

# What could we learn from the management of Sungei Buloh Wetland Reserve

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# Introduction



# Background Information

Year	Event
1993	Opened as Nature Park (NW of Singapore)
2002	130ha Nature Reserve → Sungei Buloh Wetland Reserve <hr/> Wetlands International : East Asian Australasian Shorebird Site Network
2003	1 <sup>st</sup> Singapore ASEAN Heritage Park (The Association of Southeast Asian Nations)

# Background Information

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- ❖ Since 2003, Sungei Buloh has continuous to expanded to 202 ha

## Mangroves



## Mudflats





# Background Information

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## Ponds



## Forests





# Background Information

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Visitor centers, observation hides & trails





# Background Information

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- ❖ Different animals and plants could be found



# In this presentation...

Our focus : **MANAGEMENT** of wetland reserve

- Analyze how well the reserve manage on...
  1. Conservation
  2. Education
  3. Leisure aspect
- Compare Singapore wetland reserve with HK Wetland Park
  - Reflect what we could learn from Singapore





# Management of wetland

- Conservaton
- Education
- Leisure

# Conservation

## Interaction between wetland and species

Biotic components vs Abiotic components

# Conservation

- Wetland is divided into different areas
- Different area nurture different species



**River**



**Mudflat**



**Mangrove**



**Forest**



# Conservation - River

- Important **habitats** for aquatic species and reptiles
- Form a **food** chain



Crocodile found in river



Malayan Water Monitor Lizard

- ❖ Provide cooling effect for reptiles in tropical area
- ❖ Form food chain between crocodile, Malayan Water Monitor Lizard and fishes, crocodile as top predator

# Conservation - Mudflat

- Important for migratory birds - Rich source of **food** as refilling station
- Energy stored is not sufficient for entire flight for long distance migrants



A Common Redshank eating a worm



Black-tailed Godwit eats clams

# Conservation - Mudflat

- High tides and low tides at different times attract different birds
- Different beak size prey on different organisms



Egrets, water birds with long necks and long legs attracted during high tides (more food to feed)



Mongolian Plovers, with short necks, beaks and legs attracted during low tides (less food to feed)



# Conservation - Mangrove

- Littoral zone, the area between the low and high tide zones facing the sea
- Important **habitat** of Mangrove trees



- ❖ Salt tolerant trees
- ❖ Adapted to the low oxygen (anoxic) conditions

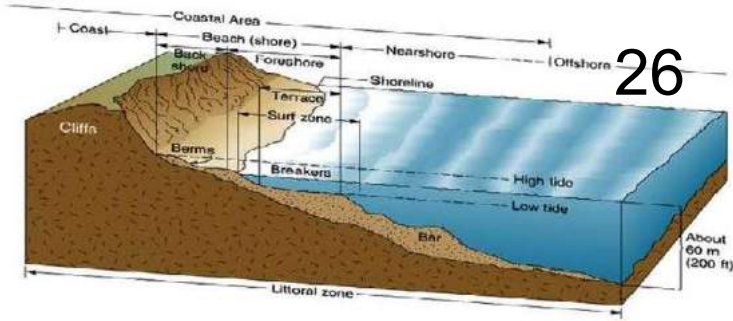


# Conservation - Mangrove

- **Habitat** of species living at intertidal zone



Giant Mudskipper found in Mangroves



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- ❖ Fish that spend most of their time out of water
- ❖ By staying damp, the fish can also breathe through its skin
- ❖ Littoral zone important for Giant mudskipper

# Conservation - Forest

- Taller trees with shades
- Important for **resting, predating and hiding** of birds



Dollar birds on tree tips

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- ❖ Named after the dollar-like silvery rings on wings
- ❖ Predators of flying insects on perch in skilful aerial pursuits
- ❖ Migratory birds from New New Guinea to Australia





# Conservation - Forest

- Important for **shading** of species under hot weather in tropical region
- Provide **habitats** and **nutrients**



Cicada eggs on leaf bottom

- ❖ Prevent drying up by sunlight
- ❖ Absorb nutrients from leaves
- ❖ Produce bubbles to protect eggs

# Conservation

**How the wetland manage to  
let people visit but without  
affecting the living of  
species ?**



## 1. Visitor number is restricted

- ❖ Managed the visitorship
- ❖ ↓ disturbance from visitor to the environment

## 2. Opening hour from 7am to 7pm

- ❖ Remaining 12 hours provide a silent environment for species to have their own living





### 3. Sterilize the shoes before entering the reserve

- ❖ Disinfecting Door Mat
- ❖ Prevent bringing bacteria into the reserve which might adversely affect the growth of living species



## 4. Using plants as barrier to separate visitor and birds living environment<sup>29</sup>

- ❖ Help maintaining a silent area

So birds....

- ❖ X Frightened
- ❖ ✓ Communicate
- ❖ ✓ Locate prey





## 5. Most of the track do not use concrete to build the pavement

- ❖ Allow plants to grow in a more flexible way





# Education

1) Education Facilities

2) Education Programmes



# Education

## 1) Education facilities

### 1a) Visitor Centre

- small “museum”
- brief introduction of the history and the importance of conservation
- a good starting point



# Education

## 1b) Main Bridge

- for observing the river
- ✓ information board
- → to introduce the species that you can observe in the river



# 1c) Bird Watching Centre

- ✓ **information board** to teach people how to distinguish the bird types
- ✓ **telescopes** for observation





## 1d) Question Board

- ✓ **interaction**, visitors <-> wetland
- catch children's awareness

## 1e) Many Information Board...



## 1f) Wireless learning trail

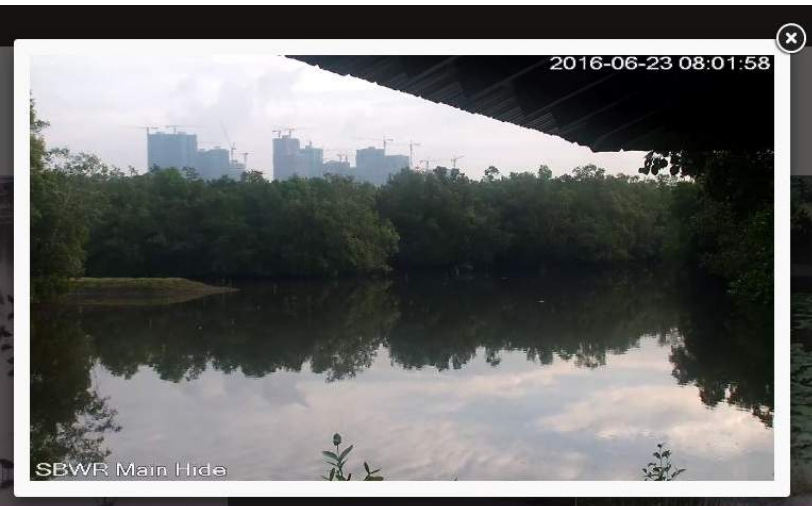
- eg. barcode scanning
  - promote “**outdoor classroom**”
  - **self learning**
  - X rely on human guide tour
- **more flexible**



## 1g) Live Camera on the website

- **3 cameras** (main hide, main bridge, pond)
- **prepared videos** of special animals
- let the school educate the students **in classroom!**

<https://sbwr.reachfield-it.com/sb/>



<https://www.nparks.gov.sg/learning/teaching-and-learning-resources/animal-cam>



## 2) Education Programmes

### 2a) FREE Guided Walk

- **7types of free guided tour:** Coney Island Guided Tour, Guided walk (in Mandarin), What's in my sky?, What's in my mud?, What's in my water?, What's in my mangrove?
- **benefits the visitors with different interests**






## 2b) Young Naturalist Camp

- 1 day camp
- indoor & outdoor activities in the wetland
- learn the conservative issues

## 2c) Nature Nurtures

- various activities, e.g. coastal clean-ups, mangrove salvaging
  - push the teenagers to contribute to the environment
- 

# Leisure

In 2003, Sungei Buloh Wetland Reserve became Singapore's first ASEAN Heritage Park.

- ❖ ASEAN = The Association of Southeast Asian Nations
  - formed in 1967 by Indonesia, Malaysia, the Philippines, Singapore and Thailand → promote political and economic cooperation and regional stability.



# Leisure

Since 2003, Sungei Buloh has continuous to expanded.

- ❖ Mangroves, mudflats, ponds, forests
- ❖ Provides an even larger protected place for the plants and animals
- ❖ The newest extension:
  - With a **brand new visitor centre & new trails** for visitors to explore and enjoy
  - Situated along Kranji Way, easily accessible by public transport  
→ makes Sungei Buloh **even closer** to the public

# Leisure

Everywhere is well managed, quiet and comfortable.

- ❖ Visitors can enjoy the beautiful view, the happiness in discovering the wonder of nature by observing different species while learning more about ecology simultaneously.
- ❖ Visitors can breath in fresh air
- ❖ Visitors can take photos with the nature everywhere in order to catch every valuable moments.





# Wonderful Places for Leisure - Examples

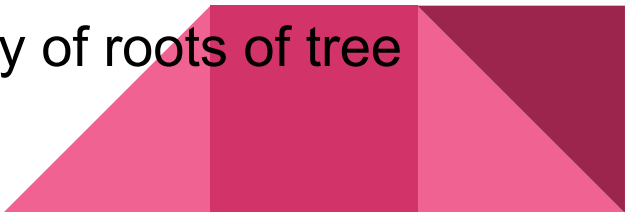
## 1) The Observation Pod & Coastal Trail

- Including the Kingfisher pod and Mudskipper pod

## 2) The Migratory Bird Trail

- Including the foot bridge and Bird observation hides

## 3) The Mangroove Boardwalk

- Admire the special shape and morphology of roots of tree
  - Discover tiny animals everywhere
- 

# Wonderful Places for Leisure -

## 1) Observation Pod & Coastal Trail

Woody bridges are built nearby the sea and over the sea

- ❖ Allow visitors to have a closer look to the habitats on the seaside
- ❖ Provide enough space for the visitors to look over the sky
  - observing birds flying cross the sky
  - admire the sky of blue and the clouds of white
- ❖ The sea perfectly holds the mirror image of the sky
- ❖ A perfect place to take amazing photos



# Wonderful Places for Leisure -

## 1) Observation Pod & Coastal Trail





# Wonderful Places for Leisure -

## 1) Observation Pod & Coastal Trail



# Wonderful Places for Leisure -

## 2) Migratory Bird Trail

Woody bridges are built surrounding the Buloh Tidal Pond

- ❖ Allow visitors to have a closer look to the birds
- ❖ Provide a few bird observation hides
  - With bird and fish species introduction boards
  - Allow space for setting up the binoculars devices to admire the species at the opposite pond side
- ❖ A good photo-taking spot
  - The beautiful hides, the painting wall



# Wonderful Place for Leisure -

## 2) Migratory Bird Trail



# Wonderful Place for Leisure -

## 2) Migratory Bird Trail





## Wonderful Place for Leisure - 2) Migratory Bird Trail



## Wonderful Place for Leisure - 2) Migratory Bird Trail



# Wonderful Places for Leisure -

## 3) Mangroove Boardwalk

Roads are built surrounded by the mangroove side

- ❖ Allow visitors to have a closer look to plant and animal species in the mangroove
- ❖ Admire the special shape and morphology of roots of tree
- ❖ Discover tiny animals everywhere
- ❖ A good photo-taking spot





# Wonderful Places for Leisure -

## 3) Mangroove Boardwalk





## Wonderful Places for Leisure - 3) Mangroove Boardwalk





## Wonderful Places for Leisure - 3) Mangroove Boardwalk



## Wonderful Places for Leisure - 3) Mangroove Boardwalk

**Guess what animals we had discovered next?!**



# Wonderful Places for Leisure - **Two Big Spiders!!!!**

## 3) Mangroove Boardwalk







# Reflection : Comparison between Singapore & Hong Kong wetland

# Basic information

- Northern part of Tin Shui Wai, New Territories
- 61-hectare wetland reserve
- 10,000m<sup>2</sup> visitor centre
- opening hour:

~Mondays, Wednesdays to Sundays, Public Holidays: 10:00am - 5:00pm

~Tuesdays (except Public Holidays): Closed



# Transportation

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# Tickets

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單次入場票 Single-entry Ticket	
標準票 Standard (每位 each)	優惠票 Concession 3 至 17 歲小童 / 全日制學生 / 65 歲或以上長者 / 殘疾人士 (及一名同行照料者) Children aged 3 to 17 / Full-time students / Senior citizens aged 65 or above / People with disabilities (and one accompanying carer) (每位 each)
\$ 30	\$ 15



# Habitat

- ❖ Freshwater Marshes
  - ❖ Mangroves
  - ❖ Intertidal Mudflat
  - ❖ Reed Marshes
  - ❖ Woodlands
- 

# Comparison between Singapore and Hong Kong

## 1) Leisure

- number of indoor and outdoor leisure
- diversity of leisure facilities

## 2) Conservation

- opening hours
- materials for pavement
- disturbance control

## 3) Education



## Map of Wetland Reserve



# leisure

	<b>Singapore</b>	<b>Hong Kong</b>
<b>Indoor</b>	<b>None</b>	<b>Many</b>
<b>Outdoor</b>	<b>Less</b>	<b>More</b>





# Indoor Leisure

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play area and fun games!



# Indoor Leisure

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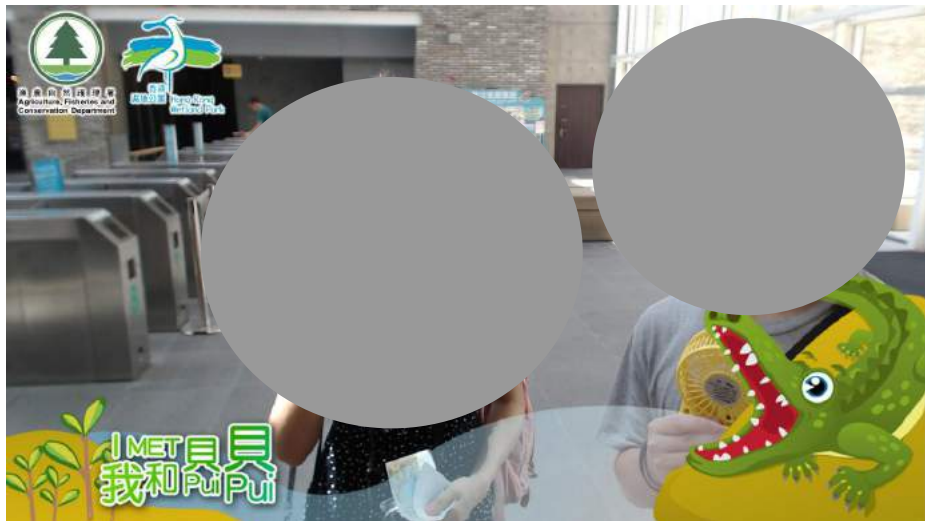
As a wetland reporter



# Indoor leisure

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Take pictures with  
celebrities of wetlands





# Indoor leisure

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viewing gallery

explore the beauty  
of birds life in marshes





# Outdoor leisure

Different kinds of walk!



nice view! :)

wildside walk

27  
mangrove boardwalk







fiddler crab!!!

# Outdoor leisure

## Bird Hides

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# Outdoor Leisure

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# Comparison on leisure

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	Singapore	Hong Kong
<b>Walks</b>	<b>Yes, 3-4</b>	<b>Yes, 5</b>
<b>Hides</b>	<b>Yes, 4</b>	<b>Yes, 3</b>
<b>Interactive games</b>	<b>None</b>	<b>Yes, many</b>

# Comparison on leisure

Besides the number of leisure facilities,  
the leisure in Hong Kong Wetland park are more...

- 1) diverse
- 2) comfortable for visitors
- 3) suitable for families



1. short opening hour
  2. Daylight utilization
  3. Ecological monitoring
  4. Habitat management
  5. reed marshes and reed filter
  6. reused fender
- 

## 2) Conservation - Daylight utilization

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# 3) Conservation - Ecological monitoring<sup>27</sup>

- ❖ birds, insects, aquatic plants surveys
- ❖ annual freshwater fish survey
- ❖ water quality monitoring
- ❖ Infrared-triggered cameras



## 4) Conservation - Habitat management 27

- ❖ Vegetation management
- ❖ water management
- ❖ control of alien species
- ❖ artificial nests



## 5) Conservation - reed marshes and reedbed filter<sup>27</sup>

- ❖ reedbed filter : filter storm water runoff
- ❖ shelters
- ❖ food



## 6) Conservation - reused fender

- ❖ discarded fenders from old ferry pier
- ❖ resting post for birds





# Comparison on conservation

- 1) artificial pavement
- 2) disturbance
- 3) no visitors numbers control
- 4) aquarium for fish and crocodile



# 1) artificial pavement

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Hong Kong



like a garden!!

Singapore





## 2) disturbance

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**Hong Kong**



**Singapore**



### 3) visitors control

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In 2015, the Hong Kong Wetland Park attracted about 460,000 visitors. On average

1260 visitors a day!!!!





# 4) aquarium for fish and crocodile

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Hong Kong



Singapore




# Education

## 1) Facilities

- visitors centre
- viewing gallery
- discovery centre
- interactive games
- 'wetland at work'
- audio guide & photos on website

## 2) Activities

- workshops
  - guided tours
- 

# Education - Facilities

## 1) Visitors centre





# Education - Facilities

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## 2) viewing gallery





# Education - Facilities

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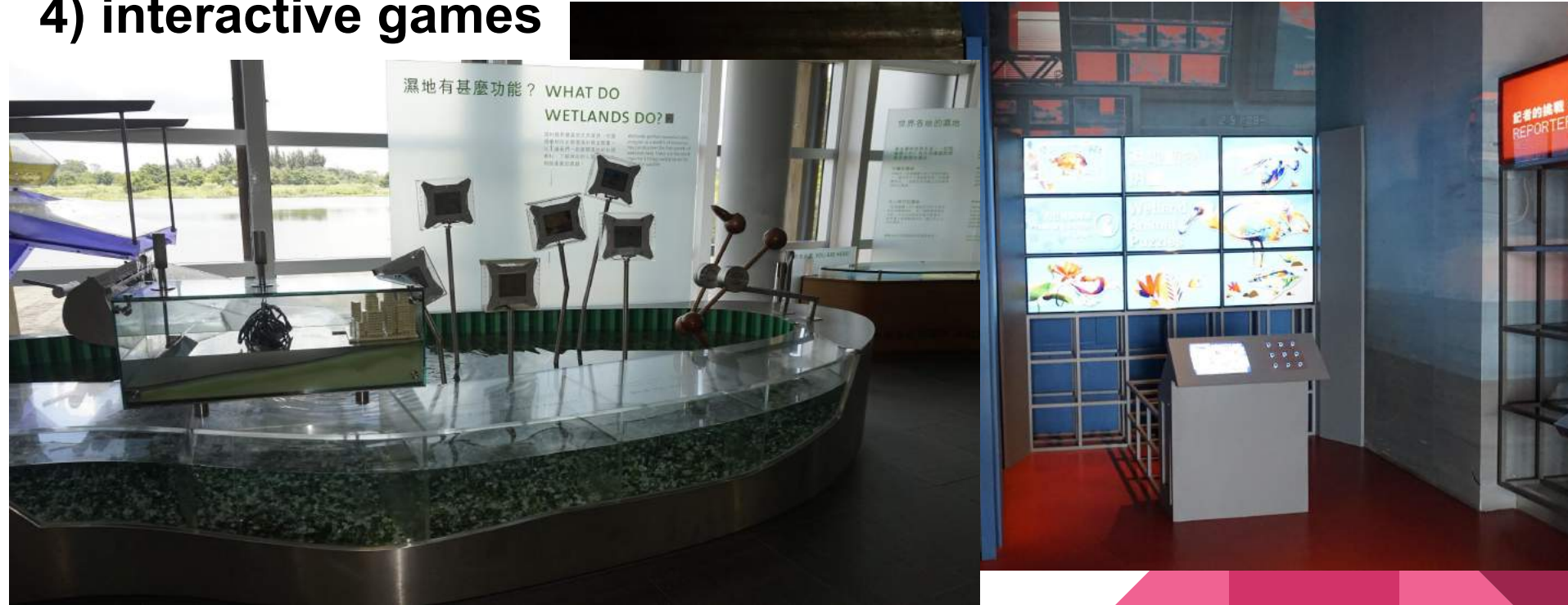
## 3) Discovery centre



# Education - Facilities

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## 4) interactive games



# Education - facilities

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## 5) 'Wetland at work'



# Education - facilities

## 6) audio guide & photos from website



- Ecological Monitoring
- Habitats
- Habitat Management
- Reserve's Highlights
- **Beauty of Wetland**
  - Freshwater Plants
  - Mangroves
  - Trees
  - **Shrubs and Herbs**
  - Birds
  - Butterflies
  - Dragonflies
  - Amphibians & Reptiles
  - Crabs & Mudskippers
  - Freshwater Fish

### Beauty of Wetland

#### Wetland Plants - Shrubs & Herbs



[Chinese Privet](#)



[Desmos](#)



[Common Melastoma](#)



[Blood-red Melastoma](#)



[Hong Kong Gordonia](#)



[Golden Dewdrops](#)



[Ramie](#)



[Winged Cassia](#)



[Marsh Fleabane](#)



[Blood-flower](#)



[Philippine Violet](#)



[Ginger Lily](#)



# Education - Activities

## 1) Workshops

- e.g. Workshops in Wetlands Discovery Centre
- e.g. Teachers' Workshops
- e.g. Volunteer's Origami Station

## 2) guided tours

- e.g. School Guided Tours
- e.g. "Know More about Butterflies" Guided Tour

# Comparison on Education

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	Singapore	Hong Kong
<b>guide tour</b>	focus on habitat	focus on species
<b>educational panels</b>	less, in hides and under some of the plants	many, in visitors' centre and the wetland reservoir
<b>workshops/camps</b>	Yes, more related to nature	Yes, some not related to wetland (e.g. origami workshop)
<b>information provided</b>	only restricted to local wetland	included wetland all over the world (polar, tropical swamp)
<b>live camera</b>	Yes	No, only photos provided

**What is good about Hong Kong Wetland Park?**



# Reflection

- ❖ suitable for families
- ❖ tourism
- ❖ more comfortable
- ❖ more interactive





# Reflection

**What can we learn from  
Sungei Buloh Wetland Reserve?**



# Reflection

**1) 'Keep it natural'**

**2) reduce disturbance by,**

- ❖ restriction in visitors' number
- ❖ natural barriers to separate visitors with the wetland

**3) Install live camera**



# References

National Parks Board. (2016). *Sungei Bulogh Wetland Reserve*. Retrieved from <https://www.nparks.gov.sg/gardens-parks-and-nature/parks-and-nature-reserves/sungei-buloh-wetland-reserve#findOutMore>

Robert Heigermoser. (2008). *Sungei Bulogh Wetland Reserve (SBWR) - Mangroves & more*. Retrieved from <http://www.ulusingapore.com/gbbuloh.htm>

Hong Kong Wetland Park. (2016). Retrieved from <http://www.wetlandpark.gov.hk/en/index.asp>.

Hui, S. Y., Ma, W. S., Poon, K. W. & Tjhia Wing Chi (2012). *The education facilities and programmes on wetland conservation at Sungei Buloh Wetland Reserve*. Retrieved from [http://www.wetlandpark.gov.hk/images/wcms/20121004\\_JWS\\_report\\_champion.pdf](http://www.wetlandpark.gov.hk/images/wcms/20121004_JWS_report_champion.pdf)



# References

Birds in backyards. Retrieved from: <http://www.birdsinbackyards.net/species/Eurystomus-orientalis>

India Nature Watch. (2009). Retrieved from: <http://www.indianaturewatch.net/displayimage.php?id=121778>

Giri, C. et al. (2011). *Status and distribution of mangrove forests of the world using earth observation satellite data*. Glob. Ecol. Biogeogr. 20, 154-159

P. K. L. Ng and N. Sivasothi. (2001). *A Guide to Mangroves of Singapore*. Volume 1: The Ecosystem and Plant Diversity.

K. K. P. Lim, D. H. Murphy, T. Morgany, N. Sivasothi, P. K. L. Ng (2001). *A Guide to Mangroves of Singapore*. Volume 2: Animal Diversity

