REPORT OF THE 2nd IMC WORKSHOP ON MANGROVE CONSERVATION AND RESTORATION (2025)

Dates: 11–18 September, 2025

Venues: Guangdong–Hainan, China

Organizers: International Mangrove Center, Guangdong Neilingding Futian National Nature Reserve Administration Bureau, and the National Academy of Forestry and Grassland Administration

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1. Introduction

The International Mangrove Center (IMC) is an independent non-profit intergovernmental organization under the Ramsar Convention and one of the Ramsar Regional Initiatives (RRIs), having the mission to promote cooperation in mangrove conservation, restoration, and wise and sustainable use; to strengthen implementation of global biodiversity and climate commitments; and to serve as a hub for knowledge sharing, and technology transfer. The IMC is playing important roles in coordinating international efforts in conservation, restoration, research, technical support, capacity building, shared policy frameworks, and public awareness.

As a part of the IMC's framework, the Second Workshop on Mangrove Conservation and Restoration 2025 was successfully organized from 11 to 18 September 2025 in Guangdong and Hainan provinces, People's Republic of China, hosted by the IMC and co-organized by the Guangdong Neilingding Futian National Nature Reserve Administration Bureau and the National Academy of Forestry and Grassland Administration (NAFGA). These intensive 10-day workshops brought together government officials, researchers, and practitioners from six countries, fostering cross-regional dialogue, technical exchange, and collaborative problem-solving.

The workshop featured in-depth lectures by leading international experts, field demonstrations of innovative restoration techniques, and hands-on training sessions in mangrove planting, monitoring, and management. Participants were also introduced to cutting-edge scientific tools, such as remote sensing for mangrove mapping, blue carbon and climate response, mangrove wetland migratory bird monitoring, and protection. Beyond technical knowledge, the workshop emphasized the importance of policy integration, international cooperation, and public awareness to ensure sustainable outcomes.

Importantly, the workshop created a dynamic platform for networking and partnership building, enabling participants to share best practices, exchange cultural perspectives, and develop joint initiatives tailored to their national and regional contexts. By combining academic rigor with practical field experience, the program not only enhanced participants' professional skills but also inspired a renewed commitment to advancing mangrove conservation and restoration under the IMC's global mission.

1.1. Objectives

- Enhance knowledge and technical capacity by providing in-depth scientific and practical knowledge on mangrove conservation, restoration, blue carbon, and climate change response through expert lectures, field visits, and on-site training.
- Promote international cooperation and experience sharing; fostering dialogue and exchange of best practices among government officials, researchers, and practitioners.

1.2. Methodology

The workshop adopted a participatory approach, including:

- Expert lectures by leading international specialists.
- Case study discussions to share challenges and solutions.
- Field based training including to field visits to various mangrove and wetland sites in Shenzhen City and Hainan province.
- Group discussions and cultural exchanges to strengthen collaboration and mutual understanding.

The workshop was implemented in accordance with the agenda program provided in **Annex 1**.

1.3. Target Participants

A total of 24 government officials from six countries attended the workshop namely Cambodia (9), China (4), Iran (1), Madagascar (8), Sierra Leone (1), and Zimbabwe (1). The full list of workshop participants is provided in **Annex 2**.

The participating countries are rich in wetland and mangrove resources. Participants were mid- to senior-level government officials and technical professionals from departments responsible for wetland conservation, forestry, and natural resources. Overall, the participants demonstrated strong professional capacity, extensive work experience, and solid technical knowledge.

2. Results of the Workshop

2.1. Opening Session

The opening of the second International Mangrove Center (IMC) international workshop on mangrove conservation and restoration was conducted simultaneously with 2025 Mangrove Wetland Education CEPA Seminar, bringing together senior government officials, international experts, and practitioners to underscore the shared commitment to wetland conservation and nature education.

Mr. Ma Guangren, Deputy Director of the Chinese Society of Forestry, highlighted that Shenzhen has achieved remarkable results in nature education, particularly in wetland education, where it continues to lead nationally and serve as a model for the Greater Bay Area. The establishment of the International Mangrove Center has further strengthened Shenzhen's international influence in wetland conservation and nature education, contributing Chinese wisdom to global ecological governance. The close collaboration between this wetland seminar and the IMC has not only raised the professional standards of the international workshop but also deepened global exchanges and cooperation in wetland conservation, providing strong support for building an international platform for the harmonious coexistence of humans and nature.

Figure 1: Mr. Ma Guangren, Deputy Director of the Chinese Society of Forestry, delivering his remarks

Prof. Bao Daming, Director General of the IMC Interim Secretariat, emphasized that mangroves, as the "coastal guardians" and "lungs of the earth," play an irreplaceable role in disaster prevention, biodiversity conservation, carbon sequestration, emission reduction, and improving livelihoods. CEPA wetland education, he noted, is a vital pathway for promoting mangrove conservation, as it not only raises public awareness and community participation but also fosters collaboration and capacity building among research institutions, professionals, and practitioners. He expressed hope that this seminar would become an important platform for sharing best practices and strengthening dialogue and cooperation, thereby advancing the conservation, restoration, and sustainable management of mangroves.

Figure 2: Prof. Bao Daming, Director General of the IMC Interim Secretariat, delivering his remarks

Mr. Zhou Jiangtao, District Mayor of the Futian District People's Government of Shenzhen, introduced the Futian Mangrove Nature Reserve as the only mangrove reserve located in the heart of a Chinese city. In recent years, Futian District has steadily advanced the development of a wetland ecological restoration demonstration zone, enhancing biodiversity conservation, expanding high-quality coastal spaces, and improving opportunities for residents and tourists to engage with the sea. The Futian Mayor is committed to making mangroves a prestigious emblem that showcases Futian's ecological quality.

Figure 3: Mr. Zhou Jiangtao, Mayor of the Futian District of Shenzhen, delivering his remarks

Mr. Wu Xiaoping, Deputy Director of the Shenzhen Municipal Planning and Natural Resources Bureau, stated that despite experiencing rapid urban development, Shenzhen has always adhered to green principles, integrating mangrove conservation into its urban strategic planning and territorial spatial management. The city actively supports the construction of the IMC and has co-hosted multiple international workshops, creating an international platform for knowledge sharing and cooperation. Shenzhen is committed to leveraging the IMC platform to work with various countries in accumulating practical wisdom and exploring adaptive solutions, jointly shaping a beautiful blueprint for global mangrove conservation and restoration.

Figure 4: Mr. Wu Xiaoping, Deputy Director of the Shenzhen Municipal Planning and Natural Resources Bureau, delivering his remarks

Figure 5: Opening ceremony of the 2025 Mangrove Wetland Education CEPA Seminar and IMC International Workshop

2.2. Technical Session

The workshop curriculum covered nine technical lectures, including one dedicated session on China and its culture, and provided participants with thematic and policy-oriented insights into wetland and mangrove conservation through global, national, and site-based perspectives, supported by scientific, governance, and practical approaches.

2.2.1. Introduction to China and its Culture

The Lecture on "Introduction to China and its Culture" was delivered by Ms. Wu Xuerui, Vice President of NAFGA, China. The lecture offered key insights into China's cultural context, with the key highlights as follows. Full details of the presentation are provided in **Annex 3.1.**

Figure 6: Ms. Wu Xuerui, Vice President, NAFGA, China, delivering her lecture.

Key highlights:

- **Geography**: The lecture showcased China's vast geographical scale, describing it as the third-largest country in the world by land area (9.6 million km²). It highlighted the unique topographical feature of the land descending in "three stairs" from west to east. The first stair consists of plateaus and mountains with altitudes over 4000 meters. The second stair comprises plateaus and basins with altitudes from 1000 – 4000 meters. The third stair consists of plains and low hills with altitudes below 1000 meters. Additionally, the lecture noted that China is rich in water resources, possessing more than 1,500 significant rivers . Among them, the Yangtze (6,300 km) and Yellow Rivers (5,464 km) are celebrated as the "mother rivers" of Chinese civilization. The country's diverse and spectacular landscapes are underscored by its 19 UNESCO World Natural Heritage sites, covering a total area of over 80,000 km^2, which showcase its commitment to environmental conservation and protection.

- **History**: The lecture presented China as one of the world's oldest continuous civilizations, with a recorded history of over 5,800 years that originated in the Yellow and Yangtze River basins. Chinese history was divided into three major periods: Ancient times (ending in 1840 with the First Opium War), the Modern period (1840-1949), characterized as a semi-colonial and semi-feudal society, and the Contemporary era (from the founding of the People's Republic of China in 1949 to the present), defined as a period of socialist revolution and construction. This long, uninterrupted historical narrative framed China's enduring cultural identity and developmental journey.
- **Political System**: The lecture emphasized China's political system as operating under the leadership of the Communist Party of China (CPC). The presentation outlined three

fundamental components: The People's Congress system as the fundamental political system, the system of Multi-party Cooperation and Political Consultation where eight democratic parties participate under CPC leadership, and the system of Regional Ethnic Autonomy to address the needs of minority populations. The administrative structure was detailed as a three-tier system consisting of provinces, counties, and townships. This structure was presented the stable framework that guides all national policies, including environmental initiatives.

- **Economy**: The lecture credited China's massive economic growth to the "reform and opening-up" policy initiated in 1978 under Deng Xiaoping. This transformation was highlighted by the dramatic rise in GDP, with China having become the world's second-largest economy (reaching 134.9 trillion RMB in 2024). The policy's success was visually symbolized by the before-and-after development of cities like Shenzhen, demonstrating the shift that provides the financial and infrastructural capacity for large-scale national projects.
- **Diplomacy**: China's foreign policy was described as being rooted in the purposes of maintaining world peace and promoting common development, with the Five Principles of Peaceful Coexistence as its core tenet *(1. Mutual respect for each other's sovereignty and territorial integrity, 2. mutual non-aggression, 3. mutual non-interference in each other's internal affairs, 4. equality and mutual benefit, and 5. peaceful coexistence*.) The lecture introduced the concept of "Major Country Diplomacy with Chinese Characteristics," which embodied the traditional ideal of "the world is for all" and was operationalized through the vision of building a **"Community with a Shared Future for Mankind."** A key instrument of this diplomacy was the Belt and Road Initiative (BRI), launched in 2013 to enhance global connectivity. The lecture concluded with specific examples of China's international cooperation, including high-level meetings with countries like Cambodia, Iran, Madagascar, Sierra Leone, and Zimbabwe, which showcased the diplomatic approach that fostered the bilateral and multilateral partnerships essential for economic development, environmental protection, and sustainable living.

2.2.2. China's Wetland Conservation and Ramsar Implementation

This lecture was delivered by **Ms. HU Xinxin,** Department of Wetland Management, National Forestry and Grassland Administration (NFGA), China, with the key highlights as follows. Full details of the presentation are provided in **Annex 3.2**.

Key Highlights:

- **The Convention on Wetlands:** The lecture highlighted the Ramsar Convention on Wetlands as a global intergovernmental framework adopted in 1971 to promote the conservation and wise use of wetlands in support of sustainable development. It explained that the Convention operates through **three core pillars: the wise use of all wetlands, the designation and management of Wetlands of International Importance, and international cooperation**. The governance structure, including the Conference of the Contracting Parties (COP), the Standing Committee (SC), and the Secretariat, was outlined, with particular emphasis on Ramsar Regional Initiatives as voluntary mechanisms supporting regional implementation**.**
- **Wetland management system in China**: The lecture highlighted that wetlands in China cover about 56.35 million ha, ranking forth in the world. These wetlands comprise 13 types, including lakes (15.13%), rivers (16.14%), swamps (3.54%), inland mudflats (11.03%), coastal tidal flats (2.76%), swamp meadows (20.36%), shrub swamps (1.38%), forest swamps (4.04%), mangroves (0.05%), salt pans (1.14%), ditches (6.43%), ponds (8.1%), and reservoirs (6.20%) (**see Figure 7**). The lecture also emphasized China's stronger legal and institutional framework for wetland conservation, especially after the Wetlands Protection Law came into

effect in 2022. The law focuses on protection, strict management, science-based restoration, and wise use, while banning harmful activities and tightly regulating wetland occupation, including special rules for mangrove protection. The lecture further explained China's hierarchical wetland management system, supported by institutions under the National Forestry and Grassland Administration (NFGA). This system covers Ramsar Sites, International Wetland Cities, national and provincial wetlands, and wetland parks. China currently has 1,205 wetlands of provincial importance, 903 national wetland parks, 58 Wetlands of National Importance, 5 National Parks, 82 Ramsar Sites, and 22 Wetland Cities.

- **China's Ramsar implementation:** The lecture further emphasized China's active implementation of its Ramsar commitments, shown through the establishment of the Ramsar Administrative Authority of China and the Wetland Center in 2005, the National Committee for Implementing the Ramsar Convention in 2007, and the Department of Wetlands Management under the NGFA in 2018. Since 1992, China has designated 82 Ramsar Sites covering 7.64 million ha, spanning coastal and inland areas from plains to plateaus, as well as 22 Wetland Cities such as Wuhan and Changshu, which serve as models for integrating urban development with wetland conservation. China has also carried out continuous and comprehensive monitoring of the ecological condition of its Ramsar Sites since 2018. Furthermore, China hosted major events such as COP14 in 2022 and actively participated in international gatherings such as COP15 in 2025. A cornerstone of these efforts is China's leadership in establishing the International Mangrove Center in 2024, which has rapidly grown to 20 member states. China's international engagement also includes sponsoring global resolutions, conducting annual training workshops, and leading cooperative projects for sustainable wetland management in the Lancang-Mekong Basin, positioning the country as a key driver of regional and global wetland conservation.

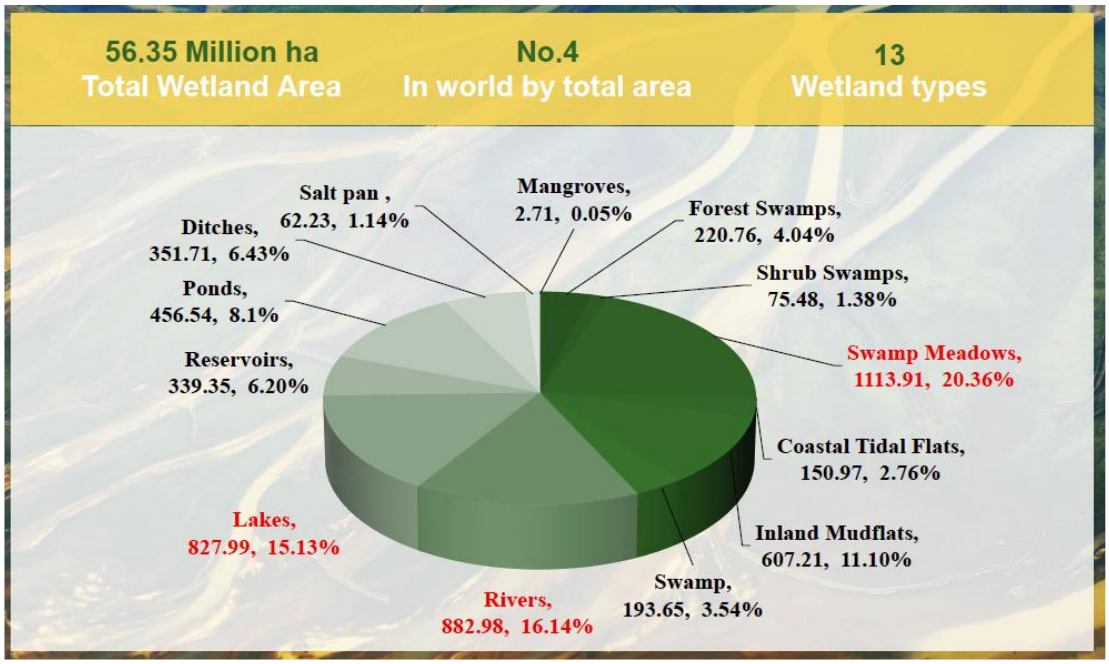


Figure 7: Wetland types in China (unit: ten thousand hectares)

2.2.3. Global Wetlands Outlook 2025 and Shenzhen Conservation Plan (2025-2035)

This lecture was delivered by **Prof. ZHOU Haichao, Shenzhen University, China**, with the key highlights as follows. Full details of the presentation are provided in **Annex 3.3.**

Key Highlights:

- **The Global Wetland Outlook (2025):** The lecture provided overviews of the Global Wetland Outlook 2025 which presents a stark assessment of the state of the world's

wetlands, framing their conservation and restoration as an urgent, non-optional necessity for planetary health. It synthesized scientific information to highlight several critical issues.

The lecture emphasized that wetland loss and degradation are ongoing and widespread global crises. It reported that all 11 natural wetland types have declined since 1970 at an average rate of 0.52% per year, driven primarily by land-use change such as agricultural expansion and urban development. **Figure 8** illustrates the estimated past extent of these wetland types circa 1970, which serves as the baseline for assessing subsequent losses.

The lecture emphasized the immense economic value of wetlands, which provide society with an estimated up to $39.01 trillion in benefits annually. These benefits include food security, water purification, flood protection, and carbon storage. However, the report stressed that these economic estimates are limited and fail to capture the profound intrinsic value of wetlands as living systems.

The lecture emphasized the scale of action and investment required to meet global targets. To align with the Kunming-Montreal Global Biodiversity Framework (specifically Targets 2 and 3), the world needs to restore approximately 123 million hectares of wetlands and effectively conserve at least 428 million hectares. It highlighted that conservation is far cheaper than restoration and pointed to a massive financing gap, noting that current biodiversity funding represents a mere 0.25% of global GDP.

The Outlook report provides four key pathways for transformative change: improving natural capital valuation in decision-making; recognizing wetlands as integral to the global water cycle; embedding wetlands in innovative financial solutions; and unlocking a mix of private and public finance. The report concluded with a call to action, stating that a future with thriving wetlands is possible only if we act together now.

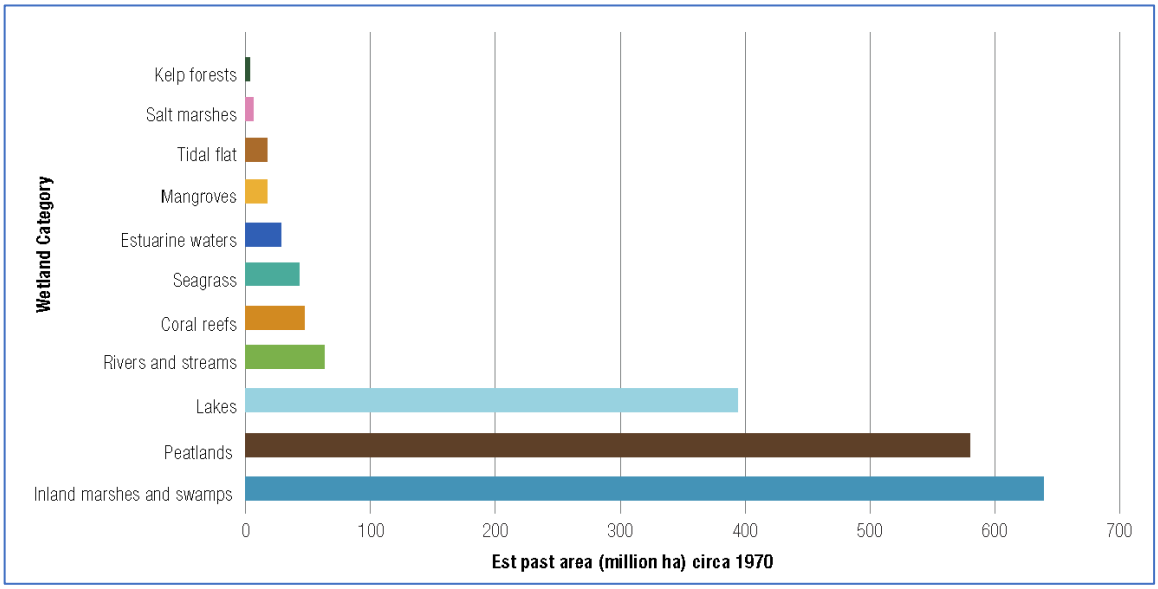
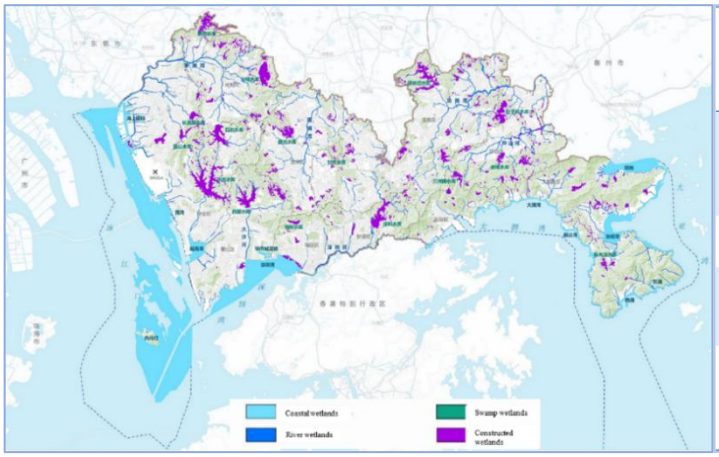


Figure 8: Estimated global extent of wetland types (million ha), circa 1970

- **Shenzhen Wetland Plan:** The lecture highlighted that the Shenzhen Wetland Conservation Plan is a specialized and actionable blueprint formally integrated into the city's territorial spatial planning system, providing clear guidance for wetland conservation and management over the next decade. Shenzhen's wetlands are categorized into four types: coastal wetlands (267.75 km^2), rivers (16.35 km^2), swamp wetlands (0.64 km^2) and constructed wetlands (63.14 km^2), together covering a total of 347.88 km^2. Of the total, coastal wetlands account for 76.62%, supporting important ecosystems such as mangroves and coral reefs (**see Figure 9**). At the same time, the lecture noted that Shenzhen faces strong pressure from high-density urban development, loss of ecological connectivity, and the need to strengthen governance capacity. The lecture further underscored the plan's

ambitious targets and implementation measures. Shenzhen aims to be recognized as an international **"Wetland City" by 2030 and a world-class coastal wetland city by 2035.** To achieve this, the plan focuses on improving wetland governance, establishing an integrated protection pattern, expanding protected areas and other effective area-based conservation measures (OECMs) to reach at least a 55% conservation rate, and leveraging international cooperation through the IMC. Practical implementation will be driven by priority projects covering wetland protection and restoration, sustainable use, and scientific research and monitoring.



Wetland type	area (square kilometer)	patch number	Average plaque Area (ha)
coastalwetlands 近海与海岸湿地	267.75	1893	14.14
rivers 河流湿地	16.35	3721	0.44
Swamp wetlands沼泽湿地	0.64	146	0.44
constructed wetlands 人工湿地	63.14	3297	1.91

Figure 9: Types and distribution of wetlands in Shenzhen

2.2.4. Mangrove Habitat Dynamics, Connectivity, and Complexity

This lecture was delivered by **Dr. A. Aldrie Amir, Associate Professor, Institute for Environment and Development, Universiti Kebangsaan Malaysia**, with the key highlights as follows. Full details of the presentation are provided in **Annex 3.4.**

Key Highlights:

- The lecture highlighted the fundamental ecological importance of mangroves as dynamic coastal wetlands that function at the interface of terrestrial, freshwater, and marine systems. It emphasized that mangroves are highly productive "blue carbon" ecosystems with exceptional capacity for carbon sequestration due to high primary productivity, efficient sediment trapping, low decomposition rates in anoxic soils, and long-term carbon burial that far exceeds many terrestrial ecosystems.
- The lecture emphasized the definition, distribution, and unique adaptations of mangroves within tropical and subtropical intertidal zones. It explained that mangroves are halophytic plants adapted to saline, waterlogged, and anaerobic soils, featuring specialized root systems such as pneumatophores, prop roots, and buttress roots, as well as viviparous reproduction. These adaptations enable mangroves to survive tidal inundation, stabilize soft sediments, and disperse seedlings over long distances.
- The lecture underscored the complexity and connectivity of mangrove ecosystems with adjacent habitats, including seagrass beds, coral reefs, mudflats, estuaries, rivers, lagoons, and inland hinterlands. Mangroves were presented as intermediary ecosystems that facilitate ecological connectivity, support biodiversity, and act as agents of coastal dynamism while also serving as witnesses to environmental and climatic change.
- The lecture addressed both natural and anthropogenic disturbances affecting mangrove ecosystems. Natural disturbances such as storms, tidal surges, droughts, and herbivory were contrasted with human-induced pressures including excessive logging, land

reclamation, pollution, mining, altered hydrology, and oil spills. The lecture noted that while mangroves possess natural regenerative capacity, sustained or excessive disturbances can exceed recovery thresholds and lead to ecosystem collapse.

- The lecture explained mangrove forest dynamics through the concept of canopy gap cycles, including gap initiation, opening, recruitment, growth, and closure phases. It demonstrated that natural gap formation promotes seedling establishment and forest rejuvenation, indicating healthy habitat dynamics, while imbalances between gap creation and recovery signal declining ecosystem resilience.
- The lecture concluded by outlining pathways for sustainable mangrove conservation and restoration, emphasizing ecological mangrove restoration, community-based management, strong legal enforcement, education and awareness, and innovative financing mechanisms such as carbon financing and payment for ecosystem services. It called for stronger integration of science, management, and community engagement to translate research and policy into effective on-the-ground action.

2.2.5. Waterbird Conservation

This lecture was delivered by **Mr. Chen Kelin, Scientist, Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China**, with the key highlights as follows. Full details of the presentation are provided in **Annex 3.5**.

Key Highlights:

- The lecture highlighted bird characteristics including the diversity in head shapes, beak types, toe arrangements, and feather structures. It explained how these anatomical features are adapted to different ecological niches, e.g. webbed feet for swimming, sharp talons for hunting, and specialized beaks for feeding. The skeletal system of birds is noted for being lightweight yet strong, with hollow bones that facilitate flight. Birds possess acute vision, wide visual fields, and specialized neck mobility to compensate for fixed eyeballs. Their hearing, taste, smell, and touch are also well-developed. Migratory birds use celestial cues, magnetic fields, and internal biological clocks to navigate vast distances. Some species have magnetite crystals in their heads that act like compasses.
- The lecture emphasized the concept of global flyways, especially American, Africa-Europe, Central Asia, and East Asian-Australasian flyways, which are the major routes migratory birds use to travel between breeding and non-breeding grounds. The lecture specifically addressed the East Asian-Australasian Flyway, showcasing the epic migrations of migratory bird species like Bar-tailed Godwit, which can travel over 11,000km non-stop.
- It also highlighted the threat of habitat loss, notably the large-scale loss of intertidal mudflats due to land reclamation for agriculture, aquaculture, and urban development. For instance, the Saemangeum project in South Korea led to the construction of a 33-kilometer seawall, resulting in the loss of 41,000 ha of tidal flats and a dramatic decline of over 70,000 Great Knots. Moreover, migratory birds are increasingly affected by pollution, illegal hunting, climate change, and infrastructure such as powerlines and dams.
- The lecture addressed conservation efforts focused on linking biodiversity protection with the needs of local communities through integrated land-use planning and alternative livelihoods and policy framework. Furthermore, monitoring is crucial and involves basic filed skills, bird identification, and advance technique like satellite tracking to gather data on population status and migration routes, which is essential for effective protection.

2.2.6. Mangroves Conservation in Mai Po Nature Reserve

This lecture was delivered by **Dr. WEN Xianji, Director, Mai Po Nature Reserve and Flyway Program, WWF-Hong Kong, China**, with the key highlights as follows. Full details of the presentation are provided in **Annex 3.6**.

Key Highlights:

- The lecture addressed that the Mai Po Nature Reserve was established in the early 1980s by integrating wetlands, shrimp ponds, and mangroves. It was designated as Ramsar Site in 1995 with the principle of wise use, maintaining traditional aquaculture while supporting biodiversity. Mai Po supports more than 20,000 waterbirds each year, including endangered species like the Black-faced Spoonbill. It hosts 466 bird species, 322 plant species, 70 fish species, 25 mammal species, 22 reptile species, and over 400 invertebrates. Intertidal mudflats, gei wai ponds, and freshwater areas serve as feeding and roosting habitats.
- **Habitat and Biodiversity Zone Management:** The lecture described a conservation plan for Mai Po that aims to create and manage Biodiversity Management Zones (BMZ). As shown in the **Figure 10:** Mai Po biodiversity management zone in 2029, the reserve was divided into seven distinct units, each with a specific ecological function. The purpose is to keep or boost populations of important species by managing habitat diversity in a way that withstands climate change. This zonal method addressed specific needs. For example, zones were set up to offer the best roosting and feeding places for the Black-faced Spoonbill, high-tide roosting spots for shorebirds, and appropriate habitats for duck groups and herons. A key part of this strategy involved careful management of water levels in the traditional gei wai ponds. This was scheduled to create shallow water for birds, control plant life, and match migration patterns. Controlling vegetation was an ongoing task, including cutting grass on bunds and flooding created bird islands to keep areas open. Additionally, active removal of mangrove seedlings took place on 45 ha of mudflat to maintain open habitats and prevent encroachment from both native and non-native mangrove species.

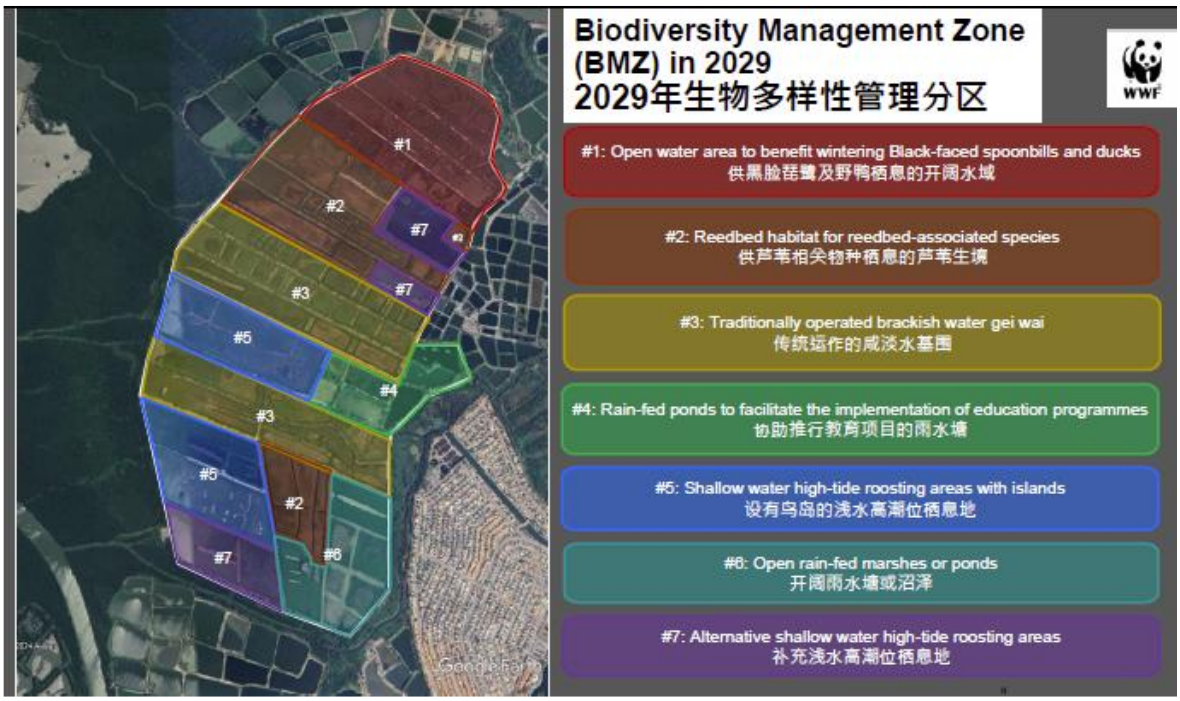


Figure 10: Biodiversity management zone in 2029

- **Restoration and Nursery Development:** The lecture introduced the restoration methods to improve habitat quality by restoring several abandoned community ponds. The work involved repairing traditional sluice gates, clearing dense vegetation, and reshaping pond floors to restore natural water flow. As part of these efforts, a mangrove nursery was also established to propagate native species such as Aegiceras corniculatum, ensuring a reliable supply of seedlings for future restoration. The lecture also mentioned that a key innovation introduced in the project was a system designed to mimic natural tidal movements, helping young mangroves adapt to real coastal conditions. As illustrated in the **Figure 11**, the system used a submersible pump to draw water from a gei wai and deliver it periodically into the nursery tanks. The water enters through an inlet, passes through 15-centimeter-deep tanks containing seedlings in 13-centimeter pots, and drains out through an outlet after each cycle. An overflow mechanism is also included to prevent excessive flooding. The lecture further emphasized that this tidal simulation process helped acclimate the seedlings to fluctuating water levels, significantly increasing their survival rates once transplanted into restored areas, often with the active participation of local volunteers.

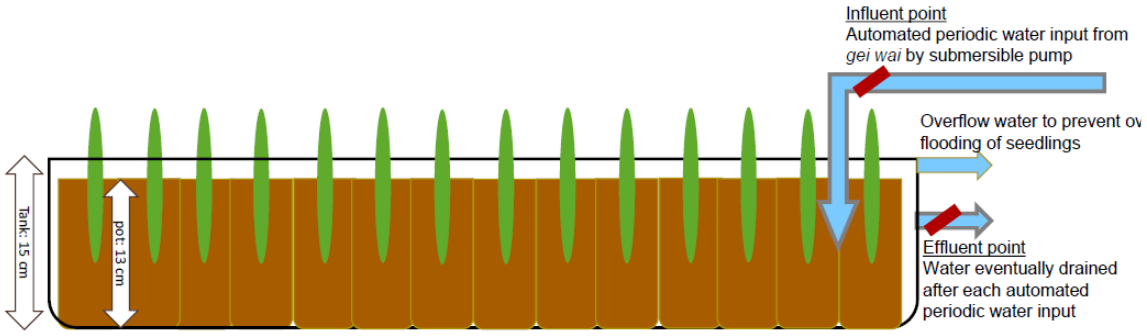


Figure 11: Schematic of mangrove nursery system mimicking tidal flow

- **Monitoring Program:** A strong long-term monitoring program is crucial for tracking how well the BMZ management works. This program produces important biodiversity data on key species and groups, which serve as indicators of management success and provide warnings about potential threats. In addition to population monitoring, significant research measured ecosystem services, such as how much carbon wetlands can store and how well mangroves can reduce wave impact. This reinforces Mai Po's role as a regional hub for wetland science.
- **Education and Regional Training:** The education program turned these conservation actions into learning experiences. Students participated in activities like “Mangrove Ecology” tours. To make a regional impact, the Wetland Management Training Program shared Mai Po's knowledge in BMZ planning, habitat management, and monitoring with wetland managers along the flyway. The goal is to replicate this successful conservation model throughout the region.

2.2.7. Integrating Mangrove Restoration with Local Economic Development

This lecture was delivered by **Ms. Verónica, Forestry Officer, Ministry of Environment, Panama**, with the key highlights as follows. Full details of the presentation are provided in **Annex 3.7.**

Key Highlights:

- The lecture highlighted the critical global significance of mangrove ecosystems and the urgent need for their conservation. It was noted that mangroves are among most biologically diverse and productive ecosystems on Earth, supporting over 4,000 species and providing essential services to approximately 118 million people living within 10

kilometers of them. However, a net global loss of 4.4% of mangrove area between 1996 and 2020 underscored the persistent threat to these vital coastal habitats.

- The lecture emphasized the necessity of integrating mangrove restoration with local economic development to ensure long-term sustainability. the core argument presented was the conservation initiatives must be deliberately merged with community-interest activities that generate jobs and income. This approach aims to align ecological recovery with the economic wellbeing of local population, moving beyond purely environmental goals to create a tangible, mutually beneficial relationship between healthy ecosystems and prosperous communities.
- The lecture addressed the practical framework for achieving this integration, which relies on a collaborative multi-stakeholder governance model. The strategy involves aligning the efforts and interests of four key groups, government bodies for policy and climate action, local communities for knowledge and livelihood support, private businesses for investment and venture development, and scientific institution for technical guidance. Specific economic opportunities were identified, including sustainable forest products, mangrove nurseries, and blue carbon projects.
- The lecture concluded by underscoring that effective governance is the key to success. By harmonizing the contributions of government, communities (civil society), business (private sector), and academia (science), mangrove restoration can successfully contribute to both ecological health and sustainable local economic development.

2.2.8. Mangrove Ecological Character Maintenance

This lecture was delivered by **Prof. LYC Cai, Beijing Forestry University, China**, with the key highlights summarized as follows. Full details of the presentation are provided in **Annex 3.8**.

Key Highlights:

- The lecture highlighted the global importance of mangroves as highly productive wetland ecosystems that provide critical ecosystem services despite occupying a relatively small proportion of global wetland area. It presented the latest global estimate of mangrove extent at approximately 147,256 km² and emphasized their exceptional role in blue carbon storage, biodiversity support, flood mitigation, food security, and livelihoods for coastal communities.
- The lecture underscored the concept of ecological character as defined under the Ramsar Convention, explaining that ecological character is determined by the interaction of ecological components, ecological processes, and ecosystem services that make a wetland become the wetland. It introduced the role of Ecological Character Descriptions (ECDs) in establishing baseline conditions, understanding natural variability, setting limits of acceptable change, and supporting informed management, monitoring, and decision-making for wetlands of international importance.
- The lecture addressed practical approaches for identifying, monitoring, and maintaining ecological character. It outlined principles for identifying critical ecological characters, setting limits of acceptable change, and developing conceptual models that link components, processes, and services. The lecture further presented a structured, step-by-step framework for wetland monitoring, including stakeholder committee establishment, identification of indicators for ecological character, threats, and management effectiveness, and the use of appropriate technologies such as remote sensing and field surveys.
- The lecture concluded by emphasizing the importance of adaptive management, stakeholder participation, and evidence-based monitoring to maintain mangrove ecological character over time. It highlighted the need for continuous data analysis, reporting, and plan updates, and used case examples to illustrate challenges in mangrove assessment and reporting. The lecture reinforced that effective ecological character maintenance is essential for sustaining

wetland functions, supporting conservation outcomes, and meeting national and international wetland commitments.

2.2.9. Development and Trading Practice of Shenzhen Mangrove Conservation Carbon Sink project

This lecture was delivered by **Dr. XIE Xinli, Shenzhen Natural Resources and Real Estate Evaluation and Development Research Center**, with the key highlights as follows. Full details of the presentation are provided in **Annex 3.9**.

Key Highlights:

- The lecture highlighted that the Shenzhen Mangrove Carbon Sink Project was initiated under a strong policy directive. It emphasized that high-level decisions from the central committee of the Communist Party of China, particularly from the Third Plenary Session in July 2024, mandated the improvement of ecological civilization systems, the development of carbon markets, and the establishment of mechanisms to realize the value of ecosystem products, encapsulated by the concept that **"lucid waters and lush mountains are invaluable assets."** The presentation further addressed that this national strategy was operationalized through a specific pilot program approved by the Ministry of Natural Resources (MNR), which tasked Shenzhen with exploring the value realization mechanism for natural resources, thereby providing direct authorization and framework for the project.
- The lecture detailed the transection as a pioneering case study in blue carbon trading. It highlighted that the project, entered on the Futian Mangrove National Nature Reserve, established a complete market mechanism. This process involved developing China's first methodology for conservation-based carbon sinks, third-party verification certifying 38,745 tons of CO_2 sequestration over a decade, and an innovative valuation method that set reserve price of 183 RMB/ton. The presentation emphasized the successful auction on September 26, 2023, where 3875 ton of carbon sinks were sold for a record 485 RMB/ton after competitive bidding, with traction completed and a certificate issued. This case was underscored as a practical model for turning ecological conservation into measurable economic value.
- The lecture emphasized that the project's success catalyzed several innovative applications for carbon sinks. It addressed the use of these credits for achieving carbon neutrality in high-profile events like the China Marine Economy Expo. A significant innovation detailed was "Judicial Carbon Sinks," where entities responsible for ecological damage can purchase carbon sinks as an alternative form of environmental restoration, integrating carbon market with judicial system. The presentation also highlighted financial innovations, including the launch of China's first mangrove carbon sink index insurance to protect against sequestration value loss and the use of carbon sinks as collateral for bank loans, creating a new "carbon-for-loans" financing channel and advancing the field of blue finance.

2.3. Sharing Country Experiences in Mangrove/Wetland Conservation and Management

During this session, participating countries presented their country experiences in mangrove and wetland conservation and restoration, highlighting the current status of ecosystems, conservation and management practices, key challenges, and proposed ways forward.

It is noted that China has achieved significant progress in mangrove conservation and restoration, supported by strong political commitment, a comprehensive legal framework, and a national action plan, resulting in a net increase in mangrove area and the early achievement of restoration targets. At the same time, countries with extensive mangrove resources, including Cambodia, Madagascar, Iran, and Sierra Leone, reported historical mangrove loss, land encroachment, pollution, and climate change, with conservation efforts through the expansion of protected areas and Ramsar Sites, the application of science-based restoration approaches such as multi-species planting, hydrological restoration, and drone seeding, as well as strengthened monitoring systems and technical standards.

In contrast, Zimbabwe focused on inland wetland conservation, emphasizing legal and policy reforms, large-scale rehabilitation, and community engagement to address widespread wetland degradation. The table below summarizes the key points from the country reports.

Table 1: Summary of country experiences in wetlands/mangrove management

Country	Status of Mangroves/ Wetlands	Conservation/Management Practices	Challenges	Way Forward
Cambodia **(Annex 4.1)**	• 73 PAs (covering 48.14% of the total area country land), including 5 Ramsar sites. • Mangroves extent declined from approximately 88,413 ha in1989 to about 51,603 ha in 2017. • Home to Asia's 10th largest mangrove ecosystem.	**Policy:** National strategy to maintain 60% forest cover, promote biodiversity. **Practice:** Multi-species plantation, community patrolling, livelihood diversification (ecotourism, biogas). **Stakeholders:** Involvement of NGOs, international agencies, and private sectors.	• Land encroachment and deforestation • Limited funding, resources, and institutional coordination • Climate change impacts.	• Strengthen legal/institutional frameworks • Promote community-based management • Mobilize sustainable financing (e.g., Blue Carbon, REDD+) • Enhance research and knowledge sharing.
China **(Annex 4.2)**	• Total mangrove area was approximately 31,000 ha in 2024, of which about 20,500 ha are located within 96 protected areas, including 7 Ramsar sites. • Mangrove extent increased from 27,101 ha in 2019, indicating net expansion. • A total of 37 native mangrove species have been recorded.	**Leadership & Law:** High-level political emphasis; Wetlands Conservation Law (2022) prohibits occupation of mangroves. **National Plan:** Mangrove Conservation and Restoration Action Plan (2020-2025) - targets exceeded (9,100 ha replanted, 10,000 ha restored). **Monitoring:** Remote sensing, ground patrols, public reporting. **Technical Standards:** Detailed national guidelines and manuals.	Monitoring and enforcement.	Continued implementation and enforcement of existing laws, plans, and technical standards.
Madagascar **(Annex 4.3)**	• Total mangrove area was approximately 390,000 ha in 2019, of which about 25% is	**Policy:** National strategy for integrated mangrove management (2022-2032) and restoration committee	• Lack of infrastructure, educational/co mmunication	• Promoting dialogues • Improving international cooperation

	located within protected areas (PAs). • Approximately 8,000 ha have been identified as potential areas for mangrove restoration. • About 32% of mangrove areas are managed by local communities. • 9 mangrove species have been recorded nationwide. • Mangroves store an estimated 303 Mt CO_2e and support the livelihoods of more than 2 million people.	(2016), and mangrove thematic group (2024). **Monitoring and Restoration:** Hydrological restoration (drainage canals), local nursey, and drone seeding (60-70% success rate). **Community engagement**: community-based mangrove management area and empowering women and youth **Livelihoods:** Sustainable value chains for crab, shrimp, honey, ecotourism.	tools, and law enforcement • Lack of data collection and management • Land conflicts and limited stakeholder capacity • Limited financial resources.	• Incubating pilot projects • Scaling up best practices • Strengthening and valuing knowledge and capacity.
Iran **(Annex 4.4)**	• Mangroves are mainly distributed along the Persian Gulf and the Gulf of Oman coasts. • Mangrove ecosystem are largely mudflat-dominate comprising 68-94% of ecosystem area. • Mangroves are vital for fish breeding, coastal defense, and carbon sequestration.	**Protection:** Designating Protected Areas; regular patrols. **Restoration:** National campaign "We Plant the Sea"; community planting; nurseries. **CEPA:** Community engagement via eco-tourism, apiculture (mangrove honey). **Partnerships:** Collaboration with UNDP, JICA, Ramsar Convention.	• Climate change (sea-level rise, temperature increase). • Pollution from industry and oil. • Balancing coastal development with conservation.	• Scale up successful community-based models. • Enhance research on climate-resilient mangroves. • Strengthen regional cooperation for shared marine ecosystems.
Sierra Leone **(Annex 4.5)**	• Total mangrove area was approximately 240,000 ha in 1990, of which about 120,000 ha were located within protected areas (PAs). • Approximately 25% (about 60,000 ha) of the total mangrove area had declined by 2016. • 6 mangrove species have been recorded, with Rhizophora spp. being the dominant species.	**Policy:** Developing a National Action Plan for the Blue Economy Strategic Framework. **Restoration:** Large-scale propagule planting (e.g., 128,000 with UNDP; 120,000 with World Bank) as livelihood support for communities. **Community Engagement:** Awareness raising and training for over 300 guards, volunteers, and community members.	• Anthropogenic pressures: wood harvesting, urbanization, farming, mining, pollution. • Inadequate resources, enforcement, and logistical capacity. • Lack of centralized GIS for monitoring.	• Establish public-private partnerships for restoration. • Update national mangrove inventory. • Identify sustainable blue carbon investment opportunities. • Promote alternative renewable energy sources.

Zimbabwe **(Annex 4.6)**	• Non-mangrove country. • Total wetland area covers 13,659,579 ha, representing 34.96% of the national territory. • 7 Ramsar Sites. • Approximately 26.72% of total wetland area was severely degraded (2021).	**Policy framework:** Environment Management Act (CAP), National Wetlands Policy (2021), and National Wetland Management Guidelines (2021). **Conservation:** Gazettement of wetlands as protected areas during 2021–2025. **Restoration:** Rehabilitation of 231,958 ha of wetlands, with a target of 350,550 ha. **Community engagement:** 18 community-based organizations are engaged in the management and sustainable use of wetlands.	Significant degradation from anthropogenic activities: agriculture, infrastructure development, deforestation, mining, waste disposal.	Implied continuation of the 5-year restoration and protection program (2021-2025).

2.4. Field Visit and On-site Teaching

A key highlight of the training workshop was the series of designed field visits and on-site teaching sessions, which provided participants with a unique opportunity to observe and engage directly with the diverse practices, challenges, and innovations in mangrove conservation across China. These visits moved from urban wetland parks in Shenzhen to vast natural reserves in Guangdong and pioneering blue carbon initiatives in Hainan, offering a comprehensive perspective on the spectrum of mangrove management approaches from strict protection and ecological restoration to innovative financing and community-based governance.

The Interim Secretariat of International Mangrove Center

The participants paid a visit to the Interim Secretariat of the International Mangrove Center (IMC). During the visit, the participants were provided with a briefing on the background and establishment process of the IMC, its core mission and mandate, governance structure, and current institutional arrangements. Updates were also shared on the progress of the IMC's establishment, including its legal status, organizational development, and priority work areas. Throughout the demonstration, the participants gained a clearer understanding of the IMC's role in promoting international cooperation on mangrove conservation, restoration, and the wise and sustainable use of mangrove ecosystems.

Figure 12: Participants visited to the Interim Secretariat of International Mangrove Center

Urban Planning and Natural Resource Bureau of Shenzhen Municipality

The participants visited to the Urban Planning and Natural Resources Bureau of Shenzhen Municipality. The visit highlighted how Shenzhen integrates urban development with ecological protection, demonstrating practical approaches to mangrove conservation and restoration, as well as the protection of habitats for migratory birds. Participants observed the bureau's planning strategies, including spatial planning, ecological protection red lines, sustainable land use, and "sponge city" and "park city" initiatives, showing how urban growth can coexist with healthy coastal ecosystems. The use of digital governance tools, public participation, and transparent planning at the Shenzhen Planning Building further illustrated how cities can balance development with ecosystem and biodiversity conservation, offering lessons applicable to mangrove and migratory bird habitat restoration in other regions.

Figure 13: Participants visited to the Urban Planning and Natural Resource Bureau of Shenzhen Municipality.

Futian Mangrove Ramsar Site in Shenzhen

The participants visited the Futian Mangrove Ramsar Site in Shenzhen, Guangdong, coordinated by Dr. Yang Qiong and Dr. Xu Hualin, scientists from the site. The visit provided crucial information, revealing that the Ramsar Site is an internationally protected wetland, distinct from the public-facing Futian Mangrove Ecological Park. Its core consists of the strictly managed Futian National Nature Reserve. The management of this core area falls under the direct authority of the Shenzhen Municipal Government's Administration of the Futian National Nature Reserve, which enforces a legal framework integrating Chinese national law with international commitments under the Ramsar Convention. This stringent management system limits public access to minimize human disturbance and focuses conservation efforts on preserving vulnerable species and critical habitats for over 20,000 migratory birds. A key milestone was the 2023 expansion of the Ramsar boundary, which formally incorporated the Ecological Park. This strategic move acknowledged the park's essential ecological role and unified the management of both areas under a single international conservation framework, despite their separate daily operations, thereby solidifying the entire area as a model of integrated urban conservation.

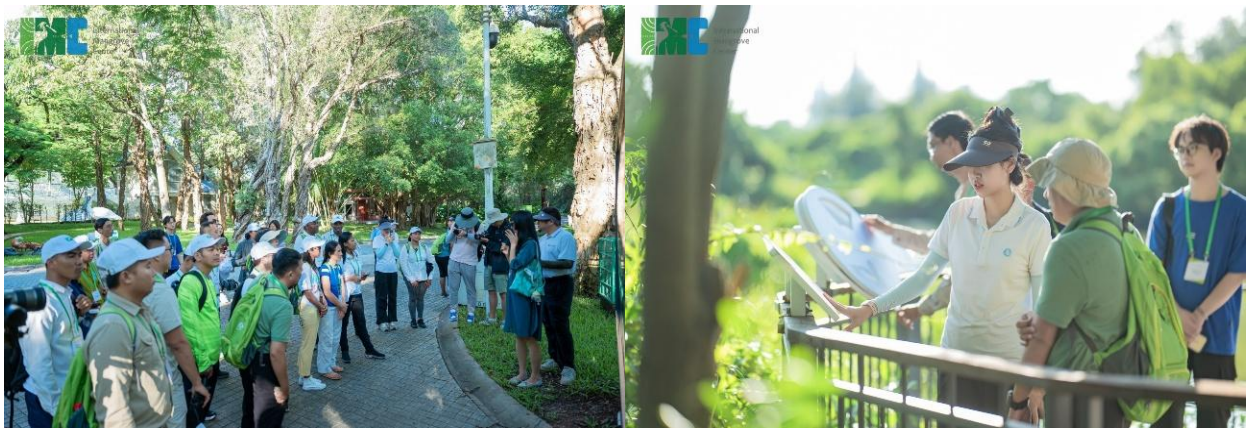


Figure 14: Participants visited to the Futian Mangrove Ramsar Site in Shenzhen

Shenzhen - A Window of Modern Development for Harmony between Man and Nature

Participants visited to the Ping An Financial Center and the Shenzhen Museum of Contemporary Art and Urban, where they gained insights into how Shenzhen integrates economic growth, architectural innovation and environmental considerations within urban development model. The visit to Ping An Financial Center highlighted the city's pursuit of high-density, efficient land use and advanced green building practices in a rapidly urbanizing context. At the Shenzhen Museum of Contemporary Art and Urban Planning, participants learned about the city's long-term planning vision, people-centered urban design and integration of green spaces, cultural infrastructure, and ecological principles into metropolitan development. Together, the visits illustrated how modern urban development can support economic vitality while promoting harmony between human activities and the natural environment.

Figure 15: Participants visited to the Ping An Financial Center in Shenzhen

Photo 16: Participants visited to the Shenzhen Museum of Contemporary Art and Urban

Shenzhen Terrestrial Wildlife Rescue and Wildlife-Borne Disease Monitoring Station

Participants also visited the Shenzhen Terrestrial Wildlife Rescue and Wildlife-Borne Disease Monitoring Station, where they learned about Shenzhen's integrated approach to wildlife conservation, ecological health, and public safety under the "One Health" framework. Ms. CHEN Dan, Officer at Shenzhen Natural Reserve Management Center, highlighted the station's dual role in rescuing, rehabilitating, and releasing injured or confiscated wildlife, particularly migratory birds and threatened species, and in monitoring wildlife-borne diseases such as avian influenza through systematic surveillance and early warning mechanisms. This visit provided the participants a deeper understanding of how wildlife rescue, disease monitoring, and habitat conservation are interconnected, especially for migratory birds that rely on mangrove and wetland ecosystems along flyways. The experience demonstrated how strengthening wildlife health monitoring and rescue systems contributes to biodiversity conservation, ecosystem resilience, and the long-term success of mangrove restoration and migratory bird protection efforts.

Figure 17: Participants visited to the Shenzhen Terrestrial Wildlife Rescue and Wildlife-Borne Disease Monitoring Station

Hainan Province Planning Exhibition Hall

Participants visited the Hainan Province Planning Exhibition Hall, where they gained a comprehensive understanding of Hainan's strategic vision as a Free Trade Port and a national Ecological Civilization Pilot Zone. Through immersive exhibits and planning models, participants learned how spatial planning, economic development, and environmental protection are integrated under the province's master plan, with strong emphasis on giving priority to ecological and environmental conservation. The exhibition highlighted Hainan's commitment to green development, coastal and marine ecosystem protection, and sustainable use of natural resources, which are highly relevant to mangrove conservation, wetland restoration, and migratory bird habitat protection. The visit enabled participants to appreciate how large-scale planning, policy incentives, and public engagement can support biodiversity conservation while promoting high-quality, sustainable development in coastal regions.

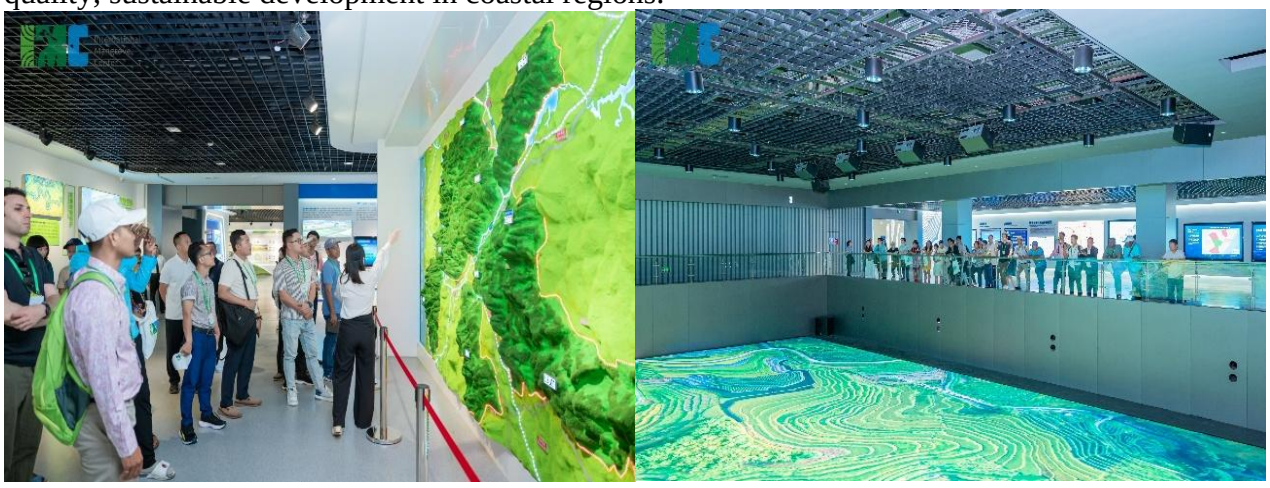


Figure 18: Participants visited to the Hainan Province Planning Exhibition Hall

Dongzhaigang National Nature Reserve

Participants visited the Dongzhaigang National Nature Reserve, China's first national-level mangrove nature reserve, where the visit was coordinated by Mr. FENG Erhui, Dongzhaigang National Nature Reserve. This visit provided a deep-understanding of the reserve's long-term mangrove conservation, large-scale restoration, and integrated ecosystem management, highlighting the reserve's strong governance framework, zonation system, and flagship restoration initiatives, particularly the "returning mariculture ponds to forests" program exemplified by the Jinniu Island Mangrove Restoration Project. Participants learned about the reserve's exceptional biodiversity, including its high diversity of mangrove species and its critical role as a habitat for

migratory waterbirds along the East Asian–Australasian Flyway, such as the Black-faced Spoonbill. The field visit demonstrated how mangrove ecosystems provide essential ecosystem services, including coastal protection, blue carbon sequestration, and nursery habitats for fisheries, offering a practical and replicable model for mangrove restoration, climate resilience, and migratory bird conservation at national and international levels.

Figure 19: Participants visited to the Dongzhaigang National Nature Reserve

Hainan Qinglan Harbor Mangrove Provincial Nature Reserve

Participants visited the Hainan Qinglan Harbor Mangrove Provincial Nature Reserve in Wenchang City, Hainan province, where the filed visit was coordinated by Mr. FU Yonggang, Officer at the Hainan Qinglan Harbor Mangrove Provincial Nature Reserve. The Nature Reserve covers a total area of approximately 2,914.6 hectares and represents one of China's most important coastal mangrove wetland ecosystems. The Nature Reserve supports high biodiversity, including 36 species of mangrove plants, around 117 bird species, many of which are migratory waterbirds along the East Asian–Australasian Flyway, and more than 300 species of fish and other aquatic organisms that depend on mangroves as nursery habitats. During the visit, participants learned about large-scale mangrove conservation and restoration initiatives, including the removal of aquaculture ponds, replanting of degraded areas, strengthened legal enforcement, and ongoing blue carbon initiatives animated at enhancing carbon sequestration and supporting climate change mitigation. The field visit demonstrated how integrated restoration, biodiversity conservation, and blue carbon approaches can strengthen mangrove ecosystem resilience, support migratory bird habitat protection, and promote sustainable coastal development.

Figure 20: Participants visited to the Hainan Qinglan Harbor Mangrove Provincial Nature Reserve

Hainan Lingshui Mangrove National Wetland Park

Participants visited Hainan Lingshui Mangrove National Wetland Park, located in Lingshui Li Autonomous County on the southern coast of Hainan Island. The park encompasses a diverse

mosaic of intertidal habitats, including mangrove forests, tidal flats, rivers, and shallow marine areas. The park provides critical habitat for a wide range of species from resident aquatic organisms and waterbirds to migratory birds that rely on the site as an important stopover along their flyways.

The field study was coordinated by Ms. Fan Ruofei, Officer at Hainan Lingshui Mangrove National Park, who introduced the park's ecosystem-based management approach integrating mangrove reforestation, biodiversity conservation, scientific monitoring, and public education. Through this visit, participants gained insights into how mangrove ecosystems function as natural coastal defenses, blue carbon sinks for climate change mitigation, and nursery grounds supporting local fisheries, illustrating how national wetland parks can balance strict ecological protection with education and sustainable use while advancing mangrove conservation, restoration, and coastal resilience.

Figure 21: Participants visited to the Hainan Lingshui Mangrove National Wetland Park

Yanoda Tropical Rainforest Park

Participants visited Yanoda Tropical Rainforest Park in Baoting Li and Miao Autonomous County, which protects a core area of approximately 45 square kilometers (about 4,500 hectares) of tropical rainforest ecosystem. During the visit, participants learned about Yanoda's conservation-driven management philosophy of "yielding to nature," where ecological protection is prioritized alongside tourism development. The park demonstrated practical measures for low-impact infrastructure, including elevated boardwalks that minimize disturbance to soil and vegetation, closed-loop environmental systems for wastewater and waste management, and its role as a pilot site for UNESCO's "Good Deeds Tourism" initiative. The visit highlighted how sustainable ecotourism, environmental education, and community engagement can coexist with the conservation of intact tropical forest ecosystems, offering valuable lessons for integrating biodiversity conservation with responsible nature-based tourism.

Figure 22: Participants visited to the Yanoda Tropical Rainforest Park

2.5. Group Work and Panel Discussions

2.5.1. Group Discussion 1

The group discussion was facilitated by Prof. LYU Cai, Beijing Forestry University, China, to enable participants to apply the concept of ecological character to practical mangrove and wetland management challenges.

The group discussion emphasized the use of conceptual models as a practical tool to visualize linkages between wetland/mangrove components, processes, services, and external pressures. Participants worked collaboratively to map ecological relationships, identify one or more critical ecological characters, and examine how changes to these characters could affect overall wetland functioning and management outcomes.

The group discussion underscored the importance of prioritization in wetland/mangrove management by encouraging participants to identify key threats, knowledge gaps, and limits of acceptable change. Through this exercise, participants highlighted the value of ecological character descriptions in supporting monitoring design, adaptive management, and decision-making.

Figure 23: Group presentations on applying ecological character concepts

2.5.2. Group Discussion 2

The group discussion on the needs and priority activities of the International Mangrove Center (IMC) was facilitated by Prof. LEI Guangchun from Beijing Forestry University, China. At the beginning of the session, Prof. LEI Guangchun introduced the mission of the IMC and its four main objectives to ensure that all participants shared a common understanding before the discussion started. Participants engaged in an interactive exchange to share their expectations, reflect on key learnings from the workshop, and identify priority actions for IMC in the coming years. The following section summarizes the main results of the discussion, including participants' expectations, the most helpful topics, and proposed priorities for IMC over the next five years.

(i). Participant's Expectation from the Workshop

Participants came with strong interest in learning from China's experience in mangrove and wetland management. Key expectations included:

- Understanding the importance of mangroves in China compared to developing countries.
- Exploring innovative technologies and methodologies used for conservation and restoration.
- Gaining capacity building and knowledge sharing opportunities from Chinese stakeholders.
- Exchanging experiences and practices with other countries.
- Observing site-level restoration and management in China, and learning how conservation can be integrated with urban development.

- Engaging with local communities to understand awareness, alternative livelihoods, and governance structures.
- Strengthening networking, culture exchange, and opportunities for collaboration with the IMC.

(ii). Key Learnings /Most Helpful Topics from the Workshop

Participants identified several important themes from the workshop, including:

- Use of advanced technologies such as drones, sensors, automatic monitoring systems, and climate change mapping.
- Strong integrated planning that combines conservation with economic development and urban growth.
- Sustainable financing opportunities, particularly carbon markets and blue carbon trading.
- Ecological mangrove restoration (EMR) techniques and methodologies adapted to different contexts.
- Mangrove habitat dynamics, connectivity, and biodiversity assessments.
- Engagement of local communities and effective CEPA approaches.
- Restoration of degraded areas such as fish ponds into mangroves.
- Conservation of migratory birds and wetland habitats, particularly in demonstration sites like Mai Po.

(iii). Priorities for the IMC in the Next Five Years

Participants highlighted a set of priority actions for IMC to consider as follow:

1. Knowledge Sharing and Strengthening Joint Research Cooperation

- Strengthen joint research and collaborative monitoring among IMC member countries.
- Establish and improve data-sharing platforms and regional databases.
- Coordinate the use of remote sensing and scientific data for mangrove assessment.
- Promote knowledge management through publications, case studies, and lessons learned.

2. Technology Transfer and Scientific and Technical Cooperation, and Training

- Facilitate the transfer and application of advanced technologies for mangrove conservation and restoration.
- Promote scientific and technical cooperation among member states and research institutions.
- Organize technical training, workshops, and exchange visits.
- Support adaptation of technologies and methodologies to national and local contexts.

3. Education, Information, Communication, and Public Awareness Mechanisms

- Strengthen CEPA approaches.
- Increase engagement of local communities, youth, and other stakeholders.
- Establish mangrove and wetland education and learning centers in member states.
- Improve information sharing and public awareness on the value of mangroves and wetlands.

4. Capacity Building and Pilot Projects

- Build capacity of technical staff, institutions, and local communities in member countries.
- Mobilize resources through grants, scholarships, and technical cooperation.
- Implement pilot IMC projects in member states to demonstrate best practices.
- Ensure strong coordination and follow-up with national focal points to support implementation.

Figure 24: Group discussion on IMC priorities and future actions

2.6. Closing Ceremony

The closing ceremony of the Second Workshop on Mangrove Conservation and Restoration was held on 18 September 2025, marking the successful completion of the two-week program.

Prof. Bao Daming, Director General of the Interim Secretariat of IMC, delivered remarks at the closing ceremony of the IMC Workshop on Mangrove Conservation and Restoration. He congratulated the participants on the successful completion of the ten-day workshop, commended their active engagement in technical discussions and field visits, and expressed appreciation to the organizers, co-organizers, and host governments for their strong support. He highlighted the workshop's contribution to IMC's core mandate of capacity building, noting key thematic areas such as multilateral environmental agreements, China's mangrove action plan, migratory bird protection, and blue carbon initiatives, as well as the value of practical learning at Ramsar sites and mangrove reserves in Shenzhen and Hainan. Mr. Bao Daming underscored the spirit of international cooperation among participating countries and outlined IMC's forthcoming work on small grants mechanisms, remote sensing–based global mangrove monitoring, and blue carbon trading research. He encouraged participants to act as ambassadors for mangrove conservation, applying the knowledge gained to strengthen conservation and restoration efforts in their home countries, and reaffirmed IMC's commitment to continued collaboration in safeguarding mangroves as shared global ecological assets.

Following, **Mr. Chen Jingjin**, Member of the Standing Committee of the Sanya Municipal Party Committee and Executive Vice Mayor of Sanya, delivered his remarks. He congratulated participants on completing the program and expressed appreciation to the experts and organizers for their contributions. Mr. Chen emphasized that Sanya, rich in mangrove diversity and home to several important reserves, has long prioritized mangrove protection and restoration. He noted that conservation is a global responsibility requiring international cooperation and welcomed the establishment of the International Mangrove Center in Shenzhen as a new milestone. He encouraged participants to bring their learning home, to promote mangrove conservation in their own countries, and to cherish their experience in Sanya.

The closing session concluded with a certificate awarding ceremony, where Prof. Bao Daming and Mr. Chen Jingjin jointly presented certificates to the participants. This formal recognition symbolized both the successful completion of the training and the collective responsibility of participants to advance mangrove protection in their respective countries and regions.

Figure 25: Prof. Bao Daming presenting a certificate to a representative participant from Iran

Figure 26: Mr. Chen Jingjin presenting a certificate to a representative participant from Madagascar

3. Conclusions

The Second International Mangrove Center Workshop on Mangrove Conservation and Restoration 2025 successfully achieved its objectives of strengthening technical knowledge, fostering international cooperation, and promoting practical, science-based approaches to mangrove and wetland conservation. Through a well-balanced combination of expert lectures, country experience sharing, field visits, and group discussions, the workshop provided participants with a comprehensive understanding of both global trends and site-specific challenges in mangrove and wetland management.

The technical sessions underscored the critical ecological, economic, and social values of mangrove ecosystems, particularly their roles in biodiversity conservation, climate change mitigation through blue carbon, disaster risk reduction, and livelihood support. Presentations on the Global Wetlands Outlook 2025 and China's wetland governance framework highlighted the urgency of reversing wetland loss and the importance of strong legal, institutional, and planning mechanisms. Case studies from Shenzhen, Mai Po, and other sites demonstrated how science-based restoration, adaptive management, long-term monitoring, and integration with urban planning can deliver measurable conservation outcomes even under intense development pressure.

The sharing of national experiences revealed both common challenges, such as land encroachment, climate change impacts, limited financial resources, and enforcement constraints, and diverse pathways for addressing them. Community-based management, policy reform, capacity building, and innovative financing mechanisms, including blue carbon markets and payment for ecosystem services, emerged as recurring priorities across countries. The discussions highlighted that while ecological contexts differ, the principles of maintaining ecological character, stakeholder engagement, and evidence-based decision-making are universally applicable.

Field visits and on-site teaching further reinforced the importance of translating policy and scientific knowledge into practical action. Participants gained first-hand exposure to integrated mangrove management models, restoration techniques, biodiversity zoning, and value-realization mechanisms, strengthening their ability to adapt these approaches to their national contexts. The cultural exchange components also deepened mutual understanding and trust, laying a strong foundation for future collaboration.

Overall, the workshop reaffirmed the role of the International Mangrove Center as a vital platform for knowledge sharing, technical cooperation, and capacity building under the Ramsar Convention framework. By equipping participants with enhanced skills, practical tools, and expanded professional networks, the workshop contributed meaningfully to advancing mangrove conservation and restoration efforts at national, regional, and global levels. Continued cooperation through the IMC, coupled with sustained investment, policy support, and knowledge exchange, will be essential to ensure that mangroves and wetlands continue to support biodiversity, climate resilience, and human well-being for present and future generations.

Annexes
Annex 1: Agenda Program

Date	Day	Time	Activities	Lecturer/Moderator/Institute	Location
Sept 10th	Wed	All Day	Arrival & Registration	Mr. JIANG Yi, Program Officer, National Academy of Forestry and Grassland Administration (NAFGA), China	Shenzhen Guohui Hotel
Sept 11th	Thus	08:30-10:30	Opening Ceremony 2025 Mangrove Wetland Education CEPA Symposium and IMC Workshop	Mr. JIANG Yi, Program Officer, NAFGA, China	The Hetao Shenzhen-Hong Kong Science and Technology Innovation Cooperation Zone **Dress code: IMC shirt*
		10:30-11:00	Tea Break & Group Photo	Mr. JIANG Yi, Program Officer, NAFGA, China	The Hetao Shenzhen-Hong Kong Science and Technology Innovation Cooperation Zone
		11:00-12:20	2025 Mangrove Wetland Education CEPA Symposium	Mr. JIANG Yi, Program Officer, NAFGA, China	The Hetao Shenzhen-Hong Kong Science and Technology Innovation Cooperation Zone
		12:20-13:00	Lunch	Mr. JIANG Yi, Program Officer, NAFGA, China	The Hetao Shenzhen-Hong Kong Science and Technology Innovation Cooperation Zone
		13:00-13:40	On-Site Teaching 1: Visit the Interim Secretariat of International Mangrove Center	Mr. WU Tong Interim Secretariat of International Mangrove Center	Hetao Innovation Center Shenzhen City

Date	Day	Time	Activities	Lecturer/Moderator/Institute	Location
		14:00-14:45	Lecture 1: Introduction to China and the Chinese Culture	Ms. WU Xuerui, Vice President, NAFGA, China	Qianhai Hall, Shenzhen Guohui Hotel
		15:30-17:00	Lecture 2: China's Wetland Conservation & Ramsar Implementation	Ms. HU Xinxin Department of Wetland Management, National Forestry and Grassland Administration (NFGA), China	Qianhai Hall, Shenzhen Guohui Hotel
Sept 12th	Fri	9:00-10:00	Lecture 3: Mangrove Habitat Dynamics, Connectivity and Complexity	Prof. A. Aldrie Amir, Universiti Kebangsaan Malaysia, Malaysia	Qianhai Hall, Shenzhen Guohui Hotel
		10:00-10:30	**Interactive Q&A** ①: Question and Answer based on the Lecture topic and Mangrove Conservation experience	Prof. A. Aldrie Amir, Universiti Kebangsaan Malaysia, Malaysia	Qianhai Hall, Shenzhen Guohui Hotel
		10:30-11:30	Lecture 4: Mangrove Conservation in Mai Po	Dr. WEN Xianji, Director of Mai Po Nature Reserve and Flyway Program, WWF-Hong Kong, China	Qianhai Hall, Shenzhen Guohui Hotel
		11:30-12:00	**Interactive Q&A** ②: Question and Answer based on the Lecture topic and Mangrove Conservation experience	Dr. WEN Xianji, Director of Mai Po Nature Reserve and Flyway Program, WWF-Hong Kong, China	Qianhai Hall, Shenzhen Guohui Hotel

Date	Day	Time	Activities	Lecturer/Moderator/Institute	Location
		14:00-15:30	On-site Teaching 2: Visit Shenzhen Planning Building & Global Wetlands Outlook Salon	Prof. ZHOU Haichao, Shenzhen University, China	Shenzhen Planning Building
		15:30-17:00	On-site Teaching 3: Guangdong Shenzhen Futian Mangrove Ramsar Site	Dr. XU Hualin Scientist of Futian Mangrove Site, China	Neilingding Futian National Nature Reserve
Sept 13th	Sat	9:00-10:00	Lecture 5: Waterbirds Conservation	Mr. CHEN Kelin, Scientist of Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China	Qianhai Hall, Shenzhen Guohui Hotel
		10:00-10:30	**Interactive Q&A** ③: Question and Answer based on the Lecture topic and Mangrove Conservation experience	Mr. CHEN Kelin, Scientist of Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China	Qianhai Hall, Shenzhen Guohui Hotel
		10:30-11:30	Lecture 6: Integrating Mangrove Restoration with Local Economic Development	Ms. Verónica Forestry Officer, Ministry of Environment, Panama	Qianhai Hall, Shenzhen Guohui Hotel
		11:30-12:00	**Interactive Q&A** ④: Question and Answer based on the Lecture topic and Mangrove Conservation experience	Ms. Verónica Forestry Officer, Ministry of Environment, Panama	Qianhai Hall, Shenzhen Guohui Hotel
		14:00-17:00	On-site Teaching 4: Shenzhen-A Window of Modern Development for Harmony Between Man and Nature	Commentator from Shenzhen Finance Center, China Ms Yuan Qiufeng, Director of Shenzhen Museum of Contemporary Art and Urban Planning, China	Shenzhen Finance Center & Shenzhen Museum of Contemporary Art and Urban Planning

Date	Day	Time	Activities	Lecturer/Moderator/Institute	Location
Sept 14th	Sun	09:00-10:30	Lecture 7: Mangrove Ecological Character Maintenance	Prof. LYU Cai, Beijing Forestry University, China	Qianhai Hall, Shenzhen Guohui Hotel
		10:30-12:00	Group Discussion Discussion 1	Prof. LYU Cai, Beijing Forestry University, China	Qianhai Hall, Shenzhen Guohui Hotel
		14:00-14:45	Lecture 8: Development and Trading Practice of Shenzhen Mangrove Conservation Carbon Sink project	Dr. XIE Xinli Shenzhen Natural Resources and Real Estate Evaluation and Development Research Center	Qianhai Hall, Shenzhen Guohui Hotel
		14:45-15:30	Discussion: Mangrove Conservation Cases and Experience Sharing	Mr. JIANG Yi, Program Officer, NAFGA, China	Qianhai Hall, Shenzhen Guohui Hotel
		15:30-17:30	On-site Teaching 5: Visit Shenzhen Terrestrial Wildlife Rescue and Wildlife-Borne Disease Monitoring Station	Ms. CHEN Dan, Shenzhen Natural Reserve Management Center	Shenzhen Natural Reserve Management Center
Sept 15th	Mon	08:50-10:15	From Shenzhen to Haikou	Mr. JIANG Yi, Program Officer, NAFGA, China	Haikou City
		11:00-11:30	Welcome Ceremony	Mr. ZHOU Yadong, Chief Engineer, Forestry Department of Hainan Province, China	He tai Hotel (Hong Cheng hu Branch)
		12:00-13:00	Lunch	Mr. JIANG Yi, Program Officer, NAFGA, China	He tai Hotel (Hong Cheng hu Branch)
		14:30-17:00	On-site Teaching 6: Hainan Province Planning Exhibition Hall	Ms. WANG Feifei, Hainan Province Planning Exhibition Hall, China	Hainan Province Planning Exhibition Hall
Sept 16th	Tues	8:30-9:30	From Hotel to Dongzhaigang National Nature Reserve	Mr. JIANG Yi, Program Officer, NAFGA, China	Haikou City

Date	Day	Time	Activities	Lecturer/Moderator/Institute	Location
		9:30-11:00	On-Site Teaching 7: Dongzhaigang National Nature Reserve	Mr. FENG Erhui, Dongzhaigang National Nature Reserve, China	Dongzhaigang National Nature Reserve
		11:00-12:00	From Dongzhaigang National Nature Reserve to Wenchang	Mr. JIANG Yi, Program Officer, NAFGA, China	Wenchang City
		12:00-13:00	Lunch	Mr. JIANG Yi, Program Officer, NAFGA, China	Jinshi International Hotel
		14:00-16:00	On-Site Teaching 8: Hainan Qinglan Harbor Mangrove Provincial Nature Reserve	Mr. FU Yonggang, Hainan Qinglan Harbor Mangrove Provincial Nature Reserve, China	Qinglan Harbor Mangrove Provincial Nature Reserve
		16:00-18:00	From Wenchang to Lingshui	Mr. JIANG Yi, Program Officer, NAFGA, China	Lingshui County
		18:00-19:00	Dinner	Mr. JIANG Yi, Program Officer, NAFGA, China	Hainan Lingshui Alcadia Hotel
Sept 17th	Wed	9:30-11:30	On-Site Teaching 9: Hainan Lingshui Mangrove National Wetland Park	Ms. FAN Ruofei, Hainan Lingshui Mangrove National Wetland Park, China	Lingshui County
		12:00-13:00	Lunch	Mr. JIANG Yi, Program Officer, NAFGA, China	Wulan Resort Hainan Clear Water Bay
		13:00-14:30	From Lingshui to Sanya	Mr. JIANG Yi, Program Officer, NAFGA, China	Sanya City
		14:30-16:30	On-Site Teaching 10: Yanoda Tropical Rainforest Park	Commentator from Yanoda Tropical Rainforest Park	Yanoda Tropical Rainforest Park

Date	Day	Time	Activities	Lecturer/Moderator/Institute	Location
		17:00-18:00	Dinner	Mr. JIANG Yi, Program Officer, NAFGA, China	Sanya Phoenix Kailai Hotel
Sept 18th	Thur	9:00-11:00	Group Discussion 2	Prof. LEI Guangchun, Beijing Forestry University, China	Phoenix A Hall, Sanya Phoenix Kailai Hotel
		11:00-11:10	Tea Break	Mr. JIANG Yi, Program Officer, NAFGA, China	Phoenix A Hall, Sanya Phoenix Kailai Hotel
		11:00-12:00	Closing Ceremony	Prof. BAO Daming Director General of the Interim Secretariat, International Mangrove Center	Phoenix A Hall, Sanya Phoenix Kailai Hotel **Dress code: IMC shirt*
		14:00-17:00	Self-study	Mr. JIANG Yi, Program Officer, NAFGA, China	Sanya City
		18:00-19:30	Farewell Dinner	Prof. BAO Daming Director General of the Interim Secretariat, International Mangrove Center	Sanya Phoenix Kailai Hotel
Sept 19th	Fri	All Day	Departure	Mr. JIANG Yi, Program Officer, NAFGA, China	Sanya City

Annex 2: List of Participants

No	Country	Names	Gender	Title/Organization	Email Address
1	**Cambodia**	PECH Moran	Male	Deputy Director, General Directorate of Natural Protected Area	morann_wcd@yahoo.com pech.moran@moe.gov.kh
2		SUN Visal	Male	Deputy Director, General Directorate of Natural Protected Area	sunvisal@gmail.com
3		PHAN Channa	Male	Deputy Director, General Directorate of Natural Protected Area	channra.phan@gmail.com
4		PEN Sokmean	Male	Chief of Office, General Directorate of Natural Protected Area	p.sokmean@yahoo.com
5		TIENG Bunna	Male	Vice Chief of Office, General Directorate of Natural Protected Area	bunnatieng16@gmail.com
6		OEUN Koemoun	Male	Vice Chief of Office, General Directorate of Natural Protected Area	koemoun@gmail.com
7		PAN Chettra	Male	Vice Chief of Office, Department of Environment, Kampot Province	panchettra@gmail.com
8		SREY Sothim	Male	Vice Chief of Office, Department of Environment, Kep Province	sothim.cwf@gmail.com
9		THAV Kim Sun	Male	Official, General Directorate of Natural Protected Area	Thavkimsun168@gamil.com
10	**Madagascar**	RAZAFINDRABE Rinah	Male	General Director of Environment and Sustainable Development, Ministry of Environment and Sustainable Development	rarinah@yahoo.fr
11		RAKOTOARISOA Julien Noël	Male	Mangrove National Focal Point, Ministry of Environment and Sustainable Development	julien.soa@yahoo.com

12		RATEFASON Tojotsara	Female	Director of Protected areas, renewable natural resources and ecosystems, Ministry of Environment and Sustainable Development	tojoratefason@gmail.com
13		RAZANAKOLONA Onjanirina	Female	Youth national focal point in the Ramsar Convention, Ministry of Environment and Sustainable Development	razanakolonasynt@gmail.com
14		RAVELOSON Onjanantenaina Cynthia	Female	Head of the Regional Forestry Department Menabe, Ministry of Environment and Sustainable Development	c.raveloson@gmail.com
15		RASOANAIVO Mbolatsioritiana Manitrala Arlivah	Female	Biodiversity & Forest and Landscape Restoration projects Coordinator, FAO	manitrala.rasoanaivo@fao.org
16		RAZAFINAIVO Ravakiniaina Frida	Female	Coordinator of Sustainable Coastal Fisheries Program, Madagascar National Parks	frida_cad@mnparks.mg
17		RASOLOFOMANANA Lilia	Female	Mangroves Program Coordinator, WWF	lrasolofomanana@wwf.mg
18	**Sierra Leone**	Samuel Ibrahim KOBBA	Male	Resource Mobilization Manager, National Protected Area Authority and Conservation Trust Fund	samuelibrahimkobba@gmail.com
19	**Zimbabwe**	Phanuel Kudakwashe MANGISI	Male	Manager- Environmental Impact Assessment(EIA) & Ecosystems Protection/Ramsar Convention National Focal Point, Environmental Management Agency (EMA)	phanuel.mangisi@ema.co.zw
20	**Iran**	Reza JAVID	Male	Head of Abadan Environmental protection Department	javidreza86@gmail.com
21	**China**	LIN Chen	Female		
22		FAN Yongli	Male		
23		HOU Gang	Male		
24		DENG Lili	Female		

Annex 3: Technical Lectures

Annex 3.1: Introduction to China and Its Culture

Introduction to China and its Culture

WU Xuerui

National Academy of Forestry and Grassland Administration

Sept. 2025

Main contents

Part One Profile of China

Part Two Population and Culture

2

Part One Profile of China

I. Geography
II. History
III. Political system
IV. Economy
V. Diplomacy

3

I. China's geography

The People's Republic of China, commonly referred to as China. China is vast in territory, with beautiful mountains and rivers.

4

1. Location and territory

East Asia and west to the Pacific, with a land area of 9.6 million km², the third largest after Russia and Canada.

5

2. Terrain and landscape

Altitude decreases from west to east, resembling a flight of three stairs. Mountains, hills and plateaus account for 67% and basins and plains 33% of China's total area.

- First stair: altitude over 4000 meters ---Plateaus and mountains
- Second stair: altitude 1000-4000 meters---Plateaus and basins
- Third stair: altitude below 1000 meters ---Plains and low hills

6

3. Rivers and water resources

China is one of the countries with the most rivers in the world, with over 1,500 rivers having a drainage area exceeding 1,000 square kilometers. Among them, the Yellow River and the Yangtze River are the mother rivers of the Chinese nation.

Every March 9th is the Mother River Protection Day in China.

7

4. Scenery

China has vast territory, abundant resources, diverse climate, beautiful scenery, and countless fascinating mountains, lakes, canyons, and waterfalls.

This picture are Lushan Mountain in central China, the Yarlung Zangbo River in southwest China, Hainan Island in southern China, and the colorful Danxia landscape in northwest China.

World Natural Heritage Sites from China

As of August 2024, China boasts 19 World Natural Heritage sites, ranking among the top globally. This includes 15 World Natural Heritage sites and 4 World Heritage Mixed sites, covering a total area of over 80,000 square kilometers.

9

The aquatic forest of Huanglong Wucaichi

Sichuan Giant Panda Sanctuaries

Arrow Bamboo Lake in Jiuzhaigou Valley

The pinnacles of Mount Sanqingshan in Jiangxi

"The Roof of Central China" in Shennongjia, Hubei

The sandstone pinnacles of Wulingyuan in Hunan

10

The red cliffs of China Danxia

The stone forests in the South China Karst

Fanjing Mountain Scenic Area in Guizhou

Chengjiang biota in Yunnan

11

Three Parallel Rivers of Yunnan Protected Areas

Snow lotus of the Tianshan Mountains in Xinjiang

The Tibetan antelope (Chiru) of Hoh Xil, Qinghai

The venerable pine trees of Mount Tai in Shandong

Bizarrely-shaped pine trees of Mount Huangshan in Anhui

Leshan Giant Buddha in Sichuan

12

The symbiotic tea-agroforestry system of Mount Wuyi in Fujian

China's Yellow(Bohai) Sea Migratory Bird Habitat

The lakes within the Badain Jaran Desert

13

II. China's history

China is one of the ancient civilizations in the world, and the only country among the four ancient civilizations (ancient Egypt, ancient India, and ancient Babylon) with uninterrupted civilization. According to the latest achievements of the "Exploration of Civilization" project, the recorded history of China is over 5800 years. In the long process of historical evolution, the Chinese people have created brilliant historical and cultural heritage.

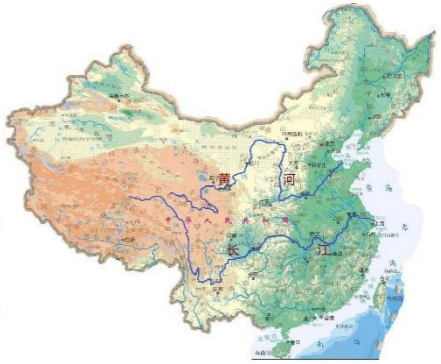
14

(1) Cradle of civilization

Chinese civilization starts from the Yellow River （5,464km） and the Yangtze River（6,300km） drainage areas.

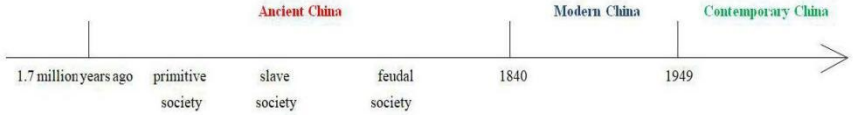
The Yellow River

The Yangtze River



15

(2) Historical periods



There are three historical periods in China's history: ancient times, modern times, and contemporary times.

16

Ancient China

China's ancient history and dynasties oriented from 1.7 million years ago, ended in 1840AD, before the First Opium War.

The ancient history includes: Primitive society, Slavery society, Feudal society.

17

Modern China

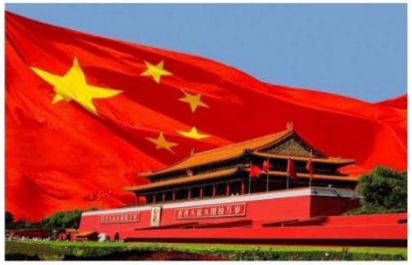
From 1840 （the First Opium War）- 1949（the founding of PRC), the history of the semi-colonial and semi-feudal society.

The first Opium War 1840

18

Contemporary China

From 1949（the founding of PRC) till now, the socialist revolution and construction period

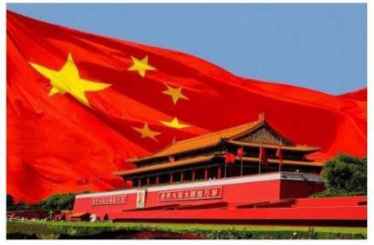


Founding of People's Republic of China 1949

19

IV. China's political system

- The basic political structure: under the leadership of the Communist Party of China, the systems of People's Congress, Multi-party Cooperation and Political Consultation, and Regional Autonomy for Ethnic Minorities are adopted.



20

1. People's congress system

- The people's congress is an important part of the system of socialism with Chinese characteristics and the fundamental political system.

21

2.Multi-party Cooperation and Political Consultation

- The CPC is the only ruling party in China and the rest 8 democratic parties, led by the CPC, participate in the state affairs.

22

3.The System of Regional Ethnic Autonomy

- Regional ethnic autonomy means that under the unified leadership of the state, regional autonomy is exercised in areas where ethnic minorities live in compact communities and organs of self-government are established to exercise the power of autonomy. It is a basic element of China's socialist, political system, and a fundamental mechanism to resolve ethnic issues.

23

4. China's administrative system

China's administrative units are currently based on a three-tier system, dividing the nation into provinces, counties and townships:

- The country is divided into provinces, autonomous regions and municipalities directly under the Central Government;
- A province or an autonomous region is subdivided into autonomous prefectures, counties, autonomous counties and cities;
- A county or an autonomous county is subdivided into townships, ethnic townships and towns.

24

- The State Council of the People's Republic of China, also known as the Central People's Government
- Municipalities directly under the Central Government and large cities are subdivided into districts and counties;
- Autonomous prefectures are subdivided into counties, autonomous counties and cities.
- Autonomous regions, autonomous prefectures and autonomous counties are all ethnic autonomous areas.
- The Constitution specifically empowers the state to establish special administrative regions when necessary.
- A special administrative region is a local administrative area directly under the Central Government.

25

V. China's economy

Reform and opening up

Deng Xiaoping
(1904-1997)

The CPC has steered China to such massive growth and development by introducing its major economic reforms, known as the reform and opening-up policy, in 1978.

Deng Xiaoping led this policy and was hailed as the "chief architect of China's reform and opening up".

By 2024, China's gross domestic product will increase to 134.9 trillion (RMB), consolidating its position as the world's second-largest economy.

26

Shenzhen before and after the policy

27

VI. China's diplomacy

1. Basic tenets
   - Maintaining world peace and promoting common development are the purposes of China's foreign policy
   - The five principles of peaceful coexistence are the basic norms of China's foreign relations.
   - Independence is the basic position of China's foreign policy.
   - Strengthening solidarity and cooperation with third world countries is the basic foothold of China's foreign policy.

28

2. Major country diplomacy with Chinese characteristics

- The major country diploma with Chinese characteristics is the inheritance and development of China's consistent foreign policy and ideology in the new era. Its core values embody the traditional Chinese culture of "the world is for all" and are in line with the universal demand for peace and friendship in human civilization.

29

A Community with Shared Future for Humanity

- To build a community with a shared future for humanity calls for concrete actions. China has advocated that the international community promote a common approach to partnership, the security landscape, economic development, cultural exchanges and eco-environmental conservation.

The Belt and Road Initiative

- The initiative was launched by Chinese President Xi Jinping in 2013.
- In September 2013, during an official visit to Kazakhstan, Xi announced the Silk Road Economic Belt, a plan to develop overland infrastructure to connect the region.
- BRI infrastructure projects connect China with different parts of the world.

30

3. Diplomatic relations and International Cooperation

China and Cambodia

China's President Xi Jinping Met With Cambodia's Prime Minister Hun Manet

Cambodia's Minister of Environment Eang Sophalleth, and China's Vice Minister of Natural Resources Sun Shuxian signed the agreement

31

China and Madagascar

China's President Xi Jinping Met With Madagascar President Andry Nirina Rajoelina

Mangrove Conservation Foundation signed the memorandum with Max Fontaine, Minister of Environment and Sustainable Development of Madagascar

32

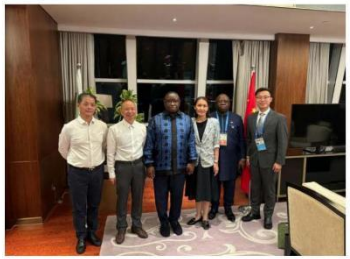
China and Iran

China's President Xi Jinping Met With Iranian President Pezehi Qiyan

The Iranian delegation visited Inner Mongolia, China

33

China and Sierra Leone



China's President Xi Jinping Met With Sierra Leone President Bio

Mahogany Industry Branch of China Forest Products Industry Association President Wu Jinsong met with Sierra Leone President Bio

34

China and Zimbabwe

China's President Xi Jinping Met With President of Zimbabwe Mnangagwa

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Part Two Population and Culture

I. Chinese Humanities
II. Chinese Culture

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I. Chinese Humanities

1. Population

The latest census shows, China's population reaches 1.41 billion.

The data shows that China's population has continued to maintain a low growth trend for 10 years, and China is accelerating to enter an aging society.

37

2. Ethnic Groups

Ethnic groups China is a unified country with 56 ethnic groups with the han people accounting for 91.11% of the total population

II. Chinese Culture

1. Traditional culture

Chinese culture, which originated in the Yellow River basin, has a history of more than five thousand years. From the Yangshao culture and Longshan culture in ancient times, to the ritual and music system of the Xia, Shang, and Zhou dynasties, and then to the contention of hundreds of schools of thought during the Spring and Autumn and Warring States periods, Chinese culture has undergone a long course of development.

The Yellow River

39

Chinese culture is inclusive and develops in a long history. In the process of historical development, not only have numerous local schools of thought emerged, but also foreign cultures have been constantly introduced. Different schools of thought and cultures have absorbed and integrated into each other in contradictions and conflicts, gradually establishing a basic pattern of Confucianism as the main body, with Confucianism, Buddhism, and Taoism each holding its own unique banner, while also working together to complement each other and apply it to society.

Confucius

benevolence, righteousness, courtesy and trustworthiness

Laotzu

non-intervention, follow the nature

Buddha

compassion, karma

40

Confucianism emphasizes benevolence and filial piety, requiring humans to hold awe for all things in nature and to maintain the harmonious order of the universe. Taoism focuses on pursuing the realm of natural non-action, integrating with nature, seeking harmony and unity between nature and human, and advocating that human should conform to the way of nature, abandon impatience and utilitarianism, and pursue inner tranquility and self-transcendence. Buddhism emphasizes letting go of desires, pursuing inner peace and transcendence, advocating compassion, paying attention to the suffering of all beings, and promoting coexistence with nature to achieve harmonious coexistence between human and nature.

2.Specific forms of Chinese Culture

2.1 Opera and Quyi arts

Chinese opera is one of the three ancient dramas in the world (including Chinese opera, Greek tragicomedy, and Indian Sanskrit opera), with over 300 genres including Peking Opera, Kunqu Opera, Yue Opera, and Yu Opera. Peking Opera is the most influential. Peking Opera, also known as Peking Opera or National Opera, is divided into four types of characters: male roles, female roles, painted roles and clowns--on stage. It has four skills: singing, speaking, acting and acrobatic fighting.

赤壁 The Red Cliffs

Quyi arts

Quyi is a general term for various "talking and singing arts". It is a unique art form that has evolved over a long period of development from folk oral literature and singing arts. According to incomplete statistics, there are about 400 different types of quyi performed by various ethnic groups in China.

Quyi, as a performing art, uses "oral talking and singing" to narrate stories, portray characters, express thoughts and emotions, and reflect social life. Just as the essential characteristic of opera art is "performing stories through singing and dancing," the fundamental feature of quyi art can be described as "narrating stories through oral talking and singing."

苏州评弹Suzhou Pingdan

45

2.2 Music and dance

Chinese music specifically refers to Chinese instrumental music and Chinese vocal music, with a history that can be traced back to the Yellow Emperor era. From Confucius' transmission of the Six Arts to modern Western music, Chinese music has continued to enrich and develop in the process of absorbing foreign musical elements. China is known as the "land of rites and music," and ancient music played a significant role and held an important position in personality cultivation, cultural life, and national etiquette.

战国时期曾侯乙编钟
Zeng Houyi Chime Bells

46

Music

Guzheng

Pipa

Erhu

47

二泉映月 Moon Reflected in Second Spring

48

Dance

It can be said that China has had a history of dance for as many years as it has had civilization. Chinese traditional dance is rich in variety and form, containing abundant cultural connotations and ethnic characteristics. Classical dance is one of the main forms of Chinese dance, which has formed a unique artistic style through thousands of years of development and inheritance. It mainly includes Han and Tang dances, court dances, and more. Ethnic and folk dances refer to the dances of various ethnic groups in China in aspects such as production labor, living customs, religious beliefs, etc., fully demonstrating the unique customs and cultural traditions of various ethnic groups in China.

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《霓裳羽衣舞》The Dance of Rainbow Skirt and Feathered Robe

50

2.3Chinese calligraphy

Calligraphy is a unique traditional art in China, mainly composed of writing Chinese characters with a brush, as well as pen calligraphy and finger writing. There are five main styles of Chinese calligraphy: seal script, clerical script, regular script, running script, and cursive script.

51

Calligraphy Practice

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2.4Poetry and rhymes, as well as classics, histories, philosophical works, and collected works,

Poetry and rhymes are the treasures of ancient Chinese literature. With refined language, profound artistic conception, and rich emotions, they express the unique perceptions of ancient literati on themes such as life, nature, love, friendship, home, and country. Poetry, songs, and rhymes emphasize rhythm, parallelism, and the creation of artistic conception, embodying the essence of ancient Chinese literary art."
From the simplicity and freshness of the "Book of Songs" to the prosperity and splendor of Tang poetry, and further to the graceful delicacy of Song lyrics, poetry and songs have carried the development process of ancient Chinese literature and reflected the social styles and humanistic spirits of different historical periods.

Li Bai, 701—762

53

The collection of classics, histories, philosophical works, and collected works constitutes the core of ancient Chinese academic culture. The classics section includes Confucian classics such as the "Book of Songs", "Book of History", "Book of Rites", "I Ching", and "Spring and Autumn Annals", which are important carriers of mainstream thought and moral norms in ancient Chinese society. The histories section includes various historical works such as "Records of the Grand Historian", "History of the Han Dynasty", and "History of the Later Han Dynasty", which record the social development, changes, and historical events of ancient China, serving as important materials for studying ancient Chinese history. The philosophical works section covers the writings of various schools of thought such as "The Analects of Confucius", "Mencius", "Laozi", "Zhuangzi", etc., representing different ideological schools and academic viewpoints in ancient China.

Sima Qian, 145B.C.--?

54

定风波(Calming Wind and Waves)

55

2.5Architecture

- The total number of world heritage sites amounts to 1,122, distributed in 167 countries around the world, with 39 dual world cultural and natural heritage sites, 213 world natural heritage sites and 869 world cultural heritage sites. China has 57 world cultural and natural heritage sites on the World Heritage List, including 39 world cultural heritage sites, 4 dual world cultural and natural heritage sites and 14 world natural heritage sites.

56

The Great Wall, also known as the Ten Thousand Li Great Wall, has a total length of over 21000 kilometers and is mainly distributed in 15 provinces, autonomous regions, and municipalities, including Hebei, Beijing, Tianjin, Shanxi, Shaanxi, Gansu, Inner Mongolia, Heilongjiang, Jilin, Liaoning, Shandong, Henan, Qinghai, Ningxia, and Xinjiang. It is listed as a world cultural heritage site. It is an ancient military defense fortification in China, a tall, sturdy, and continuous long wall used to limit the movement of enemy cavalry.

57

The Palace Museum was a royal palace of the Ming and Qing dynasties in China. It's also known as the Forbidden City, located at the center of the central axis of Beijing. The Forbidden City is centered around three major halls, covering an area of approximately 720000 square meters with a building area of approximately 150000 square meters. There are over 70 palaces of various sizes and 8707 rooms. The Forbidden City is one of the largest and most well preserved wooden structure ancient architectural complexes in the world, and is a world cultural heritage site.

58

III. Chinese martial arts

Chinese martial arts is a rich and full cultural carrier, reflecting Chinese wisdom in every move, embodying Chinese spirit in every fist and every movement, and concealing Chinese civilization in every skill and theory. Chinese martial arts emphasizes the balance of strength and softness, with both internal and external cultivation. It has a robust and beautiful appearance, as well as an elegant and profound connotation.

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Video: Three Section Cudgel

60

IV.Festivals and customs

4.1 Etiquettes

Chinese traditional culture is renowned for its long history, profound connotations, and diverse artistic forms. One of its core characteristics is the high emphasis on ceremonies and etiquette. Ceremonies and etiquette permeate every aspect of Chinese traditional culture, from family to society, from religion to politics, omnipresent. They are not only seen as a code of conduct but also carry moral values, social order, and the maintenance of interpersonal relationships. Through the study and inheritance of ceremonies and etiquette, we can gain a deep understanding of the essence of Chinese traditional culture and experience the respect and care between people.

61

In the excellent traditional Chinese culture, rituals and etiquette play an important role. Ritual is a sacred activity that expresses respect for significant events and traditional customs through standardized procedures and unique symbols. Etiquette emphasizes the norms and respect of personal behavior, reflecting the unique expression of culture.

In traditional Chinese culture, etiquette is regarded as a necessary social way and behavioral norm. It involves interpersonal communication, social interaction, and rituals in various fields. Etiquette occupies an important position in traditional Chinese culture and runs through all aspects of people's lives.

62

Tiananmen Square Flag Raising Ceremony

63

4.2 Important festivals

Chinese traditional festivals are an important part of the long history and culture of the Chinese nation, with diverse forms and rich content. The formation of traditional festivals is a process of long-term accumulation and cohesion of the historical and cultural heritage of a nation or country.

64

China is a nation of ceremonies. Rituals express Chinese people's recognition of the importance and value of things. Without a sense of ritual can hardly make people psychologically identify and comply with festivals. Rituals themselves are an important way for people to participate. Below is a brief introduction to some of the main traditional Chinese festivals.

65

Spring Festival

also known as the Lunar New Year or the Chinese New Year. The Spring Festival has a long history and evolved from the ancient era of praying for the beginning of the year and offering sacrifices. In traditional agricultural societies, the beginning of the Spring Festival is of great significance. Starting with a hundred festivals, the Spring Festival is the most solemn traditional festival of the Chinese nation. It not only embodies the ideological beliefs, ideal wishes, life entertainment, and cultural psychology of the Chinese nation, but also serves as a display of blessings, food, and entertainment activities.

66

Yuanxiao Festival

also known as the Lantern Festivalalls on the 15th day of the first lunar month every year and is one of the traditional festivals in China. The first month is the first month of the lunar calendar. The 15th day of the first month is the first full moon night of the year, so the 15th day of the first month is called "Yuanxiao (Filled round balls made of glutinous rice-flour for Lantern Festival) Festival". Since ancient times, the custom of Yuanxiaoas been dominated by the warm and festive custom of watching lanterns.

67

Qingming Festival

also known as Qingqing Festival, Xingqing Festival, March Festival, Ancestral Worship Festival, etc., is celebrated at the turn of mid spring and late spring. The Qingming Festival originated from the ancestral beliefs and spring festival customs of ancient times, and has both natural and cultural connotations. It is not only a natural solar term, but also a traditional festival.

68

Loong Boat Festival

The ancients have always advocated the path of righteousness and righteousness. The Dragon Boat Festival, also known as Zhongzheng, refers to the noon hour on this day, which is the highest point in the middle. The Loong Boat Festival originated from the worship of celestial phenomena and evolved from dragon worship in ancient times. The Dragon Boat Festival is an auspicious day of "flying dragons in the sky". People hold some celebration activities at the Dragon Boat Festival, especially the activity elements corresponding to the dragon, such as offering sacrifices to the dragon and ancestors, picking up the Loong Boat, etc., or do some activities to pray for good fortune and ward off evil spirits on this auspicious day.

69

Mid-Autumn Festival

also known as the Reunion Festival, originates from the worship of celestial phenomena and evolved from the ancient autumn moon sacrifice. Since ancient times, the Mid-Autumn Festival has been associated with customs such as moon worship, moon gazing, eating mooncakes, playing with lanterns, admiring osmanthus flowers, and drinking osmanthus wine, which have persisted and spread for a long time. Eating mooncakes has become an essential custom for celebrating the Mid-Autumn Festival across China. On this day, people eat mooncakes to symbolize "reunion".

70

New Year's Eve

marks the final night of the year, signifying the end of the old year and the beginning of a new one. It is a day for removing the old and welcoming the new, for family reunion, and for sacrificing to ancestors. Together with the Qingming Festival, the Zhongyuan Festival (July 15th), and the Double Ninth Festival, New Year's Eve is one of the major traditional Chinese festivals for ancestral worship.

71

V. Food culture

5.1 Chinese food

Chinese cuisine is famous worldwide and is one of China's business cards. Color, aroma, taste, and shape are the four major standards of Chinese cuisine. Traditional Chinese cuisine uses chopsticks as a tool for eating. For thousands of years, people have continuously summarized and formed the eight major cuisines of Chinese cuisine, namely the Shandong, Sichuan, Guangdong, Fujian, Jiangsu, Zhejiang, Hunan, and Anhui schools.

72

5.2 Chinese tea

China is the homeland of tea and the birthplace of tea culture. Chinese tea culture has a long and profound history, with a discovery and utilization spanning over 4,700 years. It has remained vibrant and widespread globally. Chinese tea culture encompasses not only the material cultural aspect but also a profound spiritual dimension. The "Tea Classic" by Lu Yu, the Tea Sage of the Tang Dynasty, sounded the clarion call of Chinese tea culture in history. Since then, the spirit of tea has permeated the imperial court and society, deeply influencing Chinese poetry, painting, calligraphy, religion, and medicine. Over thousands of years, China has accumulated not only a substantial material culture related to tea planting and production but also a rich spiritual culture associated with tea, which is the unique tea culture of China.

73

In 2022, traditional Chinese tea making techniques and related customs were included in the UNESCO Intangible Cultural Heritage List. Chinese tea art is renowned worldwide and was introduced to Japan during the Tang Dynasty, forming the Japanese tea ceremony.

China's tea varieties are also diverse, classified into green tea, black tea, oolong tea, white tea, yellow tea, dark tea, and so on.

74

VI. Technological innovations

In addition to historical relics, ancient China also had countless technological inventions. There were the Four Great Inventions in ancient China, namely paper, Movable type, gunpowder and compass, which greatly promoted the development of politics, economy and culture in ancient China. They spread to the West through various channels, and exerted great influence on the development of world civilization.

75

Paper

Paper was invented by Cai Lun in 105 AD (during the Eastern Han Dynasty). It was made from bark, hemp, rags, and old fishing nets, which is convenient for people to write and promoted cultural dissemination.

76

Movable type printing

Printing in ancient China can be traced back to the 6th century AD. Engraving printing was invented in the Tang Dynasty. Bi Sheng invented movable type printing, marking the birth of movable type printing. He was the world's first inventor, about 400 years ahead of Western lead movable type printing.

77

Gunpowder

The invention and use of gunpowder can be traced back to 2000 years ago. In the Spring and Autumn period, China had already used gunpowder for civilian and people's livelihood applications. China's gunpowder has advanced the process of world history. Gunpowder shook the feudal rule of Western Europe and was one of the important impetus to the European Renaissance and Religious Reform.

78

Compass

The invention of the compass can be traced back to the Warring States period (2500 years ago), greatly promoting the development of navigation and writing a glorious page in the history of world navigation.

79

VII. Traditional Chinese Medicine

Traditional Chinese Medicine (TCM). TCM emphasizes "observation, listening, inquiry, and palpation," viewing the human body as a unity of qi (vital energy), form, and spirit. It is also a great invention in Chinese tradition and has made significant contributions to humanity throughout history. In addition to TCM, there are also ethnic medical systems in China such as Tibetan medicine, Zhuang medicine, Miao medicine, Mongolian medicine, Uyghur medicine, Korean medicine, and Dai medicine.

80

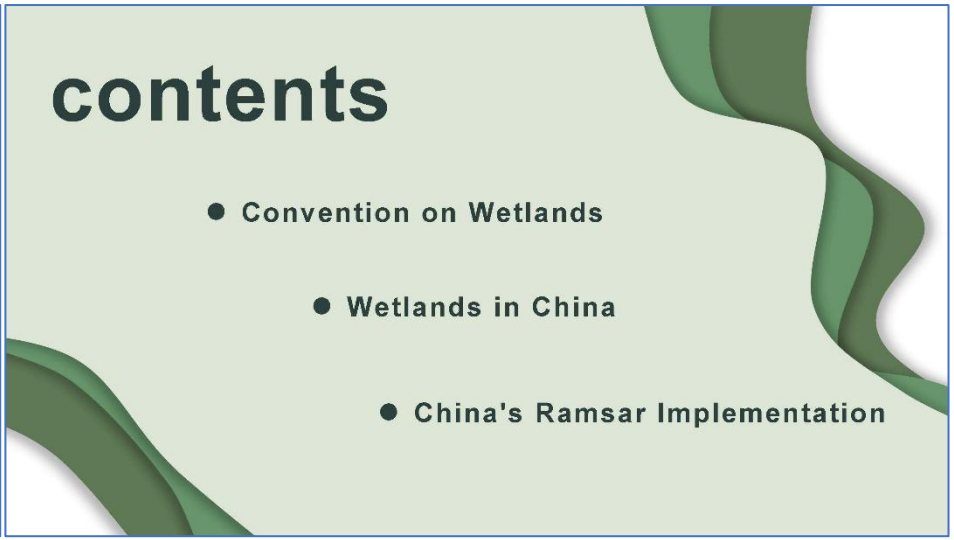
On November 16, 2010, the application for Chinese acupuncture to be included in the World Intangible Cultural Heritage succeeded.

81

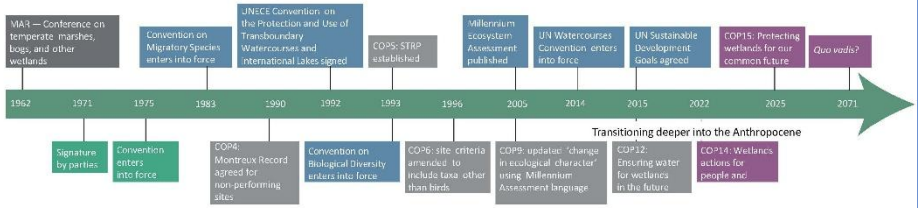
Thank you for your attention!

82

Annex 3.2: China's Wetland Conservation and Ramsar Implementation



Convention on Wetlands (Ramsar, 1971)



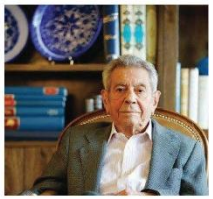
Peter Bridgewater and Rakhyun E. Kim 2021

Convention on Wetlands (Ramsar, 1971)

Origin: large area of marshland and other wetlands in Europe were being "reclaimed" or otherwise destroyed, with decline in numbers of waterfowl.

Dr Luc Hoffmann
(1923–2016)
- Swiss ornithologist, conservationist, and philanthropist.
- Project MAR initiated in 1962
- "MARshes", "MARécages", "MARismas"
- Co-founder of WWF

Prof. Geoffrey Matthews
(1923-2013)
- British ornithologist
- Director of IWRB
- Contribute to convention text



Mr Eskander Firouz
(1926–2020)
- Director of Iran's Game and Fish Department
- Organizer of Ramsar meeting in 1971

Convention on Wetlands (Ramsar, 1971)

2 February 1971, the Convention on Wetlands of International Importance especially as Waterfowl Habitat agreed by 18 nations

In February 2011 the Convention celebrated its 40th anniversary.

Convention on Wetlands (Ramsar, 1971)

Mission

"The conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world."

A **broad** definition of Wetlands includes all lakes and rivers, underground aquifers, swamps and marshes, wet grasslands, peatlands, oases, estuaries, deltas and tidal flats, mangroves and other coastal areas, coral reefs, and all human-made sites such as fish ponds, rice paddies, reservoirs and salt pans.

Convention on Wetlands (Ramsar, 1971)

It has been 54 years since the adoption of the Convention, and the objectives of the Convention on Wetlands have shifted from the protection of waterfowls and their habitats at the beginning to the wetland ecosystem conservation and wise use of the wetlands.

Ramsar
CONVENTION ON WETLANDS
CONVENTION SUR LES ZONES HUMIDES
CONVENCIÓN SOBRE LOS HUMEDALES
(Ramsar, Iran, 1971)

Convention on Wetlands (Ramsar, 1971)

Three Pillars: Wise use

At the centre of the Convention on Wetlands philosophy is the "wise use" of wetlands.

1987 COP3 Regina, Canada

"The wise use of wetlands is their sustainable utilization for the benefit of humankind in a way compatible with the maintenance of the natural properties of the ecosystem".

Sustainable utilization was defined as "human use of a wetland so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations".

Natural properties of the ecosystem were defined as "those physical, biological or chemical components such as soil, water, plants, animals and nutrients, and the interactions between them".

1990 Guidelines for the implementation of the wise use concept.

"the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development".

Convention on Wetlands (Ramsar, 1971)

Three Pillars: Ramsar list

Each Contracting Party must designate at least one wetland site within their territory for inclusion in the List of Wetlands of International Importance (the "Ramsar List").

Convention on Wetlands (Ramsar, 1971)

Three Pillars: International Cooperation

The Convention on Wetlands provides the **single most global framework** for intergovernmental cooperation on wetland issues.

Article 5 of the Convention establishes that "the Contracting Parties shall consult with each other about implementing obligations arising from the Convention especially in the case of a wetland extending over the territories of more than one Contracting Party or where a water system is shared by Contracting Parties. They shall at the same time endeavour to coordinate and support present and future policies and regulations concerning the conservation of wetlands and their flora and fauna."

Transboundary Wetlands of International Importance
67 by 2024, 2.66%

Ramsar Regional Initiatives
22 RRIs by 2024

Convention on Wetlands (Ramsar, 1971)

Ramsar Regional Initiatives

Definition

Ramsar Regional Initiatives (RRIs) under the Convention on Wetlands are intended as Operational Means to provide effective **support** for improved **implementation** of the Convention and its **strategic plan** **in specific geographic regions**, through voluntary international cooperation on wetland-related issues of common concern. Regional Centers for training and capacity building, and Regional Networks to facilitate cooperation.

2009 Europe 7 countries	1999(1991) **Europe** **Africa** **Asia** 27 Countries	2005 **North America** **Asia** **Oceania** 17+1 countries	1999(2004) Latin America & Caribbean North America 30 countries	2009 Latin America & Caribbean 14 countries	2009 East Asia 18 countries	2002 Central and West Asia 18+3 countries	2023 International Mangrove Center >18 countries

Regional Centres (4)	Regional Networks (18)				
1) CREHO	1) MedWet	5) BlackSeaWet	9) Mangroves & Coral Reefs	13) Amazon	17) IMC
2) RRC-CWA	2) WACoWet	6) Carpathian WI	10) River Plate Basin	14) IBRRI	18) Danube
3) RAMCEA	3) High Andean	7) NorBalWet	11) NigerWet	15) RRI-CA	
4) RRC-EA	4) EAAFP	8) CariWet	12) SenegalWet	16) SADC	

Convention on Wetlands (Ramsar, 1971)

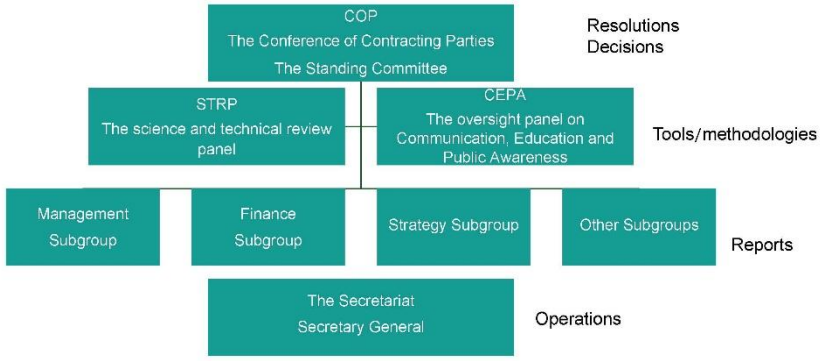
Governance

The Conference of the Contracting Parties (COP)
The Standing Committee (SC)
The Scientific and Technical Review Panel (STRP)
The Communication, capacity building, education, participation and awareness (CEPA) Oversight Panel
International Partners(Birdlife International, IUCN , WI,WWF,International Water Management Institute ,WWT)
The Secretariat and the Secretary General

Strategic Plan

Convention on Wetlands (Ramsar, 1971)

Bodies of the Convention on Wetlands



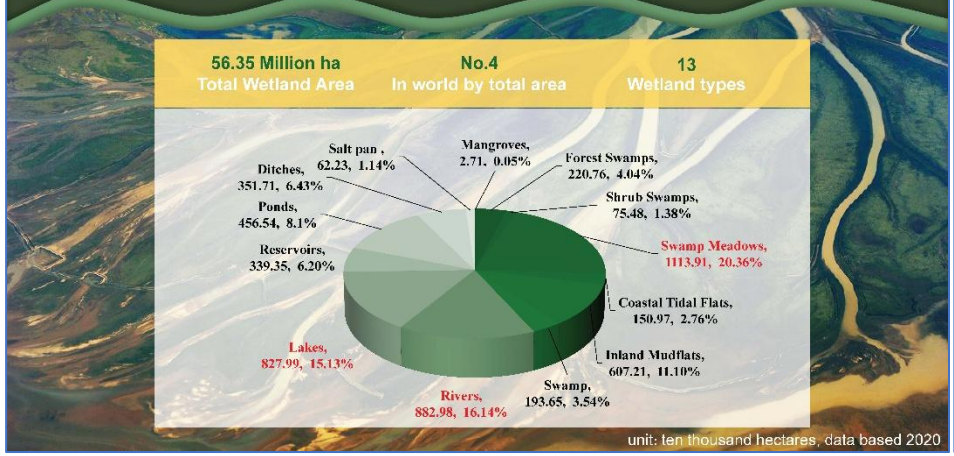
Convention on Wetlands (Ramsar, 1971)

Convention on Wetlands (Ramsar, 1971)

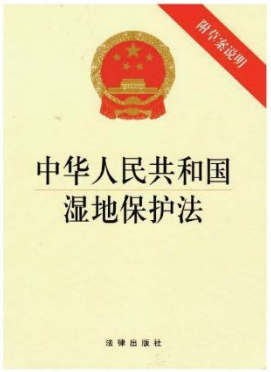
Ramsar COPs

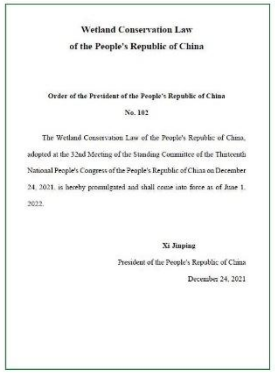
COP15	Zimbabwe Protecting Wetlands for Our Common Future	2025
COP14	China-Switzerland Wetland Actions for People and Nature	2022
COP13	UAE - Wetlands for a Sustainable Urban Future	2018
COP12	Uruguay - Wetlands for our Future	2015
COP11	Romania - Wetlands: Home and Destination	2012
COP10	Korea - Healthy Wetlands, Healthy People	2008
COP9	Uganda -Wetlands and water: supporting life, sustaining livelihoods	2005
COP8	Spain - Wetlands: Water, Life, and Culture	2002
COP7	Costa Rica - People and Wetlands -The Vital Link	1999
COP6	Australia	1996
COP5	Japan	1993
COP4	Switzerland	1990
COP3	Canada	1987
COP2	Netherlands	1984
COP1	Italy	1980

Wetlands in China-Resources



Wetlands in China-Legislation and Policy





Legal and Regulatory Systems

The Wetlands Conservation Law of the People's Republic of China was promulgated and implemented as of 1 June 2022.

30 of the 31 provinces on mainland China have released provincial regulations on wetlands.

Wetlands in China-Legislation and Policy

The Wetlands Conservation Law of the People's Republic of China

General Provisions

For purposes of this Law, wetlands refer to natural or artificial, perennial or seasonal waterlogged areas and waters with significant ecological functions, including areas of marine water the depth of which at low tide does not exceed six meters, with the exception of paddy fields as well as artificial waters and tidal flats used for aquaculture. The state adopts a system of hierarchical management and a system of lists for wetlands.

Wetlands in China-Legislation and Policy

The Wetlands Conservation Law of the People's Republic of China

Strictly control the occupation of wetlands

Article 19 The state shall strictly control the occupation of wetlands.

Occupation of wetlands of national importance is prohibited, except for major national projects, disaster prevention and mitigation projects, projects of important water conservancy and protection facilities, or wetland conservation projects, etc.

Article 20 If it is indeed necessary for a construction project to temporarily occupy wetlands, it shall be handled in accordance with the provisions of the Land Administration Law of the People's Republic of China, et al. The period of temporary occupation of the wetlands shall generally not exceed two years and no permanent structure shall be built on the wetlands temporarily occupied.

Within one year after the expiration of the temporary occupation of the wetlands, the land-using entities or individuals shall restore the size and ecological conditions of the wetlands.

Wetlands in China-Legislation and Policy

The Wetlands Conservation Law of the People's Republic of China

Strictly control the occupation of wetlands

Article 21 Except where flood control projects, navigation channels, ports or other water projects occupy wetlands in watercourse management areas and in flood detention and retention basins, the entity that has been approved to occupy important wetlands in accordance with the law shall, in light of local natural conditions, restore or rebuild the wetlands until they reach the original size and quality. If restoration or rebuilding is not feasible, a wetland restoration fee shall be paid. Those paying the wetland restoration fee may not be required to pay other fees of the same nature.

The management measures for the payment and use of wetland restoration fees shall be formulated by the financial department under the State Council, in conjunction with other relevant departments under the State Council such as the forestry and grassland department.

Wetlands in China-Legislation and Policy

The Wetlands Conservation Law of the People's Republic of China

Wetland Conservation and Utilization

Article 23 Adhering to the principles of ecology first and green development, the state strives to optimize the wetland conservation system, improve policy support and the scientific and technological support mechanism for wetland conservation, ensure the ecological functions and sustainable utilization of wetlands, and coordinate ecological, social and economic benefits.

Wetlands in China-Legislation and Policy

The Wetlands Conservation Law of the People's Republic of China

Wetland Conservation and Utilization

Article 28 The following acts that damage wetlands or their ecological functions are prohibited:

(1) reclaiming or draining natural wetlands, or permanently cutting off water sources of natural wetlands;

(2) filling in natural wetlands or conducting sand mining, ore mining, or soil extraction without authorization;

(3) discharging industrial wastewater or domestic sewage that does not meet the discharge standards for water pollutants, or other wastewater or sewage that pollutes wetlands, or dumping, stacking, discarding, or scattering solid wastes;

(4) overgrazing, indiscriminately exploiting wild flora, overfishing or fishing with damaging methods that might cause depletion of fish stocks, excessively using fertilizers or pesticides, overfeeding, or conducting other planting and breeding practices polluting wetlands; and

(5) other acts that destroy wetlands or their ecological functions.

Wetlands in China-Legislation and Policy

The Wetlands Conservation Law of the People's Republic of China

Wetland Conservation and Utilization

Article 26 The local people's governments at all levels shall give different guidance to the utilization of wetlands of provincial importance and general wetlands, encourage entities and individuals to carry out activities such as eco-tourism, eco-agriculture, eco-education and experiences in nature that meet the requirements for wetland conservation, and moderately control the scale of wetland utilization such as farming, animal husbandry and aquaculture.

The local people's governments at all levels shall encourage relevant entities to give priority to local residents' participation in wetland management and conservation.

Wetlands in China-Legislation and Policy

The Wetlands Conservation Law of the People's Republic of China

Mangrove

Article 34 The local people's governments at or above the county level of the places where mangrove wetlands are located shall organize the formulation of special planning for mangrove wetland conservation and take effective measures to protect such wetlands.

Mangrove wetlands shall be included in the lists of important wetlands. Those meeting the criteria for wetlands of national importance shall be included, with priority, in the List of Wetlands of National Importance.

It is prohibited to occupy mangrove wetlands.

Wetlands in China-Legislation and Policy

The Wetlands Conservation Law of the People's Republic of China

Mangrove

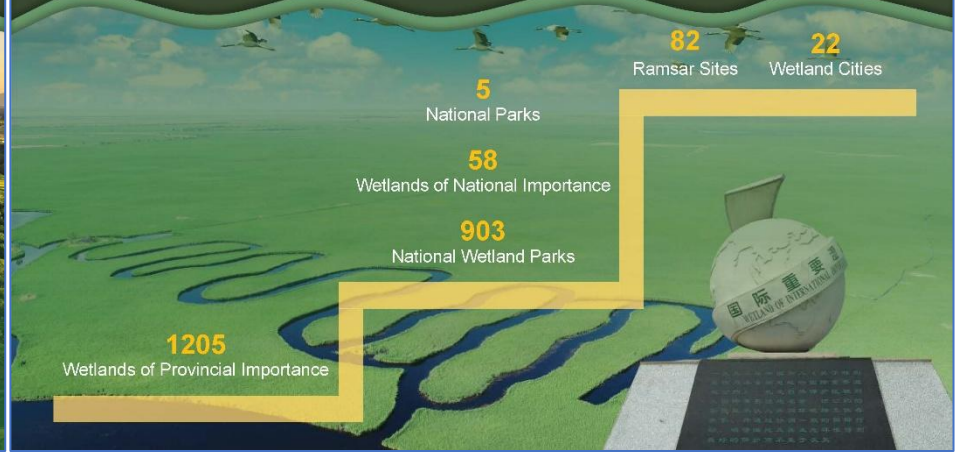
Digging ponds in mangrove wetlands is prohibited, so is logging, digging or transplanting mangroves, overharvesting mangrove seeds, or releasing or planting species that endanger the growth of mangroves. Where logging, digging, or transplanting mangroves, or collecting mangrove seeds is necessary for scientific research, medicinal purpose, or mangrove wetland conservation, the matter shall be handled in accordance with the provisions of the relevant laws and regulations.

Wetlands in China-Legislation and Policy

Regulations and Releasion on the Designation of Wetlands of National Importance
(2022)

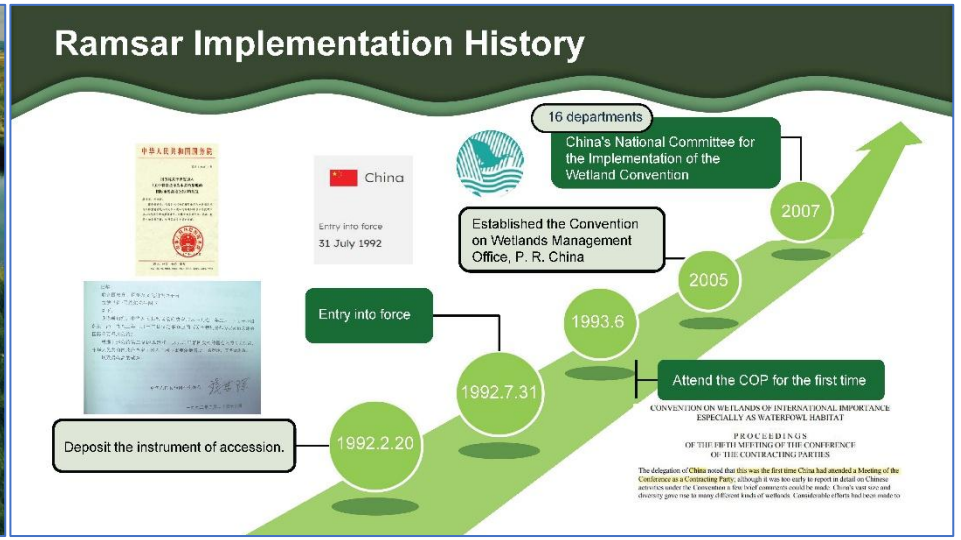
Interim Measures for the Payment, Use and Management of Wetland Restoration Fees
(2024)

Wetlands in China-Hierarchical Management System



3 China's Ramsar Implementation

Ramsar Implementation History



Ramsar Implementation

National Body
- Enhance integration of Ramsar implementation with domestic wetland conservation.

Ramsar Sites
- Conduct the application, designation, and monitoring of Ramsar sites.

International Cooperation
- Implement GEF fund project
- Combine with the "Belt and Road" initiative, deepen bilateral and multilateral wetland cooperation.

01

02 **Conferences**
- Host COP14
- Participate in COP and SC
- Organize exhibitions and side events.

03

04 **Wetland Cities**
- Conduct the application and management of Wetland Cities.

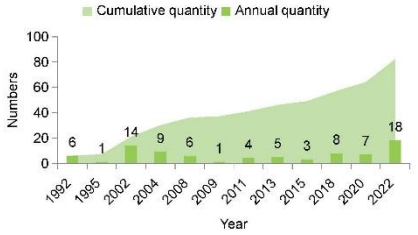
05

06 **IMC**
- Establish the International Mangrove Center in Shenzhen.

National Implementation Institution

01	Ramsar Administrative Authority of China, and Wetland Center under SFA established in 2005
02	National Committee to Implement Ramsar Convention established in 2007
03	Department of Wetlands Management under NFGA established in 2018

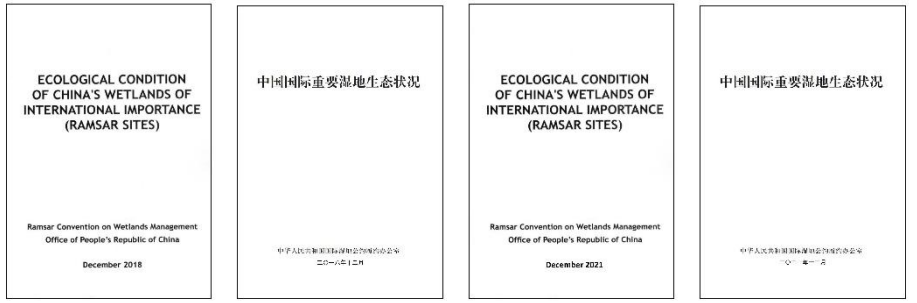
Ramsar sites in China



China has designated **82** Ramsar Sites since 1992, total **7.64 million ha**, spanning from coastal to inland areas and from plains to plateaus, covering a variety of wetland types and distributed across the country.

Ramsar sites in China

Based on "Indicator System for Monitoring the Important Wetlands", China has implemented continuous and comprehensive monitoring of ecological condition of wetlands of international importance (Ramsar sites since 2018.



Wetland City in China

2018 6 Cities
China: Changde, Changshu, Dongying, Harbin, Haikou, Yinchuan

2022 7 Cities
Hefei,Jining, Liangping, Nanchang, Panjin,Wuhan and Yangcheng

国家林业和草原局办公室文件

国家林业和草原局办公室关于印发
《国际湿地城市认证提名办法》的通知

Measures for the Administration of International Wetland City Accreditation and Indicators for International Wetland City Accreditation, NFGA

Wetland City in China

Chinese Wetland Cities showed their cases in the China exhibition at COP15.

Haikou: Known as the "Water City," Haikou boasts the most important and distinctive wetland resources, including the Dongzhai Port mangroves and Yangshan volcanic lava wetlands.

Chongming: As the world's largest estuarine alluvial island, Chongming, a district of Shanghai, born from growing sediments at the Yangtze estuary, 70% of which is covered by wetlands.

Dali: Surrounded by mountains, Dali features a unique urban pattern where alpine lakes coexist with the city, setting a model for plateau lake wetland conservation and proper use.

Wetland City in China

Fuzhou

By innovating its wetland governance system, Fuzhou strives to build a poetic habitat spanning tidal mudflats to mangrove belts, and a paradise for birdwatching and intangible cultural heritage transmission.

Hangzhou

As a cradle of Chinese civilization and one of the Seven Ancient Capitals, Hangzhou has established a system that integrates satellite, aerial and ground-based monitoring, enabling smart management of Xixi and West Lake wetlands.

Jiujiang

As an important hotspot on the East Asian-Australasian Flyway and Asia's largest wintering ground for migratory birds, Jiujiang's Poyang Lake hosts 400,000–500,000 birds annually, as the most significant habitat in the flyway.

Wetland City in China

Lhasa

Located on the middle reaches of the Lhasa River (a tributary of the Brahmaputra) at an average altitude of 3,650 meters, Lhasa has implemented 238 wetland conservation projects.

Suzhou

As a 2,500 year old "Oriental Water City" with over 20,000 rivers and 400 lakes, Suzhou has developed a "Suzhou Path" balancing conservation and use, properly utilizing wetland resources and developing eco-economy

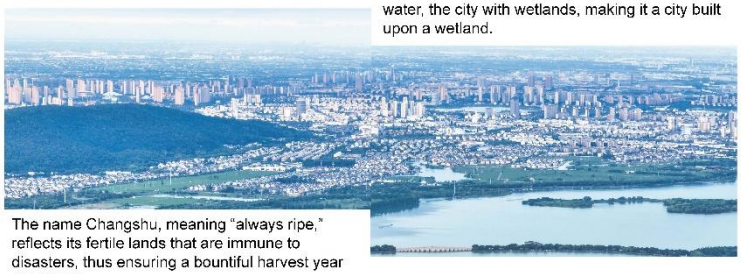
Wenzhou

At the junction of the subtropical and north subtropical zones, Wenzhou innovates "Wetland+" comprehensive governance, implementing coastal, island, and urban wetland restoration, promoting mangrove planting and blue carbon development.

Case on Wetland City

Changshu

For thousands of years, the lifestyle of the Jiangnan water town has merged people with water, the city with wetlands, making it a city built upon a wetland.



The name Changshu, meaning "always ripe," reflects its fertile lands that are immune to disasters, thus ensuring a bountiful harvest year after year.

Case on Wetland City

Changshu

Since 1985, Changshu has taken the lead in China to carry out the wetland restoration project, with a total investment of more than **8 billion yuan**.

Restored 10,000 ha of Shanghu Lake by relocating factories, afforesting, and diverting river water back to the lake.

Restored large wetlands ecologically, such as Kuncheng Lake, Shajiabang, Nanhu Dang and Qinhu Lake.

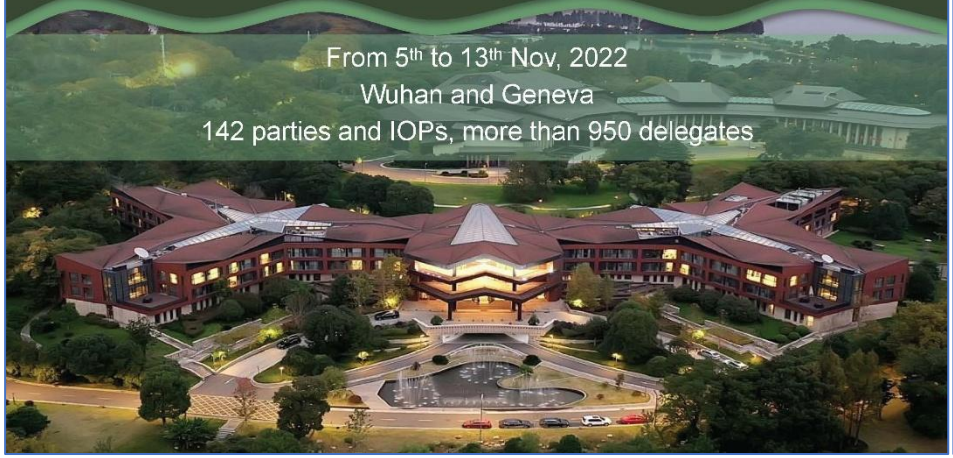
Comprehensively managed and protected a wide range of small wetlands.

Case on Wetland City

Changshu-Wetland Steward

In 2019, Changshu became the first city in China to establish a Wetland Steward Technical System. This addressed the lack of professionalism among personnel responsible for managing vegetation, food chains and bird habitats, by engaging a third party.

Hosting COP14 (2022)



Hosting COP14 - close cooperation

中华人民共和国国务院办公厅

国务院办公厅关于同意成立《湿地公约》第十四届缔约方大会组织委员会和执行委员会的函

- To establish Organizing Committee and the Executive Committee
- Composed by 22 government departments
- Made decisions on major issues
- Ensured the funding and security etc.

Hosting COP14 - rich activities

High-level Ministerial Segment

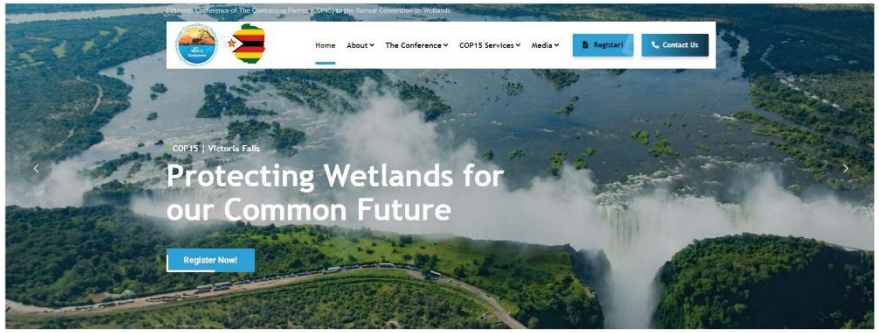
The exhibition of China's 30 years of implementing the Convention

Hosting COP14

Fruitful Outcomes

- The Wuhan Declaration
- The Global Strategic Framework for Wetland Conservation 2025-2030
- Establishment of the International Mangrove Center
- Adoption of 21 resolutions

Attending COP15



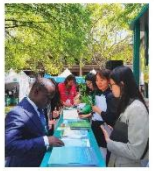
Fifteenth Conference of The Contracting Parties (COP15) to the Ramsar Convention on Wetlands
Victoria Falls | 23-31 July 2025

Attending COP15

Openning ceremony

Attending COP15

Hosting China's Exhibition



Attending COP15

Hosting China's Exhibition

Emmerson Mnangagwa, the President of Zimbabwe visited the China's Exhibition and leave note

Attending COP15

Hosting China's Exhibition

Musonda Mumba, the Secretary General of the Convention, visited the China's Exhibition and left a message highly praising China's achievements in wetland conservation.

Attending COP15

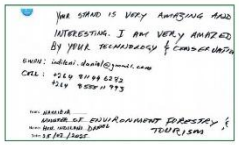
Hosting China's Exhibition

Cuba

Adianez Taboada Zamora
Vice Minister of Science, Technology and Environment

Namibia

Indileni.Daniel
Minister of Environment and Tourism



Attending COP15

Hosting China's Exhibition

Sierra Leone

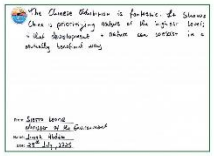
Jiwoh Abdmai

Minister of Environment And Climate Change

Iran

Ahmad-Reza Lahijanzadeh

Deputy for Marine and Wetlands at the Department of Environment



Attending COP15

Hosting China's Side Event

Yan Zhen, Vice Administrator of the NFGA , and Dr. Musonda Mumba, the SG of the Convention, attended the event and delivered speeches.

Attending COP15

Hosting China's Side Event

7 representatives delivered keynote speeches, sharing their experiences and achievements in wetland conservation.

Attending COP15

Outcomes

Adoption of 25 resolutions, 2 submitted by China

31 new wetland cities, 9 from China

5th Strategic plan 2025-2034

The Victoria Falls Declaration

Attending COP15

Cultivate numerous friendly relationships

Draft resolution from China

COP15

Draft resolution on strengthening national actions for the conservation and restoration of waterbird flyways and critical sites

Submitted by China and Cambodia.

Draft resolution from China

COP15

Draft resolution on promoting incorporation of new technology and traditional knowledge in wetland conservation, restoration, management and wise use

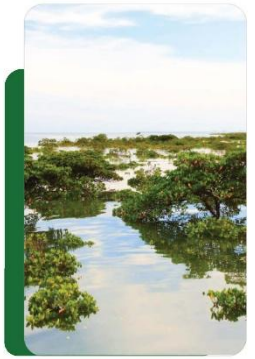
Submitted by China, Burkina Faso, Cambodia, Gabon, Libya, Madagascar and Panama.

Draft resolution from China

COP14

Proposal to establish an International Mangrove Center (a Ramsar Regional Initiative)

Submitted by China, Cambodia and Madagascar.



International Mangrove Center (IMC)

Signing Ceremony of the Establishment Agreement

Ceremony

China

Cambodia

Madagascar

Nov. 6, 2024, 18 founding member states signed the Establishment Agreement

International Mangrove Center (IMC)

More members

During COP15, Zimbabwe signed an establishment agreement with IMC, becoming the 19th intended member country.

International Mangrove Center (IMC)

Mangrove in the Republic of the Sudan

More members

The Republic of the Sudan became the 20th member.

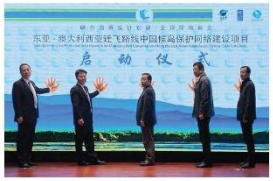
On August 25th, the Republic of the Sudan contacted the Secretariat of the IMC via email, expressing its wish to join the IMC, and officially signed the Establishment Agreement on the same day.

International Mangrove Center (IMC)

More members

During the conference, a number of contracting parties including Iran, the United Arab Emirates (UAE), Oman, and Myanmar also expressed their willingness to join.

International Cooperation



GEF projects

May 2021, GEF flyway project launched.

International training

Training workshop on wetland conservation and management every year

International Cooperation

GEF project

International Cooperation

International Cooperation for Sustainable Management of Wetlands in the Lancang- Mekong Basin

2022.11

- Workshop on Lancang-Mekong Wetland Conservation Strategic Plan
- Training Workshop on Lancang-Mekong Wetland Conservation and Management

21 Representatives from Cambodia, Laos, Myanmar and Thailand attended the workshops online

International Cooperation

International Cooperation for Sustainable Management of Wetlands in the Lancang- Mekong Basin

2024.3

- Sustainable Utilization of Wetland Resources Sharing Session

27 Representatives from Cambodia, Laos, Myanmar and Thailand attended the session online

International Cooperation

International Cooperation for Sustainable Management of Wetlands in the Lancang- Mekong Basin




2024.6

- Training Seminar on the Formulation of Wetland Protected Area Management Plans at Shenzheng

Country	Name of Protected Area	Type of Protected Area
Cambodia	Strung Sen Ramsar site	Ramsar site
Laos	Xe Champhone Ramsar site	Ramsar site
Myanmar	Inlay Lake Biosphere Reserve	Biosphere Reserve, with an area covering a Ramsar
Thailand	Bang Pakong River Wetland	Planned to apply for being Ramsar, currently composed of four national - level important wetlands
Vietnam	Lang Sen Wetland Protected Area	Ramsar site, Nature Reserve

International Cooperation

International Cooperation for Sustainable Management of Wetlands in the Lancang- Mekong Basin

2024.6

- On-site tour and exchange activities were conducted in Guangzhou and Shenzhen respectively

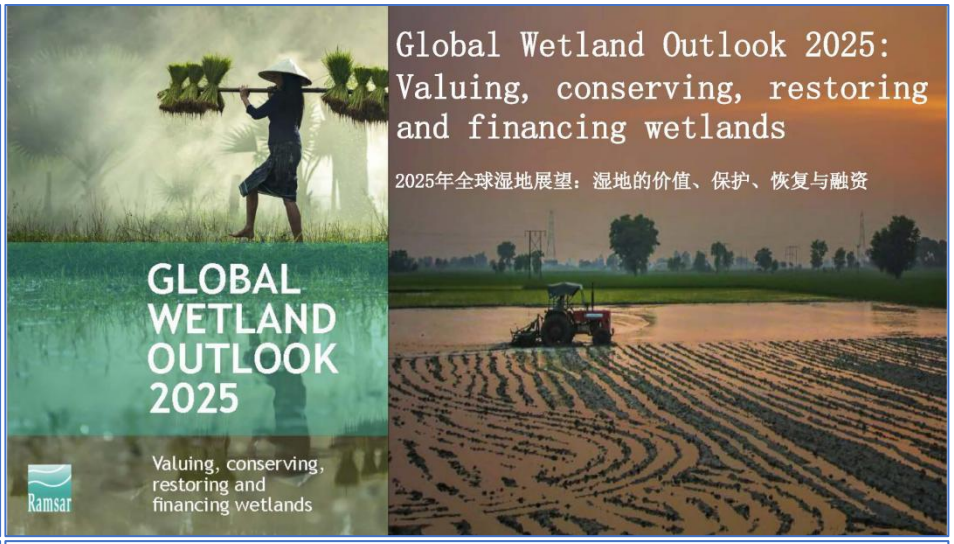
NO.1 Guangzhou Nansha Provincial Wetland

NO.2 Guangzhou Haizhu Ramsar Site

NO.3 OCT Natiiaol Wetland Park

NO.4 Shenzhen Bay Park Nature School

Annex 3.3: Global Wetland Outlook and Shenzhen Conservation Plan (2025 – 2035)



Executive Summary

This Outlook presents a synthesis of scientific information on the value of the world's wetlands, the costs to society due to wetland loss and degradation, and the scale of investment needed to restore wetlands.

- **Key Issues:** Value, Loss, Degradation, Restoration, Finance
- **Critical Links:** Wetlands are critically linked to global biodiversity, climate, and water targets
- **Pathways for Action:** Describes four pathways to support nature-positive investment)

Understanding the state and value of the world's wetlands

The *Global Wetland Outlook 2025* presents a synthesis of scientific information on the value of the world's wetlands, the costs to society due to wetland loss and degradation and the scale of investment needed to restore wetlands. It is based on the latest publications and data on the extent of inland, coastal and marine wetlands and global databases on the benefits that wetlands provide. Wetlands are vital to water and food security, and human well-being, so recognising the links between global biodiversity, climate, and water targets and wetland conservation and restoration is critical. This report recognises the barriers to achieving this and describes four pathways to support nature-positive investment in wetland conservation and wise use.

Wetlands cover a significant area of the Earth. Recent global estimates indicate that inland freshwater, coastal, and marine wetland types as defined under the Convention on Wetlands extend over 1,800 million hectares; however, data uncertainty remains due to the gaps in the available data and the differences in the methods used to gather information and report on wetland extent. These challenges are acute when making historical estimates.

Eleven broad wetland types are evaluated in the Global Wetland Outlook 2025, encompassing: Seagrass, Kelp Forests, Coral Reefs, Estuarine Waters, Salt Marshes, Mangroves, Tidal Flats, Lakes, Rivers and Streams, Inland Marshes and Swamps, and Peatlands (Mires).

Wetland loss continues. Documented wetland loss has occurred for all natural wetland types since 1970. The average rate of wetland loss was -0.52% per annum (ranging from -1.80% to -0.01%, depending on wetland type). Millions of hectares (ha) of wetlands have been lost due to land use change. For example, an estimated 177 million ha of Inland marshes and swamps have been lost since 1970.

Wetland degradation is widespread. Both reporting by Contracting Parties to the Convention on Wetlands and the World Wetland Survey (WWS) indicate there is ongoing deterioration in the ecological character of wetlands in most regions and globally. Rates of degradation vary over time and by region as a function of factors such as development and land use change. Recently, wetland declines are notable in Latin America, the Caribbean, and Africa, however, the extent of degradation also increased in Europe, North America, and Oceania.

People gain substantial benefits from wetlands. They provide food for people, are integrated with and help regulate the global water cycle, remove water pollutants, protect local communities from natural disasters, and store carbon, supporting the world's climate system. This *Global Wetland Outlook* extracted more than 1,500 value estimates from the Ecosystem Services Valuation Database, synthesising published information on regulating, provisioning, and cultural services.

Wetlands are a high-value resource and an asset to society. When we degrade or destroy wetlands, we reduce the ecosystem services and benefits they provide to people. The 1,415 million ha of remaining wetlands (across the 11 wetland types assessed) give an estimated $738 trillion (median 2023 Int$) to $39.01 trillion (mean 2023 Int$) benefits to people, every year. If all remaining wetlands are effectively managed until 2050, they will provide a net present value (NPV) greater than $205.25 trillion (median 2023 Int$) over this time period.

Wetlands provide society with up to $39 trillion in benefits each year—but we continue to lose them at a rate of 0.52% annually.

Estimates of the values of wetlands remain limited; more research is needed. There are limitations in economic valuation due to a lack of data for some wetland types, limited information on wetland degradation, and inadequate consideration of the intrinsic values of wetlands to local communities and Indigenous peoples. The economic losses are huge, but they don't capture the profound intrinsic values of wetlands – their worth simply by existing as living systems. Even so, consolidating knowledge on wetland value helps policymakers understand nature's contributions to people.

The Convention's strategic goals align with the Kunming-Montreal Global Biodiversity Framework (KM-GBF) Targets to restore at least 30% of all degraded ecosystems (Target 2) and conserve at least 30% of land, waters, and seas (Target 3). Wetland restoration and conservation can contribute to all 23 targets of the KM-GBF and are equally important for the objectives of the UN Framework Convention on Climate Change (UNFCCC) to reduce and stabilise greenhouse gas emissions, and to meet many Sustainable Development Goals (SDGs) including Target 6.6 to protect and restore water-related ecosystems. These goals also contribute to the Freshwater Challenge and its targets for wetland restoration and protection of freshwater ecosystems.

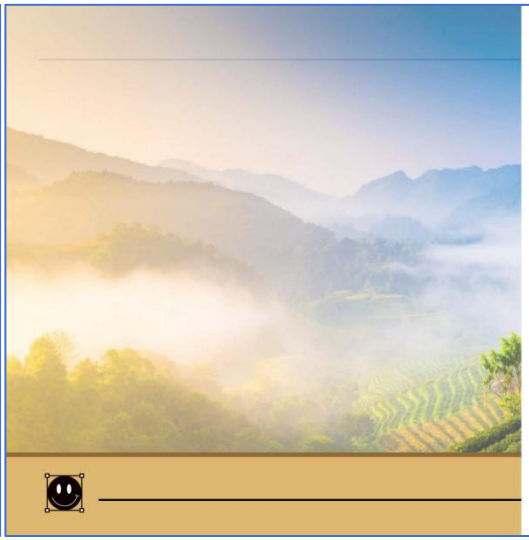
We need to enable restoration of 123 million ha of wetlands to restore 30% of lost wetlands and achieve Target 2 of the KM-GBF based on the area of wetlands transformed to agriculture and other land uses since 1970, for the 11 wetland types evaluated. This is likely an underestimate since it excludes the efforts needed to restore degraded wetlands with a deteriorated ecological character (potentially bringing the target to >350 million ha).

To achieve Target 3 of the KM-GBF, we need to effectively manage approximately 428 million ha of wetlands within protected areas or other effective area-based conservation measures (OECMs). This will meet the goal of the KM-GBF to conserve at least 30% of the remaining wetlands, based on the extent of the 11 wetland types evaluated, while recognising that the wise use of all remaining wetlands is critical.

Conservation of healthy and functioning wetlands is cheaper than restoration. Less investment is required to conserve existing wetlands than to remediate and address adverse impacts that have altered the ecological character of wetlands. Average costs for restoring wetlands can range from $1,000 per hectare (per annum, Int$) to over $70,000 per hectare.

The global financing gap for wetlands is immense. Achieving effective conservation and restoration of the world's wetlands, covering at least 550 million ha (to restore at least 123 million ha, and conserve at least 428 million ha), will require significant resource mobilisation. Current estimates show that biodiversity conservation funding accounts for just 0.03% of global GDP, highlighting the significant underinvestment in nature, including wetlands.

To conserve and restore at least 550 million hectares of wetlands, resource mobilization must scale up dramatically.



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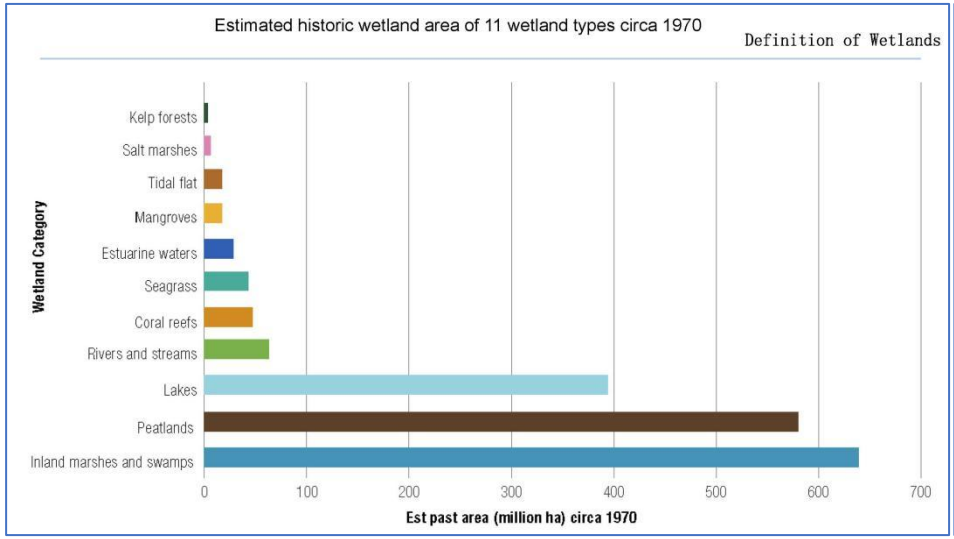
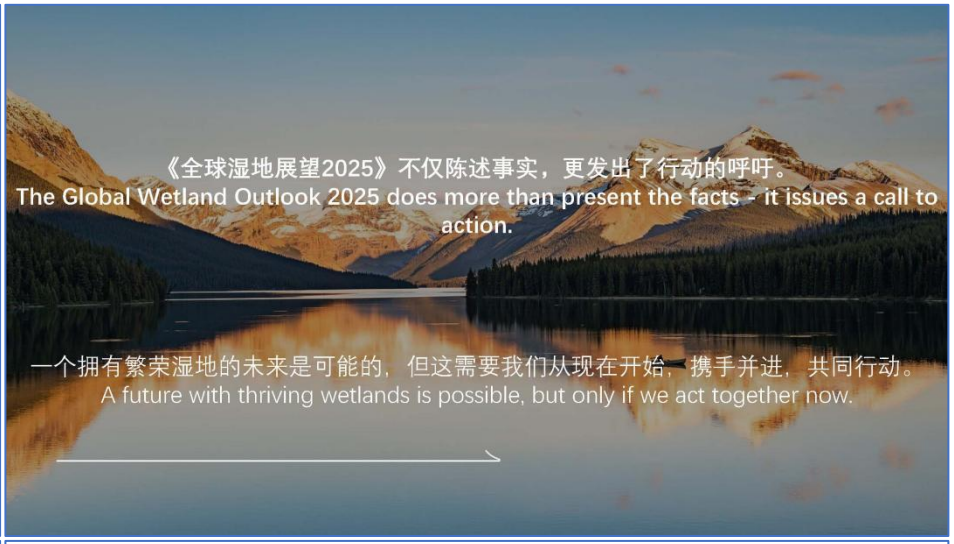
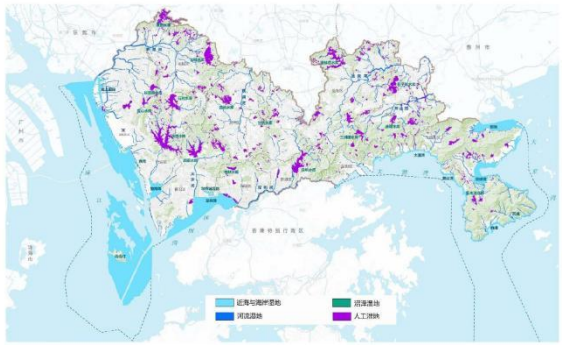




Resource Situation 资源现状

The total wetland area in Shenzhen is 347.88 square kilometers,of which the area of coastalwetlands accounts for 76.62%.
深圳2021年湿地总面积347.88平方公里，滨海湿地占76.62%

Wetland type	area (square kilometer)	patch number	Average plaque Area (ha)
coastalwetlands 近海与海岸湿地	267.75	1893	14.14
rivers 河流湿地	16.35	3721	0.44
Swamp wetlands 沼泽湿地	0.64	146	0.44
constructed wetlands 人工湿地	63.14	3297	1.91



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Resource Situation 资源现状

With typical wetland ecosystems of the South Asian tropics, including mangroves, coastal mudflat, coral reefs, estuaries, bays.
深圳拥有红树林、滨海滩涂、珊瑚礁、河口、海湾等南亚热带典型湿地生态系统



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Features and Advantages 特征与优势

becomes a key "transit station" on the migration route of East Asia-Australia migratory Birds
位于 “东亚-澳大利西亚” 国际候鸟迁飞中转站，生态区位重要

High population density, high-intensity urban construction, with significant ecological functional roles
人口高密度、城市建设高强度，生态功能作用显著

Rich practical experience in conservation and restoration, strong team of public welfare organizations, solid foundation for public participation, possessing an international cooperation platform保护修复实践经验丰富，公益组织队伍强大，拥有国际合作平台


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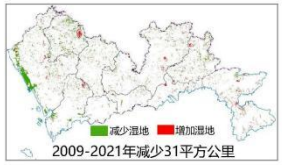
Problems and Challenges 问题与挑战

The maintenance of total wetland area faces challenges.
湿地规模总量维持面临挑战

Connectivity and biodiversity need improvement, with ecological functions not being fully realized.
连通性、生物多样性待提升，生态功能未充分发挥

The legal and regulatory systems are incomplete, and governance capabilities and levels need to be improved.
法规制度不健全，治理水平和能力有待提升

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Functional positioning of the plan 规划定位

This plan, positioned as a specialized component within the territorial spatial planning system, serves as an action initiative that guides and coordinates wetland conservation and management across the city. This plan has been formally issued by the competent authorities on March 31, 2025.

这项规划是国土空间规划体系下的专项规划，是统筹指导全市湿地保护管理的行动纲领，已于3月31日印发

深圳市规划和自然资源局
深圳市海洋发展局 文件

深规划资源〔2025〕282号

市规划和自然资源局 市海洋发展局
关于印发《深圳市湿地保护规划
（2025—2035年）》的通知

各区人民政府，市各有关单位：

为贯彻落实《中华人民共和国湿地保护法》《广东省湿地保护条例》，推进深圳湿地保护高质量发展，结合深圳实际，市规划和自然资源局会同市海洋发展局组织编制了《深圳市湿地保护

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Planning objectives 规划目标

By 2030，the city will have been recognized as a Wetland City(Ramsar accredited).
到2030年建成国际湿地城市

By 2035，become aninternational first-class coastal wetland city.
到2035年建成国际一流的滨海湿地城市

Strategic Measures 策略举措

Improve the wetland conservation management system and mechanisms.
立法先行，完善保护顶层设计

Accelerate the legislation on wetland protection Establish and improve the conservation manageme system including total quantity control, graded managment, survey and evaluation, etc.

加快湿地保护立法，健全总量管控等管理制度体系

Establish mechanisms for interdepartmental collaboration, expert consultation and decision-making, and collaborative protection in the bay area.

完善管理体制，建立部门协作、专家咨询决策、湾区协同等机制

Develop technical specifications for the full chain of "investigation and monitoring -planning -integrated infrastructure stewardship- evaluation and examination.
完善“调查监测—规划计划—建设管养—评估考核”全链条技术规范，推进管理规范化

Explore the involvement of social welfare organizations and communities in wetland governance. wetlands managed by social welfare organizations≥ 5，wetlands co-managed with communities≥ 10.

探索湿地公益治理和社区治理，建设社会公益治理的湿地、社区共建湿地

Strategic Measures 策略举措

Build a regional collaborative protection pattern of "four cores, two belts, six corridors, and multiple nodes".构建“四核、两带、六廊、多点”的区域协同总体保护格局

4 cores四核
- the Pearl River Estuary珠江口
- Shenzhen Bay深圳湾
- Daya Bay大亚湾
- Tiegang-Shiyan wetland铁岗-石岩

2 belts两带
- 珠江口-深圳湾
- 大鹏湾-大亚湾

6-corridors六廊

茅洲河	坪山河
观澜河	深圳河
龙岗河	大沙河

Strategic Measures 策略举措

Deepen and Improve Hierarchical Governance. Plan 2 National Important Wetlands and 8 or more Provincial Important Wetlands, designate municipal key wetlands in batches, and publish the General Wetland Inventory.

完善湿地分级管理体系，规划国家重要湿地2个、省级重要湿地8个以上，划定市级重要湿地，发布一般湿地名录

Strategic Measures 策略举措

Establish a wetland classification protection system with protected areas as the main body and Other Effective Area-based Conservation Measures(OECMs) as supplements. By 2035, no less than 10 Wetland conservation community will be established. The city-wide wetland conservation rate shall not be lower than 55%.

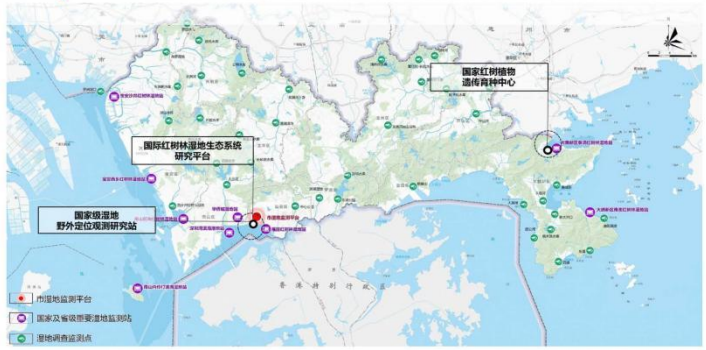
建立以自然保护地为主体，其他有效保护措施为补充的分类保护体系，到2035年设立不少于10个湿地保护小区

Strategic Measures 策略举措

High quality and high-level construct and operate the international mangrove center, promote international cooperation and joint actions.Based on the International Mangrove Center, implement cooperation on mangrove and coastal wetland protection and restoration projects, as well as on the protection of migratory bird flyways.高质量高水平建设和运行国际红树林中心，推动国际合作和联合行动。依托国际红树林中心，实施红树林及滨海湿地保护修复、候鸟迁飞通道保护合作。

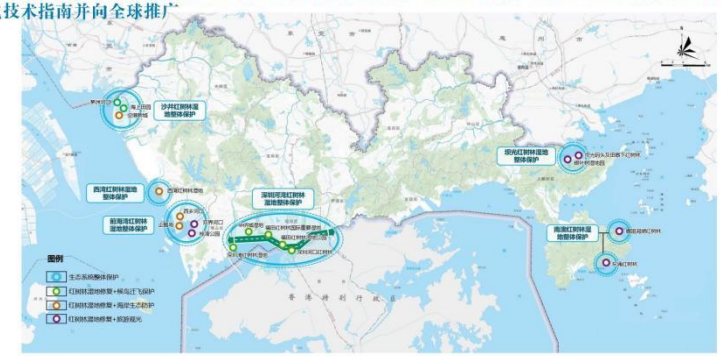
Strategic Measures 策略举措

Establish three major scientific research platform, construct a three-level monitoring network, and establish three types of investigation and monitoring systems, enhance wetland intelligent management capabilities.筹建3个重大科研平台，构建3级监测网络，建立3类调查监测体系，提升智慧管理能力



Strategic Measures 策略举措

Explore the overall protection paradigm of the mangrove wetland ecosystems, Carry out demonstration projects for a multi-objective collaborative restoration of mangrove wetlands.Develop technical guidelines and demonstration cases for mangrove conservation and restoration.探索红树林湿地生态系统整体保护范式，打造红树林湿地多目标协同修复范例，形成技术指南并向全球推广



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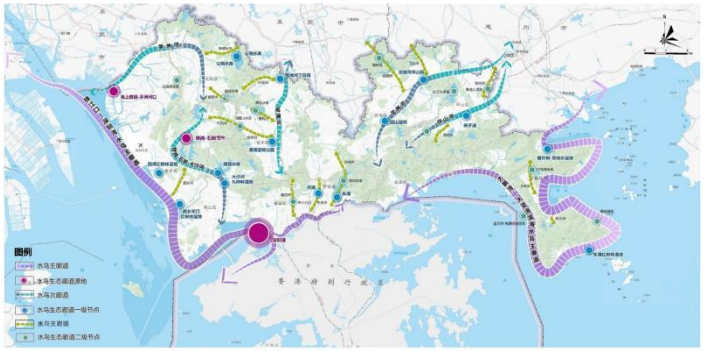
Strategic Measures 策略举措

Protect key species and their habitats, Build ecological corridors for waterbirds, strengthen bird-friendly design, and improve the suitability of waterbird habitats.

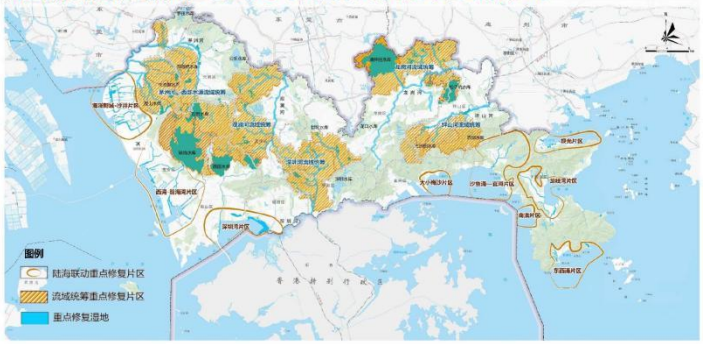
保护重要物种及其生境，构建“两主、五次、多支”水鸟生态廊道网络，加强鸟类友好设计，建设鸟类友好城市



Strategic Measures 策略举措

Clarify 9 key land-sea linkage restoration areas, restore coastal wetlands.Clarify 5 key inland watershed areas and coordinate the restoration of ecosystems such as rivers, lakes, and mountain streams based on overall arrangement.

划定9个重点片区陆海联动修复滨海湿地，划定5个重点片区流域统筹修复内陆湿地



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Strategic Measures 策略举措

Construct more than 30 diverse and wild Small and Micro Wetlands. Develop a waterfront recreation system and a science popularization and education network. Develop "wetland + tourism/culture/science & innovation" integration spacesand inject new vitality into urban development.建设多元复合、野趣十足的高品质小微湿地，构建活力滨水游憩体系。以“湿地+”激活科创、文化、旅游等绿色产业，为城市发展注入新活力

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Tasks and Projects 实施行动

Two key tasks

2项重点任务

- High-Standard application of an International Wetland City (Ramsar accredited)
- High quality and high-level construction of the International Mangrove Center

Three categories and six key projects

3类6项重点工程

- Key projects for wetland protection and restoration
- Key projects for rational utilization
- Key projects for wetland scientific research and monitoring

Recent Action Projects

28个近期行动项目

Application of Wetland City (Ramsar accredited)	Construction of the international mangrove center	Protection and restoration of mangrove wetlands	Protection and restoration of coastal wetlands
2个	4个	7个	4个
Protection and restoration of inland wetlands	Restoration and enhancement of Small and Micro Wetland	Construction of recreation and nature education network	Wetland scientific research monitoring
3个	1个	4个	3个

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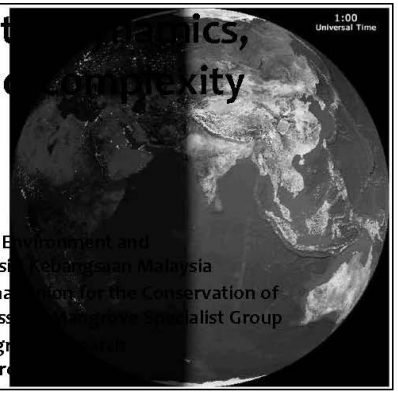
Annex 3.4: Mangrove Habitat Dynamics, Connectivity and Complexity

Mangrove Habit[illegible]amics, Connectivity an[illegible]omplexity



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Commission Member, International Union for the Conservation of Nature, Species Survival Commission, Mangrove Specialist Group
Coordinator, The Malaysian Mangrove Alliance and Network (MyMangrove)

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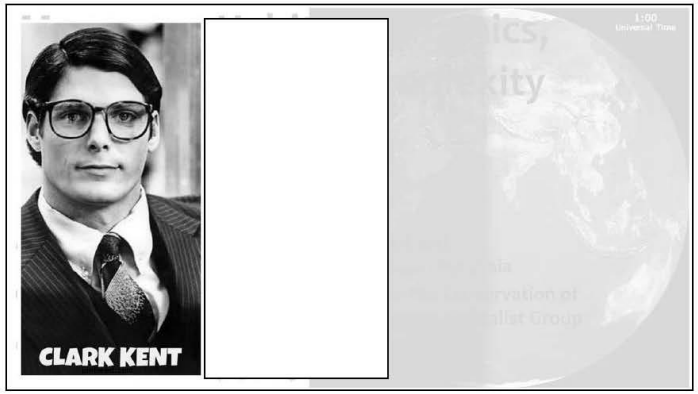

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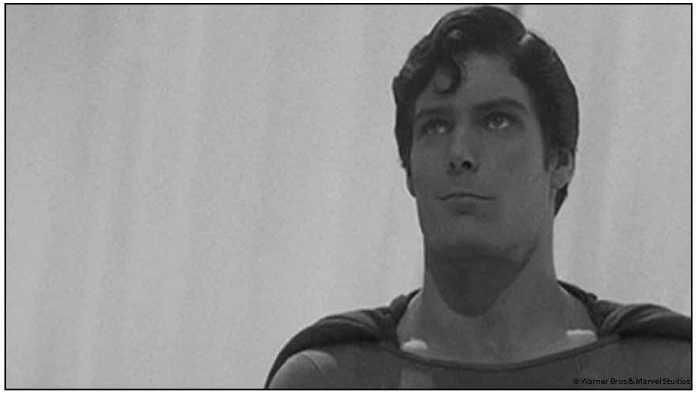

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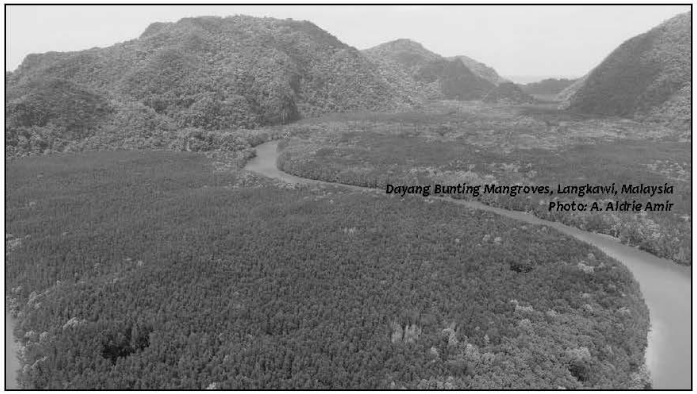

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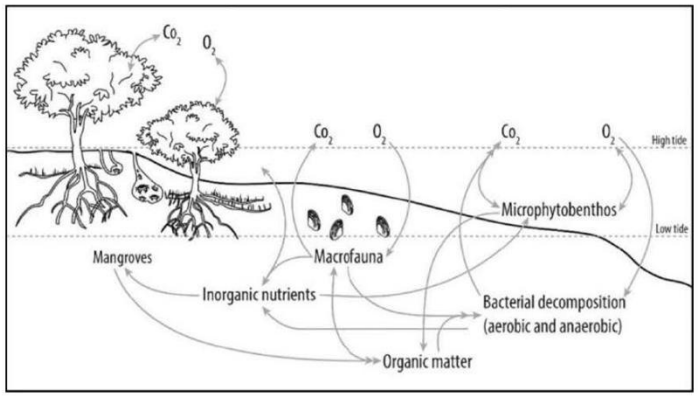

5

Blue Car

- High net prima production and trapping capac
- Entangled netw roots and rhizo prevents erosi
- Low decompos O_2 deficient se
- High C/N/P ratio

Long-term Ca vegetated sol of magnitude coastal marine terrestrial eco (McLeod et al

OXFORD

BioScience, 2024, 74, 253–268
https://doi.org/10.1093/biosci/biae007
Advance access publication date: 18 March 2024
Forum

All tidal wetlands are blue carbon ecosystems

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Abstract

Managing coastal wetlands is one of the most promising activities to reduce atmospheric greenhouse gases, and it also contributes to meeting the United Nations Sustainable Development Goals. One of the options is through blue carbon projects, in which mangroves, saltmarshes, and seagrass are managed to increase carbon sequestration and reduce greenhouse gas emissions. However, other tidal wetlands align with the characteristics of blue carbon. These wetlands are called tidal freshwater wetlands in the United States, supratidal wetlands in Australia, transitional forests in Southeast Asia, and estuarine forests in South Africa. They have similar or larger potential for atmospheric carbon sequestration and emission reductions than the currently considered blue carbon ecosystems and have been highly exploited. In the present article, we suggest that all wetlands directly or indirectly influenced by tides should be considered blue carbon. Their protection and restoration through carbon offsets could reduce emissions while providing multiple cobenefits, including biodiversity.

Keywords: carbon offsets, Cypress, Melaleuca, pestlands, tidal freshwater wetlands

6

What is a Wetland?

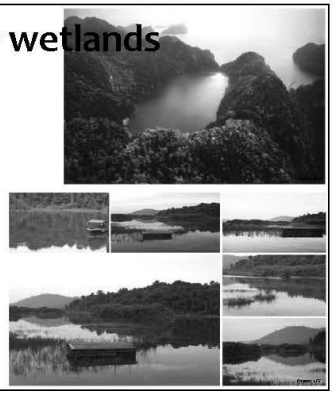
Transition between terrestrial and aquatic habitats where "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed six metres" (Wetlands International)

The substrate is predominantly undrained hydric soil (mostly anaerobic) and is saturated by water.

7

Inland or freshwater wetlands

- Rivers and streams
- Riverine floodplains
- Freshwater lake
- Freshwater ponds (>8ha)
- Marshland
- Freshwater swamp
- Peat swamp forests
- *Melaleuca* forests
- Other swamps
- Freshwater springs



8

Coastal and Marine Wetlands

- Marine waters
- Subtidal aquatic beds
- Seagrass beds
- Seaweed beds
- Coral reefs
- Rocky shores
- Sandy beaches
- Mangrove forests
- Salt marshes
- Lagoons and bays
- Intertidal mud and sand flats

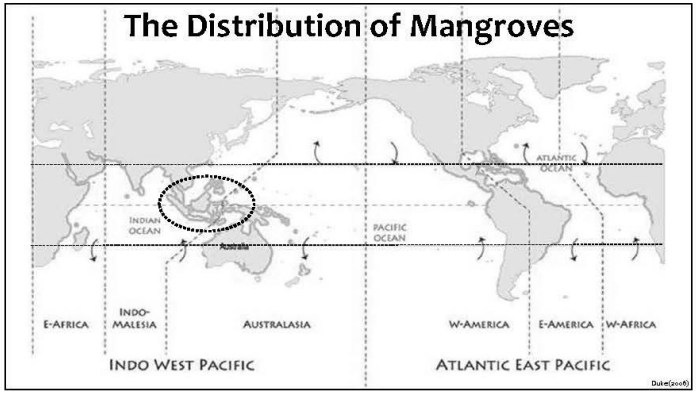
9

Man-made or Constructed Wetlands

- Water storage areas;
  - reservoirs
  - barrages
  - hydroelectric dams
- Aquaculture;
  - fish ponds
  - shrimp ponds
- Excavations;
  - mining pools
- Wastewater treatment;
  - sewage farms
  - settling ponds
  - oxidation ponds
- Irrigated land (incl. channels);
  - rice field
  - canals
  - ditches
- Other ponds (>8 ha);
  - farm ponds
  - ash ponds
  - stock ponds
- Constructed wetlands;
  - marsh
  - ponds
  - lakes
  - saltwater lakes

10

The Distribution of Mangroves



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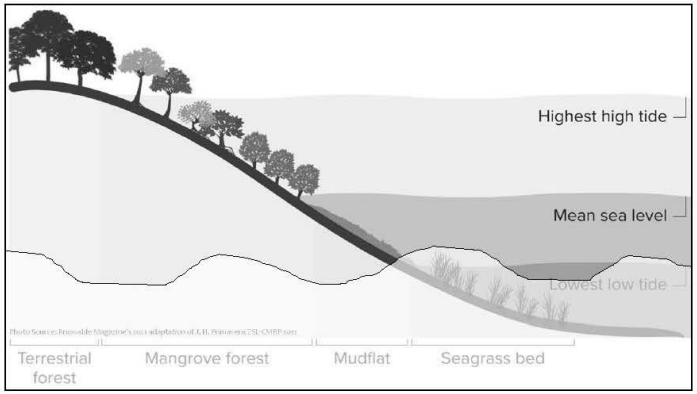

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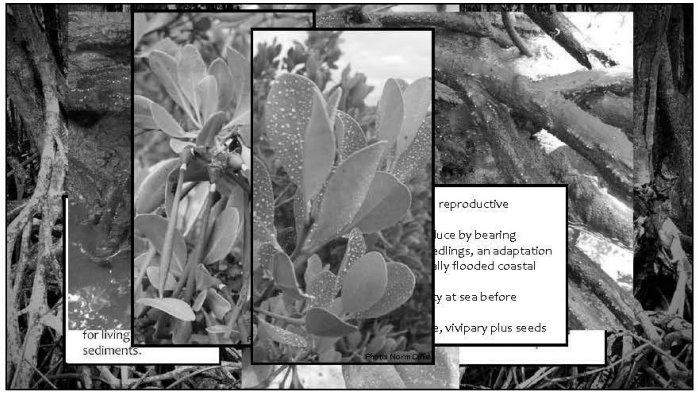
reproductive
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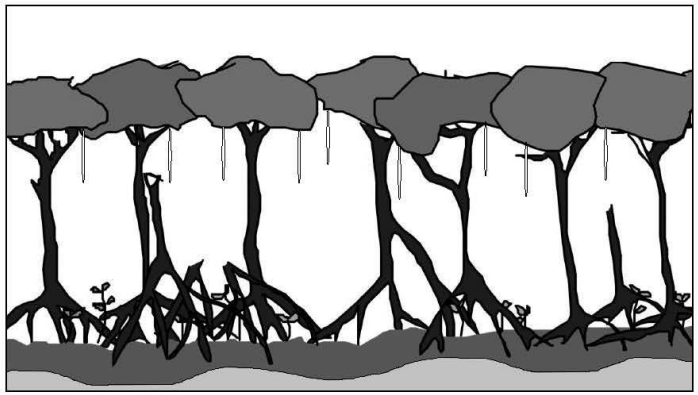
y at sea before
, vivipary plus seeds
for living
sediments.

13



14


XYZ Mangrove Island, Malaysia
Photo: A. Aldrie Amir

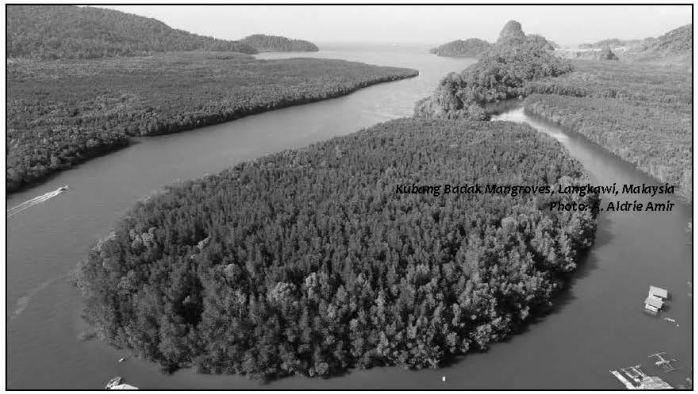
15


XYZ Mangrove Island, Malaysia
Photo: A. Aldrie Amir

16

6/19/2025

17



18

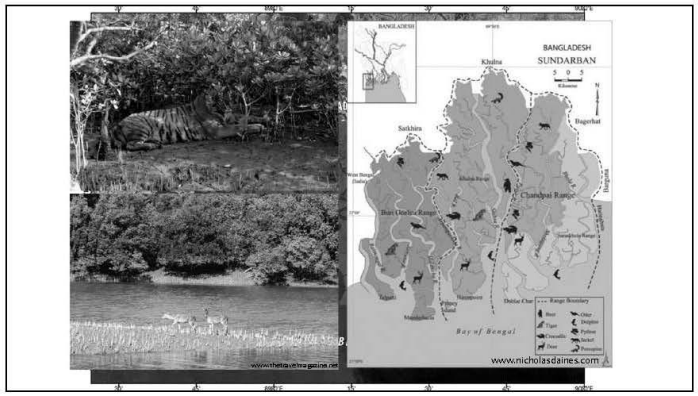
9

6/19/2025

19


Cyclone Yaas gathers speed, set for early landfall on May 26
Thousands evacuated in India as strong Cyclone Yaas inches closer
Tropical Cyclone Yaas May 26 highlights: Yaas intensifies into 'very severe cyclonic storm', landfall likely near Odisha's Dhamra Port tomorrow morning, says IMO
Cyclone Yaas: Two dead in Odisha, embankments damaged in Sundarbans as landfall process wraps up
dailymotion
Cyclone Yaas: High alert issued in Sundarbans of Bengal

21


BANGLADESH
SUNDARBAN
Khulna
Satkhira
Bagerhat
Chandpai Range
Bay of Bengal
www.nicholasdaines.com

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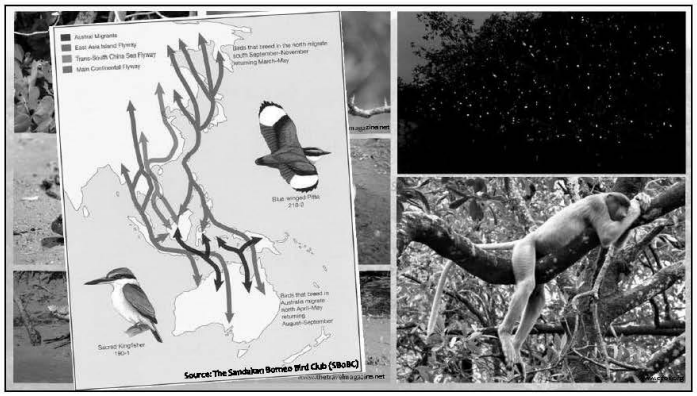
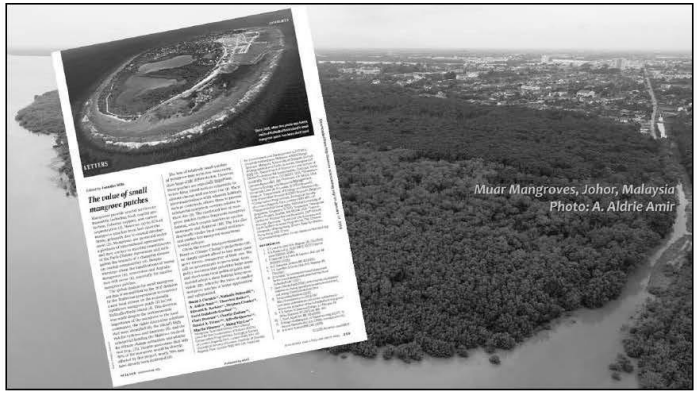
23


Source: The Sandakan Borneo Bird Club (SBoBC)

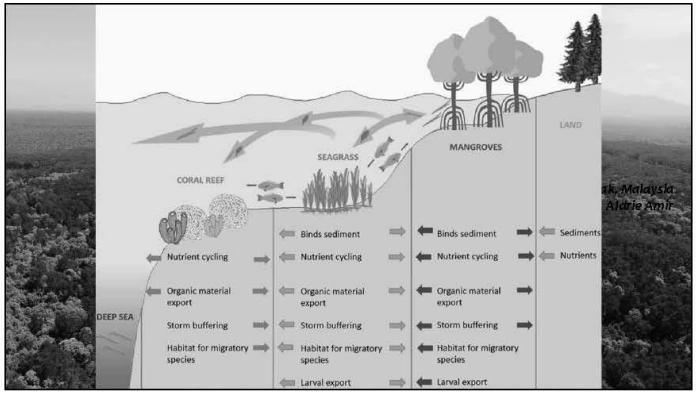
24


LETTERS
The color of small mangrove patches
Muar Mangroves, Johor, Malaysia
Photo: A. Aldrie Amir

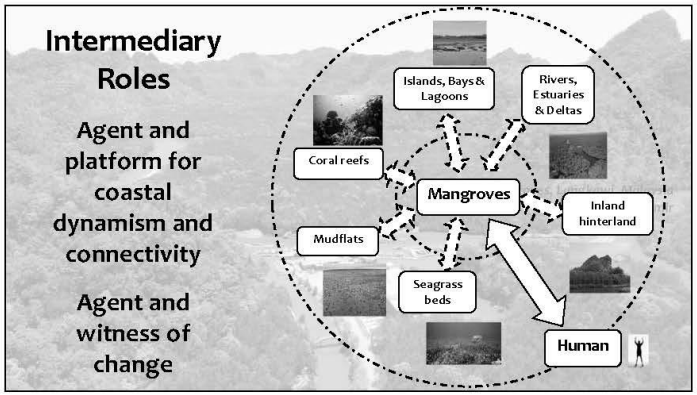
25


Seri Buat Mangroves, Pahang, Malaysia
Photo: A. Aldrie Amir

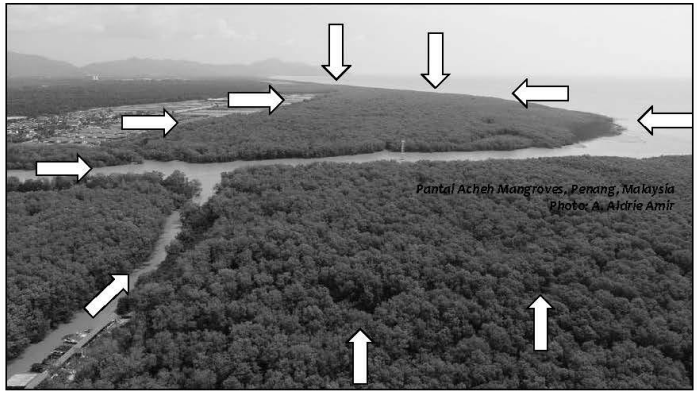
26


LAND
MANGROVES
SEAGRASS
CORAL REEF
DEEP SEA
Binds sediment
Nutrient cycling
Organic material export
Storm buffering
Habitat for migratory species
Larval export
Sediments
Nutrients

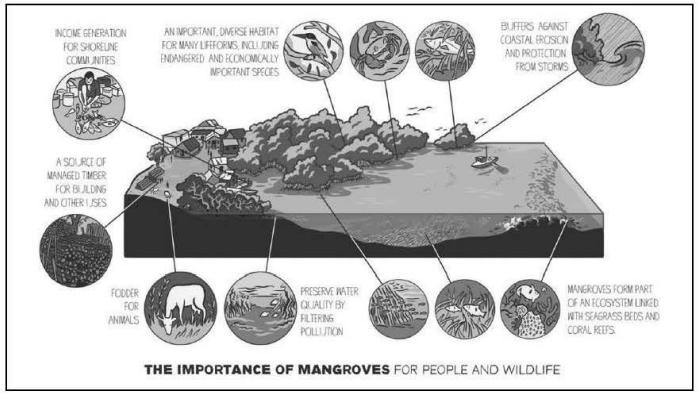
27


Intermediary Roles
Agent and platform for coastal dynamism and connectivity
Agent and witness of change
Islands, Bays & Lagoons
Rivers, Estuaries & Deltas
Coral reefs
Mangroves
Inland hinterland
Mudflats
Seagrass beds
Human

28


Pantai Acheh Mangroves, Penang, Malaysia
Photo: A. Aldrie Amir

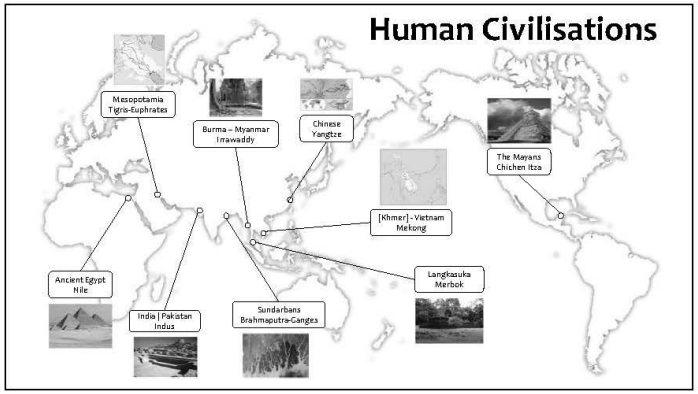
29


INCOME GENERATION FOR SHORELINE COMMUNITIES
AN IMPORTANT, DIVERSE HABITAT FOR MANY LIFEFORMS, INCLUDING ENDANGERED AND ECONOMICALLY IMPORTANT SPECIES
BUFFERS AGAINST COASTAL EROSION AND PROTECTION FROM STORMS
A SOURCE OF MANAGED TIMBER FOR BUILDING AND OTHER USES
FODDER FOR ANIMALS
PRESERVE WATER QUALITY BY FILTERING POLLUTION
MANGROVES FORM PART OF AN ECOSYSTEM LINKED WITH SEAGRASS BEDS AND CORAL REEFS
THE IMPORTANCE OF MANGROVES FOR PEOPLE AND WILDLIFE

30


PORT WELD
KTM
1885
KTM

31


Human Civilisations
Mesopotamia Tigris-Euphrates
Burma – Myanmar Irrawaddy
Chinese Yangtze
The Mayans Chichen Itza
[Khmer] - Vietnam Mekong
Ancient Egypt Nile
India | Pakistan Indus
Sundarbans Brahmaputra-Ganges
Langkasuka Merbok

32

Malaysia's major cities, towns and districts are on the coast

33

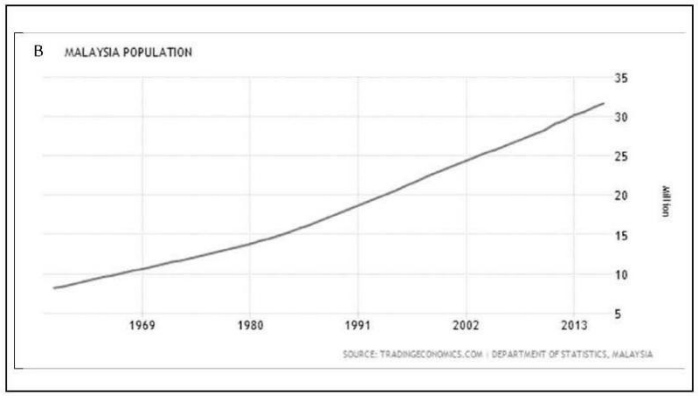


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Table 2. Percentage of the total deforested mangrove (2000–2012) converted to different land uses

Country	Aquaculture	Rice	Oil palm	Mangrove forest	Urban	Other category
Indonesia	48.6	0.1	15.7	22.6	1.9	11.2
Myanmar	1.6	87.6	1.1	0.5	1.6	7.6
Malaysia	14.7	0.1	38.2	17.6	12.8	16.7
Thailand	10.8	5.6	40.0	5.1	14.4	24.1
Philippines	36.7	0.9	11.1	7.3	2.7	41.3
Cambodia	27.7	1.5	8.9	9.8	4.6	47.6
Vietnam	21.0	10.4	0.5	0.6	62.5	4.9
Brunei	29.2	0	27.7	12.5	15.9	14.8
Timor-Leste	0	26.1	0	0	0	73.9*
Singapore	0	0	0	0	0	0
Total	29.9	21.7	16.3	15.4	4.2	12.3

Countries are ordered by total mangrove lost. Percentages might not sum to 100 owing to rounding.
*The small amount of mangrove deforestation in Timor-Leste is due mainly to shoreline erosion.

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Anthropogenic Disturbances

- Excessive logging
- Toxic chemicals runoff
- Reclamation (agriculture, aquaculture)
- Mining for peat, coal, sand, gravel, etc.
- Excessive siltation and deposition
- Impoundment
- Wash and erosion
- Long-term flooding
- Oil spills

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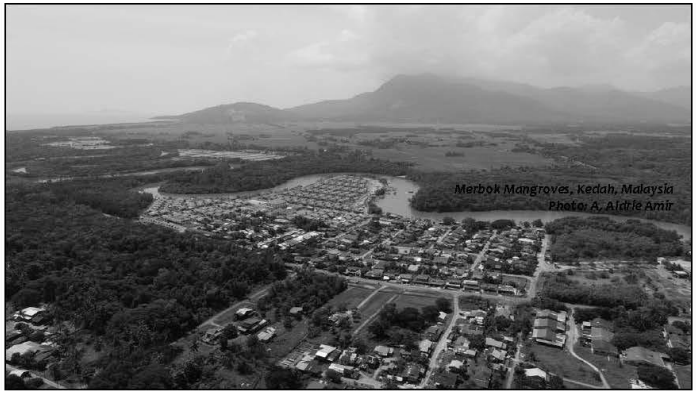
Balik Pulau Mangroves, Penang, Malaysia
Photo: A. Aldrie Amir

37


Bukit Malut Mangroves, Langkawi, Malaysia
Photo: A. Aldrie Amir

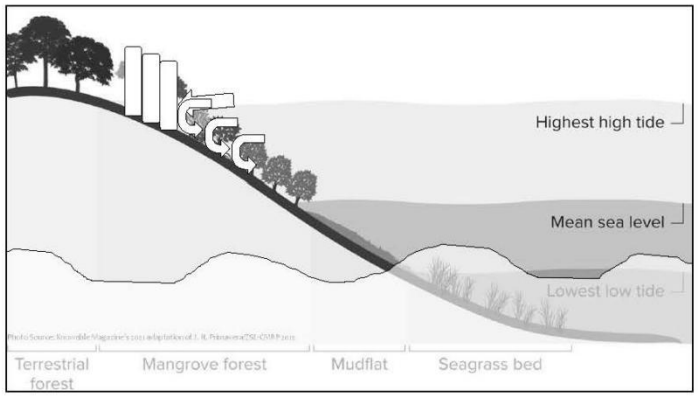
38


Merbok Mangroves, Kedah, Malaysia
Photo: A. Aldrie Amir

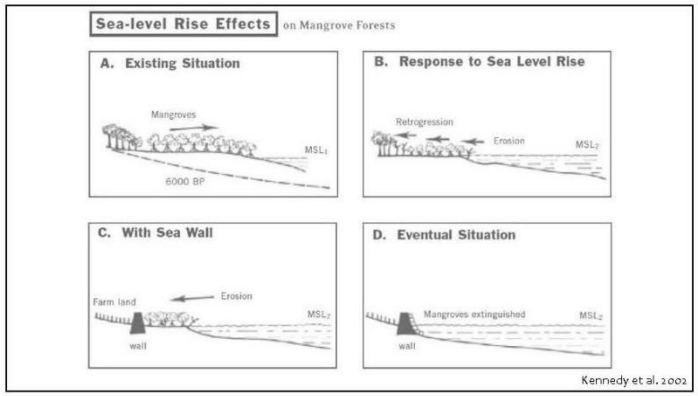
39


Sungai Pulai Mangroves, Johor, Malaysia
Photo: A. Aldrie Amir

40


Highest high tide
Mean sea level
Lowest low tide
Terrestrial forest
Mangrove forest
Mudflat
Seagrass bed

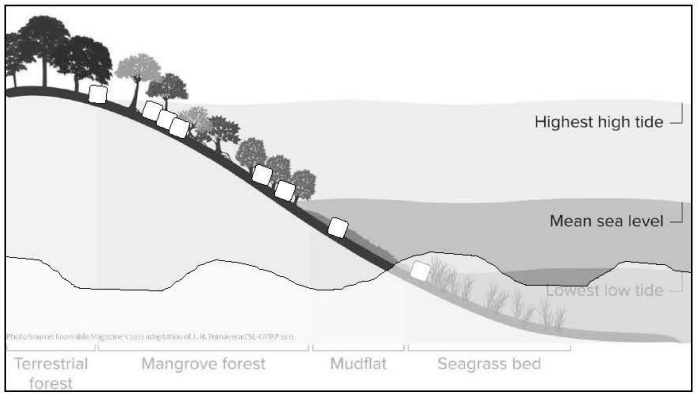
41


Sea-level Rise Effects on Mangrove Forests
A. Existing Situation
Mangroves
MSL1
6000 BP
B. Response to Sea Level Rise
Retrogression
Erosion
MSL2
C. With Sea Wall
Farm land
Erosion
MSL2
wall
D. Eventual Situation
Mangroves extinguished
MSL2
wall
Kennedy et al. 2002

42

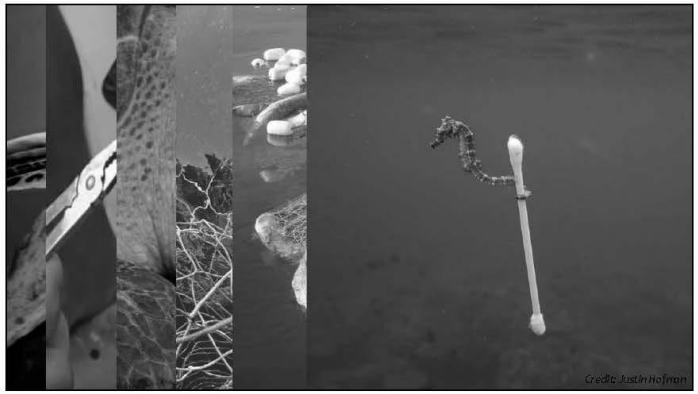

Sungai Kertih Mangroves, Terengganu, Malaysia
Photo: A. Alcinie Amir

43

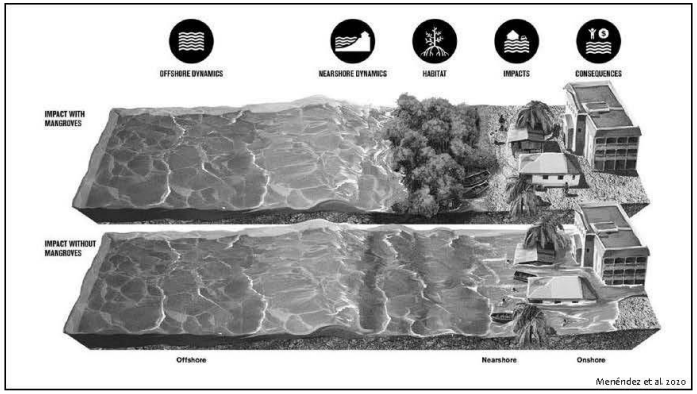

Highest high tide
Mean sea level
Lowest low tide
Terrestrial forest
Mangrove forest
Mudflat
Seagrass bed

44

45


Credit: Justin Hofman

46


OFFSHORE DYNAMICS
NEARSHORE DYNAMICS
HABITAT
IMPACTS
CONSEQUENCES
IMPACT WITH MANGROVES
IMPACT WITHOUT MANGROVES
Offshore
Nearshore
Onshore
Menéndez et al. 2020

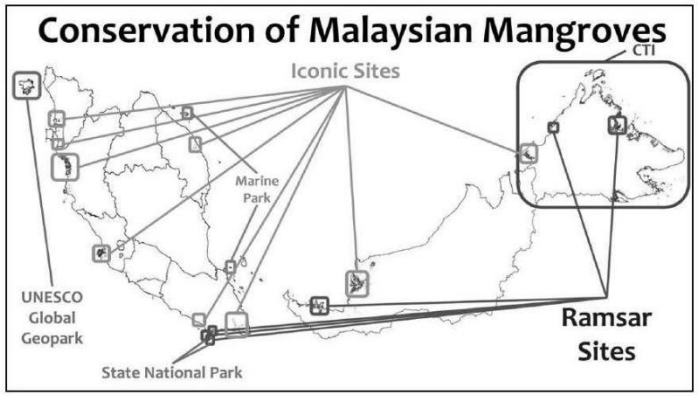
47


Matang Mangroves, Perak, Malaysia
Photo: A. Aldrie Amir

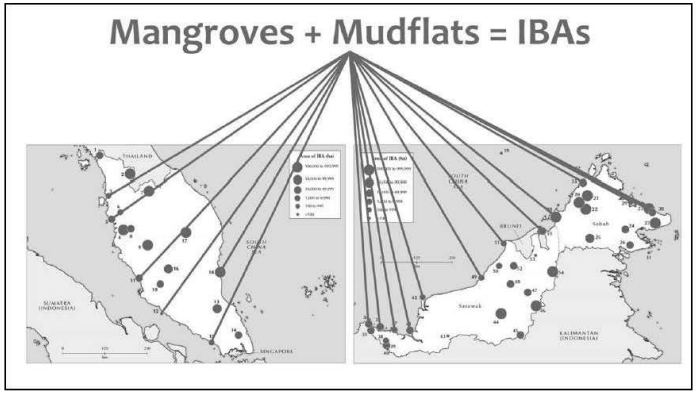
48

1. Continental Shelf Act (1966) (Revised 1972)
2. Economic Exclusive Zone Act (1984)
3. Environmental Quality Act (1974) (Amended 2012)
4. Fisheries Act (1985)
5. Five-Fuel Policy (2001)
6. Four-Fuel Diversification Policy (1981)
7. Green Technology and Climate Change Council (2010)
8. Land Conservation Act 1960 (revised 1989)
9. Local Government Act 1976
10. Low Carbon Cities Framework (2011)
11. National Agricultural Policies (NAP 1-3)
12. National Agro-food Policy (2011)
13. National Automotive Policy (2014)
14. National Biofuel Policy (2006)
15. National Coastal Zone Physical Plan (2012)
16. National Depletion Policy (1980)
17. National Energy Policy (1979) (Revised 2008)
18. National Forestry Act (1984) (Amended 1993)
19. National Forestry Policy (1978) (Revised 1992)
20. National Green Technology Policy (2009)
21. National Integrity Plan (2004)
22. National Parks Act 1980 (Updated 2013)
23. National Petroleum Policy (1975)
24. National Physical Plans
25. National Policy on Biological Diversity (2016)
26. National Policy on Climate Change (2009)
27. National Policy on the Environment (2002)
28. National Strategic Plan for Solid Waste Management (2005)
29. National Water Resources Policy (2012)
30. National Wetlands Policy (Draft)
31. New Economic Model, Government Transformation Program and Economic Transformation Program (2010)
32. Protection of Wild Life Act 1972
33. Renewable Energy Policy and Action Plan (2010)
34. Sabah Biodiversity Enactment (2000)
35. Sabah Parks Enactment (1984) (2008)
36. Sabah Wildlife Conservation Enactment (1997)
37. Sarawak Forests Ordinance (1958) (Amended 2015)
38. Sarawak Wildlife Protection Ordinance (1998)
39. Street, Drainage and Building Act 1974 (Amended 2006)
40. Territorial Sea Act (2012)
41. Town and Country Planning Act 1976 (Amended 2006)
42. Waters Act (1920) (Revised 1989)

49



50



51

52

53

54

55

Natural Disturbances

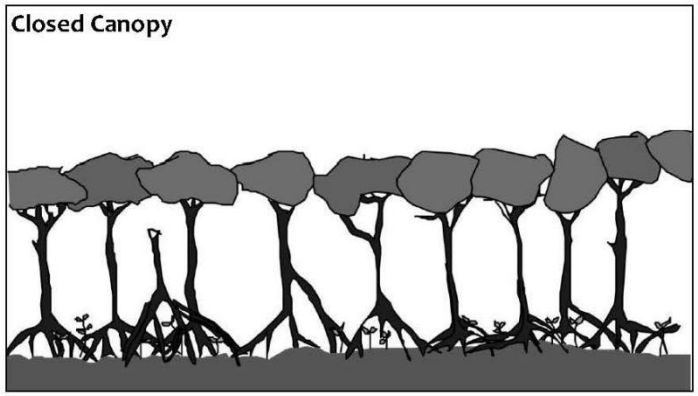
- Severe winds and gusts
- Hurricane, storm
- Hail
- Lightning strikes
- Tidal surges, tsunami
- Severe herbivory
- Drought

56

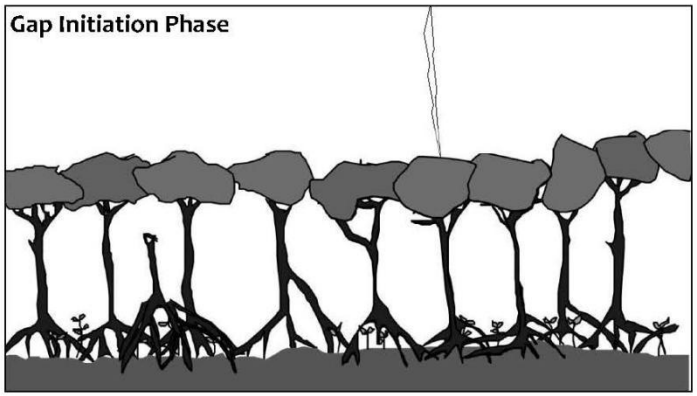
Disturbance	Causes	Impact	Location	Mean Gap Size	Reference
Natural	Lightning strike	Small to large gaps	Everglades, Florida	332 m²	Whelan and Smith, 2004
			Everglades, Florida	289 m²	Whelan, 2005
			Moreton Bay, Queensland	84.2 m²	Amir, 2011
			Pulau Kecil, Matang, Malaysia	1783.1 m²	Amir, 2012
			Kosrae, Micronesia	~700 m²	Allen et al., 2001
			Los Haitises, Dominican Republic	724 m²	Sherman et al., 2000
			Punta Galeta, Panama	601.6 m²	Sousa and Mitchell, 1999
			Punta Galeta, Panama	329 m²	Sousa et al., 2003
			Everglades, Florida	59 m²	Zhang, 2008 Zhang et al., 2008
			Galley Reach, Papua New Guinea	~1900 m²	Johns, 1986
			Galley Reach, Papua New Guinea	~300-700 m²	Paijmans and Rollet, 1977
	Insect	Small gaps	Central Belize	12 m² (Ag) 72 m² (Rma)	Feller and McKee, 1999
			Matang, Malaysia	-	Putz and Chan, 1986
	Hurricane	Major dieback	Everglades, Florida	-	Smith et al., 1994
		Major dieback	Isla Del Venado, Nicaragua	-	Roth, 1992
		Patches of gaps	Los Haitises, Dominican Republic	~700 m²	Sherman et al., 2001
	Hail	Major dieback	Port Curtis, Queensland	169.9 ha	Houston, 1999
	Tree-fall / Branch-fall	Small gaps	Ranong, Thailand	144.2 m²	Imai et al., 2006
		Small gaps	Kosrae, Micronesia	64.4 m²	Pinzon et al., 2003
	Severe drought	Major dieback	Golf of Carpentaria, Australia	7400 ha	Duke et al., 2017
	Crown shyness	Channel-like gaps between canopy crowns	Parque Nacional de Santa Rosa, Guanacaste, Costa Rica	0-9.5 m width	Putz et al., 1984
Anthropogenic	Small-scale Cutting	Patches	Kosrae, Micronesia	-	Allen et al., 2001
		Small gaps	Kosrae, Micronesia	158 m²	Ewel et al., 1998
		Patches	Kosrae, Micronesia	-	Hauff et al., 2006
		Small to large patches	Metinaro, Timor Leste	-	Alongi and de Carvalho, 2008
		Small gaps	Bais Bay, The Philippines	2.8 m²	Walters, 2005
		Large gap	Somone, Senegal	1.4 km²	Sakho et al., 2011
	Logging	Small to large gaps	Kosrae, Micronesia	114 m²	Pinzon et al., 2003
		Large gaps	Matang, Malaysia	41.4 ha	Muda and Mustafa, 2003
	Oil Spill	Major dieback	Bahia Las Minas, Panama	307 ha	Duke et al., 1997
	Experiment	Small gaps	North Queensland	50 m² & 225 m²	Clarke, 2004

Amir & Duke 2019 ECSS

57



58



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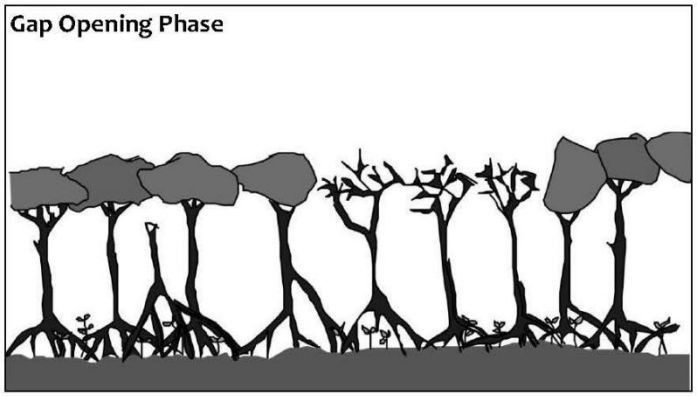
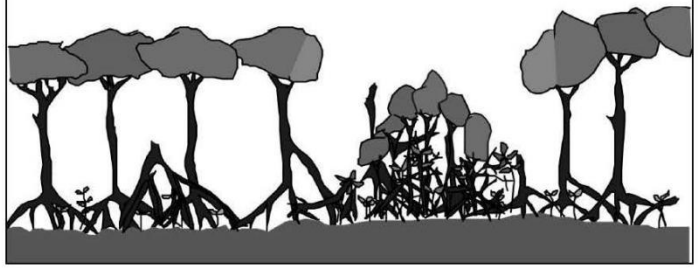


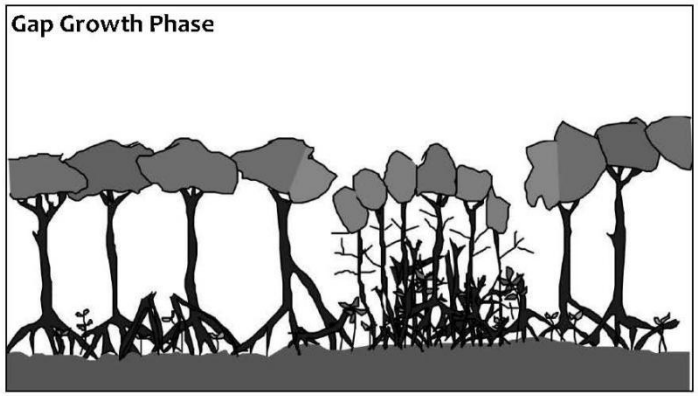
60

Gap Recruitment Phase



61

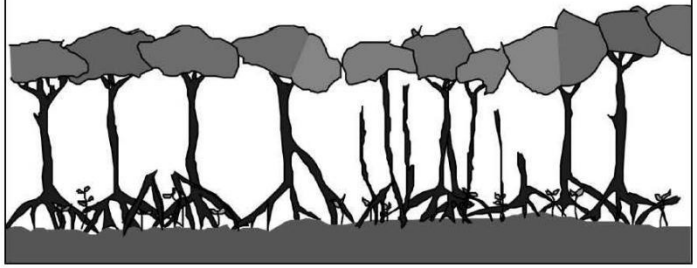
Gap Growth Phase



62

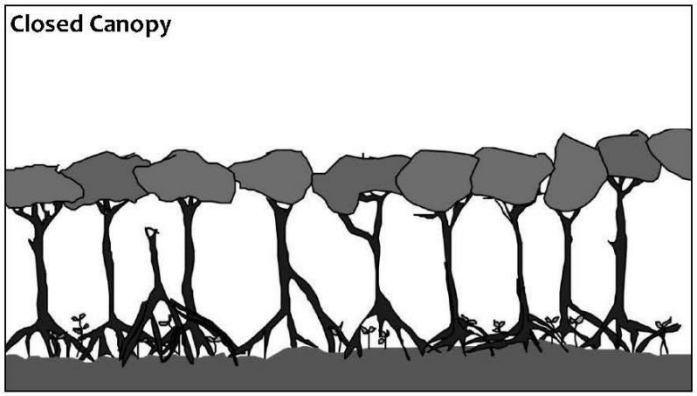
Gap Closure Phase

Reaches Site Maximal Canopy Height

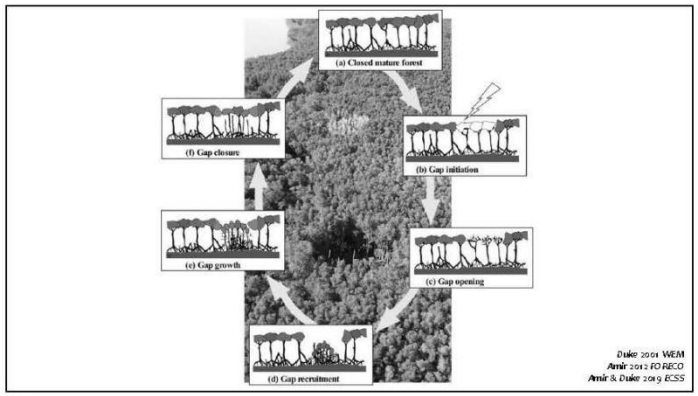


63

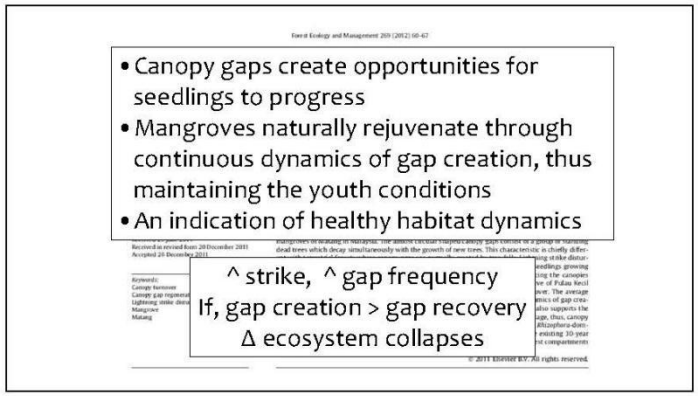
Closed Canopy



64

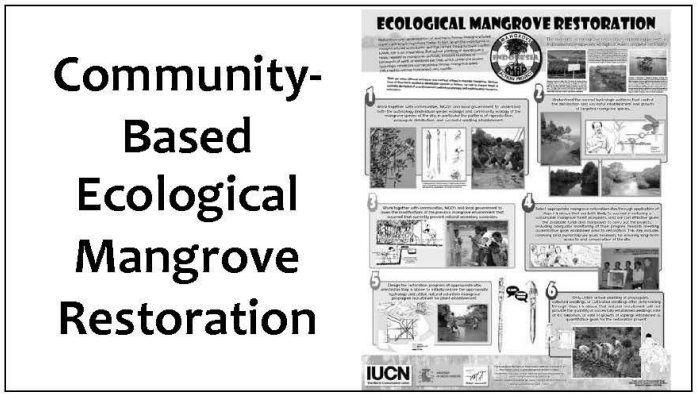

(a) Closed mature forest
(b) Gap initiation
(c) Gap opening
(d) Gap recruitment
(e) Gap growth
(f) Gap closure
Duke 2001 WEM
Amir 2012 FORECO
Amir & Duke 2019 ECSS

65


• Canopy gaps create opportunities for seedlings to progress
• Mangroves naturally rejuvenate through continuous dynamics of gap creation, thus maintaining the youth conditions
• An indication of healthy habitat dynamics
^ strike, ^ gap frequency
If, gap creation > gap recovery
Δ ecosystem collapses

66

67


Community-Based Ecological Mangrove Restoration
ECOLOGICAL MANGROVE RESTORATION
IUCN

68


Provisioning:
Goods and Products
Carbon Financing
Impactful Research
Education and Awareness
Strict Enforcement of Laws
Protected Areas for Wise Use
Payment for Ecosystem Services
Public-Private Partnership in Conservation
and more!
Supporting:
Provision of habitat to sustain genetic and species diversity and connectivity
Providing venue for the maintenance of ecosystem services
Non-material Benefits
© A. Aldrie Amir

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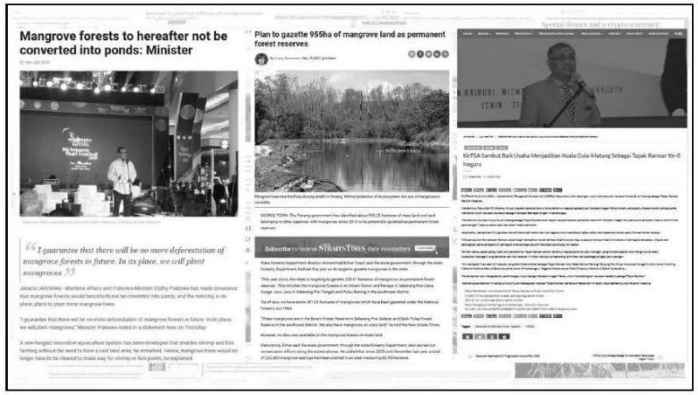
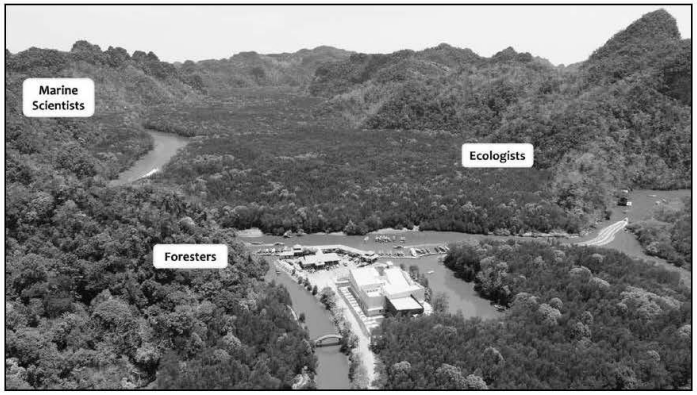

Mangrove forests to hereafter not be converted into ponds: Minister
Plan to gazette 955ha of mangrove land as permanent forest reserves
"I guarantee that there will be no more deforestation of mangrove forests in future. In its place, we will plant mangroves"

70


frontiers in Marine Science
Public Perceptions of Mangrove Forests Matter for Their Conservation

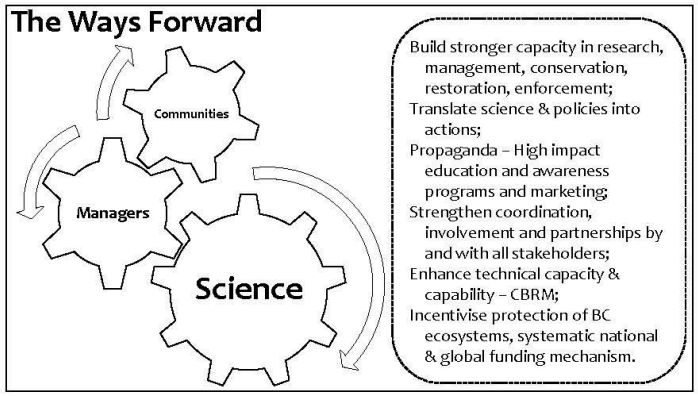
71


Marine Scientists
Ecologists
Foresters

72


Geographers
Oceanographers
Policy Researchers
Lawyers
Modelers
Tourism Experts
Engineers
Climate Scientists
Geneticists
Marine Scientists
RS & GIS Experts
Pharmacists
Business Experts
Chemists
Town & Country Planners
Physicists
Ecologists
Geologists
Tour Operators
Zoologists
Bankers & Investors
Taxonomists
Historians
Anthropologists
Social Scientists
Architects & Designers
Hydrologists
Resource Managers
Foresters
IT Experts
Teachers
Microbiologists
Economists
Botanists
Soil Scientists
Artists
Archaeologists
Wireless & Sensor Technologists
www.facebook.com/group/mymangrove
The Malaysian Mangrove Research Alliance & Network (MyMangrove)

73


The Ways Forward
Communities
Managers
Science
Build stronger capacity in research, management, conservation, restoration, enforcement;
Translate science & policies into actions;
Propaganda – High impact education and awareness programs and marketing;
Strengthen coordination, involvement and partnerships by and with all stakeholders;
Enhance technical capacity & capability – CBRM;
Incentivise protection of BC ecosystems, systematic national & global funding mechanism.

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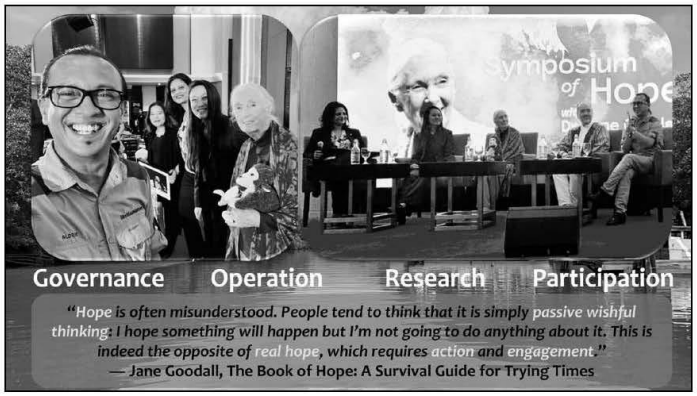
Governance
Operation
Research
Participation

75


Governance
Operation
Research
Participation
"Hope is often misunderstood. People tend to think that it is simply passive wishful thinking: I hope something will happen but I'm not going to do anything about it. This is indeed the opposite of real hope, which requires action and engagement."
— Jane Goodall, The Book of Hope: A Survival Guide for Trying Times

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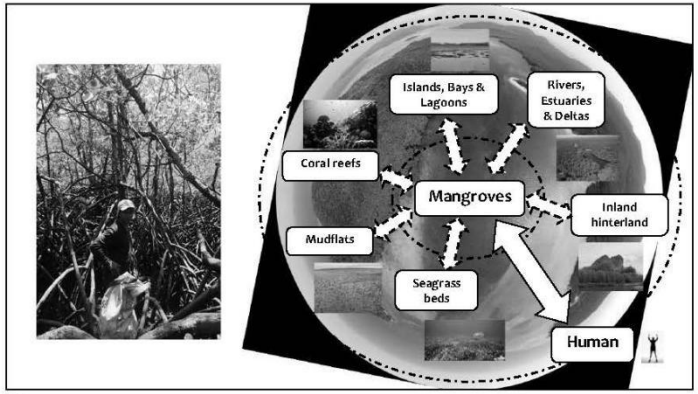
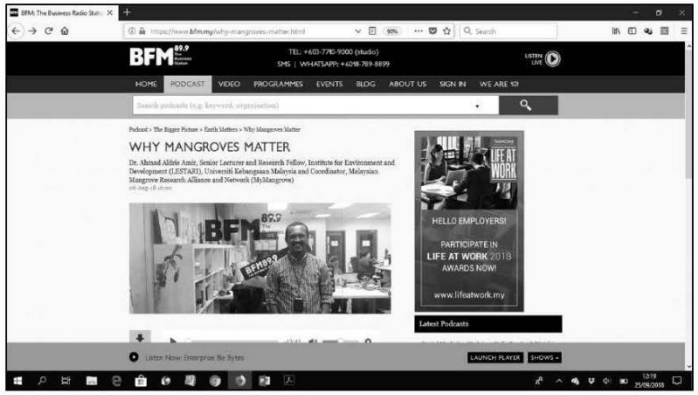

Islands, Bays & Lagoons
Rivers, Estuaries & Deltas
Coral reefs
Mangroves
Inland hinterland
Mudflats
Seagrass beds
Human

77


BFM
WHY MANGROVES MATTER
HELLO EMPLOYERS!
PARTICIPATE IN LIFE AT WORK 2018 AWARDS NOW!
www.lifeatwork.my
Latest Podcasts

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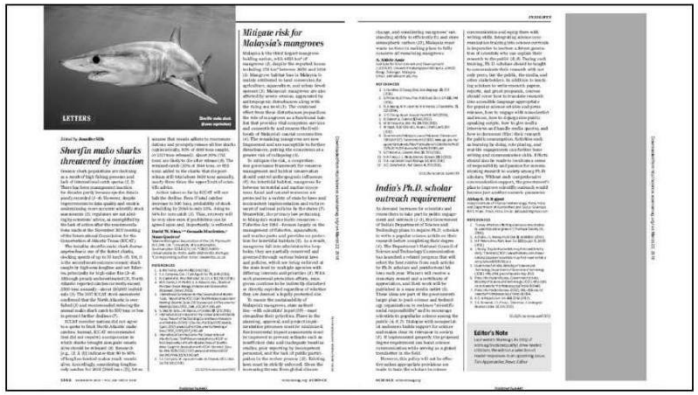
LETTERS
MASS TOURISM HURTS MANGROVES
OPINION
PROTECTING OUR MANGROVES AND COASTAL WETLANDS

79


OPINION
THERE'S BENEFIT IN THEM MANGROVES
LETTERS
The value of small mangrove patches

80



LETTERS

Shortfin mako sharks threatened by inaction

Mitigate risk for Malaysia's mangroves

India's Ph.D. scholar outreach requirement

Editor's Note

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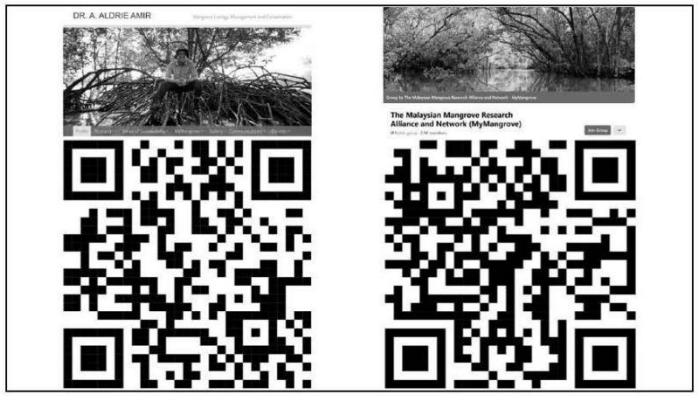

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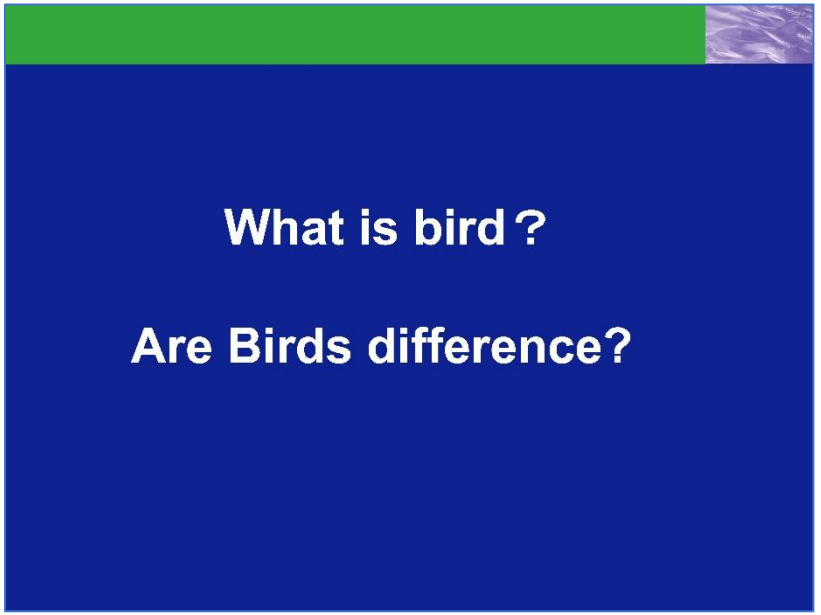
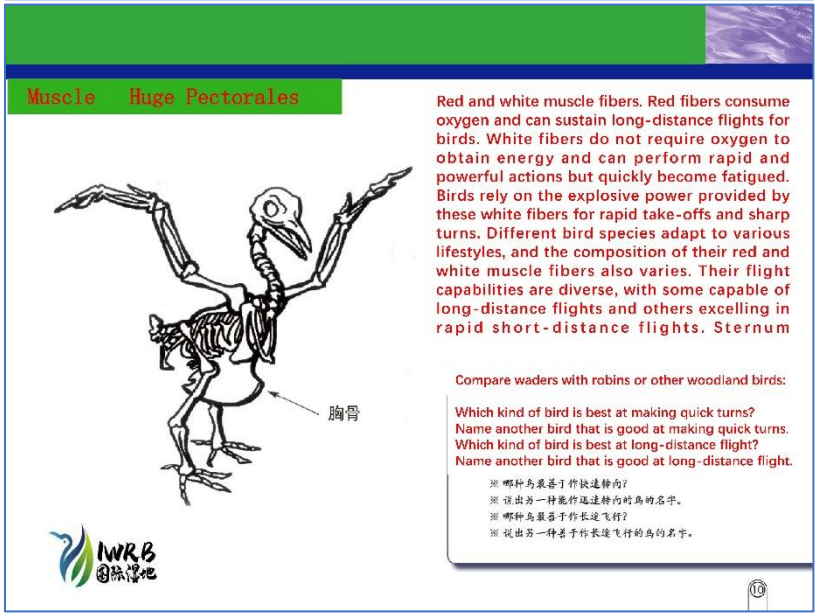
Annex 3.5: Waterbirds Conservation

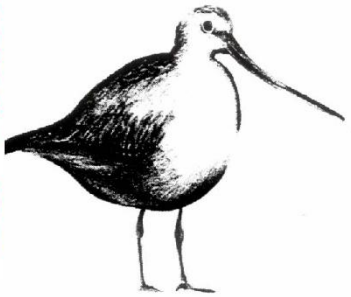




保　温

40° C　　Constant temperature
down feather【羽绒】
Hear & Energy from Sugar and Fat

Thermoregulation
Regardless of weather conditions, birds can maintain their body temperature at around 40℃. A warm body temperature ensures that the nervous system can transmit information quickly, giving the bird sufficient time to react; it also guarantees rapid and powerful muscle activity. Birds are agile animals at any time of the day, in any season, or under extreme weather conditions. A stable and warm body temperature enables birds to fly continuously for several hours, days, or even weeks without feeling tired.
How do birds obtain heat?
Birds obtain substances such as sugar and fat from their food, which are rich in energy. Through chemical processes in their bodies, this energy is released, providing heat and the energy needed for growth and activity.



Temperature control to some birds live in cold areas, such as seabirds, penguins and gulls etc., they have a special thermal insulation system, can control the heat from escaping through the foot. The arteries and veins in the legs are usually very close to each other. Under cold conditions, heat is transferred from the arteries to the returning veins. In addition, some birds can also reduce the amount of blood flows through the feet, so that when their feet touch the cold surfaces, wouldn't loss too much heat. Penguins can do this when they stand in the snow.

有些人喜欢穿含有羽毛和鸭绒的衣服

第一次从衣柜里取出的时候，朝廷有为什么会建议你补一件衣服，把它弄松软呢？

鸟类保温需要消耗能量

鸟类的能量大多从食物中获取，而保持体温就需要消耗很大一部分。与个体相近的爬行动物（蛇和蜥蜴）相比，鸟类所需的能量要比它们多出20-30倍。爬行动物不需要保持体温，它们主要从周围的环境中吸收热量，因而，所吃的食物就没有鸟类那样多。

与哺乳动物相比，我们可以发现，飞行所需的能量要远少于奔跑。例如，一只20克重的鸟飞行所需的能量还不到一只20克重的老鼠跑相同距离所消耗能量的1%。

Control temperature of body by eating food
It requires 20-30 times as much energy as reptiles
To consume energy less than one persent

Five Senses

Birds have five senses, or more? Relative to their body size, birds have a large brain. The parts of the brain that process information from the eyes, ears, and balance sensors are particularly large. Therefore, these two sensory organs are very important for birds.

Birds have excellent vision. Excellent vision is crucial for the survival of birds. Their eyeballs are relatively large. Overall, birds have very sharp vision; they can focus on conspicuous places and detect moving objects. Most birds can detect brightly colored objects. Birds cannot move their eyeballs much and compensate for this by turning their heads.

Some birds have eyes that are close together, like owls, which can accurately judge nearby objects. Their two eyes receive overlapping images through three-dimensional vision. For most birds, their two eyes are far apart, on the sides of their heads, and the images received by each eye do not overlap. Therefore, their field of view is wide, but their vision is largely two-dimensional. Many birds can also use other methods to estimate distance. Some leading male birds detect predators by judging distances through different angles.

Birds have an eyelid. It has moist glands distributed on the upper part of the eye, like a car windshield wiper. This provides good protection against wind damage during flight.

A big Head with eye and ear　　oculogyration【眼球转动】Neck rotation【脖子转到】

Birds have excellent balance, hearing, taste, smell and touch.
How do migratory birds identify directions? This issue has not been fully clarified yet. There is an innate disk in a bird's body.

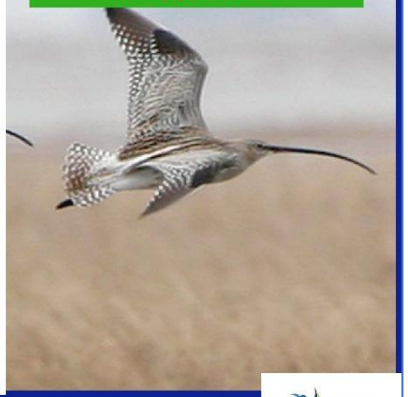
some species of birds can observe the direction of sunlight and use it as a compass. Some other birds use the arrangement shapes of galaxies to determine whether they are heading north or south.

On the heads of some birds, there are extremely small magnetic crystals, which function as a compass. These "compasses" are arranged in the Earth's magnetic field and help birds identify the direction of their flight.

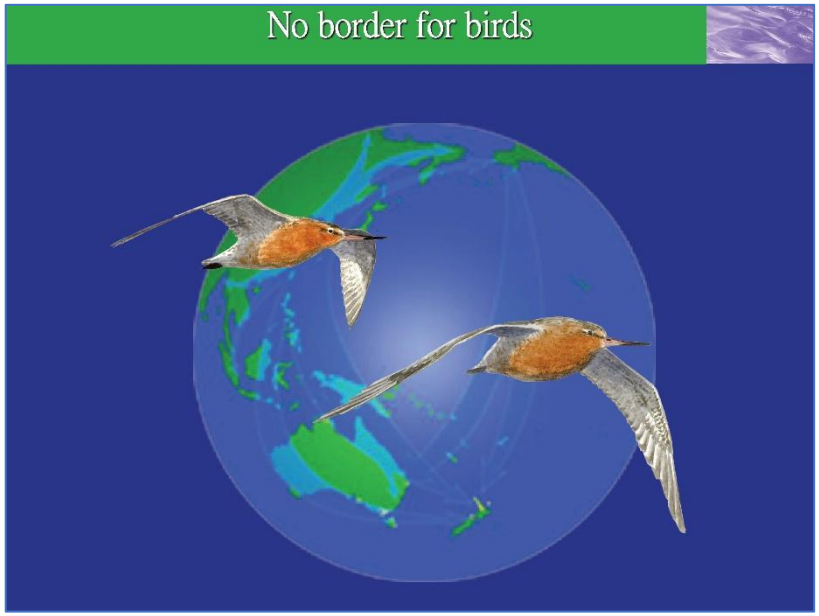
The biological clock of a bird shows the time of each day. So bird can determine the changes in the positions of the sun and stars over the 24 hours.

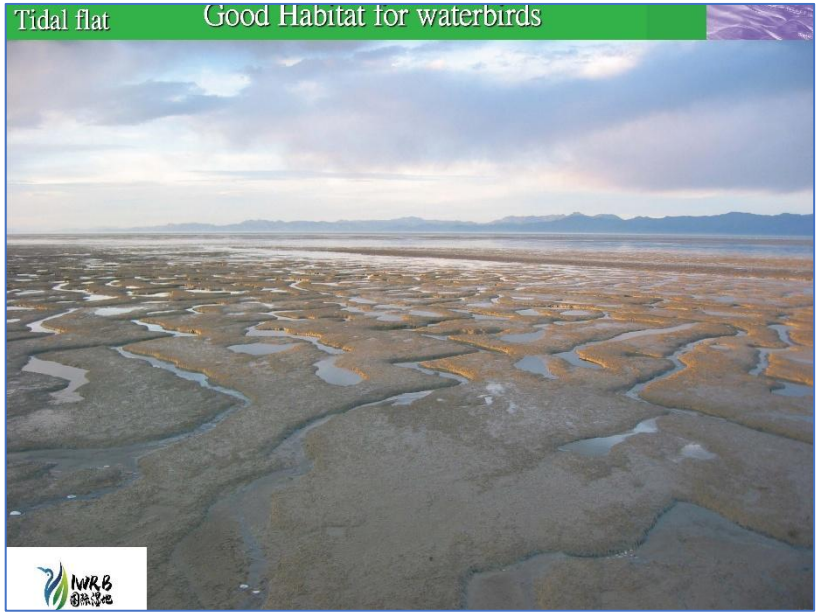
Birds also use other methods, including detecting waveforms and utilizing other sensory organs,

Eye and Ear
5 apparatus



Vision, auditory sense, balance, gustation, smell, touch


No border for birds


Tidal flat
Good Habitat for waterbirds


They need foods (shore fishes)

In March New Zealands

Jesse Conklin

Same place in Sept.

Jesse Conklin

SAME BIRD but after migration

American Flyways

No inter-governmental Agreement for Flyway

CAFF

Initiatives

- Western Hemisphere Shorebird Reserve Network
- North American Waterfowl Management Plan
- Waterbird Conservation for the Americas
- Rice and Waterbirds Working Group

- Shorebird studies
- Neotropical Waterbird Census (IWC)
- Member of the WHSRN Council (WI-O staff)
- Waterbird Population Estimates

Africa – Europe Flyways

Africa–Europe Waterbird Agreement (CMS)

European Directives

CAFF

Initiatives

- Wings over Wetlands
- (Black Sea Wet)
- (MedWet)

NGO Role:

- Technical support to AEWA
- International Waterbird Census
- Bird Flu advisor
- Waterbird Population Estimates

Central Asian Flyway

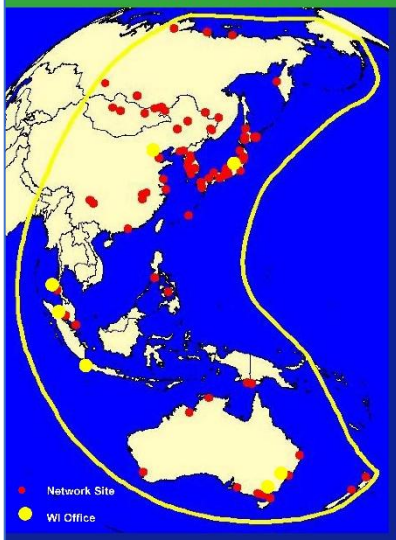
Bilateral Migratory Bird Agreement

Initiatives

NGO Role:

- Support development of a CMS Agreement
- International Waterbird Census
- Waterbird Population Estimates
- Bird Flu advisor

East Asian – Australasian Flyway



Bilateral Migratory Bird Agreements countries)

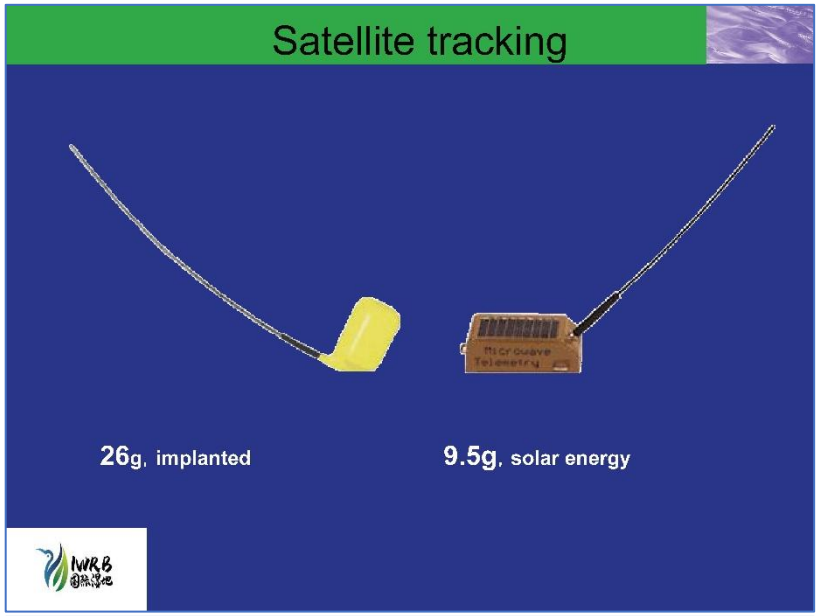
CAFF

Initiatives

- Asia Pacific Migratory Waterbird Conservation Strategy and Species-group Action Plans

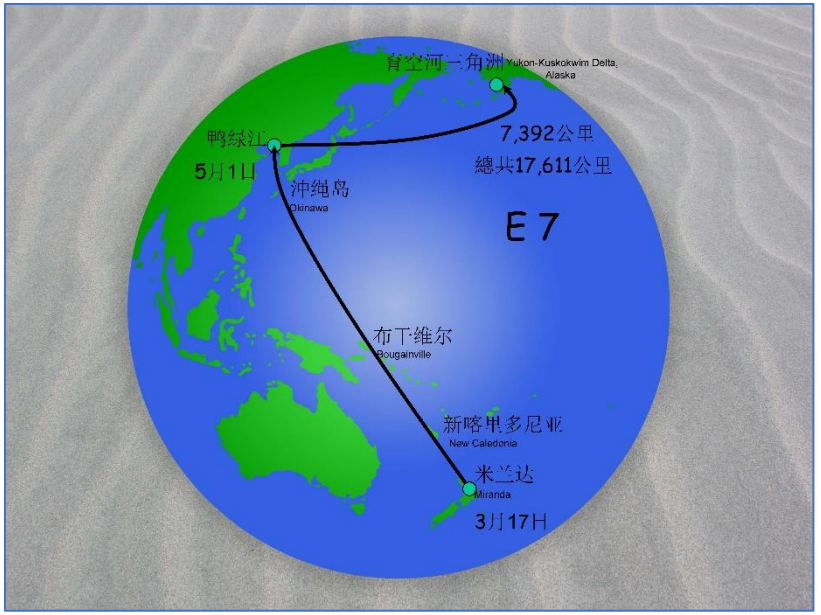
NGO Role

- Leading role (Strategy, Action Plans, Network)
- Development of Flyway Partnership
- Asian Waterbird Census
- Waterbird Population Estimates

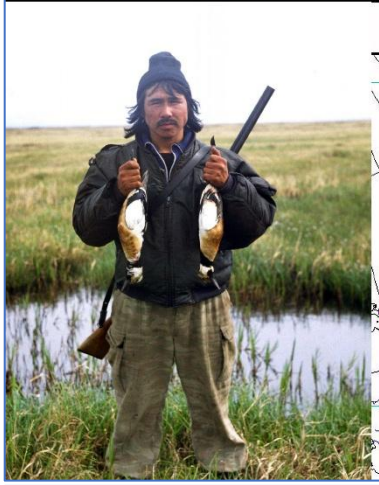

Satellite tracking
26g, implanted
9.5g, solar energy
IWRB

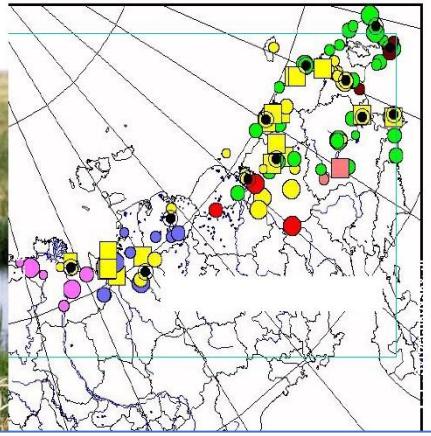

Miranda New Zealnad Feb 2007
Bob Gill


photo N. Warnock

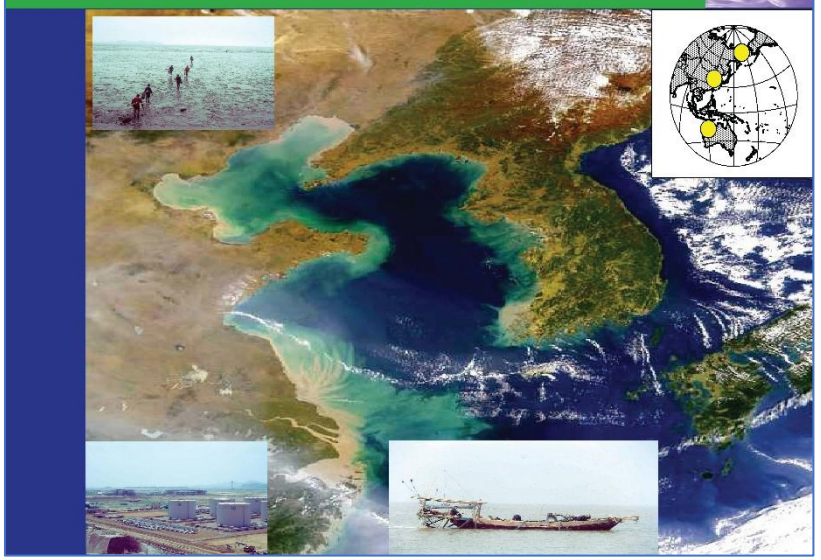

育空河三角洲 Yukon-Kuskokwim Delta, Alaska
鸭绿江
5月1日
沖绳岛
Okinawa
7,392公里
總共17,611公里
E 7
布干维尔
Bougainville
新喀里多尼亚
New Caledonia
米兰达
Miranda
3月17日

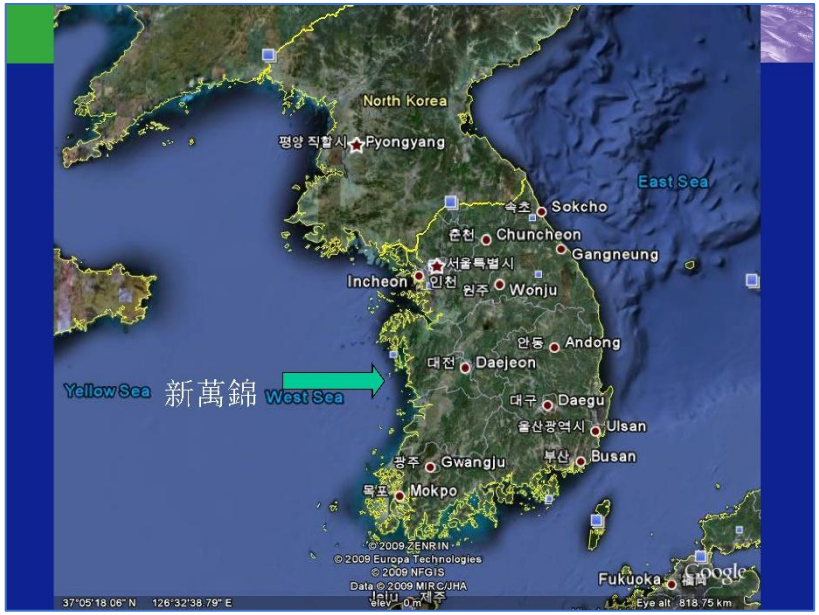
Globally threatened and locally declining waterfowl populations in northeastern Asia suffer from hunting and egg collecting





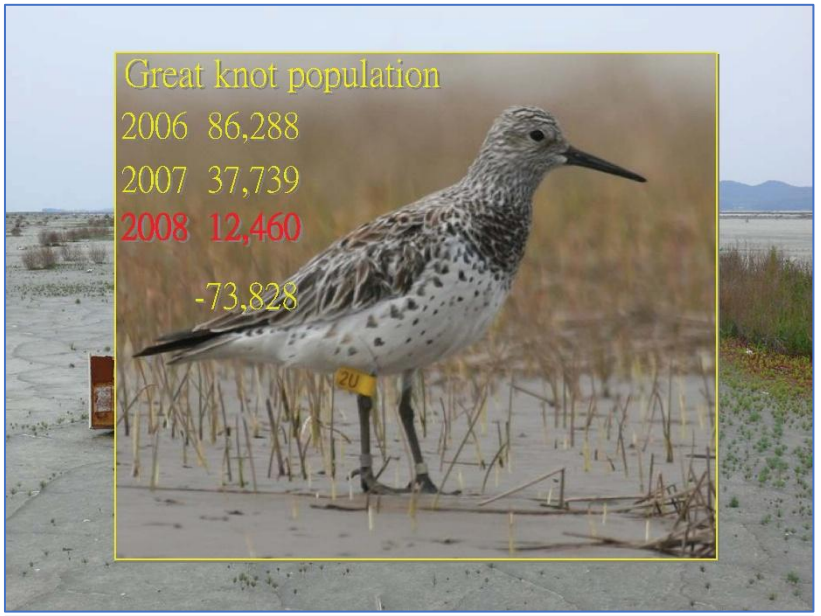
Threats



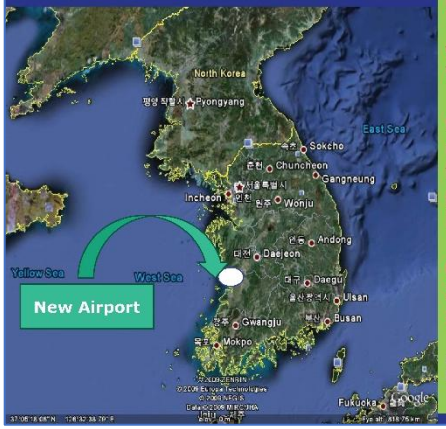


33Km. dyke (1991—2006) Reclamation 41,000h

Disaster



Constructure of New Airport



The construction of the proposed Saemangeum New Airport, within internationally important wetland and within 5-6km or the **Geum Estuary**, the most important site for shorebirds within the Republic of Korea's Getbol World Heritage property.

Currently, there are plans to build 10 or more new airports in the ROK. Four of these proposed airports, if they were to go ahead, would impact internationally important shorebird habitats (in Hwaseong FNS EAAF 142, in Cheonsu Bay FNS EAAF 046, in Saemangeum and in the Nakdong Estuary EAAF 097).

Nial Moores, PhD (Conservation of Avian Biodiversity), National Director, Birds Korea (Republic of Korea)

What we'll cover

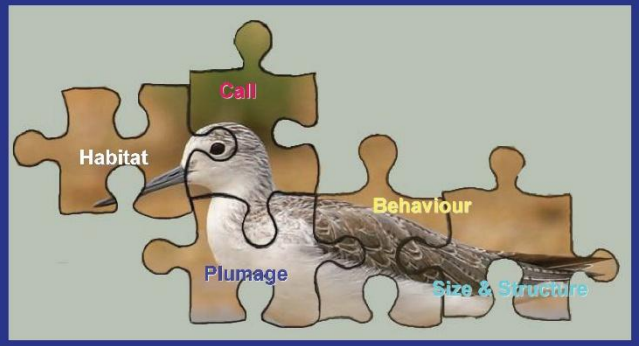
I.野外调查基本技术 Basic Field Survey Skills

II.提高观鸟技术 Improving Observation Skills

III.识别和记录 Identifying and Recording

IV.清点鸟类数量 Counting Waterbirds

Bird Identification



I. Basic Field Survey Skills

a. 使用光学仪器 （Using optics (binoculars and field scopes)

b. 野外方位 （Field positioning）

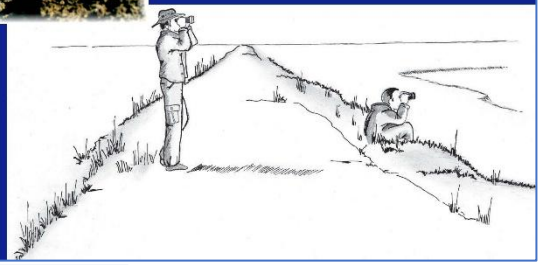
湿地学校 Wetlands School

使用光学仪器 Using optics

Field positioning

- 慢慢移动 Move slowly
- 保持安静 Be quiet
- 身体保持低姿势 Keep a low profile
- 保持一定距离 Don't get too close
- 顺光观鸟 Keep the sun behind you
- 记录鸟的行为 Note the birds behaviour

- 保持低的姿态 Keep a low profile
- 利用自然物做掩护 Use natural blinds



For Birds for Wetlands for People

Linking biodiversity conservation with the needs of local communities

Multiple use areas

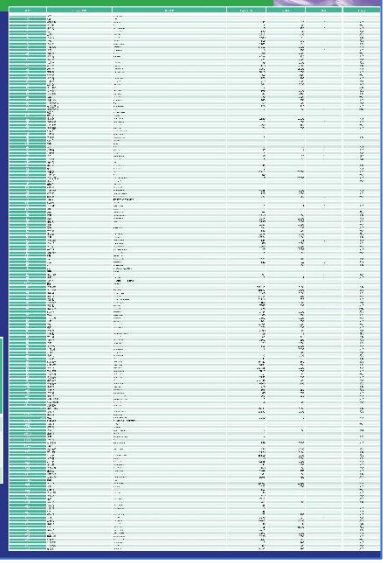
- Private landowners
- Integrated land use planning
- Alternative livelihoods
- Policy framework

Result (2016-2025)

Total of population of individual with 12,382,146.00 species of 19 family
2016 -2025

Name lists

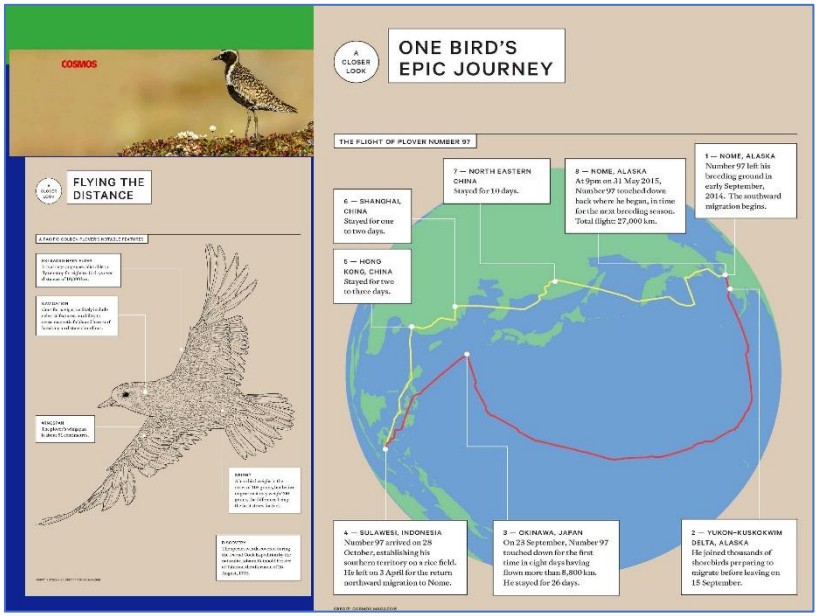
序号	目、科、物种	拉丁学名	调查区最大种群个体数	1%标准数量	保护级别	全球濒危状况
一	雁形目	ANSERIFORMES				
（一）	鸭科	Anatida				
1	疣鼻天鹅	Cygunus olor	33	15	II	无危

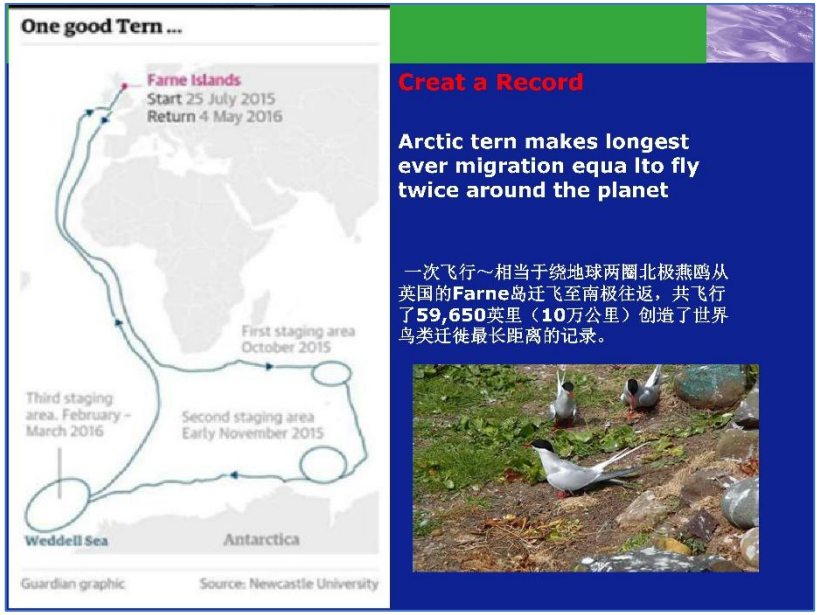


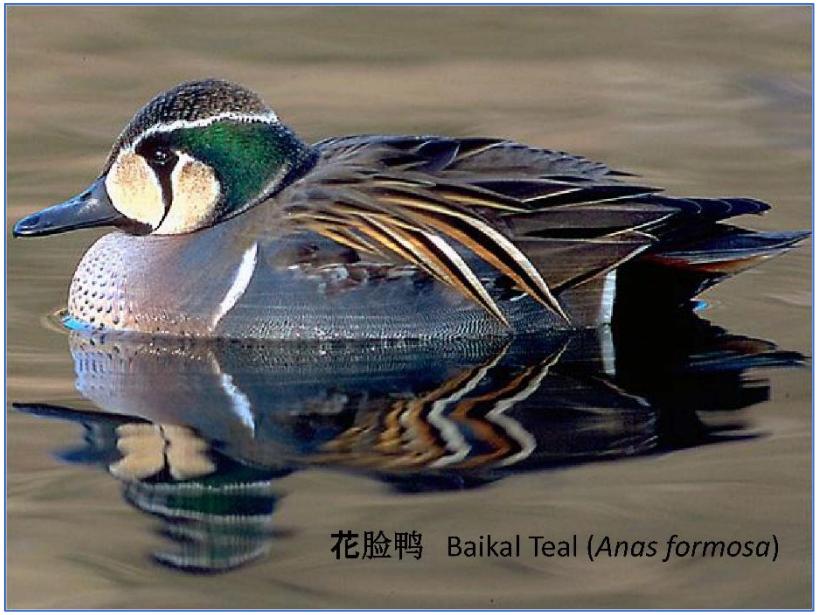
Reports (2016-2024)

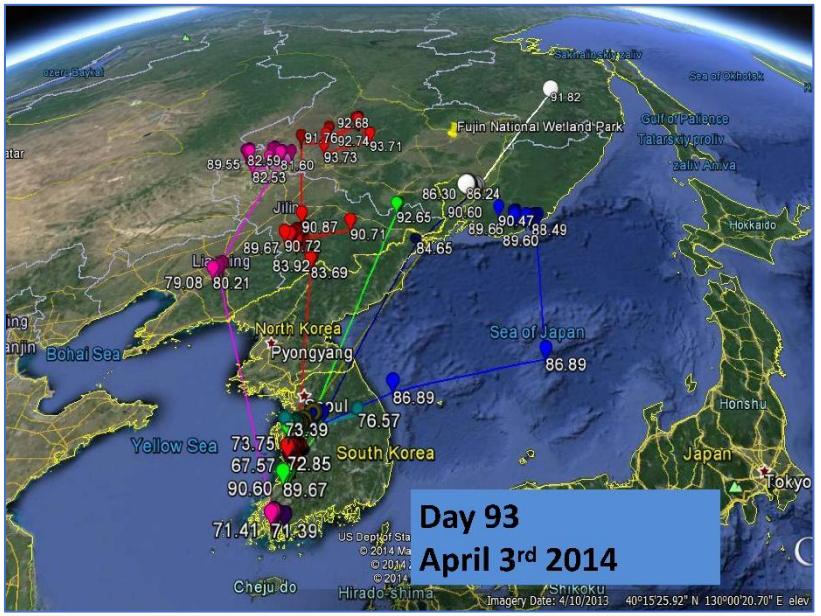
Example track of a Beijing Swift


一次史诗般旅行
金斑鸻 Pacific Golden Plover
分布范围：繁殖在俄罗斯北部、西伯利亚北部及阿拉斯加西北部；越冬在东南亚及马来西亚印度尼西亚至澳大利亚、新西兰并太平洋岛屿。
分布状况：经中国全境。冬候鸟常见于北纬25°以南沿海及开阔地区、海南岛和台湾。习性：单独或成群活动。栖于沿海滩涂、沙滩、开阔多草地区、草地及机场 。
IWRB


COSMOS
A CLOSER LOOK
ONE BIRD'S EPIC JOURNEY
FLYING THE DISTANCE
THE FLIGHT OF PLOVER NUMBER 97
1 — NOME, ALASKA
Number 97 left his breeding ground in early September, 2014. The southward migration begins.
2 — YUKON-KUSKOKWIM DELTA, ALASKA
He joined thousands of shorebirds preparing to migrate before leaving on 18 September.
3 — OKINAWA, JAPAN
On 28 September, Number 97 touched down for the first time in eight days having flown more than 8,800 km. He stayed for 26 days.
4 — SULAWESI, INDONESIA
Number 97 arrived on 28 October, establishing his southern territory on a rice field. He left on 3 April for the return northward migration to Nome.
5 — HONG KONG, CHINA
Stayed for two to three days.
6 — SHANGHAI, CHINA
Stayed for one to two days.
7 — NORTH EASTERN CHINA
Stayed for 10 days.
8 — NOME, ALASKA
At 9pm on 31 May 2015, Number 97 touched down back where he began, in time for the next breeding season. Total flight: 27,000 km.


One good Tern ...
Farne Islands
Start 25 July 2015
Return 4 May 2016
First staging area October 2015
Second staging area Early November 2015
Third staging area. February - March 2016
Weddell Sea
Antarctica
Guardian graphic
Source: Newcastle University
Creat a Record
Arctic tern makes longest ever migration equa lto fly twice around the planet
一次飞行~相当于绕地球两圈北极燕鸥从英国的Farne岛迁飞至南极往返，共飞行了59,650英里（10万公里）创造了世界鸟类迁徙最长距离的记录。


花脸鸭 Baikal Teal (*Anas formosa*)



漫游滑翔机生命周期:

Wandering Glider life cycle:

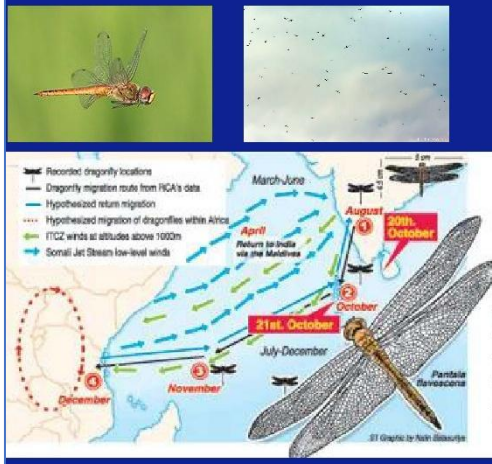
像所有蜻蜓一样，黄蜻蜓--它们需要水和湿地来产卵。

但它们使用临时湿地，所以卵到幼虫的生命阶段很短(只有6周)。（六周的卵与幼虫期）

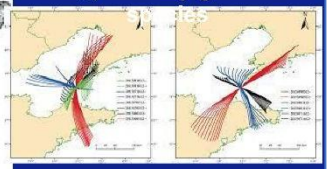
水生幼虫和有翅成虫都是掠食性的（幼虫和有翅成体均食肉性）

成年候鸟利用季风季节为下一阶段的迁徙繁殖下一代。随季风繁殖以便后代继续迁徙

Wandering Glider (*Pantala flavescens*) 黄蜻蜓，体重只有几克，迁徙7000公里，多代迁徙18000公里！在喜马拉雅山6000米以上的地方也看到过它们



Wandering Glider (黄蜻蜓) – a truly global

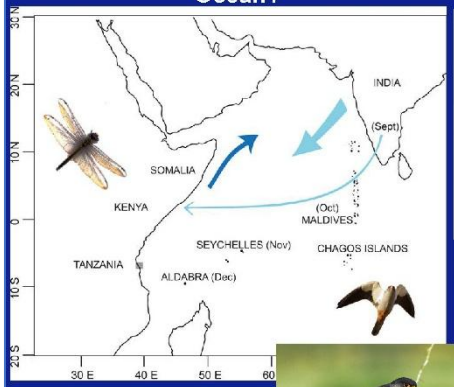


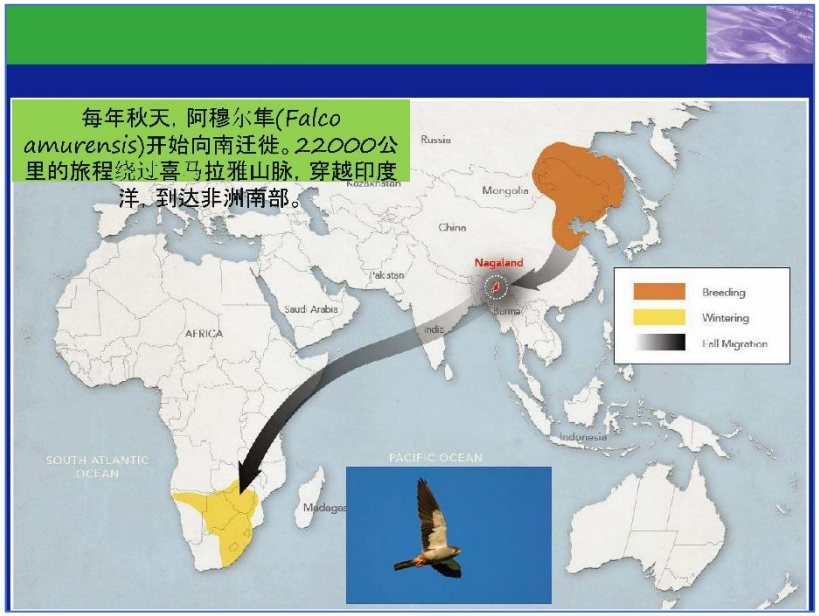
Ecosystems

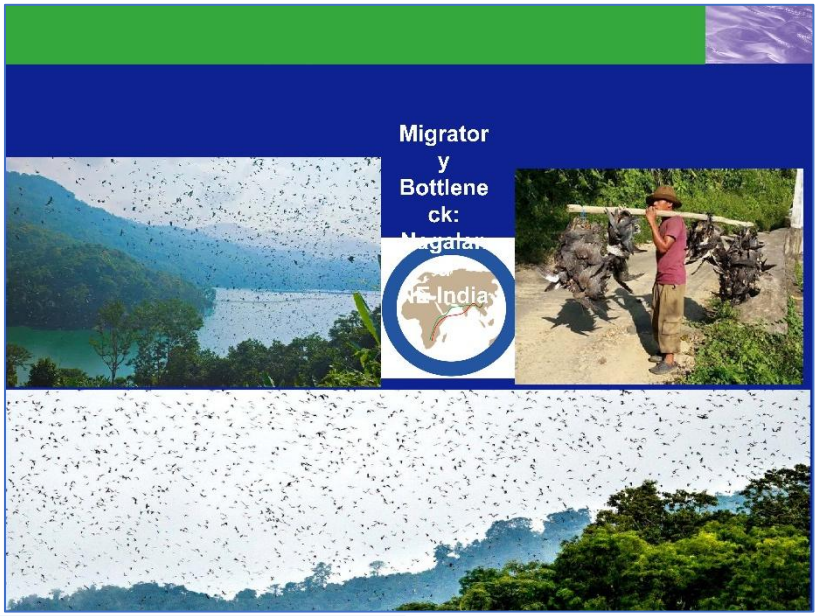
"An ecosystem is a community of organisms together with their physical environment. Ecosystems can be of different sizes and can be marine, aquatic, or terrestrial"

"生态系统是生物体及其物理环境的群落。生态系统可以有不同的大小，可以是海洋、水生或陆地。"

How do Amur Falcons cross the Indian Ocean?




每年秋天，阿穆尔隼(Falco amurensis)开始向南迁徙。22000公里的旅程绕过喜马拉雅山脉，穿越印度洋，到达非洲南部。
Russia
Mongolia
China
Nagaland
Pakistan
Saudi Arabia
AFRICA
India
Burma
Indonesia
SOUTH ATLANTIC OCEAN
PACIFIC OCEAN
Breeding
Wintering
Fall Migration


Migratory Bottleneck:
India


新概念:天空中的生态系统
Emerging concept: Ecosystems in the Sky
ECOSYSTEMS IN THE SKY
地球上最大的生态系统
比以前认为的更复杂的生态相互作用空中迁徙的关键生态系统-鸟类，昆虫和哺乳动物


Thank You

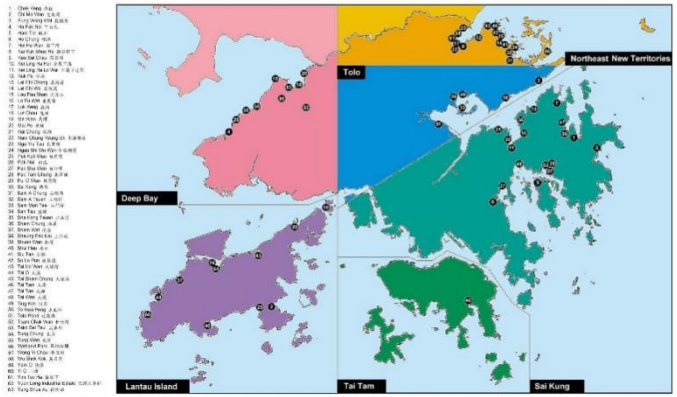
Annex 3.6: Mangrove Conservation in Mai Po Nature Reserve

Distribution of Mangrove in Hong Kong

60 stands
About 624 ha

Base map credit: https://www.hkmapservice.gov.hk/OneStopSystem/map-search?product=OSSCatB&series=iB20000

Distribution of Mangrove in Hong Kong



https://www.afcd.gov.hk/english/conservation/con_wet/con_wet_man/con_wet_man_dis/images/mangomap.jpg

True mangrove species

- *Kandelia obovata*
- *Avicennia marina*
- *Aegiceras corniculatum*
- *Acrostichum aureum*
- *Excoecaria agallocha*
- *Heritiera littoralis*
- *Bruguiera gymnorrhiza*
- *Lumnitzera racemosa*

Conservation of Mangrove in Hong Kong

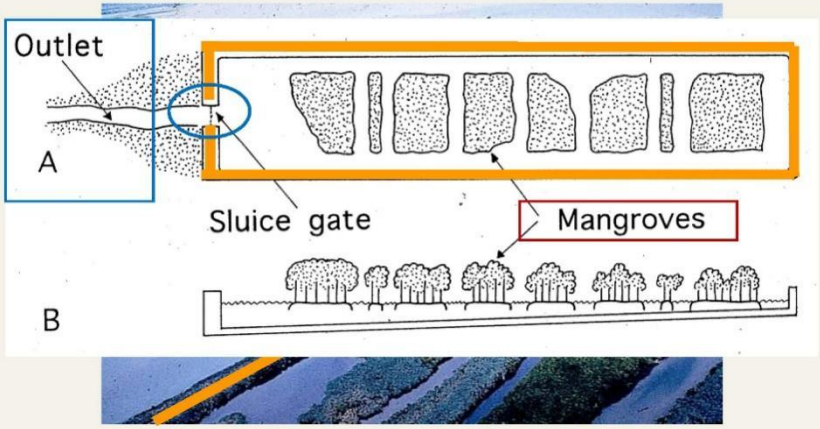
- Protect mangrove stands in Restricted Area, Marine Park or Marine Reserve - e.g. Mangroves in Hoi Ha Wan Marine Park.
- Designation of important mangrove stands as Sites of Special Scientific Interest - e.g. Ting Kok mangroves.
- Minimize the impact of urbanization through landuse planning and environmental assessment process.
  - An ecological assessment will be needed if a proposed development will affect established mangrove stands of any size
- Promote public awareness on the conservation of mangroves.
- Mangrove planting.

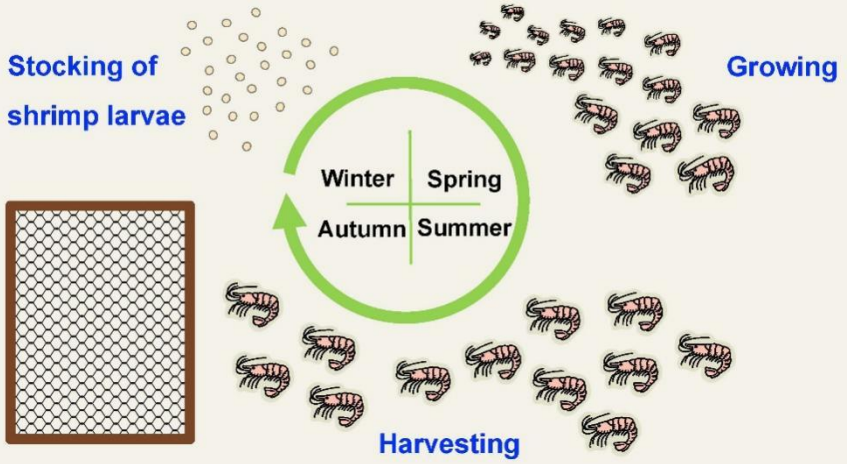
Mangrove forest

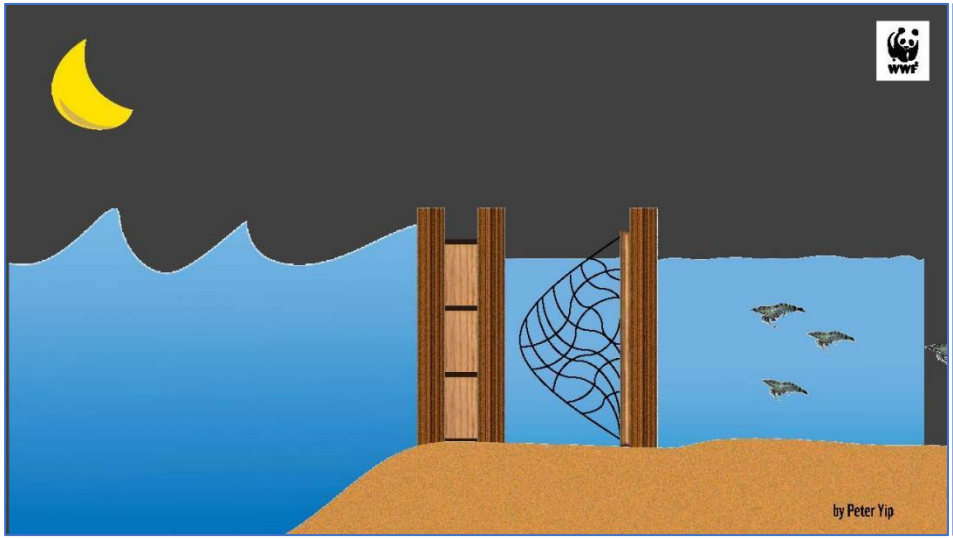
Mudflats

Gei wai (intertidal Shrimp Ponds)

Traditional *gei wai*

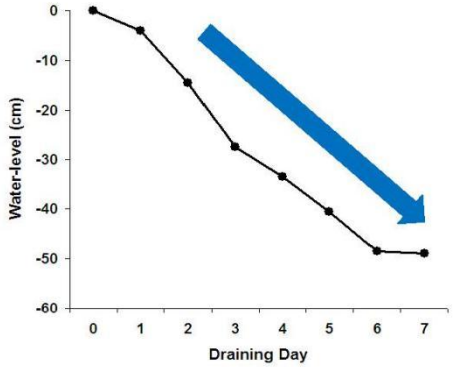


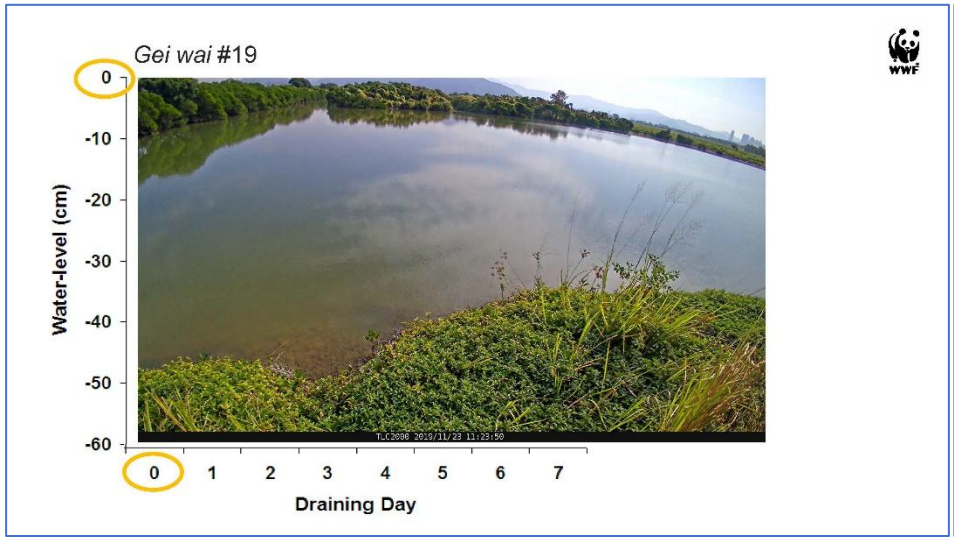




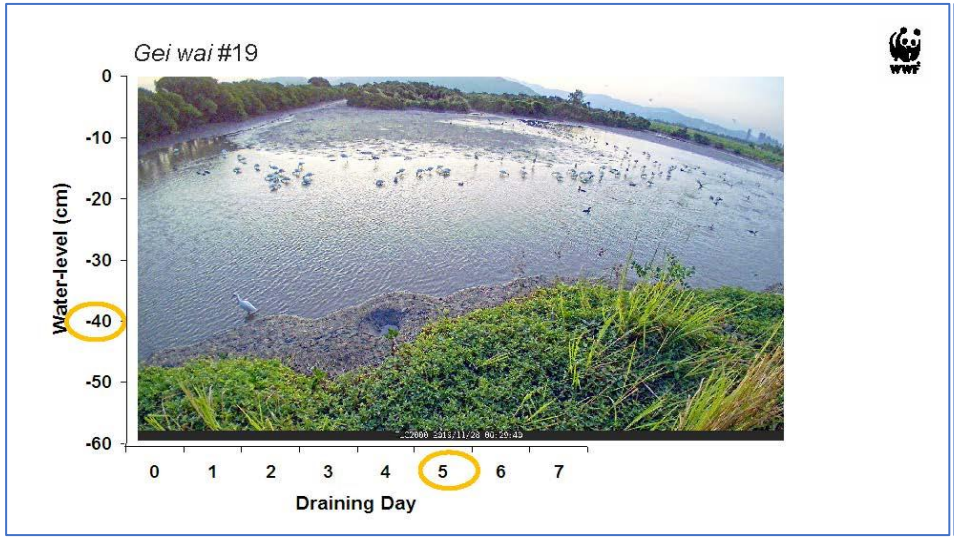
Management of water level in *gei wai*

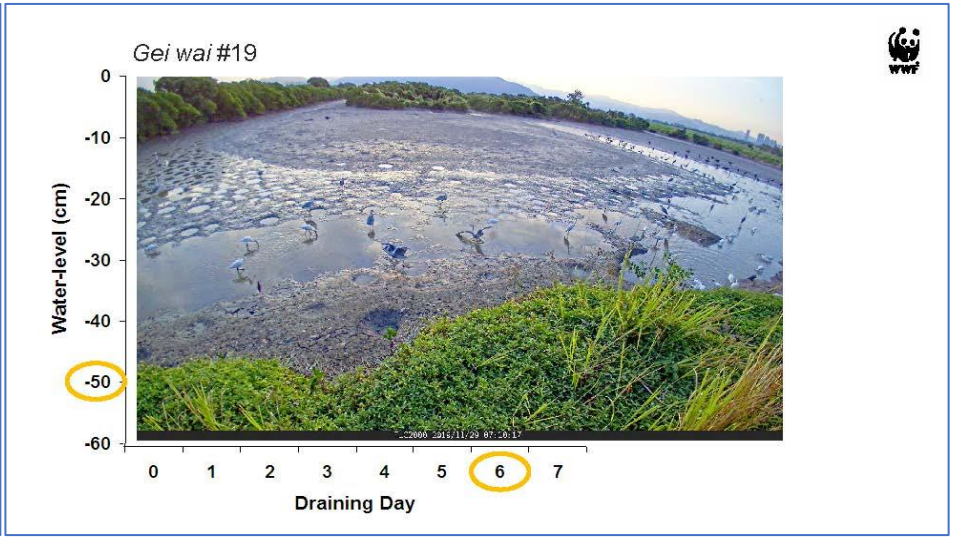
Every winter, draining *gei wai* one by one to provide food for waterbirds




Gei wai #19
Water-level (cm)
0
-10
-20
-30
-40
-50
-60
0 1 2 3 4 5 6 7
Draining Day


Gei wai #19
Water-level (cm)
0
-10
-20
-30
-40
-50
-60
0 1 2 3 4 5 6 7
Draining Day


Gei wai #19
Water-level (cm)
0
-10
-20
-30
-40
-50
-60
0 1 2 3 4 5 6 7
Draining Day

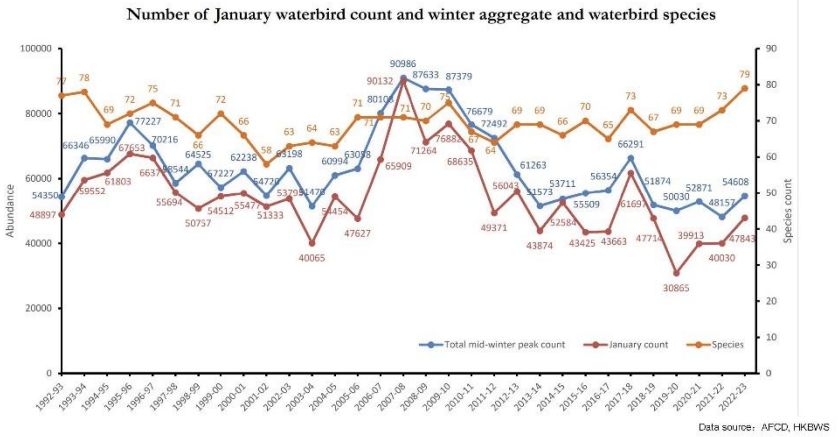

Gei wai #19
Water-level (cm)
0
-10
-20
-30
-40
-50
-60
0 1 2 3 4 5 6 7
Draining Day

Fishponds

Ecological Importance of Mai Po and Deep Bay

Taxa	Number of species
plant	322
Birds	466
mammals	25
reptiles	22
amphibians	8
fishes	70
odonates	53
butterflies	107
moths	316
ants	over 15
bees and wasps	155
spiders	over 100
shrimps	12
crabs	40

Ecological Importance of Mai Po and Deep Bay



Mai Po conservation in 1980's

1981

- WWF-Hong Kong was founded and decided to undertake a project at Mai Po

1982

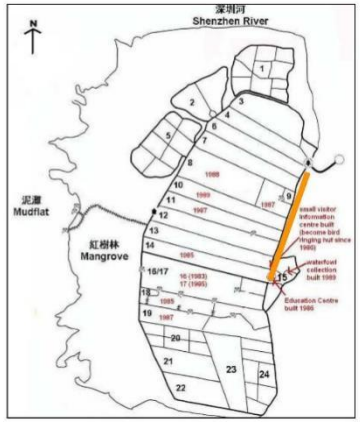
- WWF-Hong Kong submitted a proposal to the then Hong Kong Government (Hong Kong SAR now) to take over management of Mai Po at no cost

1982/83

- The then HK Govt. approved in principle, the establishment of the Mai Po Marshes Nature Reserve
- Acquisition and management of the first *gei wai* with funds from the Royal HK Jockey Club
- New land licenses (for conservation and education) were given to WWF-Hong Kong

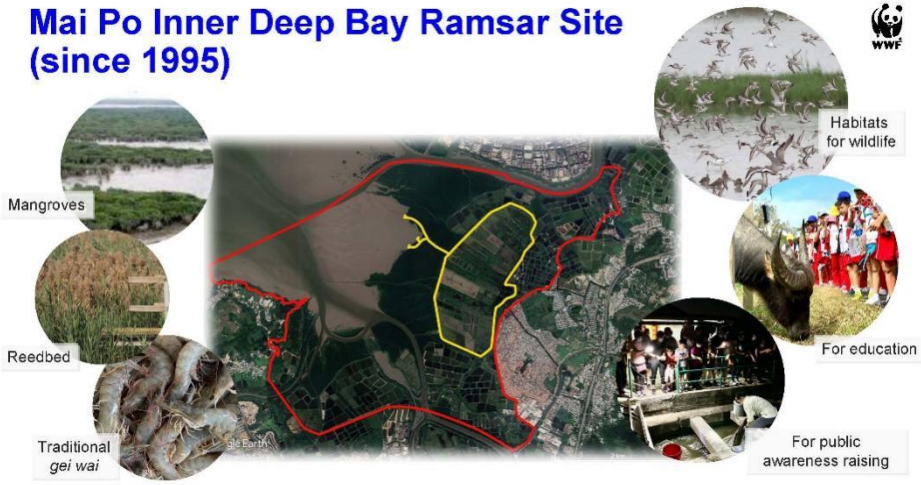
1983

- Proposal for setting up of a Mai Po Nature Reserve and Education Centre
- Constructed a Visitor Information Centre and a 1.2 km concrete footpath

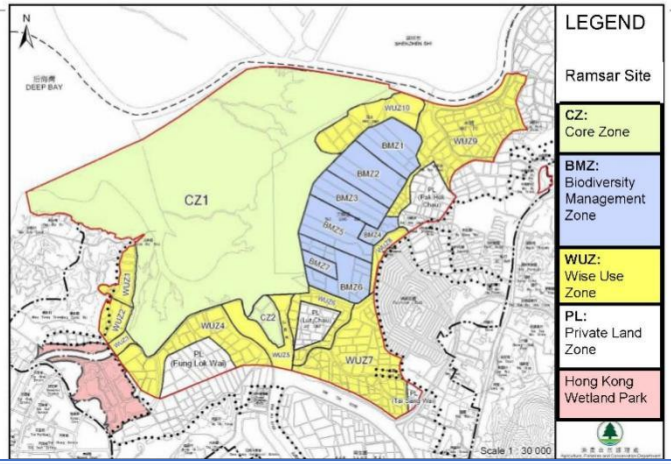


What's happening in Mai Po Nature Reserve?

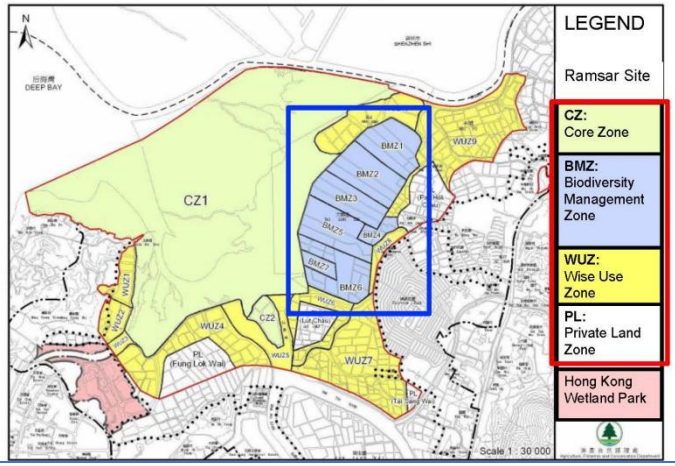
Mai Po Inner Deep Bay Ramsar Site (since 1995)



Mai Po and Inner Deep Bay Ramsar Site



Mai Po and Inner Deep Bay Ramsar Site

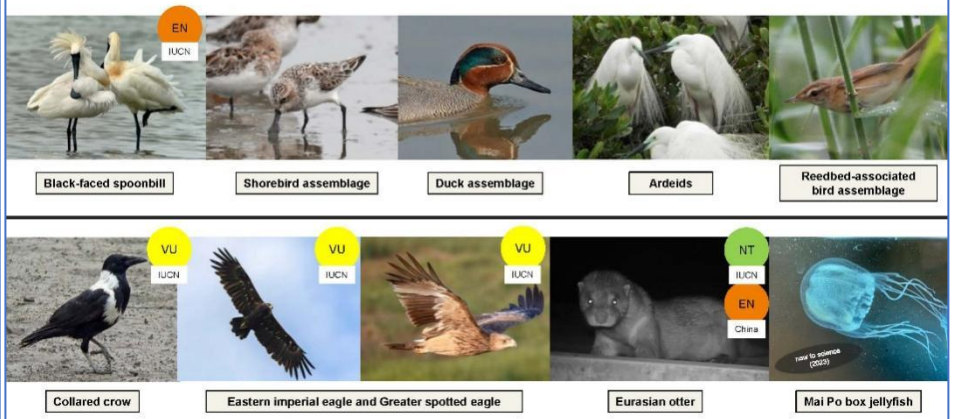


Mai Po Management Plan

Management goals :

1. As a climate-resilient and adapted staging and wintering ground for migratory waterbirds along the EAAF and for threatened indigenous biodiversity;
2. Through active management, sustain the practice of *gei wai* as an example of traditional wise use of wetlands;
3. As a regional centre for knowledge and awareness on wetland conservation

Biodiversity Conservation Targets (2024 – 2029)



Objectives

1. To **maintain or increase populations of priority species** by managing the required habitat diversity in a manner that integrates climate-adaptation strategies.
2. To **raise public awareness and educate citizens** about the importance of wetlands and their conservation, including the provision of universal access to MPNR by visitors.
3. To **share experience and knowledge** with other wetlands along the EAAF to enhance the conservation of migratory waterbirds.
4. To develop MPNR as a regional centre of excellence for **wetland research and monitoring**.

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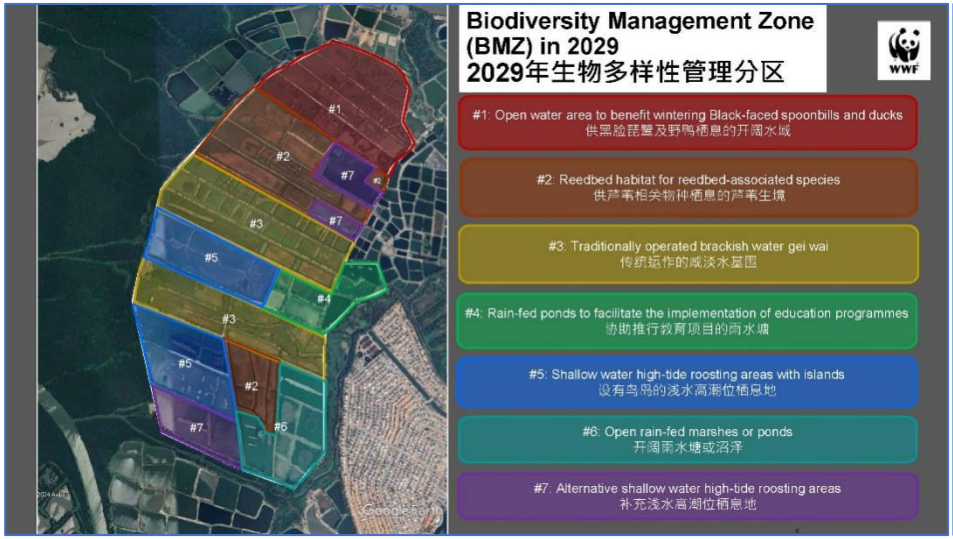


Objective 1. To maintain or increase populations of priority species by managing the required habitat diversity in a manner that integrates climate-adaptation strategies.

1.1 To provide suitable roosting and feeding habitats for wintering **Black-faced spoonbill**;
1.2 To provide high tide roosting sites for **shorebird assemblage**.
1.3 To provide suitable roosting and feeding habitats for the **duck assemblage**.
1.4 To provide suitable roosting and feeding habitats for **ardeids**.
1.5 To manage the reedbed habitat for **reedbed-associated bird assemblage**.
1.6 To provide a pre-roosting tree habitat for **Collared crow**.
1.7 To provide a perching tree habitat for **Eastern Imperial Eagle** and **Greater Spotted Eagle**
1.8 To identify and manage habitats for **Eurasian otters**.
1.9 To identify and maintain habitats for other focal key species and species groups, such as **Mai Po box jellyfish**.
1.10 To develop and manage diverse **freshwater habitats**.
1.11 To maintain **the traditional operation and landscape of the *gei wai*** habitats.
1.12 To manage the **intertidal mudflat**.
1.13 To **minimise threats** towards conservation targets and associated habitats.
1.14 To conduct **additional management** to support achieving the above objectives.

Annual work schedule for recurrent works

Recurrent work item		Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Water exchange and water level management						H	H	H	H	H	H		
Gei wai draining		H										H	H
Predatory fish management													
Vegetation cutting on bunds	BMZ1, Pond #20										H		
	BMZ5, BMZ 7								H				
	BMZ2, BMZ3, BMZ4 (every 2 years)									H			
Vegetation cutting on islands and research areas				H						H		H	
Control vegetation in open water area	BMZ5, BMZ7			H						H		H	
	other *gei wai* and ponds	H											
Removal of tree saplings along bunds			H	H									
Control of invasive species	*Mikania micrantha*	H									H		H
	Sonneratia sp.												
	Leucaena leucocephala												
	Typha												
	Golden apple snail	H					H	H					
	Red imported fire ant			H					H		H		
Management of captive water buffalos and enclosures													
Management of feral dogs and cats													
Management of vegetation around visitor facilities					H	H	H	H	H	H			
Maintenance of infrastructures		H	H	H	H	H	H	H	H	H	H	H	H
Management of vegetation on intertidal mudflat							H	H	H	H	H		

Five-year work timetable for capital works

Capital work item	2024	2025	2026	2027	2028
Desiltation of water channels, restoration of open water areas and mangrove at GW #13	H				
Creation of seasonal freshwater marsh/ponds at Pond#24b&d and installation of buffalo fence along b/d & c/e bund	H				
Creation of seasonal freshwater marsh/pond and installation of buffalo enclosure at Pond #17a	M				
Desiltation of water channels and restoration of open water areas at the landward side of GW #19		H			
Desiltation of water channels and restoration of open water areas at GW #22		H			
Desiltation of water channels and restoration of open water areas and floating-leaf plants at Pond #16b		H			
Desiltation of water channels and restoration of open water areas and reedbed at GW #10			H		
Desiltation of water channels and restoration of open water areas at GW #11			H		
Desiltation of water channels and reprofiling of islands and pond floor at GW #21			H		
Desiltation of water channels, restoration of open water areas and reprofiling of islands at GW #16/17				H	
Desiltation of water channels and restoration of open water areas at GW #14				H	
Desiltation of water channels and restoration of reedbed at GW #9				L	
Desiltation of water channels and restoration of open water areas at GW #3/4					H
Converting GW #23a into a rain-fed pond and reprofiling of its pond floor					H
Desiltation of water channels and restoration of reedbed at Pond #8b channel desilt					L

Annual water level management regime for high-tide roosting sites

Gei wai/ pond	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
GW #8a	L L	L L	L L	L L	DD F	F F	F F	F F	F L	L L	L L	L L
GW #11	L L	L L	L L	DD F	F F	F F	F L	L L	L L	L L	L L	L L
GW #16/17	L L	L L	L L	L L	M M	M M	DD F	F F	F F	F L	L L	L L
GW #20	F L	L L	L L	L L	M M	M M	M L	L L	L L	DD F	F F	F F
GW #21	F L	L L	L L	L L	M M	M M	M L	L L	L L	DD F	F F	F F
GW #22	T T	T T	T T	T H	H H	H H	H H	H H	H H	H T	T T	T T

GW #8a, GW #11, GW #16/17, GW #20, GW #21:

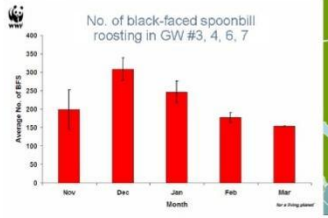
- Drain down for cutting and immediate flooding will be applied as vegetation control measure, rotational flooding is scheduled across roosting sites.
- Immediate adaptive management such as adjustment of water levels should be conducted if shorebird number falls low in spring and autumn.
- Maintain medium water level if Black-winged stilt (or other waterbirds) are nesting and until hatching, lower water level before and after heavy rain.

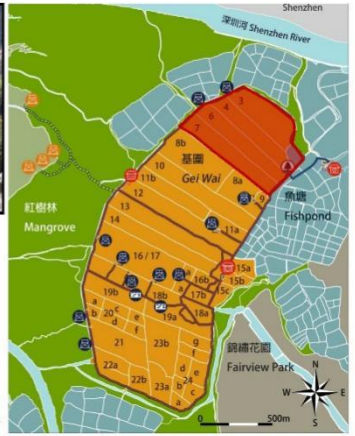
GW #22:

- Allow free water exchange/intertidal operation from Nov and end of Mar.
- Maintain high water level to control the spread of vegetation from Apr to end of Oct.

L/M/H: Low/ medium/ high water levels, with periodic water exchange depending on Deep Bay tidal cycles, on average twice a month.
F: Flooding with highest water level capacity of specific gei wai.
DD: Drain down to facilitate island and open water area vegetation cutting.
T: Allow free water exchange with delayed intertidal cycle.

Habitats for black-faced spoonbill





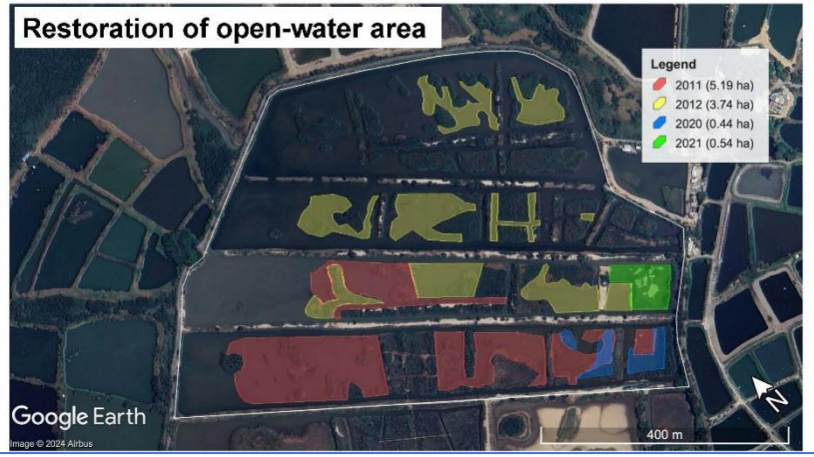
Habitats for black-faced spoonbill

Habitats for black-faced spoonbill

Weeks before the arrival of black-faced spoonbill:
Grass-cutting on the bund

Habitats for black-faced spoonbill

Habitats for black-faced spoonbill



Habitats for black-faced spoonbill

Provide suitable habitats by controlling the water level

Gei wai no.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
#3/#4/#6/#7												
					2	2	2	2	2			
				3						3		
	1	1	1								1	1

Key:

1 – Keep a low water level to provide shallow water for spoonbills to roost.

2 – Raise the water level to control the spread of grasses into the open-water areas of the *gei wai*.

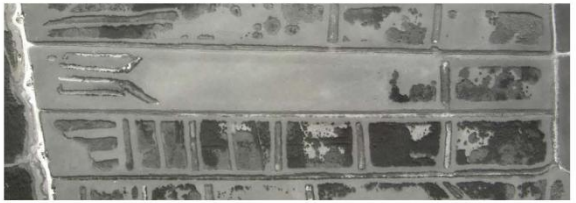
3 – Lower or raise the water level to coincide with arrival/departure of spoonbills.

Mudflat at the rising tide

High-tide roosts for shorebirds

High-tide roost: creation

1980

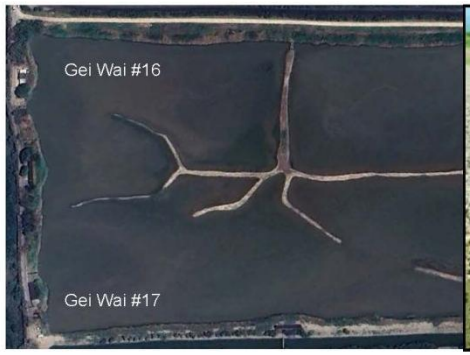


1987

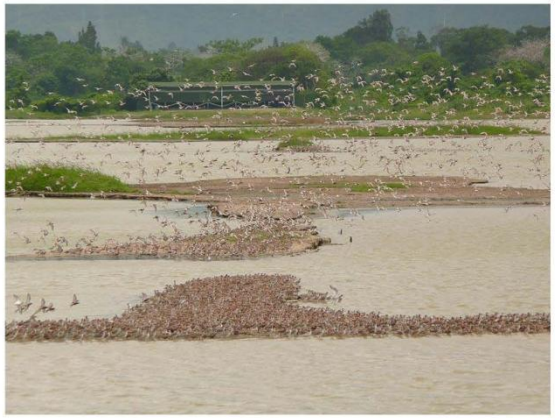
High-tide roost: creation

Shorebird assemblage

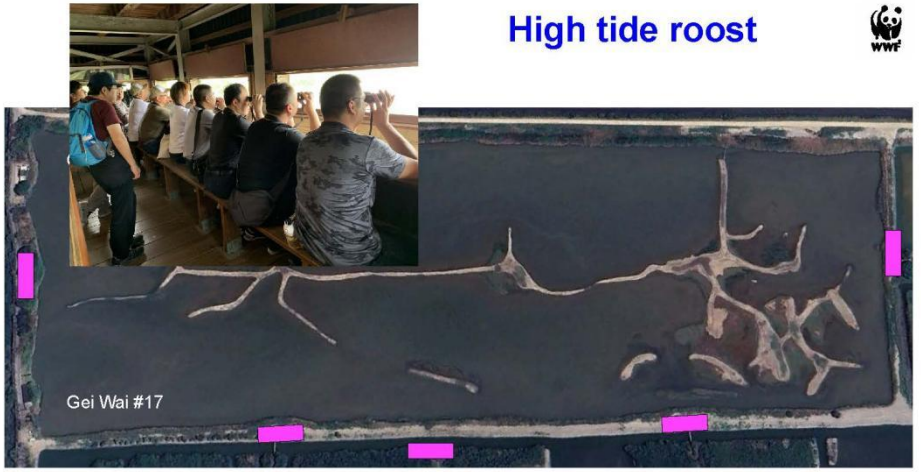
1. Shallow water
2. Large open water area
3. Creation of bird islands in different size and shape



Shorebird assemblage

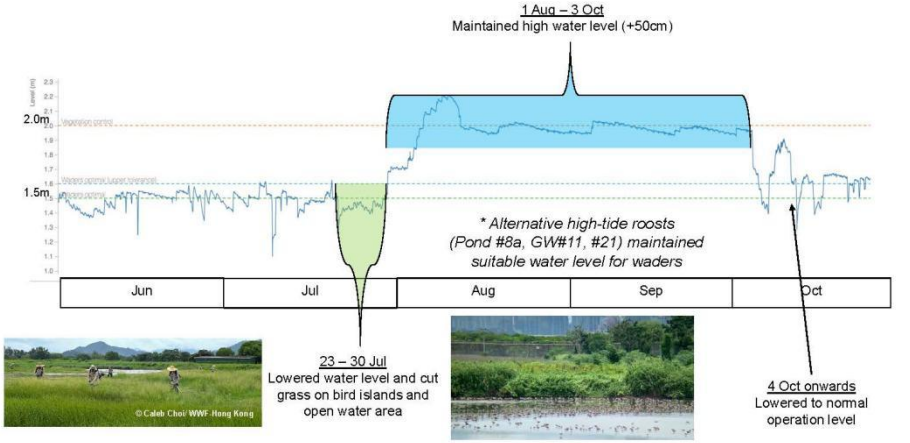


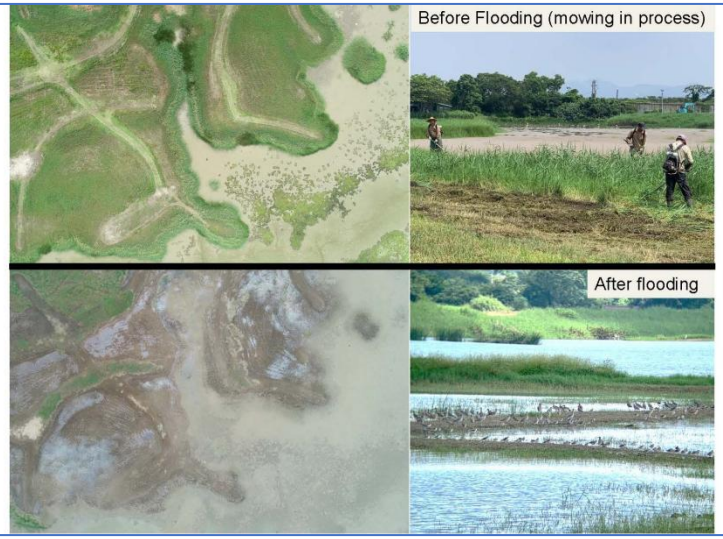
High tide roost



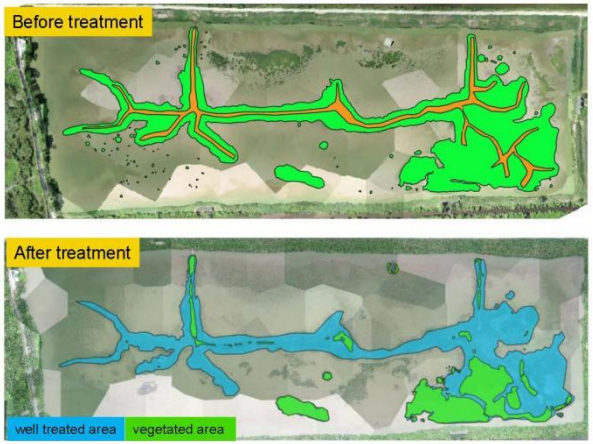
High tide roost: vegetation control

High tide roost: vegetation control





High tide roost: vegetation control



High tide roost: vegetation control

Gei wai Maintenance - Dredging

- Silt is flushed into the *gei wai* during water exchange which is carried out twice a month
- *Gei wai* channels have to be dredged every 10-15 years to maintain the deeper water areas for shrimp and fish
- The dredged mud is placed on the *gei wai* bunds

Gei wai Maintenance - Dredging

May to Oct

Nov to Apr

Tree Management

Avian predators

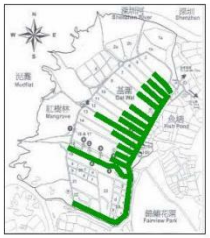
Imperial Eagle

Greater Spotted Eagle

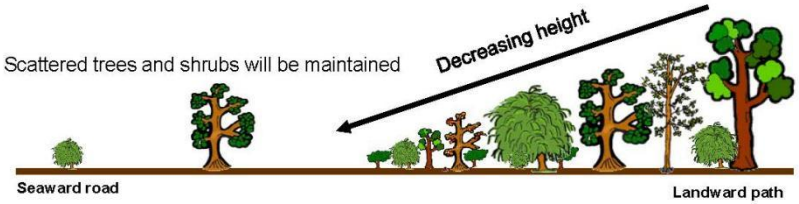
Tree Management

Along the *gei wai* bunds, maintain a balance between;

- open areas with few trees to retain traditional landscape and flight paths for waterbirds, with
- more vegetated areas that provide shade for visitors and habitats for forest birds.



Scattered trees and shrubs will be maintained

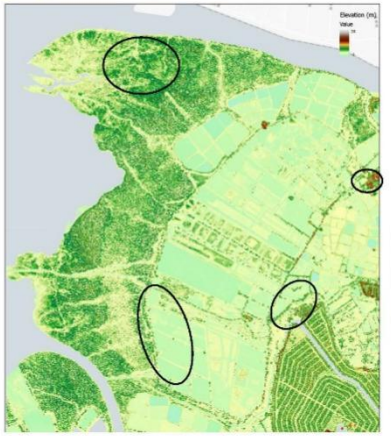


Tree Management

Tree Management

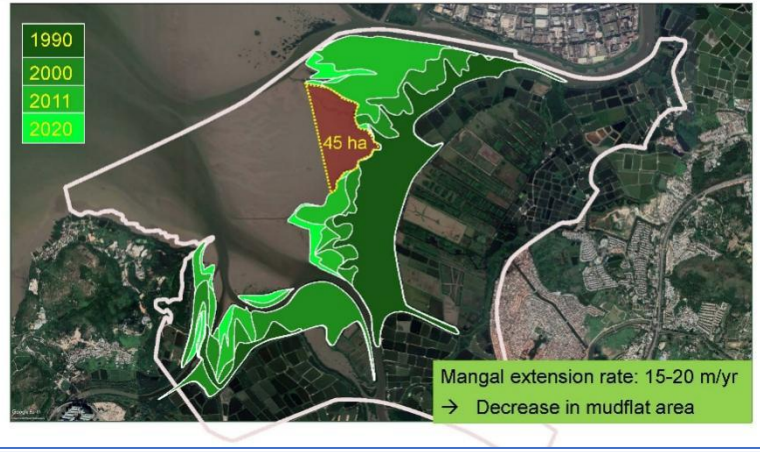
Ardeids

Collared crow



Great cormorant

Vegetation on mudflat: Mangroves



Clearance of mangrove seedlings on 45ha mudflat

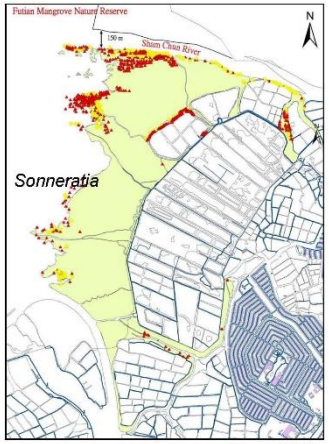
- To maintain the area of open mudflat suitable for waterbirds;
- To ensure an unobstructed view from the floating bird hides.

Clearance of mangrove seedlings on 45ha mudflat

Exotic Mangrove Management

- Early 1990s, exotic mangrove species were introduced to the northern coast of Deep Bay/Shenzhen Bay on a trial basis.
- The aim was to use these to 'green' the coastline as they can grow up to 1 m per year.
- Unfortunately, these *Sonneratia* spp. have now successfully established and are out-competing the local mangrove species.

Exotic Mangrove Management



Source: AFCD

Restoration of abandoned community ponds

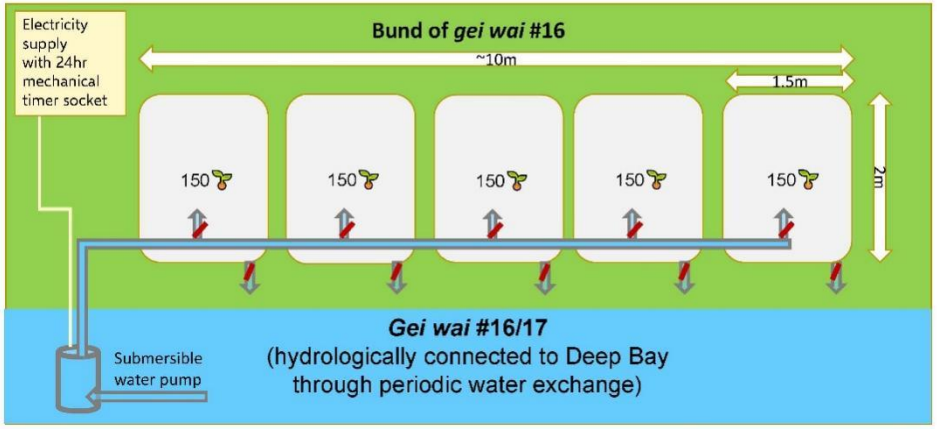
Restoration of abandoned community ponds

Traditional sluice gate repaired

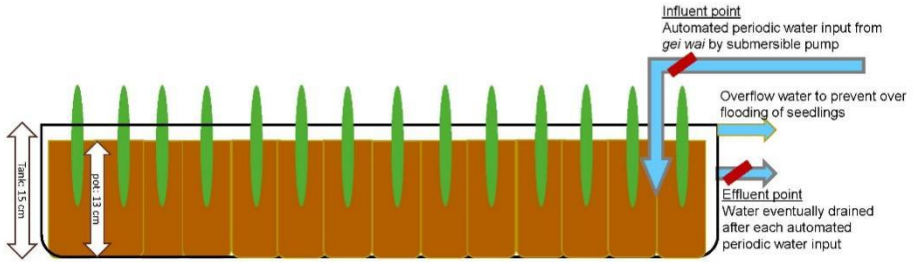
Overgrown vegetation cleared and pond floor re-profiled

Mangrove nursery establishment

Mangrove Nursery - Mimicking Tidal Flow

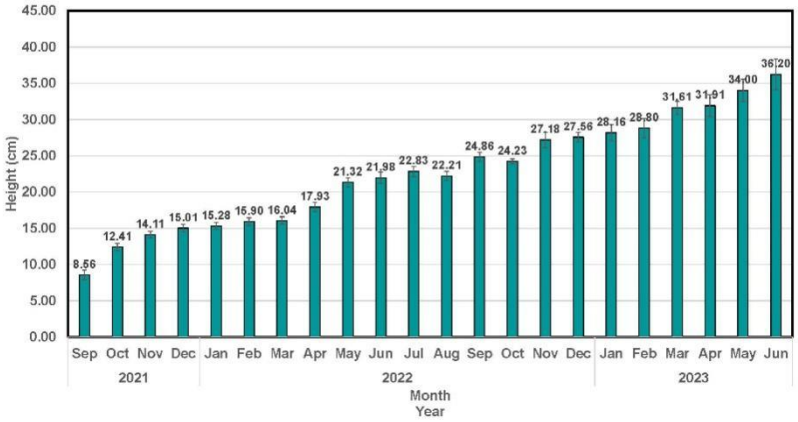


Mangrove Nursery - Mimicking Tidal Flow

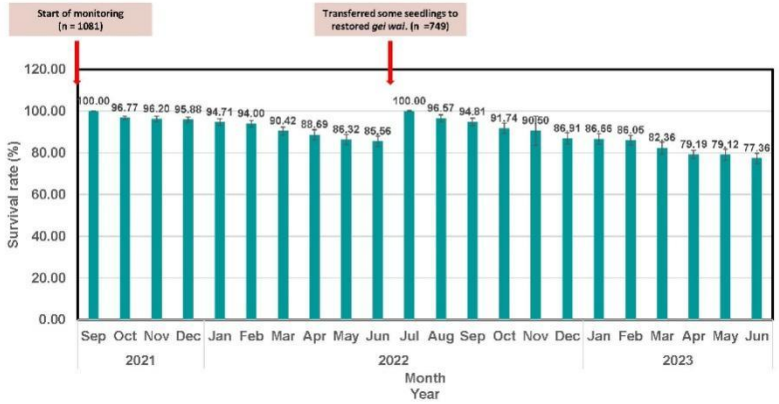


Mangrove Nursery - Mimicking Tidal Flow

Growth of *Aegiceras corniculatum* seedlings



Survival rate of *Aegiceras corniculatum* seedlings



Pest found in the nursery of *Aegiceras corniculatum*

Leaf miner

Lasiocampidae sp.

Orgyia postica

Pond floor re-profiled and mangrove planted

Aegiceras corniculatum
(seedlings from nursery)

Kandelia obovate
(droppers)

Bruguiera gymnorrhiza
(droppers)

Septic tanks built to improve the water quality

Traditional sluice gate repaired

Mangrove planting by volunteers

Aegiceras corniculatum
(seedlings from nursery)

Annual water level management regime for high-tide roosting sites

Gei wai/ pond	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
GW #8a	L L	L L	L L	L L	DD F	F F	F F	F L	L L	L L	L L	L L
GW #11	L L	L L	L L	DD F	F F	F F	F L	L L	L L	L L	L L	L L
GW #16/17	L L	L L	L L	L L	M M	M M	DD F	F F	F F	F L	L L	L L
GW #20	F L	L L	L L	L L	M M	M M	M L	L L	L L	DD F	F F	F F
GW #21	F L	L L	L L	L L	M M	M M	M L	L L	L L	DD F	F F	F F
GW #22	T T	T T	T T	T H	H H	H H	H H	H H	H H	H T	T T	T T

GW #8a, GW #11, GW #16/17, GW #20, GW #21:

- Drain down for cutting and immediate flooding will be applied as vegetation control measure, rotational flooding is scheduled across roosting sites.
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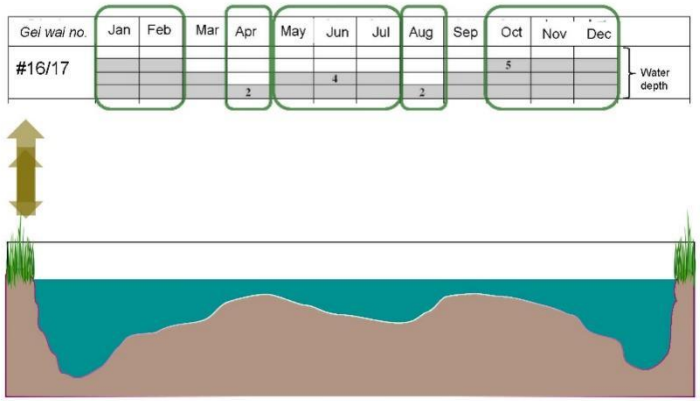
Management of water level



Research and Monitoring

Objective 4. To develop MPNR as a regional centre of excellence for wetland research and monitoring.

Key Activities:

1. Maintain the long-term monitoring programme for conservation targets, threats, and selected indicators of ecosystem change in MPNR and Deep Bay.
2. Conduct research that will help to improve habitat management and species conservation and recovery in MPNR and Deep Bay.
3. Produce research and monitoring reports and peer-reviewed publications.
4. Provide advisory and on-site support to external researchers.

Why do we conduct monitoring?

For habitat management

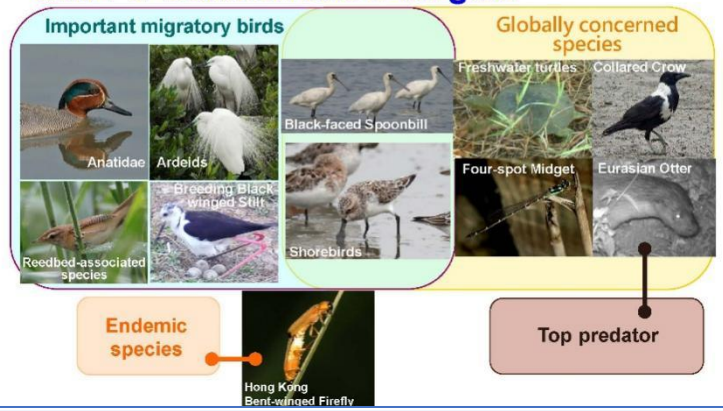
- evaluate effectiveness
- suggest improvement

Timely data as indicator and alert

- avoid serious impact

Monitoring

Mai Po Conservation Targets



Research

Carbon Study

Partner: The Chinese University of Hong Kong

Ecosystems	Carbon stock (Mg C/ha)
Mangrove in the intertidal zone of Mai Po	394 – 534
Mangrove in the gei wai of Mai Po	327- 373
Mangrove in Southern China	324 (Wang et al., 2013)
Secondary forests in country parks of Hong Kong	90 (Delang & Hang, 2009)
Urban turfgrass in Hong Kong	15-51 (Kong, Shi & Chu, 2014)

Education and Awareness

Objective 2. To raise public awareness and educate citizens about the importance of wetlands and their conservation, including the provision of universal access to MPNR by visitors.

Key Activities:

1. Regular review of approach and content of activities to complement recent developments in the sector
2. Provide students with quality learning experiences supported by teachers and motivate students to take corresponding conservation action.
3. Optimally utilize the new educational facilities under the MPNR Infrastructure upgrade project to support the continuous development of student education activities.
4. Increase the number of centre-based education activities from 400 in 2023-24 to 450 by 2028-29.
5. Use MPNR as one of the training hubs for teacher professional development programmes
6. Organize regular and season-specific Nature Schools.
7. develop fun-filled education activities in different formats to engage the public and specific segments of the community.

Education IN the Environment

Principles:

Fun

Engagement

Complementing curriculum

Real-life experience

Promoting active and sustained learning

Facilities

Bird hide

Visitor centre

Man-made wetlands

Nature trail

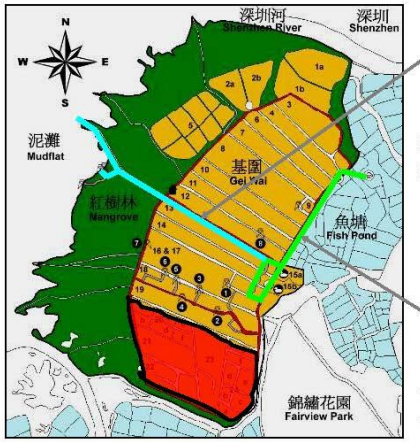
Interpretation panel

Floating boardwalk

Gei wai museum

Major infrastructure

Tour Route



Maximum number of groups: 2

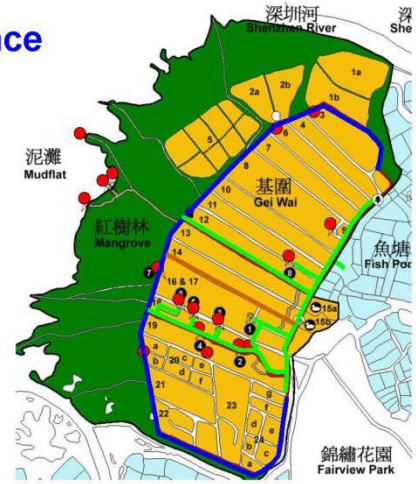
Maximum number of visitor: 25

Maximum number of groups: 4

Maximum number of visitor: 50

Reducing disturbance

- 17 Birdwatching Hides
- Barriers/Screens
  - Tall grass
  - Shrub barrier
  - Earth barrier
  - Approach to hides
- All tours are lead by trained guides (~25 pax / tour)



Student visit programme – Secondary

Programme	Highlights	Activity Format	Curricula related
WETLAND ENCOUNTER (S.1-S.6)	- Discover Hong Kong's fascinating wetlands - Learn to appreciate nature by exploring various wetland habitats. - Two learning routes are available to cater to students' different learning needs.	- Bird watching - Encounters with different types of wetlands - A floating boardwalk experience or boardwalk experience	- Science and Citizenship - Social Development
WETLAND RESERVE OFFICER (S.1-S.6)	- Take part in an on-site field study - Perform field work to understand the importance of wetland management	- On-site field study - Outdoor field work	- Science, - Citizenship and Social Development, - Biology
MANGROVE ECOLOGY (S.4-S.6)	- Explore the largest mangrove stand in Hong Kong, located in the core zone of Mai Po, and - Learn about mangroves' features, ecology and the threats they face.	- Study the features and ecology of mangrove species - Group discussion	- Biology, - Integrated Science, - Citizenship and Social Development
WETLAND ECOLOGIST (S.4-S.6)	- Experience the daily work of an ecologist, learning about the value and importance of local biodiversity through wildlife surveys and scientific measurements.	- Conduct a wildlife survey - Use scientific equipment - Observe plankton	- Biology, - Integrated Science, - Citizenship and Social Development
METROPOLIS PLANNER @ DEEP BAY (S.4-S.6)	- Uncover the impacts of large-scale development projects on wetlands in Hong Kong. - Learn about the various stakeholders involved and the importance of sustainable development through group discussions and an urban planning exercise.	- Field study - Urban planning case study - Group discussion	- Integrated Science, - Citizenship and Social Development, - Biology, - Geography

Student visit programme – Primary

Programme	Highlights	Activity Format	Curricula related
DISCOVERING WETLAND TREASURES (P.4-P.6)	- Uncover the significance of wetlands to humans and wildlife through sensory exploration and interactive games, and by learning to appreciate various wetland habitats.	- Interactive games - Sensory activities	- General Studies, - Primary Science - Primary Humanities
THE STORY OF BIRDS (P.4-P.6)	- Go on a simulated migratory journey with beautiful Black-faced spoonbills - Discover why it is so important for us to protect wetland habitats along flyways for migratory birds.	- Bird migration simulation - Take part in a bird watching activity	- General Studies, - Primary Science - Primary Humanities
THE MINI-WORLD OF MAI PO (P.4-P.6)	- Observe insects and other small wildlife species up close. - Learn how they live, how their bodies work, and all about their complex relationships with the surrounding environment.	- Observe insects - Take samples from ponds	- General Studies, - Primary Science - Primary Humanities

Student visit programme – secondary

Mangrove Ecology

4-hour activity, including study the features and ecology of mangrove species and the threats they face

RUNDOWN

Welcome and programme introduction • Introduction of Mai Po Inner Deep Bay Ramsar Site • Introduction on mangrove and common wildlife in Mai Po	30 mins
Field Observation • Discover the species and habitat diversity of Mai Po • Understand the value of mangrove and other wetland habitats to wildlife and human	60 mins
Mangrove observation along the Floating Boardwalk • Explore the features and ecology of mangroves	75 mins
Indoor activity • Learn about the threats mangroves are facing and their importance	45 mins
Conclusion: Reflection and Q&A	10 mins
Total walking distance: 5km	

Student visit programme – secondary

Mangrove Ecology

Public guided tours

Programme	Date	Highlights	Limitation
Exploring Mai Po	Every Wed & Thu	- Watch birds in bird hides - Walk along boardwalk inside *gei wai*	Aged 5 or above; Participants aged between 5 to 15 must be accompanied by an adult
Exploring Mai Po (round-trip shuttle)	Every Fri, Sat, Sun & public holidays	*Same as above*	*Same as above*
Mangrove Boardwalk Adventure	Every Fri, Sat & Sun	- Visit diff. habitat types; - Visit the biggest mangrove forest in HK thru a floating boardwalk; - Enjoy rich biodiversity on mudflat	Aged 8 or above; Participants aged between 8 to 15 must be accompanied by an adult
Night Safari (May – Aug)	Every Fri & Sat	- Enjoy sunset; - Explore nocturnal wildlife (e.g. bats, fireflies, reptiles & amphibians, mammals)	Aged 8 or above; Participants aged between 8 to 15 must be accompanied by an adult
Amazing *gei wai* (May - mid-Jul)	Selected dates with suitable tidal level	- Learn the *gei wai* culture; - Enjoy sunset; - Visit *gei wai* museum; - Harvest *gei wai* shrimps	Aged 5 or above; Participants aged between 5 to 15 must be accompanied by an adult
Flay Your Wings (Nov – Apr; round-trip shuttle bus)	Selected dates with suitable tidal level	- Floating boardwalk experience; - Watch birds on the mudflat; - Learn about bird ecology and behaviour	Aged 12 or above; Participants aged between 12 to 15 must be accompanied by an adult
Mai Po Day & Night (overnight)	Fri & Sat	- Enjoy sunset tour; - Enjoy dinner & breakfast; - 4-hr guided tour	Aged 8 or above; Participants aged between 8 to 17 must be accompanied by an adult

Public guided tour

Mangrove Boardwalk Adventure

- All year round
- Standard route + Floating Boardwalk
- Get to know about the importance of mangrove forest and its role in global climate change challenge
- Duration: 4 hours
- Distance: Around 6 km
- Age: 8 or above

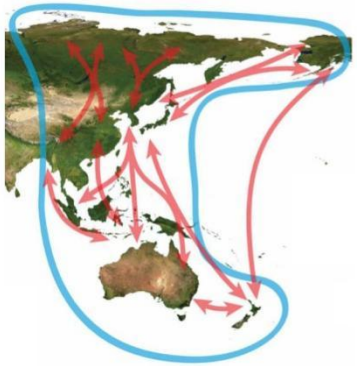
Regional Training and Outreach

Objective 3. To share experience and knowledge with other wetlands along the EAAF to enhance the conservation of migratory waterbirds.

Key Activities:

1. Conduct 13 training courses and study tours for wetland managers and officials annually, for around 200 participants in total.
2. On-site wetland training and advisory work at four to six important wetland sites along the EAAF for continued engagement, outreach, networking, and regional capacity building.
3. Develop an online network of wetland managers for communication.
4. Work with the Education Team to integrate Education on Sustainable Development in the wetland management training courses.

Wetland Management Training Programme



- Started in 1990
- Offering 10 Training Courses (8-day)
- Offering 5 study tours (1-5 days)
- About 150 participants each year

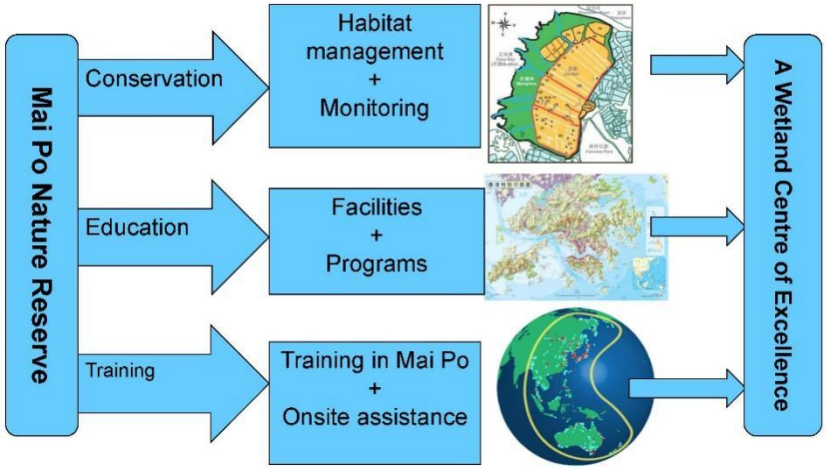
Participants

- Nature Reserve/ Wetland Park Staff
- Gov't Officials and/or Decision Makers
- Educators
- Research Institutes

Application after training

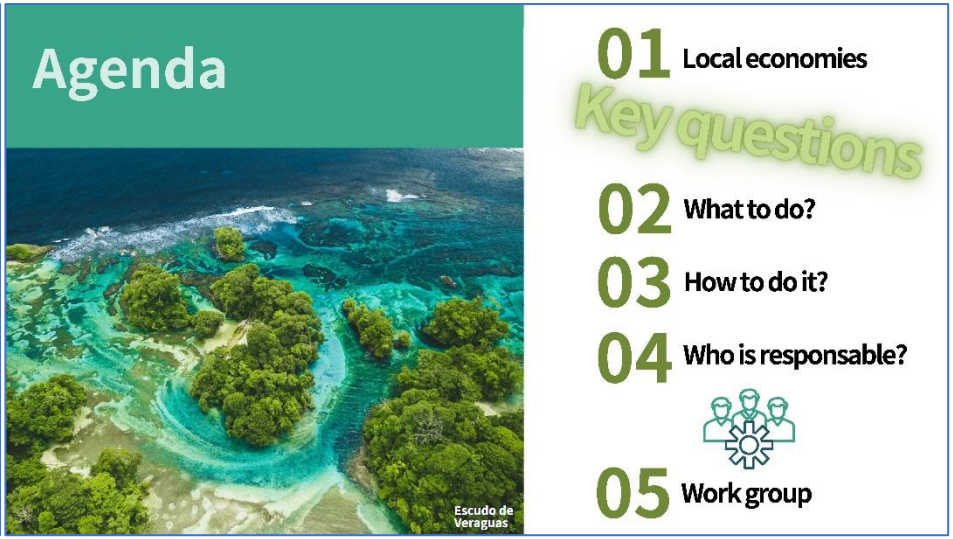
China Wetlands Project

1. To **protect biodiversity** through capacity building, management planning and habitat restoration
2. To **use wetlands wisely** through the development and introduction of best practices
3. To **raise** the conservation **awareness** through education for sustainable development (ESD)

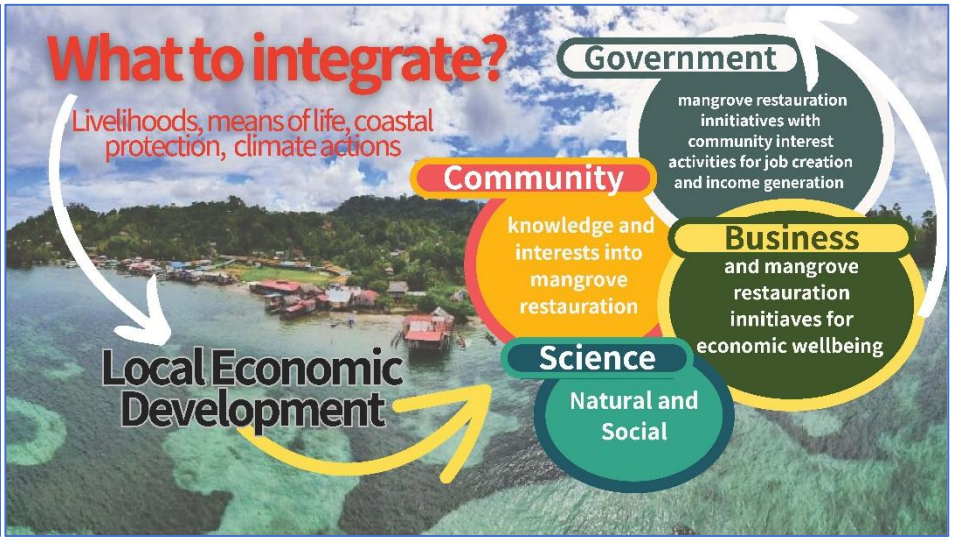


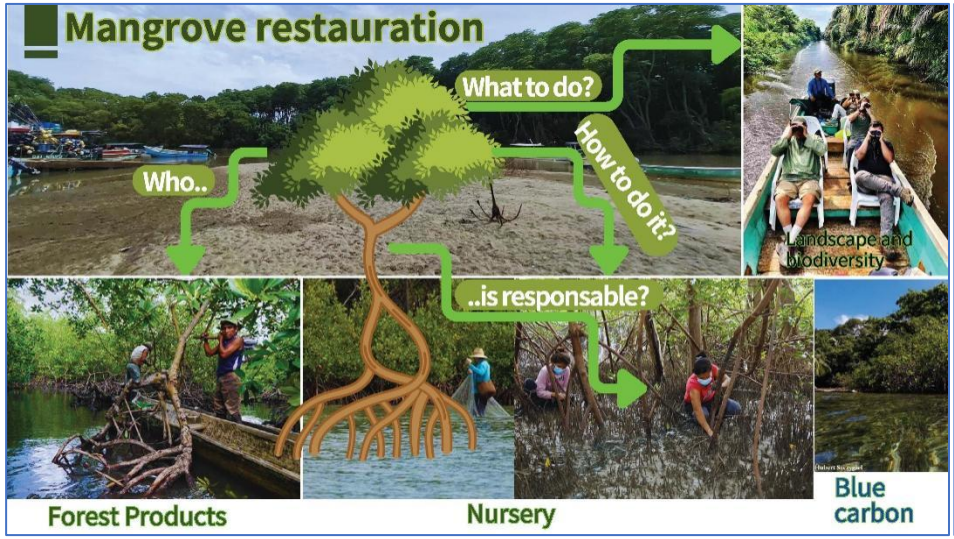

Thank you
wwf.org.hk
Xianji Wen (xjwen@wwf.org.hk)
Solutions for a living planet

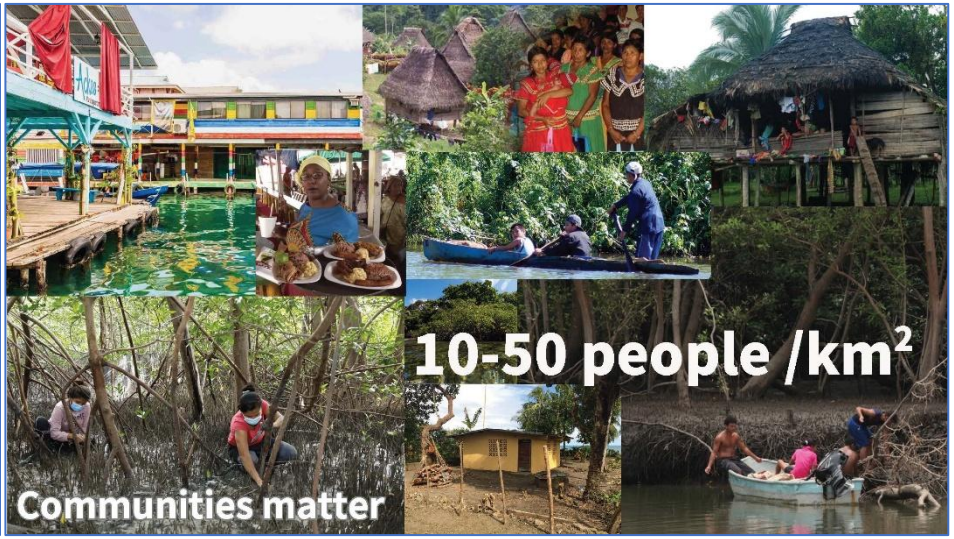
Annex 3.7: Integrating Mangrove Restoration with Local Economic Development



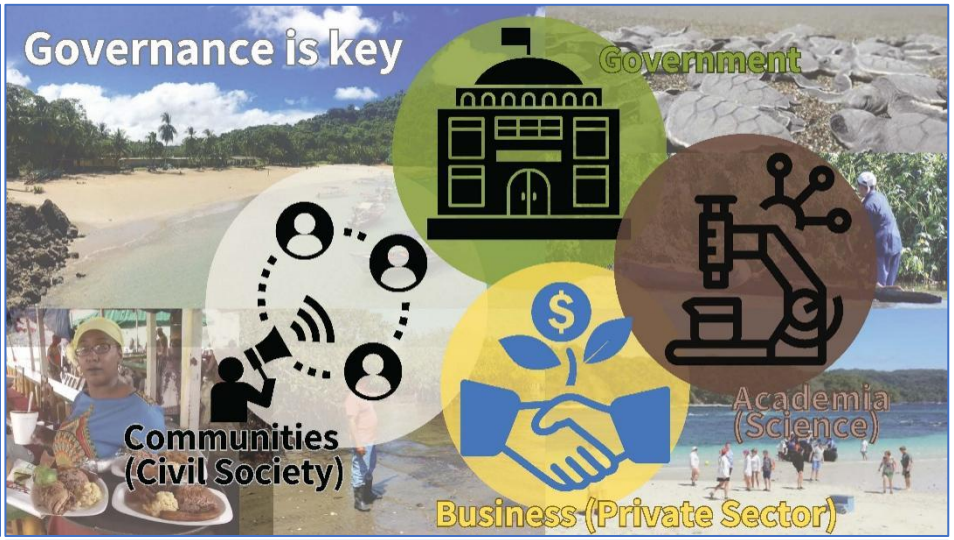

Contribution to global economy
Carbon sink
Coastal protection
USD 500 000/year
Guararé
Tourism
Wood extraction
Fisheries
Sea food


What to integrate?
Livelihoods, means of life, coastal protection, climate actions
Government
mangrove restauration innitiatives with community interest activities for job creation and income generation
Community
knowledge and interests into mangrove restauration
Business
and mangrove restauration innitiaves for economic wellbeing
Science
Natural and Social
Local Economic Development

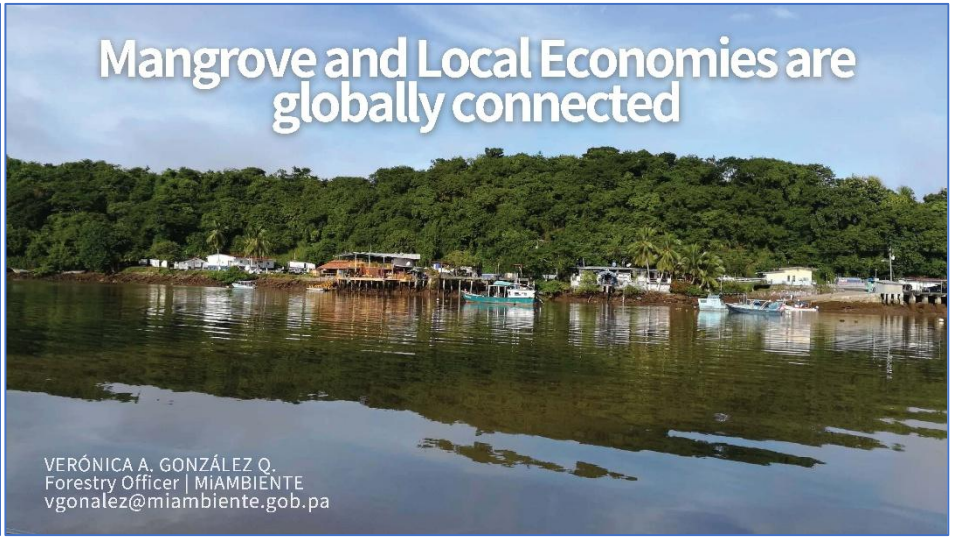

Mangrove restauration
What to do?
How to do it?
Who..
..is responsable?
Landscape and Biodiversity
Forest Products
Nursery
Blue carbon


10-50 people /km²
Communities matter

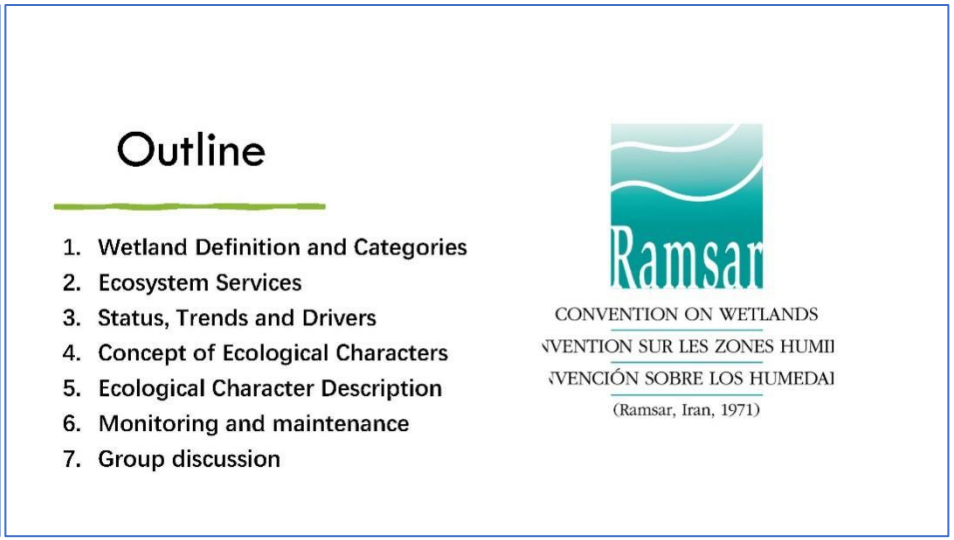

Mangrove forests are among the most biologically diverse and productive ecosystems on Earth despite covering less than 1% of the world's surface
60-80 species of trees and shrubs uniquely adapted to the saline environment and associated species
> 4,000 species
Nature is important
Fungi
Bacteria
Algae
Invertebrates
Reptiles
Birds
Mammals

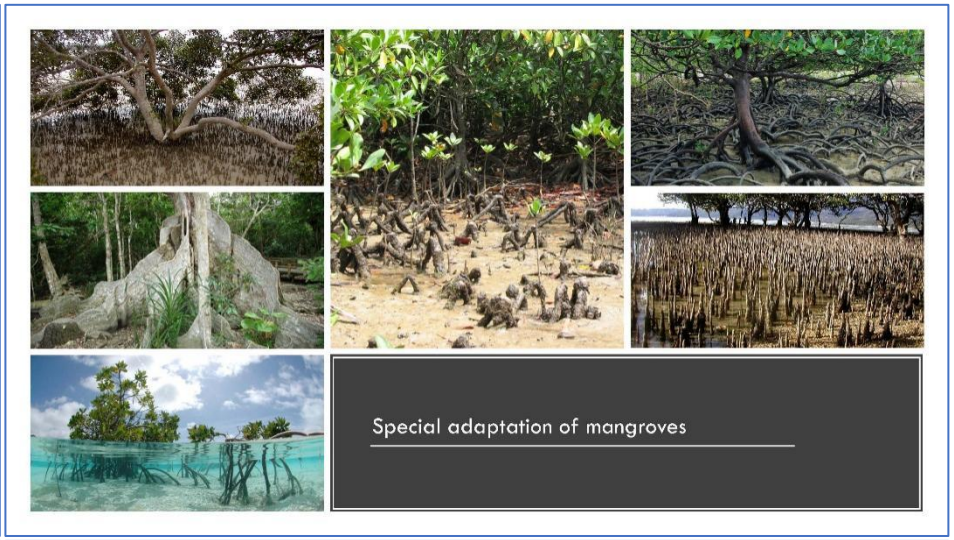

Governance is key
Government
Communities (Civil Society)
Academia (Science)
Business (Private Sector)

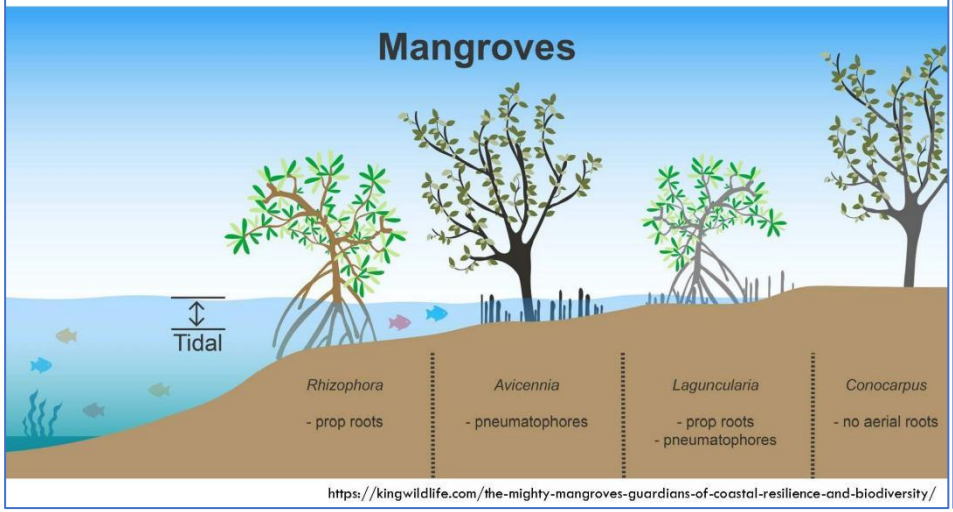

Work group
1. What to do?
2. How to do it?
3. Who is responsable?
Local economies & mangrove restauration
What is going on?
Playa Bonita

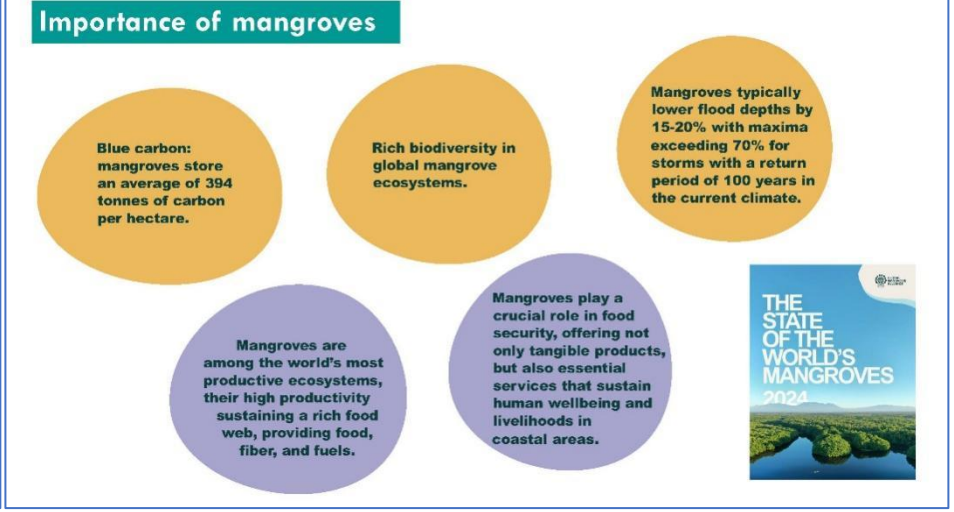

Mangrove and Local Economies are globally connected
VERÓNICA A. GONZÁLEZ Q.
Forestry Officer | MiAMBIENTE
vgonalez@miambiente.gob.pa

Annex 3.8: Mangrove Ecological Character Maintenance

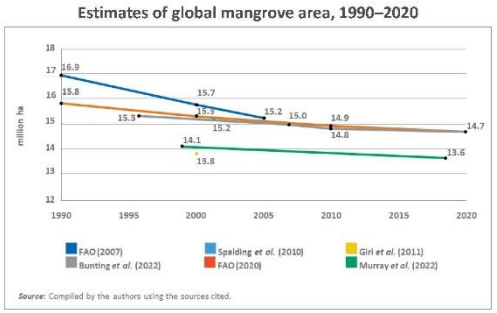



Special adaptation of mangroves


Mangroves
Tidal
Rhizophora
- prop roots
Avicennia
- pneumatophores
Laguncularia
- prop roots
- pneumatophores
Conocarpus
- no aerial roots
https://kingwildlife.com/the-mighty-mangroves-guardians-of-coastal-resilience-and-biodiversity/

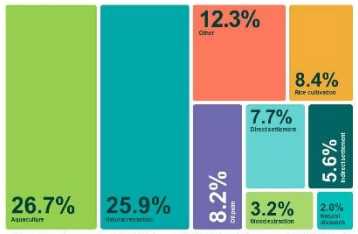

Importance of mangroves
Blue carbon: mangroves store an average of 394 tonnes of carbon per hectare.
Rich biodiversity in global mangrove ecosystems.
Mangroves typically lower flood depths by 15-20% with maxima exceeding 70% for storms with a return period of 100 years in the current climate.
Mangroves are among the world's most productive ecosystems, their high productivity sustaining a rich food web, providing food, fiber, and fuels.
Mangroves play a crucial role in food security, offering not only tangible products, but also essential services that sustain human wellbeing and livelihoods in coastal areas.
THE STATE OF THE WORLD'S MANGROVES 2024

Trends and divers of change



The world's mangroves 2000 2020. (FAO, 2023)

The conversion of mangroves for aquaculture, oil palm plantations and rice cultivation accounted for 43.3% of global mangrove loss between 2000 and 2020. Nature itself contributes to 25.9%.



Global drivers of mangrove loss, 2000–2020 (Source: FAO (2023) The world's mangroves 2000–2020. Rome) Re-generated by the state of world's Mangroves 2024

Urgency of action

PRESS RELEASE 21 MAY, 2024

More than half of all mangrove ecosystems at risk of collapse by 2050, first global assessment finds

Gland, Switzerland, 22 May 2024 (IUCN) – More than half of the world's mangrove ecosystems are at risk of collapse, according to the first global mangrove assessment for the International Union for Conservation of Nature (IUCN) Red List of Ecosystems.

Without significant changes by **2050**, climate change and sea level rise will result in the loss of

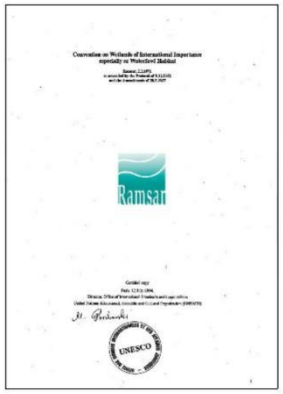
- **1.8 billion tonnes** of carbon stored (**17%** of the total current carbon stored in mangroves), currently valued at a minimum of **$13 billion** at market prices in voluntary carbon markets and representing a cost to society equal to **$336 billion** based on the social cost of carbon.
- protection for **2.1 million lives** exposed to coastal flooding (**14.5%** of current lives exposed) and **$36 billion** worth in protection to properties (**35.7%** of current property values protected)
- **17 million days** of fishing effort per year (**14%** of current fishing effort is supported by mangroves).

https://iucn.org/press-release/202405/more-half-all-mangrove-ecosystems-risk-collapse-2050-first-global-assessment

1. Wetland Definition and Categories

Ramsar
CONVENTION ON WETLANDS
CONVENTION SUR LES ZONES HUMIDES
CONVENCIÓN SOBRE LOS HUMEDALES

What are wetlands?



Convention on Wetlands 1971

Wetlands Conservation Law of the People's Republic of China 2022

Convention Definition of Wetlands

Ramsar
CONVENTION ON WETLANDS
CONVENTION SUR LES ZONES HUMIDES
CONVENCIÓN SOBRE LOS HUMEDALES
(Ramsar, Iran, 1971)

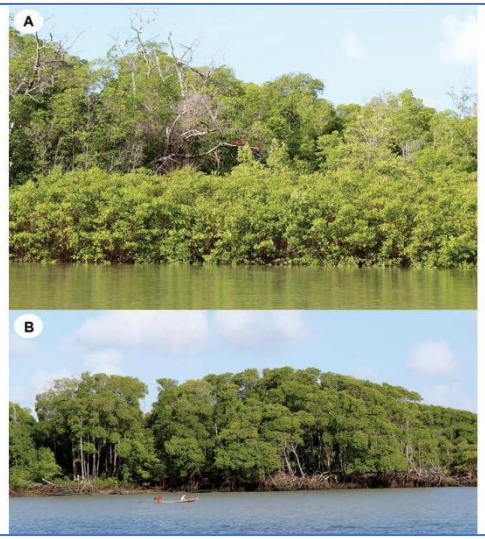
Article 1 Definition

1. For the purpose of this Convention wetlands are **areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres**.

The wetlands include **surrounding areas** of the shores, riverbanks, and entire watercourses.

NASA/Joshua Stevens

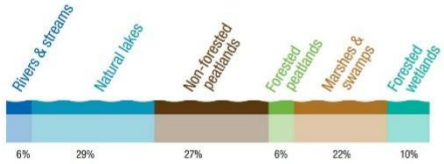
https://earthobservatory.nasa.gov/images/92130/dramatic-flooding-in-eastern-africa



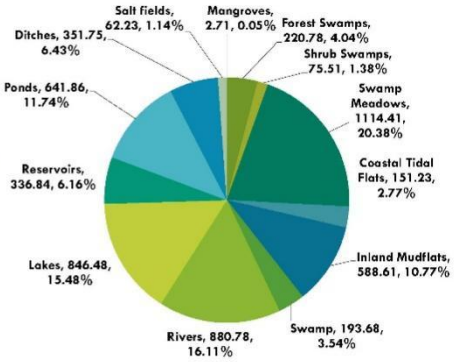
Ottoni et al. 2021
DOI: 10.1590/1676-0611-BN-2020-1172

Categories of Wetlands

Ramsar	China
3 classes 42 types • marine wetlands • artificial wetlands • inland wetlands. These groups can be classified further according to the type of water such as the fresh, alkaline, saline, and brackish water.	5 classes 42 types GB/T 24708-2009 • coastal wetlands • riverine wetlands • lake wetlands • marsh/swamp wetlands • artificial wetlands Statics by Ramsar Category is different by China's Category



Areas (%) of world natural inland wetland classes

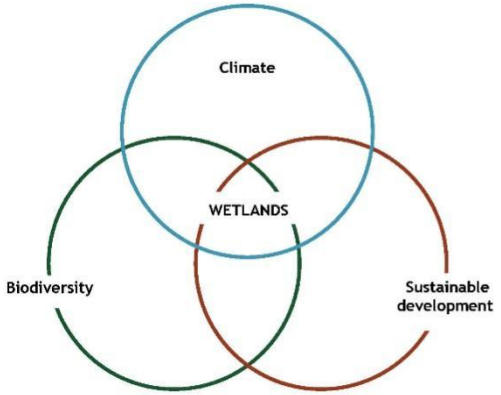


Areas (%) of wetland classes in China

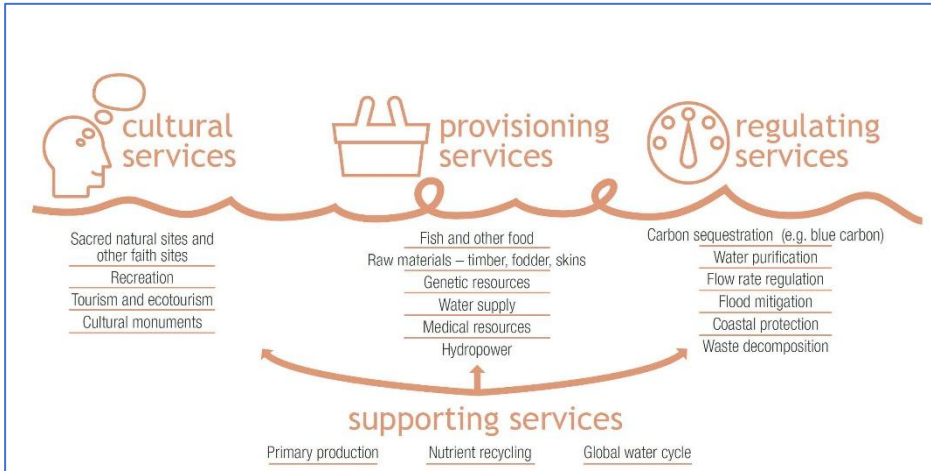
2. Ecosystem Services

Ramsar
CONVENTION ON WETLANDS
CONVENTION SUR LES ZONES HUMIDES
CONVENCIÓN SOBRE LOS HUMEDALES
(Ramsar, Iran, 1971)

- Wetland ecosystem services **far exceed** those of terrestrial ecosystems
  - **critical food supplies** including rice and freshwater and coastal fish, **and fresh water, fibre and fuel**.
  - **regulating** services influence **climate and hydrological regimes**, and **reduce** both **pollution and disaster risk.**
  - natural features of wetlands often have **cultural and spiritual importance.**
- Wetlands offer **recreational possibilities and tourism benefits.**
- Storage and sequestration of **carbon** by wetlands play an important role in regulating the global climate.
  - **Peatlands and vegetated coastal wetlands** are large carbon sinks. Salt marshes sequester millions of tonnes of carbon annually.
  - Despite occupying only 3% of the land surface, peatlands store twice as much carbon as the world's forests
  - **Mangroves store 3-4 more times of Carbon than Rainforest**



Water
Food
Water regulation
Climate regulation
Salinization of soils
Culture heritage
Recreation and tourism

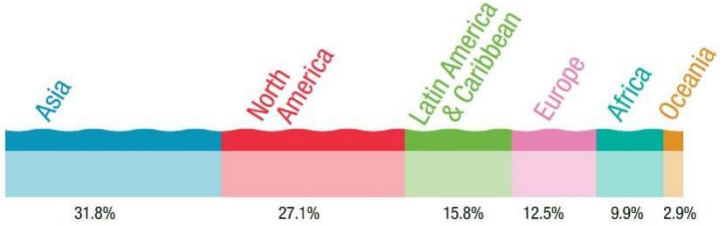


Carbon cycle in/through Wetlands

3. Status ,Trends & Drivers GWO 2018 & 2021

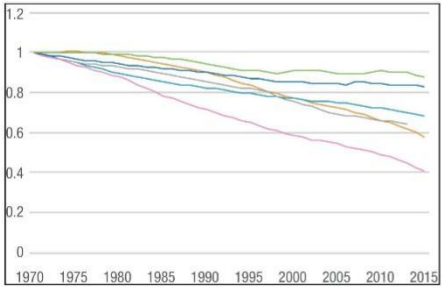
Area of global inland and coastal wetlands

15-16 million km² GWO 2021
12.1 million km² GWO 2018



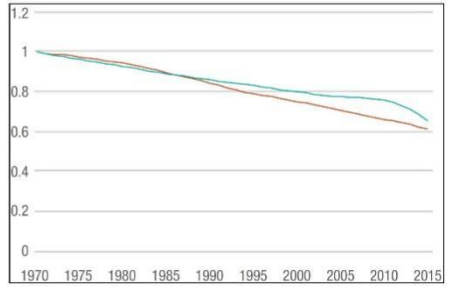
Loss of Wetlands GWO 2018

Up to **87%** of the global wetland resource has been lost since **1700 CE** in places where data exist



Natural WET Index by Region

About **35%** in both marine/coastal and inland natural wetland areas studied between **1970 and 2015**



Inland and Marine/Coastal WET Index

Trends of Wetlands

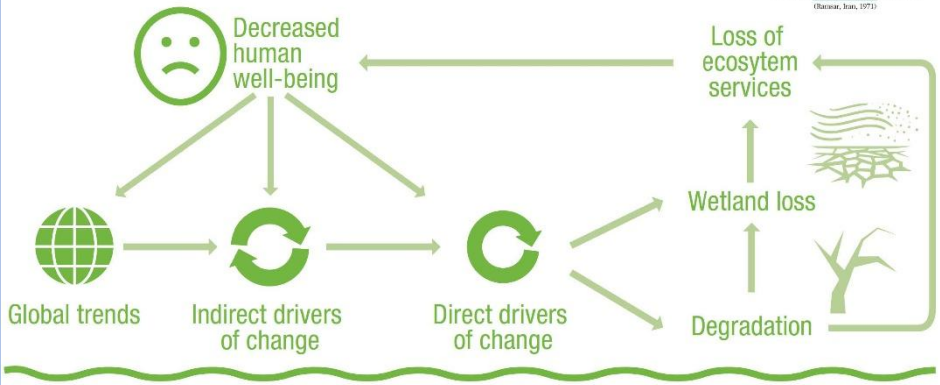
GWO 2018

Inland natural wetlands	Global area (million km²)			
	Wetland classes	Wetland sub-classes*	Global area change (% change)*	Global area change (qualitative)*
Rivers & streams	0.624-0.662			↓
Natural lakes	3.232-4.200			↓
Natural lakes (>10 ha)		2.670		↓
Natural pools (1-10 ha)		0.562		
Peatlands	4.232		-0.97	→
Non-forested peatlands (bogs, mires & fens)		3.118	+6.80	↑
Forested peatlands		0.696	-25.32	↓
Tropical peatlands		1.505	-28	↓
Temperate & boreal peatlands		3.380		
Marshes and swamps (on alluvial soils), including floodplains	2.530			↓
Tropical freshwater swamps (alluvial soils)		1.480		↓
Forested wetlands (on alluvial soils)	1.170			
Groundwater-dependent wetlands				
Karst & cave systems				
Springs & oases				
Other groundwater-dependent wetlands				

	Global area (million km²)			
	Wetland classes	Wetland sub-classes*	Global area change (%)*	Global area change (qualitative)*
Estuaries	0.660			↓↓↓
Unvegetated tidal flats		0.458		↓↓↓
Saltmarshes		0.550		↓
Coastal deltas		>0.030	-52.4	↓↓
Mangroves	0.143		-4.3%	→
Seagrass beds	0.177		-29	↓
Coral reefs (warm water systems)	0.284		-19	↓
Shellfish reefs			-85	↓↓
Coastal lagoons				↓
Kelp forests			-0.018	→
Shallow subtidal marine systems				↓
Sand dunes/beaches/rocky shores				
Coastal karst & caves				

3. Status ,Trends & Drivers

Ramsar
CONVENTION ON WETLANDS
CONVENTION SUR LES ZONES HUMIDES
CONVENCIÓN SOBRE LOS HUMEDALES
(Ramsar, Iran, 1971)



Type of Drivers

GWO 2018

Direct drivers

Drainage and conversion, introduction of pollution and invasive species, extraction activities, and other actions affecting the water quantity and frequency of flooding and drying

Indirect drivers

Supply of energy, food, fibre, infrastructure, tourism and recreation

Direct and indirect drivers

Climate change: abnormal precipitation and evaporation, extreme weathers, phenology shift, warmer temperature

Global megatrends: demography, globalization, consumption and urbanization, with climate change creating uncertainty

Governance: awareness, inventory, monitoring, research, management

Alteration-Physical regime change
- Flow regime (quantity and frequency)
- Sediment
- Salinization
- Temperature

Extraction-Over use
- Water
- Fishing
- Wood harvesting
- Sand and gravel mining

Introduction-Over load
- Nutrients
- Chemicals
- Solid wastes
- Invasive Species

Conversion-Structure Change
- Drainage
- Reclamation/Construction/urbanization
- Activities/noise
- Buring/ploughing
- Community composition/horticulture

Hot Issues and Priorities of the Ramsar Convention

Themes
- **Climate & Carbon**-Impacts and responses, Blue Carbon, mitigation
- **Agriculture**-Maintaining and restoring the ecological character in agricultural wetlands
- **Biodiversity**-KM Global Biodiversity Framework, OECMs, Working coastal habitats
- **Sustainable Development**-SDGs

Tools
- **Application** of criteria for designating RS
- **Tools** for wetland assessment, mapping and monitoring: Carbon and Small Wetlands

Solutions
- **Financial** cost of wetland loss and degradation and investment required for restoration
- **Policy** and **legal** framework for conservation and wise use

4. Concept of Ecological Characters

Ramsar
CONVENTION ON WETLANDS
CONVENTION SUR LES ZONES HUMIDES
CONVENCIÓN SOBRE LOS HUMEDALES
(Ramsar, Irán, 1971)

Article 3.2 Ecological Character

Each Contracting Party shall arrange to be informed at the earliest possible time if the ecological character of any wetland in its territory and included in the List **has changed, is changing or is likely to change** as the result of technological developments, pollution or other human interference. Information on such changes shall be passed without delay to the organization or government responsible for the continuing bureau duties specified in Article 8.

COP14 2022

14th Meeting of the Conference of the Contracting Parties to the Ramsar Convention on Wetlands

"Wetlands Action for People and Nature"
Wuhan, China, and Geneva, Switzerland 5-13 November 2022

Resolution XIV.13

The status of Sites in the List of Wetlands of International Importance

75% of the 2,439 Sites that had been designated by 30 June 2022, either the Ramsar Information Sheets (RISs) or adequate maps had not been submitted, or relevant RISs or maps had not been updated for over six years, so that recent information on the status of these Sites was not available

Convention on Wetlands (Ramsar, Iran, 1971)
5th Meeting of the Conference of the Contracting Parties
Kushiro, Japan
9-16 June 1993

Resolution 5.4: The Record of Ramsar sites where changes in ecological character have occurred, are occurring, or are likely to occur (Montreux Record)

DETERMINES that the purpose of the Montreux Record is to identify priority sites for positive national and international conservation attention, to guide implementation of the Monitoring Procedure, and to guide allocation of resources available under financial mechanisms;

CONVENTION ON WETLANDS (Ramsar, Iran, 1971)

Proceedings of the 6TH Meeting of the Conference of the Contracting Parties (Brisbane, Australia, 19-27 March 1996)

RESOLUTION VI.1: WORKING DEFINITIONS OF ECOLOGICAL CHARACTER, GUIDELINES FOR DESCRIBING AND MAINTAINING THE ECOLOGICAL CHARACTER OF LISTED SITES, AND GUIDELINES FOR OPERATION OF THE MONTREUX RECORD

3.2 The Montreux Record is the principal tool of the Convention for highlighting those sites where an adverse change in ecological character has occurred, is occurring, or is likely to occur, and which are therefore in need of priority conservation attention. It shall be maintained as part of the Ramsar Database and shall be subject to continuous review.

When we look at people, there are... then we describe...

When we look at wetlands, there are... then we describe...

typical

unique

degraded

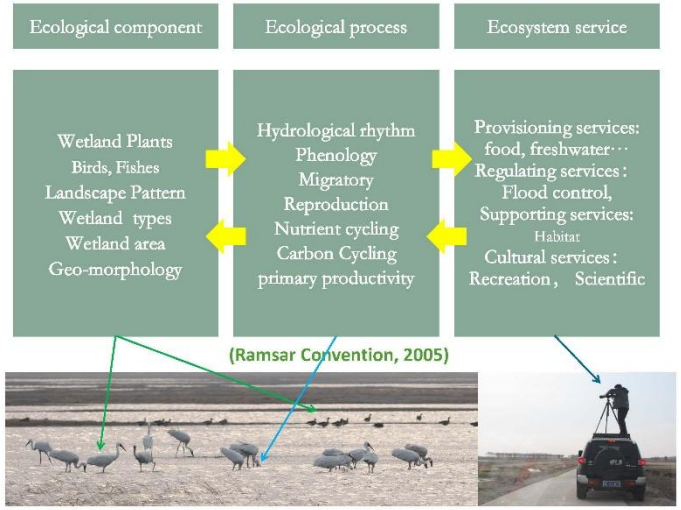
Wetlands also have characters:
ecological characters

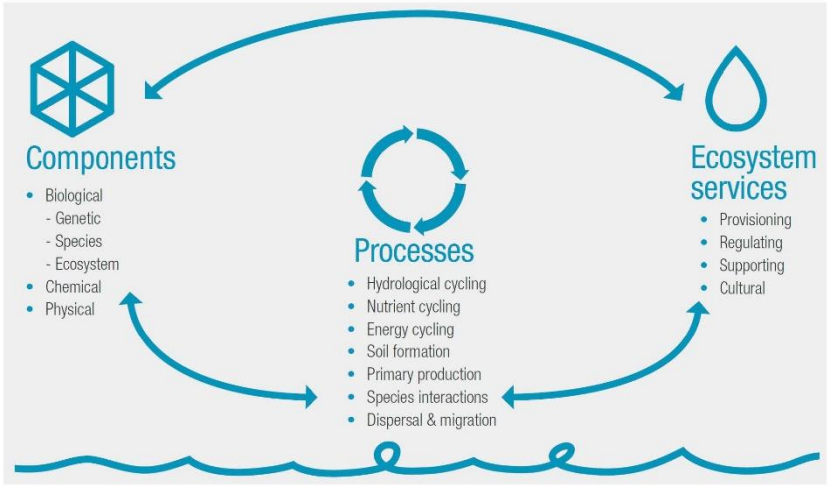
Ecological Characters:
Why a Wetland is THE WETLAND

The Concept of Ecological Character

=Ecological component
+Ecological process
+Ecosystem service

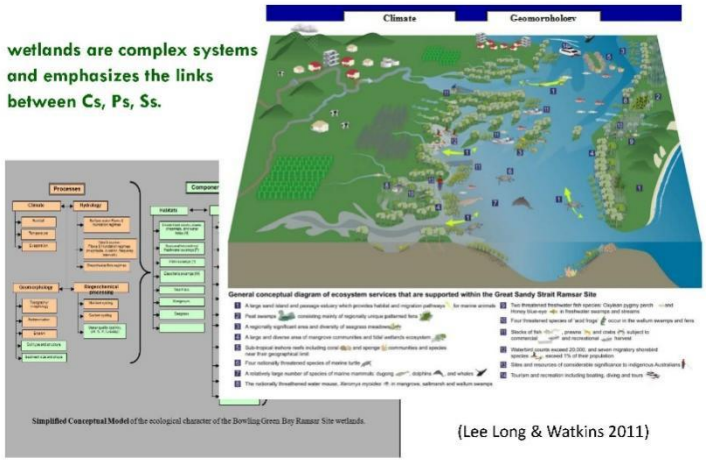
Momoge: World largest stopover site for Siberian Cranes





Conceptual Model for EC

wetlands are complex systems and emphasizes the links between Cs, Ps, Ss.



(Lee Long & Watkins 2011)

5. Ecological Character Description

Ramsar
CONVENTION ON WETLANDS
CONVENTION SUR LES ZONES HUMIDES
CONVENCIÓN SOBRE LOS HUMEDALES

- Describes the **ecosystem services** of a wetland, and the critical **ecological components** and **ecological processes** that underpin those services - **at a given point in time**
- Via ECD
  - provides a benchmark description at the time of listing, natural variability and **limits of acceptable change (LAC)** of the ecosystem
  - better dynamic monitoring on biodiversity
  - provides support for management plans, decisions and actions

1605 Earth Quake at Dongzhaigang, Hainan

Rogers K et al 2017
DOI:10.1007/s10750-017-3257-5.

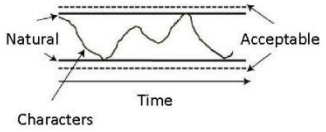
Identifying Critical Characters

Principle of identifying critical character

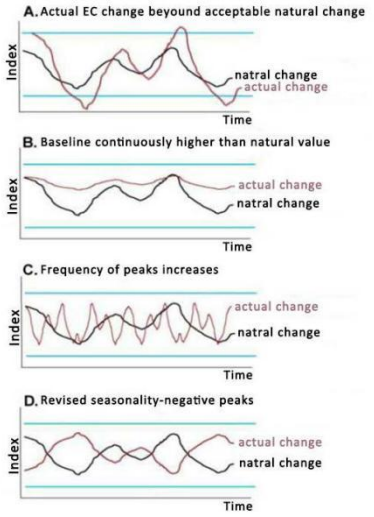
—are key determinants of a sites' character and/or degree of importance and/or unique status;
—if they change beyond their natural range, are likely to cause significant negative consequences to the ecosystem(s) of this site;
—have important ecological links in space or time to other ecosystems or populations

Thus, a critical C,P must meet 1, as well as 2 and/or 3

Setting LAC



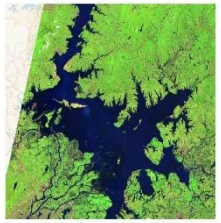
(after Phillips 2006).



NASA/Joshua Stevens

https://earthobservatory.nasa.gov/images/92130/dramatic-flooding-in-eastern-africa


Dongting Lake, 11 July 2022

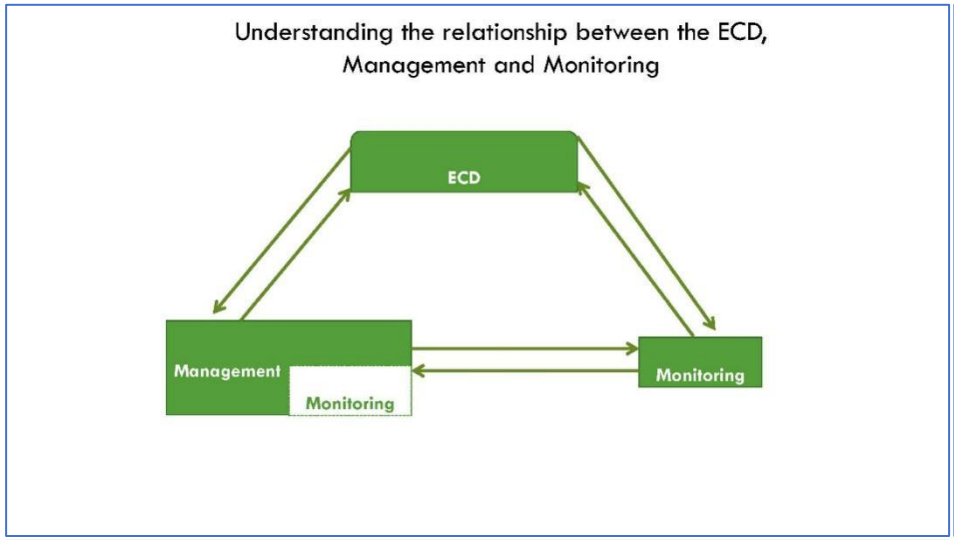

Poyang Lake, 11 July 2022

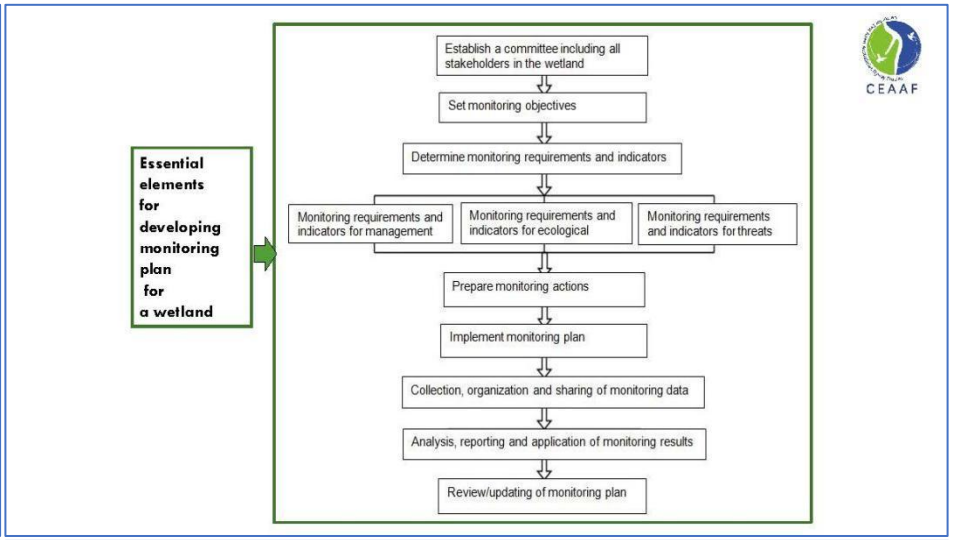
2022


Dongting Lake, 15 August 2022

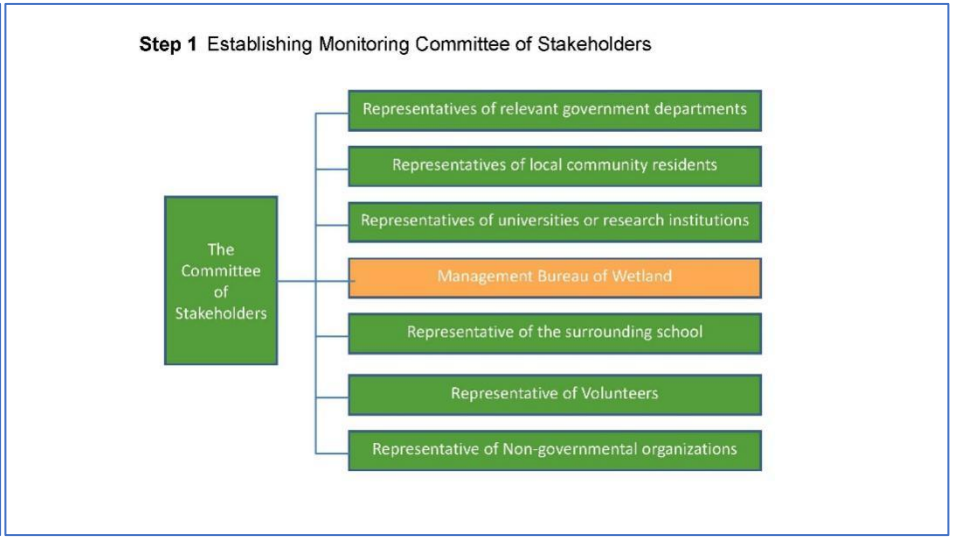

Poyang Lake, 15 August 2022

6. Ecological character monitoring and maintenance


Understanding the relationship between the ECD, Management and Monitoring
ECD
Management
Monitoring
Monitoring


CEAAF
Essential elements for developing monitoring plan for a wetland
Establish a committee including all stakeholders in the wetland
Set monitoring objectives
Determine monitoring requirements and indicators
Monitoring requirements and indicators for management
Monitoring requirements and indicators for ecological
Monitoring requirements and indicators for threats
Prepare monitoring actions
Implement monitoring plan
Collection, organization and sharing of monitoring data
Analysis, reporting and application of monitoring results
Review/updating of monitoring plan


10 Steps for Developing Monitoring Plan
Start a Committee
Objective
EC indicators
Threats indicators
Management indicators
Technology Methodology
Actions
Data collection & Database
Analysis
Evaluation


Step 1 Establishing Monitoring Committee of Stakeholders
The Committee of Stakeholders
Representatives of relevant government departments
Representatives of local community residents
Representatives of universities or research institutions
Management Bureau of Wetland
Representative of the surrounding school
Representative of Volunteers
Representative of Non-governmental organizations

Step 1 Establishing Monitoring Committee of Stakeholders

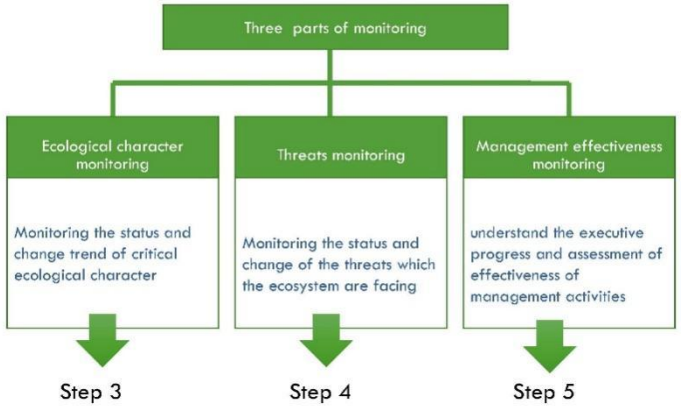
Step 1 Establishing Monitoring Committee of Stakeholders

In order to ensure that

- integrates well with the development plans of all stakeholders,
- secures more supporting resources,
- facilitates implementation,

a committee of stakeholders in monitoring should be established at the outset.

Step 2 Identifying Monitoring Objectives

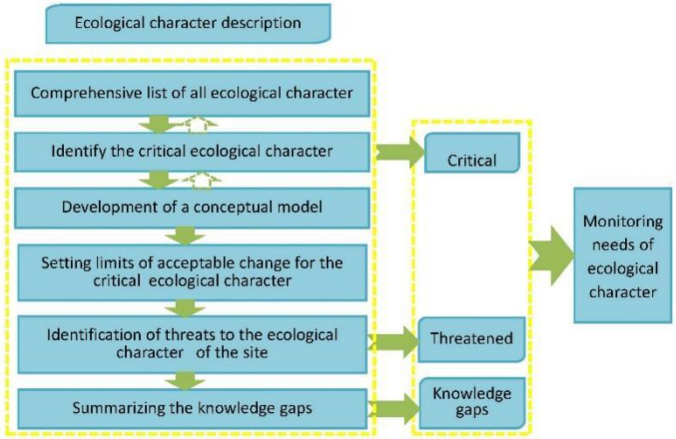


Step 2 Identifying Monitoring Objectives

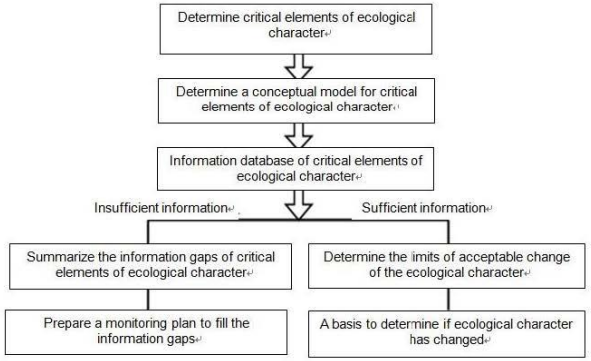
General "Guiding Principles"

- Answer the questions raised in the management process
- Iinvestigate the status and trends of change of ecological character;
- Investigate the threats that may influence ecological character;
- Monitor implementation progress and the effectiveness of management activities;
- Promote public participation and balance the interests of all parties.

Step 3 Identify Monitoring Needs and Indicators for Ecological Character



Step 3 Identify Wetland Monitoring Needs and Indicators for Ecological Character



Step 4 Identify Monitoring Needs and Indicators for Threats

CEAAF

Eexisting or potential threats to the ecological character of PAs

Actual or likely threat or threatening activities	Impacted ecological character	Potential impact(s) to ecosystem components, processes and/or services	Likelihood	Timing of threat

e.g., threats: Introduction and/or poor control of invasive species

CEAAF

A list of threats developed by the **International Union for the Conservation of Nature (IUCN)** and the **Conservation Measures Partnership (CMP)**

http://www.iucn.org/about/work/programmes/species/red_list/resources/technical_documents/new_classification_schemes/

These categories may be a useful starting point for identifying threats to ecological character of a Protected Area.

Step 5 Identify Monitoring Needs and Indicators for Management Effectiveness

Through monitoring of executive progress and effectiveness of wetland management activities, managers can assess the impacts of management actions on wetland ecosystem, review and update management plan.

Management activities	Excepted objectives	Implementation	Whether objectives has been achieved	Reason

Wetland restoration

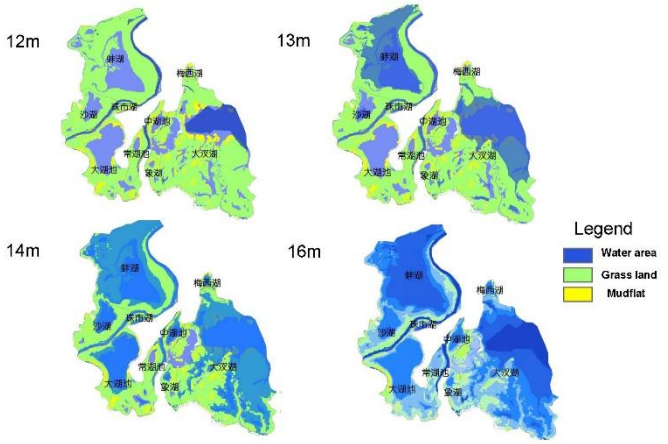
review of the extent of expected scenarios realized……

Step 6 Develop Action Plan for Monitoring Indicators

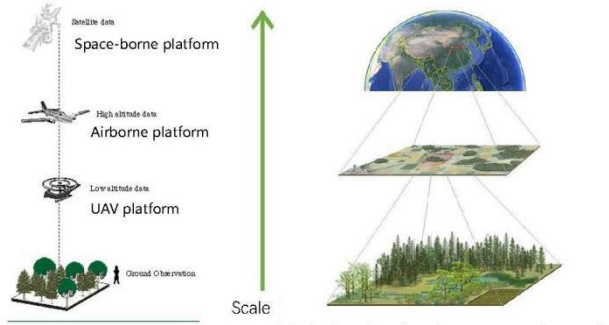
In this section, we should select monitoring methods, indentify monitoring frequency, and priority of monitoring activities as showing in the following table:

Indicators	Methods	Monitoring frequency	Source of funding	Priority

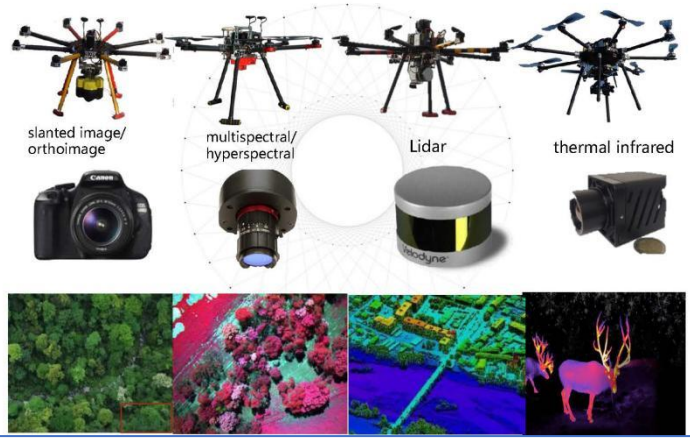
Monitor Change of wetland landscape by remote sensing technology

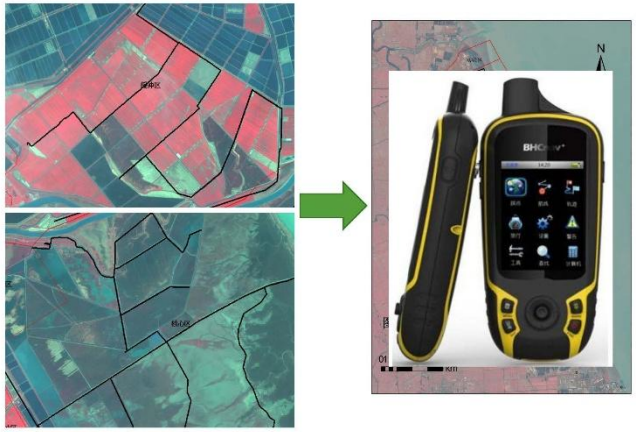


RS can provide biodiversity information of multiple spatial scale and time scale



(global-region-landscape-sample area)

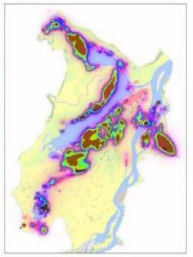




Plant survey

Sampling of benthos

Acoustic recorder



Step 7 Implementation of Monitoring Action Plan

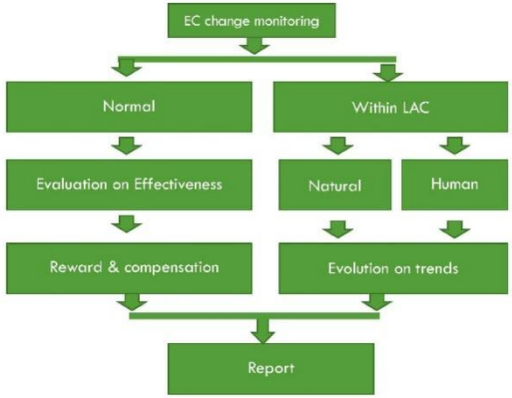
Monitoring action plan should be implemented with contracting parties; the task arrangement should be recorded by management bureau.

Monitoring activities	Executor	Reporting frequency	Contact

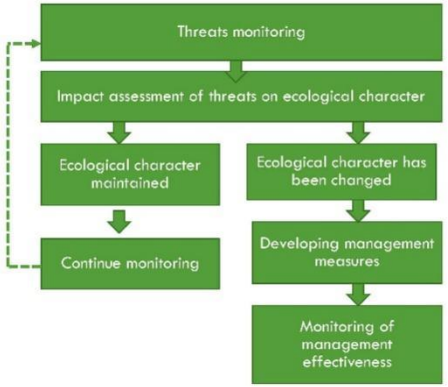
Step 8 Collection and Submission of Monitoring Data

The executors of monitoring activities should submission data to the Bureau.

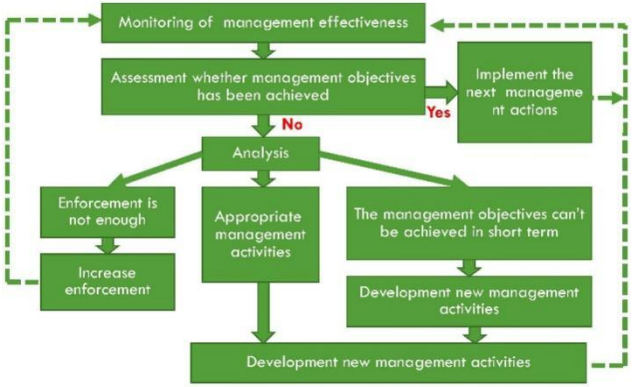
Step 9 Analysis, Reports and Applications of Monitoring Data



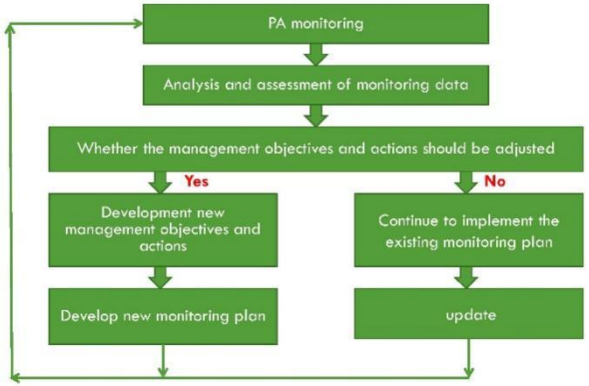
Step 9 Analysis, Reports and Applications of Monitoring Data



Step 9 Analysis, Reports and Applications of Monitoring Data



Step 10 Update of monitoring plan



How much mangroves increased in China actually?

14th Meeting of the Conference of the Contracting Parties to the Ramsar Convention on Wetlands

"Wetlands Action for People and Nature"
Wuhan, China, and Geneva, Switzerland 5-13 November 2022

COP14 2022

Resolution XIV.19

Proposal to establish an International Mangrove Centre (a Ramsar Regional Initiative)

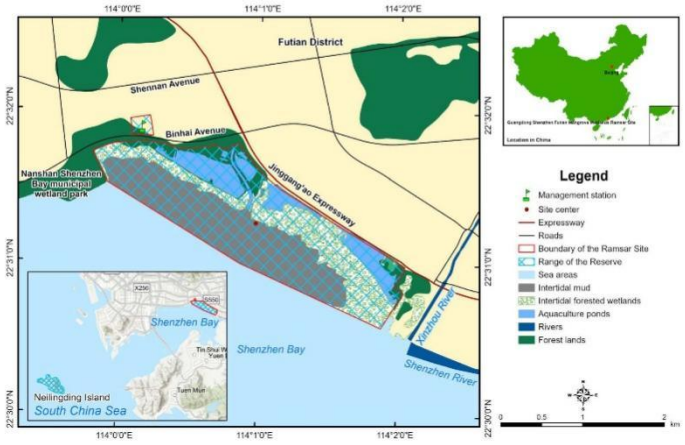
Background session in draft Resolution, a case of increasing / net gain of mangroves in China:

7000 ha in the past 20 years - Data by NFGA
5000 ha in the past 20 years – Data by MNR

Where are the missing 2000 ha?

Guangdong Shenzhen Futian Mangrove Wetlands Ramsar Site

(Total area 367.64 ha)



Before

After

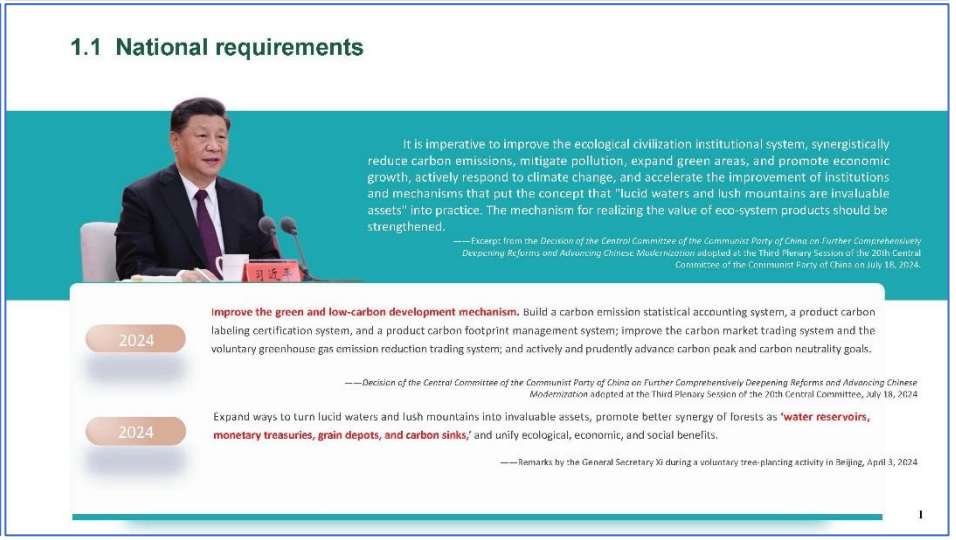
Group discussion on challenges and priorities

1. Select a shared challenge in your region 5min
2. Describe the issue + list 3 major Components, Processes and ESs 15min
3. Draw a map of conceptual model + optional box conceptual model 20min
4. Identify/Think of 1 Critical Ec 10min
5. Think one priority solution 10min
6. 5 Group reports 5 min each:
   - challenge
   - map
   - 1-3 critical ECs
   - 1-3 Priorities


CUBAFRINAME
MANGROVE
FOREST


Thank you!
lucai.wetland@foxmail.com

Annex 3.9: Shenzhen Mangrove Conservation Carbon Sink: Development and Trading Practice



1.1 National requirements

Official Guidance on Establishing and Improving the Mechanism for Realizing the Value of Eco-system Products

Improve the carbon emission trading mechanism and explore pilot programs for carbon sink rights trading.

——General Office of the Communist Party of China Central Committee & General Office of the State Council, April 2021

Guidance on Fully, Accurately, and Comprehensively Implementing the New Development Philosophy and Achieving the Carbon Peak and Carbon Neutrality Goals

Advance the development of market-based mechanisms, integrate carbon sink trading into the national carbon emission trading market, and establish a sound ecological conservation compensation mechanism that reflects the value of carbon sinks.

——Communist Party of China Central Committee & State Council, September 2021

Notice on Issuing the Action Plan for Carbon Dioxide Peaking Before 2030

Establish a sound ecological conservation compensation mechanism that reflects the value of carbon sinks, and research and formulate rules for carbon sink projects to participate in the national carbon emission trading market.

——State Council, October 2021

Regulations on Ecological Conservation Compensation

The state shall establish sound trading mechanisms for carbon emission rights, pollution discharge rights, water use rights, carbon sink rights, and other权益 (rights and interests), promote the development of trading markets, and improve trading rules.

——State Council, April 2024

2

1.2 Ministry requirements

In February 2021, the Ministry of Natural Resources initiated the work on realizing the value of eco-system products by issuing the *Letter on Issuing the Guidelines for Pilot Projects on the Mechanism of Realizing the Value of Eco-system Products in the Field of Natural Resources*. **The implementation plan for Shenzhen was approved in July**, with Guangzhou being another pilot city in Guangdong Province.

中华人民共和国自然资源部

自然资源部关于广东省深圳市、广州市自然资源领域生态产品价值实现机制试点的批复

3

02

Transaction Case

- Background
- Transaction Overview

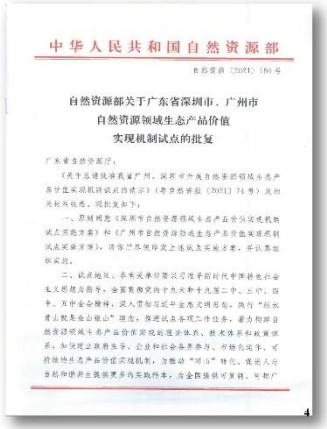
2.1 Background

□ Pilot Program for Realizing the Value of Eco-system Products (EVP)

In April 2021, the General Offices of the CPC Central Committee and the State Council issued the *Official Guidance on Establishing and Improving the Mechanism for Realizing the Value of Eco-system Products*, calling for the exploration of pilot programs for carbon sink rights trading.

In February 2021, the Ministry of Natural Resources issued the *Guidelines for Pilot Projects on the Mechanism of Realizing the Value of Eco-system Products in the Field of Natural Resources*, urging efforts to develop a theoretical framework, a technical system, and a policy system for realizing the value of eco-system products in the domain of natural resources.

In July 2021, the Ministry of Natural Resources approved the *Proposal from Shenzhen on Pilot Projects for the Mechanism of Realizing the Value of Eco-system Products in the Field of Natural Resources*, requiring active advancement of ecosystem carbon sink trading and exploration in establishing an ecological conservation compensation mechanism that reflects the value of carbon sinks.sm that reflects the value of carbon sink.



中华人民共和国自然资源部

自然资源部关于广东省深圳市、广州市自然资源领域生态产品价值实现机制试点的批复

4

2.1 Background

☐ EVP Realization Model

Eco-system products refer to natural elements that maintain ecological security, ensure ecological regulation functions, and provide a desirable living environment, including clean air, fresh water, and a pleasant climate.

——*National Plan for Major Functional Zones* issued by the State Council

- **Ecological compensation between upstream and downstream river basins; transfer payments for key ecological zones; resource-based ecological compensation.**
- **Trading of cultivated land balance quotas in China; the US wetland mitigation banking model; "land ticket" trading; "forest ticket" trading; carbon sink trading; forest rights trading; water rights trading.**
- **Ecological restoration and value enhancement of mines, coastal zones, etc.; comprehensive land consolidation across entire regions; integrated land development.**
- **Franchise operations; eco-agriculture; eco-tourism; eco-brand certification.**
- **Eco-banks; green funds; carbon tax; environmental protection tax; fees for paid resource use.**

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2.2 Transaction Overview

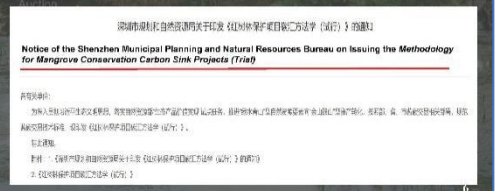
☐ Mangrove Conservation Carbon Sink Trading Pilot

Taking the lead, the Futian Mangrove National Nature Reserve, which had completed unified natural resource registration, was selected to pioneer blue carbon trading. This initiative has preliminarily established a comprehensive trading mechanism covering the entire chain, including: ownership registration of mangrove carbon sinks, methodology development, carbon sink verification, reserve price assessment for auctions, formulation of trading organization plans, and carbon trade registration.

Methodology Development | Carbon Sink Verification | Reserve Price Assessment for Auctions | Trading Organization Plans | Mangrove Conservation Carbon Sink Auction | Carbon Sink Certificate and Registration | Carbon Sink Index Insurance | Government "Leveraging" Effect

The first methodology in China targeting biodiversity conservation and climate change response

The methodology underwent review by authoritative experts from the Ministry of Natural Resources, Chinese Academy of Sciences, Tsinghua University, Chinese Academy of Agricultural Sciences, China Green Carbon Foundation, and other institutions. It was unanimously recognized as a pioneering achievement in China, effectively filling the gap in methodologies for carbon sink projects focused on natural ecosystem conservation.



Notice of the Shenzhen Municipal Planning and Natural Resources Bureau on Issuing the *Methodology for Mangrove Conservation Carbon Sink Projects (Trial)*

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2.2 Transaction Overview

☐ Methodological Features

The Futian Mangrove Conservation Carbon Sink Project is located in the Futian Mangrove National Nature Reserve, the only such reserve situated within the urban core of a Chinese metropolis. Endowed with the premium credentials of the "International Mangrove Center," it integrates three key attributes: biodiversity conservation, climate change response, and community sustainable development. As a "star" product in high-quality carbon sink development, it is hailed as "the jewel in the crown."

Climate Change Response (Mangrove Conservation Carbon Sink)

Biodiversity Conservation (Habitat for Rare Migratory Birds)

Community Sustainable Development (Mangroves Enhancing Community Well-being)

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2.2 Transaction Overview

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Certification of carbon sink for mangrove conservation project

The verification confirms that the mangrove conservation activities across the 126-hectare pilot area generated a total carbon sink of 38,745.44 tonnes during the first monitoring period (January 1, 2010-January 1, 2020), with an annual average of 3,874.544 tonnes.

深圳湾红树林保护碳汇项目
碳减排量核证报告

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2.2 Transaction Overview

Mangrove Conservation Carbon Sink Trading Pilot

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Methodology Development | Carbon Sink Verification | Reserve Price Assessment for Auctions | Trading Organization Plan | Mangrove Conservation Carbon Sink Auction | Carbon Sink Certificate and Registration | Carbon Sink Index Insurance | Government Leveraging Effect

Explored Carbon Sink Valuation Methods and Determined the Reserve Price for Auctions

Starting from aspects such as costs, benefits, market conditions, and technical pathways, we conducted a comprehensive valuation of the mangrove conservation carbon sink using the market comparison approach. This process integrated factors including the pilot's significance, resource scarcity, and Shenzhen's specific circumstances. Through this assessment and expert review, the price of the mangrove conservation carbon sink was determined to be RMB 183 per tonne, which generally aligns with actual market conditions.


福田红树林保护项目碳汇价格评估报告
保密

9

2.2 Transaction Overview

Innovative Design of a Valuation Methodology for Mangrove Conservation Carbon Sinks

At present, carbon sink transactions are predominantly conducted through negotiation, as there is no mature carbon sink valuation methodology domestically or internationally. The reserve price for the mangrove carbon sink auction was determined with reference to land asset appraisal methods.

This study explores the development of carbon sink valuation methodologies by analyzing cost-benefit analysis and market dynamics. Utilizing the market comparison approach, we selected blue carbon trading cases with comparable transaction timelines, subject matter, and operational frameworks to establish a modified factor system comprising 3 primary indicators and 15 secondary metrics. The framework quantifies and adjusts the impact of comparative factors—including resource scarcity, mangrove conservation practices, and carbon sink product quality—on valuation. Through this systematic evaluation, we assess the carbon sequestration value of protected mangrove ecosystems.

China's first carbon sink value assessment report for auction was developed, and the reserve price of carbon sink credits for mangrove protection project was duly examined through expert deliberation.


福田红树林保护碳汇价格评估报告
保密
深圳市自然资源和不动产评估发展研究中心
2023年06月

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2.2 Transaction Overview

Mangrove Conservation Carbon Sink Trading Pilot

Taking the lead, the Futian Mangrove National Nature Reserve, which had completed unified natural resource registration, was selected to pioneer blue carbon trading. This initiative has preliminarily established a comprehensive trading mechanism covering the entire chain, including: ownership registration of mangrove carbon sinks, methodology development, carbon sink verification, reserve price assessment for auctions, formulation of trading organization plans, and carbon trade registration.

Methodology Development | Carbon Sink Verification | Reserve Price Assessment for Auctions | Trading Organization Plan | Mangrove Conservation Carbon Sink Auction | Carbon Sink Certificate and Registration | Carbon Sink Index Insurance | Government Leveraging Effect

Formulated organizational plans for pilot transactions

- With the consent of the municipal government, the Pilot Organization Plan for Mangrove Protection and Carbon Sink Trading in Futian Mangrove Nature Reserve was issued;
- Considering factors such as resource scarcity and sustainable development, the carbon sink of mangrove protection for one year was selected as the trading target of 3875 tons;
- In order to enhance the demonstration significance and publicity effect of the pilot, it is clear that the transaction method is open auction.


深圳市规划和自然资源局文件

市规划和自然资源局关于印发《福田红树林自然保护区(红树林保护碳汇交易试点组织方案)》的通知

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2.2 Transaction Overview

Mangrove Conservation Carbon Sink Trading Pilot

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Methodology Development | Carbon Sink Verification | Reserve Price Assessment for Auctions | Trading Organization Plan | Mangrove Conservation Carbon Sink Auction | Carbon Sink Certificate and Registration | Carbon Sink Index Insurance | Government Leveraging Effect

China's first mangrove protection carbon sink transaction was successfully completed

On September 26,2023, a mangrove conservation carbon sink auction attracted 17 enterprises and organizations. After 92 rounds of intense bidding, Shenzhen Blue Carbon Home Care Technology Co., Ltd. (formerly Shenzhen Jiahua Beauty Products Co., Ltd.) secured the auction with a winning bid of 485 yuan per ton. The total transaction value reached approximately 1.88 million yuan, which was fully remitted to municipal fiscal authorities. This record-breaking price set a new benchmark for carbon credits in China's national carbon market.

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2.2 Transaction Overview

☐ Mangrove Conservation Carbon Sink Trading Pilot

Taking the lead, the Futian Mangrove National Nature Reserve, which had completed unified natural resource registration, was selected to pioneer blue carbon trading. This initiative has preliminarily established a comprehensive trading mechanism covering the entire chain, including: ownership registration of mangrove carbon sinks, methodology development, carbon sink verification, reserve price assessment for auctions, formulation of trading organization plans, and carbon trade registration.

Carbon Sink Certificate and Registration

The first carbon sink certificate in the field of natural resources was issued and the carbon sink registration of natural resources was handled

- The first carbon sink certificate in the field of natural resources in Shenzhen was issued to the winner.
- Register the total amount of carbon sequestration for mangrove protection on the natural resources register and register the carbon sequestration for the successful bidder;
- The International Mangrove Centre will reserve a booth for the winner.

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2.2 Transaction Overview

☐ Mangrove Conservation Carbon Sink Trading Pilot

Taking the lead, the Futian Mangrove National Nature Reserve, which had completed unified natural resource registration, was selected to pioneer blue carbon trading. This initiative has preliminarily established a comprehensive trading mechanism covering the entire chain, including: ownership registration of mangrove carbon sinks, methodology development, carbon sink verification, reserve price assessment for auctions, formulation of trading organization plans, and carbon trade registration.

Carbon Sink Index Insurance

China's first mangrove carbon sink index insurance was launched in Shenzhen

- In collaboration with the Shenzhen Regulatory Bureau of Chinas National Financial Regulatory Administration, we will explore the establishment of a cooperative mechanism for blue carbon trading and innovative financial models. By organically integrating ecological conservation with insurance mechanisms, we aim to develop innovative financial insurance products tailored for mangrove ecosystem protection and biodiversity preservation.
- The case won the Excellence Award (ranked first) of "2023 Guangdong-Hong Kong-Macao Greater Bay Area Green Finance Excellent Case" and the 2023 Shenzhen Green Finance Excellent Case to Support the Real Economy.

2.2 Transaction Overview

☐ Mangrove Conservation Carbon Sink Trading Pilot

Taking the lead, the Futian Mangrove National Nature Reserve, which had completed unified natural resource registration, was selected to pioneer blue carbon trading. This initiative has preliminarily established a comprehensive trading mechanism covering the entire chain, including: ownership registration of mangrove carbon sinks, methodology development, carbon sink verification, reserve price assessment for auctions, formulation of trading organization plans, and carbon trade registration.

Government "Leveraging" Effect

The governments "leverage" effect has been highly recognized by the Ministry of Natural Resources and warmly received by the society

- The series of reports were published in the internal information of the General Office of the CPC Central Committee, the State Office, the Ministry, the Provincial Government office and the Municipal government office; it was selected as the "annual hot word" of high-quality development in Shenzhen;
- CCTV1, CCTV13, Xinhua News Agency, Peoples Daily, Natural Resources News, Shenzhen News, Hong Kong Commercial Daily and other more than a dozen domestic and foreign news media attention and coverage;
- Helped Futian District to become one of the top 10 Green and Beautiful Guangdong competitors.
- Exhibiting in the Sea Expo will create a good publicity atmosphere and social effect.

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03

Innovative Applications

- Carbon Neutrality
- Judicial Carbon Sinks
- Financial Insurance
- Financial Collateralization

3.1 Exploring Application Scenarios for Carbon Neutrality

Selecting events with international influence that promote the concept of green development to achieve carbon neutrality.

- Carbon Neutrality for the 2024 China Marine Economy Expo Professional Forum (90 tonnes)
- Carbon Neutrality for the 4th "Shanhai Liancheng · Nature Shenzhen" Lifestyle Festival (10 tonnes)
- Carbon Neutrality for the 2025 "Green Futian, Zero-Carbon Public Welfare" Event (20 tonnes)

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3.2 Justicial Carbon Sinks


深圳市规划和自然资源局
深圳市海洋发展局 文件

Actively exploring diversified pathways for realizing the value of eco-system products, the city has promoted the integration of the mechanism for realizing the value of eco-system products in the natural resources sector with the mechanism for restoring ecological and environmental damages. The Municipal Planning and Natural Resources Bureau, in collaboration with the Municipal Qianhai People's Procuratorate and the Municipal Finance Bureau, has jointly **developed a novel model for marine ecological and environmental damage restoration termed "Mangrove Conservation Carbon Sinks + Ecological Justice"**.

On January 21, 2025, the *Implementation Plan for Mangrove Conservation Carbon Sink Subscription as an Alternative to Marine Ecological Restoration* was issued by the Shenzhen Municipal Planning and Natural Resources Bureau and the Shenzhen Municipal Oceanic Development Bureau. In March, the Municipal Qianhai People's Procuratorate subscribed to 520 tonnes of mangrove conservation carbon sinks from the Guangdong Neilingding-Futian National Nature Reserve to be used for alternative marine ecological and environmental damage restoration, **completing Shenzhen's first judicial blue carbon transaction**.

In August 2025, led by the Shenzhen Municipal Intermediate People's Court and jointly issued by multiple departments including the Shenzhen Municipal Planning and Natural Resources Bureau, the *Implementation Opinions on Applying the Subscription of Carbon Sinks as a Fulfillment Method (Trial)* was promulgated. Adhering to the principle of prioritizing ecological restoration, the document outlines regulatory requirements and procedural guidelines for actively directing responsible parties in relevant environmental resource cases to voluntarily subscribe to carbon sinks as an alternative means of fulfilling ecological and environmental restoration responsibilities and compensation liabilities. This initiative aims to enhance the level of law enforcement and judiciary in ecological and environmental resource cases, thereby supporting and securing the achievement of carbon peak and carbon neutrality goals.

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3.3 Financial Insurance

Working in partnership with the National Financial Regulatory and Administration Commission's Shenzhen Bureau, we are exploring the establishment of a cooperative mechanism for blue carbon trading and innovative financial formats. By organically integrating "ecological conservation + insurance mechanisms," we are innovatively developing financial insurance products tailored for mangrove and biodiversity protection.

On July 25, 2023, witnessed by the Shenzhen Municipal Planning and Natural Resources Bureau and the National Financial Regulatory and Administration Commission's Shenzhen Bureau, the Administration of Guangdong Neilingding-Futian National Nature Reserve signed the *Futian Mangrove Nature Reserve Mangrove Carbon Sink Insurance Donation Agreement* with Ping An Property & Casualty Insurance Company of China, Ltd. Shenzhen Branch. **This marked the launch of the first mangrove carbon sink index insurance policy in China, implemented in Shenzhen.**

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3.4 Financial Collateralization

In October 2024, Shenzhen Branch of Industrial Bank Co., Ltd. and Shenzhen Blue Carbon Home Chemical Technology Co., Ltd. officially signed an agreement on innovative blue carbon finance cooperation, launching **Shenzhen's first mangrove conservation carbon sink pledge financing operation**. By adopting an approach of exchanging "carbon" for "loans," this initiative provides enterprises with new financing channels and focuses on meeting their working capital needs, representing an innovative breakthrough in the field of blue finance.

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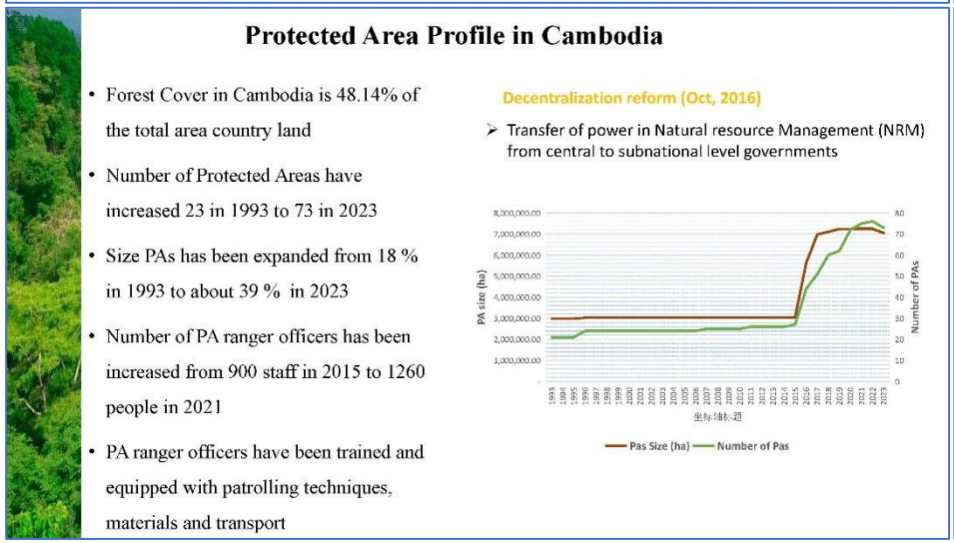
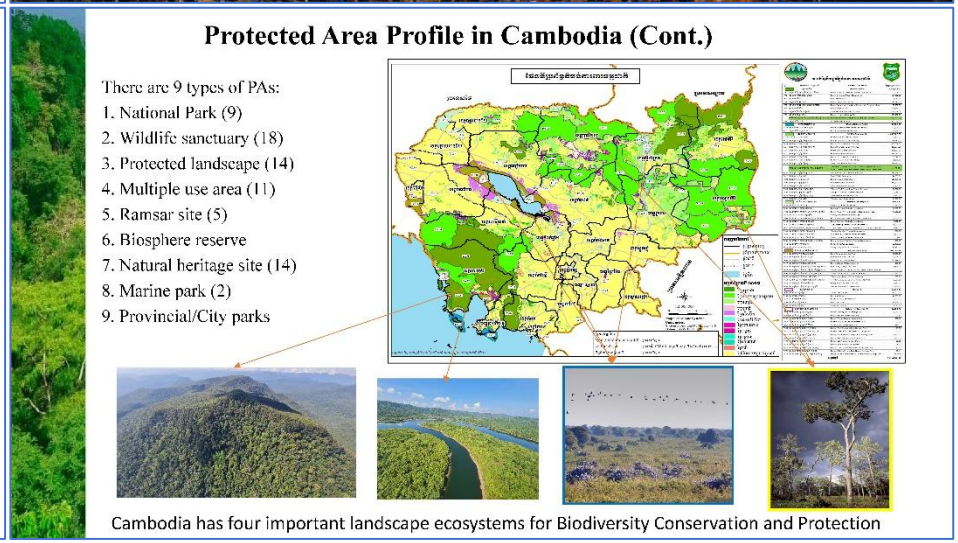
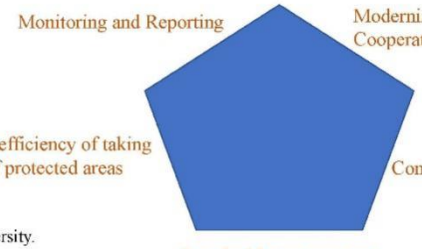
Thank You!
We welcome your questions and feedback.
Development Research Center for Natural Resource and Real Estate Assessment, Shenzhen
Reporter: Xie Xinli
September 14, 2025

Annex 4: Country Presentations
Annex 4.1: Cambodia

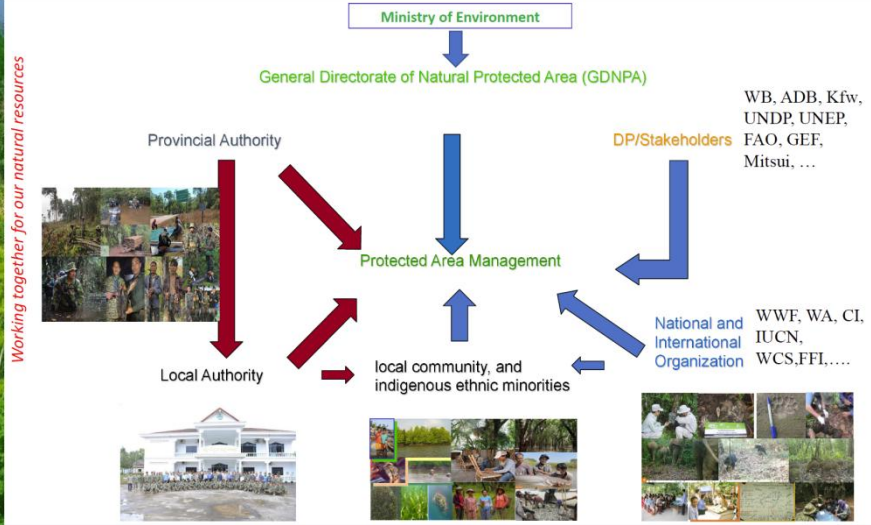




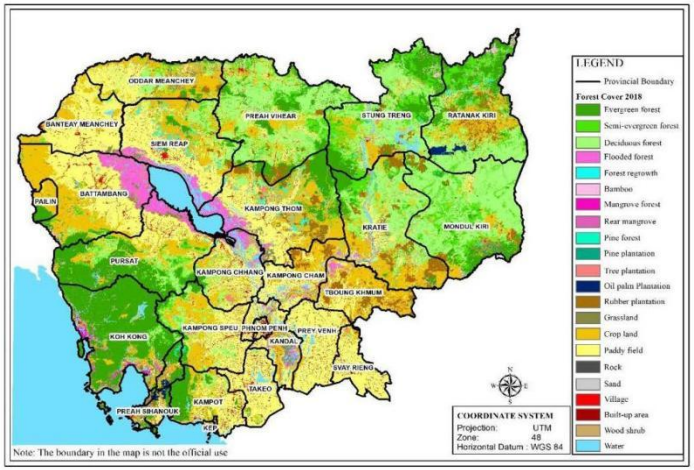
Protected Area Management Strategy in Cambodia (2017-2031)

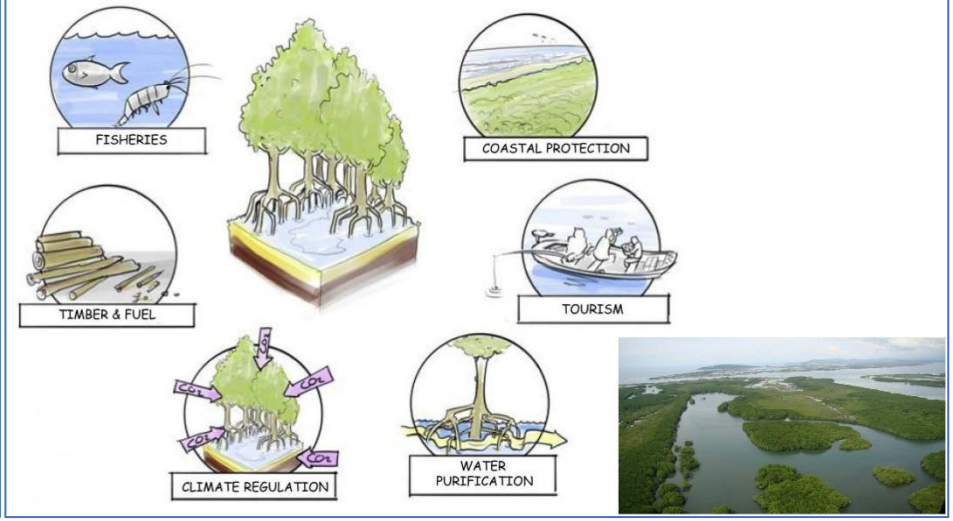


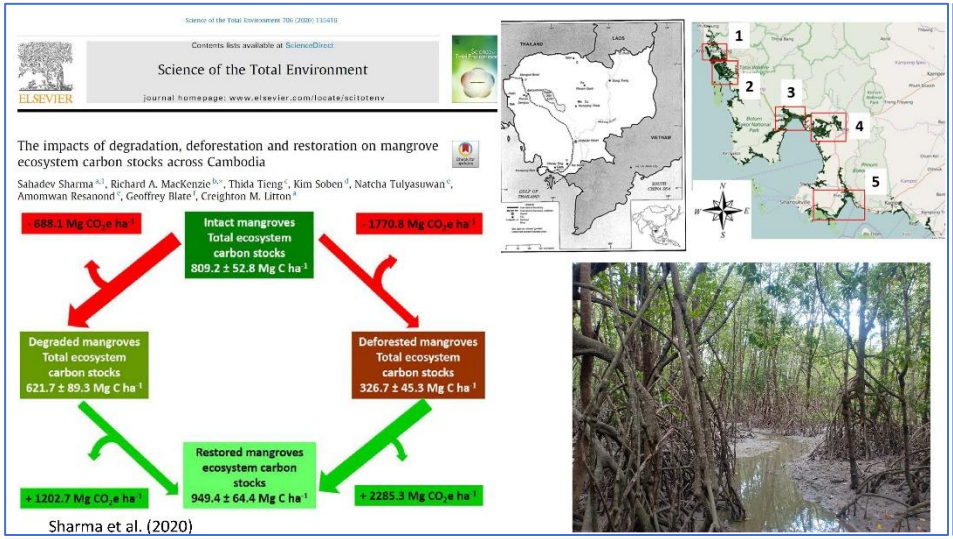
- Protects and conserves biodiversity.
- Ensures sustainable use of natural resources.
- Ensures the right of local communities to participate in decision-making.
- Stabilizes the natural environment.
- Enhances the livelihood of the local community.



- Cambodia hosts the 10th largest mangrove ecosystem in Asia.
- Mangrove forest in Cambodia are found along its 435km-long coastline in four provinces (Koh Kong Sihanoukville Kampot and Kep
- There are 37 true mangrove species have been identified in Cambodia in (Smith 1996)
- Most commonly found mangrove species are *Rhizophora apiculate* and *Nypa fruticans*.







Sharma et al. (2020)

A Snapshot of recorded biodiversity in Koh Kapik Ramsar Site, one of the coastal protected areas in Cambodia (1/2)

1. **Flora**
   - 64 species of mangroves recorded in the Koh Kapik Ramsar site
2. **Fauna**
   - 41 bird species
   - 25 species of mammals
   - 74 larval and juvenile taxa belonging to 53 genera, 31 families, and 15 orders

Muñoz et al., 2024

A Snapshot of recorded biodiversity in Koh Kapik Ramsar Site, one of the coastal protected areas in Cambodia (2/2)

Mangrove Forest Reduction

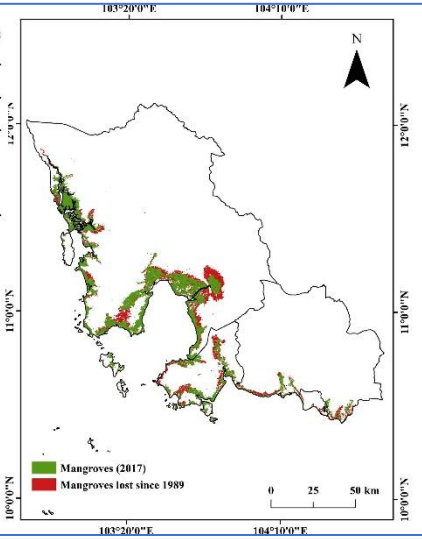
Anthropogenic activities, such as

- ***Shrimp Farming:*** in 1990S Shrimp culture boomed and decline in 2000s >70% were abandoned due to loss productivity. Early 1994 ~840 ha and increase to ~1240 ha end of 1994.
- ***Salt fields:*** in 1990s ~3500-4000ha in Kampot (Mastaller, 1999)
- ***Charcoal production***
- ***Fuel-wood extraction***
- Rapid expansion in fisheries and infrastructure development the region from 1961 to 2015, people migrated from inland to the coastal areas for better living
- **Climate change**

Possible threats to coastal due to the loss of mangrove forest are tropical cyclones, storm surges, rising sea level, coastal erosion and salt water intrusion into agricultural lands

Changes in the areas covered by mangrove forests in different coastal provinces of Cambodia (1989–2017).

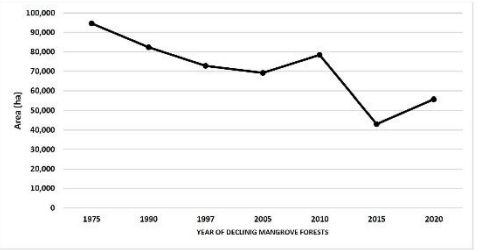
Year	Area covered by mangroves (ha)				
	Koh Kong	Sihanouk Ville	Kampot	Kep	Total
1989	67,559	15,666	4430	758	88,413
1994	60,614	12,966	4252	613	78,445
2009	46,026	9988	2492	428	58,934
2016–2017	41,122	7539	2444	498	51,603



Different estimates of mangrove forest areas from literature.

Year	Agency/Reference	Area (ha)
1964	Report No.2 of Ministry of Water, Forests and Hunting in Ung (1991)	96,300
1973	World Bank, UNDP, and FAO (1996)	94,600
1973	MoE (2009)	94,000
1975	The Mekong River Commission/UNDP/FAO	94,600
1980	FAO (2005)	91,200
1990	FAO (2005)	82,400
1992–93	Department of Fisheries	37,000
1992–93	The Mekong River Commission/UNDP/FAO	85,100
1993	Department of Forestry and Wildlife, Forest Wildlife Research and Education Institute	77,669
1993	MoE (2010)	62,416
1997	The Mekong River Commission/UNDP/FAO	77,260
1997	Department of Forestry and Wildlife, Forest Wildlife Research and Education Institute	72,835
1997	Ashwell (1997)	63,039
1997	MoE (2010)	57,482
2000	FAO (2005)	73,600
2002	MoE (2002)	56,241
2005	FAO (2005)	69,200
2006	Ministry of Land Management, Urban Planning and Construction, Cambodia	33,087
2010	Fishery Administration (FiA)	78,405
2015	Rizvi and Singer (2011)	43,000

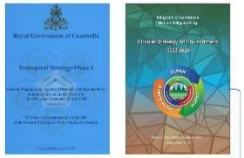
Veettil & Quang (2019)

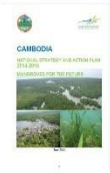


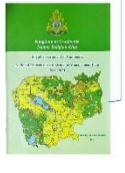
Sum et al. (2022)

III. Conservation efforts (1/5)

III.1 Policy and Legislation Framework

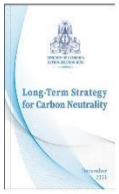






Objectives:

1. Maintain the forest cover of at least 60% and carbon neutral by 2050 of land area and to promote the preservation of ecosystem, the protection of biodiversity and the conservation of natural protected areas.
2. To intensify tree planting movement
3. Improving protected area management
4. Enhancing local communities' livelihood
5. To protect, conserve and manage both ecological and socio-economic system to ensure the long-term sustainability of coastal ecosystems of mangroves as a flagship species and other coastal resources and benefits of the coastal resources-dependent dwellers in Cambodia.
6. MoE circular strategy of environment 2023 - 2028



III. Conservation efforts (2/5)

III.2 Conservation practices

Community-Based Conservation in coastal areas;
Community Protected Area (CPA)= 17
Community Fisheries (CFi)– 41

Improve and expand mangrove nursery in coastal area

Strengthening law enforcement (ranger officers)

Provide legitimate tenure right

Protected Areas system, spatial planning and zoning

Mangrove Conservation

Disseminate the benefits of mangrove forests to local communities (Training, workshop, people to people)

Sustainable Farming Practice: working with local community to do farming.

Experimental Farming: Planting mangrove trees 5ha in Koh Smao village, to show people the benefit of having mangrove forests to balance the environment and biodiversity.

Reducing Logging in the Mangrove forest: install manure-powered biogas on 12 local farm

III. Conservation efforts (3/5)

III.3 Restoration practice

1. **Restoration Approach:**
   - Follow Guidelines for Mangrove Restoration
   - Experimental multi-species of mangrove plantation
   - Re-plantation of multi-species of mangrove
   - Monitoring the growth and survival of planted mangrove
2. **Several NGOs, Agencies, and communities have been involved in mangrove restoration such as;**
   - Culture and Environment Preservation Association (CEPA), Wetlands International ,The Participatory Management of Mangrove Resource (PMMR), IUCN, Mangrove for the Future (MFF), ActionAid, BCC Project, CCA4CSII Project, Coastal Zone Management project of DANIDA
3. **Private Sectors involvement:**
   - British Chevening Alumni Association of Cambodia, Vital Company, Panasonic company, Heineken Cambodia, ATALIAN Cambodia

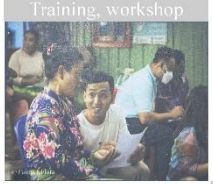
III. Conservation efforts (4/5)

III.4 Community Involvement

- Acknowledged the benefit of mangrove ecosystem for their daily life
- Annual mangrove planting
- Patrolling activities to safeguard mangrove cut down or other illegal activities
- Livelihood diversification
- Communities-based ecotourism (Trapeang Sangke, Peam krosaop, Boeng kachhang, koh salao and koh kapi CPAs)
- Participate in workshop or training to gain more knowledge about mangrove
- and share their respective practical experiences

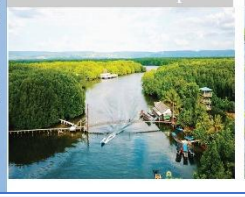
Patrolling

Training, workshop



local community farming

Peam Krosaop



Trapean Sangke

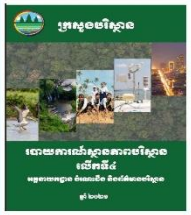
Reducing Logging in the Mangrove forest: install manure-powered biogas

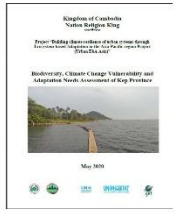
III. Conservation efforts (5/5)

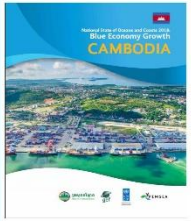
III.5 Monitoring and Assessment

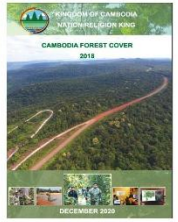
There are some reports on Cambodia's environmental status for coastal areas, such as:

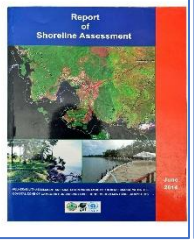
- 5th Environmental status report
- Biodiversity, Climate Change Vulnerability and Adaptation Needs Assessment of Kep Province
- Mangrove Biodiversity Survey Report (Peam Krasop wildlife sanctuary and Koh Kapik Ramsar site
- Coastal Mangroves. Rehabilitation and Management
- Cambodia Forest Cover 2018
- 6th National Report to the Convention on Biological Diversity
- National State of Ocean and Coasts 2018: Blue Economy Growth, Cambodia
- Report of Shoreline Assessment









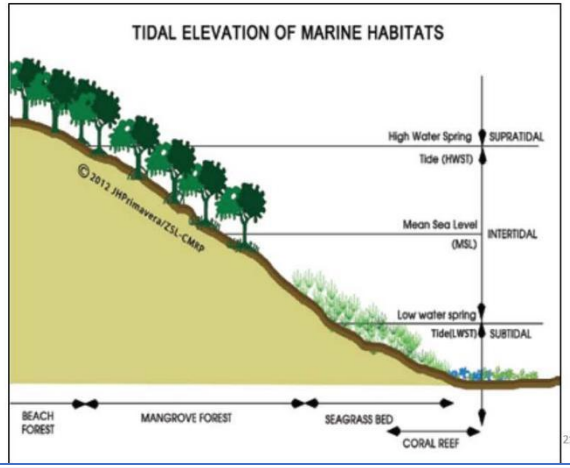


Based Practices of Mangrove Restoration in Cambodia

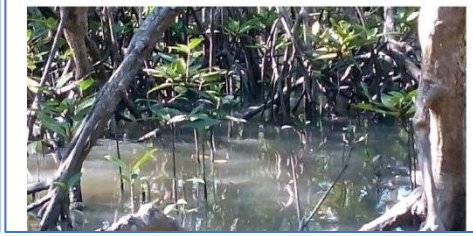
Planning Planting Mangrove. Determine zones

Seed or Seedlings Options?

- Doing nothing (protection/boat exclusion)
- Assist General Regeneration (ANR)
- Translocation (wildlings)
- Seeds (lower water)
- *Seedlings* (high waters)



In the parent mangrove occurrences of wilding are plenty. At times difficult to access them and secure soil ball to be dug up with the wilding. Photo by GIC BCCP 2017



Mangrove Nursery – Boeng Kachaeng

- Seed bed raising Rhizophora seedling.
- The light shade provide by *Maleleuca* trees.
- nylon net shaded
- Polythene pots and placed directly on the ground
- Roots can penetrate into the muddy soil
- Open air nursery
- Roots develop much faster than stem and foliage
- Seedling raising: Inundated twice a day during the 1-2 months required for the propagules to develop into planted seedling

Photo by MoE

Out-planting seedlings

Seedling Transplanting

- Seedling bulked and tied in bundles of 12-24 pots.
- Placed on a sledge or wooden board and pulled by string

Out-planting seedlings

Spacing

- *BCCP: 1 x 1 m => 2 x 1½ m from 10,000 plants/ha to 3,300 plants/ha*
- ***Example**: High density of 15,030 Rhizophora apiculata trees / ha was found in 5 year-old stands decreasing sharply to 9,810 in 8 year-old stands, proving stocking was too high (suggest >1.2 x 1.2 m). Data from Malaysia*
- Vietnam (spacing) 2 x 3 and 2 x 3 m

Recommended:

- 2 x 1½ in fragile semi-deep area m in shallow waters / safe areas in enrichment areas (EP)

Seed Sowing

- Seed sowing or propagules resembles planting seedling.
- Seed sowing conducts at low tide when there is a dry spell during rains

- Accomplished plantation of Rhizophora seedling 1.5x2 m in Boeng Krataeng 2018
- Support-sticks tied to the seedling for stabilising and avoiding topple or tilt.

Photo by Mr. Both

Alternative Mangrove Species for piloting..?

Bruguiera decandra

A mangrove tree of family Rhizophoraceae. "decandra" means "ten male", referring to the flower having ten stamens.

Small tree up to 15 metres (50 ft) tall with a trunk diameter of up to 30 cm (12 in). Its bark is pale brown. The flowers are white. The ovoid to conical fruits measure up to 1.8 cm (0.7 in) long. It grows naturally in India, Bangladesh, Burma, Thailand, Malaysia, and Cambodia. Its habitat is mangrove swamps and tidal creeks.

Bruguiera sexangula Synonym *Bruguiera eriopetala*

Bruguiera sexangula, commonly called the upriver orange mangrove, is a mangrove shrub or tree usually growing up to 15 m, occasionally 30 m, in height.

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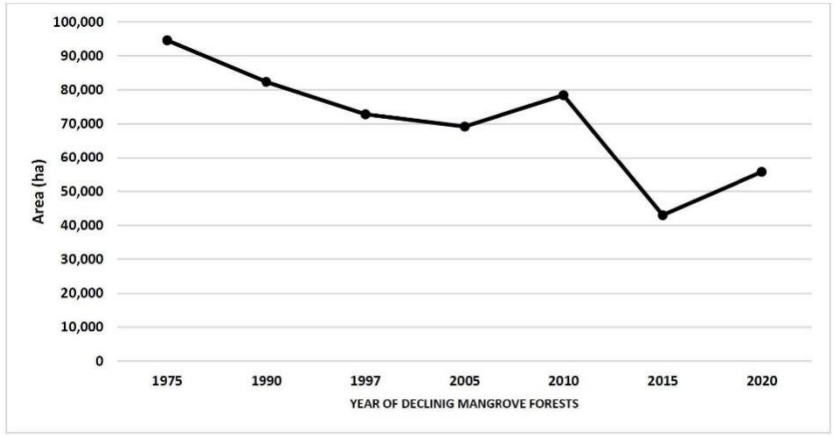


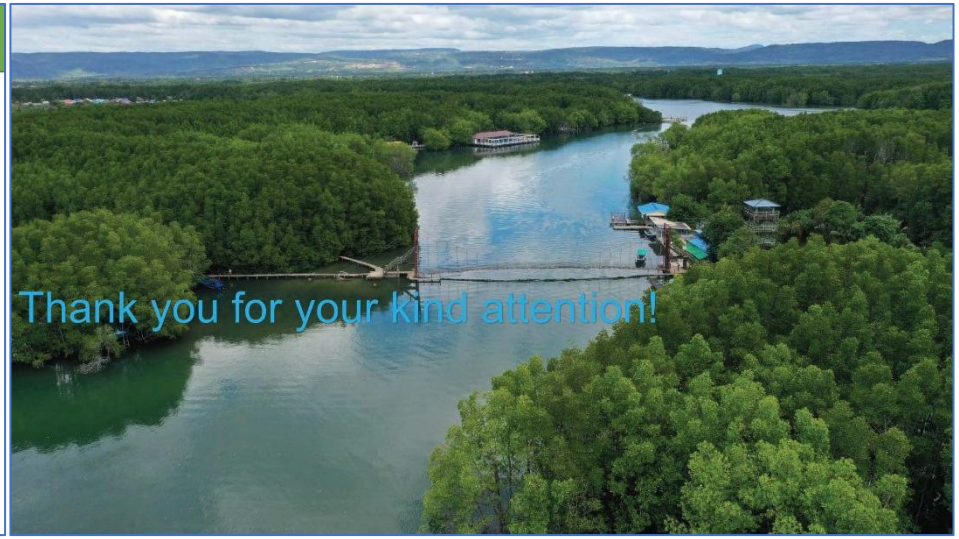
Sum et al. (2022)

IV. Challenges

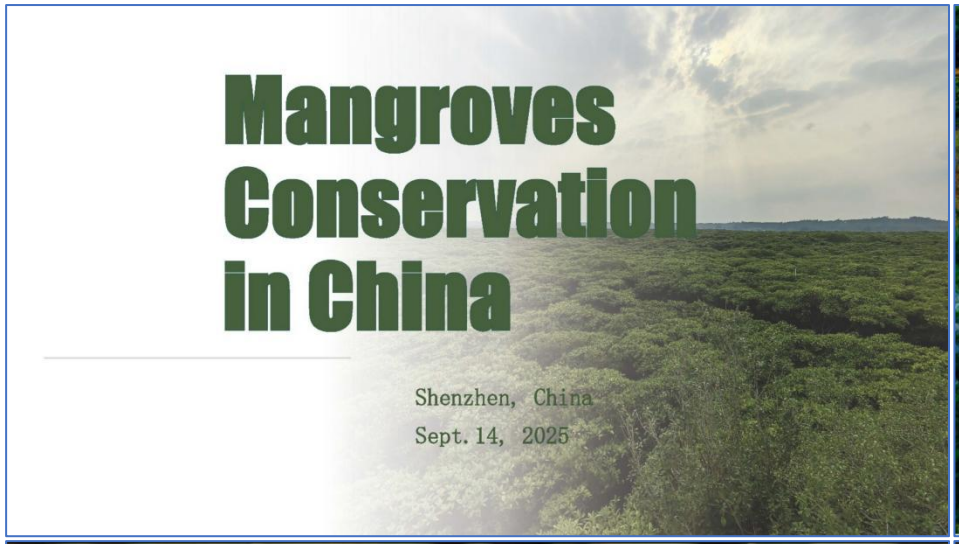
- Capacities and equipment of land encroachment limited
- Land encroachment in the coastal lead to deforestation and conversion
- Climate Change Impacts
- Limited Funding and Resources
- Limited Capacity for Restoration
- Insufficient coordination among relevant institutions/stakeholders

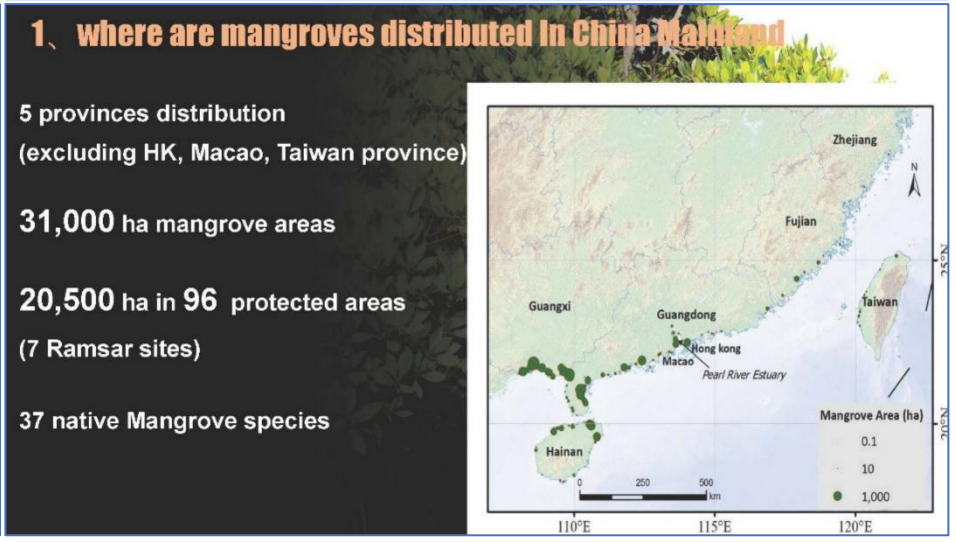
V. Way Forward

- Strengthen legal and institutional frameworks
- Promote community-based management
- Expand and enhance restoration efforts
- Strengthen monitoring, research, and knowledge sharing
- Mobilize sustainable financing
  - blue carbon financing, e.g., REDD+
  - Encourage Public-Private Partnerships
  - Apply for grants e.g., Green Climate Fund, GEF, and more.
- Promote nature-based solutions
- Communication, education, participation, and awareness



Annex 4.2: China





2、How does China protect mangroves?

(1)The National leader emphasizes on mangroves

- In 2017, President Xi visited to the **Beihai Golden Bay Mangrove Reserve** in Guangxi Zhuang Autonomous Region.
- In 2022, he announced at COP14 to **establish the IMC** in China.
- In 2023, he visited to the **mangrove area on Jinniu Island in Zhanjiang** of Guangdong province.

"**Mangroves are national treasures**"

2、How does China protect mangroves?

(2) Legislation

◎ **Wetlands Conservation Law of the People's Republic of China (released in 2022)**

The law emphasizes principles such as protection priority, strict management, systematic governance, scientific restoration, and rational utilization

Article 34

.....

Mangrove wetlands shall be included in the list of important wetlands; those meeting the criteria for national important wetlands shall be prioritized for inclusion in the list of national important wetlands.

It is prohibited to occupy mangrove wetlands.

◎ **5 regulations at provincial level (all five provinces with mangroves in China)**

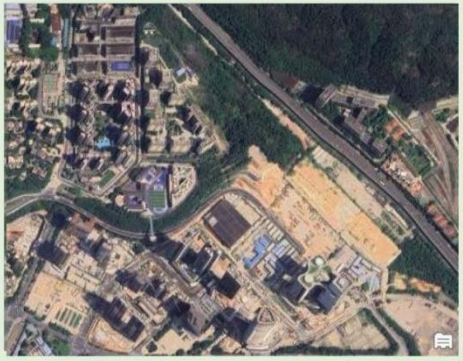
2、How does China protect mangroves?

Forest department and Natural resource department are responsible for mangrove protection

There is strict protection and monitoring system on mangroves

1. **Remote Sensing and Spatial Monitoring**

2. **Ground-Based and Ecological Monitoring**
   Video surveillance
   patrol system
   public reporting channels



2、How does China protect mangroves?

(3) National plan

Mangrove Conservation and Restoration Action Plan (2020-2025)

- **By 2025, to replant 9,050 ha of mangroves and to restore 9,750 ha of existing mangroves**

Replantation

Province	Target (ha)
Zhejiang	200
Fujian	350
Guangdong	5500
Guangxi	1000
Hainan	2000
Total	**9050**

Restoration

Province	Target (ha)
Zhejiang	—
Fujian	550
Guangdong	2500
Guangxi	3500
Hainan	3200
Total	**9750**

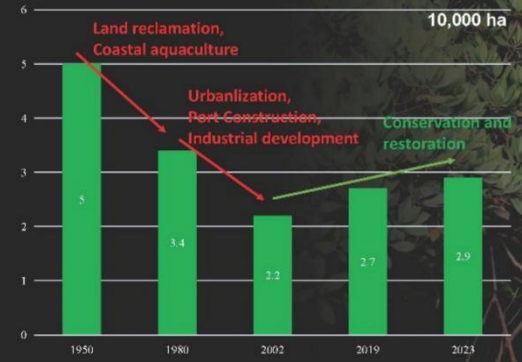
Central government → Restoration funding → local governments → Restoration funding → Nature Reserves → Design and construction Units

2、How does China protect mangroves?

(4)Technical Standards and guidelines

Guidelines on mangrove restoration

3、What has China achieved in mangrove conservation



3、What has China achieved in mangrove conservation

The increase of China mangrove area since 2019

Provinces	2019	2020	2021	2022	2023	2024
Zhejiang	118.23	118.19	123.86	337.48	351.76	343.91
Fujian	1212.15	1211.69	1276.65	1309.67	1499.32	1781.45
Guangdong	10651.83	10618.39	10624.84	10992.38	11448.38	11643.71
Guangxi	9421.04	9475.73	9617.47	10404.17	10621.87	10798.54
Hainan	5697.73	5685.41	5727.68	6165.01	6350.69	6432.95
Total	27101.46	27109.41	27370.53	29208.71	30273.43	31000.56

Over the past five years,
China replanted over 9,100 hectares, restored 10,000 hectares,
Total mangrove area reaches 31000 hectares, achieving the goals set in the Plan ahead of schedule

Annex 4.3: Iran

Protection and Active Restoration

❖**Protecting:**

- Key sites designated as Protected Areas
- Regular patrols to prevent illegal logging and land-use changes

❖**Restoration:**

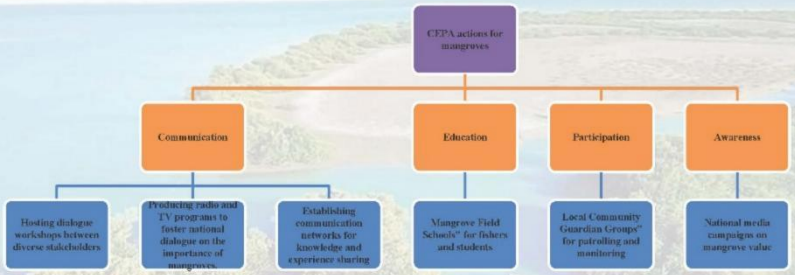
- National campaign: "We Plant the Sea"
- Large-scale community planting events
- Establishment of native sapling nurseries

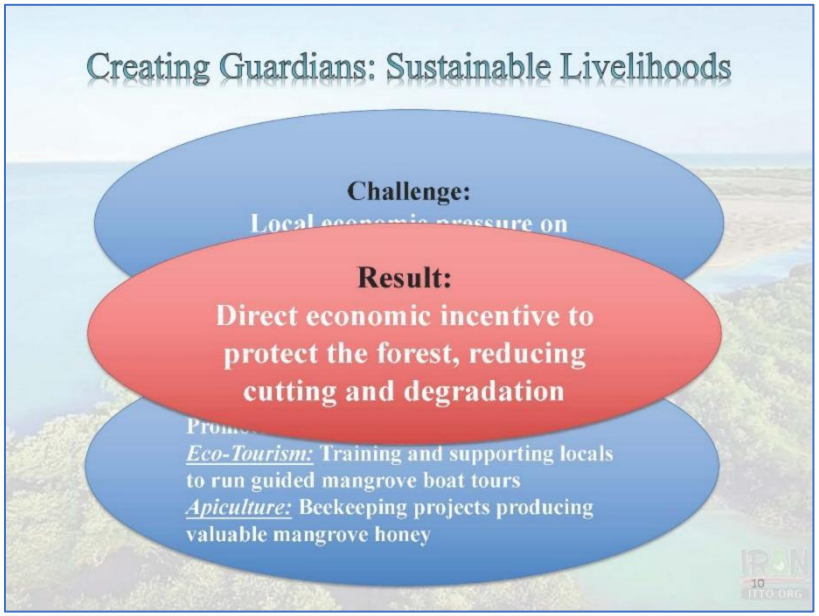
Areas of Hara (mangrove) habitats along the Iranian coasts of the Gulf of Oman and the Persian Gulf, broken down by province and by Protected area. The areas are given in square kilometers.

Percent of mudflat area	Percent of habitat area	Ecosystem area	Mudflat area	Habitat area	Region
86	14	40.312	34.546	5.766	Sistan & Baluchestan mangroves
79	21	578.7218	455.2852	123.4366	Hormozgan mangroves
86	14	199.065	171.013	22.9776	Oman Sea mangroves
94	6	2231.8018	2107.7152	124.0866	Persian Gulf mangroves
88	12	80.3666	71.008	9.3586	Gabrik Managed Area; Jask Managed Areas (Central, West, and East)
83	17	46.069	38.216	7.853	Rud-e Gaz Hara Managed Area
89	11	164.6162	145.991	18.625	Tiab–Minab Managed Area
68	32	267.807	183.221	84.586	Hara Protected Area
82	18	25.547	20.992	4.555	Bahu Kalat Protected Area




The Heart of Our Strategy: The CEPA Approach




Creating Guardians: Sustainable Livelihoods
Challenge:
Result:
Direct economic incentive to protect the forest, reducing cutting and degradation
Eco-Tourism: Training and supporting locals to run guided mangrove boat tours
Apiculture: Beekeeping projects producing valuable mangrove honey


Cooperation: Leveraging Partnerships
• International Collaboration
UNDP:
Community empowerment and integrated management projects
JICA:
Technical expertise and knowledge exchange
Ramsar Convention:
Framework for international reporting and cooperation
Ramsar
CONVENTION ON WETLANDS
CONVENTION SUR LES ZONES HUMIDES
CONVENCIÓN SOBRE LOS HUMEDALES
(Ramsar, Iran, 1971)

- **National Coordination**

Close collaboration between Department of Environment and Forestry, Fisheries, and Local Governments

سازمان حفاظت محیط زیست

Department Of Environment

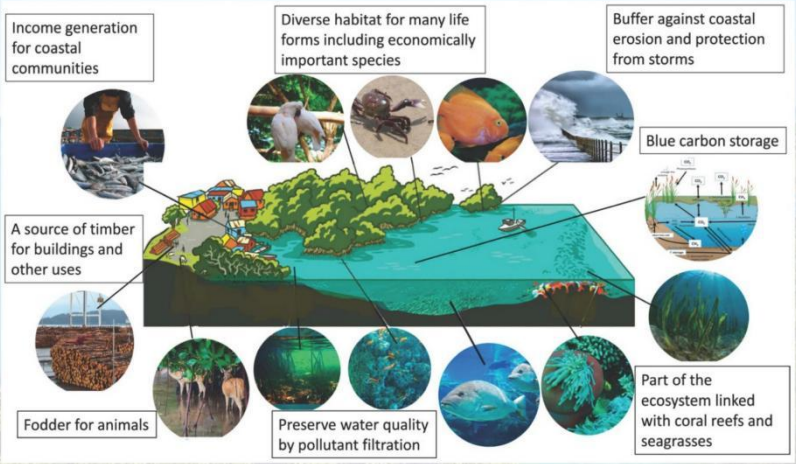
Ongoing Challenges & the Path Forward

❖ Persisting Challenges:

- **Climate Change:** Rising sea temperatures, sea-level rise
- **Pollution:** Industrial and oil pollution in the Persian Gulf
- **Development:** Balancing coastal development with conservation

❖**Future Vision:**

- Scale up successful community-based models
- Enhance research on climate-resilient mangroves
- Strengthen regional cooperation for shared marine ecosystems



Akram et al., 2023
(https://doi.org/10.3390/f14091698)

Conclusion:
A Model for the Future

- Iran's model demonstrates that effective conservation is holistic.
- Success is achieved by integrating legal protection, scientific research, and—most importantly—the hearts and minds of local communities.
- Investing in mangroves is an investment in climate resilience, economic stability, and biodiversity for generations to come.

Thank you for your attention!

Annex 4.4: Madagascar

Deepening Intercontinental Dialogue for a Shared Future of CEPA

2025 Mangrove Wetland Education CEPA Symposium and Opening Session of the International Mangrove Center Workshop

2025中国(深圳)湿地教育CEPA研讨会暨国际红树林中心研讨班首课

OVERVIEW: Advantages and opportunities

303Mt CO2e stored

41-74% of annual CO2 emissions from fossil fuels stored

> 8,000 Ha of restoration potential area

> 2 million (6%) people whose livelihoods sustained (including women & youth)

82.6M USD/Year to the country's economy

Source: Ministry of Environment and Sustainable Development in Madagascar, 2019

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MAIN INITIATIVES with good practices & lessons learned

- FLR strategy&mapping of potential areas
- National strategy for integrated management of mangrove (2022-2032)
- Restoration comittee (2016). Mangrove thematic group (2024)
- More mangroves in protected areas & community-based mangrove management areas
- Empowering women & youth

- Various researches
- Social & local medias
- Adapted took kits
- Periodic follow-up & surveillance
- Drone
- Remote sensing & GIS

- Hydrological restoration (drainage canal)
- Local nursery
- Drone seed dropping
- Improved crab farming & artisanal fisheries

- Sustainable mangrove value chains (crab, shrimp, honey, ecotourism, blue carbon, etc.)
- Business incubation & acceleration
- Recipes with improved nutritional value by using mangrove products

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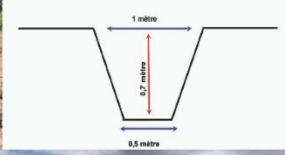
Mangrove drainage system



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Drone Seed Dropping for Mangrove restoration

Species: *Avicennia marina*
Seed dropping: 1 ha in 10 minutes
Load capacity : 15 to 20 kg seeds/vol
Type of seeding drone: GAIA 90, Hexacopter

Success rate: 60 to 70%

Very practical for hard-to access areas, results 10 times higher with less person mobilized

Source: Ministry of Environment and Sustainable Development in Madagascar 2024

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CHALLENGES
Lack of infrastructures: Access, signs (boundary, prohibition)
Lack of adapted educational tools
Data collection and management
Lack of adapted communication tools
Land conflict
Lack of law enforcement
Limited capacities of key stakeholders
Lack of financial resources
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暨国际红树林中心研讨班首课
Toward the Global Reach of the IMC & Vision for the Future
International Mangrove Center
Platform for research and expertise, bringing together scientific knowledge & traditional wisdom to design and implement real world solution
Promoting dialogues
Improving international cooperation
Incubating pilot projects
Scaling up best practices
Strengthening & valuing knowledge and capacity
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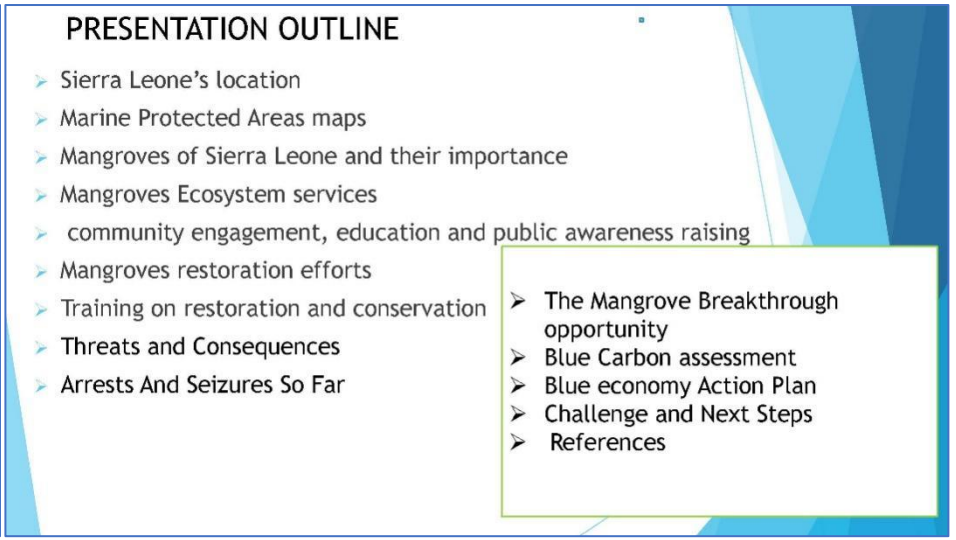
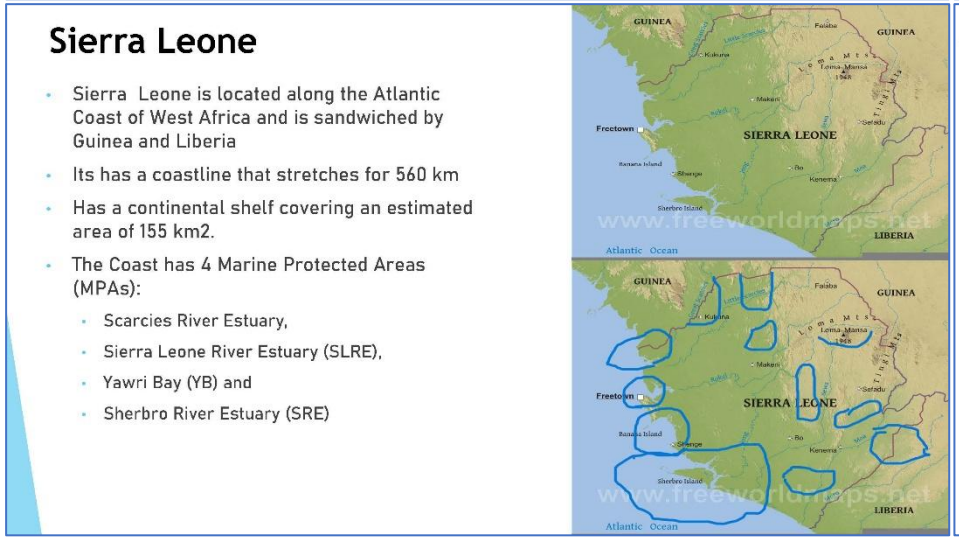
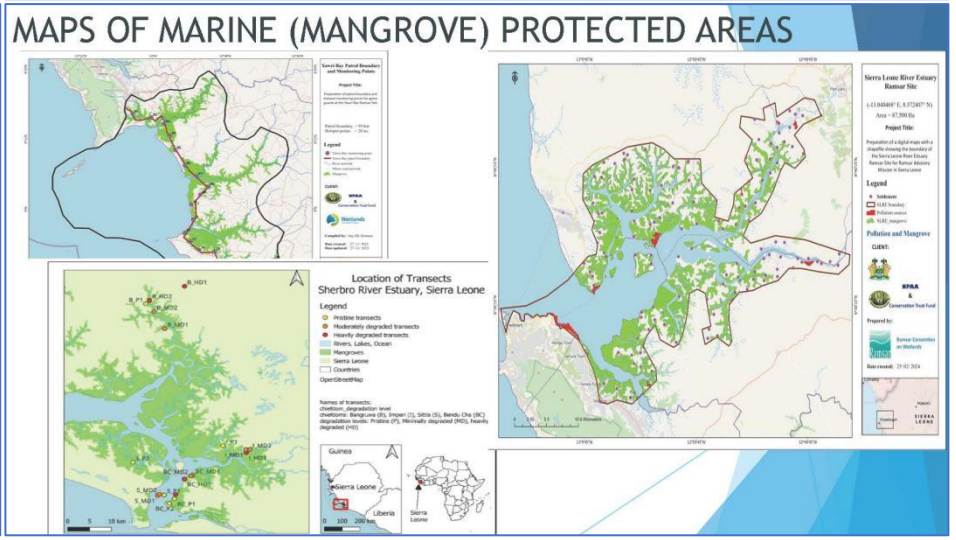
Misaotra
Thank you
谢谢
Think and act together for our unique and blue forest in the world
Food and Agriculture Organization of the United Nations
WWF
11 September 2025 in Shenzen, China
China Nature Education Conference - Wetland Education Sub-Forum
2025中国自然教育大会湿地教育边会

Annex 4.5: Sierra Leone

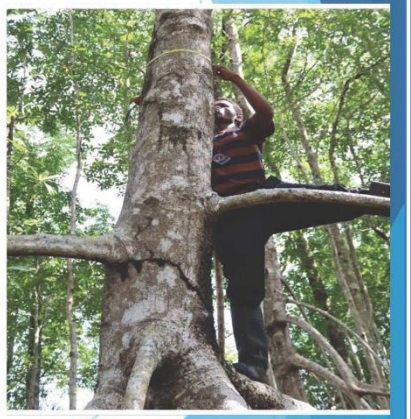






The Mangroves of Sierra Leone and Importance

- Sierra Leone had approximately about 240,000 hectares of mangroves in 1990, which is 1.7 % of the continent's total (13.8 million hectares)
- 25% of all mangroves were lost/degraded by 2016 (about 60,000 Hectares)
- All 4 MPAs hold about 120,000 hectares of mangrove forests
- Sherbro River Estuary (SRE) holds about 76,000 hectare of mangroves (63% of all 4 MPAs)
- The SRE has six true mangrove plant species of which *Rhizophora spp* is dominant
- SRE mangrove trees have grown as tall a 55m & 72cm in diameter (DBH))



Mangrove Ecosystem Services

- It hosts several migratory and resident bird species which depend on them for shelter, nutrition and habitat.
- Several important water-dwelling species such as the threatened sea turtles, primates, antelopes, manatees, different fish species, molluscs, crustaceans and reptiles depend on them directly or indirectly for shelter, nutrition or reproduction
- Protects communities against coastal erosion, tidal floods, windstorms and pollutions
- It provides wood, support cultural and traditional practices and other ecosystem services to over 1 million Sierra Leoneans either directly or indirectly
- Blue Carbon credit sales, ecotourism.
- NTFPs extraction, Bee keeping.

COMMUNITY ENGAGEMENT, PUBLIC AWARENESS

12,840 PEOPLE AWARENESS WERE RAISED DURING THE RESTORATION LIFE SPAN			
WOMEN (< 50)	MEN (<50)	YOUTHS+ Teens (General)	ADULTS (50+)
2,856	1,918	3,120 (Men and Women)	4,840(Men and Women)

HOWEVER, IT IS SPECULATED THAT THE AWARENESS & SENSITIZATION OF MORE THAN 20,000 PEOPLE HAVE BEEN RASIED DIRECTLY & INDIRECTLY FROM MEETINGS, WORKSHOPS, RADIO PROGRAMS IN FREETOWN, WATERLOO, TOMBO AND MOYAMBA, PORTLOKO, KAMBIA, BONTHE AND FROM THE NEWS PAPER PUBLICATIONS ON THE EFFORTS

MANGROVE RESTORATION EFFORTS

- Major Restoration efforts have been done in 2024 and 2025
- 45,000 Propagules planted in the Whiteman's Bay of the SLRE Ramsar Site with support from CRS
- 128,000 Propagules planted in the Aberdeen Creek through Biodiversity Offset Fee from World Bank
- 120,000 Propagules planted in the Last Banking area of Tourist Board Aberdeen with UNDP support
- 65,000 planted in Cockle Bay by Freetown City Council through Freetown the Tree Town project
- 14,000 Propagules planted in the Fogbo Creek with support from RAMPAO in Senegal.
- 250,000 planted in the Western Area project by UNDP Western Urban & Rural
- 60,000 Propagules planted in Tokeh, Fogbo, Bottom Oku and Old Wharf by Goal Sierra Leone.
- Restoration is done by communities as livelihood support for payment for Propagules, planting maintenance and tracking.
- Volunerable women and youth are beneficiaries of the scheme

NUMBER OF PEOPLE TRAINED ON MANGROVE RESTORATION AND CONSERVATION

GAME GUARDS	ECOGUARDS	VOLUNTEERS	COMMUNITIES	FORCES
10 in Yawri Bay (Tombo)	5 in Western Area	3 in Tombo	10 in Tombo and Fogbo	4 SLP, 3 Navy-RSLAF
15 in Fogbo Yawri Bay	2 in Ribbi	3 in Shenge	10 in Ribbi and Bumpeh	5 Navy-RSLAF
16 in Shenge	2 in Bumpe	2 in Fogbo	6 in Shenge	3 Chiefdom Police
60 in SLRE (Aberdeen Creek & Masiaka)	100 in Aberdeen Creek on to Deep Yai Wata	45 Aberdeen Creek and beyond	25 Lungi, Pepel, Lokomasama	3 SLP, 2 Nay-RSLAF, 5 Chiefdom Police
Total number of people trained				**331 People**

COMMUNITY ENGAGEMENT,PUBLIC AWARENESS OUTCOME

- Reduction in the level of mangroves harvest in the Bay
- Reduction in human-wildlife conflict as communities have been educated on wildlife habitat loss prevention.
- Increased marine turtle and manatee sightings due to improved knowledge on conservation relevance and Byelaws/National Laws enforcement in full force
- Reduction in the level of confrontation between Game Guards/communities/Ecoguards during enforcements.
- Natural regeneration of degraded mangrove areas.
- Reduction in Mangrove carrying boats frequency in the Bay.
- Based on the level of knowledge, awareness, sensitization and public awareness, chiefdom stakeholders and coastal communities now comply with P. A. Management.

Threats and Consequences

- mangroves are disappearing at alarming rate **of about 1% annually** in Sierra Leone due to anthropogenic activities:
- the excessive harvesting of wood for energy and construction,
- urbanisation due to population growth and housing;
- Farming and agricultural purposes;
- mining (salt, sand mining, mineral mining- bauxite, rutile), pollution,
- climate change and the looming emergence of the oil and gas industry

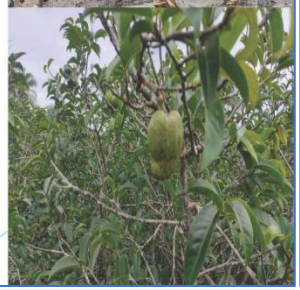
Consequences

- Socio-economic impacts on the communities & society at large
- Loss of s of livelihoods and
- Release of grehouse gases (carbon emissions) into the atmosphere
- and the loss of fish-breeding sites
- Loss of important revenue to local and national governments

ARRESTS AND SEIZURES SO FAR

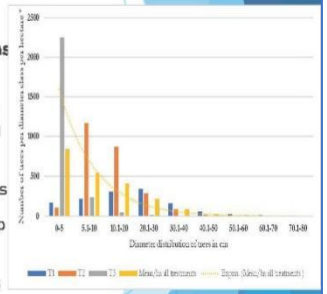
The Mangrove Breakthrough opportur

- Mangroves present opportunities for the blue carbon exploitation in Sierra Leone plus other ecosystem services
- Blue carbon investments in mangroves supports biodiversity, local livelihoods, community development and landscape protection, especially against the impacts of climate change
- Mangroves in Sierra Leone have the characteristics to meet various carbon trading standards including clean development mechanism (CDM), Plan Vivo and Voluntary Carbon Standards (VCS)/Verra
- Areas inundated with plastics have proven to be fertile for Mangrove growth and survival.
- New Mangrove species are being discovered



Preliminary Carbon Survey Results in the Sherbro River Estuary MPA

- The total carbon stocks of pristine mangroves amounted to **707 T C/ha to a depth 1 m**.
- About 70% of the carbon concentration is in the soils.
- **This value is higher than carbon stocks reported from many other regions in Africa**.
- Degradation resulted in declining basal area, decreasing density of large trees (≥ 30 cm diameter) **but increasing stem density of small trees (5–10 cm diameter).**
- All carbon pools declined with increasing degradation across all locations
- While above- and below ground carbon decreased by 96 %, soil carbon (up to 1 m depth) decreased by 44 %.
- Heavy exploitation led to degradation & change in the dominating species from *Rhizophora racemosa* to Rhizophora mangle across all locations.
- The study encouraged investment in conservation & protection **of pristine forest & restoration of degraded mangroves**



Methodology Approach: SRE Carb

- Data was collected in November and December 2021.)

For the above ground assessments:

- A total of **20 Transects of 20m x 100m were established** each encompassing 108 Temporal sample plots (TSP).
- The selection of transects include
  - (i) undisturbed or near intact mangrove forests with close or almost closed canopy (T_1),
  - moderately degraded (T_2) characterised by a reasonably closed (40% – 60%) canopy cover and
  - highly degraded/depleted (T_3) illustrated by an open (0% – 30% canopy cover, sometimes with a high density of seedlings or saplings.

For below ground carbon,

- soil samples at different depths were sampled as follows:
  - 0cm – 15cm, 16cm – 30cm, 31cm – 60cm, and
  - 61cm – 100cm.

Preparation of the National Action Plan for the Sierra Leone Blue Economy Strategic Framework

Background to the Sierra Leone Blue Economy Strategic Framework

In 2022, the GoSL, with the support of the UNDP developed a comprehensive National Blue Economy Strategic Framework (BESF) to guide an integrated and sustainable approach to exploiting and managing the country's oceanic resources

The BESF framework is basically a medium-term strategy aimed at supporting sustainable and equitable economic growth through ocean-related sectors and activities

The BESF was developed through a comprehensive study on the Blue Economy Potentials in Sierra Leone, and a nationwide stakeholder consultations and technical reviews.

Background to the Sierra Leone Blue Economy Strategic Framework
CONTINUE

The framework identified 17 strategic priorities for policy actions, grouped into six broad thematic areas.

However, the effective operationalisation of these broad strategic policy actions requires the formulation and implementation of a roadmap and action plan for the framework.

Thus, in order to fully realise the country's blue economy potential, the UNDP is supporting the Government of Sierra Leone to prepare a comprehensive National Action Plan (NAP) for the Framework.

The NAP will identify bankable actions and interventions with a comprehensive monitoring and evaluation framework and implementation arrangement.

Promoting the blue economy management process is also part of the broader Government of Sierra Leone's continued effort to promote economic diversification and inclusive growth.

Why a Blue Economy Strategic Framework

A comprehensive BESF will help the country

- To accurately value the contributions of natural oceanic capital to welfare, to inform policy decision
- To invest in and use the best available science, data and technology to governance reforms and shape policy decisions
- To weigh the relative importance of each sector of the blue economy and decide, based on its own priorities and circumstances, which ones to prioritize
- Ensure the effective inclusion and active participation of all societal groups so as to realize the full potential of the blue economy also requires

Preparation of the National Action Plan for the Blue Economy Strategic Framework

The Objective of this exercise is to develop a National Action Plan for the implementation of the BESF through a national consultative process and reviews

experts and policy makers to identify bankable projects, actions, policies and legislations in respect of the strategic areas already identified in the BESF for the country's short to medium-term blue economy needs for the

Undertake regional stakeholder consultations to identify the blue economy needs, ongoing related projects and interventions.

The Challenge and Next Steps

- The country lacks the adequate resources to conserve & protect pristine mangrove forests
- Inadequate enforcement of existing legislation,
- Inadequate logistical capacity, no mobility.
- Absence of a centralised GIS and remote sensing system for monitoring mangrove forest cover change.
- Institutional support from Global Mangrove initiatives
- Challenge in identifying Mangrove species

Next Steps

- Establish public/private partnership for restoration and conservation of mangrove forests and ecosystems in the country
- Update inventory of all mangroves in the country
- Identify suitable sustainable investment opportunity for blue carbon trading
- **Promoting sustainable alternative renewable energy options as degradation mitigation**

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THANK YOU

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Annex 4.6: Zimbabwe

Zimbabwe's Perspective on Wetlands

Phanuel Kudakwashe Mangisi

Presentation Outline

- **Background**
- **Wetlands Status in Zimbabwe**
- **Government Efforts in Wetland Management**

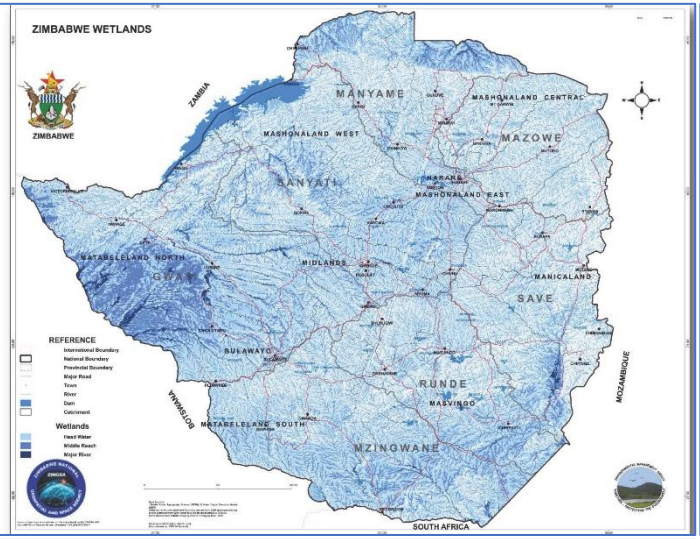
Background

- Wetlands are one of the Country's vital ecosystems that have traditionally provided a wide range of ecological goods and services such as water provision, flood control, support for biodiversity, local climate control and food provisions.
- Wetland Defined as 'any area of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, and includes riparian land adjacent to the wetland'.
- Zimbabwe has a variety of wetlands covering 34.96% of the total area of the Country.
- Some of the wetlands in Zimbabwe such as Victoria Falls , Chinhoyi Caves and Mana Pools are recognised as conservation and tourism areas.

Background

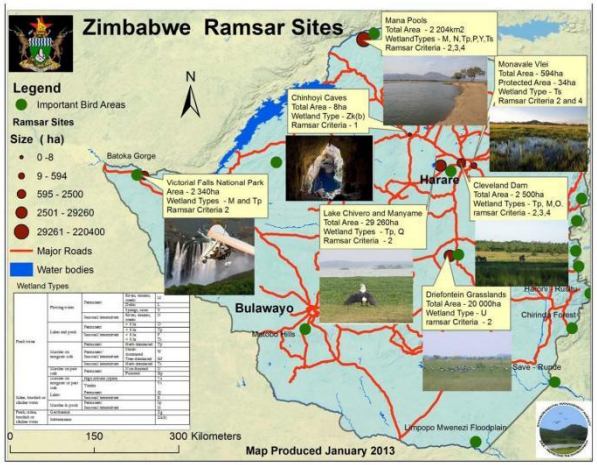
- Despite all the important benefits the nation derives from wetlands, the Country has witnessed significate loss of these vital assets because of a number of anthropogenic activities which include agriculture, infrastructure development , deforestation , mineral extraction, solid and liquid waste disposal, freshwater diversion
- This has resulted in 17.63% of the remaining wetlands in pristine conditions,55.65% moderately degraded and 26.72 % being severely degraded according to the mapping exercise conducted in 2021

- The total area covered by wetlands is approximately **13 659 579 ha** which **34.96 %** of the total area of Zimbabwe.



Zimbabwe's Ramsar Sites

- Zimbabwe has a total of seven **(7)** Ramsar Sites.



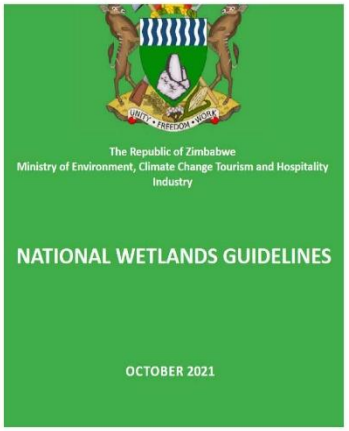
Government of Zimbabwe efforts on Wetlands Management

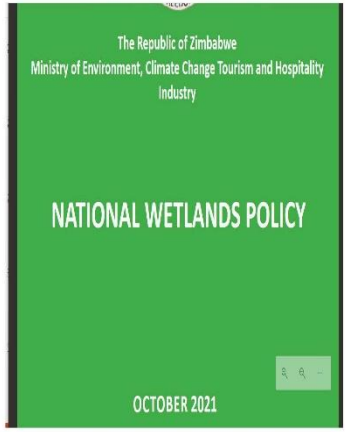
1. **Acceded to Ramsar Convention in 2013 and have 7 Ramsar listed sites**
2. **Development of wetlands management framework:**

- Legal Framework in Place(Environmental Management Act CAP 20:27 Section 113, Statutory Instrument 7 of 2007, the EIA process for Prescribed projects
- National Wetlands Policy (2021);
- National Wetlands Management Guidelines (2021);
- National Wetlands Master Plan (2021);

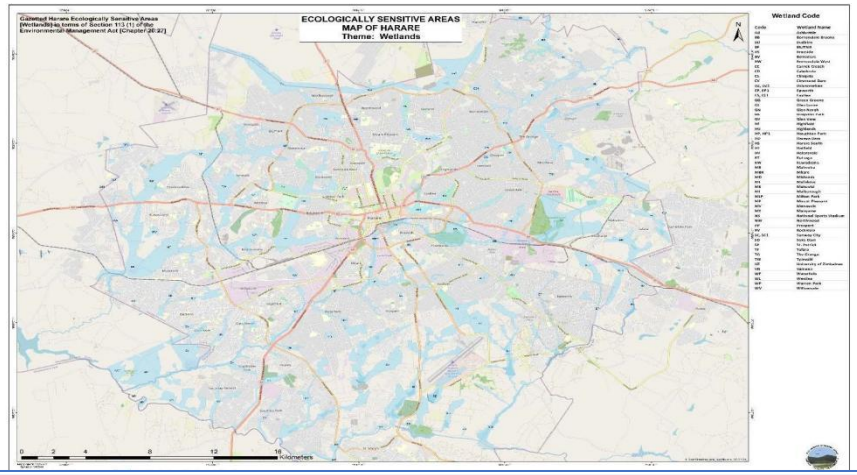
3. **Gazetting of wetlands as ecologically sensitive areas (2021-2025):**The Agency gazetted selected wetland ecologically sensitive areas as protected areas, to protect them from anthropogenic activities that degrade or destroy the wetlands.

Policy Interventions





Harare Gazetted ESA wetlands Map



Rehabilitation and protection of degraded wetlands

- A 5-year nationwide wetland restoration and protection programme (2021-2025) launched in 2021, targeting the rehabilitation of approximately 350,550ha of vleis.
- 18 community-based initiatives supported, aimed at the promotion of sustainable utilization of wetlands resulting, in 231,958.68ha being rehabilitated and sustainably managed as at June 2025
- Projects mainly involved fencing of the core wetland as well as establishing community gardens

Kasibo Wetland Rehabilitation

Kasibo Protected wetland

Chamudyahoto wetland Before and After.

Before interventions (13/10/2021)

After intervention (13/09/2023)

Lake Chivero Ramsar Site

Mana Pools Ramsar Site

Mana Pools Ramsar Site

COP 15 Hosting

COP 15 Hosting

COP 15 Hosting

Thank You