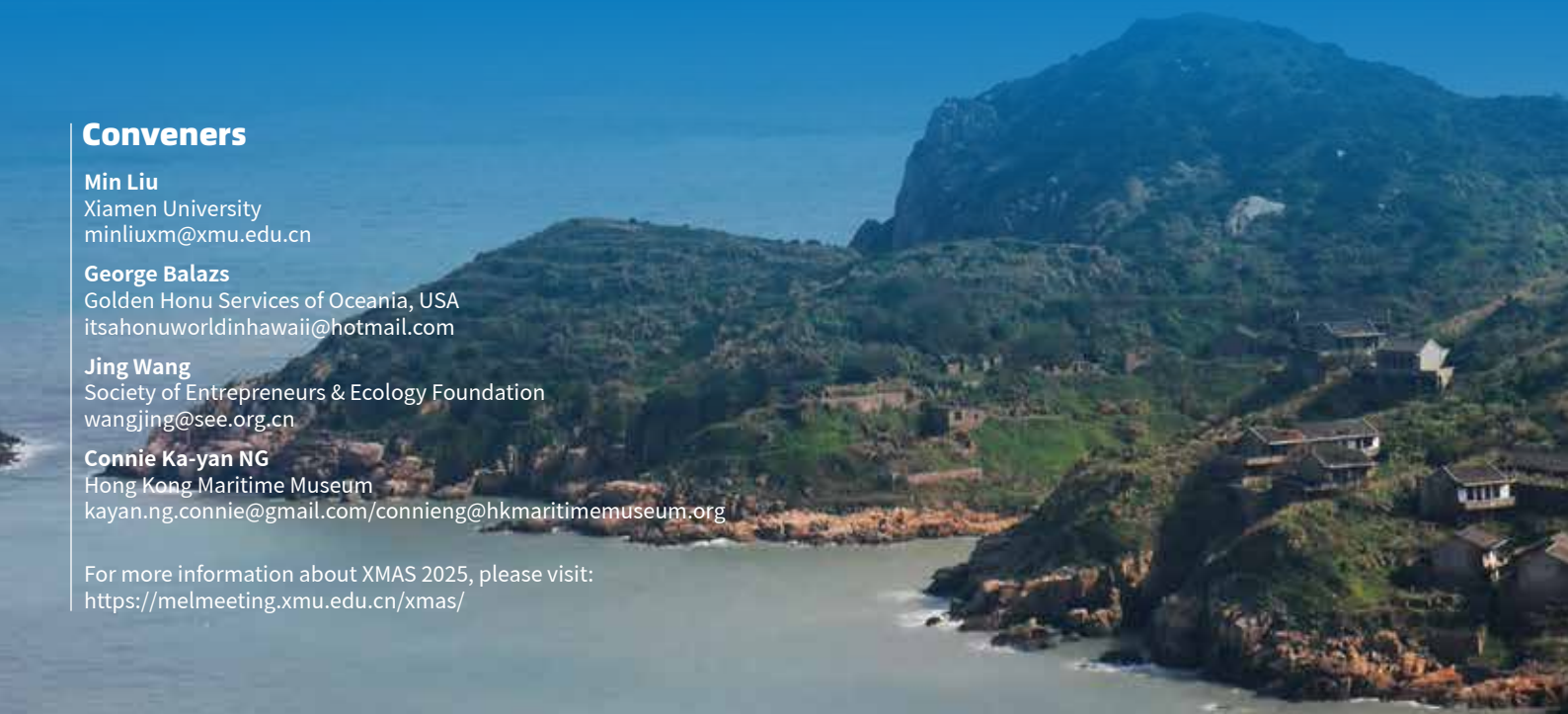
2025 Xiamen Symposium on
Marine Environmental Sciences

Session 72

Sea Turtle and Marine Mammal Conservation: Management, Academic and Outreach Perspectives

Agenda

January 15-16, 2025
Xiamen International Conference Center



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For more information about XMAS 2025, please visit:
https://melmeeting.xmu.edu.cn/xmas/

January 15, 2025 Agenda

Time 13:15-18:30

Venue 1 1F Meeting Room, Xiamen International Conference Center

Venue 2 Poster Hall, Xiamen International Conference Center

【Part 1】 1F Meeting Room		
Chair Jing Wang	13:15-13:30	Welcome speech • Min Liu, Xiamen University • Xu Yang, SEE Foundation
	13:30-13:45	Hawaii's sea turtle conservation success story: a 50-year journey of research, recovery, and cultural awareness • George Balazs/USA, Golden Honu Services of Oceania (present by Connie Ka Yan Ng/Hong Kong Maritime Museum)
	13:45-14:00	What we can learn from a long-term census of loggerhead turtle nesting grounds in Japan • Yoshimasa Matsuzawa/Sea Turtle Association of Japan
	14:00-14:15	Balancing marine life: towards managing green turtles and seagrass ecosystems in Okinawa, Japan • Tomoko Hamabata/Tohoku University
	14:15-14:30	Thoughts on population recovery of green sea turtle in Xisha Sea • Hai-Tao Shi/Hainan Normal University
	14:30-14:45	Survival in perilous ocean: underwater predators of sea turtle hatchlings at Chagar Hutang Bay, Redang Island, Malaysia • Maizah Abdullah/Universiti Malaysia Terengganu
	14:45-15:00	Migratory patterns and hotspots of green turtles identified in Southeast Asia call for international collaboration and cross-boundary management effort • Min Liu/Xiamen University
	15:00-15:20	Coffee Break
【Part 2】 1F Meeting Room		
Chair Connie Ng	15:20-15:35	Non-invasive heart rate monitoring opens up new avenues for research in sea turtles • Tomoko Narazaki/Meijo University (video record)
	15:35-15:50	Effects of marine plastic pollution on large marine animals, with a particular focus on sea turtles and finless porpoises • Taewon Kim/Inha University
	15:50-16:05	Distribution pattern of cetaceans in the South China Sea based on visual surveys and environmental DNA metabarcoding • Jianlong Li/Hainan University

Chair Connie Ng	**16:05-16:20**	QR code mark traceability test—innovative application of internet of things technology in sea turtle rescue • Zhongrong Xia/Guangdong Huidong Sea Turtle National Nature Reserve Bureau
	16:20-16:35	Knowledge on hawksbill sea turtle based on the genomics from Naozhou Island waters in South China Sea • Zhongduo Wang/ Guangdong Ocean University
	16:35-16:50	Microbial diversity characteristics and differential analysis in green turtle nests in the Xisha Islands, China • Liu Lin/Hainan Normal University
【Part 3】 Poster Hall (16:50-18:30)		
Chair Jing Wang Connie Ng Min Liu		Nest productivity for green turtles *(Chelonia mydas)* at Qilianyu of Xuande Islands, South China Sea • Wenxiang Gao/Xiamen University
		Overview of the current status, challenges and opportunities of sea turtle research and conservation in China – Finding the key to push forward conservation actions across disciplines and boundaries • Connie Ka Yan Ng/ Hong Kong Maritime Museum
		Sand temperature fluctuation and risk analysis of female-biased nests at the green turtle nesting ground of Qilianyu, Xisha Islands • Chenrui Jiang/Xiamen University
		New management unit for conservation of the endangered green turtle Chelonia mydas at the Xisha (Paracel) Islands, South China Sea • Shiyu Guan/Xiamen university
		Effect of beach erosion and typhoon on green turtle nesting grounds and implications for conservation management at Xisha Islands, South China Sea • Ting Zhang/Hainan Normal University
		Research on antibiotic resistance genes in wild and artificially bred green turtles (Chelonia mydas) • Xin Niu/Hainan Normal University
		Conservation needs of marine ETP species – case study of seahorse *(Hippocampus spp.)* and finless porpoise *(Neophocaena spp.)* • Lebin Liu/Qingdao Marine Conservation Society
		Innovative approaches in Sea turtle conservation • Song LIU/WWF China
19:00-21:00		Welcome dinner (exact location o will be informed during the conference)

January 16, 2025 Agenda

Time 08:30-10:00 & 14:30-17:00

Venue 1 3C Meeting Room, Xiamen International Conference Center

Venue 2 Meeting Room, Ocean Building, Xiamen University

【Part 4】 3C Meeting Room, Xiamen International Conference Center		
Chair Min Liu	08:30-08:45	Replacing artisanal fisheries with dolphin watching: Strategy for coastal-delphinid conservation and sustainable community-based marine ecotourism • Shiang-Lin Huang/Guangxi Academy of Marine Sciences, Guangxi Academy of Sciences
	08:45-09:00	Report on TED efficiency trials aboard a Gabonese fish trawler owned by a Chines Operator • Michel michel/fishingcleaner.com
	09:00-09:15	Funded studies on sea turtle and marine mammal in the past decade • Kwan Chak Leung/Ocean Park Conservation Foundation of Hong Kong
	09:15-09:30	Marine turtle conservation in China: achievements and challenges • Jing Wang/Beijing China Society of Entrepreneurs & Ecology Foundation
	09:30-09:45	Empowering citizen science to reveal sea turtle populations together • Daphne Hoh/TurtleSpot Taiwan, Biodiversity Research Centre, Academia Sinica, Taipei
	09:45-10:00	Overview of the current status, challenges and opportunities of sea turtle research and conservation in China – Finding the key to push forward conservation actions across disciplines and boundaries • Connie Ka Yan Ng/Hong Kong Maritime Museum
13:50	Shuttle bus from Xiamen International Conference Center entrance to XMU	

【Part 5】 Group Discussion Meeting Room, Ocean Building, Xiamen University		
Chair Min Liu Connie Ng Jing Wang	14:30-17:00	Topic 1 Management
		Topic 2 Management
		Topic 3 Public education & engagement
18:00-20:00	Social dinner (exact location will be informed during the conference)	

Note All oral presenters must submit ppt file to the **Speaker Ready Area** before the start of the session. Speakers on 16th January are advised to submit their ppt file on 15th January as PART 4 will start at 8:30.

Other events

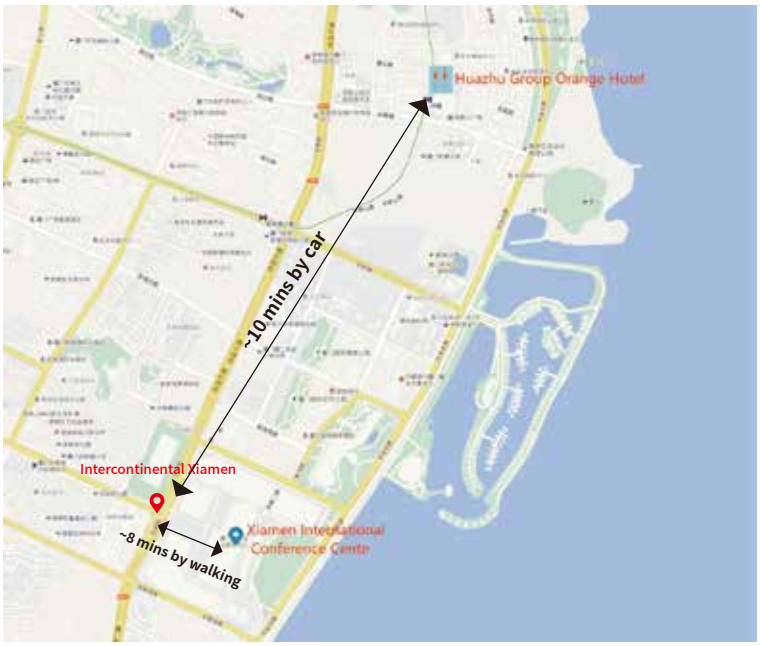
❶ XMAS Icebreaker

Date

January 13, 18:30-20:30

Venue

Intercontinental Xiamen 3F
(厦门海景洲际酒店三楼)



❷ New Book Launch – 《Marine Fishes of China and Adjacent Waters》 by Min Liu, Kwang-tsao Shao, Yvonne Sadovy de Mitcheson, Xiao Chen

Date

January 14, 16:50-18:30

Venue

1B Meeting Room,
Xiamen International
Conference Center

Marine Fishes of China and Adjacent Waters

This event features the launch of the new book “Marine Fishes of China and Adjacent Waters”, edited by Min Liu, Kwang-Tsao Shao, Yvonne Sadovy de Mitcheson and Xiao Chen. This book includes three volumes, and 1943 marine fish species with color photographs (specimen and/or alive) available. The book also includes a definitive list of the total marine fish diversity — 4061 species — known from China’ s coastal and adjacent waters. The large number of species represents a national challenge if we want to safeguard such biological wealth for posterity. The book highlights the research gaps, particularly on reproduction and habit. You will meet the editors and the publisher, who will accompany you in exploring the beauty of marine life and come to recognize the richness and vitality of marine fishes.

Oral Speaking Abstracts

Hawaii's sea turtle conservation success story: a 50-year journey of research, recovery, and cultural awareness

George Balazs/USA, Golden Honu Services of Oceania

Seven species of ocean turtles exist globally as descendants of ancient reptilian lineages that have adapted and survived for millions of years. Over the course of human history an array of relationships has developed with turtles, and especially marine turtles, amongst coastal and island peoples including in the Hawaiian Islands. Turtles are woven deeply into the cultural, traditional, spiritual, and contemporary fabric of humanity with uses ranging from food to fortune telling, pets to funerary, and ecotourism. In 2012, and again in 2019, the Hawaiian green turtle, or honu in the Hawaiian language, a genetically discrete population of Chelonia mydas, was downlisted from the IUCN Red List Category of Endangered to Least Concern, following comprehensive assessments by IUCN (http://www.iucnredlist.org/details/16285718/0). The biological recovery of the Hawaiian green turtle population can be attributed to bold steps of protection first taken by the State of Hawaii in 1975 completely banning the commercial harvest of turtles that were primarily being sold to restaurants involved in tourism. In 1978 green turtles in Hawaii were listed under the USA Endangered Species Act, thereby transferring local management authority by the State of Hawaii to the USA Federal Government. The wisdom and need for this change are still being vigorously debated. Over the past 50 years Hawaii's honu have exhibited new behaviors and adaptations along with an increasing population expanding into new habitats. Changes have ranged from increases in terrestrial basking, occupying streams and harbors, feeding on new types of vegetation, and the slowing of somatic growth rates, as witnessed firsthand by the author since the early 1970s. In light of this rise in abundance, two key questions are currently being asked 1) Is the ecosystem carrying capacity of certain if not many Hawaiian green turtle foraging areas being reached or exceeded? and 2) Should a small legal and sustainable non-commercial harvest be allowed for Native Hawaiians? Considering the historical rise to abundance following depletion, green turtles in Hawaii constitute a unique experimental model to comprehensively understand the restoration dynamics and limitations of an increasing sea turtle population. Conservation practices in Hawaii can serve as a real-life learning site for people in other regions striving to save and sustainably use their own charismatic and culturally important sea turtle resources. However, this can only occur when management authority is returned from the USA Federal Government to local control by the State of Hawaii.

What we can learn from a long-term census of loggerhead turtle nesting grounds in Japan

Yoshimasa Matsuzawa/Sea Turtle Association of Japan

The nesting sites of the loggerhead sea turtle in the North Pacific are distributed almost entirely in the Japanese archipelago. I compared the nesting trends of the five major nesting sites, namely Yakushima, Miyazaki, Kamoda, Minabe, and Omaezaki, where the local conservation groups have conducted nesting survey for at least 40 years, and considered the causes of deference among them. The general trends were similar. However, when I looked at the height of the mode around 1990 and around 2012, the latter mode was significantly higher in Yakushima and Miyazaki, whereas the other three sites showed the opposite. This is thought to reflect the fact that females of this species get mature at around 40 years of age and return to their natal beach to lay eggs, and that while in Yakushima and Miyazaki 80 to 90 percent of the eggs were consumed locally until the early 1970s, in the other three locations there was no culture of active egg utilization. Among the five sites, only Kamoda did not show a mode around 2012, and instead showed a monotonically decreasing trend. Three facts worth noting in relation to this are that females tagged at nesting sites such as Kamoda in Tokushima Prefecture have been observed multiple times landing on Minabe Town in Wakayama Prefecture, across the sea to the east, that the ratio of nesting frequencies in Tokushima Prefecture and Wakayama Prefecture has steadily decreased from approximately 1 to 0 since the beginning of this century, and that the secular changes in the total number of nests in Tokushima Prefecture and Wakayama Prefecture are very similar to those in Shizuoka Prefecture and Aichi Prefecture. Furthermore, Anan City, which includes Kamota, is the base of the company that was the first in the world to successfully develop blue LEDs, and in recent years, high-intensity street lights have become visible in various parts of Tokushima Prefecture. Taking all of this into consideration, it is believed that many of the loggerhead turtles born on the beaches of Tokushima Prefecture have recently come to lay their eggs on the beaches of Wakayama Prefecture, across the sea, because they dislike the brightness of their native coasts. These results highlight the importance of protecting females, their eggs and darkness at nesting sites in order to conserve sea turtle.

Balancing marine life: towards managing green turtles and seagrass ecosystems in Okinawa, Japan

Tomoko Hamabata/Tohoku University, Japan

The seagrass beds along the Okinawan coast of Japan are crucial not only for the marine ecosystem but also for the local fishing industry, which supports the livelihoods of coastal communities. In recent years, an environmental issue has emerged, as seagrass beds have been deteriorating and becoming depleted due to increased grazing pressure from the growing population of green sea turtles. Since 2024, we have initiated a project to study the current statuses of green turtle foraging aggregation and seagrass beds in three coastal waters around Okinawa (Iriomote, Irabu, and Kume Islands). The

project will collect information on the habitat use, population demographics, and life stage information of green turtles, assess the loss of seagrass beds, and calculate the carrying capacity of each seagrass area for green turtles. In addition, we will use a population dynamics model based on field data and experiments to simulate the factors behind the rapid increase in green turtle populations and develop future ecosystem management plans. We are also conducting sociological research to explore ecosystem management plans that are socially and ecologically acceptable. The research for this project will be carried out by experts from five universities and national research institutes, but the project as a whole will be driven by collaboration and communication with a range of local and external experts. Our goal is to explore how these turtles can coexist with seagrass beds and use this knowledge to promote sustainable ecosystem management.

Thoughts on population recovery of green sea turtle in Xisha Sea

Hai-Tao Shi/Hainan Normal University, China

Green sea turtle *(Chelonia mydas)* is the only sea turtle species breeding in China, and the Qilianyu of Xisha Islands are the largest remaining nesting grounds of green sea turtles in Chinese waters. Nesting site selection is particularly important for the survival of eggs, and understanding the micro-habitat characteristics of green sea turtle nesting sites is crucial for delineating priority conservation areas for nesting grounds. In this study, we examined several micro-habitat ecological factors of the usage and control quadrats, as well as successful and aborted nests, through differential comparisons, principal component and generalized linear model analysis. There were significant differences in micro-habitat ecological factors such as temperature, humidity, and particle size distribution (0.250-1 mm) between the usage and control quadrats. The nests of green sea turtle were concentrated at a distance of 20.1-30 m from the high tide line, with a preferred distance from vegetation of 0-0.5 m. The vegetation cover of successful nests was concentrated in the range of 0-25%, and the preferred sand types for successful nests were coarse sand (0.425-1 mm) and medium sand (0.250-0.425 mm). The key micro-habitat factors affecting the success of nesting were found to be sand characteristics such as humidity, bulk density, and ratio of particle size. Therefore, green sea turtles in the Xisha Islands exhibit preferences for micro-habitat ecological factors in nest site selection, and the ecological factors of nesting grounds can affect the hatching success rate of green sea turtles. It is recommended to continuously monitor the characteristics and changes in green sea turtle nest site selection and take measures to provide high-quality nesting and hatching environments for sea turtles.

Survival in perilous ocean: underwater predators of sea turtle hatchlings at Chagar Hutang Bay, Redang Island, Malaysia

Maizah Abdullah/Universiti Malaysia Terengganu, Malaysia

The declining health of the world' s coral reefs and tropical seas is adding pressure to vulnerable marine fauna. To guide mitigation efforts, understanding the complex

dynamics of marine communities has become a top priority, particularly trophic interactions involving threatened or endangered species. Being slower and more conspicuous swimmers than most reef fishes, sea turtle hatchlings would presumably be a more accessible food source for the underwater predators. In a unique case study at one of Malaysia' s most productive turtle nesting sites (Chagar Hutang Turtle Sanctuary (CHTS), Redang Island) we investigated the occurrence and abundance of large predator fishes and their trophic interaction with the sea turtle hatchlings via field observation and stable isotope analysis approach. We hypothesized that large predators such as sharks and groupers would hunt on hatchlings during the turtle nesting season and, when available, may favour turtle hatchlings over alternative prey. Predation by the blacktip reef sharks *Carcharhinus melanopterus* and the grouper *Epinephelus quoyanus* on sea turtle hatchlings in Chagar Hutang bay were discovered during the fieldwork. One juvenile of blacktip reef sharks fed exclusively up to eight sea turtle hatchlings, while one individual grouper fed exclusively up to two hatchlings. Based on the stable isotope analysis $\delta^{13}C$ and $\delta^{15}N$, the mixing model suggested that the hatchlings become the main diet to the sharks and grouper primarily during the peak nesting season. The present study provides valuable insights on the trophic dynamics of the underwater predators, as it combines direct field observations with stable isotope analysis, providing a more comprehensive picture of the predators' dietary preferences during the peak turtle nesting season. The findings emphasize the critical role that large predatory fishes play in shaping the survival rates of sea turtle hatchlings, which in turn can affect the long-term viability of turtle populations at Chagar Hutang Bay, one of Malaysia's key nesting sites.

Migratory patterns and hotspots of green turtles identified in Southeast Asia call for international collaboration and cross-boundary management effort

Min Liu/Xiamen University, China

Green turtle *(Chelonia mydas)* is the most abundant sea turtle species in Chinese waters. The uncertainty regarding locations and ranges of their foraging grounds, combined with the complexity of their migratory behavior, increases the difficulty of conservation actions. Based on a satellite tracking study on 27 green turtles from 2016 to 2024, we revealed that the areas with dense active areas closely coincided with the documented seagrass beds, indicating a strong relationship between the turtles' hotspots and their foraging grounds. These hotspots scattered in Southeast Asia, including the waters near Nghĩa Hà, Hòn Cau Island, Cù Lao Thu Island, the Bai Long Wei Island and Cô Tô Archipelago in Vietnam; the eastern and western coasts of the Leizhou Peninsula and the Qiongzhou Strait; the eastern waters of Hainan; the waters around Xisha Islands, Nansha Islands and Dongsha Island, the South China Sea; the coastal area of Huizhou in Guangdong; the waters near Putian in Fujian; the waters near the Penghu Archipelago and the northern coast of Taiwan; the waters near Cabalete Island in the Philippines; and the waters of the northern part of Pulau Banggi Island in Malaysia. Further investi-

gations of important foraging seagrass beds will be crucial for determining the movement ranges of green turtles in different countries. The 27 green turtles tracked moved actively in coastal waters from Guangxi to Guangdong and northward to Fujian Province, passing through the Qiongzhou Strait and Taiwan Strait, and forming a key migratory corridor. Nearshore migratory pattern makes green turtles vulnerable to human impacts. For marine species with long distance migratory behavior and nearshore habit such as green turtles, the success of their protection will highly depend on the effective international and regional collaboration.

Non-invasive heart rate monitoring opens up new avenues for research in sea turtles

Tomoko Narazaki/Meijo University, Japan

As global environmental changes raise concerns, understanding how animals respond to habitat changes and human-induced stress is crucial. Heart rate, regulated by autonomic nervous system, is also modulated by factors such as physical exercise and stress, making it a widely used indicator of internal conditions in medical and physiological studies involving humans and livestock etc. Recently, a non-invasive method has been developed to measure the heart rate of freely moving sea turtles using electrocardiogram loggers. This method does not require surgical insertion of electrodes; instead, adhesive electrode pads can be attached to the carapace. This approach minimizes stress on the turtles and allows for measurements of turtles across a wide range of developmental stages. Here, we present our recent research projects that aim to assess internal physiological states, such as metabolic rate and stress responses, which cannot be fully captured through behavioral observation alone. The significance of non-invasive heart rate monitoring and potential future directions for research will be addressed.

Effects of marine plastic pollution on large marine animals, with a particular focus on sea turtles and finless porpoises

Taewon Kim/Inha University, South Korea

Plastic is predicted to cause the most significant damage to marine ecosystems as it flows into the ocean through rivers. The impact of marine plastic on large marine animals can be considered from two major perspectives. One is the problem of ghost fishing caused by large animals getting entangled in marine plastics, primarily discarded fishing gear. The other is the issue of animals ingesting various types of plastic. The Marine Zoology Laboratory at Inha University conducted a study focused on sea turtles to investigate the situation of discarded fishing gear, which is a leading cause of bycatch and stranding. More than 70% of the trash discarded in the waters of Jeju Island is fishing gear, with fishing lines and lures being the most commonly found items. The fact that fishing gear is frequently found in areas where sea turtles are often stranded highlights the seriousness of the issue. Sea turtles often mistake plastic for food and swallow it. In an experiment with hawksbill sea turtles, it was found that they prefer yellow

plastic, and individual differences were observed in their ability to distinguish between plastic bags and real food. It has been revealed that much of the plastic in the ocean exists in the form of microplastics, which mix with the food of large marine animals and are found in their stomach contents. The more microplastics they ingest, the higher the risk of absorbing other toxic chemicals like BPA. A comparison of the microplastics found in the lung and stomach tissues of finless porpoises revealed that the proportion of microplastics containing more toxic chemicals was higher in the lungs. Large marine animals serve as a mirror for the impact of plastic on humans, as they occupy a similar ecological position to us. Therefore, more research is needed not only for the conservation of marine animals but also for the protection of human health.

Distribution pattern of cetaceans in the South China Sea based on visual surveys and environmental DNA metabarcoding

Jianlong Li/Hainan University, China

The South China Sea is a crucial habitat and potential nursery for cetaceans. This study involved five ship-based visual surveys in three summers and two springs from 2020 to 2023, combined with environmental DNA (eDNA) metabarcoding, an emerging tool, to understand the relative abundance and spatial and temporal distribution of cetaceans in offshore and abyssal areas of the South China Sea. The combination of visual observations and eDNA metabarcoding enabled the detection of a total of 18 cetacean species, and 12 species were identified by both methods. Cetaceans showed temporal variation; 7 species in the springs, and 17 species in the summers. Expedition route design, meteorological conditions, and sea conditions between the two seasons can partly explain the seasonal differences. The Hyperoodontidae and Physeteridae species tend to occupy regions with high bathymetric drop gradients, particularly those situated on continental slopes and seamounts. The Delphinidae species are more widely distributed and relatively abundant. Of the cetaceans successfully amplified by eDNA metabarcoding, species with larger group sizes and closer distances tend to be more easily detected. Although the complex and turbulent hydrographic environment of the oceans reduces the duration of eDNA and increases the uncertainty in capturing eDNA signals, our findings indicate that eDNA techniques can provide additional information and hold promise as a potential complementary tool for cetacean monitoring.

QR code mark traceability test—innovative application of internet of things technology in sea turtle rescue

Zhongrong Xia/Guangdong Huidong Sea Turtle National Nature Reserve Bureau

Hatchery release has been used for the conservation of green turtles for many years. To improve the rescue management of released individuals and avoid their negative impact on wild populations, the application of individual markers is particularly important. Quick response (QR) code was used to tag the individual of released turtles in Huidong Sea Turtle National Nature Reserve, the unique spawning site and nature

reserve for sea turtles in China. The viscosity differences of four safe and non-toxic glues (e.g., epoxy resin, acrylic glue, ABS glue, and nail gel 401) in different age groups were tested. The results revealed that epoxy resin glue has the best adhesion effect on 8-year-old turtles, and the intact rate after 50 days was 100%. It is suitable to be used for the rescue of stranded turtles within 50 days of release. Nail gel 401 has the best adhesion effect on the carapace of 1-year-old turtles, with an intact rate of 100% after 50 days, which can be used for short-time conservation of young turtles. The release experiments of 18 eight-year-old sea turtles with passive integrated transponder (PIT) tags, QR codes, and steel tags showed that QR codes are conducive to public participation and improve rescue efficiency. In fact, QR code is a powerful measure to overcome the limitations of the existing individual label. However, the QR code fused with turtle carapace can only be applied for turtle rescue and tracing in the short-term due to its limited persistence.

Knowledge on hawksbill sea turtle based on the genomics from Naozhou Island waters in South China Sea

Zhongduo Wang/ Guangdong Ocean University, China

The critically endangered hawksbill turtle *(Eretmochelys imbricata)* is a species of significant ecological and conservation importance. This study presents a comprehensive genomic analysis of E. imbricata, combining high-quality genome sequencing with population genetics in the South China Sea. We report the first chromosome-level genome assembly for E. imbricata, spanning 2,138.26 Mb with a contig N50 of 123.49 Mb and scaffold N50 of 137.21 Mb. The assembly comprises 28 chromosomes containing 20,206 protein-coding genes, with 99.48% functionally annotated. Comparative genomic analysis revealed an expansion in olfactory receptor genes and positive selection in immune, sensory, and aging-related systems, suggesting adaptations to aquatic environments and longevity. We further investigated the genetic structure of hawksbill turtle populations in Naozhou Island Waters using whole-genome resequencing of 13 individuals. The analysis yielded 337.54 GB of high-quality data with an average sequencing depth of 11x. We identified 12,703,462 SNPs, with 114,273 located in exonic regions. PCA analysis showed no distinct clustering, indicating diverse origins of the sampled individuals. Demographic analysis revealed population fluctuations over the past 50 million years, with a recent sharp decline stabilizing around 1 million years ago. LD analysis indicated high genetic diversity, particularly on chromosomes 1, 13, 14, and 24—annotation of polymorphic sites highlighted olfactory receptor and immunoglobulin heavy chain genes under strong positive selection.

Additionally, we analyzed whole mitochondrial genomes, integrating D-loop data from global samples to provide a comprehensive phylogeographic context. This analysis revealed high genetic diversity (Hd = 0.974, Pi = 0.01477) and identified six known and five private haplotypes. Phylogenetic analysis indicated the presence of two Indo-Pacific lineages and significant gene flow with certain Australian rookeries while showing marked differentiation from Southeast Asian and American populations. This study provides valuable genomic resources for understanding E. imbricata's genetic evolu-

tion and highlights the unique genetic composition of the Naozhou Island Waters population. Our findings suggest this population should be considered an independent management unit, emphasizing the need for targeted conservation strategies in the South China Sea region.

Microbial diversity characteristics and differential analysis in green turtle nests in the Xisha Islands, China

Liu Lin/Hainan Normal University, China

Sea turtles are renowned "living fossils" and ideal flagship marine conservation species. Sea turtles exhibit strong fidelity to their nesting grounds, and the quality of nesting grounds is closely linked to their survival. Microbial diversity, abundance, and potential pathogens are important indicators for measuring the quality of nesting grounds. The Xisha Islands are the largest nesting grounds for green turtles *(Chelonia mydas)* in China. Protecting the security and sustainability of the nesting grounds is of significant importance. This study was conducted at the nesting grounds of green turtles on the North Island in the Xisha Islands. We compared and analyzed the bacterial community composition and characteristics of the sand of nests before and after hatching and the samples of hatched eggshells, unhatched egg contents, and gastrointestinal tracts of deceased hatchlings using high-throughput Illumina sequencing technology. The results showed that the bacterial community composition in the sand of nests before and after hatching was significantly different ($R = 0.941$, $P = 0.001$). The sand of nests before hatching showed higher bacterial diversity and richness than that after hatching ($P < 0.001$). Additionally, significant differences in the bacterial community composition between hatched eggshells, unhatched egg contents, and gastrointestinal tracts of deceased hatchlings were observed ($R = 0.438$, $P = 0.001$); the bacterial diversity and richness of the hatched eggshells were significantly higher than those of the latter two ($P < 0.001$). The relative abundance of unclassified_d__Bacteria, Bacillus, Streptomyces, and others in the sand of nests after hatching was significantly decreased than that in the sand of nests before hatching ($P < 0.05$); however, the relative abundance of Flavobacterium, Brevundimonas, Acinetobacter, and others increased significantly ($P < 0.001$). Most of the bacteria identified in our study are opportunistic pathogens that cause infections in plants and animals. The unhatched egg contents had a larger amount of opportunistic pathogens than hatched eggshells and gastrointestinal tracts of deceased hatchlings. The presence and long-term accumulation of these pathogens may disrupt the ecological balance of the microbial community in nesting grounds, increase the susceptibility of sea turtle eggs, and pose a threat to the hatching and hatchling survival of sea turtle eggs, thereby posing a certain level of safety risk.

Replacing artisanal fisheries with dolphin watching: Strategy for coastal-delphinid conservation and sustainable community-based marine ecotourism

Shiang-Lin Huang/Guangxi Academy of Marine Sciences, Guangxi Academy of Sciences, China

In coastal delphinid conservation, dolphin watching (DW) is frequently proposed for artisanal fishers as a community-based marine ecotourism (CBME) plan to reduce fishing effort and delphinid bycatch. Questions including whether DW profitability is sufficient to replace fishing and whether fishers can conduct DW sustainably, however, are rarely examined.
In the present study, questionnaire targeting tourists was implemented to investigate DW profitability in Sanniang Bay, China where DW-based CBME has been operated by local fishers since 2004. CBME sustainability was evaluated by comparing DW profitability to household income with reference to local poverty, and rural and economically-comfortable families in China.
Out of 1046 tourists interviewed, a total of 40 (3.82%) tourists knew there is DW in Sanniang Bay, whilst 292 (27.9%) tourists were lured to attend DW with low pricing. The fisher earned 110RMB (ca. 16.0$USD) per DW trip and required two, four, and nine trips per day to earn household income higher than poverty, rural and economically-comfortable lines. Raising ticket fee and maximizing per-trip number of tourists can substantially improve DW profitability, which facilitates CBME sustainability and poses minimal impacts on target animals.
CBME in rural areas could be trapped into low popularity-low pricing-low profitability embarrassments because of primitive tour facilities, insufficient ecological education value, poor hospitality skills and lacking marketing access. The sustainable CBME should incorporate ecologically-friendly conducts, direct indigenous profits with minimal transaction costs, venture and service diversification, and marketing with indigenous cultural characteristics.
DW history in Sanniang Bay further indicates profit distribution of tourism ventures directly influence CBME sustainability. Accordingly, indigenous rights, economic equity and social justice should be centrally placed in CBME policying with the minimal intervention from non-indigenous capitals and commercialized manipulations.

Report on TED efficiency trials aboard a Gabonese fish trawler owned by a Chines Operator

Michel michel/fishingcleaner.com, French Guiana

Fishery dependent testing of TED-equipped trawls was conducted as a means of demonstrating the TED effect on catch rates of fish onboard a Gabonese trawler that is owned by a Chinese operator. The project was a collaborative effort between NOAA Fisheries, Gabon Direction General de la Pêche et Agriculture (DGPA), the Wildlife Conservation Society Gabon (WCS) and Virginia Sea Grant (VASG). The project was made possible through funding from the NOAA Fisheries Office of International Affairs, International Cooperation and Assistance Program. A fishing gear specialist from VASG and 2 technicians from the DGPA collected information on catch rates of fish and bycatch from trawls equipped with a 14.6cm bar spacing TED specially designed for testing aboard a Gabonese fish trawler of built in China. Trawling operations were conducted in southern Gabonese waters located on the central west coast of Africa in August of 2015. Catch

data was collected from TED versus non-TED equipped trawls during two series of 30 consecutive comparative tows (all top-opening). The duration of the tows and fishing zones were at the captain' s discretion. Fish loss was estimated at 10.4% for the first 30 tows but after two minor adjustments (extension of TED flap by 40cm and shortening the tail end of the trawl by 2.4m) the next 30 tows showed a gain of 0.9% for the TED equipped trawl. Bycatch reduction in the TED equipped trawl was 11.2% for the second 30 tows. A statistical analysis of the catch data between a top-opening TED-equipped trawl and non-TED trawl for the second 30 tows showed no difference in the catch rates of targeted fish while the reduction of bycatch was statistically significant. Large fish specimens of guitar fish were captured less often in the TED equipped trawl.

Funded studies on sea turtle and marine mammal in the past decade

Kwan Chak Leung/Ocean Park Conservation Foundation Hong Kong, Hong Kong SAR

The Ocean Park Conservation Foundation Hong Kong (OPCFHK) solicits projects on threatened wildlife in China and Asia (e.g. amphibians, reptiles, birds, fishes, invertebrates and other aquatic and terrestrial mammals) and their habitats throughout Asia. OPCF funded over 70 projects about sea turtles and marine mammals. Study outcomes have contributed to successful conservation and entailed the development of conservation action plans and/or social science-based conservation programmes.

Marine turtle conservation in China: achievements and challenges

Jing Wang/Beijing Society of Entrepreneurs & Ecology Foundation, China

China is home to five of the world' s seven marine turtle species: green turtle, hawksbill turtle, olive ridley turtle, leatherback turtle, and loggerhead sea turtle. In 2021, these species were elevated to first-class protection status under China' s newly revised “List of National Key Protected Wild Animals,” marking a significant milestone in marine turtle conservation. These turtles have long held cultural significance in China and serve as an important marine flagship species. In 2011, China revised the "Regulations on the Protection of Aquatic Wild Animals," further strengthening conservation efforts for species like marine turtles, spotted seals, and Chinese white dolphins. Preparing since 2016, the former Ministry of Agriculture took the lead in establishing the China Sea Turtle Conservation Alliance (CSTCA) in 2018, building a platform for multi-party participation and jointed promotion of marine turtle conservation. In 2019, the Marine Turtle Conservation Action Plan (2019-2033) was released, which provides guidance for marine turtle conservation across the country. In the same year, the "the CSTCA Expert Advisory Committee " was established to better promote international cooperation on marine turtle conservation. Since the implementation of the Action Plan five years ago, the CSTCA has released over 350 turtles and tracked more than 25 to study their migratory routes, contributing valuable data to global conservation efforts. In cooperation with the Sansha Marine Protected Area Bureau, the protection and research work of China's largest green turtle spawning ground has been completed, and the spawning

ground has recorded an average of more than 200 nests of eggs landed yearly in recent years. Collaborative efforts with various social organizations have resulted in marine turtle conservation outreach exceeding 100 million people. Through the unremitting efforts of all parties, significant achievements have been made in the protection of marine turtle habitats, artificial breeding, standardized rescue and release, public communication and education, and especially the jointed efforts of relevant functional departments to crack down on illegal fishing and illegal trade of marine turtles, have significantly improved the survival of marine turtles in China. However, with the far-reaching effects of climate change and human activities (marine litter problems), marine turtle conservation is still a long way off. We must continue working together for a better future for marine turtles, also for ourselves.

Empowering citizen science to reveal sea turtle populations together

Daphne Hoh/TurtleSpot Taiwan, Biodiversity Research Centre, Taiwan

Our understanding of foraging sea turtle populations in the coastal waters around Taiwan is limited compared to nesting sea turtles. However, in recent years, marine research projects involving citizen scientists have been developing, especially with the growing popularity of water recreation activities. Since 2017, the TurtleSpot Taiwan project has invited citizen scientists to take photos and report sea turtle sightings. Clear photographs of sea turtles' faces have allowed us to identify individual turtles using unique scale patterns (i.e. photo identification), helping us identify areas where sea turtles are commonly found in the region. Through this data collection, we identified key foraging habitats for sea turtles, including Xiaoliuqiu, Hengchun, and Green Island.
We considered the potential bias of this opportunistic data collection and whether the survey provides a thorough and complete picture of the sea turtle population of the region. Following this thought, we have planned a systematic two-year survey of foraging sea turtles in Hengchun and Green Island, starting in 2023. This survey will be conducted seasonally with trained citizen scientists, including local SCUBA diving instructors and volunteers, to gain further insights into the population ecology and threats to sea turtles in the area and allow us to compare our sighting data via different collection methods. The training provided to the volunteers includes basic knowledge about sea turtles, citizen science and open data, introduction to sea turtle stranding and rescue, survey methods, underwater surveys, data management, and individual identification techniques.
The results of new sea turtle individuals detected via the systematic surveys in Hengchun and Green Island have already surpassed previous records from citizen science sighting reports, addressing the biases of opportunistic reports. Through the systematic survey, we have also noted observations such as the higher proportion of hawksbill turtles on Green Island and the rare documentation of the black sea turtle *(Chelonia mydas agassizii)* in Hengchun, which is seldom seen in Asia. This project helps us better understand the status of foraging sea turtle populations, encourages long-term local participation in monitoring efforts, and provides data to inform marine

conservation policies. In this presentation, we will share our experience in running the project and how we carried out our systematic survey.

Overview of the current status, challenges and opportunities of sea turtle research and conservation in China – Finding the key to push forward conservation actions across disciplines and boundaries

Connie Ka Yan Ng/Hong Kong Maritime Museum, Hong Kong SAR

Sea turtles are globally endangered species that migrate in long distances at certain life stages. Five sea turtle species, green turtle (Chelonia mydas), loggerhead turtle (Caretta caretta), hawksbill turtle (Eretmochelys imbricata), olive ridley turtle (Lepidochelys olivacea) and leatherback turtle (Dermochelys coriacea), are recorded in the China Region. Green turtle is the most common species with occurrence of nesting populations and foraging aggregations. Loggerhead turtle is also found foraging in the Chinese Seas, including the East China Sea, and neighboring area. Sea turtles have been facing imminent threats in different life stages, from their nesting sites on land to foraging grounds and migratory corridors in the ocean. In light of such borderless migration and threats faced throughout the life stages, devoted and collaborative conservation efforts are needed to restore the dwindling sea turtle populations. All sea turtle species are listed as the Category I of the national protected animals in China. Together with the Government, the China Sea Turtle Conservation Alliance, established in 2018, has formulated a 15-year Sea Turtle Conservation Action Plan. By building on our scientific knowledge of the population demography, habitat use and connectivity, and ecology of sea turtles, coupled with the perspectives of current conservation effort and public education, this presentation aims to identify essential information gaps, propose potential research opportunities, and explore collaboration among stakeholders. In synergy with our respect of the socio-cultural need, integration of local and traditional knowledge, and resources across disciplines, this presentation also aspires to facilitate cross-sectoral dialogue and reinforce commitment on finding flexible means to overcome challenges and to develop conservation strategies rooted with the community for a sustainable future.

Poster Presentation Abstracts

Nest productivity for green turtles *(Chelonia mydas)* at Qilianyu of Xuande Islands, South China Sea

Wenxiang Gao/Xiamen University, China

Green turtles *(Chelonia mydas)* have been documented nesting in southern China, including Guangdong Province, Hong Kong, Taiwan, and the South China Sea. In 2016~2018, more than 100 nests were recorded each year among 7 islands of the Qilianyu (Xuande Islands, South China Sea), revealing that the Qilianyu represents the largest extant nesting ground for green turtles in China. In August and September 2017, a total of 95 green turtle *(Chelonia mydas)* nests were geolocated on 5 islands of the Qilianyu; North Island had the highest number of nests (n = 58) and nest density (18.5 nests/ km). The number of eggs in each nest ranged from 58 to 131 (89 ± 20 [mean ± SD], n = 15), and the nest productivity was 14.8%~96.8% (70.7% ± 26.3%, n = 15). These data represent the first report for green turtle nesting productivity in the Xuande Islands. Long-term monitoring should continue. Nesting habitat characteristics, including vegetation, sand particles, humidity, and oceanography at different islands, should be examined to understand the nest site selection mechanism of local green turtles. We also recommend nesting beach monitoring and research at the Yongle Islands and elsewhere in the South China Sea.

Sand temperature fluctuation and risk analysis of female-biased nests at the green turtle nesting ground of Qilianyu, Xisha Islands

Chenrui Jiang/Xiamen University, China

Under the premise of not interfering with the natural incubation of green turtle nests, this study monitored year-round sand temperature near the nests during December 2019 and December 2020 at the green turtle nesting ground of Qilianyu (Xisha Qundao) using HOBO temperature loggers. The results were then combined with nesting date, metabolic heat generated during incubation, and the fitting relationship between air temperature and sand temperature in order to estimate the number of female-biased nests. The results showed that the year-round sand temperature of Qilianyu was from 22.3 (February) to 34.1 °C (July). The daily sand temperature range between the highest and the lowest, and its variation range were small throughout the year. There was a significant and positive correlation between the sand temperature and the air temperature ($p < 0.05$). The rainfall at Qilianyu was mainly concentrated in August to November in 2020, and the monthly sand temperature range between the highest and the lowest was significantly and positively correlated with the rainfall ($p = 0.001$). The sand temperature fluctuation of the vegetation boundary was more moderate than that of the exposed beach at Bei Dao, the core nesting island, showing a pattern of warmer winter

and cooler summer. There were 149 nests found at the green turtle nesting ground of Qilianyu in 2020. Based on the nesting date records, it was confirmed that green turtles could nest nearly throughout the year except January and February, and the nesting peak was from May to September. It was estimated that totally 119 nests were female-biased, mainly laid in May to August, and the whole year nest% with female-biased was 79.9%~92.6% in 2020. Under the general trend of global warming, the hatchlings at Xisha Qundao - the largest green turtle nesting ground in China, would be female-biased. The impacts of climate change on the green turtle population of China merit more attention.

New management unit for conservation of the endangered green turtle *Chelonia mydas* at the Xisha (Paracel) Islands, South China Sea

Shiyu Guan/Xiamen University, China

The Qilianyu cluster of the Xisha (Paracel) Islands has one of the few remaining green turtle *Chelonia mydas* rookeries in the China region. Genetic samples were obtained from dead green turtle embryos and hatchlings salvaged from post-hatched nests at Middle Island (n = 3), North Island (n = 9) and South Sand (n = 1) of the Qilianyu cluster in 2017—2019. The ~800 bp mitochondrial DNA control region was sequenced from the samples, and 5 haplotypes were identified belonging to 2 documented clades (clades III and VIII), including one new haplotype (CmP244.1) and four previously reported haplotypes (CmP18.1, CmP19.1, CmP20.1, CmP75.1). These results were combined with previously published mtDNA data for the Qilianyu cluster and nearby (~93 km) Yongle Islands indicating a lack of differentiation based on truncated 384 bp control region sequences (exact test, $p = 0.0997$; $FST = 0.015$, $p = 0.2760$), to represent a single Xisha Islands rookery. The rookery at the Xisha Islands was significantly differentiated ($p < 0.01$) from all 19 management units (MUs) documented in the Indo-Pacific and Japan regions, supporting recognition of the Xisha Islands rookery as a new independent MU. The results will help inform national and international conservation action plans by China and the countries around the South China Sea to protect green turtles in the West Pacific Ocean.

Effect of beach erosion and typhoon on green turtle nesting grounds and implications for conservation management at Xisha Islands, South China Sea

Ting Zhang/Hainan Normal University, China

Sea turtles are ideal flagship and umbrella species for marine biodiversity conservation. The quality of nesting grounds is crucial for the successful reproduction of sea turtles, determining whether they can successfully nest and hatch. Xisha Islands represent the largest remaining nesting grounds for green turtles in China, but face numerous threats and lack management guidelines for nesting ground restoration. From 2019 to 2022, this study continuously monitored the beach changes and coastal erosion in North Island of Xisha Islands. Results show that from 2020 to 2022, the beach area of North

Island decreased annually by 11,840 m^2. The proportion of suitable nesting sand types (including coarse and medium sands) also decreased annually. The peak nesting period of green turtles on North Island coincides with the high occurrence of typhoons in South China Sea, causing tidal surges that inundate green turtle nests and result in an average nest loss rate of 35.25%. Based on the above threats, it is recommended to promptly initiate habitat restoration in severely eroded areas of green turtle nesting grounds, to prevent further declines in nesting area and quality, and to implement measures such as nest relocation to enhance green turtle reproductive success.

Research on antibiotic resistance genes in wild and artificially bred green turtles (Chelonia mydas)

Xin Niu/Hainan Normal University, China

Sea turtles, as "flagship species" and "umbrella species" in marine ecosystems, are not only valued for their ecological importance but also play a crucial role in biodiversity conservation and ecosystem health monitoring. However, overfishing of eggs and adult specimens have led to a significant decline in the green sea turtle *(Chelonia mydas)* population. Artificial breeding is crucial in conserving endangered sea turtle populations, having demonstrated efficacy in expanding, rewilding, releasing, and restoring wild green turtle populations, yet it risks introducing antibiotic resistance genes (ARGs) to wild populations and ecosystems. This study employed metagenomic techniques to compare the distribution characteristics of ARGs in wild and artificially bred *C. mydas* The findings revealed that the total abundance of ARGs in *C. mydas* that have been artificially bred was significantly higher than that in wild individuals. Through Principal Coordinate Analysis (PCoA) and Adonis analysis, we uncovered significant differences in the composition of ARG subtypes between the two environments, specifically that artificially bred green turtles carried 102 unique ARG subtypes, while wild green sea turtles carried 13 unique ARG subtypes. Linear discriminant analysis effect size (LEfSe) further revealed that 9 ARG subtypes were significantly enriched in wild *C. mydas* and 26 in artificially bred *C. mydas* . Additionally, the abundance of mobile genetic elements (MGEs) co-occurring with ARGs in artificially bred *C. mydas* was significantly higher than in wild *C. mydas* In the analysis of bacteria carrying ARGs, wild *C. mydas* exhibited greater bacterial diversity. Furthermore, in artificially bred *C. mydas* , we discovered 23 potential human pathogenic bacteria (HPB) that contain antibiotic resistance genes. In contrast, in wild *C. mydas* , only one type of HPB carrying an antibiotic resistance gene was found. The findings of this study not only enhance our understanding of the distribution and dissemination of ARGs within the gut microbial communities of *C. mydas* , but also provide vital information for assessing the potential impact of releasing artificially bred *C. mydas* on the spread of antibiotic resistance.

Conservation needs of marine ETP species – case study of seahorse *(Hippocampus spp.)* and finless porpoise *(Neophocaena spp.)*

Lebin Liu/Qingdao Marine Conservation Society, China

The past few decades have witnessed an increasing awareness of the protection of marine ecosystems and the conservation of Endangered, Threatened, and Protected (ETP) aquatic species in China. Nonetheless, collaborative conservation efforts are needed to mitigate the negative effects brought by human activities. Since established in 2017, Qingdao Marine Conservation Society (QMCS) has been focused on the conservation of ETP species and their habitats. Based on data collected from published literatures, field surveys, and stakeholder interviews, QMCS has found fisheries bycatch and habitat loss being the major threats to marine ETP species. Species with relatively lower mobility, such as Seahorse (Hippocampus spp.), are more susceptible to active fishing gear (for example bottom trawl) bycatch, which can also pose threats to their habitats; species with higher mobility, such as Finless Porpoise (Neophocaena spp.), are more likely to be bycaught by passive fishing gears (with exceptions such as paired pelagic trawl). Due to the biological differences between the two species groups, the optimal conservation measures could be different accordingly. For instance, establishing a legally managed Marine Protected Area (MPA) that prohibits fishing activities could effectively protect the residential Seahorse population, while it is not suitable for Finless Porpoises which could constantly swim in and out the geographical boundaries. As migratory species, conservation measures for Finless Porpoise (and likewise Sea Turtles) can share experiences such as the application of excluder devices. Besides, the protection of Seahorse' s habitats (i.e. seagrass bed) in subtropical and tropical area could also benefit some Sea Turtle species that are dependent on seagrass beds or other similar habitats. In addition, methods (e.g. social media campaign, education, policy recommendation) to raise public awareness and influence polices & legislations are transferable among all marine ETP species group. Apart from fisheries bycatch, human activities such as coastal reclamation, in-shore and off-shore construction, sand mining, and plastic pollution could have negative impacts on marine ETP species as well. More conservation efforts and better management measures underpinned by collaboration of all key stakeholders are urgently needed to save marine ETP species.

Innovative approaches in Sea turtle conservation

Song Liu/WWF China

Sea turtles face significant threats like Illegal harvesting, habitat encroachment, and pollution. WWF, through its global network, works to halt the decline of sea turtle populations and supports efforts toward their recovery. Key initiatives focus on reducing the unsustainable harvest and illegal trade of sea turtles, as well as protecting vital sea turtle habitats.

To address the demand for sea turtle products among travelers, WWF collaborates with the travel industry to establish the Sustainable Travel Alliance. Through targeted social marketing campaigns, this initiative seeks to influence traveler behavior and reduce the consumption of sea turtle products. Additionally, WWF partners with e-commerce, social media, and technology companies through the Coalition to End Wildlife Trafficking Online. This coalition tackles the trade of sea turtle products and other wildlife crimes on digital platforms. Launched in 2018, the Coalition now includes 47 member companies operating across Africa, Asia, Europe, and the Americas.

Sponsors

Xian Yu Meets the Ocean

Together with SEE Foundation, the "Xian Yu Meets the Ocean" project will support marine biodiversity conservation efforts in the Beibu Gulf, promote the recycling of discarded fishing gear, and facilitate fundamental scientific research and industrial applications. It will also carry out initiatives for tracing and cleaning up marine litter in China, enhancing public awareness of marine conservation and zero-waste practices. The project aims to create a case study of social participation in marine conservation in China, support the cultivation of "Blue Citizens", and promote the development of a blue circular economy.

Project Actions

Biodiversity Conservation in the Beibu Gulf

- Monitoring and conservation of species
- Restoration and conservation of habitats

Recycling of Discarded Fishing Gear and Fundamental Scientific Research and Industrial Applications

- Exploration of recycling and reuse of discarded fishing gear
- Advancing scientific research and industrial applications for recycled fishing gear

Marine Litter Tracing and Cleanup Actions in China

- Cleaning up trash from major water systems, beaches, and seabeds
- Zero-waste actions

Enhancing Public Awareness of Ocean Conservation and Zero-Waste Practices

- Online lectures
- Offline exhibitions
- International exchange and cooperation

Thank you to Alibaba Philanthropy, all caring merchants on Xian Yu, and supporters for their generous contributions to the "Xian Yu Meets the Ocean" project

Sponsors

As a leading global provider of information and communications technology (ICT) infrastructure and smart devices, Huawei believes that digital technology is a key enabler of sustainable development.

Aligned with the UN SDGs and Huawei's vision and mission, Huawei launched its TECH4ALL initiative in 2019 to use technology as a vector for positive change in the areas of inclusion and sustainability.

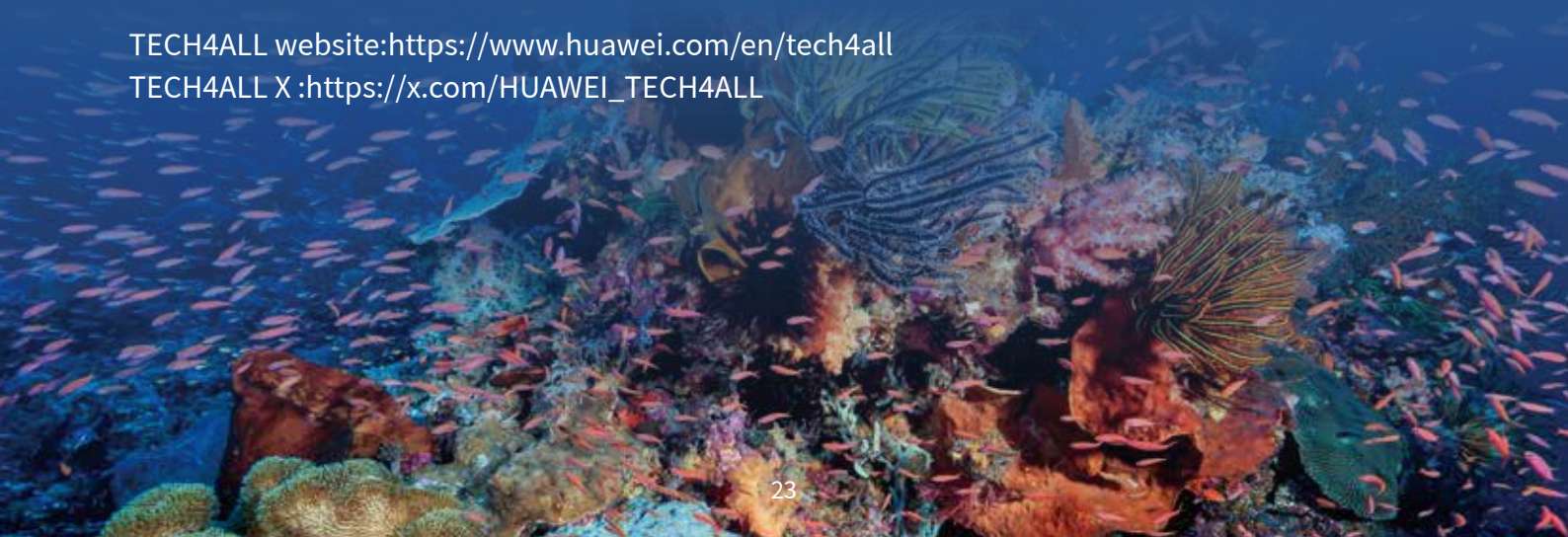
In the environment domain, Huawei has worked with governments, NGOs, conservation organizations, academic institutions, carriers, local communities, and other partners to implement nature conservation projects across the world. To date, TECH4ALL solutions have been deployed in 58 protected areas in Asia, South America, Africa, and Europe, with a focus on forest, wetland, and ocean ecosystems.

In China's Sansha North Island, we are currently working with Sansha Marine Protected Area Administration and SEE Foundation to monitor endangered green sea turtles during their spawning season. The TECH4ALL solution uses night vision cameras and AI to monitor the turtles at night when the turtles come ashore to lay their eggs. The system uses an AI algorithm developed based on Huawei Ascend framework to identify the turtles from video footage in real-time, even in very low light.

When a turtle is identified, rangers are sent a text message. Previously, they had to patrol the beach to check the spawning sites, but low visibility yielded unreliable results. During the spawning season in 2024, the system identified more than 140 turtle nests at more than 90% accuracy. The corresponding data is valuable both for scientific research and for developing targeted measures for protecting the endangered turtles.

In China Dongshan Island, we are also supporting Xiamen University to monitor the coral reef ecosystem and fish activity with a view to ensuring the health of the ecosystem.

TECH4ALL website:https://www.huawei.com/en/tech4all
TECH4ALL X :https://x.com/HUAWEI_TECH4ALL



Hotel Information

Name: Huazhu Group Orange Hotel
Address: No.1 Kaohsiung Road, Guanyin Mountain Plaza, Siming District, Xiamen, Fujian, China
Tel: 0086 592 2277888

Shuttle bus

On Jan. 15 and 16, free shuttle bus will be provided and details are as following:

Date	Time	Pick-up point	Drop-off point	Minibus information
Jan. 15	07:55	Orange hotel entrance	Xiamen International Conference Center entrance	license plate number 闽D00552
	18:40	Xiamen International Conference Center entrance	Welcome dinner location	
	21:00	Welcome dinner location	Orange hotel/International Center Hotel	
Jan. 16	07:55	Orange hotel entrance	Xiamen International Conference Center entrance	
	13:50	Xiamen International Conference Center entrance	Xiamen University	
	17:30	Xiamen University	Social dinner location	
	20:00	Social dinner location	Orange hotel/International Center Hotel	

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