LEISURE CITY
Transforming from traditional fishing village to sustainable oriented tourism city – the case of PENGHU, TAIWAN
LEISURE CITY – Transforming from traditional fishing village to sustainable oriented tourism

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**LEISURE CITY – Transforming from traditional fishing village to sustainable oriented tourism city – the case of PENGHU, TAIWAN**

<table>
<thead>
<tr>
<th>CONTENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Introduction</td>
<td>06</td>
</tr>
<tr>
<td>2 Background</td>
<td>08</td>
</tr>
<tr>
<td>3 Archipelago &amp; City Analysis</td>
<td>24</td>
</tr>
<tr>
<td>4 Project Framework</td>
<td></td>
</tr>
<tr>
<td>4-1 Problem Statement</td>
<td>34</td>
</tr>
<tr>
<td>4-2 Research Questions</td>
<td>36</td>
</tr>
<tr>
<td>4-3 Project Aim</td>
<td>37</td>
</tr>
<tr>
<td>5 Theory</td>
<td></td>
</tr>
<tr>
<td>5-1 Theoretical Framework</td>
<td>38</td>
</tr>
<tr>
<td>6 Design Guidline</td>
<td></td>
</tr>
<tr>
<td>6-1 Zoning</td>
<td>42</td>
</tr>
<tr>
<td>6-2 Sustainable Tourism</td>
<td>46</td>
</tr>
<tr>
<td>6-3 Green Energy</td>
<td>56</td>
</tr>
<tr>
<td>7 Project</td>
<td></td>
</tr>
<tr>
<td>City extension</td>
<td>62</td>
</tr>
<tr>
<td>Typology</td>
<td>64</td>
</tr>
<tr>
<td>3 step analysis</td>
<td>66</td>
</tr>
<tr>
<td>City land use</td>
<td>67</td>
</tr>
<tr>
<td>Green structure</td>
<td>68</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>71</td>
</tr>
<tr>
<td>Public space &amp; road connection</td>
<td>72</td>
</tr>
<tr>
<td>Tourist facility</td>
<td>73</td>
</tr>
<tr>
<td>Functional area</td>
<td>74</td>
</tr>
<tr>
<td>Strategy</td>
<td>76</td>
</tr>
<tr>
<td>City park</td>
<td>78</td>
</tr>
<tr>
<td>Image</td>
<td>80</td>
</tr>
<tr>
<td>8 Evaluation</td>
<td>86</td>
</tr>
<tr>
<td>9 Reference</td>
<td>92</td>
</tr>
</tbody>
</table>
Penghu is the only island county in Taiwan, which locates on the Taiwan Strait between Taiwan and China. It is 45 km away from Taiwan and about 200 km away from China. In total 127.96 square km area, Penghu is composed of 90 isles with 91,785 residents. It was a traditional settlement and military base. People on the islands were mainly fisherman and farmer. Around 1981, there was a migration tide from Penghu to main land of Taiwan then the demography of Penghu keeping decrease until now. Without too many natural resource, labors and stable consumption market, the economic and industrial structure in Penghu forced to transform into tourism base to keep the local economy alive. Two decades passed, Penghu now is become a famous recreational and touristic destination of Taiwan. Every summer, around 500,000 visitors came there to enjoy the beautiful landscape, unique culture and beach.

In the develop orientation, although government set up their aims are first to keep develop tourism to draw more visitor and enlarge the local economic base; second to promote local industry and manufacture to attract more investment; third to develop technology and knowledge sector to reach the goal of sustainable development.

![Development Orientation](source: Islands General Construction Implementation Plan from Penghu county government)
However, the method of island tourism development is very controversial. The two main strategies that government used to develop tourism and attract tourists are building casino resorts and open border to China. On 26 September 2009, the result of referendum in Penghu opposed the plan of constructing casinos. But in July, the border still opened without any supporting program. Is Penghu already prepared to accept large amount of tourists? Or it will soon collapse because over-develop tourism.

Penghu is a poor county with less population, for a long time dependent on government’s subsidy and tourist consumption. If it refused to accept more tourists then it also suffered the consequence of economic recession. No matter to maintain historical building, to preserve unique culture activities or to reserve and research wild species, money always required. Once the government cannot afford the budget for preserve and protect these cultural and natural precious. The damage of culture and ecology may never recover. Therefore, a comprehensive and integrated planning in term of culture, economy and ecology is needed in Penghu. As an urban planner, we should contribute our profession to conserve culture and nature to make this archipelago attractive and livable. Furthermore, finding Penghu’s potentiality to develop manufactory or industry to diversify local economy. After improving the local financial condition, Penghu can have ability to provide more employments for residents and to self-maintain their city environment. Moreover, to keep population stay on the island even attracts more people living and working there.
Penghu is located on Taiwan Strait. It is 45 km away from Taiwan and about 150 km away from China. In total 127.96 square km area, Penghu is composed of 90 isles with 91,785 residents. However, there are 71 isles are uninhabited, therefore, most of inhabitants are living in the main city – Magong. As a tropical archipelago, **Penghu has similar latitude with Caribbean islands and Hawaii**. It has long time been considered as one of the key point areas for tourism development in Taiwan. Although Penghu is geographically close to main land of Taiwan, but the limited way to access Penghu make it become a periphery area of Taiwan. Beside, Magong, the biggest city of Penghu was a fishing village, therefore, the **main street** is constructed **close to the harbor**. However, most visitors now are traveling there by airplane. The **low accessibility from airport to city center** also gives people the image of desolation.
### PENGHU ATLAS

**Penghu County**
- contain 1 city and 5 township
- Area: 128 km²
- 90 isles with 71 uninhabited isles

**Position (LAT/LONG)**
- East to West: around 40 km
- North to South: around 60 km
- N 23°12’ ~ 47’ / E119°19’ ~ 43’

**Population**: 91,785
**Tourist number**: 479,992 (2008)
**Tourist season**: April to October

**Climate**
- Tropical
- Average temperature:
  - 23°C
  - Summer: 28.3°C
  - Winter: 16.2°C

**Average annual rainfall**: 1000mm
**Evaporation**: 1600mm
The land of Penghu was formed by a volcano erupted under the ocean, after thousands of years’ weathering and erosion, the landform became the way we are looking today. The landscape of Penghu is quite flat. The archipelago is slightly slides from south to north and the highest point is only 79m on Damao isle in the south side.
Since 1969, the population in Penghu keeps shrinking and now it is 23% decline than 4 decades ago. The household number is increased 40% compared with 20 years ago. The changing structure of demography and family size caused several social problems such as lack labors to develop local industry and agriculture, aging society and urban-rural gap. There are around 92,000 inhabitants live on the archipelago. 80% of them are concentrated in the biggest island and more than 1/5 people are living in Magong city center. Therefore, the density is quite different between city and rural area. In addition, the pool local economy pushing young generation migrates to other cities to have a job to support their families. Therefore, there are large amount of elders and children on the islands but less young adults.
**Weather** – Penghu is located on the tropical of cancer. Like most of tourism islands, it has nice weather and less rainfall. The average temperature in 2008 is 23°C, the highest is 28.3°C in July and the lowest is 16.2°C in February. However, because the **strong northeast monsoon** (6m/sec ~32.6m/sec) **blows in winter**, the feel temperature is much lower than it is. In order to prevent the strong wind damaging the crop and vegetable, people built wind proof walls around farm land called “Crop house”. These constuctions are form a unique culture landscape on the islands. The ferry transport also affect by the wind. When the wind and waves are too strong then the ferries will stop service. The chilly wind and unstable transportation in winter lead the tourists mainly visit the island in summer. The **tourism season** on the islands is from **April to September**, after October it becomes a dead city for another 6 months until next year. The wind also bring some advantage for the archipelago like **wind power**. The wind farm provide 6~7% electricity for the energy demand of Penghu.

**Rainfall** – The rainy season is every April to September. It rains around 95 days a year and the average annual rainfall in Penghu is about 1000mm. But the annual amount of evaporation is approximately 1600mm. Obviously the water resource is precious on the islands.

![The amount of precipitation and evaporation in Penghu](image-url)
**Current** – Penghu is surrounded by ocean. Clear water and 3 main currents the china coast current, the Kuroshio and the South China Sea Monsoon Current converged here, which form two big fishing grounds at both north and south side. As the result, for a long time Penghu was famous for its rich fishing resources. This unique advantage also affects its economy. Fishing was one of the main income sources on the island until the population decrease and the social structure changed in 80s.

**Waves** – The average wave in summer is 0.8m high and is 1.7m in winter. When the North-East Monsoon blowing in winter, there are 52% of waves will be higher than 1.5m, sometimes the waves and wind are too strong to operate the ferries. At that time the transportation on the sea would be interrupted.

**Tides** – There are two high and low tides per day in Penghu archipelago. The tides flow toward north when the high tides and flow toward south when the low tides. Because the landform of Penghu is flat, therefore, some isle will be submerged when the high tide and some area in-between isle will be exposed when the low tide. That attracted many tourists to see the unique scenery in Penghu. Also, the intertidal zone has rich marine resources that many people collected seafood and seaweed.
Penghu’s culture is highly related to ocean. From the building materials, religion, lifestyle to the diet, almost everything have influence by the ocean. Even though the tourism already replaces fishing become the main economic activity on the islands. Many festivals and events are still related to the sea. **The strong characteristic of ocean can be seen as the identity of Penghu archipelago.**
The main street of Magong city is very narrow and has less characteristic.

However, inside the Magong city, the image of ocean does no longer exist. The harbor area has less characteristic and not attractive. The main street extends toward the north against the ocean. The harbor becomes the fringe of the city, people is difficult to aware the existence of the harbor and ocean while stand in the city center. Beside, the new concrete buildings replace most of traditional houses. **The city now is already losing its own culture.**
LEISURE CITY

[BACKGROUND] NATURE

The bay and wave-erosion platform.

Landscape – There are many volcanic landscape, wave-erosion platform, cliff and cavity, sandy coast and rocky coast on the archipelago. Those unique natural landscapes also become part of the image of Penghu. Many visitors came here to see the beautiful scenery and enjoy the entire natural environment.

Animal – The bird resources are rich in Penghu. Some people even call it the paradise of birds. According to a survey in 2003, there are 326 species including finches, warblers and various kinds of sea birds living on the islands. However, from the data on the survey that shows only one-fifth of these birds stay in Penghu, most of them are migrant birds. These birds come to the islands every year from January to April, and leave after May. June and July are the two months with the fewest birds.

Marine – There are rich marine resources in Penghu archipelago. The clean water and currents converge here create a great environment for corals and fishes. The rich fish resource also attracting dolphins came to this area. Every November to next March, people can see the Spinner Dolphins, Gill’s Bottle-nosed Dolphins and Bottle-nosed Dolphin swim in groups in the outer sea of Penghu searching for food. The endanger Green Turtle is also a simple animal of Penghu. There are only a few beaches have Green Turtle laying eggs. Penghu is one of the areas that Green Turtle visited regularly. The beach now is become a preservation area for the Green Turtle.
Plant – The soil layer in Penghu is quite thin and not fertile. The strong wind and drought environment also make the plant difficult to grow. Therefore, most of the plants on the islands have the characteristic of drought-enduring and salt resistance. The trees on the islands are mainly for wind proof and beautification purpose. The main species of tree are Pagoda, Casuarina and Araucaria.
Agriculture – Agriculture was the main economic resource on the archipelago. Although the lands are not fertile, there still produce various food crops like sorghum, sweet potato and vegetables and the cash crops such as loofah, garbo melon, melon, peanut and dragon fruit. These crops was selling to the local food markets and also shipping to main land of Taiwan. However, highly percentage of farmlands on the islands was abandoned. Right now, foods are mainly come from main land of Taiwan. Instead of growing crops, herbs and cactus plants become the new cash crops in Penghu. Feng ru grass, glycine tomentella, aloe and cactus are all easy grow and can survive the drought environment.
Livestock – The land of Penghu is not fertile; the quantity of crops is unsatisfied compared with the production in main land of Taiwan. As the result, many farmers were raised livestock to have extra income and foods. In 80s, it was the peak time of livestock development of Penghu. But because the population decrease, less demand from local market and the price was difficult to compete with main land of Taiwan, therefore, the livestock was decline.
Fishing – Because there is three currents converge here and form two big fish grounds. For a long time, fishing is an important economic resource on the islands. But because the population shrinkage and ageing society, less people working on fish boats now, the fishing industry also decline. In addition, the quantity of output and income of traditional fishing is much lower than aquaculture and recreational fishing. As the result, the fishing industry on the islands was transform to tourism oriented to adept the change.
Tourism – Since 1981, Penghu started to transform its economy structure from agriculture and fishing to tourism. Now, Penghu’s economy is highly dependent on tourism. More than 50% GDP on the islands are relate to tourism activities. But the seasonal tourism also makes Penghu’s economy fragile and danger. The shrinking population and ageing society also affect the local economic development. Up to 59% people are no in labor forces or unemployment, this number is much higher than other counties in Taiwan*. Over the past 3 decades, tourism revenue and services are the main income of Penghu’s inhabitants. Each year, around 500,000 tourists visit Penghu and create over 3 billions’ business on the islands. However, the seasonal tourism and mainly depend on domestic tourism market that limited the tourism development in Penghu. During the off-season, the unstable income is difficult to support a family. Many people choose to migrate to main land of Taiwan to have a part time job, also most of high-educated people will move out to find a better job in Taiwan. As the result, the government decided to open border to China to attract more tourists to improve the local economy in 2008.


![Employment structure in Penghu from 1995 to 2006](image)

Source: Lecture of National Penghu Marine and Fishery Vocational High School
From 12 millions tourists in 2001 to 45.8 millions in 2008, the amount of people traveled abroad were increase dramatically in China. The top three traveling countries or regions of Chinese tourists are Hong Kong, Macau and Japan. It illustrated that Chinese tourists prefer to have a trip in neighboring countries or a place easy to access. According to the president of Taiwan Travel Agents Association, there have 50 millions Chinese showed their interesting to visit Taiwan. In addition, a song that describes the view of Penghu is famous in China. Many people are interesting to visit this paradise to see the beautiful islands themselves. That means after open the border and start to provide visa on arrival service, the visitors expect to reach 800,000 in 2010 and will soon have 1 million tourists or more each year in Penghu.

However, the fast changing on Penghu’s tourism market inevitability affect the local society, economy and environment. Especially the seasonal tourism in Penghu will make the situation more serious. It can be expect that in summer the influx of tourists will consume large amount of water, electricity and seafood, also disposal great amount of waste and increase CO2 emission by using private vehicle and other transportation (flight and ferry). Although that can bring a lot of money and investment to Penghu, but it also means more pollution and congestion near attraction points. In addition, the activities on the beach or in the sea might affect the breeding of wild animals or destroy coral reefs and cause irreparable damage of local ecology. Therefore, Penghu needs a comprehensive and integrated plan to help it to reduce the negative impact while develops tourism.

★2 According to the statistic of Department of Fujian Province Administration for Transportation, from January to September 2009, Fujian previously transport 1,049,358 people to Kinmen, Matsu and Penghu by ferries. From 19 Aug. 2009, the first month already shipping 3451 tourists to Penghu and will increase frequency ferries to transport more people to Penghu. Transcription from website: http://tw.news.yahoo.com/article/url/d/a/091012/1/ssmv.html
Economic changing – More tourists visiting also mean more demand on services, transportation, accommodation and goods. It can be expect that more investment will put in to the large-scale constrictions like improving infrastructure or building leisure resorts. More jobs opportunities and daily consumption will enlarge the labor market and strengthen local economy.

Environmental impact –
Water—Penghu’s water support dependent on water desalination plants, underground water storage and water ship from Taiwan. Now the fresh water barely enough for local residents and 500,000 tourists yearly. Once the tourist numbers increase, the water desalination plants have to extend or to construct more water plants to fulfill the water demand of visitors. However, produce more fresh water from desalinator means more demand on energy. Also, now the brine from desalinator is directly disposal to the sea, but when it produces double or treble water then the brine disposal would damage the ecology of the ocean.

Air—The air pollution and CO2 emission expect to increase while the need of transportation and electricity raise. Therefore, developing wind power become important to reduce the pollution and to save money. Although the windmills generate less electricity in summer, however, it still contributed 13,000 KWH per day and can produce up to 8,000 tons of sweet water. When there are 1 million tourists, the benefit from those visitors can be use to implement wind power or electric vehicles.

Land—Although Penghu had recycling garbage for several years and the result was great. But still, everyday there are 60 tons garbage shipping to Kaohsiung’s incinerator to burn. During the pick of tourist season, around 70~80 tons waste disposal already a trouble for the Penghu government. After open the border, the amount of garbage will increase dramatically. When the tourist numbers reach 1 million people, the garbage produce will near 100 tons per day in the tourist season.
There are frequent flights and ferries connect Penghu with main land of Taiwan, but not with other countries. The periphery position and its low accessibility now is difficult to attract foreigner tourists. As the result, the infrastructure and public transport should be improved. Because the island is quite small, there is no highway or railway, all the transports are depend on national road that circulated on the islands. And the main island is connect with other two big islands by bridge. From the space syntax analysis, we can
see the most integrate area[higher accessibility] is between airport and city center. How to improve the city center’s accessibility is also important in this plan. Also, there are 69 ports in Penghu. Although most of them are serve less than 30 fishboats, but still, each year government has to pay large amount of money to maintain and set up checking spots in these harbors. Therefore, the usage of harbor should be increase.
For the tourists, public transport is the best way to travel around because it is cheap and rather convenience. However, due to the buses are mainly services for local communities in Penghu. In addition, many tourist facilities and attractions can only reached by bus. Therefore, most of tourists choose use private vehicles on the islands. The bus system’s mobility should be improved to provide better service for visitors.
The commute ferries are rare in Penghu, the frequent ships are once or twice per day serviced between Magong and the isles in the south. As the result, most people choose to take private boat when they want to travel to small isles. Also, there is no frequent ferry connect with surrounding countries especially China. The connection should be improved to upgrade the importance of public ferry transport.
The Magong Harbor is a mixed function port with 2 ferry landings, 1 cargo dock, 4 fishing piers, 1 naval port, and 1 dock shared with cargo ships and ferries. After the open border, there is more tourist visits Penghu by boat. When the tourist numbers reach 1 million, the passengers expect to increase 5 times than now. The harbor might be inadequate when the large amount of tourists and cargo all concentrate to the main harbor. Therefore, it's possible to contribute function to other harbors to prevent the congest situation in Magong harbor for the nearly future.
Magong Airport has similar condition with Eindhoven Airport. It has stander runway [3000m x 45m] that has no problem to take off or landing large airplane. It is possible to develop charter flight to China or even frequent flight when there is more demand. Because the airport’s function is sufficient, so in this project, I will focus on improve the main harbor.
**Water** – The water resources on the island are rainwater, underground water and seawater desalination plant. Less than 1% areas are using for water storages on the islands. The demand of water is higher than the production of desalination plant.

Buying water from Taiwan cost €4/tons, so the increase cost for each tourists is €1 per day (water in Taiwan is €0.25/tons).

**Electricity** –
The wind farm provide 6~7% of Penghu’s need. The thermal power plant produce 129,000 KWh/year.
Shipping garbages back to main land of Taiwan cost €60/tons.

Waste water are disposal into ocean without treatment.

Garbage Landfill – There is no incinerator in Penghu region and 1/3 of garbage landfills are already full.

Sewage system – Except Magong city, there are no sewage system in Penghu region. The waste water from neighborhood and factories are directly disposal into ocean without any treatment.
Penghu develops tourism over 20 years. There are already a lot of tourist facilities on the islands, but the problem is there is no tourism developing plans to guide the development. As the result, the similar tourist facilities are constructed everywhere on the archipelago, which is less efficient and waste resources. In addition, almost all inhabited islands are developed for tourism, which speed up the destruction of the natural environment.
Magong city has over 400 years’ history, although it already experienced several time’s extension. But the block still keep the way of old structure, therefore, the main shopping street is very narrow. Plus the city center didn’t well connect with the open spaces. As the result, during the tourist season, the city will very crowded and the traffic in the city would become nightmare. It can be imaged once the tourist numbers become double, the congestion situation will devastated the city.
Due to the economic reason, the border is open to China to increase the tourism revenue in Penghu. However, the rapid change also brings or enhances some problems while develop tourism. Many issues have to be considering beforehand in order to prevent the vulnerable ecology and society collapse on the islands. For example, the government did not have a comprehensive tourism develop plan for this archipelago. The tourist facilities and attractions are spread all over on the archipelago. The similar function’s amenities and attractions scatter in every island. The fragmented tourist facilities and attractions make visitors wandered on the archipelago. Without a comprehensive development plan, inhabitants, tourists and wild life might need to compete with each other for resources and habitant.

The public transport on the islands is also not sufficiency. The buses are mainly services in-between communities. Ferries that connect with main land of Penghu with other isles are rarely. Some of facilities and attractions can only reached by private vehicles (cars or boats). The poor public transport and low accessibility at district scale also inconvenience for foreign visitors.

Because Penghu was focus on developing domestic tourism before 2008, most of tourists are come from main land of Taiwan by airplane. Therefore, the main harbor is available to berth ferries, fishing boats and cargo ships. However, after open the border, more Chinese tourists are taking ferries to visit Penghu. The main harbor will soon inadequate for accept all of the ships. Beside, the city center has around 400 years’ history; the urban area is narrow and less open space. The main street in Magong city is only 8 meters wide and the pedestrian is occupying by motorcycle, goods and odds and ends. It can be imagine when large amount of Chinese tourists arrival, the old city center would be congest and the traffic in city center would be chaotically. In addition, the tourism in Penghu is dependent on natural landscape and scenery. Without high-
quality services and facilities, Penghu’s tourism remained stagnant and primitive.

Magong is the biggest city in Penghu. It has potential to provide better facilities and services for tourists to upgrade the local tourism. However, its characteristic is not clear as other small isles like Wangan, Cimei and Jibei in the same archipelago. Also, from the preliminary results of a Space Syntax analysis carried our previously, with a 3-step analysis, we can see, that the main street is not ideal. The relative low visibility of the street and little public space in the city center of Magong city makes it less attractive for both residents and tourists.

Furthermore, the utilities and facilities are lack on the islands. The water resource is always precious on the island, now it is barely enough for the residents and small amount of tourists. When the large amount of Chinese visitors arrival, the demand of water would be increase rapidly. The need of electricity, accommodations and food supply in Penghu will also raised. In addition, Penghu did not have incinerator now, the difficulty of disposal waste would be another issues when develop tourism.
The following research questions are deal with the main problems I stated in this project. The final products are expected to provide a vision and idea to show how can I deal with these problem in Penghu region.

In Regional Scale
1. How to define the tourism developing zones in Penghu region to minimize the social, ecological and environmental impact cause by open border effect.
   1-1. Where are the most popular attractions located and how to access them? And how to improve accessibility of those attractions when they are hard to reach?
   1-2. Which area would develop priority for tourists and which area would be preserved for inhabitants or nature?

In City Scale
2. How to improve the Magong’s harbor city image and living environment to place both tourists and inhabitants?
   2-1. What is the existing spatial condition of city center? Is there has room for further extension?
   2-2. What kind of spatial intervention can help to keep the living quality and environment while more tourists arrive?
Leisure city is a city, which provides environment for recreational activities, living and working. Public spaces, facilities and infrastructures should be designed multi-purpose and diversification and be used for both tourists and residents. People share space for different kinds of activities also communicate with others that may not local.

The aim of this project is to transform Magong a leisure city to make it a better place for living and working. Developing sustainable tourism to first enlarge its economic base in order to support urban develop and self-maintain of city. Also, consider the open border effect to plan a complete supporting program to avoid the impact of economy and ecology changing. Furthermore, construct public space and communal facilities or give historical buildings new function to create city attraction to make Magong attractive and livable.
A research paper related to the graduation project has been required in MSc3. It will provide the theoretical support for the thesis and strong the argument of the graduation project. In this paper, it will deal with the issue of sustainable tourism development in a Leisure City and its element and framework. Following is the abstract of the paper:

**Keywords:**
- Leisure City
- Sustainable Tourism
- Urban Transformation
- City Regeneration
- City Element & Framework

**Leisure City: a model of sustainable tourism development**

Abstract—According to the World Travel and Tourism Council’s (WTTC) report, the Travel and Tourism (T & T) Total Demand was reach 6,200 billion dollars and the T & T Economic GDP was 4,700 billion dollars, which equal to 10.6% of GDP of the worldwide in 2005. In addition, the T & T activities provided 221 million job opportunities indicated that 8.3% of the world’s employment related to tourism activities or 1 in every 11.2 job is tourism-relate work [1]. Tourism has become an important global economic source. Many states were making every effort to develop tourism in order to grow their economy, especially when the post-war industries were shrinking gradually [2] nowadays. Leisure city is about to transform traditional economic structure into tourism and change the city an attraction. Carlino G.[2008] ststed that one of the contribution of develop tourism is to renew the physical environment and improve image for the cities or areas. The investments of the tourism market were directly and/or indirectly used in maintaining tourist facilities and public space, improving transportation systems and constructing amenities. Museums, parks and plazas, shopping malls and sport stadiums, those facilities and places take an important role
in gentrification of physical environment in a city or an area. Also, the convenience transportation system can improve local accessibility and economy development. Therefore, the city is not only an attraction for tourists but also offer a good living environment for residents. In order to keep the balance of living and touristic activity, the tourism must develop in a sustainable way which regarding socioeconomic and environmental considerations [3]. Improving city function like increase service sector to provide better services for tourists and residents. Offering dynamic activities and construct public space for meeting and recreation to give tourists opportunity to experience local culture and life. Preserving nature as attraction and use tourism receipts to maintain the city itself. In that case, both citizen and tourists get benefit from the change.

In order to build the argument for the urban framework of leisure city, this paper will focus on discussion what kind of city has potential to develop itself a leisure city. Also, answering what is essential spatial intervention to leisure city development and how to enhance city’s characteristic by spatial planning. Law (1992) classified the tourism elements into three categories: (1) Primary elements content the activity places and leisure setting; (2) Secondary elements included the services and facilities and (3) Additional elements, the accessibility and tourist facilities to understand the relevance of tourism resources and users. Base on it, this paper attempt to analysis and build up a model for leisure city development.

DESIGN GUIDELINE
DEVELOP ZONING
SUSTAINABLE TOURISM
RENEWABLE ENERGY & RECYCLE RESOURCE
After pointing out the most famous attractions in Penghu. We can find that many cultural and natural attractions are concentrated at the west part; and the water recreation spots are mainly at the south of Magong city and the east side. When it becomes a diagram, then it is more clear that there are three zones on the map. Green part is the natural and cultural attraction zone, blue belt is water related activities and the pink area is the place that has more farm lands and less tourist facilities.
Furthermore, by estimate the existing users of these attractions and analysis the trend of future users. I made the map to show which area will be more intensive use, which area should be extensive use and which area can be preserved.
Combing with the two main concept – zoning of attraction and zoning of usage, I divided the Penghu archipelago into three different level’s developing zones. There is more people visit the central area that can be the priority-developing zone. The suburban area, which has less attraction and more farmlands, can be developing as a supporting area for the city center. The surrounding small isles would be low developing area to preserve its nature environment. In addition, inside the priority developing zone will have more intensive tourism activities and the small isles at the south and north would accept fewer tourists and have less tourist activities.
In order to find out the area, which has possibility or potential to have further develop. I start to analysis the land use map of Penghu. There are 55% of land are agricultural use, however, with the population shrinking and ageing society. Highly percentages of lands in Penghu are abandoned. Now over half of agriculture lands are stop farming and become grasslands. Also, there are no urban planning 2 decades ago, so the cemeteries are scatter and dispersed everywhere on the islands. They cover 6% of total land in Penghu while only 7% lands are urban area.
In addition, there is less than 1% area are using for water storages although the water resource is precious there. Furthermore, there are large amount of land are occupy by military now, however, there is no war and supporting large amount of army also cost a lot. Therefore, the central government wants to cut the army from 30,000 to 3000. That means the land can be adaptive reuse after the army withdraw.
In order to clarify my aims and objectives, it is useful to examine the definitions on the sustainable tourism, the main economic engine for the islands. “Tourism which leads to management of all resources in such a way that economic, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity and life support systems” (World Tourism Organization, 1996 in Shah, K., McHarry, J. and Gardiner, R., 2002). The main idea is to benefit inhabitants, respect local culture and conserve natural resources while developing tourism. In other words, sustainable tourism intends to minimize the negative impacts of conventional tourism and help to generate income, employment and preservation of local ecosystem.

The sustainability principles refer to the socio-cultural, economic and environmental aspects of tourism development.
Socially and culturally—The concept of sustainable tourism in term of social and cultural aspect is to respect the tradition and local culture to understand and accept the cultural difference. Also, conserve their built and living cultural heritage and traditional values. As the result, in this project, I choose to maintain the old crop house and beach to develop an area for tourists to experience traditional agriculture and seafood collecting. In addition, renovated the architectonic heritage as accommodation to provide visitor an opportunity to live in a traditional building and solve the problem of accommodation shortage during the tourist season as well.
Economically— A long-term economic operations to provide socio-economic benefits to all inhabitants, stockholders and tourists, which including stable income, job opportunities and social services of local communities. While develops tourism, the food demand for the tourists can stimulate the local agriculture, livestock and aquaculture development. Abandoned land can once again be farming and the farm can be opened as a city farm to visitors. In addition, combined aquaculture and recreational fishing, the inner sea can be another attraction for people who love to fishing.
Environmentally— Reduce the waste of environmental resources and maintaining essential ecological processes to help to conserve natural heritage and biodiversity is the main idea in regarded in environmental aspect. Therefore, in this project small scale and minimize construct facilities is the principle of my design. Planting tree to make woodland for campsite can increase the inhabitant of wildlife also can provide different kind of choice of accommodation. Extend the existing wind farm to generate more power and reduce the dependent of thermal power plan.
LEISURE CITY

[DESIGN GUIDELINE] SUSTAINABLE TOURISM

>>infrastructure plan

Flight
Bus line
Bike path
Ferry
Water taxi
Fishing Charter
Sailing

Day time

Night time
Contribute the cargo function from Magong harbor to Longmen fish port

For develop sustainable tourism, public transport like bus and ferry would be improved in this project. Also, increase night transport to increase the accessibility of Penghu. In addition constructing bike path to slow down the speed of tourists. So they can stay longer and enjoy the beautiful landscape on the islands. The Magong harbor is mix functional port with only two ferry platforms. Now 10% Taiwanese and 40% Chinese tourists arrived Penghu by boats. When the tourists number reach 1,000,000, the expectation of passenger number will approximate 250,000, which is 5 times increase than now. Therefore, contributing function to other harbor has to be considering in the plan.
LEISURE CITY
[DESIGN GUIDELINE] SUSTAINABLE TOURISM

DEVELOPING PLAN

- Residential area
- Hotel/Resort area
- Industrial area
- Seafood collection
- Livestock farm
- Agriculture
- Camp site
- Woodland
- Green house area
- Park/Recreational green
- Existing grassland
- Water storage
- Beach

- Fishing+Cargo port/Fishing+Ferry/Ferry
- Boat tour
- New incinerator
- Bus line
- Bike path
- Water path
- Water taxi

54
Phase 1:
- Develop the new city center near third harbor
- Improve the public transport in the regional level
- Construct bike path to connect the existing attractions
- Open the crop house and beach as tourist experiment area for traditional agriculture and fishing
- New ferry line to link the three big islands
- Open part of the livestock research center as tourist farm
- New woodland near tourist farm
- Extend the existing wind farm

Phase 2:
(When the tourist numbers reach to 1 million)
- Move the cargo harbor to the east side
- Construct new residential area near new cargo harbor
- Develop agriculture and livestock in supporting area
- Enlarge the water storage for irrigating crop
- Develop water taxi to have higher mobility on transport tourists
- Build campsite in new woodland area
- Develop solar energy

Phase 3:
(When the tourist numbers reach to 2 million)
- Develop new industrial area in Magong and Husi
- Build more houses near new industrial area and the area between city and airport
- Develop beach club, golf club in the resort area in the south circle
The wind farm provide 6-7% electricity need in Penghu.

The new houses in Penghu can use solar cells as part of building material.

Solar power can use to operate vehicle like bus and ferry.
Solar power – Each year there are more than 250 sunny days in Penghu. That means solar power can be considered seriously to replace the traditional thermal power to provide clean energy. Also, the solar power can use for electronic vehicle like bus and ferry to reduce the usage of gasoline.

Wind power – The strong wind in Penghu provides a perfect chance to develop wind power. Now the existing wind farm only provides 6-7% electricity demand of the island. The wind farm should be extending to generate more clean energy.

Water recycle – Rainwater and gray water from households can be recycle and reuse to irrigate plant, also can construct wetland to clean the family waste water to provide habitats for wildlife or for recreational purpose.
Energy plan

Every isle in Peghu archipelago has its own water plane and power plane. Therefore, most of projects will be extend or enlarge the existing facilities.

**Mainland**

Developing solar energy and extend existing wind farm to provide clean energy on the islands. Also, use these renewable powers in seawater desalination plant to generate more fresh water. Constructing storm sewer and wetland in the new develop area of city center to clean wastewater for irrigate. Furthermore, enlarge water storage to watering the farmland in supporting area. When tourist numbers reach to 1 million then it is possible to construct incinerator to solve the problem of waste disposal.

**Jibei (North)**

Because the north isle is planning to be the resort area, therefore, it should have its own wind farm and desalination plant. Recycle gray water (shower/swimming pool) to irrigate plant and using for cleaning. It is not necessary to build two incinerates in Penghu, so the waste will ship back to main land to burn.

**Eco-islands (South)**

Using the existing power plant and water plant and limit the amount of tourists who stay over night to minimize the use of resources.
The general energy plan

- Thermal power plant
- Wind farm
- Water storage
- Desalination plant
- Garbage landfill
- Unavailable landfill
- Extend existing wind farm
- Enlarge water storage
- Extend existing desalination plant
- Storm Sewer and wetland
- Unavailable landfill

Eco-islands

Jibei
PROJECT
Magong city was first appeared on the map in 16 century. After 400 year’s developing, now the city scale is 10 times than before. The city was built at the land near harbor area and generally growth toward north and to the other side of the bay. Therefore, the historical city center is now become the edge of the current city.
During the war period, Penghu has its strategic position in the Taiwan Strait. Many military base and facilities are built on the islands to against China. However, there is no war within 40 years, the land that occupy by the military can possible reuse for the city extension.
The building typology in Magong city is mainly lower than 5 stories. Most of high-rise buildings are built near N-road and some of them are in the city center. Generally speaking, the urban landscape is flat in the city and the height of buildings reduced from city to suburban area.
Magong city was developing from a fish village, therefore the city center is near harbor area. However, considered the mobility and comfort, most of people choose to take flight to visit Penghu. As the result, airport is the first stop of tourists not harbor. From the 3-step analysis map we can find that the position of existing city center is quite periphery and the accessibility is related low.
There are three areas that have potential to have further development in the city center. First one is the military base in the west side. New residential area and waterfront park can be place in there when the military retune the land to local government. Second, the third harbor area now is not yet development. However, the central position makes it possible to construct the new city center, because it has strong related to harbor and has higher accessibility (from airport) than the current center. Third is the cemetery near the northeast bay.
Although there are a lot of public spaces in Magong city, but most of them are occupy by indoor facilities like culture center, stadium and swimming pool. When take out all of these, the real green spaces are little and scatter around the city.
Construct new green spaces to link the existing green structure to form an integrate park system for the city.

Therefore I place several new green elements such as City Park, boulevard and parkway along the harbor in my plan to connect with the existing green spaces of the city. In addition, the boulevard that connects with city and airport can function as a way-mark to guide the direction from airport to the new city center.
New green structure connect with the existing green space in the city and create a complete zone for leisure and recreational activity.
Although the current main shopping street connected the city center with N-road and airport but it has less connection with open space and green area. Therefore, the new boulevard and parkway along waterfront would take an important role to link the old city center and new developing area with green spaces.
There are many tourist facilities like accommodations, shops, restaurants and entertainments concentrated on the both side of main shopping street and the N-road. But less shops and restaurants opened in the harbor area. That makes harbor less attractive. The attractions located on two main leisure areas, which are the green spaces in the city center. But the position of tourist information is periphery. It neither closes to any attractions nor the current city center.
LEISURE CITY

PROJECT STRATEGY

Old Shipyard

76
Phase 1:
- Develop the new city center near third harbor
- Construct City Park and information center to link the existing tourist facilities in this area an attraction cluster
- Reorganize the function of ports, move fish port to the east side and cargo harbor near industrial area
- Improve the ferry stations in the city
- Construct boulevard and parkway (combine grassland, pedestrian and bike path) along harbor to link new and old city center

Phase 2:
(When the tourist numbers reach to 1 million)
- Regain the land from military as new residential area
- Construct waterfront park at the west side of the city
- Construct wetland in waterfront park to clean the wastewater from the neighborhood
- Renovate the traditional village buildings to construct Cultural Park and reuse some of the building as accommodation
- Build water taxi stops along harbor

Phase 3:
(When tourist numbers reach to 2 million)
- Develop new industrial area to connect the existing shipyard
- Build more houses near new industrial area and the area between city and airport
Because the landform is flat in Penghu and the tallest building is less than 80m in the current city center. It’s nice to create some artificial landscape to have different topography in the city. Also a observation tower can provide tourists a place to have a view of whole archipelago. In the city park project, the new tourist information center with observation tower is link to the existing culture center and culture museum at north and the new waterfront plaza and old fish market at south to form a new attraction zone for visitors in the new city center.
LEISURE CITY

Current image
New city center
Walk along the waterfront parkway— from current city center to new city center
Wetland in the city park
EVALUATION
From the government perspectives we can find out that government is tend to have more economic development on each island. The sprawl model of developing plans lead the island has less characteristic and unsustainable. Also, the government expects there will be a 32,000 inhabitants increase when tourist number reach to 1 million. And it will require 345ha new residential area in Penghu. However, in the city planning it only create around 25ha residential area at north side of the city and the area near third harbor. If the expectation is correct, that means the suburban and small village on other isles have to develop 320ha housing area, which the city will triple the size and the small villages will growth into a city within 10 years.
The third harbor development in government plan

Regenerating the old center and developing the new city center.

- New residential area
- Mixed use area
- Regenerate house area
- Regenerate mixed use area

- Green space
- Commercial area
- Fish related shop/restau
- Hotel site
- New residential area
- Governmental agency
- Industrial area
- Fish port
- Parking lot

- Attractive spot
- Historical street
- Traditional village conservation

Extend first and second harbor
Transform third harbor from industrial use to tourism

Regenerating the old center and developing the new city center.
Because the city center now is located near the first harbor, which is a periphery position toward the city that makes it difficult to extend and to connect with the other side of city. It is obvious that in the current city pattern there is a gap between the city center and the settlement in the other side of it. By moving the city center to the third harbor, the city pattern become more integrate and complete on the map. The central position of the new city center also makes it easy to extend in the future.
The green spaces in the city and less connected with main shopping street. Most of them are located at the edge of the city and not use by inhabitants. After construct the new parkway along harbors and boulevard to link the old city and new city center. The green structure in the city has form a complete ring and less fragment. The boulevard and parkway also help to guid people walk to the open space at the edge of the city.
The space syntax map shows the new city center become more integrate by add new connections with harbor and N-road. More pedestrians and bike paths are constructed in the city park and make this area connectable with surrounding area. Also, the accessibility of new city center is become higher than before.
This map shows that the usage of open space in the city is increased after make the new City Park and Waterfront Park. The people were crowded in the main shopping street and now are guided to the new open spaces.
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PHOTOGRAPHY


P15, P28, P33 Photographer: Chia Hung Jen


