

Protection and Utilization of Underwater Cultural Heritage

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ABSTRACT

The topic of this abstract fits best within this session, because underwater cultural heritage (UCH) are remains of ancient human civilization. Ancient maritime trade promoted economic and cultural exchange among coastal countries, and promoted the development of world civilization. They are very precious historical information and rare physical data. The case study under consideration are ancient ships and its accompanying UCH in the South China Sea. I briefly discuss the protection of the UCH and explore their development and utilization. Only by developing and utilizing UCH can the study of ancient civilization continue. The resources available to conduct the work include mainly taking 'Huaguang Reef I', 'Nanhai I', 'Nanao I' and other shipwrecks and their UCH as examples. I study the historical evolution and transformation of the three shipwrecks, as well as the cargo such as pottery, metal and the wooden hull. Creative products and related themes and activities are developed according to their historical characteristics, so as to let the cultural relics speak. The research approach is through the development and research of these cases whereby audience can walk into the site that stores the ancient ships, these are tourist attractions. The income from tickets or cultural and creative products provides financial support for the protection and maintenance of ancient ships and UCH. The results are forming a virtuous circle and bringing immeasurable cultural influence.

INTRODUCTION

The topic of this paper fits best within the session 'History and Current Trends of Underwater Archaeology around East Asia'. Ancient maritime trades have promoted economic and cultural exchanges among coastal countries and developed the histories of world civilizations, providing valuable historical information and rare materials. China has a long history of ancient maritime activities, and the continuous discoveries of shipwrecks from the past reveal its once-thriving maritime trade. The extensive history of maritime transportation has resulted in a rich underwater cultural heritage. Although China started its efforts for underwater cultural heritage relatively late, it has developed a series of advanced protection concepts such as 'in-situ protection and overall salvage'. These concepts have greatly enhanced and deepened the understanding of underwater cultural heritage protection by conducting surveys of underwater cultural heritage and promoting public participation.

In contact with seawater, substances undergo varying degrees of dissolution and corrosion. This damage primarily occurs due to the interaction of chemical, physical, and biological activities in seawater. The extent of damage to cultural heritage, which may have been submerged for hundreds or even thousands of years, can be imagined. Cultural heritage that has been underwater for centuries experiences deterioration, and the rate of deterioration accelerates after it is removed from the water due to rapid changes in the preservation environment. This is especially true for metal and water-saturated wooden artefacts, which can suffer from corrosion and cracking if not rescued and protected properly. Such damage can be irreversible. Preservation methods for underwater cultural heritage vary depending on the materials involved.

Desalination and dehydration are the first necessary treatments. Salt substances present within raised artefacts pose a significant hidden danger to ceramics, metalware, and even wooden artefacts. The presence of salt can lead to glaze loss in ceramics and cyclic corrosion in metalware. Deionized water is the most cost-effective method for desalination, while complexing agents are used to remove sulfur iron compound salts from wooden relics. Additionally, some artefacts may be covered in a layer of white scale or even the remains of marine organisms. These should be preserved in a way that does not hinder historical research, as they serve as evidence and features of the underwater cultural heritage. The subsequent steps of restoration do not differ significantly from those applied to artefacts found on land.

CASE STUDIES

The case studies considered in this context include the following: the Song Dynasty shipwreck in Houzhu Port in Quanzhou Bay, the underwater inscription on Baiheliang in Chongqing, the Song Dynasty shipwreck of ‘Nanhai I’, the Ming Dynasty shipwreck of ‘Nanao I’, and the Southern Song shipwreck of ‘Huaguangjiao I’.

Museums, along with their assistive technology products, are valuable resources for conducting this work. Museums serve as institutions for knowledge production, information dissemination, protection, education, research, and outreach. They should actively engage in social activities and respond to social changes, not merely exhibiting collections but also guiding public participation and contributing to local community development. In recent years, the three-fold concept of underwater cultural heritage in Chinese museums, namely ‘Display, Protection, and Research’, has become increasingly evident.

Various museums, such as the Maritime Silk Road Museum of Guangdong, Guangdong Museum, China Port Museum, and Hainan Museum, have successively established specialized laboratories for underwater cultural heritage protection based on ancient shipwrecks such as ‘Nanhai I’, ‘Nanao I’, ‘Xiaobaijiao I’, and ‘Huaguangjiao I’. These museums have developed systematic displays and research on underwater cultural heritage. Moreover, they have incorporated network communication technologies such as the internet, big data, cloud computing, 5G, and artificial intelligence into their exhibitions. These technologies are rapidly transforming the ways in which people interact with museums, deepening museums' involvement in local society across all aspects. They also present new challenges and opportunities for development.

Among the technologies utilized by museums, cloud exhibitions and digital displays stand out, allowing audiences to enjoy museum exhibition information from the comfort of their homes. Such technologies also promote the protection and utilization of underwater cultural heritage. As an example, at ‘the 9th China Museum and Related Products and Technology Expo’ in 2022, China (Hainan) Nanhai Museum employed advanced 5G+ VR technology. This allowed visitors at the exhibition site in Zhengzhou, thousands of kilometers away from the South China Sea, to virtually experience the island of Sansha, providing a real-life experience spanning thousands of miles. Through this technology, the museum effectively enhanced its audience service, cultural artifact restoration, and security management capabilities.

The research question for museums revolves around how to effectively utilize and promote the protection of underwater cultural heritage. The artefacts recovered from underwater sites enrich the museum's collections and inspire ideas and perspectives on the protection and utilization of underwater cultural heritage. With the growing recognition of the value of underwater cultural heritage, the number of maritime museums worldwide has significantly increased. Underwater cultural heritage has become a significant resource for many museums, and advancements in technology have made the exhibition of underwater cultural heritage more engaging and immersive. Modern digital technology and multimedia exhibition methods have enabled museums to showcase not only small artefacts that were easily raised from the water but also underwater archaeological sites that are challenging to retrieve. These technologies have made underwater cultural heritage more accessible to the general public, creating vivid and interactive exhibitions that capture the imagination of visitors.

With the advent of new technologies, museums are leveraging underwater cultural heritage to develop innovative museum displays. One notable example is the Song Dynasty shipwreck in Houzhu Port, located in Quanzhou Bay, which is among the earliest historical shipwrecks excavated in Chinese waters. To create a compelling exhibition for this shipwreck, the government decided to construct the ‘Quanzhou Bay Ancient Ship Exhibition Hall’ within the local Kaiyuan Temple. The exhibition hall is designed with two floors. The lower floor features the physical display of the shipwreck, allowing visitors to view the actual remains. On the upper floor, the exhibition content encompasses a ‘three-in-one’ display, showcasing the port, shipwreck archaeology, and artefacts associated with the site. This integrated approach provides visitors with a comprehensive understanding of the historical context and significance of the shipwreck. The success of the ‘Ancient Ship Exhibition Hall’ in Quanzhou has had a profound impact on the exhibition design for historical shipwrecks in many other

museums. The exhibition system pioneered by Quanzhou's museum has become a symbol of China's utilization of underwater cultural heritage, and its replication in other museums reflects its effectiveness and influence in showcasing and preserving these valuable artefacts.

The year 2009 marked a significant milestone in the innovative integration of underwater cultural heritage protection and museums in China. The practices of 'in-situ protection' and 'relocation protection' of underwater cultural heritage at the Chongqing Baiheliang Underwater Museum and the Guangdong Maritime Silk Road Museum were recognized by UNESCO as exemplary cases of protection and utilization. These initiatives showcase China's ingenuity and expertise in cultural heritage preservation and utilization.

The Baiheliang site in Chongqing is renowned for its ancient inscriptions and stone fish carvings, which document hydrological information about the Yangtze River spanning over 1,200 years, including more than 60 years of dry periods. UNESCO recognizes it as 'the world's first ancient hydrological station' due to its remarkable preservation. However, with the completion of the Three Gorges Dam on the Yangtze River, the Baiheliang site would be submerged. To safeguard this invaluable cultural heritage, an underwater museum was constructed based on the concept of 'building a museum on the original site, preserving the environment in its original state, and displaying it in its original state'. Visitors to the Baiheliang Underwater Museum can descend via escalator to the stone carving exhibition area located 38 meters underwater. Even individuals without diving skills can admire the white crane beam through display windows. This groundbreaking presentation method, which allows non-diving visitors to access underwater heritage, had not been attempted by museums worldwide before. UNESCO hailed it as the 'world's first non-diving accessible underwater heritage museum'. Subsequently, other countries, such as Italy, adopted a similar underwater display approach. For instance, in the Bay of Camarina in Sicily, Italy, a transparent underwater corridor was constructed, enabling people to enter the water from the shore and closely observe one of the 'stone pillar wrecks'. These pioneering efforts in China and their subsequent replication in other parts of the world demonstrate the innovative and influential role that China's underwater cultural heritage protection and utilization practices have played in enhancing public accessibility and appreciation of submerged archaeological sites.

The protection project of the 'Nanhai I', Song Dynasty shipwreck, is another remarkable example of the relocation and preservation of underwater cultural heritage. Through the 'overall salvage' initiative, the entire shipwreck site was relocated to the purpose-built Guangdong Maritime Silk Road Museum for archaeological excavation, scientific research, conservation, and exhibition purposes. This comprehensive approach to salvaging and protecting the 'Nanhai I' shipwreck represents a unique and innovative methodology and system for the preservation and utilization of underwater cultural heritage. It enables a seamless connection between excavation, protection, and exhibition within the museum, providing a holistic understanding of the historical context. The relocation and protection of the 'Nanhai I' shipwreck demonstrate the ingenuity of Chinese museums in safeguarding and showcasing underwater cultural heritage. The success of this methodology and system has proven its effectiveness in both heritage preservation and generating social benefits. In recent years, leveraging the power of the 'Internet+' and digital resources, the excavated artefacts have been widely utilized in social education, cultural and creative product development, animation and game creation, and the integration of new media technologies such as online live streaming, children's game consoles, message touch machines, naked-eye 3D studios, and VR or AR experiences. These advancements have significantly enhanced the interaction between museums and their audiences, amplifying the dissemination of historical and cultural knowledge related to the 'Nanhai I' shipwreck. The utilization of digital resources and new media technologies has greatly enriched the visitor experience, enabling a more immersive and interactive exploration of the history and cultural significance associated with the 'Nanhai I' shipwreck.

In 2007, fishermen made a significant discovery in the three-point golden sea southeast of Nanao Island in Guangdong Province. They stumbled upon an ancient shipwreck from the Ming Dynasty, which had been missing for over 400 years. The shipwreck, named 'Nanao I', underwent subsequent excavation and recovery efforts. Between 2010 and 2012, underwater archaeological excavations took place, resulting in the retrieval of over 27,000 artefacts. The majority of these artefacts were blue and white porcelain, accompanied by pottery, metalware, wood, stone tools, and other items. Additionally,

24,000 copper coins, 29,000 bead tube ornaments, as well as organic and inorganic specimens like fruit pits, tuber crops, and mercury were found. After the completion of the underwater archaeology project in 2012, 'Nanao I' was covered by a large probe frame to preserve its hull at the original site. The raised artefacts were transported to the museum for conservation treatment, where they are now displayed. The Nanao County Coastal Defense History Museum hosts an exhibition centered around the 'Nanao I' shipwreck. Visitors can embark on a high-fidelity virtual journey aboard an ancient wooden boat, wearing 360° VR equipment. Through the 'VR Sailing Experience: 'Nanao I' Silk Road Story' special 3D cartoon, visitors are transported back in time to the prosperous Ming Dynasty. They can explore vivid historical scenes, immersing themselves in the magnificent and longstanding legend of marine trade. The exhibition also features the 'South Australia I' VR panoramic navigation experience platform. By utilizing intelligent and information technology, this project presents intricate historical narratives, enhances the exhibition's quality, and effectively disseminates its themes and content. Visitors can wear 360° VR equipment for the 'Underwater Archaeology VR' project, simulating the experience of being an archaeological team member diving deep underwater to conduct underwater excavations. The exhibition hall also includes a restored model of the 'Nanao I' wreck, showcasing the shipwreck scene, cargo, and surrounding underwater world. Various artefacts from the 'Nanao I', such as seabed stones, plates, bowls, and jars, are exhibited to demonstrate the cultural relics of Nanao Port and South Australia, highlighting the prosperity of the Maritime Silk Road. The three-dimensional surround sound effect further immerses visitors in the experience. An integral part of the exhibition's quality enhancement is the QR code self-service guide system. These QR codes facilitate multi-terminal adaptation, allowing visitors to access information on museum exhibits, real-life scenes, and virtual immersive experiences through digital collections. This system provides self-service automatic explanations, enhancing visitors' viewing experiences and improving the overall service quality of the exhibition hall. The 'Nanao I' Aquatic Cultural Relics Exhibition at Shantou Museum drew over 20,000 visitors in just over a month. Furthermore, the Guangdong Provincial Museum collaborated with the National Institute of Marine Cultural Properties of Korea to host the 'Nanao I: Ming Dynasty Maritime Trade' exhibition. This marked the first overseas cooperation of Guangdong Provincial Museum for an underwater archaeology exhibition. It is worth noting that the 'Nanao I' shipwreck site was selected as one of the 'National Top Ten Archaeological New Discoveries', signifying its significance in the field of underwater archaeology in China.

CONCLUSIONS

Chinese museums have embraced the rich underwater cultural heritage resources and are utilizing them in diverse and innovative ways. One such example is the Hainan Provincial Museum, which has curated a series of exhibitions centered around the artefacts recovered from the sunken ship 'Huaguangjiao I' in the Xisha Islands. These exhibitions aim to showcase the essence and stories of the sunken ship, particularly in relation to the history of maritime trade and the Maritime Silk Road. Notably, the exhibitions titled 'Direction of the Sea: Special Exhibition on Huaguangjiao I Sunken Ship' and 'Pan Boat of the South China Sea: Exhibition on the Maritime Civilization of the South China Sea' have both received the prestigious National Top Ten Exhibition Awards, a rare achievement in the field of exhibitions. Another noteworthy endeavor is the 'Silk Road Sailing Far' exhibition led by the Fujian Provincial Museum. This exhibition brings together artefacts from over 50 museums nationwide to comprehensively depict the extensive and magnificent history of the Maritime Silk Road. Alongside other historical artefacts, the exhibition also showcases underwater archaeological achievements, highlighting the importance of maritime heritage in the context of the Silk Road. These initiatives demonstrate the commitment of Chinese museums to utilize underwater cultural heritage to tell compelling stories and shed light on the historical significance of maritime trade routes like the Maritime Silk Road. By integrating artefacts recovered from underwater sites, these exhibitions offer visitors a unique perspective on the past and contribute to a deeper understanding of China's rich maritime history.

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