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Editor's note: In this supplement, contribution to biodiversity conservation by several Taiwan research teams and NGOs was reported by the Taiwan Environmental Information Center, a partner organization of SWAN International.

A Long Way to Go: Ocean Preservation in Taiwan—the Turtle Conservation Area in Penghu County

Taiwan is fortunate to have its two neighbouring islands, Wang-an Island in Penghu County and Orchid Island in Taitung County, as the rookeries of the green turtles—*Chelonia mydas*. To protect this endangered species, Penghu County Government set up a conservation area on Wangan Island 15 years ago. It is wondered, however, whether the establishment of the conservation area has made a difference in sea turtle conservation or whether there have emerged several pullbacks.

Prof. Yi-Jun Chen at National Taiwan Ocean University has dedicated more than a decade to the study of the ecology of sea turtles. Being the promoter of 'the-one-and-only nesting conservation area of the green turtles' in Taiwan, he has been engaging in sea turtle conservation for years and has also been troubled by loads of problems. Realizing that sea turtles spend 95% to 98% of their life in the ocean, and that the females only set foot on land for nesting and laying eggs, Prof. Chen believed that the establishment of a conservation area was not simply a biological issue. Rather, people planning for the conservation area would have to confront numerous social, economical and political challenges.

Establishment of the Green Turtle Conservation Area in Wangan Island, Penghu County

In 1992, Prof. Chen and his students visited Wangan Island in Penghu County, where the beach provided a suitable nesting environment for the green turtles. His research team, however,

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came to realize that the nesting environment was being ruined due to the government's promotion of tourism. It was seen at that time that cement buildings sprung up on the coast resulting in a serious impact on the green turtles' reproduction. Prof. Chen tried to negotiate with the authorities concerned, yet the efforts were in vain. Later, he tried to raise the public's awareness of green turtle conservation via the mass media. It was a wise move and finally brought the green turtles in the spotlight. The Green Turtle Conservation Area in Wangan Island was then established in the summer of 1995.

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Prof. Chen believed that the establishment of a conservation area was not difficult, because the real challenge lied in the administration and management in the future. To begin with, the protected beach had been open to tourists and there were some villages and guest houses nearby. In order to reduce tourists' and villagers' antipathy towards the conservation area and to prevent them from disturbing the green turtles, Prof. Chen and his partners came up with the solution to have the beach open at day time and regulated at night time when the green turtles land on the coast.

With the establishment of the conservation area, a series of conservation campaigns were launched along with the continuation of existing academic research and turtle rescue. In addition to introducing the ecology of the green turtles to the public and hosting the beach cleaning activities, the main aim was to raise funds and transform local villagers into turtle guards.

“The best way to win the local people's support is to hire them and provide them with working opportunities and stable income.” said Prof. Chen.

15 years since the establishment of the conservation area, the green turtles have become the emblem of Wangan. The statistics also show that they have contributed substantially to the local economy—the turtles visit and stay in

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Wangan for no more than 2.5 months each year, yet they bring along a net profit of 4 million NT dollars. In view of the benefits, local people are proud of the turtles and care about their conservation. This has become a win-win situation for both turtle conservation and local economy.

“Eco-tourism” in Liuqiu Township?

Prof. Chen, however, expressed that the conservation success in Wangan was a special case, and that the concept of eco-tourism should not be abused. The reason is that without discreet planning and management, eco-tourism may be mishandled to damage the environment.

Prof. Chen took Liuqiu Township as an example of failure. The township used to attract divers for its diversified coral reefs, yet substantial numbers of tourists soon caused the collapse of the ecosystem. Without coral reefs and fishes, tourists find the underwater world of Liuqiu dull and boring.

Local travel agents then started to promote “eco-tourism” by introducing the ecology of tidal flats to tourists. In a high season, however, thousands of tourists swarm into Liuqiu daily with an average of 3 thousand of them stay overnight. It can thus be seen that more than 3 hundred people squeeze on a coast with only 2 hundred meter in length. The absurdity is doubled when garbage and leftovers of campfire

and firecrackers scattered at the beach. “It shows how people exhaust every single resource for transient profits.” said Prof. Chen. He urged that eco-tourism should not be a slogan, but should be realized as a practice of green consumption.

What about sea turtles’ future when marine habitats are destroyed?

The establishment of marine protected areas (MPA) has become the prevailing choice to preserve the biodiversity of marine creatures. In 2009, former US president Bush made central Pacific Ocean the largest MPA of the US. This April, the British government announced to have Chagos archipelago as the largest MPA in the Indian Ocean. In recent years, the Taiwanese government has also set up two marine national parks, Dongsha and Taijiang. In addition, there are more than 30 conservation areas of fishery resources around Taiwan. However, one cannot help but wonder whether the establishment of MPAs is the panacea for marine resources conservation.

Take one of the conservation areas, Qingwan, as an example. Zhaolun Chen, researcher at Biodiversity Research Center of Academia Sinica, said that the percentage of live coral cover went from 80.9% in 2001 to 16% in 2008. Even if Qingwan has been designated as a conservation area in 2005, this cannot stop people from dumping in the ocean waste soils

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generated by net-cage farming and manmade constructions, nor can the designation prohibit poaching activities

If the establishment of MPAs cannot prevent oceanic habitats from destruction, what else can be done to save turtles and other marine creatures?

Marine preservation requires individuals' joint efforts worldwide

Dr. Zhaolun Chen emphasized that local communities' involvement in managing the protected areas is the key to success.

Prof. Yi-Jun Chen, on the other hand, believed that education is primary. He recalled an accident occurred at Wangan a few years ago: One night while sea turtles went ashore for laying eggs, there were a boisterous group of 30-odds university students who refused to leave the beach and had a conflict with present researchers. One of the students said, "The beach is not yours and it's not for research only, why can't we have fun here?" These words struck Prof. Chen profoundly, and this is also why even the conservation area has been set up for 15 years, educational activities, such as talks and lectures, have never stopped. It is hoped that these activities can enlighten the public so as to recruit more people for conservation work.

The risk that the sea turtles and other marine creatures are facing is exactly what human beings

will have to confront in the future. In other words, protecting the sea turtles and the ocean is nothing but a way to guarantee our own future, and that marine preservation is imperative and requires joint efforts from everyone everywhere!



Retrieving a Lost Pastoral Dream and Nourishing the Mind with Content - Story of Cixin's Organic Eco-ponds

Say 'No' to Chemical Fertilizers, 'Yes' to Chemical-free Farming

People born in the 1950s share happy memories of catching frogs and loaches, and chasing after fireflies in paddy fields. Since the overuse of chemical pesticides and fertilizers 30 years ago, fields all over the world, including those in Taiwan, have ended up a bleak place which yields nothing but crop. Known as Richang the Old Monk, the founder of Cixin Organic Farming Foundation told his disciples that using chemical pesticides and fertilizers was a similar practice to massacre and that something had to be done about it. In 1994, one of Richang's disciples, Youfa Song, responded to the Old Monk's appeal and stopped using chemicals in his fields.

Moreover, he donated his orange orchard at Guanxi to the master for preaches and practices.

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Richang called out to his followers to “work together to make this place a snug for all”. This is how organic farming was introduced to the land at Guanxi and Cixin Organic Farming Foundation was established. The foundation has set up educational farms around Taiwan, so that visitors may experience for themselves the benefits of organic farming. The foundation has also established an organic farming resource center so as to closely connect agricultural production, ecosystem, living and life.

Return to Nature and Go Organic

At Gukeng, Yunlin County, the foundation has been using a 13-acre land situated in the Fuzhimayun Farm by the Lunzai River since 2007. No pesticides, germicides, herbicides or chemical fertilizers have ever been applied here. The center also avoids the use of petrochemical surfactants as they cause water pollution by releasing environment hormones. On the other hand, rain is collected along with waste water which is to be discharged into a group of manmade wetlands for natural purification. To increase biodiversity of paddy fields, ponds and rivers, about 30 species of water plants and 17 species of native land plants are grown in the wetland area. This collection of wetlands not only purifies waste water, but also has the functions of water reserve, flood prevention and food supply.

A Lotus Pond—An Eco-paradise

The area around the resource centre was often seen to have attracted a large population of wetland birds. Frequent visitors included black-winged stilts, egrets and black-crowned night herons. There was once when more than 50 black-winged stilts were recorded.

Since the amount of water in paddy fields was maintained at a varying level depending on agricultural needs, the population of wetland birds changes accordingly. Staff of the foundation, therefore, constructed a 0.3-acre lotus pond so that water can be maintained stably. The pond is dotted with aquatic plants year-round, and three small islands for aquatic creatures to rest and hide. Colorful lotuses in the pond have later become visitors’ favorite. Under certain circumstances, visitors may have the chance to pick the lotuses. This spring, the resource center will become the nursery of 5 couples of little grebes and moorhens. Meanwhile, thousands of nymph castings belonging to five dragonfly species have been discovered, which suggests that the lotus pond has homed numerous aquatic insects.

Story of the Cixin Ditch: profound respect for Nature and Life

In addition to organic agricultural, the foundation promotes a holistic organic attitude towards living, environment and life. Take Mr.

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Hongzhen Xiao for example. In the past, whenever water was drained from his rice field, a lot of small fish and shrimps would die of drought. In view of this, Mr. Xiao dug a ditch to accommodate these creatures when the field turned dry. In addition to the ditch, he intentionally leaves an area of rice field unharvested to reserve water in the paddy field to attract birds. When ecologists were invited for investigation, they found many painted snipes hidden in his field. Moreover, since there is an average of 30 painted snipes turning up every evening and feed themselves with young apple snails, eggs of apple snails are rarely seen in his field.

The Outcome: the recovery of biodiversity

The resource center takes up an area of 13 acres out of the 120-acre Fuzhimayuan Farm which has been practicing organic farming for 7 years. Half of the resource center is wetlands which include paddy fields and ponds whereas the other half is dry land. Since the environment in this vast area is protected along with good wetland management, the resource center features high biodiversity. Take birds for example, 49 species were recorded this September. In addition to the protected species, such as pratincoles, goatsuckers, painted snipes and collard scops owls, almost all plain species appeared in the area.

Go Organic to Create a Win-win Scenario for Conservation and Economy

In Taiwan, conservation and economy are usually placed at both ends of a spectrum, but a win-win scenario can be created by going organic. It has to start with an issue that everyone cares about and is willing to participate, such as “health”. In view of improving personal health, people having little knowledge about conservation eventually care about health of the earth through a preference for organic food. For conservation activists, they choose organic meals as a way to support their belief. For farmers, they no longer need chemicals to harm themselves and the earth, while still make a living through organic farming. Not only do Cixin’s organic eco-ponds illustrate how one can live a life benefiting himself and Nature, but they also illustrate how we as human beings can humble ourselves to pay profound respect to Nature and other creatures.

(Author: Liyi Cheng, Co-ordinator of Cixin Organic Farming Foundation)



Experiencing The Yami/Tau Sustainable Culture in an Eco-tour

Wisdom That the Orchid Island offers

In December, 1999, while people were waiting for the New Year’s first sunlight on the

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other side of the island, members of Taitung Sustainable Development Society (TSDS) and residents of the Dong Ching Village were building up a traditional house at Dong Ching Elementary School. This was out of the intention to unveil the Yami/Tau sustainable lifestyle by holding the house-building ritual in the first sunlight of a new year. The ritual was a long process which started from materials selection to the house completion. The hosts and guests sang in the new house till sunrise after it was collaboratively done, and the ritual ended when people delivered taros and pork to one another. For an outsider, this cultural experience is beyond imagination, yet for the Yami/Tau people, this is life.

The Yami/Tau Wisdom in Biodiversity Conservation

In order to promote ecotourism, members of TSDS frequently associate with the Yami/Tau people. The longer we stay on the island, the more we are surprised at the Yami/Tau people's wisdom in biodiversity conservation. The island not only harbors numerous unknown species, but also features spectacular landscapes. The most stunning part of the island is the Yami/Tau traditional lifestyle which closely connects to Nature and full of taboos existing for the sake of sustainability. When people propose conventions on biodiversity and appeal for maintaining intact ecosystems after overdevelopment, the Yami/Tau people have long integrated the idea

and realized it in daily life.

Proper Management of Rich Cultural and Natural Resources

The indigenous culture on the Orchid Island has undergone constant changes, yet the island has the traditional Yami/Tau lifestyle preserved thanks to the fact that it is surrounded by water. At the time being, all the 6 villages are highly autonomous in terms of administration of village affairs. Each village has its territory, administration organizations, migration history, distinctive mythology and rituals.

There is, however, a knowledge gap between the older and the younger generation due to the fact that most young Yami/Tau people have not continued traditional practices. This has impacted on the youngsters' perception of local geography and ecology. Nonetheless, a growing number of local people have come to realize that the island has the potential to develop tourism and attract tourists with traditional culture and natural landscapes. They think hard of the ideal way to develop local tourism sustainably. Frankly, the Yami/Tau people expect to bring in financial income by utilizing the island's rich cultural and natural resources.

The Ecotourism Based on Local Knowledge

Nowadays, the Yami/Tau people's awareness of developing tourism is growing, so they need a plan for ecotourism based on local

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knowledge. To prevent the island's tourism development from falling into a general pattern, TSDS has spent more than 10 years involving in tribal affairs such such as eco-tourism planning in each village and community construction projects.

People often regard ecotourism as an inapproachable ideal. In our point of view, however, local knowledge is of primary importance when it comes to promoting ecotourism in an aboriginal community. It not only allows community members to learn from ancestors' wise way living with Nature, but also involves the whole community in sustainable development. The incompatibility between species conservation and economic development is not such a big issue as one would imagine. However, the government's policies do diverge from local people's thoughts of tourism. It is expected that the Yami/Tau people can keep participating in public affairs and constantly communicate with governmental officials to gradually solve the many problems encountered during the course of ecotourism development.

Developing a Sustainable Economy While Protecting the Island's Ecosystem

Traditional Yami/Tau culture is the accumulation of local knowledge originated from the attempt to maintain biodiversity. The rich natural and cultural resources are essential in future development of tourism, so both the

government and the local cannot think too carefully of how to manage them well. The Orchid Island deserves the tourism based on environmental protection and ecological conservation so as to guarantee an *autonomous industry* requiring the empowerment of local experts. With the development of ecotourism, the island's ecosystem can be protected, the Yami/Tau culture can be preserved and there will have more jobs created for local residents. I do hope that the Orchid Island can soon become the island practicing sustainable ecotourism so that it remains a blessed place where *flying fish* visit every year as promised in the mythology.

(Author: Meihua Yang, Member of Taitung Sustainable Development Society)



Crab or Hotel? The Key Point of Conservation of Taiwan Land Crab

Scholar: Cooperate 4 Parties To Control The Tribe Quantity Of Land Crabs

Land crab is a special resource in peninsula Pingtung. Headquarter of Kenting National Park commissioned assistant professor Liu and his team of the Department of Ecology of Providence University to make research about land crab resources in 2009 and found 6 families and 30 species of land crabs, which is considered very high land crab diversity in the world.

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There are around 17 species of crabs in Backbay village area along, and most of them are classified into land crabs, this situation is due to the high underground water level, which is within depth of 2 meter underground. The most indicative local land crab species is *Cardisoma carnifex*. It has the biggest build in land crabs (just smaller than coconut crab of land pagurian species) and the quantity of *Cardisoma carnifex* in Backbay area is the highest in whole Taiwan.

Backbay village becomes important roosts of land crabs due to its special geographical condition, but the future of the species is still unknown because of development case of Ching Zang Hotel. Assistant professor Liu indicated that the global quantity of land crabs is decreasing rapidly. He recommended reserving the Backbay habitat of land crabs by changing or purchasing land, but the plan was unavailable because of limitation of laws and lack of the government support. The compromise plan is to negotiate with developing unit to keep maximum roots for protecting land crabs, assure the quantity of land crabs is not lower than 3,000 or the development case should be stopped immediately and restart the environmental evaluation.

Land crab plays multiple and complicated roles in nature. Generally speaking, it is a

decomposer in ecosystem. It eats fallen leaves, decomposes and absorbs leave material for other creatures, and speeds up the material and energy flow of ecosystem.

Islands on sea are difficult to be reached by land creatures excepting birds; land crabs may sometimes play role on top of food chain here. On some islands, land crab may eat seeds as well as young and fallen leaves. Seeds that consumed by land crabs may not grow up, so land crab's existing or not may affect composition and quantity of local plants and plays an important role in forest ecosystem. The X'mas Island, 300 km away from southern-east of Java is a good example.

Land crab holds its eggs until the embryo growth had completed, then the mother land crab releases her eggs on seashore, the land materials and energy are brought to sea and sea creatures. Later, the big eyes larva of land crab returns to land and brings back the sea materials and energy.



For Protecting Raptors, Taiwan Needs to Draw the Maps of Migration Routes

Black eagles devour merely mammals and birds. Collared scops owl's nests in city collapse

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due to the falling trees or leaves. And the missing grey-faced buzzards lost their trails mostly in Bashi Channel. All these well-known birds are raptors of the order Falconiformes.

The president of Raptor Research Group Liou Siao-Ru showed there're forty five species of raptors in Taiwan. Thirty two species are diurnal and the rest are nocturnal. Raptors are higher-level consumers. They are huge and glamorous, so they were symbols of nobility in ancient times. The Paiwan and Rukai also took their feathers as noble symbolization. However, the Director of Conservation Division, Forestry Bureau-Kuan, Li-Hao said that the excessive hunting has put raptors in dangerous conditions.

Protected by Wildlife Conservation Act, raptors in Taiwan are protected animals, and some of them are considered endangered, such as black eagle, Hodgson's hawk eagle, peregrine falcon, and grass owl.

According to Liou, raptors conservation got started in 1960s, but there wasn't precise position until 1979. The 2nd Council of Southeast Asia in 1983 was held in Taiwan. Since then, Taiwan had participated in international raptors' councils. In 1994, the Taiwan Raptor Research Group was founded. The 1st Taiwan Raptors seminar decided the conference will be held every five year.

Liou suggested we should reinforce the raptors' sample size, their basic life history, and the research of inhabitation. She also declared the oncoming goals of the Taiwan Raptor Research Group—they'll work on the research of Taipei Raptors' inhabitation, draw the map of Taiwan raptors, and get the conservation moving. She also emphasized that protecting the inhabitation is the one and only solution. "Keeping their places is the key to protecting their species."

The South China Sea is home to the strongest internal waves in the world and is notable for many typhoon occurrences. Both phenomena are products of atmosphere and internal ocean circulations, which help bring nutrient from bottom of the ocean to the photic zone for the phytoplankton to live on. As a result, it boosts photosynthesis and allows carbon dioxide to be absorbed. Therefore, studying carbon dioxide decrease and its relation to typhoons and internal waves in the South China Sea might help unlock the climate change mystery.

Secondly, to study whether nutrient input will sufficiently boost photosynthesis and reduce carbon dioxide. Every year in spring, dust storms originated from China and biomass burning from Southeast Asia, carry nutrient through long distances of air travel and let it fall on upper layer

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of the South China Sea. It is important to find out if the nutrient can boost photosynthesis and reduce carbon dioxide in atmosphere.

Finally, to find out how severe ocean acidification can impact on the Dongsha atolls. As carbon dioxide level continues to rise, ocean acidification has become one of the most worrying issues facing the world's ecosystems. Coral reefs are composed of calcium carbonate (CaCO₃). Acidity increase will hamper calcium carbonate production and accumulation, which affect coral growth. Coral reefs might face serious disintegration. Therefore, it is critical to investigate whether acidity might be a disintegrating force for the Dongsha atolls.



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