenous Peoples and Local Communities

Target 15

Adopting Legal, Administrative, or Policy Measures to Encourage and Support Enterprises





Reference: protected planet

- Impact of Climate Change
- Sustainable Growth
- Small-Scale Fisheries and Aquaculture (SSFA)
- Indigenous People and Local Communities

Ongoing actions

National Climate Change Adaptation Action Plan (2023-2026)

In "Coastal and Marine Environment sector" and "Agricultural Production and Biodiversity sector"

Focusing on

- Nature-based Solutions (NbS)
 promote climate change adaptation efforts, build capacity for foundational scientific research and investigations
- Adaptation Measures
 - Marine Habitat Ecosystem Survey and Restoration Plan: coral reefs, algal reefs, rocky reefs, and artificial coastlines.
 - Protection and Restoration of Key Ecosystems: protect and restore key areas, coral transplantation, strengthening networks.
 - Reducing Human-Induced Stress in Impacted Areas: overfishing, pollution, integrated protection.
- Mitigation Measures
 - Expansion and Evaluation of Coastal Carbon Systems: distribution, capacity, potential restoration sites, seagrass planting.
 - Collaboration with Local Governments, Communities, and Enterprises

National Climate Adaptation Action Plan (2023-2026)



Agricultural Production and Biodiversity

Enhance coastal disaster and marine change monitoring and early warning systems

Goal

Enhance the capacity of ecosystems to respond to climate change

Strengthen marine environmental monitoring and biodiversity conservation

Strategy

Strengthen the adaptation of natural ecosystems

Monitoring and restoration of marine carbon sink ecosystems

Measures

Monitor and manage protected areas to accelerate biodiversity conservation

Adaptation Strategies of Coastal and Marine Environment

Prevent coastal disasters, strengthen marine environment monitoring and early warning, and ensure sustainable marine resources

- Improve sea level monitoring, early warning and
- analysis

Comprehensive and long-term systematic basic survey of sea areas, construction and application of marine big

- Incorporate risk analysis into coastal plan reviews in response to climate change
- Maintaining coastal dynamic balance using nature-based (NbS) approaches



- Planning, constructing and managing conservation areas in response to climate change
- Marine carbon sink ecosystem monitoring and restoration

Strengthen coastal adaptation capabilities

Strengthen monitoring and early warning mechanisms

Strengthen marine environment monitoring and biological conservation

From Species to Ecosystem



Scientific Research & Inventory

→ Build the
Network &
Restoration

Establish the system & Expand the Scale

Sea Area

 $170,000 \text{ km}^2$

Coastline

+ 1,500 km

Biodiversity

15,000+ 海洋生物物種

Marine Ecosystem Hotspots

330+海洋生態熱點



Conservation Plans

Taiwanese Humpback Dolphin 臺灣白海豚保育計畫 Georgia Ratio to to come targets (2004)

202

Humpback Dolphin



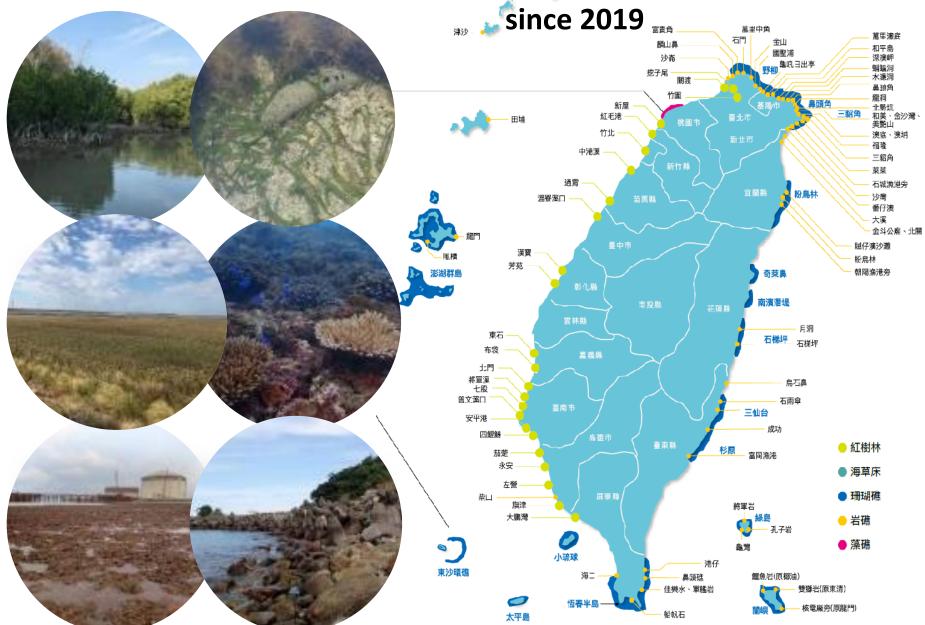
Chinese Crested Tern





2024

Ecosystem Survey: Inventory



Mangrove

Seagrass beds

Salt marshes

Coral reef

Algae reef

Mud flat

Natural shores

Artificial shorelines

330 sites



Chinese Taipei's 2050

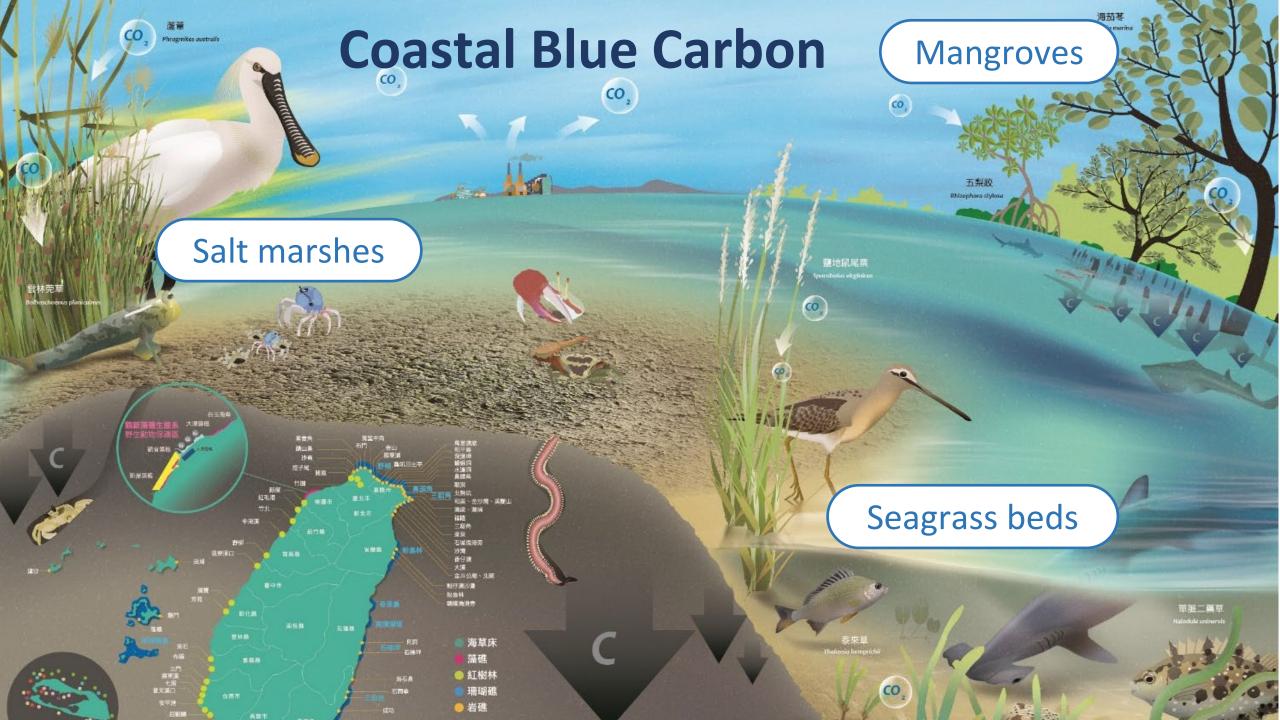
Net-Zero Transition

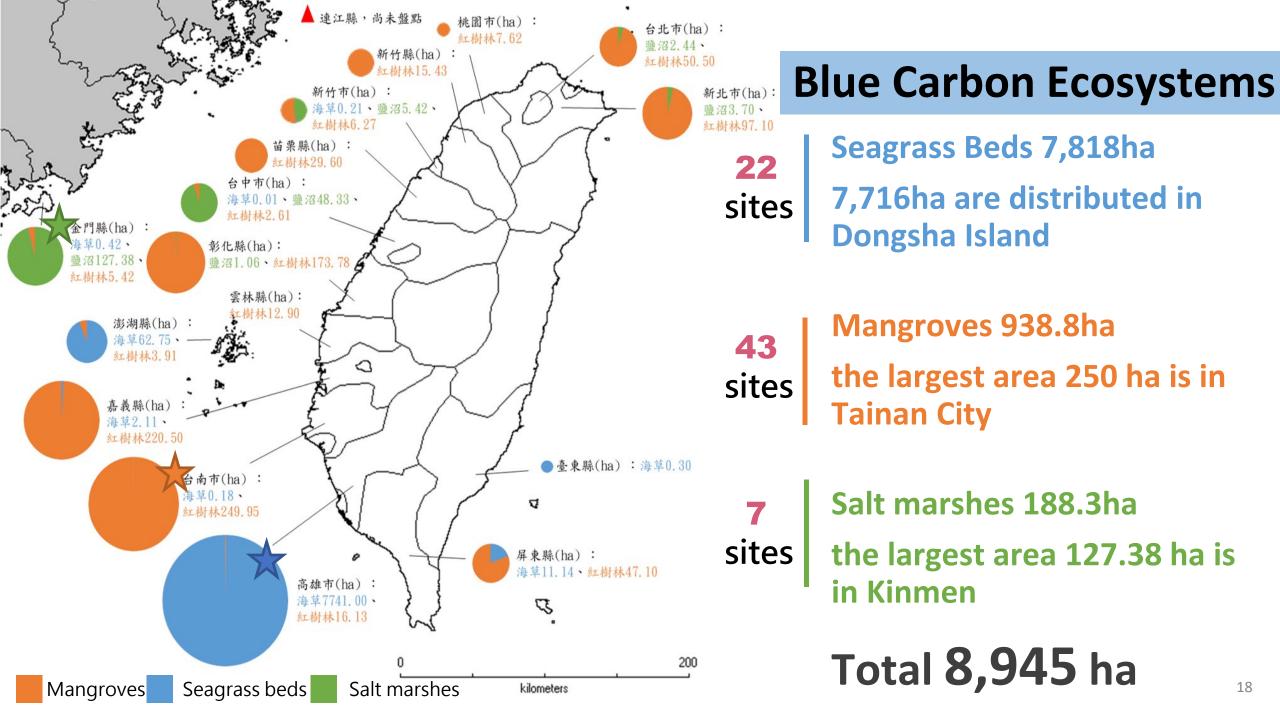
> **12 Key Strategies**

Published in March 2022



https://www.ndc.gov.tw/Content List.aspx?n=6BA5CC3D71A1BF6F





12 Seagrass Species in Taiwan

Thalassiodendron ciliatum

泰來草 Thalassia hemprichii



演替晚期常駐型 Persistent

4 Mangrove Species in Taiwan



Avicennia marina 海茄苳



Kandelia obovata 水筆仔



Rhizophora stylosa 五梨跤



Lumnitzera racemosa 欖李

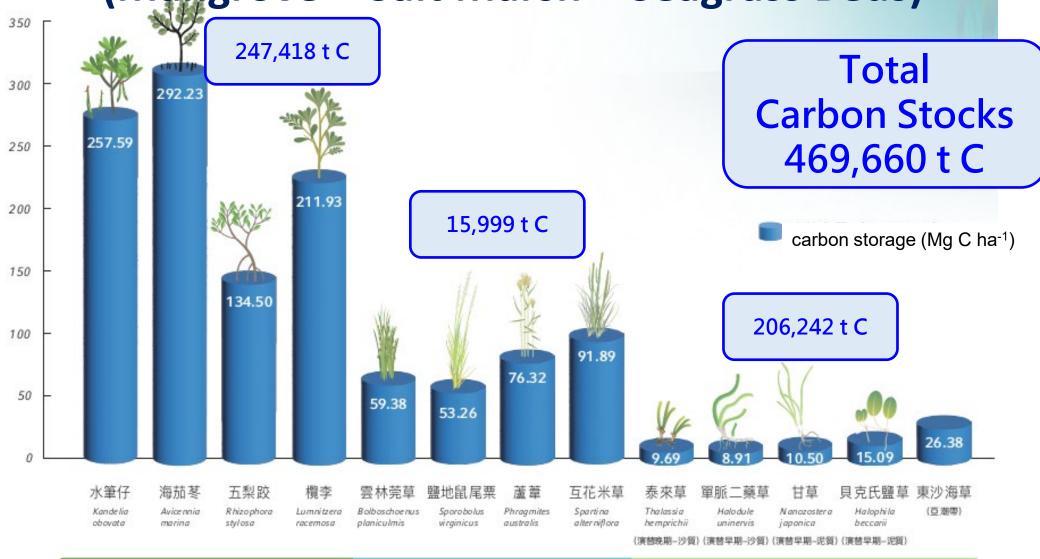


Ceriops tagal 細蕊紅樹 (Extinction in natural habitat)



Bruguiera gymnorhiza 紅茄苳 (Extinction in natural habitat)

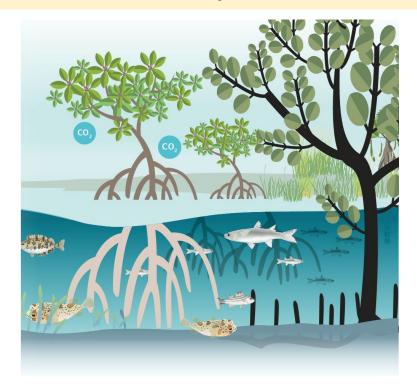
The carbon storage of major species (Mangrove \ Salt Marsh \ Seagrass Beds)



Six Steps for strengthen Blue Carbon

Climate Change Response Act Article 4

The long-term national GHG emission reduction goal is achieving GHG net-zero emission by 2050.

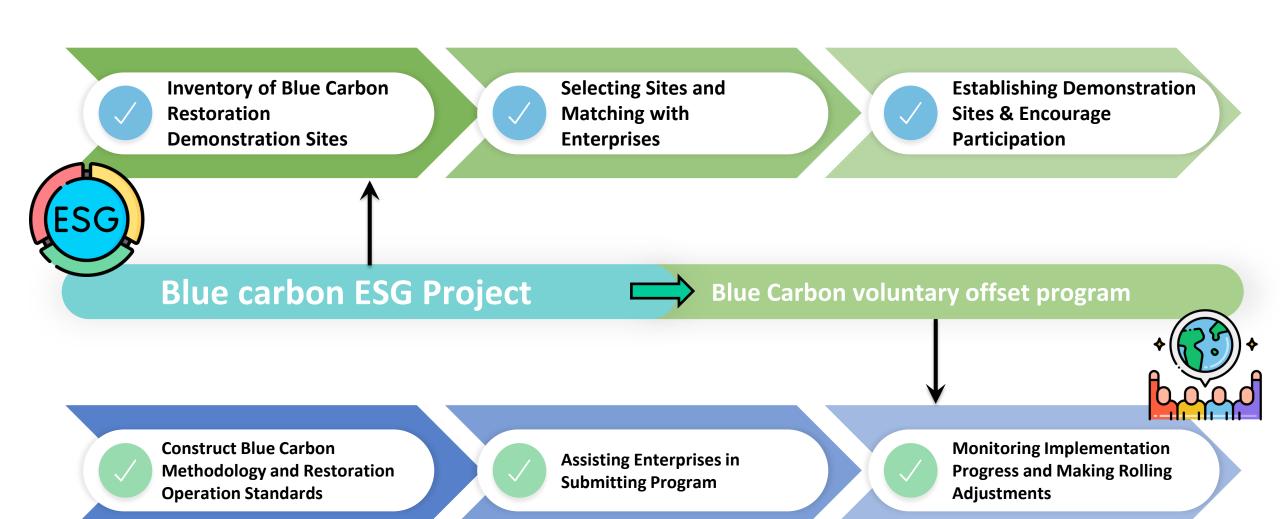


- Scientific inventory, confirmation of priority areas
 - 2 Establishing collaborative networks
 - 3 Developing blue carbon methodologies
 - Blue Carbon GHG Offset Project
 - Research and technique development
- 6 Information sharing, long-term monitoring and feedback

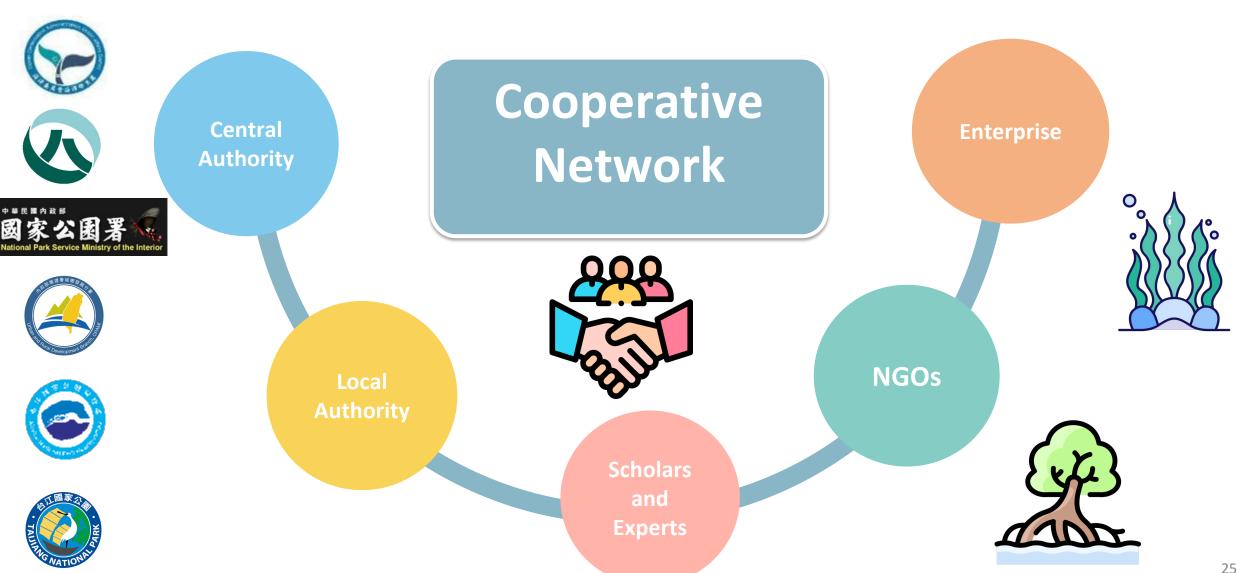
Development and Introduction of Relevant Techniques



Blue Carbon Voluntary Offset Program



Blue Carbon Collaborative Network

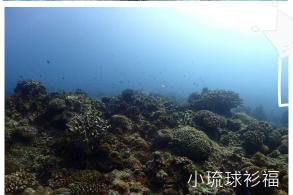


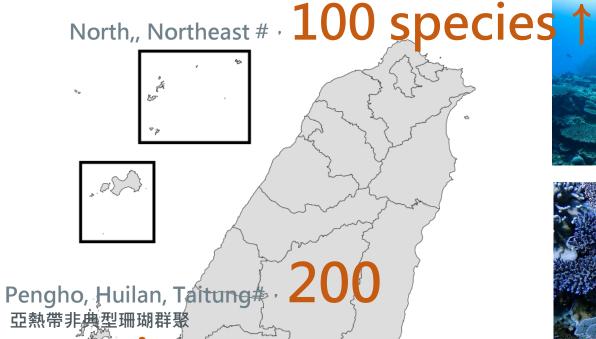


Overview of Taiwan's Coral Reef Resources











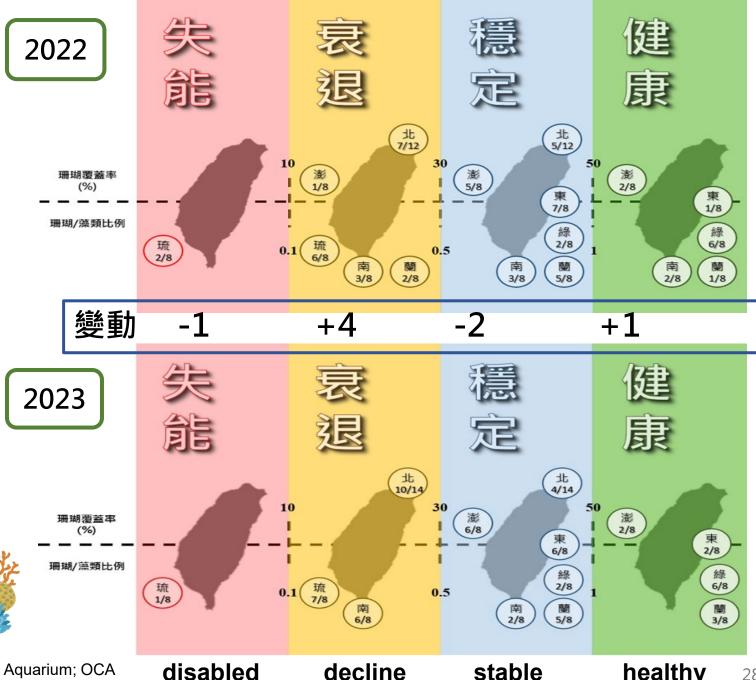






Coral Reef Condition

- Coral reef surveys in Taiwan began around the 1970s
- In 2019, the health of coral reefs was assessed at 114 locations in Taiwan
- The average coral coverage dropped from 33% in 1997 to 25.5% in 2017
- Since 2021, the OCA and the National Museum of Marine Biology and Aquarium conducted coral reef surveys across Taiwan.
- To quantify the health of corals across Taiwan, 30 monitoring points are selected. Each point investigated deep and shallow area, and obtained a total of 60 sets of data.



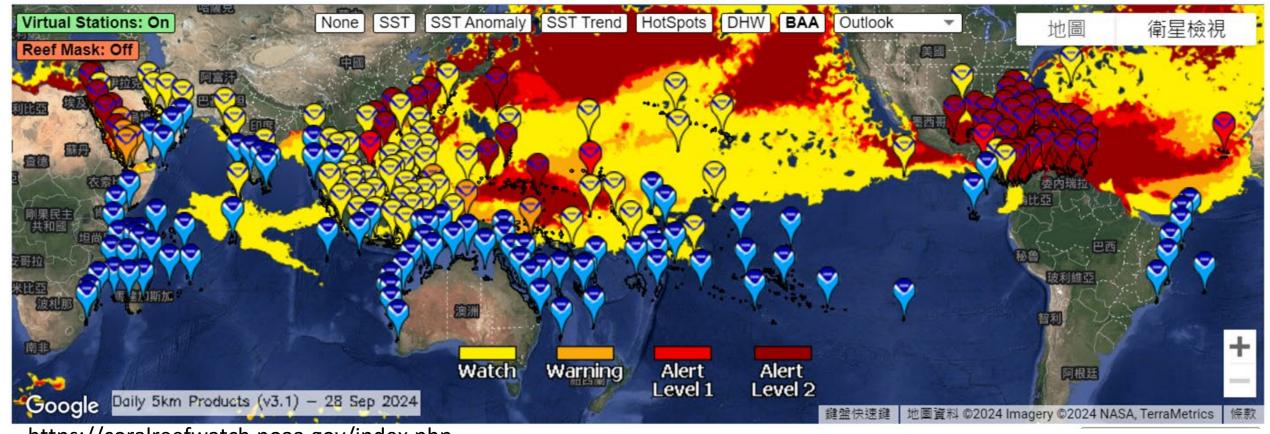
Coral Bleaching Events

Coral reefs around Taiwan waters are often affected by various disturbances and abnormally high temperatures. The bleaching events occur in 1998, 2002, 2007, 2010, 2014, 2016, 2017 and 2020. This year (2024) coral bleaching in Taiwan is in line with global trends.

NOAA Coral Reef Watch Daily 5km Bleaching Alert Area 7-day Maximum (v3.1) 29 Sep 2024



National Environmental Satellite, Data, and Information Service (NESDIS)



https://coralreefwatch.noaa.gov/index.php

Coral Restoration

cooperation with NGO, communities etc. 合作



復育個案 Case







Penghu Restoration

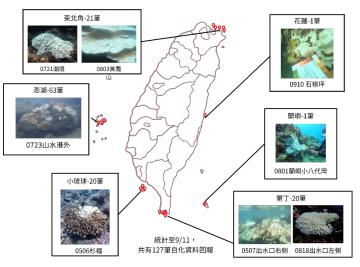
Coral restoration 1,000 plant, total area 100m² transplanted plants grew well and index fish

Collaborating with civil groups

Coral restoration brick 60 bricks total area reached 34.56 m²

Monitoring (31 sites) & Education

珊瑚回報機制













Legal, Administrative or Policy Measures



Legislative Purpose of the Marine Conservation Act (§1)



Protecting the Marine Ecosystem



Conserving
Marine
Biodiversity



Coordinating and Promoting MPA



Rational
Utilization of
Marine
Biological
Resources



Promoting
Marine
Conservation
Education

Area-based Conservation Efforts





Community-Based Marine Conservation Programs

• Funded projects for non-governmental organizations and schools











































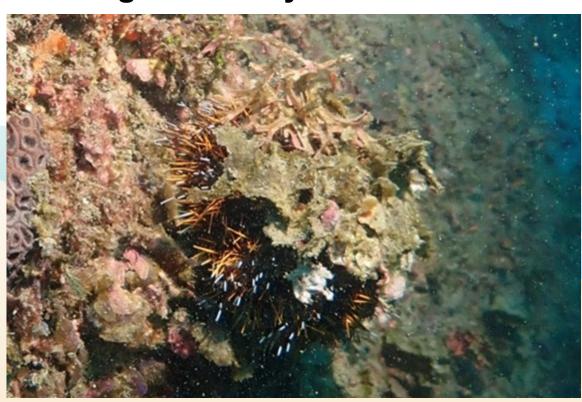
Suao & Toucheng Aquatic Organisms Propagation and Conservation Zone 蘇澳頭城

Objects of protection

small abalone, Porphyra, lobster, Gelidium, and other shellfishes and seaweeds.

Collaborating with the local government

Ecological survey





Qimei Aquatic Organisms Propagation and

Area-based Conservation Efforts

Conservation Zone 七美

Objects of protection small abalone, Pyram, sea urchin, lobster

Collaborating with the local community

- Promoting citizen scientists in marine science
- Patrolling





Area-based Conservation Efforts

in Dulan, Taitung County 都蘭

Collaborating with the local community

- Stakeholder Engagement
- Indigenous Knowledge







Ecosystem Restoration



花蓮縣海洋生態保育協會,進行海洋廢棄物清理並分 類。



社團法人桃園市野鳥學會,觀察小燕鷗繁殖過程。



社團法人宜蘭縣野鳥學會,觀察小燕鷗覓食過程。



社團法人花蓮縣野鳥學會,觀察小燕鷗育雛過程。



澎湖縣七美鄉平和社區發展協會,志工協助投放水泥 製的錨至保育區。



宜蘭縣無尾港文教促進會,澳仔角淨灘活動合影。



桃園石滬協會,帶領學童實地參訪石滬並認識古法友 善捕魚的方式。

Community-Based Marine Conservation Programs

• Funded projects for non-governmental organizations and schools





Γhemes

Habitat maintenance, survey and monitoring 40+Ha



citizen scientists to investigate activities

2,834 sessions



Friendly Fishing

Promote friendly fishing knowledge and Clean fishing spot environment

Local groups involved in marine conservation actions

2020 **18** groups 2023 **59** groups

2021 **38** groups 2024 **65** groups

2022 **39** groups 2024 **58** groups



Marine Conservation

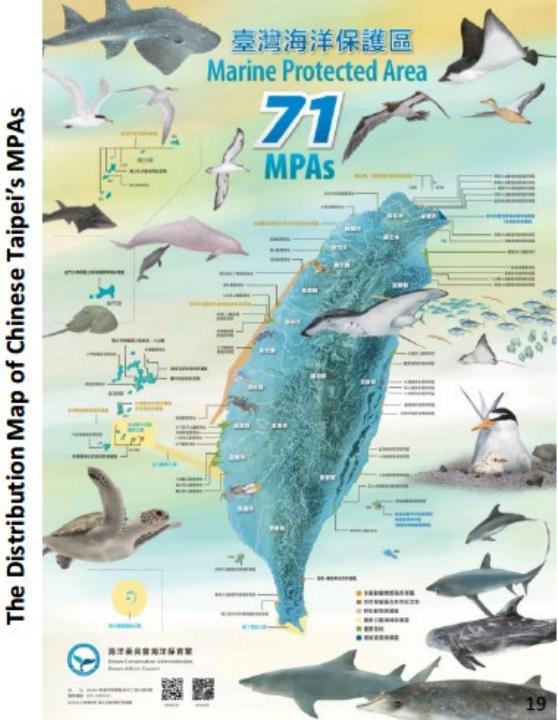
Promotion Education promotion 50,000+people

Clean Oceans Initiative

Marine debris survey 38 sessions Underwater net removal 19.64 ton





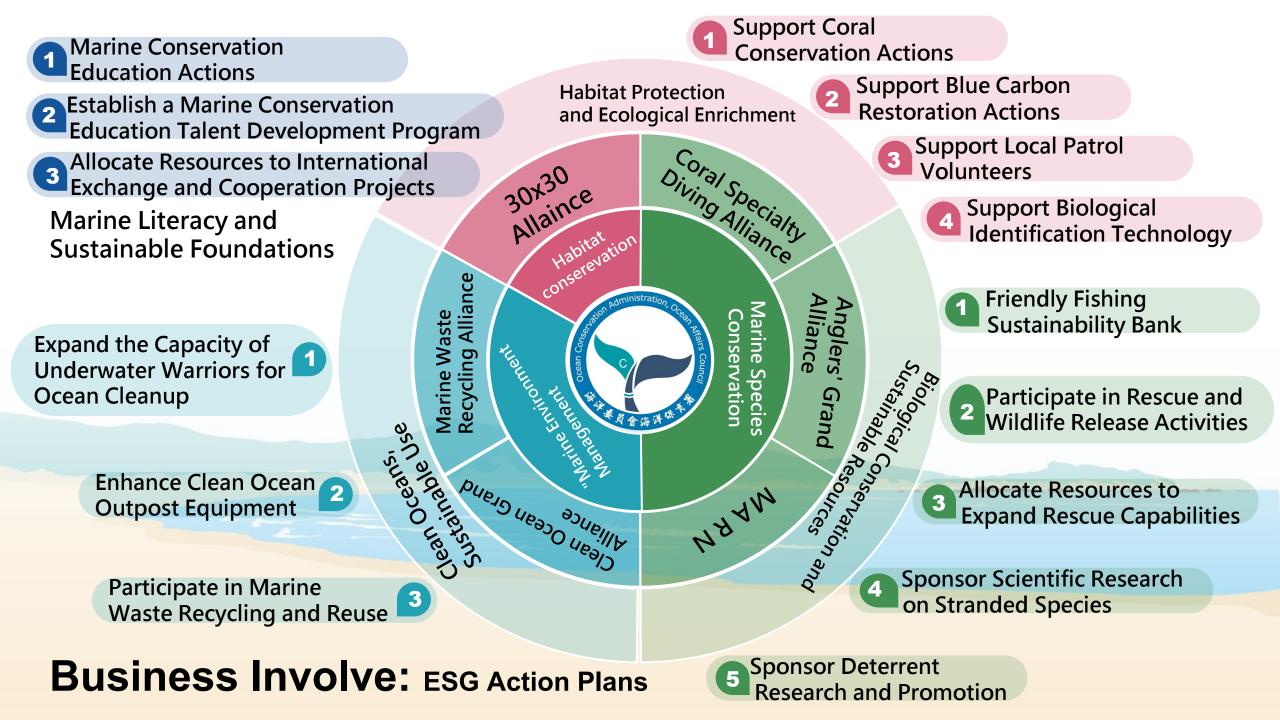


海洋保護區 (MPAs)

- 擴大並有效管理目前的保護區網絡,特別 是在氣候變遷的背景下
- 保護成果需取決於適應性治理、強有力的 社會參與、有效和公平的利益分享機制, 以及對各項規範的監測和執行
- 以及對各項規範的監測和執行
 Expanding and effectively managing the current network of Marine Protected Areas, is important for protecting biodiversity, especially in the context of climate change.
- Conservation outcomes also depend on adaptive governance, strong social participation, effective and equitable benefit-sharing mechanisms, and the monitoring and enforcement of norms.

Marine Protected Areas





中



海洋保育△攜手永續

守護海洋,海好有你

Q 請輸入關鍵字

熱門關鍵字: 海洋保護區

鯨豚救援 海廢清除

海廢再生

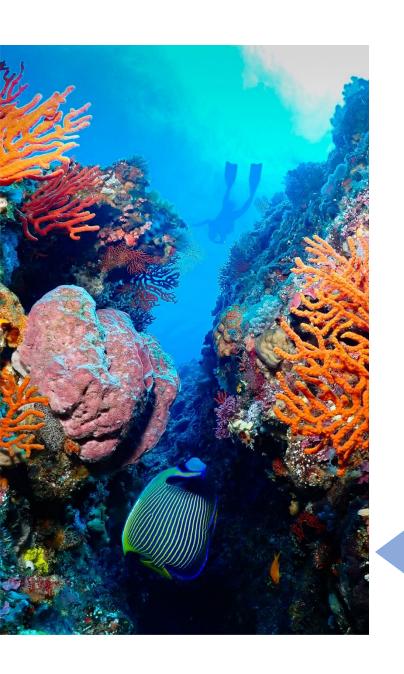
氣候變遷

在地守護

企業 ESG









Our Oceans, Our Future.