

# ICOA1238: REAL ILLUSTRATION OF CONTINUITY IN HUMAN FISHING/HUNTING CULTURES FROM PAST TO PRESENT - INTRODUCTION ABOUT THE CONSERVATION OF STONE TIDAL WEIRS AT TAIWAN

## Subtheme 01: Integrating Heritage and Sustainable Urban Development by engaging diverse Communities for Heritage Management

**Session 3:** World Heritage, Regulations and Guidelines, Authenticity and Integrity

**Location:** Gulmohar Hall, India Habitat Centre

**Time:** December 14, 2017, 12:30 – 12:45

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**Abstract:** Stone tidal weir is a traditional kind of stone trap made for fishing. Its prototype was a curved U or V-shaped underwater stonewall laid within the intertidal zone. Sea animals could be brought into the trap when the tide came up and left inside the trap as tide dropped. It’s a specific kind of human landscape which could be found only if stones could be easily obtained at some shingle or coral reef beaches. In Asia, the stone tidal weirs just existed in some parts of Korea, Thailand and western Kyushu, Okinawa, Yaeyama, Quanzhou, and Taiwan. At Taiwan, this way of fishing was assumed practiced by the Docas family of the Pinghu people of early Taiwan. As it was bearing wave erosions twice a day, its construction deserved more efforts in regular maintenance than any other similar stone-laid walls like terraced fields. Not just inexhaustible stones in hand, but sufficient labour which could spontaneously be obtained by tacit understanding are key factors for these kinds of construction to be built and sustained. Consequently, the sharing of the trapped-fishing was based on each household’s contribution in initial construction and sustaining maintenance, the consensus in sweat-equity. Therefore, anywhere if the tidal stone weir existed and could still function well, it could be regarded as a kind of human landscape which manifested the genuine social production of fishing. At Penghu Islands and Houlung, the shingle coast section of Taiwan some stone tidal weirs still existed and functioned-well under regular maintenance by the government. Their existences witnessed the sweat-equity consensus associated with segmented-ownership, periodical fishing right, maintenance-responsibility and the labour contribution during initial construction. Even existing, they are all under severe risk and sustainable management planning is urgent and necessary. This paper proposed to make a brief introduction about Taiwan’s tidal weirs’ restoration and maintenance which is trying to keep the real illustration of continuity of local fishing/hunting cultures.

**Key words:** *sweat-equity, conservation management planning (CMP), stakeholder participation, sustainable means of construction*

## Briefing about the Stone Tidal Weirs at Taiwan

Stone tidal weir is a kind of masonry landscape made for snaring fishes and sea animals within the “intertidal zone” along the coasts where tide fluctuation is evident. With the tidal weirs, shoals of fish should be brought into the stone trap when rising tide is coming and should be snared inside the trap when tide dropping. In terms of materiality, the stone tidal weir usually appeared in the fringe reef or the gravel with mild-sloped and adequate stone or chipped pieces of reef were available. The development of stone tidal weir could be traced back to the Pre-Sapiens, which has been categorized to part of the oldest fishing equipment in human fishing and hunting cultures in according with the ethnologist’s (Nishimura Asahi Taro) speculation.

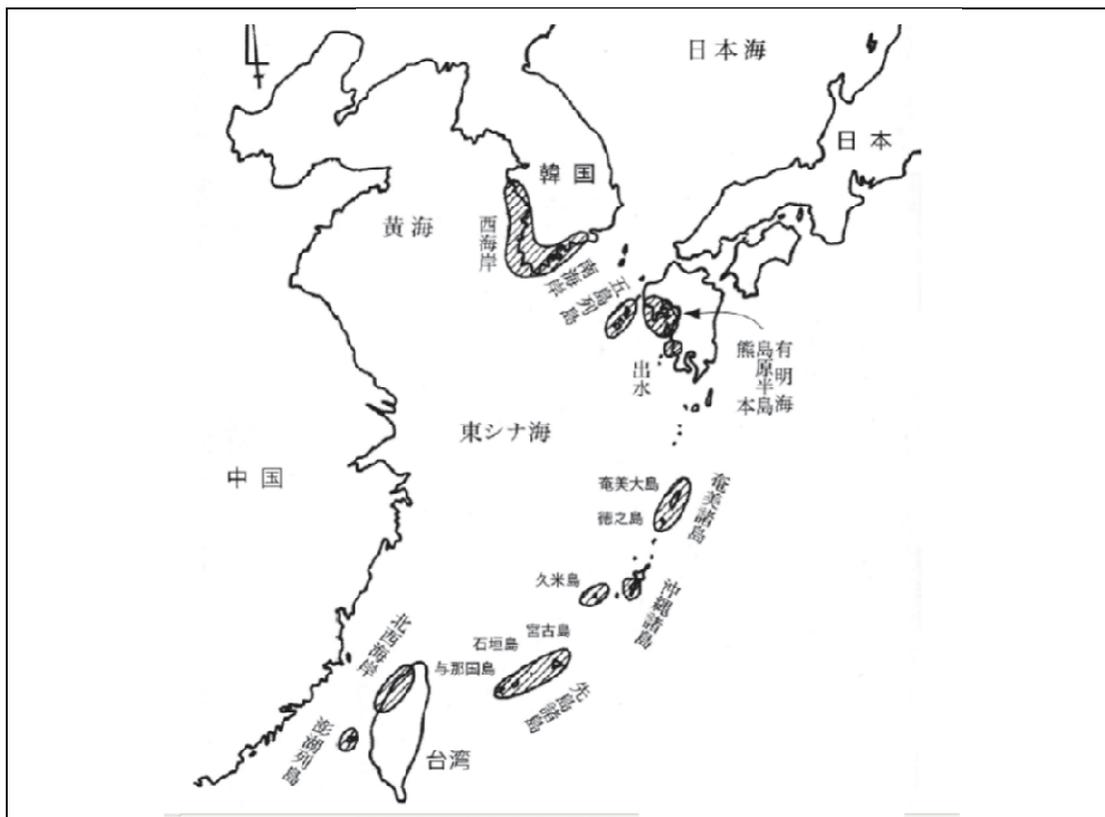


Fig.1– Distribution of the stone tidal weirs within East Asia

It is currently known that the world’s stone tidal weirs are distributed within the Islands of the Indian Ocean (Mauritius), east coast of the Atlantic Ocean (Spain, France), the Pacific Islands (Philippines, Indonesia, Hawaii, Polynesia, Micronesia, Melanesia), especially there is relatively apparent distribution in the peripheral area of East China sea in East Asia (Korea, Kyushu, Okinawa, Taiwan, Pescadores,

Quanzhou, Zhangzhou and so on, *Fig. 1*),<sup>1</sup> while those of Taiwan and Penghu Islands are scattered in the utmost southern tip of East China Sea region.

### Stone Tidal Weirs at Taiwan

Penghu Islands, located in the middle of Taiwan Strait where channel of cold current and warm current alternating between the East China Sea and the South China Sea, have always been important fisheries historically and geographically. In geological aspects, the coral reef coastal terrain provides a stable and gentle seabed where abundant chips of basalt made by volcanism and coral stones formed a good environment to construct stone tidal weirs. Therefore, more than 500 stone tidal weirs had ever been set up around Penghu Islands and more than 90 had still existed; which is deemed the region of the world's largest and most concentrated distribution in accordance with the Penghu County Government official statistics.

Facing the Taiwan Strait and the same fisheries, the west coast of Taiwan Island and has similar fishery resources: especially the migratory fish southbound from the sea gate of China Yangtze River, such as the fixed and a large number of “mullet”. That has even created seasonal fishing and hunting cultures between the fishermen of Fujian Province and Guangdong Province since the Ming Dynasty. But, such coast is basically with sandy sea bed which is relatively unstable to the construction of stone tidal weirs. Nevertheless, as the western foothills’ of the gravel terrace were very close to the coastline from Taipei to the northern part of Taichung, the northern coastal sections relatively manifested in the effects of erosion are filled with gravels, and have formed shingle beaches with sandy seabed or the coastal terrain of which the shingle beaches and the algal reefs are intertwined, providing a relatively adequate source of stone, and on account of such a coastal geological condition, hence a large number of stone tidal weirs were distributed among the northern places on Taiwan's west coast, northbound from Taichung, Miaoli, Hsinchu, Taoyuan, Tamsui, Sanzhi and other places as well before.

According to the surveys,<sup>2</sup> the stone tidal weirs of Taiwan and the Penghu Islands can be roughly classified as “sharp-crested weir” and “deep water weir” based on its depth of the sea where it located and the way to catch fishes (*Fig. 2*). Among which, the “sharp-crested weir” similar to the traditional Pingpu Tribe’s “dry-snaring fishing” method built in the intertidal zone above the low water mark gets completely dry on the ebb with only a weir dike and one (or a few) drain outlet to speedily discharge the seawater so as to catch fishes; or using stone revetment similar to the micro-terrain tide pool as a set of fish-collecting facilities which made for enclosing sea animals inside the trap for fishing assistance, thereby developing basically the dustpan-shaped, boat-shaped, U-shaped weirs, (*Fig. 3*) and sometimes the boat-shaped ones accumulated to look like “fish scale” and formed layers of weirs along the coastline. (*Fig. 4*) These two types of stone tidal weirs have been sprawling over the intertidal zones between the Penghu Islands and Taiwan's northwest coast for more than three centuries and witnessed the ecological wisdom of the indigenous people.

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1Stone Tidal Weirs of East Asia in Transition Tawa Masataka, *humanities review*(The Journal of the Literary Association of Kwansai Gakuin University),59(4),95-107 (2010-02-20)

2General Investigation of the Cultural Heritages of Stone Tidal Weirs at Taiwan, 《石厝文化資產普查計畫》Lin, Wen-cheng,2017:23





Fig. 5- The “deep water weir” located around Penghu Islands

Featuring in the coral reefs and basalt reefs of the coastal terrain and their rough angular surfaces which easily anchored to each other, in comparison to cobbles/ pebbles and sandy seabed of the northern coast of Taiwan, Penghu area’s rocky materials coupled with relatively stable coral reef seabed permitted weirs to be constructed where the depth of water is still up to the masons’ chest on the ebb (Fig. 5). That is the reason why there were weirs located in deep water surrounding Penghu Islands which were significantly different from the “sharp-crested weirs” located in the intertidal zone of Taiwan (Fig. 6).

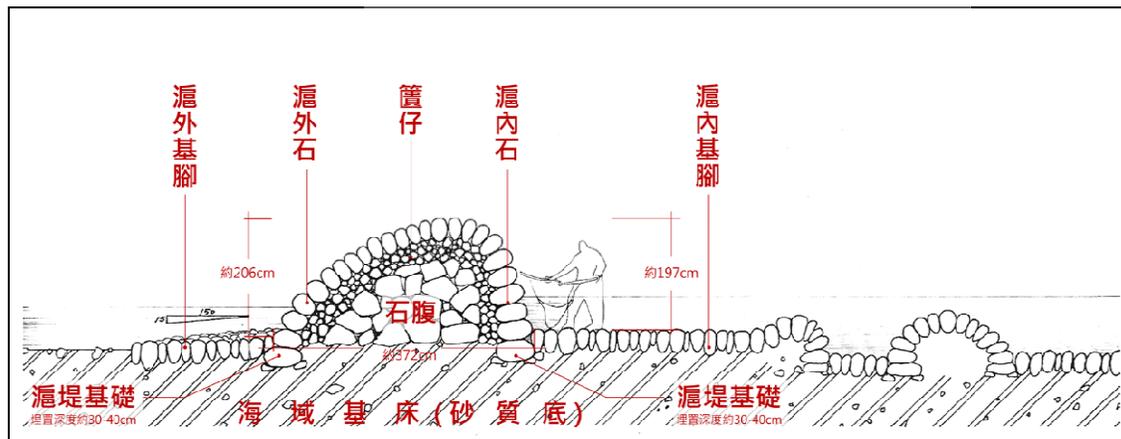


Fig. 6- The section of the “sharp-crested weirs” constructed by cobbles and pebbles

On account of the indigenous fishing experience, the tidal zone beneath the highest sea level on the ebb is where prone to trap the migratory fishes, therefore extra weir dikes in curve-shaped were built inward at the end of the curly tail of the outer dikes to form the bowl-like traps named “tiger eye” (weir room). The extra construction of the “weir room” (Fig. 7) were often in 2~3 meters high above the seabed to have them submerged on the flood but emerged on the ebb. That was also subject to guide the shoals of fish

more effectively for fish-shooting or bracketing after the ebb. Just like the heart-shaped or some other geometrical patterns of stone weirs, they are tangible testimony of human ecological and geological wisdom in accordance with tectonic reasons but only could be found around the Penghu Islands.



Fig.7- The “deep water weirs” with “tiger eye” (weir room) (from <http://www.penghu-nsa.gov.tw/index.aspx>)

Generally speaking, the types of the stone tidal weirs were decided by the land form and geological feature of the seabed, the width of the intertidal zone, and the availability of the stones where the weirs should be constructed. On the contrary, different types of stone tidal weirs not only illustrated the diversified coastal land features of Taiwan and its surrounding islands, but also witnessed the ecological wisdom and the fishing-hunting cultures of the indigenous people after long struggling with the wild natural of the sea. But behind the physical built forms of the human coastal landscape, the stone tidal weirs also witnessed the unphysical aspects behind, which related to the social organization and the rules committed to build and sustain the function of the weirs. Both the physical built forms and the unphysical social aspects behind were the crucial parts of the marine heritages and worth further studies.

According to the historical archives, the history of the stone tidal weirs could be traced back to 1717 for Taiwan and 1683 for Penghu. Both helped to figure out the social relations from local production and surplus exchanging networking between indigenous Docas family of the Pingpu people, the Chinese agents, and the Vereenigde Oostindische Compagnie (abbreviated as the VOC). The cooperation of construction and the regulations made for patrolling and separated-maintaining all made for extend and sustain the functions of the tidal weirs.

Recent studies about the stone tidal weirs had clarified that: responding to more than 3.5 meters of tide fluctuation, stone tidal weirs of Taiwan must have the at least scale for function. This scale usually exceeds the capabilities of family-based labours and was subjected to cooperation beyond single families

or clans. Team works with labours from different families and clan is necessary (Fig.8). Confronting with the wild nature, stone tidal weirs started to be



Fig.8- Cooperation of weirs construction

damaged by rising tides and typhoons right from the moment of its establishment, therefore regular patrolling and maintaining are necessary through responsibility-sharing within the construction team members. In comparison to some other mason works like the retaining walls of terraced fields, the stone tidal weirs reserved much more patience in modifying and repairing any damages caused by tides. The labours devoting to construction, maintaining and patrolling were in correspondence with how many days per one to two month each single family could share. From Penghu to Taiwan, each stone tidal weir should be regarded as a single fishing unit with their own regulations and commitments in the sharing within labours and rewards. Set for years of practicing-and-modifying, these regulations and commitments gradually became the consensus of sweat equity.

Reviewing from the archives, especially the written contracts at Taiwan, the some stone tidal weirs were considered as a production equipment and the sharing of its property right was corresponded in detail to obligation of labours devoting to construction/ patrolling/ length of maintaining and the rights to rewards, which trans-related to the sharing of portions in units of day and month. In addition to portion between rights and obligations, there are some records of tidal weirs around Penghu Islands had detailed description about the duration of repairing and punishment for absence of labouring and festival preparing. From the 18th century until now, to some stone tidal weirs which still function well around Penghu and Taiwan, even not prevailing, the traditional consensus of sweat equity still applied partially. These written archives and the oral histories which interviewing the senior fishermen and masons all confirmed to be the intangible testimonies and played as another crucial parts for further heritage preservation.

The stone tidal weirs were not just a physical human coastal landscape; they also manifested the rich cultural-social aspects behind them; especially when local livelihood highly relied on fishing and agriculture. From the 1970s, when Taiwan was incorporated into the “new division of labours” globally and initiated its industrialization and urbanization, young labours rapidly flew out and the sharing of rewards from the fish-bracketing and shooting inside the stone weirs played with less importance to family income. From 1960s stone tidal weirs at Taiwan reached its peak amount and falling gradually because lesser efforts were devoting for patrolling and maintaining. Young labours would rather betting efforts to employment opportunities outside the villages, instead of exposing themselves to severe sunshine or extreme cold water for maintaining and patrolling. Fish-bracketing became amateur and hobbies for senior labours. More and more weirs could not trap fishes because partially collapsed and compelled the coalitions lose its capacity. The pollution caused by industrialization and the construction for new harbours and land-reclamation along the existing coastal line companying with the “groin effect” also altered the natural environment and had some damages to coastal ecology, especially to the northern part of Taiwan.

So far there is less than ten stone tidal weirs still existed along the coast line of northern Taiwan. Two of them could still function and fish-bracketing are still popular. Penghu islands, even far from the pollutions, the income inside the weirs is far less than the prevailing sea custom network farming. Preservation of the stone tidal weirs is still encountering sustaining problems.



Fig.9- The bird eye view of Qi-mei Stone Tidal Weir (from <https://iguang.tw/u/4417786/article/879551.html>)

In recent years as the Qi-mei Stone Tidal Weirs became the major tourist attraction for Penghu County (Fig.9), the local County Government of Penghu and Miaoli realized the potentials of these heritages and had been willing to designate some of them on the heritage list. Even governmental aid for further investigations and restoration had been initiated, nevertheless the traditional stone weirs still confronting problems of self-sustaining. Additionally, problems such as personnel aging of the senior masons, insufficient budget for regular maintaining, global warming, and climate change are still waiting for resolving. We are glad to announce that Taiwan's Bureau of Cultural Affairs of the Central Government had set up cooperation programs with the local governments for fostering heritage designation, physical damaged restoration, and engaging social organization assistance and counselling, in order to sustain preservation and managing chronically. Stone tidal weirs are kinds of alive heritage illustrate the long-term interaction between the human beings and the wild nature of the sea. What we had been encountering maybe had occurred or should be happened somewhere else the stone tidal weirs still alive. Global experience sharing, cooperation and mutual supporting are more than welcomed and appreciated the most!

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## List of Figures

*Fig. 1- Distribution of*

*Fig. 2- “Sharp-crested weir” (left) and “deep weir”(right)*

*Fig. 3- The dustpan-shaped (left), boat-shaped (right),*

*Fig. 4- The accumulated “fish scale” like stone tidal weirs formed layers of weirs along the coastline.*

*Fig. 5- The “deep water weir” located around Penghu Islands*

*Fig. 6- The section of the “sharp-crested weirs” constructed by cobbles and pebbles*

*Fig. 7- The “deep water weirs” with “tiger eye” (weir room) (from <http://www.penghu-nsa.gov.tw/index.aspx>)*

*Fig. 8- Cooperation of weirs construction*

*Fig. 9- The bird eye view of Qi-mei Stone Tidal Weir (from <https://iguang.tw/u/4417786/article/879551.html>)*

# ICOA1238: UNE RÉELLE ILLUSTRATION DE LA CONTINUITÉ DES CULTURES DE LA CHASSE ET DE LA PÊCHE ENTRE LE PASSÉ ET LE PRÉSENT ; INTRODUCTION À LA CONSERVATION DES ÉCLUSES À MARÉE À TAIWAN

## Sous-thème 01: Intégrer le patrimoine et le développement urbain durable en engageant Diverses communautés pour la gestion du patrimoine

**Session 3:** Patrimoine mondial, Réglementations et directives, Authenticité et intégrité

**Lieu:** Hall Gulmohur, India Habitat Centre

**Date et heure:** 14 Décembre, 2017, 12:30 – 12:45

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**Résumé:** Une écluse à marée est une sorte de piège en pierres traditionnel utilisé pour la pêche. Son prototype est un muret en pierre en forme de U ou de V installé dans le fond des parties de la côte que la marée découvre. Les poissons et crustacés sont ainsi amenés dans la nasse à marée haute et restent prisonniers quand la mer se retire. Elle représente donc un paysage façonné par l'homme qui ne se trouve qu'à condition que les pierres puissent être facilement obtenues, sous forme de galets ou de concrétions coralliennes.

En Asie, les écluses à marée ont été réalisées dans quelques zones de la Corée, de la Thaïlande, de la partie occidentale de Kyushu, à Okinawa, Yaeyama, Quanzhou et Taiwan. A Taiwan, cette forme de pêche a été surtout pratiquée par les Docas, branche du peuple Pinghu du Taiwan ancien. Soumis à l'érosion des marées deux fois par jour, ce type d'ouvrage a nécessité plus d'effort d'entretien régulier que d'autres murs en moellons de pierre, comme ceux des cultures en terrasse par exemple. Il ne suffit pas d'avoir des pierres

à disposition, la construction et la maintenance de ce type d'ouvrage nécessite des travaux réguliers qui impliquent une compréhension tacite des acteurs. En conséquence, le partage du produit de la pêche était basé sur la participation de chaque foyer

à la construction initiale et à sa maintenance, la contribution en nature étant ainsi consensuelle. Chaque lieu où les écluses à marée existaient et pouvaient encore fonctionner correctement formait ainsi la preuve d'un aménagement du paysage produit par une authentique production sociale liée à la pêche. Dans les îles Penghu et à Houlung, secteurs de plages en galet de Taiwan, quelques

écluses à marée existent encore et fonctionnent grâce à l'entretien assuré par l'Etat. Leur existence est la preuve d'un consensus sur la contribution en nature associée à une propriété morcelée, des droits de pêche saisonniers, un devoir d'entretien et une contribution aux travaux de construction initiale. Bien qu'encore en activité, ces ouvrages sont soumis à de nombreux risques et un plan de gestion durable devient urgent et nécessaire.

Cet article propose une courte introduction sur la restauration et l'entretien des écluses à marée de Taiwan afin de préserver une réelle illustration de la continuité des cultures de la chasse et de la pêche.

***Mots-clés:** contribution en nature, plan directeur de conservation, participation des intervenants, modes durables de construction*