

The Past, Present, and Future Regeneration Opportunities of Stone Tidal Weirs - The Case of Taiwan

Tung Ying-Ying

ABSTRACT

Stone Tidal Weirs can be found all around the world and were once an important way for our predecessors to sustain their livelihood through fishing. However, in recent years, due to technological advancements, stone tidal weirs have lost their economic value and many have been left to deteriorate and collapse. Studying stone tidal weirs has become an obscure topic. Nevertheless, stone tidal weirs were an important fishing method for coastal residents in human history, and have had a significant impact on human culture in tangible and intangible ways. Although there are few surviving "live" stone tidal weirs today, as they periodically appear above sea level, they are an underwater cultural heritage that the public can see and access without diving. They are one of the best materials for advocating and promoting education on protecting underwater cultural heritage.

Taiwan has many beautifully shaped and numerous stone tidal weirs around its periphery. The government has made significant efforts in subsidizing restoration, cultivating talent for building stone tidal weirs, and researching and promoting education in hopes of preserving Taiwan's precious stone tidal weirs. Local communities and organizations in Taiwan are also making efforts to combine the cultural landscape of stone tidal weirs with tourism, utilizing the unique features of local stone tidal weirs to create diverse new opportunities for reuse. By combining the efforts of local residents and tourists, the shape and good condition of stone tidal weirs can be preserved, and the beauty and fishing culture of stone tidal weirs can be passed down to future generations, allowing them to exist sustainably.

Keywords: Stone tidal weirs, fishing, underwater cultural heritage, Penghu

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I. INTRODUCTION

This article, "The Past, Present, and Future Regeneration Opportunities of Stone Tidal Weirs - The Case of Taiwan," is most suitable for the 12th topic of this conference, "Sticks, Stones, & Old Fish Bones: The Role and Cultural Heritage of Fish Weir Traditions in the Asia-Pacific Region." Stone tidal weirs were built by coastal residents in the intertidal zone, where they worked together to construct embankments to trap fish using the ebb and flow of tides. This was a way for the village to share their fishing harvest and a marine life culture. Taiwan has the most stone tidal weirs in the world, with over 574 in Penghu County alone. Some stone tidal weirs can even be traced back over 300 years ago. However, with the development of technology and the introduction of new fishing equipment, such as trawling, stone tidal weirs have easily been replaced in economic value.

The decline of stone tidal weirs is a problem faced by all countries around the world. Nowadays, many countries leave their stone tidal weirs abandoned and collapsed. Stone tidal weirs require collective effort to build, maintain, restore, distribute fishing harvests, and manage registrations, but modern people are reluctant to invest labor and funds. Taiwan has numerous stone tidal weirs, many of which are still "live," meaning that they can still catch

fish and are operational. This article explores the decline and revitalization methods of stone tidal weirs in Taiwan, which is in line with the 12th topic of the conference.

II. CASE STUDIES

The case studies being examined pertain to the many well-preserved stone tidal weirs in Taiwan, which serve as a great example of how proper utilization can not only preserve them but also transform them into new cultural heritages, resulting in a win-win situation. Therefore, we are pleased to share Taiwan's methods for preserving stone tidal weirs, particularly in the face of the issues of revitalization and sustainability. This article explores Taiwan's case studies, which include:

- 2.1 Accepting the fact that stone tidal weirs are in decline.
- 2.2 Ways to revitalize stone tidal weirs - Using Taiwan's preservation of stone tidal weirs as a case study.
- 2.3 Transformation and regeneration of stone tidal weirs.

III. RESOURCES

- 3.1 Data collection: historical records and research reports on the preservation of stone tidal weirs in Taiwan over the years.
- 3.2 Interviews: scholars who have studied stone tidal weirs in Taiwan and local historians and cultural workers involved in the reuse of stone tidal weirs.
- 3.3 Policy making and budget allocation: the government's initiatives towards the preservation of stone tidal weirs.

IV. FRAMEWORK

4-1 Facing the decline of the stone tidal weirs

4.1.1 The fishing yield is no match for modern fishing

The economic benefits of stone tidal weir fishing are poor. The catch difference between stone tidal weir fishing and modern fishing boats is too great. In the past, small fishing boats had poor safety and could not go out to sea in bad weather, so they relied heavily on stone tidal weir fishing. Nowadays, fishing boats are safer and can catch more fish, so residents naturally give up the laborious way of catching fish through stone tidal weirs.

4.1.2 The technology for building stone weirs is gradually becoming lost.

The construction of stone tidal weirs requires the participation of a certain number of villagers, and the repair of stone tidal weirs also requires the timing of the ebb tide. Whether under the scorching sun or in strong winds... building, repairing, and patrolling the weirs are all high-labor, outdoor work. It is not the best job option for young people nowadays, and they are unwilling to take over. The lack of inheritance of stone tidal weir construction and repair skills has resulted in a technical gap.

4.1.3 Stone tidal weir fishing cannot become a major job.

The return on investment is not proportional, and it cannot become the main source of income for residents, resulting in intergenerational gaps. All declining industries in the

world are due to the development of technology and changes in social lifestyles. Those engaged in the industry cannot obtain sufficient income to support their lives, and therefore turn to developing industries that can provide for their basic needs. The catch from stone tidal weirs is small, and after the investment, no one is willing to invest in the construction and repair of stone tidal weirs again. The decline of stone tidal weirs is an inevitable result of the operation of the times.

4-2 Ways to revitalize the stone tidal weirs

4.2.1 The government values the protection of stone tidal weirs.

4.2.1.1 Value the cultural status of stone tidal weirs and restoration techniques (1).

Since 2006 and 2008, the Penghu County Government has successively logged the "Double Hearts Shihu"(雙心石滬) (2) and the "Jibe Shihu Group"(吉貝石滬群)(3) as a cultural landscape (Figure 1). In 2009, "Penhu Shihu Group" was selected by the Ministry of Culture as one of the 18 Potential World Heritage Sites in Taiwan(4). In 2010, the Ministry of Culture designated the "Penghu Marine Culture Association - Jibei Baohu Team"(石滬修造技術)(5) as a national cultural heritage preservation and technology preservation group. Since 2015, the Houlong WaiPu Stone tide Weirs group(後龍外埔石滬群)(6) have been registered as a cultural landscape in Miaoli County. The preservation and maintenance of Stone tide weirs is an important project in the preservation of cultural heritage in Taiwan. The government actively subsidizes the restoration of stone tidal weirs throughout the country and holds local and international symposiums in 2018 and 2023 (Figure 1). In 2021, Taiwan hosted the Asia-Pacific Underwater Cultural Heritage Conference, with stone tidal weirs as the main topic (Figure 1). In recent years, the awareness of preserving underwater cultural heritage has gradually increased, and the study of stone tidal weirs has expanded to include the perspective of underwater cultural heritage.

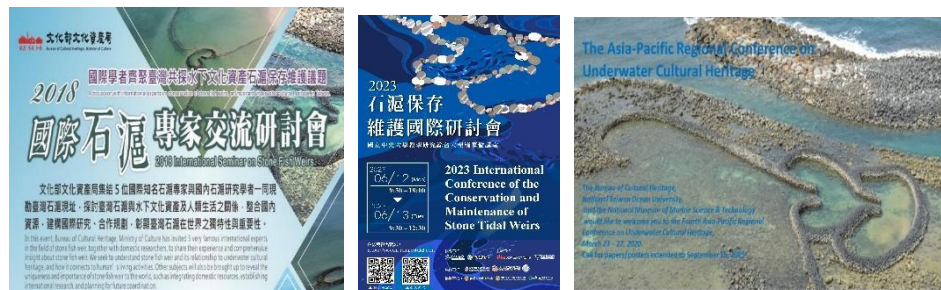


Figure 1. 2018 International symposiums poster (left), International symposiums poster (middle), 2021 4th APCONF web site (right)

4.2.1.2 Funding is being allocated to encourage scholars to research and restore Stone tidal weirs.

Taiwan has a large number of scholars studying stone tidal weirs, and their research can inspire young students to participate, achieving the goal of passing down knowledge (Figure 2). The government provides funding for repairing damaged stone tidal weirs and hiring personnel for restoration work. Hosting international conferences can help understand the current status of stone tidal weir preservation in different countries, facilitate knowledge exchange, and promote the belief of protecting stone weirs among Taiwanese people.



Figure 2 Research results of the Stone tidal Weir investigation provided by Professor Lee, Ming-Ju.

4.2.2 Research achievements and tourism performance establish confidence.

4.2.2.1 "Taiwan has the world's most densely distributed and beautiful stone tidal weirs.

With over 600 households of stone tidal weirs, the ones in Penghu have unique shape and structures such as the fish trap houses(滬屋), which have become a popular tourist attraction due to their stunning and distinctive appearance. The public takes great pride in Taiwan's beautiful stone tidal weirs, enhancing their confidence.(Figure 3)



Figure 3 Jibe Stone Tidal Weirs.

4.2.2.2 Teachers from schools located near stone tidal weirs actively participate in research.

This encourages students' curiosity and awareness, as well as a culture of research. Such as Tamkangz University(淡江大學) and National Central University(國立中央大學) in northern Taiwan, and Tunghai University(東海大學) investigate Miaoli area. National Penghu University of Science and Technology(國立澎湖科技大學) conducts research on stone tidal weirs in Penghu. Through these research efforts (Figure 4), people gain a deeper understanding of the history of stone tidal weirs, community management methods, interactive approaches, and the unique characteristics of these structures. This

makes stone tidal weirs a familiar and beloved part of our culture.

專案計畫成果		
類別	計畫名稱	期程
其他	110-111年澎湖石滬群申請登錄登錄總論述調查研究計畫	2021/01/01~2022/09/21
工作紀錄,保存維護計畫,其他	109-111年度澎湖石滬文化景觀管理維護作業暨工法傳習推廣	2020/05/01~2022/12/31
保存維護計畫	107-108年澎湖石滬文化景觀-古石滬管理維護案	2019/01/01~2019/12/31
保存維護計畫	106年澎湖石滬文化景觀-古石滬管理維護案	2017/01/01~2018/12/31
工作紀錄,保存維護計畫,其他,保存計畫	澎湖石滬群世界遺產潛力點區域創新暨輔導推廣計畫補助案成果報告書(106年)	2017/01/01~2017/12/31
保存維護計畫	105年澎湖石滬文化景觀-古石滬管理維護案	2016/11/16~2017/06/30
工作紀錄,保存維護計畫,其他,保存計畫	澎湖石滬群世界遺產潛力點區域整合暨輔導推廣計畫成果報告書(105年)	2016/01/01~2016/12/15
保存計畫	吉甯印仔北石滬地勢變遷緊急修繕工程委託案	2015/05/01~2015/12/30
其他	103-推動澎湖石滬群臺灣世界遺產潛力點計畫	2014/01/01~2014/12/31
其他	102-推動澎湖石滬群臺灣世界遺產潛力點計畫	2013/01/01~2013/12/31
文化景觀調查或先期調查研究計畫	澎湖石滬基礎調查資料數位化建置案	2012/01/01~2012/12/31
其他	澎湖石滬群網路資訊系統建置案	2011/01/01~2011/12/31
文化景觀調查或先期調查研究計畫	澎湖石滬漁業文化調查計畫	1996/07/01~1999/06/30

Figure 4. Research project results list

4.2.2.3 The revitalization of stone tidal weirs brings tourism benefits.

The largest quantity and most beautiful stone tidal weirs bring local characteristics and tourism benefits to the region. In order to revitalize the stone tidal weirs, young people have returned to their hometowns and combined tourism with innovative ideas to turn stone tidal weirs into new tourist attractions. This has not only created job opportunities for themselves but also brought in tourists to benefit the local community, creating a win-win situation and allowing for the preservation of the stone tidal weirs to continue.

4.2.3 Community involvement creates value for the revitalization of stone tidal weirs.

4.2.3.1 In regions of Taiwan where stone tidal weirs are alive, there is a commitment from local historians and young people to preserve them. including Tamsui(淡水), Sanzhi(三芝), Xinwu(新屋), and Houlong(後龍) in Taiwan island, as well as on the outlying island of Penghu. In addition to the 七美雙心石滬in Qimei(七美)Penghu, Jibe Village in Baisha Township(吉貝白沙鄉), Penghu boasts 116 stone tidal weirs, which are highly concentrated and beautifully shaped, earning it the title of "the land of stone tidal weirs." In these areas, young people have returned to their hometowns and, under the guidance of their elders, work diligently to learn the lost technology of building and repairing stone tidal weirs. They also bring new vitality to the stone tidal weirs through innovative marketing techniques that are unique to their generation.

4.2.3.2 The active reporting and publishing by non-governmental media and NGO are crucial for the preservation and maintenance of local cultural heritage in Taiwan.

In addition to government efforts, the involvement of the private sector is the most stable force. NGOs publish various books introducing stone tidal weirs (Figure 5), and major media outlets report extensively on the history and characteristics of Taiwan's

stone tidal weirs(Figure 5), making them more than just a term. Through media coverage of the history and unique features of stone tidal weirs, a strong momentum is created for the promotion of stone tidal weir preservation by the private sector.



Figure 5 Publication (left), media report (right)

4.2.3.3 Active promotion of combining tourism with stone tidal weirs to create new economic value.

Stone tidal weirs have become a source of pride for local people, and young people are willing to return to their hometowns to revive and operate them. By combining the preservation of stone tidal weirs with tourism, a new way of thinking about stone tidal weir tourism is created, making it possible to turn the preservation of stone tidal weirs into a viable and sustainable occupation. This approach leads to a win-win situation for the preservation of Taiwan's stone tidal weirs and the development of local tourism.

4-3 Transformation and Regeneration of Stone Tidal Weirs

It is not only about reviving and preserving the technology of stone tidal weirs, but also about reviving the cultural value of stone tidal weirs that have lost their fishing value, creating new economic value, and transforming them into a sustainable industry.

4.3.1 Xinwu Stone Tidal Weir Story House(新屋石滬故事館)(7) is a converted old Police watchhouse and dormitory building by the seaside, where local cultural and historical workers introduce the history and stories of stone tidal weirs, exhibitions, and local cuisine. The locals are also invited to help restore the stone tidal weirs, which has gained their recognition. In addition, one-day tours and accommodation experiences centered around the stone tidal weirs have been developed, which are highly favored by locals and tourists alike (Figure 6).



Figure 6 Xinwu Stone Tidal Weir Story House DB. (left), The "Isle. travel" Studio facebook(right)

4.3.2 Young people returning to their hometown, Penghu, establishing The "Isle. travel" Studio"(離島出走)(8) bringing an experienced local master to teach them how to build and repair stone tidal weirs while also documenting each step of the process to preserve the precious techniques of the master. Also they organize unique and exclusive stone tidal weir experiences for in-depth travel, setting themselves apart from other travel agencies. Promoting the experience of repairing stone tidal weirs, led by the local stone masters, to rediscover the craft of stonemasonry. By restoring the stone tidal weirs, it awakens people's memories and emotions towards the ocean, and helps them understand the island culture of stone tidal weirs (Figure 6).

V. CONCLUSION

As human civilization progresses, our way of life has undergone significant changes. With the advent of large fishing vessels, the income generated by stone tidal weirs can no longer compete with that of offshore fishing. As a result, many stone tidal weirs have been abandoned, collapsed, gradually disappearing beneath the sea. Without economic incentives, these stone tidal weirs have ceased to be popular topics of discussion, and many have quietly disappeared. However, in Taiwan, stone tidal weirs face the same challenges but are seen as important historical and cultural heritage. They were vital constructions for coastal communities hundreds of years ago, serving as important hubs for social interactions. Thanks to the efforts of scholars, government support, and active participation from the public, young people are willing to invest in the preservation and revitalization of these stone tidal weirs. They have become not only exclusive terms for seaside communities but also a unique tourist attraction where visitors can experience the traditional practices of carrying and stacking stones and fishing inside the weirs. Through innovation and regeneration, the history and features of these stone tidal weirs have spread across all walks of life, and the young people invested in their preservation have found meaning and value in them. Therefore, the regeneration of stone tidal weirs in Taiwan can be passed down from generation to generation and become a unique landscape feature that protects these historical structures. We hope that Taiwan's stone tidal weirs can become a world heritage list, and other countries can also value their preservation.

Acknowledgements

I appreciate the assistance provided by the consultant Rich Giomanni Wan and ChatGPT in translating.

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