



WWF Hong Kong Mai Po Secondary School Student Visit Programme
Diversity of Life
Students' Worksheets and Suggested Follow-up Activities

WWF Hong Kong has been dedicated these past twenty-one years to environmental protection through the implementation of education and conservation programmes. We promote environmental education for both local and overseas communities, especially in the development of student programmes.

In order to provide a more comprehensive study and life wide learning for students, WWF Hong Kong has recently revised the captioned programme. Teachers are encouraged to use the attached worksheets and suggested follow-up activities to reinforce students' learning. Detailed information of the activities is as follows:

Activities	Supporting Materials	Objectives
1. During field trip: Field Observation	<ul style="list-style-type: none">• Student worksheets• Bird identification cards*• Mangrove identification cards* <i>(* identification cards will be provided during the field trip)</i>	<ul style="list-style-type: none">• To encourage students to be actively involved in and more attentive during their field study trip.• To enhance students' interest in, understanding of and concern for their living environment through observation and study.• To develop students' observation skills.• To enable students to recognise at least three common waterbirds and mangrove species
2. After field trip: Webbing Game	<ul style="list-style-type: none">• A ball of string• Photographs or cards with the name of a species	<ul style="list-style-type: none">• To enhance social skill of students through grouping game.• To increase students' understanding of the complexity of ecosystem and interaction among species.• To increase their knowledge and awareness of environmental degradation to ecosystem.• To develop students' respect for every unique form of life.
3. After field trip: Discussion Forum	<ul style="list-style-type: none">• Questions for discussion• Suggested answers	<ul style="list-style-type: none">• To develop students' critical thinking through group discussion.• To increase their moral value through environmental education and active discussion.

Should you have any questions or need further information, please feel free to contact our Education Officers on tel. no. 2652-0285 or by e-mail at [ihcsc@wwf.org.hk].



ACTIVITY 1: FIELD OBSERVATION

Objectives: Through the activity, students can:

1. Gain first-hand experience and achieve effective learning;
2. Enhance their interest in, understanding of and concern for their living environment through observation and active participation;
3. Learn how to conduct simple research by developing their field observation and data collection skills.

Students' level: Form 4 to 7

Duration: Four hours

Materials: Student worksheets, Bird identification cards*, Mangrove identification cards*
(* identification cards will be provided during field trip or can be downloaded from WWF Hong Kong website at www.wwf.org.hk/eng/education/edu_resources/edu_others.html)

Venue: Mai Po Nature Reserve

Procedures:

1. Divide the class into approximately eight groups, preferably each group having no more than five students. Ask students' reasons for visiting the reserve and what do they expect to see or find at the reserve (*Note: for teachers assessment of students' short-term change in attitudes see Suggested Teachers' Assessment*)
2. Ask each group to record down the date, starting time of record, site of observation and weather condition before the trip starts.
3. Ask each group to record down the type(s) of species, number of individual for each species and location of species identified and preferably draw morphology of species identified during field trip.
4. During the trip, students should carefully observe the colour (grooming, feathers), shape and behavior of living organism (feeding or swimming).
5. Education Officers will discuss with students their experience and findings after field trip:
 - Ask students what kinds of species did they find?
 - Ask students what are the relationships amongst the species?
 - Ask students what type of species was most impressive to them?

Extensions:

- Teacher can apply the same student worksheet format to various places/habitat types (e.g. stream, beach, woodland, etc.) in Hong Kong when they are going to organise a field trip. After several field trips, teachers and students can compare spatial variation of various places/ habitat types bio-diversity. The aim is to raise students' awareness of the diversity of life in Hong Kong.
- **Note:** Please change the list of species for other types of habitats. The list provided in the worksheet is applicable to wetlands (Reedbeds, Mangroves and Fishpond Habitats)



Suggested websites for references:

- <http://www.unep.ch/bio/bio-leaf.html> (An explanatory leaflet about the Conservation on Biological Diversity)
- http://www.nodc.noaa.gov/OC5/BARPLANK/WWW/HTML/gc_help.html (Index of bio-diversity, definitions)
- http://resources.ed.gov.hk/envir-ed/hkissue/c_ml_7_1.html

Suggested students' assessment:

1. Prior to the field visit, teachers should ask their students questions to investigate students' level of nature appreciation and attitude towards wildlife conservation. After the field trip, ask similar questions to see whether students' perceptions have changed or are similar prior to the visit. Suggested questions include, a) reason(s) for visiting the proposed site and what do they expect to see or find from that site, b) students' participation in outdoor activities and frequency in participation (e.g. walks in country parks), joining environmental/green club, c) whether students' watch nature programme on television, etc.
2. During the field trip, teachers should also observe students' individual behaviour e.g. attention and interest in the surrounding landscape, keenness in asking questions, etc.

GROUP NO.

**WWF Hong Kong Mai Po Secondary School Visit Programme
Diversity of life in Wetlands – Students' Worksheet**

Date: _____
Time: _____
Location: Mai Po Nature Reserve
Weather condition: _____

I. Vegetation

Species	No. of Individuals	Total no.	Site of observation
Algae			
Guinea grass			
Reed			
Superb fig			
Cerbera			
Mangrove			
Mangrove fern			
Mikania			
Others:			

Please draw 2 species your have recorded in above:

Name of species:

Name of species:



II. Crustaceans

Species	No. of Individuals	Total no.	Site of observation
Gei Wai Shrimp			
Mangrove crab			
Fiddler crab			
Others:			

Please draw 2 species you have recorded in above:

Name of species:

Name of species:

III. Insect

Species	No. of Individuals	Total no.	Site of observation
Butterfly			
Dragonfly			
Wasp			
Mosquito			
Black Tree Ant			
Moth			
Others:			

Please draw 2 species you have recorded in above:

Name of species:

Name of species:

IV. Fish

Species	No. of Individuals	Total no.	Site of observation
Grey Mullet			
Tilapia			
Mudskipper			
Others:			

Please draw 2 species your have recorded in above:

Name of species:

Name of species:

V. Reptile

Species	No. of Individuals	Total no.	Site of observation
Snake			
Chinese Stink			
Others:			

Please draw 2 species your have recorded in above:

Name of species:

Name of species:



VI. Bird

Species	No. of Individuals	Total no.	Site of observation
Black-faced Spoonbill (winter)			
Cormorant (winter)			
Avocet (winter)			
Wigeon (winter)			
Grey Heron			
Great Egret			
Little Egret			
Chinese Pond Heron			
Black Kite			
Spotted Dove			
Others:			

Please draw 2 species your have recorded in above:

Name of species:

Name of species:

VII. Mammals

Species	No. of Individuals	Total no.	Site of observation
Mongoose			
Others:			

Please draw 2 species your have recorded in above:

Name of species:

Name of species:

ACTIVITY 2: WEBS OF LIFE

Objectives: Through the activity, student can:

1. enhance their social skill through grouping games;
2. increase their understanding of the interaction among species and the complexity of ecosystem;
3. enrich their knowledge and increase awareness of environmental degradation to ecosystem.

Student levels: Form 4 to 7

Duration: 30 minutes

Materials: A ball of string and wildlife cards* (one for each student)

Venue: Activity room or playground

Procedures:

1. Ask students to summarise the data and species they have recorded in their students' worksheet.
2. Prepare photograph or card with name of those species.
3. Prepare a ball of string.
4. Divide students into two groups of different group sizes. Group A has a greater number of students (from 15 to 20) while Group B has a smaller number of students (about 5).
5. Ask the groups to form circles and sit down.
6. Each group should have both plants and animals.
7. All students should hold their own card or photograph, which represent different species.
8. When all the students have their own card, they should connect each other with the ball of string. The string between two students represents interaction between species and those connected along the string. For example, Mangrove, a primary producer is a food source for *Gei Wai* shrimp but the Sun helps the primary producer to produce food. The relationship between two organisms may represent more than one type of linkage and interaction among species. This linkage not only represents relationships of predation but also represents other interactions such as symbiosis, competition, etc. (*Hints: To form a complex web, more students should hold card of primary producer in order to support more living organisms in the upper tropic level/ food web.*)
9. After 10 minutes, each student should become involved in the web.
10. After forming the web, teachers should try to break the web by suggesting one or two negative impacts on the web. For example, pollution, land reclamation or urban development, which causes environmental degradation. Suggest using conditions that would normally damage the foundation of web especially for primary producers. For example, land reclamation would need to remove mangrove trees.
11. Ask students to suggest what would happen to the other components of the web.
12. Conclude by point out that:



- In a simple web, where all components are dependent only on one source (primary producer) for survival, any damage or removal of this sole supporter will cause the whole web to collapse.
- In a complex web, where the reliance of one component to another is not only limited to one single source (more than one primary producer), the structure of web will be maintained even though there are negative impacts or stress added onto the web. For example, if in an area where there are different species of fruit trees and even if one species of fruit tree has been attacked by disease, the fruit-eating birds in the woodland can still obtain their food from the remaining fruit tree species. Thus illustrating the importance of diversity.
- The extinction of one type of species will affect the ecosystem and ultimately affect humans. In addition, humans should also respect wildlife as they have their rights to survival.
- Higher bio-diversity should more likely be able to withstand changes.

Extensions:

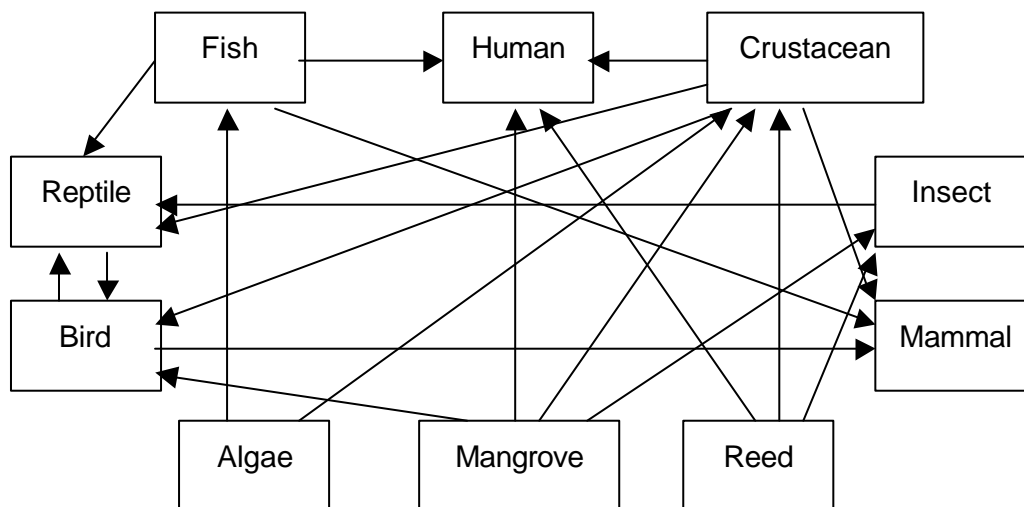
- Teachers should reinforce the importance of environmental conservation by helping students to build up environmentally responsible values. For example, teachers can encourage their students to join voluntary work related to environmental protection;
- Ask students what can they do to make a world of difference in their:
 - Daily life
 - School
 - Holiday time
 - Whenever they may be in the countryside

Suggested students' assessments:

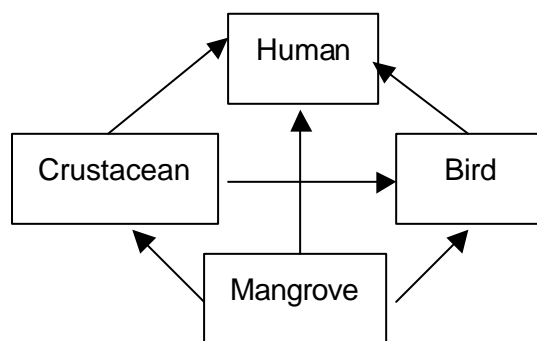
The suggested extension exercise could be used to assess students' change in attitude towards nature appreciation and conservation by giving students a few minutes at the beginning of each lesson time to report on what they did either in school, on holiday, during weekends or at home that they have done which is related to environmental protection, nature conservation and/or appreciation.

Suggested Answers for Activity 2 Webs of Life:

Suggested Complex Web:



Suggested Simple Web:



The negative impacts which affect the biodiversity of an ecosystem includes:

Human activities

- Land reclamation
- Pollution
- Unsustainable use of resources

Natural factors

- Unstable weather condition
- Disease
- Shortage of food supply

Possible negative results:

- 1) Number of primary producers (mangrove, reed) reduced.
- 2) Some of the species in upper tropic levels will also reduced.
- 3) In a long run, if degradation of environment continues, the number and diversity of species will be affected.
- 4) Species diversity in a complex web or ecosystem is much higher. Degradation of one or two species will not directly cause the collapse of web. The web, however, will still be affected and because of its complexity, we will not know what the long-term impacts will be on the system.
- 5) The simple web will totally collapse when a primary producer (Mangrove) is being used unsustainably.
- 6) Both webs will collapse when there is environmental degradation in a long-run, but the collapse will be at a different speed and in a different form.
- 7) Extinction of species.

ACTIVITY 3: DISCUSSION FORUM

Objective: Through the activity, students can:

1. Develop critical thinking through group discussion;
2. Increase their moral values through environmental education and active discussion.

Student levels: Form 4 to 7

Duration: One hour

Materials: Question for discussion and suggested answers

Venue: Classroom

Procedures:

1. Divide the class into four groups, each group should have approximately eight students.
2. Ask students about their experience in activities 1 and 2. Let them elaborate their findings in activity 1.
3. Discuss with their experiences and findings using the following questions:
 - (i) According to interactions among species, living organisms can be classified into different trophic levels namely primary producer, primary consumer, secondary consumer, tertiary consumer. Based on the data students have recorded, ask your students to classify the species into the different trophic levels.
 - (ii) Mangrove is a food source for *Gei Wai* Shrimp, the relationship between mangrove and *Gei Wai* Shrimp is namely consumption. Apart from consumption, there are other types of relationships between organisms such as symbiosis. From students' observation during the trip, ask your students to list some interrelationships that can be found among the various organisms. For each relationship, please give an example of species.
 - (iii) If all the species in a particular trophic level were being removed due to environmental degradation, state whether this could result in any effect or modification in the interaction of other species. If so, predict the possible outcome of the species extinction in a particular trophic level.
 - (iv) List the importance of biodiversity to ecosystems.
 - (v) List the importance of biodiversity to humans.
 - (vi) After the visit to the Mai Po Nature Reserve, ask your students what they think that they can do in their daily lives to help conserve biodiversity.

Extensions:

Teachers can ask more questions during the discussion session. The questions can relate to current issues of urban development and environmental protection. Teachers should encourage their students to express their opinions on these issues.

Suggested student's assessment:

The discussion forum is a good medium in assessing students' attitude and by observing their behaviour and answers.



Suggested Answers for Activity 3 Discussion forum:

(i)

Primary producer	Primary consumer	Secondary consumer	Tertiary consumer
Algae	Butterfly	Grey Mullet	Cormorant
Guinea grass	Mosquito	Tilapia	Little Egret
Reed grass	Black tree Ant	Dragonfly	Grey Heron
Superb fig	Moths	Chinese bulbul	Avocets
Cerbera	<i>Gei Wai</i> Shrimp		Black Kite
Mangrove	Fiddler crab		
	Mudskipper		

Although species in the upper trophic level consume species in lower trophic levels, each species in the same trophic level interact amongst different species forming a complex food web in the ecosystem and helping to stabilise the ecosystem structure.

- (ii) - Neutralism e.g. Guinea grass + Black Kite
 - Competition e.g. Great Egret + Grey Heron
 - Symbiosis e.g. Wasp + Superb fig
- (iii) - Number of species will sharply decrease if primary producers are removed.
 - Loss of habitat (Mangrove not only provides food source to wildlife, but also living habitat to many organisms).
 - Linkage of other species will become fragile when one interaction between species is weakened.
 - Loss of environmental resource that is useful to humans.
 - Conclusion: Stability of ecosystem will be affected once linkages are broken.
- (iv) - Stabilise ecosystem structure in the number of predators and prey (e.g. Birds limit the abundance of caterpillars that defoliate trees).
 - Efficient use of energy through different trophic levels.
 - Diversity of food sources to larva stage of organisms.
 - Large gene pool for evolution.
- (v) - Diversity of life provides humans a variety of useful environmental resources (e.g. Reeds can be used as a source for paper making industry.)
 - Numerous sources of medicines (e.g. Smoke generated from burning the wood of Milky mangrove *Excoecaria agallocha* can be used for treating leprosy. Bark and roots of Spiny Bears Beech *Acanthus ilicifolius* was thought to be able to reduce cold symptoms, cure

skin allergies and diseases.)

- Food source (e.g. Shrimp, Oyster, Crab and Fish)
- Aesthetic value to humans in the sense of appreciating nature (e.g. variety of birds in and around Mai Po.)
- Academic value for scientific research.
- Economic value e.g. *gei wai* shrimp harvesting, ecotourism.
- Wild species serve as a source for potential new domesticates.
- Genes pool used to improve genes of established domesticates.
- Species of wild enemies of pests can control their effects on crops.
- Genetic diversity can prevent pest and disease, which cause crop failures.

- (vi)
- Every form of life is unique and should have the right to survive.
 - Spreading the message of environmental protection.
 - Sustainable use of environmental resources by using the “4R” concept: Reduce, Reuse, Recycle, Replace.
 - Join volunteer work related to environmental protection.
 - Support the work of environmental conservation organisation by becoming a member.