



WWF

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HONG KONG

35 YEARS  
OF CONSERVATION

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## Mai Po Nature Reserve

Mudflat

Gei wai

Mangroves

Freshwater *gei wai*

**Discovering Biodiversity in Hong Kong Wetlands**  
Biodiversity Journey - Educational resource pack  
for Secondary school teachers

# About WWF

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WWF is one of the world's most respected conservation organizations, with a network active in more than 100 countries. WWF's mission is to build a future in which humans live in harmony with nature, by:

- conserving the world's biological diversity
- ensuring that the use of renewable natural resources is sustainable
- promoting the reduction of pollution and wasteful consumption.

WWF-Hong Kong has been working since 1981. In support of our global mission, WWF-Hong Kong's vision is to transform Hong Kong into Asia's most sustainable city where nature is conserved, carbon pollution is reduced, and consumption is environmentally responsible.

# Foreword



Hong Kong is one of the biodiversity hotspots, bursting with species and habitats that are precious and unique to the region and indeed the world. For almost 35 years, WWF-Hong Kong has been devoted to conserving the territory's valuable natural environments.

In 2015, we launched a two-year project called "Discovering Biodiversity in Hong Kong Wetlands" aiming to update the species found in Mai Po Nature Reserve and the surrounding Deep Bay wetlands. Ensuring that the list of species is up to date is part of WWF's contribution to the government's Biodiversity Strategy and Action Plan.

Conserving biodiversity is essential to our future. WWF-Hong Kong believes that integrating biodiversity into the school curriculum is the key to promoting conservation as it allows students to learn about nature at a young age. We hope that the publication of this education pack will help teachers introduce the concepts of biodiversity and citizen science into secondary schools and educate students about Hong Kong's invaluable ecosystems and organisms. Assisted by our online resource bank, teachers can use the lesson plans contained in this education pack to organize activities at their schools, help their students learn about biodiversity and hopefully bring them to natural environments like Mai Po Nature Reserve for further field study. We hope that through these lessons, students will come to better understand biodiversity and deepen their relationship with nature by working as citizen scientists.

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# "Biodiversity Journey- Educational resource pack for Secondary school teachers" User manual



## The pack includes

1. Lesson Plans for Liberal Studies
  - Four lesson plans that can be conducted on campus and in community
2. Urban wildlife identification chart
  - Showcase the common wildlife seen in the urban area
3. Wetland birds identification chart
  - Showcase birds species in wetlands
4. Educational poster
  - Biodiversity in Mai Po
5. Educational poster
  - Threats to biodiversity
6. Online resource bank
  - Includes WWF's publications and teaching materials

In support to Liberal Studies, Science, Moral, Civic and National Education; Can be used during lessons and activity periods

## Lesson plans

### Theme One: Learning about biodiversity through citizen science

#### Lesson One: An On-campus Biodiversity Journey

##### On-campus observation activity

Supporting materials provided in this pack for this lesson plan

1 2 5 6



#### Lesson Two: Habitats On Campus and in the Community

##### Observation and comparison of habitats on campus and in the community

Supporting materials provided in this pack for this lesson plan

1 2 6

### Theme Two : Conservation work to protect our biodiversity

#### Lesson One: A Biodiversity Journey Through Mai Po

##### Photos and data analysis related to Mai Po

Supporting materials provided in this pack for this lesson plan

1 3 4 5 6



#### Lesson Two: Is conservation work important?

##### Case studies on best land use

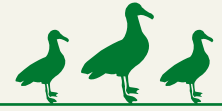
Supporting materials provided in this pack for this lesson plan

1 3 5 6

The relationship between human and biodiversity; Importance of sustainable development; How should we treat biodiversity as a global citizen?



# Biodiversity



The term given to the variety of life present in a specific area on Earth.  
There are three types of biodiversity: genetic diversity, species diversity and ecosystem diversity.

## Genetic diversity

The variety of genes in a species. With a rich genetic biodiversity, a species can quickly adapt to a rapidly-changing environment, ensuring that the species can survive and nurture the next generations.



## Species diversity

The variety of species in a given area. The presence of more species will ensure the stability of the ecosystem.



## Ecosystem diversity

The variety of ecosystems in a given area. A place that has a wide variety of ecosystems can sustain a greater number of species.



The word "Biodiversity" was suggested in 1986 to replace the vocabulary "Biological Biodiversity" which meant biodiversity in species level. Rich biodiversity is essential to providing wildlife and human beings with vital resources, and to ensuring that organisms can adapt to changes in their habitats. Ultimately, healthy biodiversity helps maintain ecological balance, making it extremely important that we conserve biodiversity together.

### What is the Biodiversity Strategy and Action Plan?

In 1993, the United Nations Conference on Environment and Development established an international legally-binding treaty called the Convention on Biological Diversity (CBD). The treaty both encourages and obliges its members to protect biodiversity in their nations through sustainable development. In 2016, the Hong Kong government formulated its own Biodiversity Strategy and Action Plan (BSAP) to oversee biodiversity in Hong Kong and propose relevant conservation measures.

# Citizen Science

Traditionally, scientists have always been responsible for scientific research. In general, even though many scientific discoveries and theories are of great importance to the world, they do not make their way into the public eye, as many people are not particularly interested in pursuing scientific knowledge. Citizen science is a process that mainstreams scientific research, allowing people with different backgrounds to enhance their scientific knowledge by playing an active role in various research projects. Apart from speeding up the progress of research, the direct participation of ordinary citizens often helps provide new ideas which facilitate the research process. Conducting ecological surveys is one of the most interesting and accessible ways to take part in citizen science research projects.

## Can students be citizen scientists?

Becoming a citizen scientist requires no professional qualifications. Indeed, the only requirement is an interest in taking part. Students can certainly be citizen scientists, conducting research and learning about biodiversity through hands-on experiences. Taking part in an ecological survey not only enhances school subjects like liberal studies, biology and geography; it also provides a unique learning experience and a useful tool to develop students' interest in nature, science, and their moral and civic responsibilities.



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## Did you know?

A citizen science element has been added into WWF-Hong Kong's two-year "Discovering Biodiversity in Hong Kong Wetlands" project which began in 2015. Volunteers and students with different backgrounds have participated in various ecological surveys in the Mai Po wetlands, conducting numerous ecological surveys including benthic surveys, large mammal surveys, spider surveys and more. The participants got to experience the daily work of a wetland scientist and increase their knowledge of biodiversity at the same time.

Know more at :  
[http://www.wwf.org.hk/en/whatwedo/water\\_wetlands/mai\\_po\\_nature\\_reserve/discovering\\_biodiversity\\_in\\_hong\\_kong\\_wetlands/](http://www.wwf.org.hk/en/whatwedo/water_wetlands/mai_po_nature_reserve/discovering_biodiversity_in_hong_kong_wetlands/)

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## Words from citizen scientists

"It is normally difficult to see nocturnal animals but now we could thanks to the technology. This data is important since it let us know that animals are very close to us and also increase our awareness towards conservation. Under rapid development, somebody has to speak for these animals too."

- Lawrence Chow

"I am glad that my friends and I were able to finish the task together. I have learnt a lot about different kinds of mudflat inhabitants!"

- Kong Wong

Pui Shing Catholic Secondary School



© WWF-Hong Kong

# Theme One:

## Learning about biodiversity through citizen science



There are two lesson plans under this theme.

### Lesson One: An On-campus Biodiversity Journey

#### Learning objectives

- Step outside the classroom to understand biodiversity concepts
- Learn to appreciate nature
- Understand the fundamentals of biodiversity and the essence of the relationship between humans and the natural world, while encouraging students to live a sustainable lifestyle



**Target Subject:** Science, Biology, Liberal Studies, Moral, Civic and National Education

**Suggested lesson time:** 40 minutes

Time (min)	Activity	Materials needed
5	Introduction of biodiversity by video and photos	Video of Mai Po on online resource bank
15	Discovering biodiversity on-campus	Urban wildlife identification chart, magnifying glass, camera
15	Human impacts towards biodiversity	Educational poster- Threats to biodiversity
5	Discussion	-

### Lesson Two: Habitats On Campus and in the Community

#### Learning objectives

- Conduct species and ecosystem observations and comparisons on the school campus and in two places in the nearby community and explain the differences between the biodiversity in these locations
- Develop a sense of responsibility to nature conservation



**Target Subject:** Science, Biology, Liberal Studies, Moral, Civic and National Education

**Suggested lesson time:** 40 minutes

Time (min)	Activity	Materials needed
30	Discovering biodiversity on-campus and in community	Urban wildlife identification chart, magnifying glass, camera
10	Discussion	-

This lesson aims to help students learn about biodiversity at their school. They are encouraged to observe and discuss details of the natural world without having to list and classify specific species.

# Lesson One:

## An On-campus Biodiversity Journey

### Activity One: Videos and Photos

Photos and videos on biodiversity will be shown, please pay close attention.

Discussion: What kinds of habitats and wildlife did you see? Please state the scenes which you thought displayed biodiversity. Are there any other habitats or species in Hong Kong that were not shown in the video?

### Activity Two: On-campus observation activity

Are there any organisms living on your school campus? It's time to conduct a detailed search of the campus to see if we can make any unexpected discoveries! Use a camera and the record sheet below to keep track of what you see. Use the identification charts to identify the species.

#### During the search:

- Follow your teacher's instructions
- Quietly observe any creatures you find without disturbing them
- Respect wildlife at all times
- Keep quiet and you will see more creatures!
- Stay away from bees, wasps and hornets, they may become agitated and sting people
- Do not touch bird faeces

Wildlife	Quantity	Wildlife	Quantity
Birds		Insects	
Oriental Magpie Robin		Dragonfly	
Black Kite		Damselfly	
Tree Sparrow		Butterfly	
Red-whiskered Bulbul		Moth	
Chinese Bulbul		Beetle	
Spotted Dove		Bee and wasp	
Black-collared Starling		Others _____	
Others _____			
Reptiles		Mammals	
Gecko		Dog	
Others _____		Cat	
		Bat	
Amphibians		Others _____	
Frog			
Others _____			

How are biodiversity and human life connected? How important is rich biodiversity to the natural environment?



## Activity Three: Threats to biodiversity

The organisms observed on the school campus may be affected by human activities. Can you provide some examples of how these creatures might be disturbed?

---

How might activities on this campus affect nearby wildlife?

---

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**There are large-scaled habitat destruction happening at the moment in different places of Hong Kong.**



Wetland area shrinkage, reclamation



Marine Litter

## Conclusion

We should be aware of the smaller creatures surrounding us and remember that there are conservation issues associated with them. Every organism in every ecosystem has its own unique ecological role. Human activities like deforestation and water pollution undoubtedly affect biodiversity. But there are lots of ways that we can protect the environment – the first and most important is changing our daily habits like reducing our use of single-use plastic and using resources more wisely.

What can you do to conserve biodiversity in your daily life and at your school? Discuss these ideas with your teachers and classmates.



# Lesson Two:

## Habitats On Campus and in the Community

If we look hard, we can find little creatures on our school campus and in the surrounding community too! Are the species and habitats found in these places different from each other?

### On-site study

#### What is a habitat?

Simply put, it is a place where organisms live. The variety of species found in a habitat depends on the habitat's climate and environment. Rivers, forests and grasslands are all examples of habitats.

1. Describe the habitats you visited – compare the habitats at your school with two locations in your community.

	Location 1	Location 2	School campus
Time			
Simple diagram (Please draw a simple diagram to illustrate the location)			
Abiotic factor: (e.g. temperature, day length, relative humidity)			
Description about the location (e.g. human activities, types of habitats)			

2. Wildlife survey: Record the quantity of different species you have encountered.

Wildlife	Quantity			Wildlife	Quantity		
Birds	Location 1	Location 2	School campus	Insects	Location 1	Location 2	School campus
Oriental Magpie Robin				Dragonfly			
Black Kite				Damselfly			
Tree Sparrow				Butterfly			
Red-whiskered Bulbul				Moth			
Chinese Bulbul				Beetle			
Spotted Dove				Bee and wasp			
Black-collared Starling				Others _____			
Others _____							
Reptiles	Location 1	Location 2	School campus	Mammals	Location 1	Location 2	School campus
Gecko				Dog			
Others _____				Cat			
Amphibians	Location 1	Location 2	School campus	Bat			
Frog				Others _____			
Others _____							

#### During the search:

- Follow your teacher's instructions
- Quietly observe any creatures you find without disturbing them
- Respect wildlife at all times
- Keep quiet and you will see more creatures!
- Stay away from bees, wasps and hornets, they may become agitated and sting people
- Do not touch bird faeces

# Lesson Two:

## Conclusions and reflection

### Think about the following questions

What might be some explanations for differing levels of biodiversity in different locations?

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Counting number of wildlife present in a habitat is a kind of activities for citizen scientist. What responsibilities come with being a citizen scientist?

---

As a citizen, how should you treat the natural world?

---

### Discussion

How can we enrich biodiversity on our school campus?



# Suggested answers to Theme One

## Lesson One: An On-campus Biodiversity Journey

### Activity One

**Discussion:** What kinds of habitats and wildlife did you see? Please state the scenes which you thought displayed biodiversity. Are there any other habitats or species in Hong Kong that were not shown in the video?

**Suggested answers:** Examples: Dogs, bees and wasps, bats, grassland, etc.

### Activity Two

**How are biodiversity and human life connected? How important is rich biodiversity to the natural environment?**

**Suggested answers:** Teachers can explain that every species has its own unique yet essential role in ensuring the stability of the ecosystem and the transfer of energy along the food chain. Various ecosystems have different climates and provide different types of food and shelter for different organisms. With a suitable environment and sufficient resources, organisms can reproduce safely and pass their genes on to the next generations.

### Activity Three

**The organisms observed on the school campus may be affected by human activities. Can you provide some examples of how these creatures might be disturbed?**

**Suggested answers:** Garbage, lights, water pollution, vehicles, noise, pest control.

**How might activities on this campus affect nearby wildlife?**

**Suggested answers:** Animals cannot communicate properly if it is too noisy, pest control might lower the biodiversity of the surrounding area.

## Lesson Two: Habitats On Campus and in the Community

### Conclusions and reflection:

**What might be some explanations for differing levels of biodiversity in different locations?**

**Suggested answers:** Human activities, air quality, location of water resources, availability of resources.

**Counting number of wildlife present in a habitat is a kind of activities for citizen scientist. What responsibilities come with being a citizen scientist?**

**Suggested answers:** Observing wildlife in detail, diligently collecting data for surveys, accurate recording, and properly using tools.

**As a citizen, how should you treat the natural world?**

**Suggested answers:** Teachers should emphasise that everyone needs to care for the environment – when conducting observations, do not disturb wildlife; in daily life, try to protect nature.

### Discussion:

**How can we enrich biodiversity on our school campus?**

**Recommendations for enhancing biodiversity on campus:**

**On campus:**

- Add a bird bath, small pool and birdhouses to encourage birds to stop by
- Attract butterflies by planting plants from the Rutaceae family

**Species protection:**

- Minimize impacts to wildlife during activities and construction
- Planting local native plants in school campus

**Promotion activities:**

- Learn and appreciate the nature. Promote concept of biodiversity to classmates.
- Conduct long-term ecological survey to record species in campus and development of habitats.

### Reference information and extended activities

- **Reference information:** WWF-Hong Kong online resource bank, posters of this education pack
- **Extended activities:** Ecological surveys on the school campus (trees, birds and insects)  
(Manual available in online resource bank)



# Theme Two:

## Conservation work to protect our biodiversity

There are two lesson plans under this theme.

### Lesson One: A Biodiversity Journey Through Mai Po

#### Learning objectives

- Use Mai Po as an example to learn about biodiversity in Hong Kong
- Learn to analyse data and investigate the reasons behind changes in species population numbers



**Target Subject: Liberal Studies, Moral, Civic and National Education**

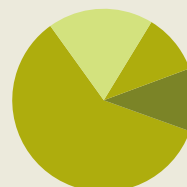
**Suggested lesson time: 40 minutes**

Time (min)	Activity	Materials needed
15	Learn about local biodiversity with photos and videos	Photos and videos about Mai Po in online resource bank, wetland birds identification chart, educational poster-Biodiversity in Mai Po
20	Data analysis on changes and distribution of species population numbers	Figures in this lesson plan
5	Discussion as conclusion	Newspaper cutting in online resource bank, educational poster - Threats to biodiversity

### Lesson Two: Is conservation work important?

#### Learning objectives

- Study development projects near Inner Deep Bay and Long Valley to observe the importance of wetland conservation
- Use data analysis to study the effectiveness of existing conservation measures and policies



**Target subjects: Liberal Studies, Moral, Civic and National Education**

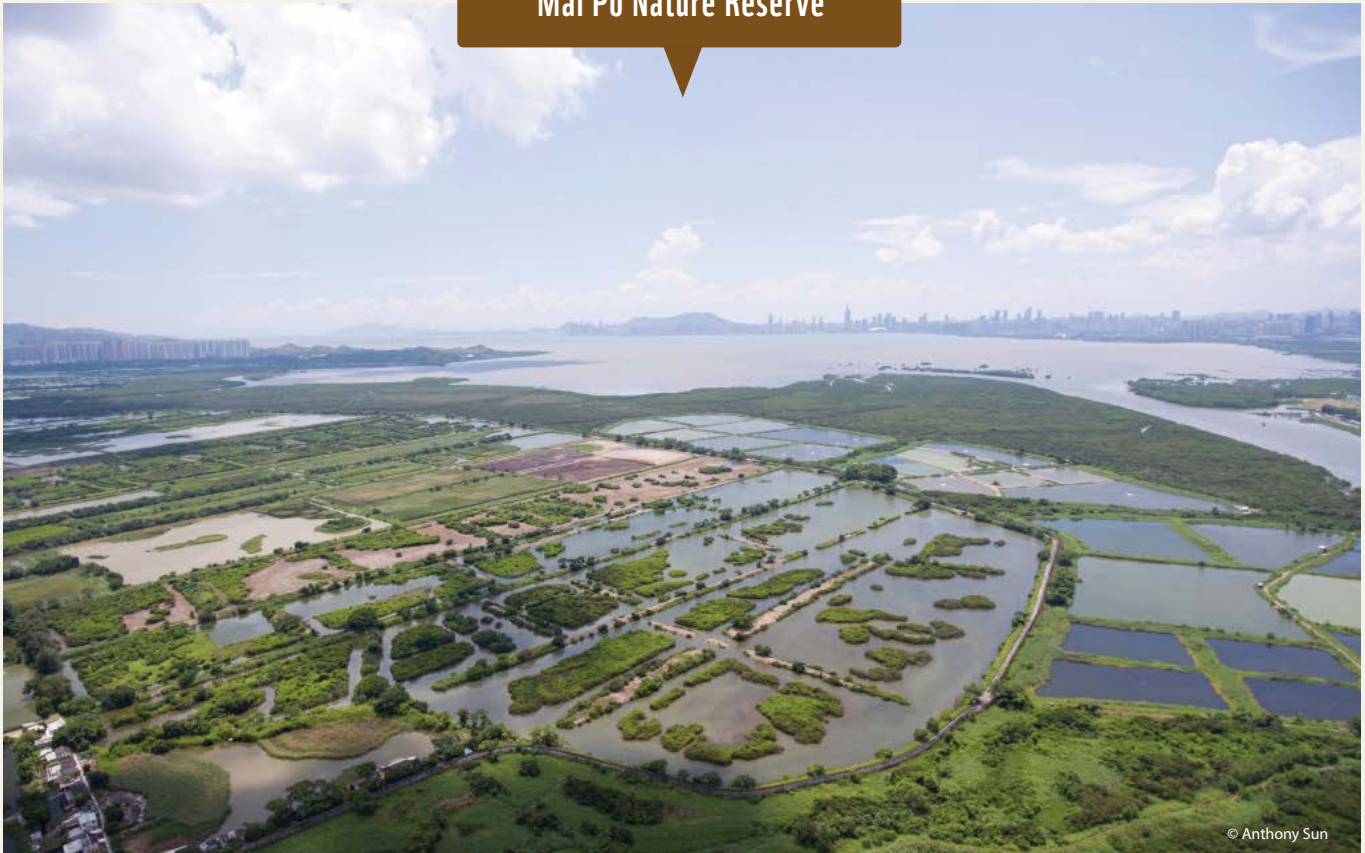
**Suggested lesson time: 40 minutes**

Time (min)	Activity	Materials needed
15	Photo analysis on land use of Inner Deep Bay over 30 years	Photos in this lesson plan
20	Data analysis on effectiveness of conservation work in Long Valley	Figures in this lesson plan
5	Discussion as conclusion	-

The suggested analyses for these two lesson plans are for reference only. The distribution of species is often affected by various environmental factors. Teachers should encourage students to search for more information to ensure that they analyse the data thoroughly and critically.



## Mai Po Nature Reserve



© Anthony Sun

**The 380-hectare Mai Po Nature Reserve is located in Inner Deep Bay in northwest Hong Kong.**

The Reserve is an important wintering spot for birds using the East Asian-Australasian Flyway, and attracts thousands of waterbirds which forage and rest here every winter, including the endangered Black-faced Spoonbill. Protecting wetland habitats is a key to conserving beautiful yet threatened species like these birds.

WWF-Hong Kong has been managing Mai Po Nature Reserve since 1983 as part of our efforts to conserve local biodiversity. In 1995, Mai Po was listed as Ramsar Site under the Ramsar Convention, which lists wetlands of international importance around the world.

Check out more at:  
[http://www.wwf.org.hk/en/whatwedo/water\\_wetlands/mai\\_po\\_nature\\_reserve/](http://www.wwf.org.hk/en/whatwedo/water_wetlands/mai_po_nature_reserve/)



# Lesson One: A Biodiversity Journey Through Mai Po

## Activity One: Photo and video analysis

A video about Mai Po will be played, please pay close attention and then answer the following questions.



© WWF-Hong Kong

Photo One



©Augustine Chung/WWF-Hong Kong

Photo Two

## Discussion

1. State the names of these two local mammals species.

---

2. What kinds of biodiversity are found in Mai Po?  
(Genetic diversity, species diversity, ecosystem diversity)

---

3. Are there any invasive species in Mai Po?  
Think about how invasive species would affect the ecological balance of an ecosystem.

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© Roger Lee/WWF-Hong Kong



Apple Snail



© Nicole Lam/WWF-Hong Kong

Mikania

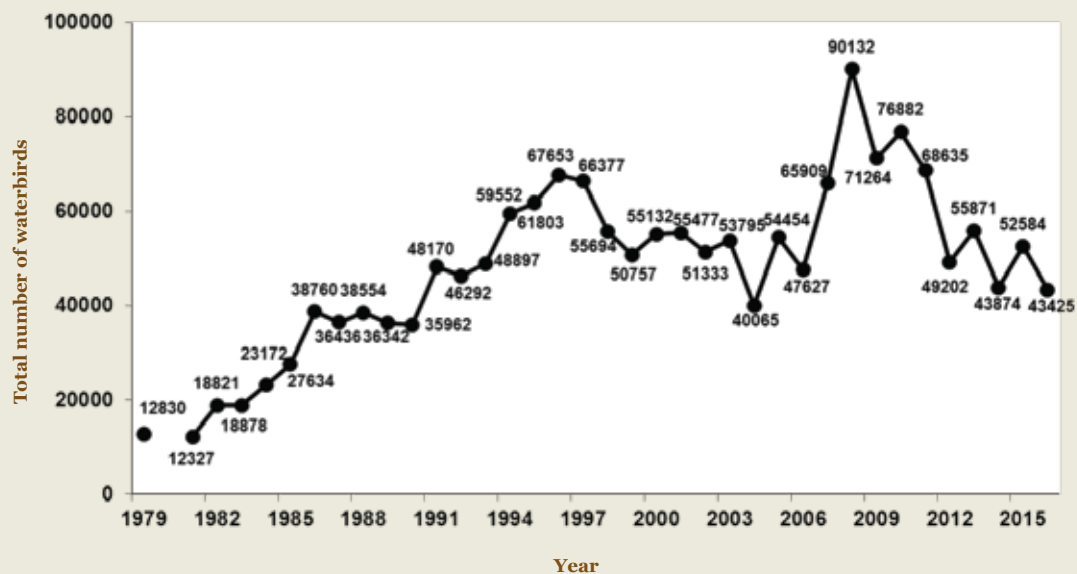
## Did you know?

Invasive species are not local species, they are species that are intentionally or accidentally introduced into a place. They reproduce rapidly and induce intense competition which affects the health and growth of existing local species.



## Activity Two: Think and discuss

Figure One : Mai Po and Inner Deep Bay waterbird counts in January 1979-2016



Source: Agriculture, Fisheries and Conservation Department, Hong Kong Bird Watching Society

Figure Two : Distribution of Mai Po Bent-winged Firefly





# Lesson One:

## Think and discuss

1. Describe the trend in the Inner Deep Bay waterbird population by studying Figure One.

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2. Explain the increase in waterbirds number since 1980s.

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3. Using Figure Two, describe and explain the distribution of the Mai Po Bent-winged Firefly.

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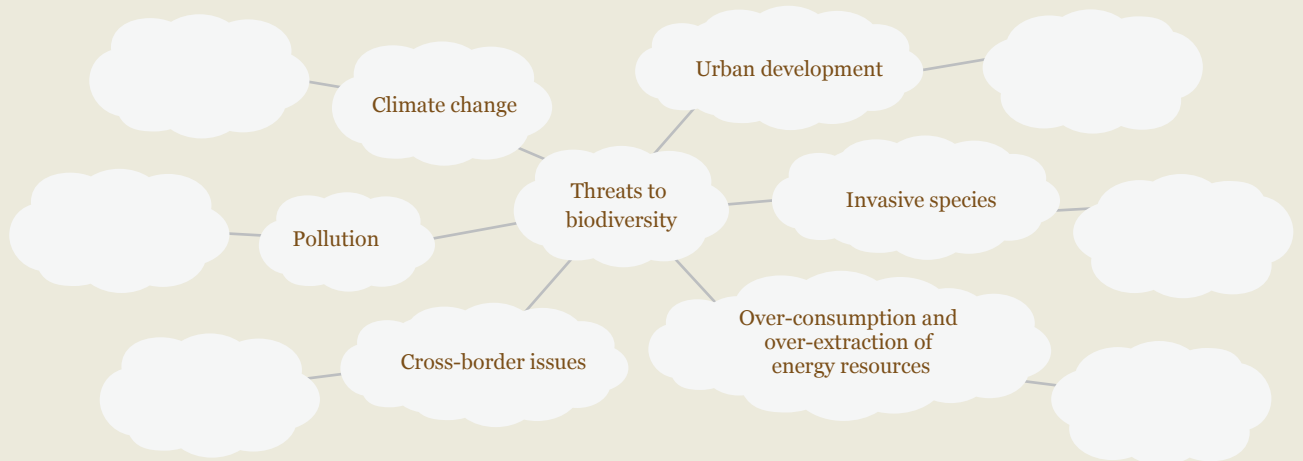
4. Synthesize all this information above to determine the relationship between the changes in species population and human activities.

(Tips: Consider development in Shenzhen, economic reform in China, urban development in Hong Kong, and global warming)

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### Conclusion and reflection

There are numerous threats to biodiversity. Try to explain the following concepts based on your understanding:



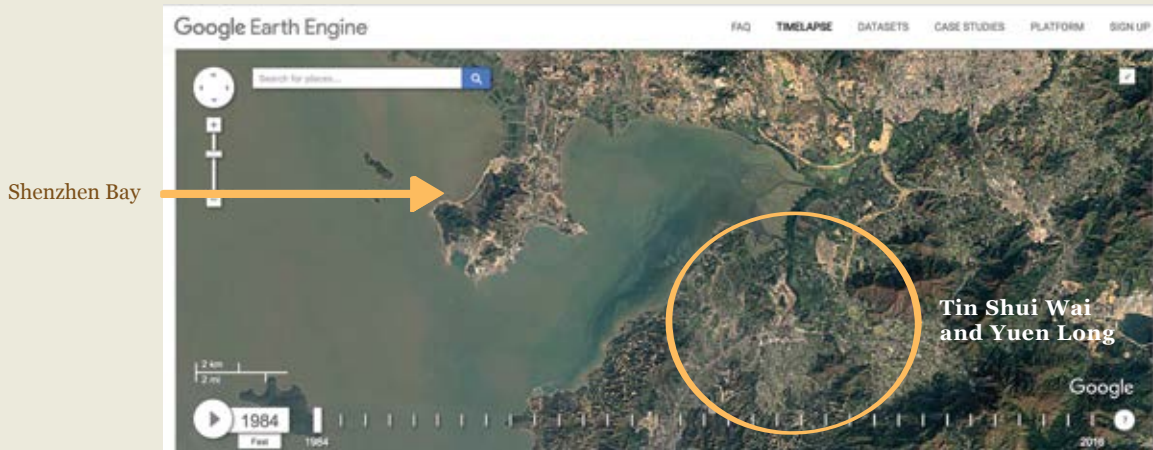
Extended discussion:  
In your opinion, which of the above concepts most affects Hong Kong's local biodiversity?



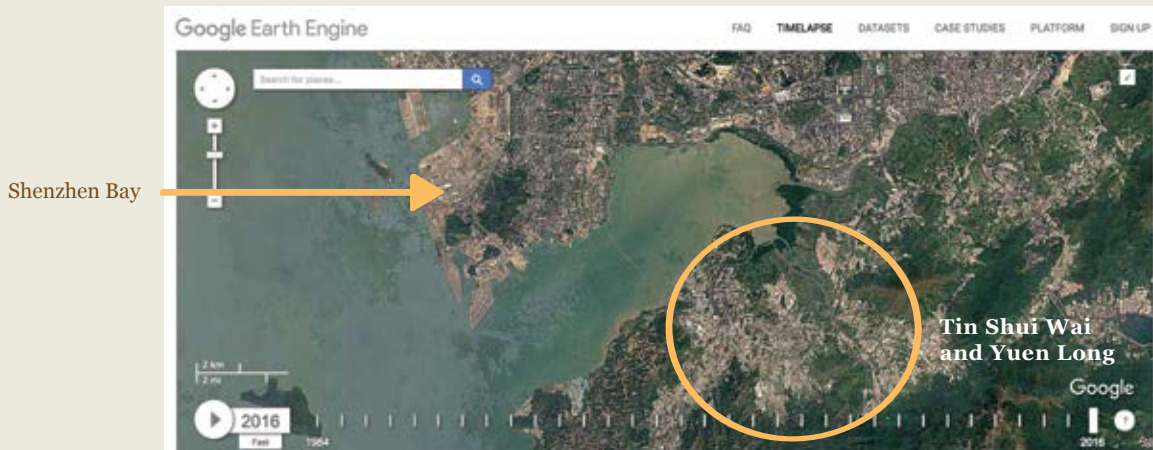
# Lesson Two: Is Conservation Work Important?

## Activity One: Photo Analysis

Picture One: Development near Inner Deep Bay (1984)



Picture Two: Development near Inner Deep Bay (2016)



Timelapse:

<https://earthengine.google.com/timelapse/#v=22.47236,113.97463,10.917,latLng&t=0.49>

## Think and discuss

1. Observe the timelapse and the photos and describe the changes you see in the circled area, i.e. Tin Shui Wai and Yuen Long.  

---
2. Compare the regional changes over the past 30 years in Shenzhen Bay.  

---
3. State some possible factors that have caused the decrease in wetlands in the above two areas. Imagine what would have happened if Mai Po had not become a nature reserve.  

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### Nature Conservation Management Agreement

Background information:

Long Valley is located at the northern part of the New Territories. Inside this 25-hectre freshwater wetland, rich biodiversity can be found!

Under the “Nature Conservation Management for Long Valley”, over 15 ha of wet agricultural land and fish ponds have been managed by Conservancy Association and Hong Kong Bird Watching Society since 2005 which aims to protect and enrich the ecological importance of the site through management work, bird monitoring and environmental education.

Know more at:

[http://www.cahk.org.hk/show\\_works.php?type=uid&u=48&lang=en](http://www.cahk.org.hk/show_works.php?type=uid&u=48&lang=en)

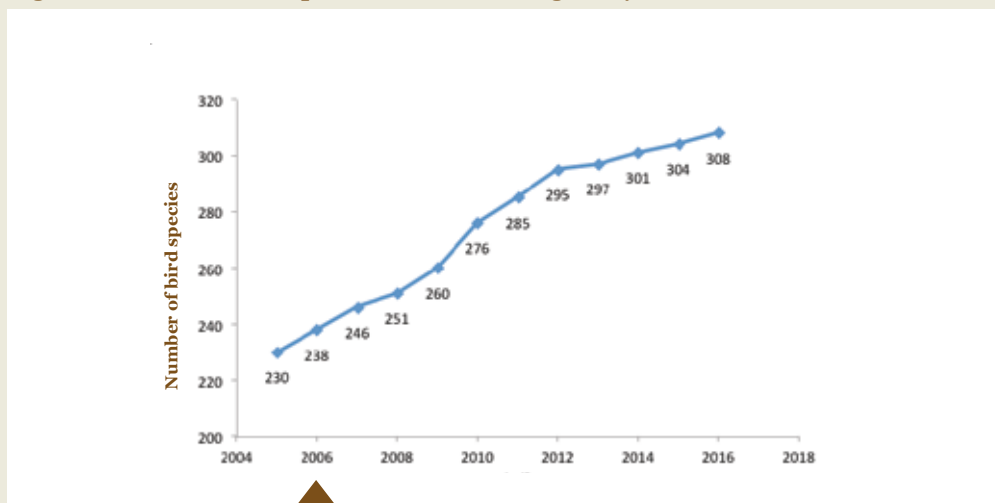
**Figure 1: Regular bird counts in Long Valley from 2006 to 2015**



Implementation of “Nature Conservation Management Agreement”

Data source:  
Hong Kong Bird Watching Society & The Conservancy Association

**Figure 2: Number of bird species recorded in Long Valley from 2006 to 2015**



Implementation of “Nature Conservation Management Agreement”

Data source:  
Hong Kong Bird Watching Society & The Conservancy Association

# Lesson Two:

## Think and discuss

1. Take reference of the above data, describe changes of the average bird counts and number of bird species recorded over 10 years.

2. Support the below statement by using different information and figures above.  
"Wetland conservation work protects local biodiversity"

### Conclusion and reflection

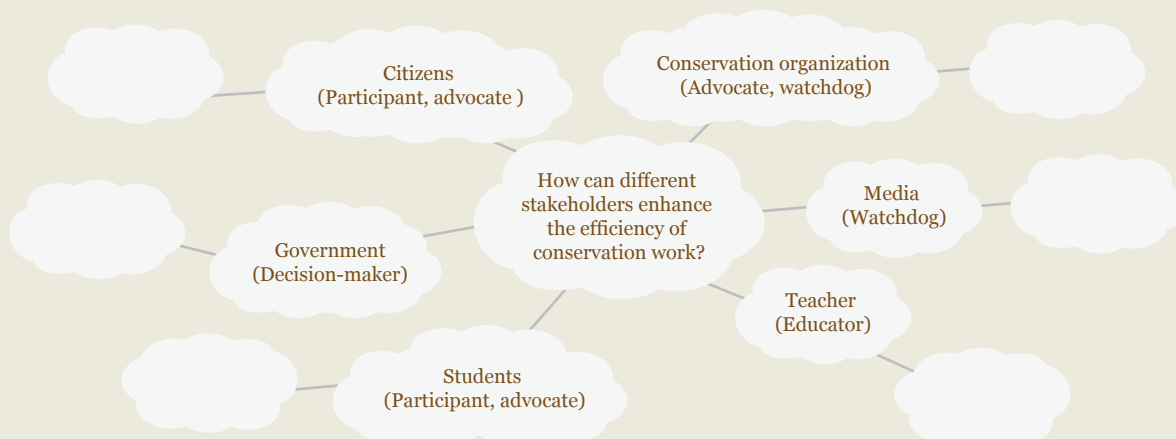
#### Policies and practices conserving local biodiversity:

- **Legal protection** like the Wild Animal Protection Ordinance and the Town Planning Ordinance.
- **Marine Parks and Marine Reserve**  
→Five marine parks and one marine reserve have been established to protect marine species and their habitats in Hong Kong.
- **Country parks and Hong Kong Wetland Park**  
→40% of Hong Kong's land area is listed as country park land and special areas. Exhibitions and visitor centres help educate the public on the importance of parks. Hong Kong Wetland Park was set up as a compensation measure for new town development. This park helps maintain wetlands' ecological function, acts as a buffer zone and educates people about the importance of wetlands.
- **Nature reserves and SSSIs**  
→Hong Kong has a number of nature reserves and Sites of Special Scientific Interest (SSSIs), like Mai Po Nature Reserve and Tai Po Kau Nature Reserve.
- **Coral reef checks** are conducted to determine the ecological status of the marine environment.

### Extended discussion

1. To what extent do the conservation policies of the Hong Kong government successfully maintain local biodiversity?

2. How can different stakeholders enhance the effectiveness of conservation work?





# Reference answers to Theme Two

## Lesson One: A Biodiversity Journey Through Mai Po

### Activity One: Photo and video analysis

1.State the names of these two local mammals species.

Photo One: Small Indian civet Photo Two: Mai Po Bent-winged Firefly

2.What kinds of biodiversity are found in Mai Po? (Genetic diversity, species diversity, ecosystem diversity)

**Suggested answer:** Ecosystem and species biodiversity. Five different wetlands can be found in the reserve, such as *gei wai*, mudflats, mangroves, reedbeds and freshwater ponds. There are also other species like amphibians, reptiles, mammals and plants.

3. Are there any invasive species in Mai Po?

Think about how invasive species would affect the ecological balance of an ecosystem.

**Suggested answer:** With no natural enemies here, invasive species reproduce rapidly and compete for resource with local native species.

### Activity Two: Think and discuss

1. Describe the trend in the Inner Deep Bay waterbird number population by studying Figure One.

**Suggested answer:** Although the highest number of waterbirds was recorded in 2006, the number of waterbirds has been decreasing gradually since then.

2. Explain the increase in waterbirds number since 1980s.

**Suggested answer:** There has been active habitat management in Mai Po to enrich local biodiversity, the methodology of water bird counts become more mature, climate change occurs and other wetlands along the East Asian-Australasian Flyway are destroyed, etc., causing water birds to migrate to new sites like Deep Bay Area.

3. Using Figure Two, describe and explain the distribution of the Mai Po Bent-winged Firefly.

**Suggested answer:** Mai Po Bent-winged Firefly can be found in mangroves near Fairview Park and are less frequently seen near the mudflat since the northern part of the reserve has serious light pollution, affecting the communication between fireflies.

4. Synthesize all this information above to determine the relationship between the changes in species population and human activities.

**Suggested answers:**

#### **Economic reform in China and development in Shenzhen:**

Economic reform in China was introduced by the Chinese government in 1978 to boost the nation's economy. To facilitate trade with other countries, Shenzhen was categorized as the first Special Economic Zone in 1980. Inside the rapidly-developing city with increasing immigrants, thousands of hectares of wetlands were converted into airports, piers and factories, leading to a massive decline in biodiversity.

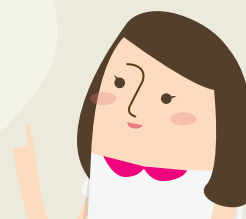
#### **Urbanisation in Hong Kong:**

Hong Kong is a financial centre with over 7 million people. To meet the needs of a growing human population, facilities and flats were built on existing wetlands, fishponds and farmlands; becoming new urban areas. Wildlife are difficult to survive in these rapidly-changing and densely populated environments.

#### **Climate Change:**

Meanwhile, across the world, the burning of fossil fuels is a major cause of elevated global temperatures and climate change. Elevated temperature causes longer summer time and shorter winter time, leading to an alteration of seasonal migratory route for birds and other animals. Meanwhile, the changes also affect the reproduction of wildlife and their habitats.

Note to teachers: The actual reasons for the firefly's distribution have yet to be determined. The aim of this question is to get students to come up with assumptions and reasonable answers after comparing different factors. Teachers can encourage their students to confirm their answer by performing further research.



### Conclusion and reflection:

There are numerous threats to biodiversity. Try to explain the following concepts based on your understanding:

The poster in this education pack listing threats to biodiversity can be used to further elaborate on these themes. Urbanization, habitat destruction, invasive species, over-consumption of natural resources and low public awareness are examples of threats.

### Extended discussion:

In your opinion, which of the above concepts most affects Hong Kong's local biodiversity?

**Suggested answers:** Urbanization in Hong Kong, overconsumption and extracting energy resources. For example, demand for housing is increasing, with developers converting wetlands into urban areas to meet this demand and create profits, reclamation is also occurring in coastal areas and the problem of over-fishing, etc.

## Reference answers to Lesson Two

### Is Conservation Work Important?

#### Activity One: Photo Analysis

##### Think and discuss:

1. Observe the timelapse and the photos and describe the changes you see in the circled area, i.e. Tin Shui Wai and Yuen Long.

**Suggested answer:** The Tin Shui Wai and Yuen Long area had many fishponds in the past; but these fishponds were paved over for new town development and became residential areas.

2. The arrows point to Shenzhen Bay. Compare the regional changes over the past 30 years in Shenzhen Bay.

**Suggested answer:** Large and frequent reclamation activities have occurred, leading to a marked decrease in wetland areas.

3. State some possible factors that have caused the decrease in wetlands in the above two areas. Imagine what would have happened if Mai Po had not become a nature reserve.

**Suggested answer:** Urban development and serious sedimentation from the Pearl River, resulting in turning wetlands into drylands. If Mai Po was not listed as a nature reserve, it may be developed for other uses.

#### Activity Two: Data analysis

##### Think and discuss:

1. Take reference of the above data, describe changes of the average bird counts and number of bird species recorded over 10 years.

**Suggested answer:** After the launch of "Nature Conservation Management Agreement", the average bird counts and the number of bird species recorded increased generally.

2. Support the below statement by using different information and figures above. "Wetland conservation work protects local biodiversity"

**Suggested answer:** Students are encouraged to search for information online. Answers are acceptable if it is logical with relevant materials

**Example:** Long Valley has been selected as one of the 12 priority sites under the "New Nature Conservation Policy" in 2004.

Through "Nature Conservation Management Agreement", Hong Kong Bird Watching Society and the Conservancy Association collaborate with different local stakeholders to implement a host of management measures in Long Valley. The outcome is satisfactory with increasing records of bird numbers and species.

## Conclusion and reflection

### Extended discussion

1. To what extent do the conservation policies of the Hong Kong government successfully maintain local biodiversity?

**Marking scheme:** Explain the effectiveness of conservation policies in Hong Kong comprehensively and logically. Assess the question critically and comprehensively through different perspectives. Understand and apply related knowledge and concepts thoroughly while answering the question (For example: Conservation measures, biodiversity, nature reserve, urban development).

#### **Suggested answer**

##### Conservation measures are effective in Hong Kong

- High proportion of protected area: Hong Kong has 24 country parks and 22 special areas that are of 44,239 ha in total. 5 marine parks and 1 marine reserve were established.

- Education on biodiversity: The government works with various organizations (including universities and non-governmental organizations) to promote biodiversity through exhibitions, tours and workshops in society.

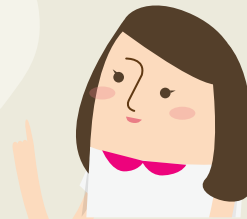
- International cooperation: Implementation of Convention on Biological Diversity enhances conservation of local biodiversity and safeguards precious natural resources.

##### Conservation measures are ineffective in Hong Kong

- Limitations of Environmental Impact Assessment in terms of law enforcement on habitats destruction

- Difficulties in cross-boundary monitoring: There are hectares of undeveloped natural habitats near the borders of Hong Kong and Shenzhen. Within the framework of “One country, two systems”, governments of both Hong Kong and mainland China have weak liaison on regional pollution and conservation.

Answers are acceptable if they are logical  
and supported by good reasoning



2. How can different stakeholders enhance the effectiveness of conservation work?

#### **eNGOs:**

Act as an environmental watchdog for the government, provide recommendations and point out actions and ideas which work against conservation. Educate the public about the importance of environmental protection, encourage people to work for conservation.

#### **The Government:**

Enhance cross-boundary liaison. Listen to ideas and opinions from different stakeholders in society. Propose and implement policies which protect local biodiversity.

#### **The Media:**

Ensure conservation issues are prioritized in the news, report on conservation issues accurately and without any bias.

#### **Citizens:**

Take part in public consultation exercises and share opinions about policies proposed by the government.

#### **Students:**

Be aware of conservation messages and news reports, participate in activities related to environmental protection.

#### **Teachers:**

Integrate conservation topics into lessons to help students learn more about environmental protection. Arrange more outdoor activities for students to experience the nature.



## WWF-Hong Kong's ESD programmes

WWF-Hong Kong works hard to enhance students' awareness of the many roles that wetland ecosystems play through various Education for Sustainable Development (ESD) programmes held at our outdoor education centres. Students learn about the importance of biodiversity and humanity's relationship with the natural world through a variety of activities.

Other than these education programmes, WWF also provides programmes at Mai Po Nature Reserve which allow schools to hold ESD-related life-wide learning and other learning experience activities throughout the school year which flexibly match the varying needs of both teachers and students.



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## Protect biodiversity together!



When an area has a high level of biodiversity, all kinds of living creatures can enjoy indispensable natural resources and safe and secure habitats, while humans can experience the wonders of nature. Unfortunately, biodiversity in Hong Kong faces a number of threats and challenges, with human activities presenting the greatest and most immediate threat. The Ecological Footprint Report, published in 2016, states that, if everyone on Earth lived the lifestyle that we do in Hong Kong, we would need 3.9 planets to fulfil our demand for natural resources. If we want to conserve biodiversity for the next generation, we must begin to live a sustainable lifestyle and change our existing habits.

WWF-Hong Kong will continue to work towards safeguarding our precious natural environment by advocating that the government adopt a proactive conservation strategy and actively promoting the importance of biodiversity to the public and in schools across the SAR. We encourage everyone to discuss the importance of conserving our biodiversity with as many people as they can. Only by working together can we build a future in which people live in harmony with nature.

Find out more about WWF's secondary school education programmes here:

[http://www.wwf.org.hk/en/whatwedo/community\\_engagement\\_and\\_education/programmes\\_for\\_students\\_teachers/](http://www.wwf.org.hk/en/whatwedo/community_engagement_and_education/programmes_for_students_teachers/)

Enquiries:

Phone: 2526-1011 (press 5 after selecting the language)

Email: [education@wwf.org.hk](mailto:education@wwf.org.hk)

For more information on public visits to Mai Po:

[http://www.wwf.org.hk/en/your\\_support/gomaipo/](http://www.wwf.org.hk/en/your_support/gomaipo/)

Online resource bank

WWF has established an online "biodiversity resource bank" to aid teachers as they prepare lessons related to biodiversity. We encourage all teachers to access these resources at [http://www.wwf.org.hk/en/reslib/resources/edu\\_resources/](http://www.wwf.org.hk/en/reslib/resources/edu_resources/) and actively use them during their lessons.

