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A review of sustainability associated with the covid-19 pandemic era in Pongso no Tao (Lanyu)

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Abstract

Since the beginning of 2020, the global pandemic of COVID-19 has been raging around the world. Taiwanese people have turned to domestic traveling such as outlying islands being the No. 1 choice when they are unable to travel abroad, forming a trend of "Pretend to Go Abroad" tour. During the 2020 summer vacation, visitors were a sharp increase. For Taiwanese, Pongso no Tao (Lanyu), an outlying island with the most inconvenient transportation and full of ethnic style, became the first choice for traveling among those outlying islands in Taiwan. Pongso no Tao is an island inhabited by the Yami/Tao people. It has special ocean cultural assets and a unique natural ecology. Last year, the retaliatory tourism wave brought by the pandemic of COVID-19 and resulted in what kind of negative natural ecological impacts on Pongso no Tao. Excess tourists may bring ecological impact. This review aims to discuss the sustainable development of Pongso no Tao, extract critical components that contribute to the dynamic stability and sustainability of ecosystem. We will provide useful suggestions to contribute enabling Pongso no Tao to continue to move towards sustainability and maintain its unique ocean culture.

Keywords: Lanyu (Orchid Island), Yami/Tao People, Ocean Culture, Sustainability, Pandemic of COVID-19

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人之島新冠肺炎大流行時代的永續性綜論

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摘要

自 2020 年初以來，COVID-19 的全球大流行已在全球肆虐。台灣人在無法出國旅遊時，轉向國內旅遊，如離島等，成為第一選擇，形成“偽出國”旅遊的熱潮。2020 年暑假期間，遊客人數急劇增加。對於台灣人來說，交通最不便、充滿民族風情的離島人之島（蘭嶼）成為台灣離島遊的首選。Pongso no Tao 是一個島上居住著原住民族雅美/達悟族人，擁有特殊的海洋文化資產和獨特的自然生態。去年，由新冠肺炎大流行帶來的報復性旅遊浪潮對人之島造成了什麼樣的負面自然生態影響，過多的遊客可能會帶來生態影響。本綜述旨在討論人之島的永續性發展，提取有助於生態系統動態穩定性和可持續性的關鍵成分。我們將提供對於未來永續發展有用的建議，幫助人之島繼續朝著永續發展的方向發展並保持其獨特的海洋文化。

關鍵字: 蘭嶼（人之島）、雅美/達悟族、海洋文化、永續性、新冠肺炎大流行

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Introduction

Pongso no Tao is also called Lanyu (Orchid Island or Botel Tobago), has a natural ecosystem with healthy natural ecological benefits and profound traditional cultural values [1, 2]. Through customary laws (consuetudinary laws), the ecosystem has been guarded by the Yami/Tao indigenous people for a long time, and therefore, Pongso no Tao is in line with the Indigenous and Community Definition of Conservation Area (ICCA) of the United Nations [3,4]. Pongso no Tao is an island about 90 kilometers southeast of Taitung County and was called "Hongtouyu" in Mandarin in the early days [2]. It was a volcanic island formed by lava and clastic rocks erupted by a submarine volcano [1]. County Road East No. 80 around the island, and the Zhongheng Road (County Road East No 81) between Hongtou and Yinye Villages, strung the island's six tribes: Yayo, Langdao (Iraralay), Dongqing (Iranmeylek), Yeyin (Ivalino), Hongtou (Imaorod) and Yuren (Iratay), and also strung the island's scenic spots [5]. Tourists mainly come to Pongso no Tao by air and boat. The main factor in the off-season tourist decline is the unstable closure of boat and air transportation due to the strong influence of the northeast monsoon [6].

1. Valuable water resources in Pongso no Tao

The main livelihoods of the Yami/Tao people are agriculture and fisheries. The agricultural workers are women. The main crops include water taro (soli in Yami/Tao Language), dry land taro (keytan in Yami/Tao Language), sweet potato (wakey in Yami/Tao Language), millet (kadayi in Yami/Tao Language) [7, 8]. There are different types and cultivation methods of taro and in addition to being eaten on weekdays, it is also used as a sacrifice at important ceremonies and inauguration ceremonies or as a gift to friends and relatives [9]. The agricultural labor work is dominated by women, and they have rich experience and technology inheritance; the fishery work is the responsibility of men, and the main work is fishing for migratory flying fish [9]. In addition, the Yami/Tao people also stock goats, livestock pigs, and chickens, and slaughter and share them during the inauguration ceremony, flying fish festival or various sacrifices [7, 8].

The Yami/Tao people in Pongso no Tao attach great importance to taro, a staple crop that has existed since ancient times and tt needs enough water to produce a sufficient harvest of taro [9]. Traditionally, Yami/Tao women are responsible for cultivating taro [8]. According to the description of Yami/Tao people and a report by Liu X.G. [10] : Yami/Tao people's taro paddy fields are related to the source of water, and thus Yami/Tao women's farming methods cannot be the same as traditional Taiwanese's paddy fields, using large-scale farming methods, or spraying pesticides and fertilizers. Because of the scattered field bases, women often need to travel between different tribes [9]. Paddy fields and dry fields are farmed alternately and it is common to run more than two bases in a day [7]. In recent years, it has been recorded that there are five taro varieties of commonly grown, namely Alaleng, Mineysiver (also known as Mamasevehen, Maseveh), Kalaro, Ovan, and Milakasoli in Yami/Tao language [11]. However, there have been documented 21 kinds of taro varieties in Pongso no Tao in 21th century, and this numbers are more than the documented 17 taro varieties in Batan Island, Philippines [12]. Yu and Dong [13] pointed out that there was a legend of the Great Famine in Pongso no Tao: "The land on the whole island was cursed, and no crops could grow about two hundred years ago, and the whole Pongso

no Tao experienced nine years, the Great Famine".

Liu [10] pointed out that she once observed that the water source of a household was laid and connected by five relatives who jointly invested about NT $ 40,000 (about 1500 US dollars). At the same time, she also found that there was a clear distinction between the pipeline and the waterway of the water source. The distinction of water source is very important to Yami/Tao people; it can also be separated by small wooden strips in narrow waterways in order to distinguish the water source and paddy fields, even if the paddy fields are as large as 2400 square centimeters [10]. Adhering to the distinction between stones shows the importance of water source division and also shows the importance of water resources to the people of Pongso no Tao. This also involves the series of water flow between paddy fields [10]. The kinship of the owners between the paddy fields and the surrounding paddy fields indicates that these paddy fields share the same water source [10]. Paddy fields are as important to Yami/Tao people as precious lives [10]. A Yami/Tao woman said that because her father-in-law is a wizard, in the past, Yami/Tao people often used the valuable paddy fields in exchange for the same when they asked for help from the wizard (his father-in-law) because of major accidents [10]. Because of the precious human life, the descendants of wizards inherit a considerable number of paddy fields, and there are many paddy fields located in the water source [11, 14].

Taiwan is narrow and densely populated [15]. The rivers in the territory are steep and short [15]. In addition, the difference in rainfall in the dry rainy season makes it difficult to store wate r[15]. A common water control strategy is to build reservoirs and dams to stabilize the people's water supply and reduce the suffering of water shortages [15]. For outlying islands, water resources are not easy to obtain, and often because of the large differences in wet and dry seasons, reservoirs are built in all outlying island counties and cities in western Taiwan [15]. Currently, for the eastern outlying islands of Taiwan, only Green Island has a reservoir in the eastern region. There is a man-made reservoir in Green Island where the supply of Chouqin Reservoir is relatively high [15]. Stable tap water is available for the residents of the island [16]. Compared with Green Island, in the era when there was no food import in Pongso no Tao, mastering water resources was a necessary means for survival. Water is the source of life, and the mastery of water is related to the reproduction of offspring. The use and management of water is the key to accumulating social prestige. Water is a source of disputes in interpersonal and social relationships, and it may also be a bridge to repair relationships. It has a rich social nature. The construction of water pipes and national houses affected the way the Yami/Tao people used daily water. From the past tribes moved to tribal public wells to draw water, to use water pipes to divert water to their houses [16].

There is no reservoir in Pongso no Tao [16]. At present, the Taiwan Water Company has three water purification stations on the island, which are located in Dongqing Village, Langdao Village, and Hongtou Village [16]. These three water purification stations are all supplied by ground water sources. The average water consumption is 928 CMD, which is as high as 1,200 CMD during festivals and summer holidays [16]. The difference is as high as about 270 CMD (Cubic Meter per Day) [16]. Outlying islands are generally in short supply of water resources. Pongso no Tao has suffered from the wave of revenge travel caused by the COVID-19 epidemic

since 2020 (Figure 1). This challenge was faced for the first time during the peak summer vacation. This year's holiday water consumption reached 2386 CMD, an increase of approximately 537 CMD [16]. Pongso no Tao has tap water, but 60% of the people obtain water from streams and ground water [16]. However, the tap water has also increased the number of people who use it due to its convenience [16]. The common people and the water company use the same source of water [16]. At present, if the water consumption of each household does not exceed 40 degrees, the water fee is paid by the township government [16]. Taking the average household water consumption of about 20 degrees per month, the upper limit of 40 degrees should be sufficient [15]. However, it is worth noting that the current statistics on water use are all official data. The actual water consumption is conservatively estimated to be 1.5 times, and the estimated actual water consumption at the peak of 2021 holiday is as high as 3579 CMD [15].

Many ocean cultural ethnic groups and communities around the world have successfully implemented coastal management systems without scientific data or modern technology. Traditional ecological knowledge (TEK) is regarded as a belief system with a cultural framework and has played an important role in successful cases [17, 18, 19, 20]. The Yami/Tao ethnic group in Pongso no Tao is one of the representatives [20]. After investigation, there are 7 genera and 24 species of flying fish in the vicinity of Pongso no Tao. Six flying fish species are considered to be the dominant species [21]. Can the seas owned by the six tribes of Pongso no Tao continue to maintain the sustainability of fishery resources? In fact, it is closely related to whether the island can continue to maintain clean water resources and the direction of pollution-free sewage pollution.

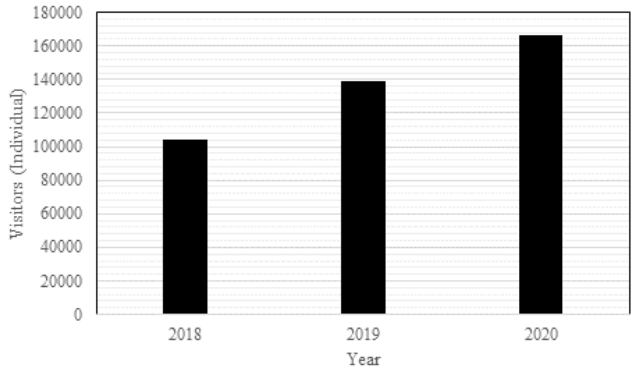

Figure 1: The total number of visitors to Pongso no Tao from January to December 2018-2020.

2. The crisis of excessive tourism on Pongso no Tao

There are six tribes in Pongso no Tao, namely Yayo, Iraralay, Iranmeylek, Ivalino, Imaorod, and Iratay [5]. From August 2020 to August 2021, after twelve months of research and investigation conducted by us, the current situation of Pongso no Tao was found that there was no industrial water in Pongso no Tao, and water for people's livelihood and agriculture were the main expenditure items [16]. Water consumption during the Pongso no Tao sightseeing season is the maximum expenditure time [16]. Most of it belongs to the people's livelihood (tourism waste water) and irrigation water [16]. However, because the Pongso no Tao sightseeing season overlaps with the local wet season months, serious water shortages have not yet occurred.

According to the Yami/Tao seniors said that since they can remember, there has been no water shortage in Pongso no Tao, but there are legends [13]. If the climate changes in the future, when the rainy season is no longer the rainy season, the problem will come out.

In recent years, the number of visitors to Pongso no Tao has continued to increase (Figure 1), but the number of tourists has soared in 2020. During the summer vacation (July-September) statistics show that the number of visitors to Pongso no Tao has been nearly 35,000 more than in 2019. For the first time in Pongso no Tao's history, the number of people on the island exceeded 30,000 for three consecutive months (Figure 2), but the original inhabitants of the island were about 5,000 people (including 90% Yami/Tao people and 10% other Taiwanese groups), and most of the people who visited Pongso no Tao were tourists. It is six times more than the local residents of Pongso no Tao [16]. Will Pongso no Tao still be able to maintain a lack of water in the future? Tourists have continued to increase from 2000 to October 2020 in Pongso no Tao, and there has been exponential growth during the peak holiday period in recent years [16, 22].

Previous studies have pointed out that modernization and globalization have become irreversible trends, and tourist literacy needs to be managed rather than completely rejected (for example, in eco-tourism, external tourists are allowed to enjoy the beauty of the ocean in more places, but an environment for external tourists needs to be established first such as environment education knowledge) [23]. Modern technology and government policies may inadvertently destroy the original tribal traditional protection practices (such as in the case of using motor boats and foreign fishing boats snatch fishery resources), and outsiders participate in the activity resource system (tourists) that were previously only attended by Yami/Tao people [23]. The case of non-Yami/Tao fishermen may also undermine the traditional protection practices of tribes. Whether at hometown or abroad, tribes and communities are currently the focus of attention of all parties [24]. The society also gives high expectations to the important roles and functions that tribes and communities can play [24]. However, in the face of endless government policies, tribes and communities in changing societies have already surfaced potential problems. Not only inappropriate government policies have failed to get a reasonable solution, they may even worsen the conditions of tribes and communities [24].

Pongso no Tao has documented about 30s endemic plant species and 900 plants species (200 of those 900 plant species are not recorded in Taiwan), 22 liverworts and mosses, 130 fungi species and algae has 159 species [25, 26, 27, 28] . Therefore, Pongso no Tao has a unique biodiversity and should be conserved. Making proper policies is essential for sustainability in nature and culture of Pongso no Tao. For example, inappropriate government policies have caused flying fish to be commercialized, which has affected the overall flying fish culture-related marine resources [29]; previous studies have also pointed out that overloaded tourism activities have severely affected the ecology of Pongso no Tao [29]. The impact on its natural resources and the traditional culture of the Yami/Tao people, such as affecting the health of the Lanyu Horned Owl and the survival of the Lanyu Pearl Butterfly, indirectly led to the extinction of the species [30]. Tourism and economic development need to be coordinated with each other in order to effectively reduce the generation of pollution sources. Only with a healthy ecosystem can there be continuous tourism resources.

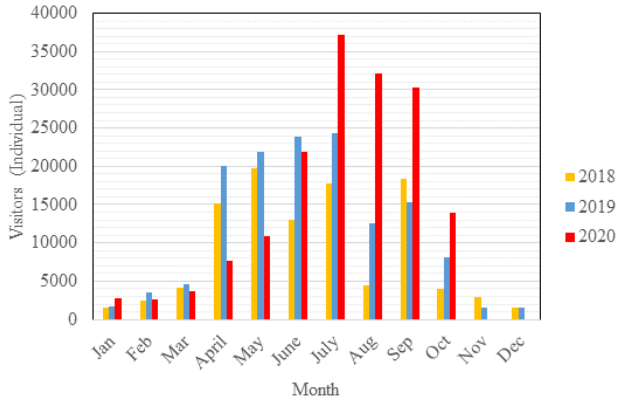

Figure 2: The monthly number of visitors to Pongso no Tao from 2018 to 2020.

3. Application of United Nations Sustainability Index in Pongso no Tao

The Sustainable Development Goals (SDGs) of the United Nations include 17 Goals and 169 Targets, demonstrating the scale and ambition of the Sustainable Development Goals [31]. Among these 17 goals, there are three major items associated with this study. Goal 6: Clean Water and Sanitation: Provide water sanitation and sustainable management for all; Goal 14: Life Below Water: Protection, sustainable use of oceans and marine resources, and promote sustainable development; and Goal 17: Partnerships for the Goals: strengthen the means of implementation and revitalize the sustainable development of the global partnership; it is the goal project for the sustainability of the Yami/Tao marine culture. For Pongso no Tao, it is important to continue to have clean water and maintain a self-sufficient food source. In particular, Pongso no Tao belongs to an island ecosystem. This also reminds the government to give priority to sustainable ecological development while developing tourism and tourism. Pongso no Tao is currently in a healthy state of water-related ecosystems such as forest wetlands and aquifers. There is currently no water quality monitoring data for the river part, but according to local people, they have taken river water to drink at home since ancient times. When only in the dry season, the government water company might grab water from the people. However, the current penetration rate of Pongso no Tao 's tap water is only about 40%, and the local residents still occupy the majority of natural mountains and rivers [32]. This pattern is affected by the spring and summer tourism trends [32]. Most people who operate homestays will use the tap water from the water company to provide them for tourists [32]. Water quality sampling, the results of the sampling are in line with drinking water source and drinking water quality standards [32].

For Goal 17, Sharman Ramboan once said: The emotions of the sea are often understood by non-ocean people; others say that the sun goes down, we mean the sun goes down the sea; we naturally learn the knowledge of the ocean and bring up our unique marine culture, but if the marine environment loses health, how will our culture achieve the sustainability that everyone says? The impact of tourists on local culture is often discussed in the Lan En Cultural and Educational Foundation Introspection, in addition, from time to time, some scholars' related papers mentioned the sustainability of Pongso no Tao, such as the article "The Yami/Tao People's Response to Modern Environmental Governance and the Development of Sustainable Environmental Governance"[23].

As far as Pongso no Tao is concerned, it is an independent island and coastal resource. In addition to maintaining its existing traditional fishery culture, prohibiting overfishing, preventing excessive land pollution from polluting the sea, can it ensure good fish quality and maintain fishery resources However, there is no scientific experimental data to prove whether the water resources of the six tribes are polluted [33]. For the Yami/Tao people in Pongso no Tao, they protect their unique marine culture, integrate with the world, and use traditional marine culture as a benchmark to introduce new perspectives to maintain their future sustainability in response to changes in the environment [33]. The sustainable development convention drawn up by the United Nations to gather all countries in the world is worthy of our reference, especially when it comes to the sustainability of water resources. It is the right of the people in the 21st century to have clean and pollution-free water and air. Fortunately, Pongso no Tao, which is on an outlying island, has no air pollution problems from the west (mainland), so you can focus on achieving the sustainability of water resources [33]. Since Pongso no Tao itself has sufficient water supply, you only need to focus on Preventing water pollution and enclosing an ecologically sustainable situation can not only give residents a safe living space, but also allow freshwater and marine organisms to have a safe home in order to continue to maintain a self-sufficient marine culture.

4. Nuclear waste storage site problem

Based on the Taiwan Electric Power Company [34] and Yang [35] researches, we summarized our finding as follows. Because there is a nuclear waste storage site in the Longmen area of Pongso no Tao, government units have continued to monitor the coastal water quality in the waters near Longmen for the past 37 years (1979 to 2018). The conclusion of the study is that the coastal areas are affected by land sources, with low salinity and high nutrients. The rest, such as pH and dissolved oxygen, roughly meet the Class A water quality standards, indicating that the seawater near the nuclear waste storage site meets the requirements. National water quality testing standards. Taiwan Power Company stated that the agency built its own sewage treatment system, so it will not cause offshore water pollution. However, the offshore water quality test commissioned by a domestic research unit found that the offshore area of Iratay Village has excessively high nutrients, showing that the source of pollution comes from the land. The report of the research team commissioned pointed out that the nutrients (nitrates, nitrites, phosphates, silicates) in the hydrological and water quality measurement stations are higher than those in the offshore seas. Coastal seawater has long been subjected to the influx of terrestrial water containing high amounts of nutrients. The research team of Chen and others in the sea area near the Lanyu nuclear waste storage site [36] showed that there is no seasonal change in salinity, but the variation of each measurement station is large. The results of the Iratay Village station showed that the salinity was low, which was caused by the influx of land-sourced water into the sea [36]. The water temperature of the sea was mainly affected by weather and seasonal changes and the pH and dissolved oxygen of all the stations [36]. The amount meets the standards of Class A (applicable to first-class aquatic water and swimming) sea waters specified in the "Marine Environmental Classification and Marine Environmental Quality Standards" promulgated by the Environmental Protection Administration on December 26, 1990; Often accompanied by higher dissolved oxygen, it shows that the sea area has a more vigorous photosynthesis; the nutrients

(nitrate, nitrite, phosphate, silicate) in each station are higher than those in the open sea, which is nearshore Seawater has long been subjected to the influx of terrestrial water containing high amounts of nutrients [36].

Because currently no industry in Pongso no Tao, there is no problem of industrial waste water. However, domestic sewage and residential sewage from guesthouses and restaurants attached to tourists have become the main land pollution sources of Pongso no Tao. In addition, the study has not been deciphered about whether the friendly and non-toxic traditional Yami/Tao agriculture has been invaded by modern chemicals and pesticides in recent years. Up to day, there is no water quality and ecological monitoring data that can solve the above problems. We can't wait for serious problems before taking supplementary education measures, especially for fragile small island ecosystems. Therefore, it will become a research item that needs investigation and experiment in the future, and long-term ecological surveys should be carried out in the offshore areas and river outlets of each tribe in order to establish the first-hand information of the complete environmental ecology of each tribe on Pongso no Tao.

5. Threats of Residual Pesticides in Sewage and Water

Water is one of the most important substances on the earth. All animals and plants must have water to survive. If there is no water, there will be no life on the earth. It covers about 71% of the earth's surface and is essential for all known life forms, but only 2.5% of the water on the earth is fresh water [37]. Due to industrialization and urbanization, global water resources are becoming more and more polluted. In most developing countries, the risk of such polluted water consumption and sanitation problems is increasing. The rapid urbanization and industrialization process releases a lot of purified and reuse of wastewater [38]. Wastewater and sewage are increasingly used as water resources for urban and suburban agricultural irrigation, which promotes important economic activities and is more valuable in many densely populated countries [38]. Land changes the water quality of natural water bodies, and the increasingly serious water shortage has had a major negative impact on the world’s economic development, human livelihoods and environmental quality [38]. Therefore, protecting water from pollution or seeking more advanced non-water and sewage treatment remedial methods have become the basic needs of today’s environment [39]. For places that are still suffering from environmental pollution and threats, such as fragile islands, the government needs to make more efforts [39].

Sewage refers to water that contains pollutants generated outside of the business; Water pollution refers to the quality of water that changes due to the intervention of substances, organisms or energy, which affects its normal use or endangers the health and living environment of the people (business: refers to companies, factories, mines, etc.) ; Wastewater treatment industry, animal husbandry, or other undertakings designated by the central competent authority); Wastewater: refers to the water containing pollutants produced by the undertaking in the manufacturing, operation, natural resource development process or operating environment [40]. The classification of pollutants is: Oxygen Demanding Wastes, Disease Causing Agents, Plant Nutrients, Organic Compounds, Oil, Inorganic chemicals, Sediments, Radioactive Materials, and Heat [41]. Catering industry, tourist hotels and restaurants providing catering services should set up grease retention facilities to remove grease from catering wastewater [40]. If there are too

many tourists, the hotel and catering businesses do not have grease retention facilities, and then the excessively high degree of grease in the estuary and offshore areas would be measured, and so on for the rest of the projects [40]. With the development of society and economy, the development and construction of remote mountainous areas such as catchment areas and hillsides have begun. In suburbs, non-urban areas or remote mountainous areas, areas with low population density and low pollution, sewage pipeline facilities are insufficient, and sewage treatment plants are built [42]. Operation is not easy, and the operation and maintenance costs are not in line with the practical considerations such as cost-effectiveness [42]. The discharge of fertilizers, pesticides, chemical substances and other civil sewage directly flows into ditches or adjacent rivers, enters the sea, and becomes a source of water pollution, and the above becomes the blind spot of water pollution prevention and control [42].

The health status of water resources is a major challenge facing humanity in the 21st century [39]. Water pollutants, such as chemical pollution, especially inorganic and organic micro-pollutants, including toxic metals and metalloids, and various synthetic organic chemical substances, are already harmful to human health and cause a negative impact [39]. Chemical water pollutants can be divided into two categories: A relatively small amount of large pollutants usually occur at the level of milligrams per liter, including nutrients such as nitrogen and phosphorus, as well as natural organic components [43, 44]. The sources and effects of these common classic pollutants are known, but designing sustainable treatment technologies for them is still a scientific challenge [45]. High nutrient loading may lead to increased primary production of biomass, oxygen consumption, and toxic algal blooms; increased salt seepage into surface water through roads and excessive irrigation constitute another long-term problem; high salt concentration prevents direct use as drinking water, and inhibit the growth of crops in agriculture [46, 47]. Due to overexploitation of aquifers and sea level rise, sea salt intrusion into groundwater has exacerbated this problem in many coastal areas (such as India and China) [46, 47]. Persistent organic pollutants (POPs) have affected water systems globally for more than 50 years [48]. During this period, geological pollutants have always been one of the main sources of long-term regional and water pollution, plus pesticides and the scale of wastewater sources from region to local has various short-term negative effects, often causing long-term damage to the ecosystem [48].

Urban sewage and industrial wastewater are well-known sources of pollution, including tourism and catering wastewater [49, 50]. However, recent surveys have shown that agriculture is also the main cause of global water pollution, including a large number of pesticides, nutrients, organic matter, drug residues, sediments, salt loss induced salinization, plastic particles and pathogens [51]. The reduction in water flow has increased water pollution, which is largely driven by the large demand for industrial water and the demand for crop irrigation from agriculture [52, 53]. In some high-income countries, agriculture has surpassed the pollution of urban sewage and industrial wastewater (except for the environmentally harmful substances of industrial wastewater), and has become a major factor in the eutrophication of inland and coastal waters and the pollution of nitrate and salt groundwater [54, 55]. In the European Union (EU) research report, 38% of water bodies are under tremendous pressure from AWP [56]; in the United States, agriculture is the main source of pollution in rivers and streams [57]; China’s agricultural survey

also found that almost groundwater is polluted entirely by nitrogen sources [31]. In many low-income countries, concerns about health and the environment are increasing, and pesticide pollution is often found to be the source of water pollution [45, 50]. The study by Evans et al. [58] also pointed out how to better share scientific evidence and knowledge with the public and farmers in the future to encourage friendly farming practices, which is the foundation of sustainable development in all countries.

The associated agriculture pollution have been extremely attributed to the growth of several fundamental factors including the growth of human population, changes in demand for food and fuel, and climate change [50]. Managing pollution and minimizing agricultural risks requires a deep understanding of: (1) the source and destination of pollutants, the changing pollutant pattern (2) contaminants of emerging concern (CEC) and plastics Particulate issues (3) the impact of globalization, trade and other driving factors and climate change (4) the impact on humans and the environment (5) the effectiveness of measures to reduce pollution and alleviate pollution [58]. For issues related to water pollution, especially agricultural pollution in a broad sense, past research results have shown that data may be unevenly distributed across the globe. There are many types of general agricultural pollutants, including chemical agricultural and livestock drugs, antibiotics, hormones, fertilizers, indirect toxins, industrial nanoscale pollutants, plastic particles, antimicrobial cleaners and their transformation products [57, 59, 60]. They are usually not monitored, but they may cause adverse effects on ecology and human health [61, 62, 63]. According to reports, more than 700 CECs have been detected in the aquatic environment in Europe, and more than 200 drugs have been found in rivers around the world [61, 62, 63]. CEC has been proven to affect the environment and may harm humans [64, 65]. A large number of studies are being conducted on the impact of wildlife and humans to improve the understanding of these pollutants [64, 65].

In many parts of the world, water pollution has worsened, and high pollution threats have been found in America, Europe, Asia, and parts of Africa [66]. This deterioration is expected to exacerbate threats to the environment, human health, and sustainable development [58]. However, due to the current global population and reliance on agricultural production, it also directly has an unprecedented impact on water quality, so the contribution of the chemical agricultural revolution needs to be more considered (Evans et al., 2019). Agricultural water pollution (AWP) has become a category of 21st specific domain knowledge [50, 58]. Current and future research needs include attribution of pollution sources, emerging pollutants, cost issues, costs, and incentives to reduce pollution [50, 58]. Agricultural water pollution has become a global problem [58]. It is expected that as the population grows, the demand for food will increase, and the diet will be made up of a higher percentage of protein_ the predicted result will be more livestock, greater production and increased use of chemicals products, including the use of various chemical and biological agents [58]. Understanding these impact changes will require research in multiple fields to determine the source, relative proportion, flow rate, conversion process and the impact of pollutants, to understand CEC, including long-term environmental and health impacts, various effects and cumulative effects, especially in terms of drug resistance, all these are one of the great challenges of sustainable development [57, 58, 65].

Microplastics are considered as emerging pollutants of concern and plastic particles usually refer to particles smaller than 5 mm in size [67]. In 2009, the National Oceanic and Atmospheric Administration (NOAA) defined plastic particles as plastic particles smaller than 5 mm and they can be called microplastics. These plastic particles are tiny plastic particles that can be used as scrubbers in cosmetics, hand sanitizers and hair dryers, or tiny fragments of various plastic products that have been weathered for a long time [68]. Since scientists first published an article on the environmental ecology of plastic particles entering the ocean in 1972, these pollutants are now ubiquitous in almost all marine environments, even in terrestrial ecosystems [69, 70, 71, 72]. The durability of plastic makes it highly resistant to degradation and enters the aquatic environment. Nowadays, this has become a problem that has attracted more and more attention from the scientific community, because these particles are easily contacted by a wide range of aquatic organisms due to their small size, and finally pass Food web transfer [70, 73]. It has been found that the accumulated toxins from the microorganisms leads to the chronic food chain effects of marine organisms [73, 74]. The under concerned dangerous effects of alternating ingestion of plastic particles on the human body can lead to chromosomal changes, leading to infertility, obesity, cancer and other diseases [73, 74].

6. Suggestions

In addition, direct sightings and interviews are very effective methods for exploring the causes of changes in the marine resources of Pongso no Tao. At present, the people of Pongso no Tao have begun to use herbicides to manage farmland, and domestic wastewater is directly discharged into the ocean, and garbage such as plastic bags is also a problem. The launch of the monitoring program, through oral transmission, Pongso no Tao Radio Broadcasting, expects that the pollution behavior of the people will be reduced. In addition, one can also find a community to demonstrate and promote, including household wastewater treatment, environmental sanitation, setting up waste sorting and recycling stations, and doing a good job in waste reduction and recycling. In other words, the monitoring of the ecological environment is not only monitoring, but also a way to guide the life style of the entire Pongso no Tao stakeholders towards a friendly environment. In fact, the Yami/Tao people care more about their island culture and ecological environment than the outside world. The Yami/Tao people launched a large-scale anti-nuclear waste campaign during the period of martial law. The Yami/Tao famous writer Mr. Sharman Ranboan even practices writing and engaging in labor, absorbing, discarding, reproducing and transforming traditional culture. When the so-called retaliatory tourism due to COVID-19 Pandemic took place in Pongso no Tao in the peak seasons of 2020, a warning that "tourists are more terrible than nuclear waste" was come out because this island sustainability has been declined extremely. Control numbers of visitors is necessary to maintain the island health ecosystem and culture.

Conclusion

The changes in irrigation water of Pongso no Tao and people's livelihood water under social and cultural changes are affected by a large number of tourists, and the water pollution level is expected to increase accordingly. However, the correlation between the number of tourists,

location, date, pollution level and weather changes is awaiting research. Nowadays, tourism is actively promoted from the center to the local level, and outlying islands such as Pongso no Tao is the most popular choice for " Pretend to Go Abroad tour." The homestays are extremely increasing these years, and the demand for rental locomotives is in short supply. In order to facilitate tourists to enjoy the scenery, related facilities are constantly being built, and they are lost in the economic development of business opportunities. Although Yami/Tao people can use foreign food or imported food to survive, the way of using irrigation water and the social system constructed are still the core of Yami/Tao culture. Foreign food and culture alter in indigenous people' lifestyle have made the water source controlled by Yami/Tao people also used for people's livelihood needs. The history of the ocean nation reflects the survival culture developed by the Yami/Tao people in the isolated island environment, and the adaptation, integration and conflict presented by the influence of foreign material culture. Different generations of Yami/Tao people have different experiences in the living space environment, so that their traditional knowledge about water has changed from the main capital of the livelihood economy, and increased their knowledge of water use methods and knowledge brought about by changes. The water around and on the islands is still in different forms and supplies. For the survival and future of the people on the island, in addition to advocating Pongso no Tao eco-tourism and the Yami/Tao indiginous tourism, the Taiwanese government should also help the Yami/Tao people establish a management model that combines traditional regulations and tourism activities to reduce pollution sources. Severely polluted, the loss of tourism does not matter, but the loss of the health ecological environment and marine assets that depend on their livelihood is not only the eternal loss of the Yami/Tao people, but also the ecological and cultural heritage that the Taiwanese cannot make up for. Rebuilding the Sustainability in Pongso no Tao in the 21st century becomes a top priority, especially in the post COVID-19 pandemic era.

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