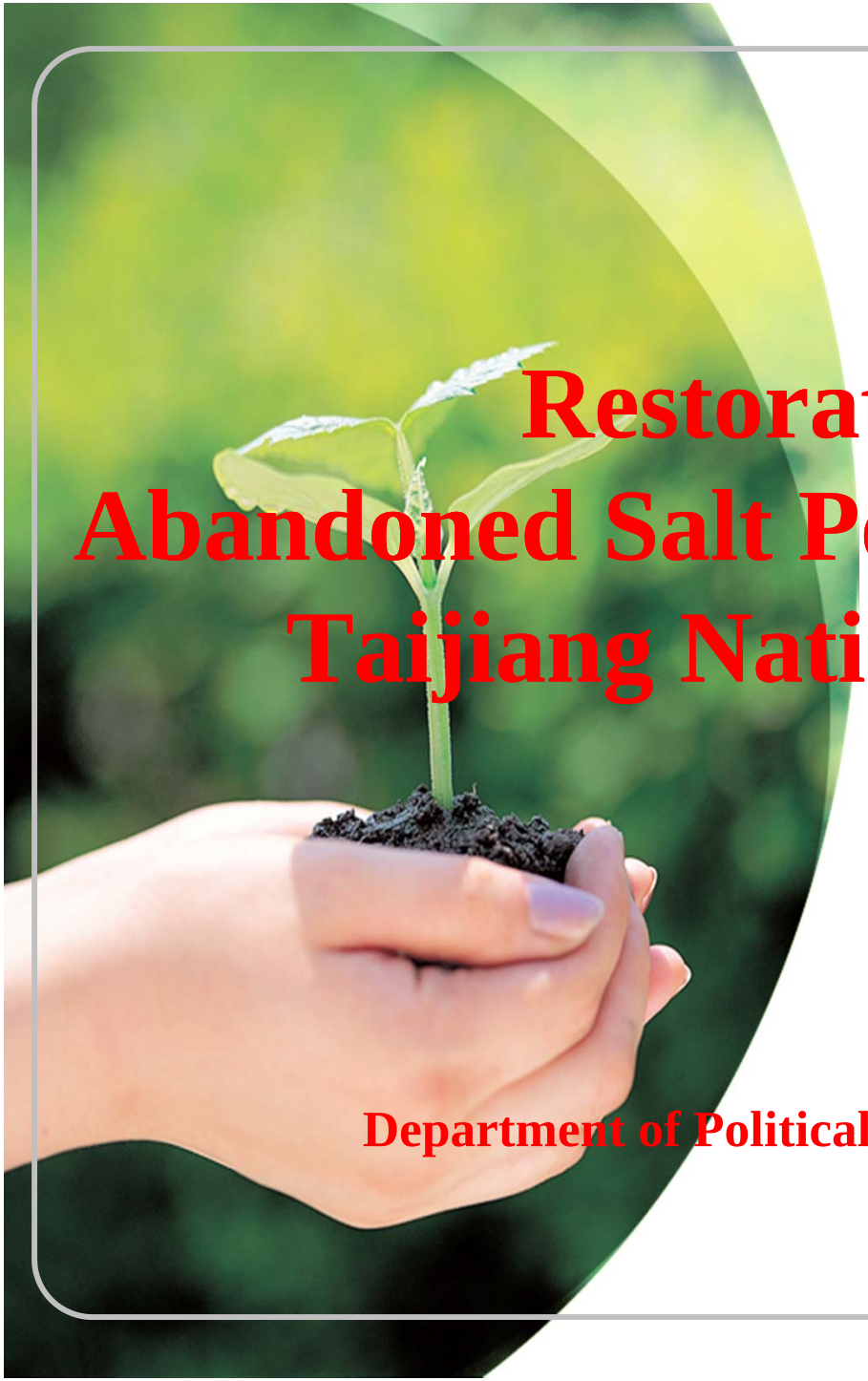

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Restoration Strategies of the Abandoned Salt Pond – a case study at Taijiang National Park in Taiwan

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Introduction

- There has been increasing interest for restoring ecology and biodiversity
- Biodiversity, Cultural diversity, Technology diversity could all be applied to the restoration of abandoned salt ponds at Taijiang National Park, Tainan, Taiwan.
- Where is it?

台江國家公園

Background of the case

- Taijiang National Park was established on Dec. 28 of 2009. The eighth National Park.
- History, culture
- Ecology,
- Industries, technology








台江國家公園


?
中國大陸
南韓
日本
太平洋
琉球
台灣
菲律賓

Background 2

- Taijiang National Park
- Salt Cultural Village
- Abandoned salt ponds
- TNP is about 39000 hectares including ocean area. The land area is about 4900 hectares

Ecology restoration of abandoned salt farm

Background 3

- This paper is about the ecology & ecology restoration of Taijiang National Park.
- Ecology restoration implies that the importance of ecology was recognized by stakeholders.
- However, restoration strategies should be based on the consensus of stakeholders from different organizations and/or different disciplines.

Background 4

- The major species (plants) in the National Park areas are mangroves, which include Kandelia candel, Lumnitzera racemosa Willd, Rhizophora mucronata Lam, and Avicennia marina (Forsk.) Vierh.
- Animals are Fiddler crabs, Black-Winged Stilt, Black-Faced Spoonbill, Egretta garzetta, and so on

Background 5

- Salt Pond Cultural & Ecological Village about 3 hectares.
- The village is under management by both Taijiang National Park office and Agriculture Bureau of Tainan City Government

Research Purpose

- The purpose of this paper is to explore the strategies of ecology restoration for the case of abandoned salt pond in Tainan City, Taiwan.
- The main goal is to improve the effectiveness of the ecology restoration.
- Davis & Slobodkin(2004) mentioned that the goal of restoration is ‘‘the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.”

Research Problems

- Identifying the abandoned salt ponds for restoration. But four important problems:
- 1. many agencies responsible for preservation & conservation
- 2. environmental education implication
- 3. restoration implication for other abandoned salt ponds
- 4. credible commitments of stakeholders.

Literature review

- **Davis & Slobodkin(2004) defined ecological restoration to be ‘‘*the process of restoring one or more valued processes or attributes of a landscape*.”**
- **The process may include ecology, cultural, and technological perspectives.**

Ecological Perspective

- **According to online Encyclopedia Britannica, *"ecology deals with the organism and its environment. The concept of environment includes both other organisms and physical surroundings……These interactions between individuals, between populations, and between organisms and their environment form ecological systems, or ecosystems….."***
- **Organism and Environments**

Ecological Perspective 2

- **Different species**
- **Plants: Mangrove**
- **Birds: Black faced spoonbill birds**
- **Davis & Slobodkin (2004) stated that "*although ecology plays a central and essential role in the implementation of restoration projects, we believe that defining restoration goals and objectives is fundamentally a value-based, not scientific, activity*."**

Ecological Perspective 3

- **Edith Allen (2003) emphasized that ‘‘*restoration is not only about the science of ecology but it also includes societal decisions on appropriate end points for restoration, economics of restoration and the valuation of nature, policy and planning, education and volunteerism, and other social and philosophical issues*.”**

Ecological Perspective 4

- **Encyclopedia Britannica, biodiversity is defined as "*the variety of life found in a place on Earth or, often, the total variety of life on Earth. A common measure of this variety, called species richness, is the count of species in an area.*"**

Ecological Perspective 5

- **ecosystem", which is defined as "*An ecosystem can be categorized into its abiotic constituents, including minerals, climate, soil, water, sunlight, and all other nonliving elements, and its biotic constituents, consisting of all its living members. Linking these constituents together are two major forces: the flow of energy through the ecosystem, and the cycling of nutrients within the ecosystem.*"**

Cultural Perspective

- Biodiversity implies cultural diversity, and diversified governance structures
- The purpose is to motivate community, bureaucrats, and citizen participation

Cultural Perspective 1

- Buildings, construction, salt farm facilities could all have cultural meanings
- Salt farm culture, religion, bureaucratic culture
- **culture is the fortune and sustainability of our future.**

Cultural Perspective 2

- **Based on North's(1990) definition, the meaning of institution includes formal and informal constraints, which cover social, political, and organizational cultures. And it involves consensus and/or cooperation among organizations.**

Technological Perspective

- Biodiversity implies technological diversity
- What are the technologies needed for ecology restoration?

Technological Perspective 1

- 1. ecological technology (wetland construction, species such as fish, plant, birds, bacteria
- 2. ecological monitoring
- 3. water quality improvement and monitoring
- 4. civil engineering: water flow, sands, rain
- 5. remote sensing
- 6. local knowledge

Research Design

- The in-depth interview method was the major method used in this study. To explore the restoration strategies of the abandoned salt ponds, 10 people related to the system were interviewed. Basic information regarding the interviewees is shown in Table 1

Table 1: The basic information of the interviewees

Coded name	Profession	Meeting Places	Date
A	Elected community leader	The Salt Farm Cultural Village	03/21/2013
B1	Bureaucrat of Agriculture Bureau, Tainan City Government	National Cheng Kung University	03/28/2013
B2	Bureaucrat of Agriculture Bureau, Tainan City Government	The Salt Farm Cultural Village	02/25/2013
C	Department Chief, Taijiang National Park	Office of Taijiang National Park	03/14/2013
D1	Civil Engineering scholar	National Cheng Kung University	03/18/2013
D2	Ecologist	National Cheng Kung University	03/10/2013
D3	Ecologist	National Cheng Kung University	01/12/2013
D4	Earth Science Scholar	National Cheng Kung University	04/14/2013
D5	Ecologist	National Cheng Kung University	4/14/2013
E	Fisherman and Ecology Tour Guide	The Salt Farm Cultural Village	4/20/2013

Photo 1: the abandoned salt ponds area for restoration

Research findings and discussion

- It was found that the restoration of the abandoned salt ponds needs a lot of efforts from different perspectives. In the following, three perspectives, including ecology, engineering, and technology are used to discuss the effectiveness of restoration ecology

The Ecological Perspective

- The plant has to be locally grown
- E indicated that Rhizophora stylosa and Sea Lettuce were probably the most suitable plants to restore the ecology of the abandoned salt pond.
- D3 expressed that the ecology of the abandoned salt ponds could be restored by planting Rhizophora stylosa (mangrove) by controlling water valves to bring fresh sea water into the abandoned salt ponds.

Ecological Perspective 1

- There are three different kinds of specimen room in the village.
- 1. a sperm whale specimen room
- 2. there was a small specimen room with birds.
- 3. there is a small specimen room with fish and crabs.
- The ideal situation is to integrate the three specimen rooms to be a big museum as the Ecology and Cultural Museum besides Viva Lake in Japan.

Green Tunnel

Mangrove

Mangrove

Mangrove 2

Mangrove 3

Kandelia candel 水筆仔

Lumnitzera racemosa Willd 欖李

Rhizophora mucronata Lam 五梨跤，又稱紅海欖

Avicennia marina (Forsk.) Vierh.海茄冬

Mangrove (embryo)

Mudskipper & fiddler crab

Egret 鷺鷥

Black-faced Spoonbill

Black-faced spoonbill birds

- Fly away from home for 8000 miles

中華蛸豆蟹_母腹面_北門(2012)

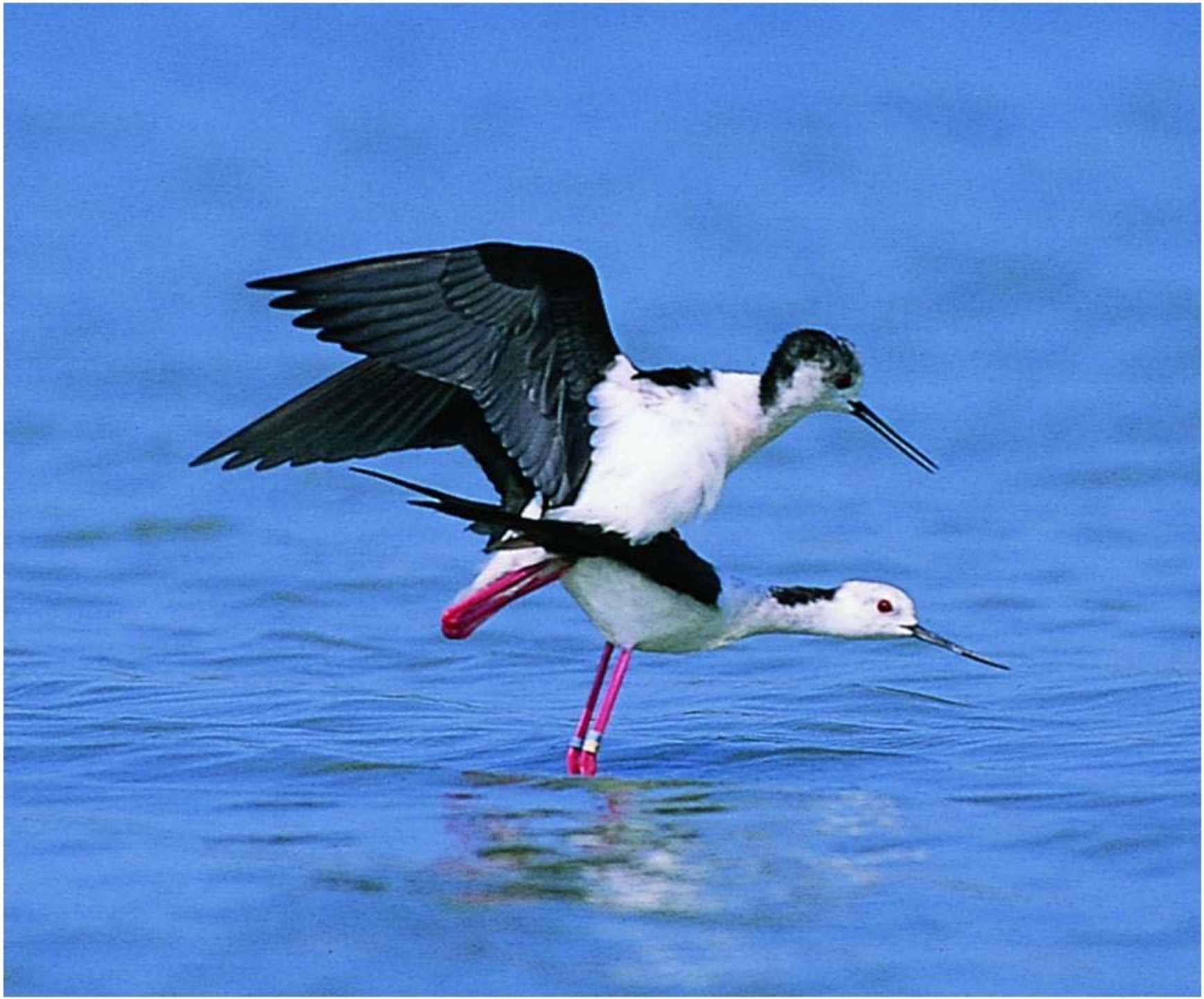

是誰？來拜訪台南濕地
生命
雉尾水雉 Pheasant-tailed Jacana
(Hydrophasianus chirurgus)

They are getting married with beautiful hair

濕地是鳥語花香的田野，
是蛙鳴魚躍的河流，
是孕育生命的處所。

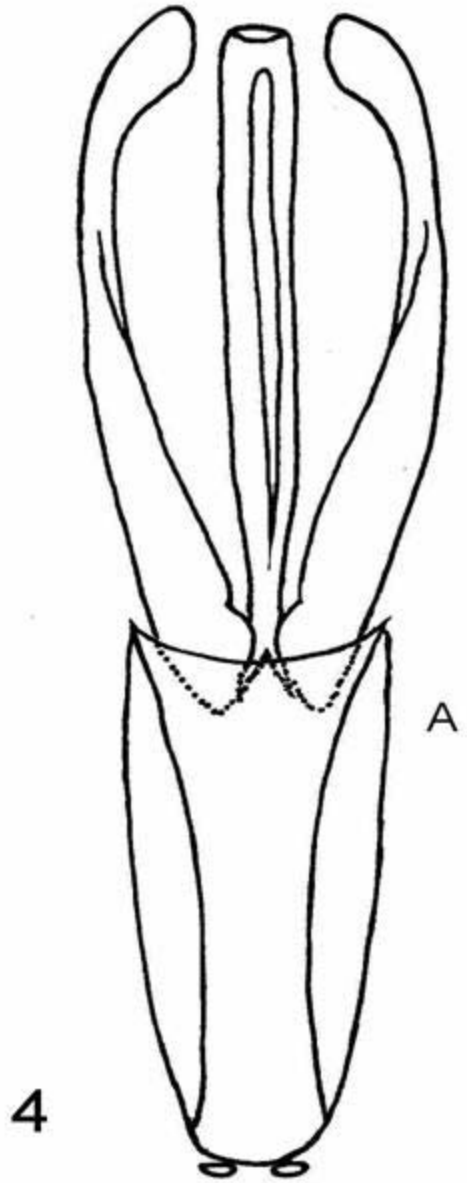
Marketing for the wetland

高蹺鴴



豐年蝦

大員牙蟲 (*Berosus tayouanus*)



水蠅(Ephydridae)的幼蟲、蛹及成蟲
是小型水鳥的食物

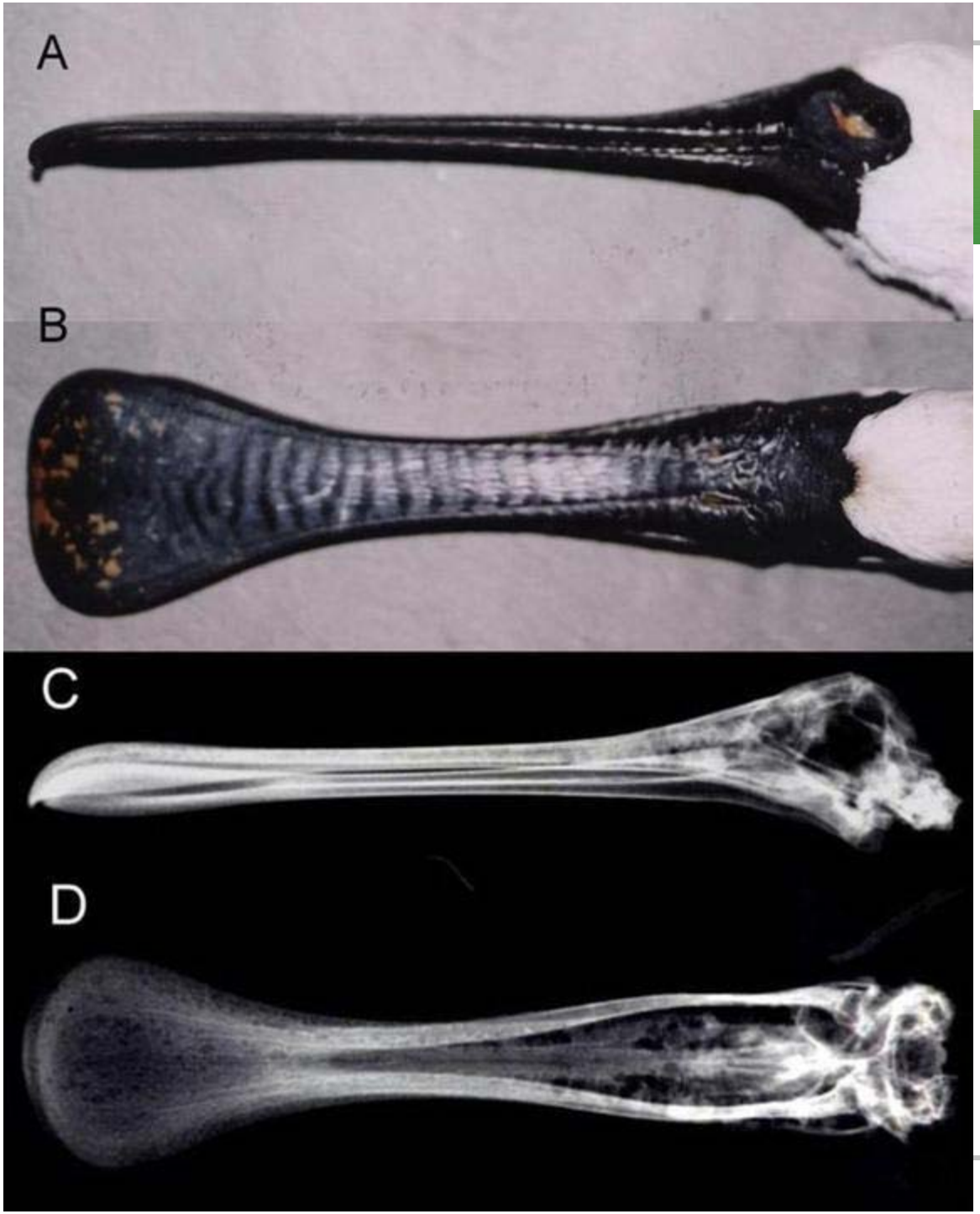
濕地是一塊又髒又臭的爛泥低地，是滋生蚊蠅的積水窪地。


2006.2.7七股大寮台17線邊

G/YB : The photograph
was taken on Okinawa Island
on 15 April 2001
G/YB

Species : Black-winged Stilt
Date : 16 Jun. 2001
Resighting place : Cheonsu Bay, Chungcheongnam-do(36.40N, 126.27E)
Observer : Mr. Hyun-Tae Kim
Observation detatils : Right tibia - white(upper) and yellow(lower), Left tibia-green

黑面琵鷺的食源
大鱗鮻及其耳石
Chelon macrolepis



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Bill of BFS is darker and spoon shaped


推動保護區運動興起，但
保護區是300公頃？
還是3,000公頃？
需具有覓食、休息與生殖、育幼的功能

劃設曾文溪口北岸黑面琵鷺保護區歷經長達12年的抗爭

劃設四草野生動物保護區歷經3年的爭取

Cultural Perspective

- A insisted the cultural factors of salt farms twenty years ago should be built into the Salt Farm Cultural Village.
- A is working very hard to rebuild the salt farms to attract visitors.
- The history of the salt farm was from 1921 to 2000. It was the first salt farm by using a roof tile tray to produce salt.

Cultural Perspective 1

- Salt farm
- Building
- Specimen room

Cultural Perspective 2

- It is expected that the Agricultural Bureau of Tainan City Government, Taijiang Naitonal Park, and the Salt Farm Cultural Village should work together to preserve the ecology.
- But it was found that there were power struggles and/or potential conflicts among the three organizations.

Abandoned Dormitory

Abandoned salt ponds

Salt culture


安順鹽場復活！

鹽田文化村

儀式重現

Culture of Salt Industry (end in 1991)

Dynamic Salt Culture & Ecology Village

南寮鹽田生態文化村
生態式博物館_盧建銘談過程

會見山科大講師盧建銘（左起）向文建會主委陳郁秀介紹學自鳥巢的過濾工藝；最右為台南市長許添財。　記者于國華／攝影

四草溼地新傳奇

【記者于國華／報導】文建會「地方文化館」推動以來的最高額補助，給了沒有「館」的「鹽田生態文化村」。

在台南市四草南寮社區與居民相處兩年的崑山科技大學講師盧建銘，用組織的操作，建立以文化產業帶動生態保育的社區營造模式。

對生態保育者而言，南寮村所在的四草溼地，是台灣的自然寶庫。民國八十三年指定為「生態保護區」之後，固然免除了開發的衝擊，但也讓居民生計陷入困境。南寮社區的安順鹽場自1919年開始生產，如今仍然保留台灣唯一的運鹽碼頭等產業遺產。隨著鹽民遷出，位於鹽田間、紀錄鹽業發展歷史和智慧的聚落，也頹於荒廢。

盧建銘偶然進入南寮，在台南市建設局農林課的零星補助下，和居民展開社區營造試驗。他以一年多時間觀察社區組織、政治脈絡和自然生態，在推動「鹽田生態文化村」之前，他已經熟悉當地鳥類、了解水族和植物習性，以及濕地動植物的依存關係。

重視基礎研究的盧建銘，帶著學生觀察鳥類築巢，經過建築學理和鳥類生態分析之後，再以人工仿製，開發成燈罩、花器等工藝品。他和學生也以有限的材料費，與村民自力搭建合乎標準的賞鳥亭；而所使用木材，則砍自破壞生態的銀合歡。

南寮村民意識到生態保育可以帶來生機，從此環境保育，不再只是保育團體的事。盧建銘將「文化產業」視為一種「技術」，用以整合社區總體營造、生態保育和文化資產保存，組織並建立社區組織關係。

在人去樓空的村舍中，盧建銘和村民重新進駐，建立編織、版畫等工房，其中一間專事開發鳥巢工藝品。他希望開發更多種產品，組織村民成為「文化工人」，以特色工藝和生態保育，建立四草的文化產業發展核心；所育和觀光配合的產業例如民宿等，則希望設在保護區之外，不干擾自然環境。

台南市副市長許添財在去年三月，了解南寮社區的故事，意識到其中的自然條件和人文潛力；雖然市府資源有限，許副市以幾乎每周在市府召開一次的行政協調會，給予南寮村最大的支持。

而南寮村「生態式博物館」的發展概念，也得到文建會青睞，得到一千二百萬元「地方文化館」經費補助，將用以整理環境和發展社區組織；文建會主委陳郁秀日前也專程南下，和台南市長許添財一同主持「鹽田生態文化村」工程啟動。勞委會永續就業方案，也即將有經費投入南寮。

依過去經驗，政府補助可以支持社區發展，但也可能限制助長，造成社區營造的「終結」；強調慢工出細活的盧建銘意識到這個問題，謹慎的說，社區承接能力和發展速度，是接受計畫補助的先決條件；南寮鹽村不「吸金」、不急於創造績優，必要時會對政府計畫喊停，回歸社區民眾的自力營造。

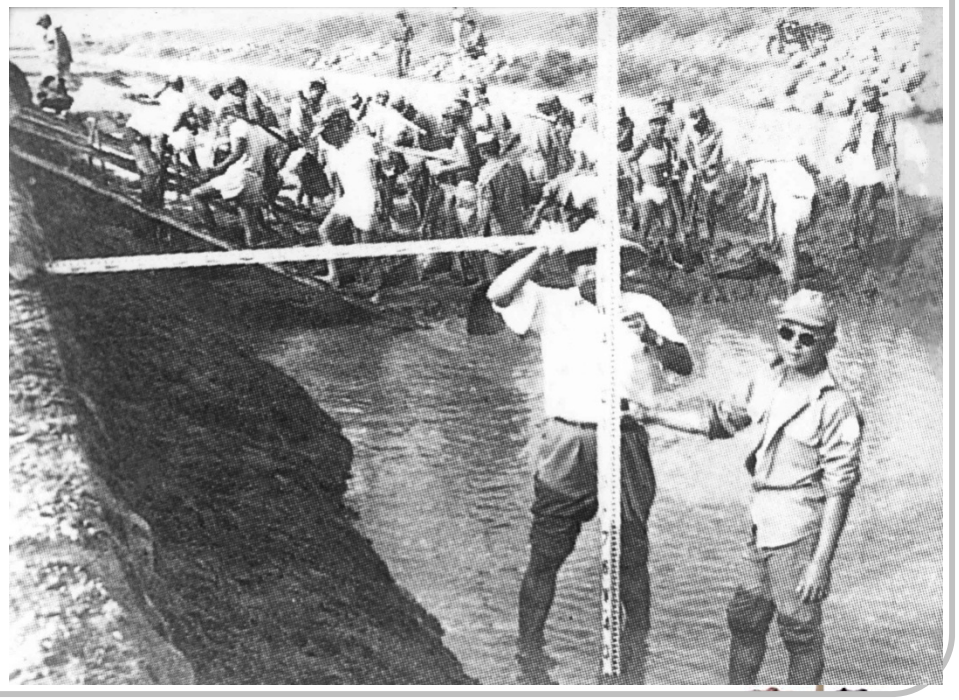
Salt turtle

History of the An-Shun Salt Farm

The salt farm was 10 Km from the city. There were about 120 households of salt farmers. And there were 350 hector salt farm. The wild species preserved area was established in 1994. The other half was developed as science park. No salt was produced since 1998. The households were moved including the temple, 永鎮宮. 。

日治時期鹽場變遷圖

Japanese Colonial Period, pier development



History of the An-Shun Salt Farm

- Community Development become the focus in 2003. The village was subsidized for job creating purpose.
- The salt farm culture was emphasized

Coral Reef Enclosure

- Salt Police Office was built in 1923
- The office has been dismantled. But the enclosure was still there. The materials were from Pen-hu. It lasted for 90 years.

Salt Farm Police Office (1952)

- Salt was important and valuable property
- The office was built in 1952.
- Good public security due to the salt police

Court in Japanese Colonial Period

Old dormitory

- **The dormitory was built in 1952 for the managers of the salt farm, which was government owned enterprise**

Clinic of the Salt Farm

community center → Sperm Whale Room

- For recreation purpose such as movie for community citizens

Memorial Stone in the village

- It was built in 1952

The roof tile tray salt farm

Roof tile tray method for salt producing

Bird's view of the salt farm

The An-Shun Salt Farm Office

- The office was built by using special materials in 1919 and was finished in 1923.

Pier for salt transportation

- **The Salt Pier was built in 1925 for the purpose of salt transportation**

Old pump machine (抽水機)

Old pump machine was installed in 1941.
The machine is still operating. Toshiba.

The history of An-Shun Salt Farm

From 帆船 to Train Transportation

Photo 1: 1940、1950’ s ships for salt transportation
Photo 2: 1970 by using motors
Photo 3: 1980 using train

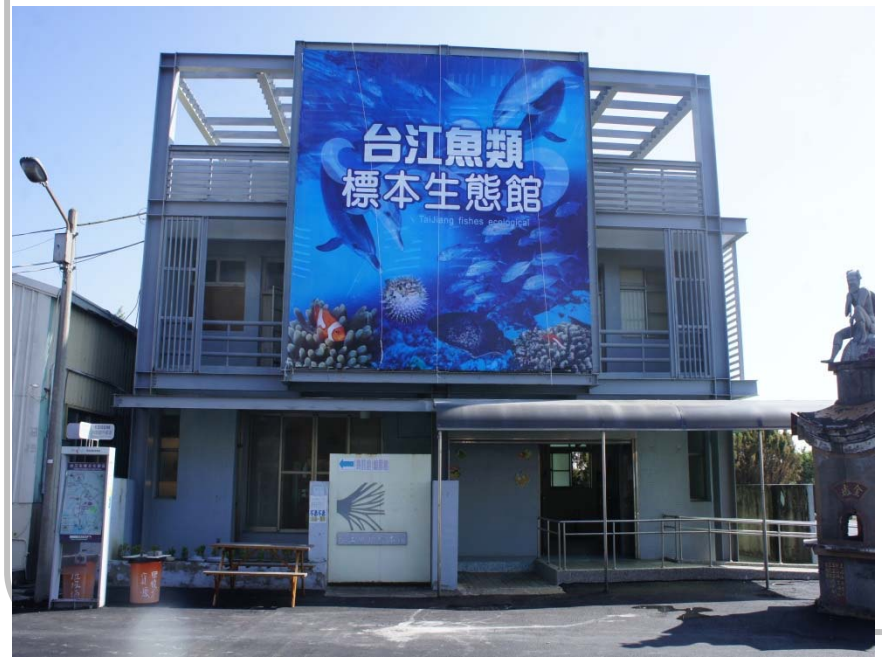
Photo 1

Photo 2

Photo 3

Taijiang Fish Specimen Room

- **Taijiang Fish Specimen Room was opened on Feb. 14 of 2010. The fish specimen was given by Kaohsiung Ocean U. to Tainan City Government.**



The Taijiang Sperm Whale Room

- The whale was found on Jan. 25 of 2004 on the shore of Yunlin County. There are 16.7 meters' long, and 50 tons' weight. The whale was broke out during the transportation


台江鯨豚館
TAIJIANG CETACEAN MUSEUM


抹香鯨的骨骼系統

Specimen Room for Birds

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館內標本

館內一景

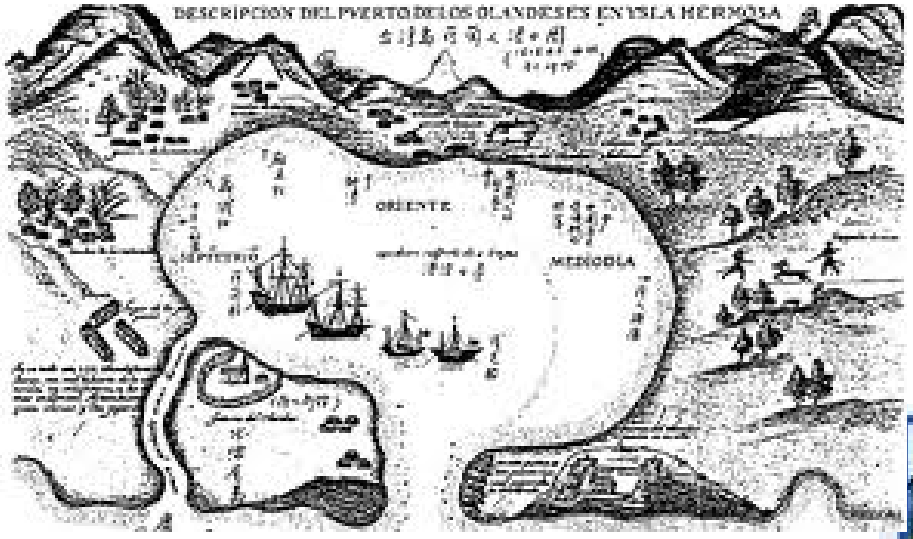
蒼鷺標本

鳥類生態館後面

Good bye Salt Farm on June 22 of 2002 at Chi-Gu
Organized by County Government & Tai-Salt Company

Old map of Taijiang National Park

Old map of Taijiang inner sea



Aboriginal people

Culture perspective 3

- 1. Linkage with Koxinga or with Dutch before 1662
- 2. Linkage with salt farms after 1919
- 3. Linkage with the way of life of community

Koxinga's Portrait

Milk Fish

Koxinga's memorial park

- Beside the 聖母廟
- There are nothing except 銅像 and 紀念碑，

Koxinga's memory








Shi-cao Da-Chuan Temple

General & God 陳酉

Technological Perspective

- Technology has to cope with “environment such as culture and ecology in the context of ecosystem.
- The technology of developing the salt farm in 1919
- Science Park, which was built in 1998
- An-Shun Plant of CPDC, which was built in 1944 of Japanese colonial period

Technological perspective 2

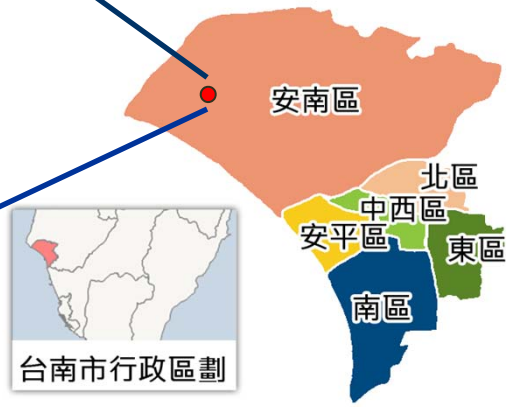
- 1. methods and/or processes, construction
- 2. materials to be consistent with nature or ecology
- 3. rules and/or regulations
- 4. technology diversity

What kinds of technology

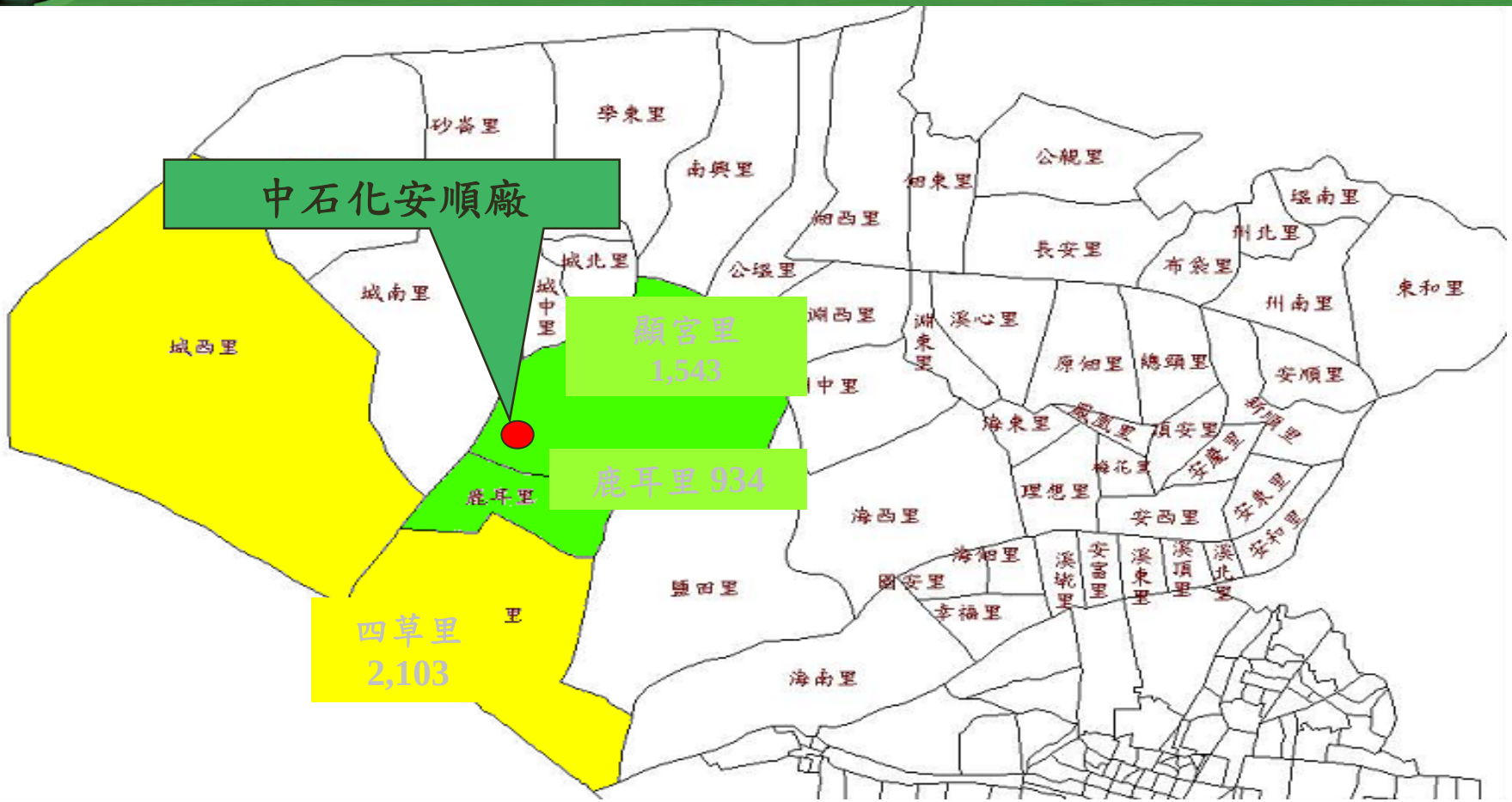
- **Technology diversity**
- 1. **Engineering technology:** civil engineering, material science, salt farm rebuild
- 2. Remote sensing **technology**
- 3. **Ecological technology,** bio-technology
- 4. urban planning
- **5. Local knowledge**
- **6. Architectural (cultural) technology**

Taijiang National Park

CPDC at Anan District of Tainan



Three Polluted Communities of An-Nan District



Ecology restoration of abandoned salt farm

logo

South Bay Salt Pond Restoration Project

Restoring the Wild Heart of the South Bay

Senator Feinstein involved a lot on SBSP

Culture Landscape

Engineer

Map


San Francisco
San Francisco Bay
PACIFIC
OCEAN
Alameda Creek
Watershed
San Francisquito
Creek & Upper
Peninsula
Watersheds
West
Valley
Watershed
Coyote Creek
Watershed
Guadalupe
Watershed
10 KM
10 MI

Map 2

Egret

Conclusion

- In order to preserve ecology, biodiversity, cultural diversity, and technological diversity are all necessary.
- It requires different disciplines to solve the ecological problems.
- Therefore, the three perspectives, including ecology, culture, and technology could be used and be applied at ecology restoration of the abandoned salt ponds.

Conclusion 1

- The Taijing National Park should play more important role at ecology restoration such as the abandoned salt pond restoration.
- But, it was found that the role of ecology played by Taijiang National Park seemed very limited.

Conclusion 2

- The salt pond restoration project indicated at Photo 1 could be a starting point to promote biodiversity, cultural diversity, and technological diversity.
- But, of course, strategy design based on cross disciplinary and/or functional agencies cooperation is necessary to have the strategy effectiveness of salt pond restoration.

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Thank You !

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