

Hong Kong Offshore LNG Terminal Project

Marine Conservation Enhancement Fund

PART A: The Project and Investigator

1. Funded Project Details

Project Number:	MCEF20001			
Project Title:	Safeguarding a future for seagrass meadows in Hong Kong by implementing tools for monitoring, conserving and restoring their natural populations.			
Name of Organisation:	The University of Hong Kong			
Reporting Period:	From:	1st June 2020	To:	31 st May 2024
Date of Report Submission:	19th Jan 2025			

2. Information of the Principal Investigator

Name:	Dr Juan Diego Gaitan-Espitia
Position Held:	Associate Professor

1. Executive summary:

The project aimed to develop an integrated conservation and restoration program for seagrasses in Hong Kong through a fine-resolution assessment of their environmental, demographic and genetic status. To our knowledge, there are no previous integrative studies in Hong Kong examining all of these factors for developing managing programs for conservation and restoration. This fundamental knowledge-gap restricts our ability to assess the effectiveness of conservation strategies and develop long-term monitoring programs (Gaitán-Espitia and Hobday 2020). By applying a novel, integrative and cost-effective approach, we aimed to target major conservation challenges for seagrasses in Hong Kong and South China (Fong 2000, Huang et al. 2006). During the project, three key objectives have been achieved, as elaborated below:

- (1) To assess and characterize environmental (water and sediments) conditions of seagrasses in Hong Kong.

The project undertook a detailed examination of water and sediment parameters throughout the duration of the funding. Through this assessment, a fine-resolution landscape map was created to depict the distribution of seagrass meadows in the region. This map not only highlighted the geographical extent of these ecosystems but also provided valuable insights into the specific environmental conditions essential for the survival and persistence of seagrasses. In addition to mapping seagrass habitats, the project delved into analysing the environmental characteristics of the area, including the biochemistry of soils and the composition of the rhizome microbiome. Understanding these factors is crucial in deciphering the intricate relationships between seagrasses and their surrounding environment, shedding light on the key elements that influence their health and vitality. The findings from this environmental assessment were documented in a research paper (currently under final preparation), which will serve as a valuable contribution to the scientific community and conservation practitioners. Moreover, our research and findings were shared with the general community through media coverage, helping to raise awareness about the significance of seagrass conservation and the environmental challenges faced by these ecosystems in Hong Kong. Multiple training workshop were also organized with schools, NGOs and other stakeholders, as part of the project's outreach efforts. These workshops were designed to educate and engage various stakeholders, including volunteers, non-governmental organizations (NGOs), and the Agriculture, Fisheries and Conservation Department (AFCD). By sharing knowledge and insights gained from the environmental assessment, the workshop aimed to empower participants with the tools and information needed to contribute effectively to seagrass conservation efforts in the region. Through collaborative initiatives like these, the project fostered a sense of community involvement and commitment to safeguarding seagrass habitats for future generations.

(2) To assess health, demographic and genetic characteristics of seagrasses in Hong Kong.

In order to comprehensively evaluate the health, demographic, and genetic characteristics of seagrass populations in Hong Kong, the project embarked on a multifaceted assessment approach. A database was compiled, containing information essential for understanding and managing seagrass ecosystems in the region. This database encapsulated crucial details regarding the status of seagrass populations, encompassing factors such as population sizes, distribution patterns, and overall health indicators. By systematically documenting this information, we were able to gain valuable insights into the current state of seagrass habitats and identify areas that may require targeted conservation efforts. Moreover, the genetic component of the assessment focused on unravelling the genetic diversity present within seagrass populations, examining gene flow dynamics, and elucidating connectivity patterns among different seagrass meadows. Understanding the genetic makeup of seagrasses is pivotal for devising effective conservation strategies that promote genetic resilience and adaptability in the face of environmental stressors. Additionally, the assessment delved into demographic parameters at both seasonal and spatial scales, shedding light on population dynamics, growth rates, and spatial distribution patterns of seagrasses. This comprehensive demographic analysis provided a nuanced understanding of how seagrass populations fluctuate over time and space, informing conservation practices tailored to the specific needs of these ecosystems. Furthermore, the project endeavoured to equip conservation practitioners and policymakers with essential genetic tools and resources for the management of seagrasses in Hong Kong. By consolidating this knowledge into accessible resources, the project aimed to facilitate evidence-based decision-making and promote sustainable conservation practices. The culmination of these efforts resulted in the production of two chapters in a PhD thesis that synthesized the key findings of the assessment, contributing valuable insights to the scientific community and informing future research endeavours in seagrass conservation. Additionally, at least one media coverage associated with the project helped disseminate the importance of seagrass conservation and the significance of understanding the health, demographic, and genetic aspects of these vital marine ecosystems in Hong Kong.

(3) To develop and implement a genetic-informed seed bank program for restoration of populations through transplantation of germinated and adult plants.

The project undertook a multifaceted approach aimed at enhancing the resilience and sustainability of these vital marine ecosystems. The initiative involved establishing a dynamic seed bank that not only preserved genetic diversity but also facilitated the cultivation of adult plants for transplantation into natural environments. The creation of this seed bank represented a pivotal step towards securing the genetic resources necessary for the long-term conservation and restoration of seagrass populations in Hong Kong. By safeguarding a diverse array of seeds and adult plants, the program ensured a robust genetic reservoir that could be tapped into for future restoration efforts, thereby bolstering the resilience of seagrass habitats against environmental threats and disturbances. Furthermore, the deployment and growth of transplanted individuals in natural environments served as a practical demonstration of the program's effectiveness in enhancing seagrass populations. By reintroducing germinated and adult plants into their native habitats, the project not only bolstered existing populations but also contributed to the overall health and diversity of seagrass ecosystems in the region. The outcomes of this restoration program are currently part of PhD thesis (HKU) and will be documented in a research paper, encapsulating the methodologies, results, and implications of the transplantation efforts. This research paper will serve as a valuable resource for scientists, conservation practitioners, and policymakers seeking to implement similar genetic-informed restoration initiatives in seagrass ecosystems. Additionally, at least one media coverage associated with the project helped amplify the reach and impact of the restoration program, raising awareness about the importance of genetic-informed conservation strategies and highlighting the positive outcomes of the transplantation efforts on seagrass populations in Hong Kong. Moreover, multiple training workshops were organized to engage stakeholders, including NGOs, the AFCD, and decision-maker units from the Hong Kong Government. These workshops provided a platform for knowledge sharing, capacity building, and collaboration, empowering participants with the skills and insights needed to support ongoing conservation and restoration efforts in the region.

Moving forward, following the completion of this project, it is crucial to continue monitoring the implemented conservation and restoration efforts. Long-term monitoring programs should be established to assess the effectiveness of the strategies and ensure the sustainability of seagrass populations in Hong Kong's waters. Collaboration with stakeholders, ongoing research, and community engagement will be essential in maintaining the success of the integrated conservation and restoration program for seagrasses.