

**Hong Kong Offshore LNG Terminal Project
Marine Conservation Enhancement Fund**

**“Managing Pak Nai's ecologically important habitats
to preserve its natural beauty and sensitive biodiversity”
(1st May 2021 – 30th April 2023)**

Completion Report



(Photo: TNC volunteers and Conservation Ambassadors work together to remove the invasive Spartina Cordgrass on the mudflats at Pak Nai)



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Executive Summary and Way Forward

Pak Nai is one of Hong Kong's important ecological hotspots. It is a critical nursing ground for endangered Chinese Horseshoe Crabs (*Tachypleus tridentatus*), threatened Mangrove Horseshoe Crab (*Carcinoscorpius rotundicauda*), threatened Beccari's seagrass (*Halophila beccarii*) and multiple Hong Kong oyster species. Despite its ecological importance, Pak Nai suffers from inadequate management and is threatened by unregulated tourism, unsustainable fishing practices, marine debris and invasive species.

Recognizing the importance of Pak Nai's mudflats in 2021, and with generous funding support from MCEF, TNC was able to adopt a community-based and ecosystem focused conservation approach through a 2-year habitat management project – "Managing Pak Nai's ecologically important habitats to preserve its natural beauty and sensitive biodiversity" (MCEF20009). The project ran from May 2021 to April 2023.

Over the past 2 years, the project has been carried out successfully with most targets exceeded. TNC has engaged more than 4,000 members of the public in habitat management at Pak Nai. Some of the project's achievements are detailed below:

1. More than 6600m² of abandoned oyster farm was reconfigured into more naturally arranged oyster beds which not only benefits the oyster beds themselves, but also horseshoe crabs, seagrass and other intertidal organisms (Approximately 95% of the farm area was restored back to exposed soft shore and 5% was reconfigured into more natural oyster reef patches);
2. According to recent surveys, the horseshoe crab population in Pak Nai has shown a 13% increase from summer 2021 to 2022. During the summer of 2022, we conducted surveys and found that the juvenile horseshoe crab hotspot had shifted from the left to the right side of the mudflat, where we had previously reconfigured abandoned oyster farm activities. Our survey recorded a significant increase, with 66 juvenile horseshoe crabs spotted on the right side, four times more than in the previous summer. This indicates that our reconfiguration efforts have positively impacted the juvenile horseshoe crab population;
3. More than 1315m² of invasive *Spartina* cordgrass was removed through manual digging. However, much of it is already growing back suggesting the need to develop a more targeted strategy;
4. More than 190m³ of aquaculture debris and 1840kg of marine litter were removed, to reduce the chance of intertidal organisms becoming entangled or being blocked from foraging;
5. More juvenile Chinese horseshoe crabs have been observed and recorded in the restored and aquaculture debris-free areas of mudflats compared to the control area;
6. A stable increase in overall horseshoe crab population has been observed from summer 2020 to summer 2021 and summer 2021 to summer 2022;
7. Members of local communities (Pak Nai, Ha Tsuen and oyster farming communities) have increased awareness of the importance of Pak Nai's ecosystems, threats and habitat restoration actions; Awareness has been raised through discussions, initiated by TNC, between the local community, green groups, academics and various government departments.
8. We collaborated with 7 environmental NGOs on management activities and discussions on long-term management strategies;
9. We kick started actions to propose long-term management strategies to the Hong Kong Government, through Environment and Ecology Bureau and Agriculture and Fisheries and Conservation Department.

Based on stakeholder engagement discussions with community partners (eNGOs), local communities, researchers and government representatives from Environment and Ecology Bureau and Agriculture, Fisheries and Conservation Department, the following recommendations are made to ensure that Pak Nai is sustainably managed in the future:

1. Two key conservation approaches should continue:
 - Community conservation
 - Ecosystem-based conservation

2. On-going site-based management with regular field activities:
 - Invasive *Spartina* removal and monitoring: to create a more systematic and methodological approach. Pilot experiments with more scientific research are needed to develop effective long term management solutions.
 - Marine litter and aquaculture debris clean-up: there is a constant influx of debris which should be cleared on a monthly basis

3. 4 Knowledge gaps that should be investigated:
 - (A) Investigation into human threats to Pak Nai including:
 - Ecosystem impacts from human activity, notably tourists
 - Monitoring of illegal dumping/ Pig farms
 - Potential impacts from floating oyster farms activities on subtidal benthos
 - (B) Potential future development plans
 - Risk and opportunities related to Northern Metropolis and planned railway expansion
 - Economic assessments of ecosystem services
 - Tourism carrying capacity study
 - (C) Ecosystem based approach/ interconnections between habitats
 - Integration of data and more collaboration across different research areas
 - Consolidate various sampling activities to take place in the same set of locations, so that the results from different projects (seagrass, sediment and horseshoe crab studies) can be compared or integrated more effectively
 - (D) Other species related research
 - Impact of invasive cordgrass (*Spartina*) and testing the effectiveness of removal methods
 - Adult HSC populations
 - Migratory birds
 - Microbiome and associated biodiversity of oyster reef/ Potential change in macrobacteria community after reef reconfiguration

To incorporate these recommendations and respond to a multitude of growing threats TNC intends to formulate a longer-term management plan to be shared with the Hong Kong government as recommendations for the future Coastal Protection Park planned under the Northern Metropolis Development plan. To do so TNC is seeking support for a 13-month (phase 2) from MCEF, during which we will continue carrying out major management works while also advancing our scientific research, habitat management, public engagement and regional collaboration efforts.