

CHEM1200 Discovery in Biology

Ecology of Hong Kong

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THE WILDLIFE MAP OF HONG KONG



A photograph of a lush, green woodland. In the foreground, several people wearing hats and backpacks are walking along a path. The background features tall, mature trees with thick trunks and dense foliage. Sunlight filters through the canopy, creating bright highlights and deep shadows. A small, open stone structure is visible in the distance.

Woodland

Shrubland



A wide-angle photograph of a lush green mountain ridge. A dirt trail winds its way along the crest of the mountain. In the background, a large body of water is visible, dotted with several small, green, hilly islands. The sky is blue with some scattered white clouds.

Grasslan
d



Freshwater
Stream

Mangrove



Mudflat



An aerial photograph of a coastal landscape. A long, white sandy beach curves along the left side of a deep blue bay. The bay is framed by steep, densely forested hills and mountains that rise behind the beach. The water is a vibrant turquoise color, appearing darker towards the shore and lighter further out. The sky is clear and blue.

Sandy
Beach

Rocky Shore



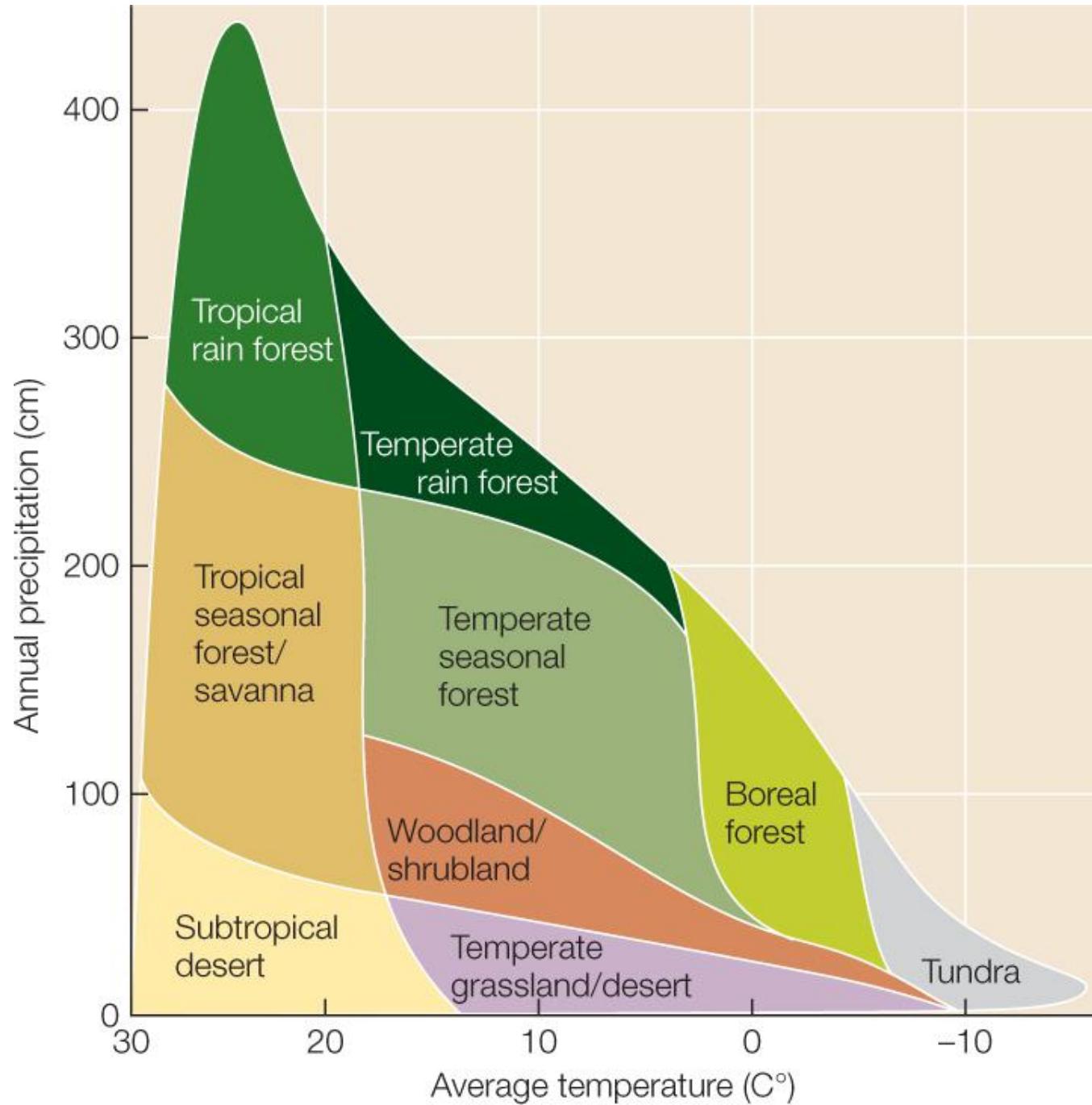
A scuba diver in dark gear swims towards the left, silhouetted against the bright water. In the foreground, a large, healthy coral reef covered in soft corals in shades of orange, yellow, and purple rises from the bottom. The water is slightly hazy.

Coral Habitat

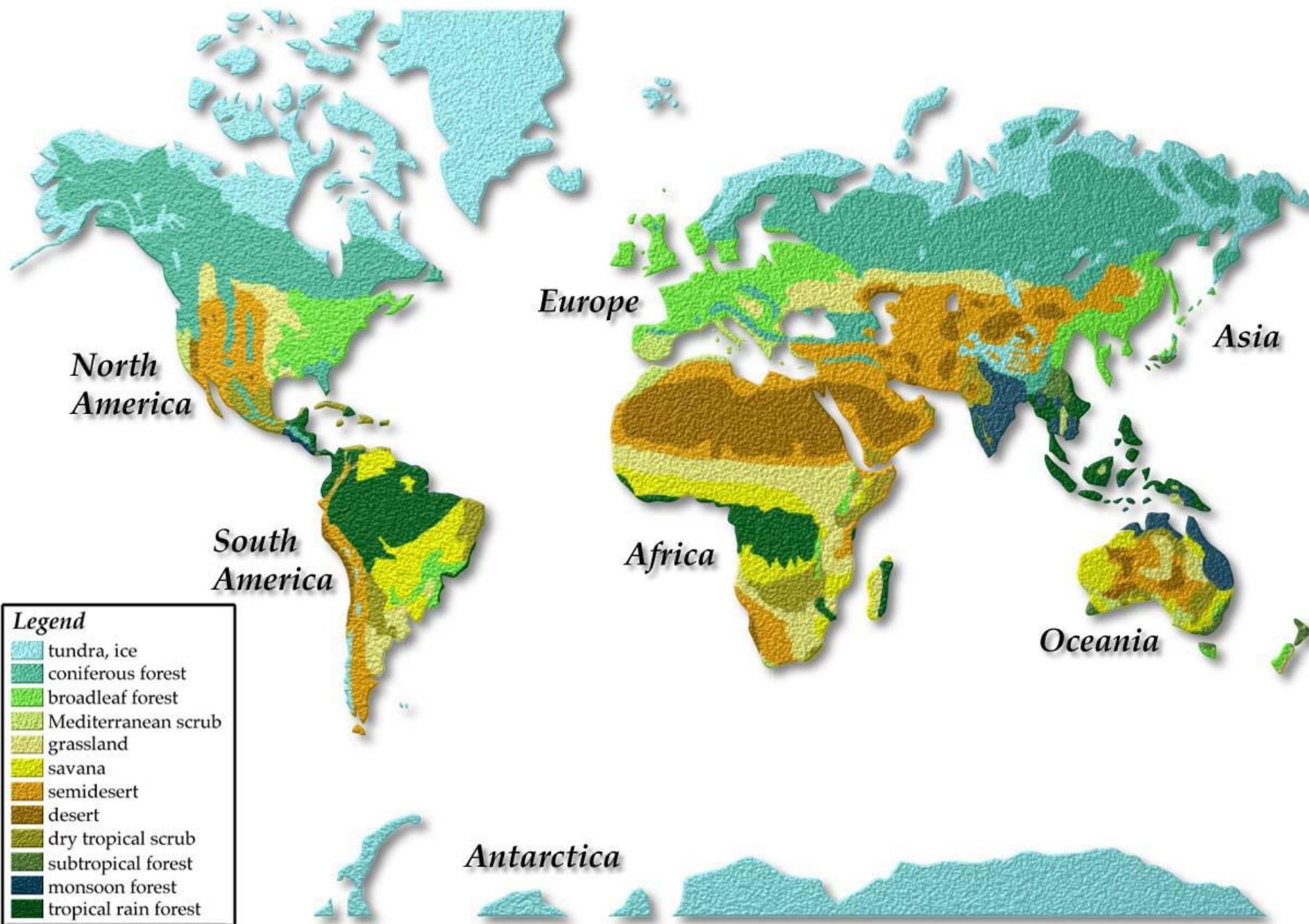


Plant and Animal Groups	No. of species
Birds	530
Butterflies	264
Dragonflies	118
Freshwater fish	186
Marine fish	997
Hard corals	84
Terrestrial mammals	58
Amphibians	24
Reptiles	88
Vascular plants	3300 (native: 2100)

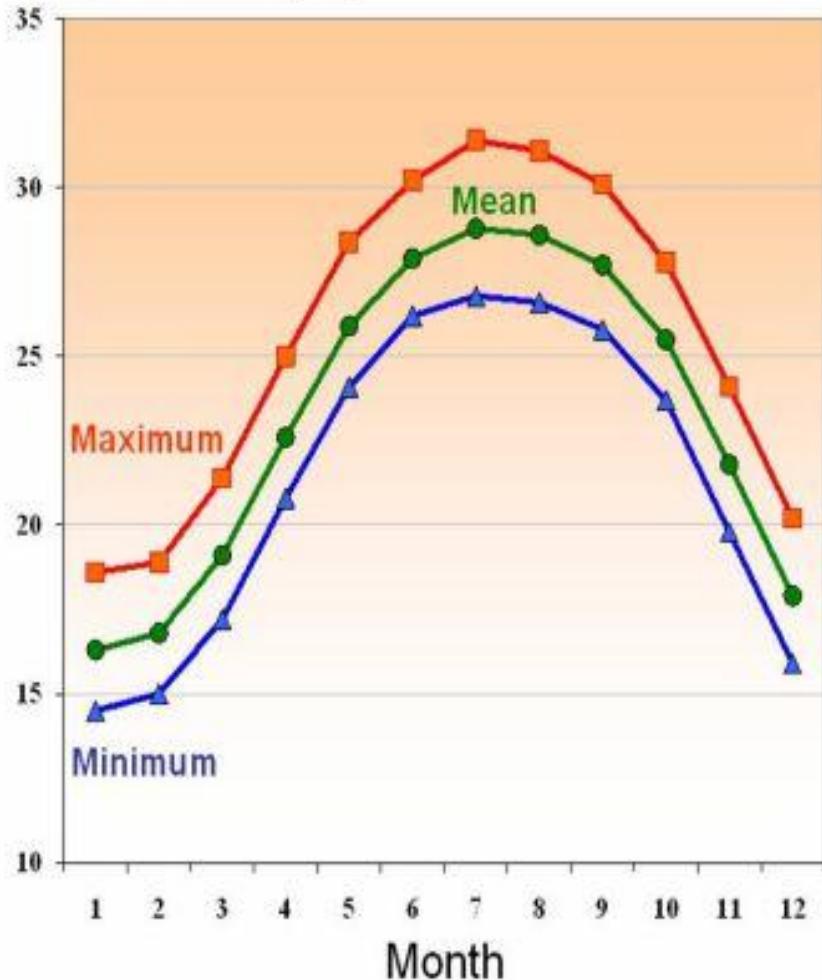
Natural vegetation in Hong Kong



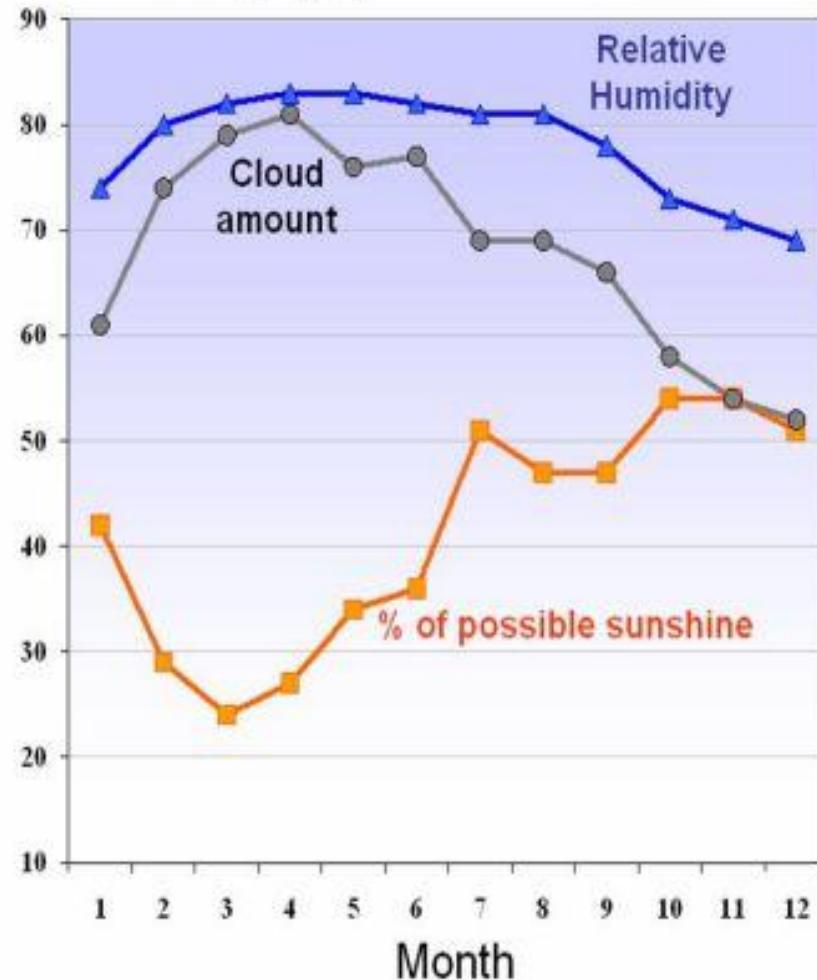
The rainfall and temperature determine the vegetation types on earth



Temperature (°C)



Percentage (%)



Monthly means of daily maximum, mean and minimum temperature (left), relative humidity, cloud amount recorded at the Hong Kong Observatory and percentage of possible sunshine at King's Park (right) between 1981-2010



Natural vegetation in Hong Kong

- Woodland, shrubland and grassland
- Woodland (evergreen broad-leaved forest of the subtropical flora of Southeast Asia)
 - (1) River-bank woodland
 - along rivers and low-lying areas
 - (2) Lowland woodland
 - hilly areas and valleys below 300 – 400 m
 - (3) Low-hill forests
 - uplands between 300 – 800 m
 - (4) Montane forests
 - hilly reliefs at 700 – 1000 m

Forest in Hong Kong

1) Plantation forest

- trees of a single species are planted around a reservoir area to prevent erosion

2) Secondary forest

- recovered naturally from previous loss

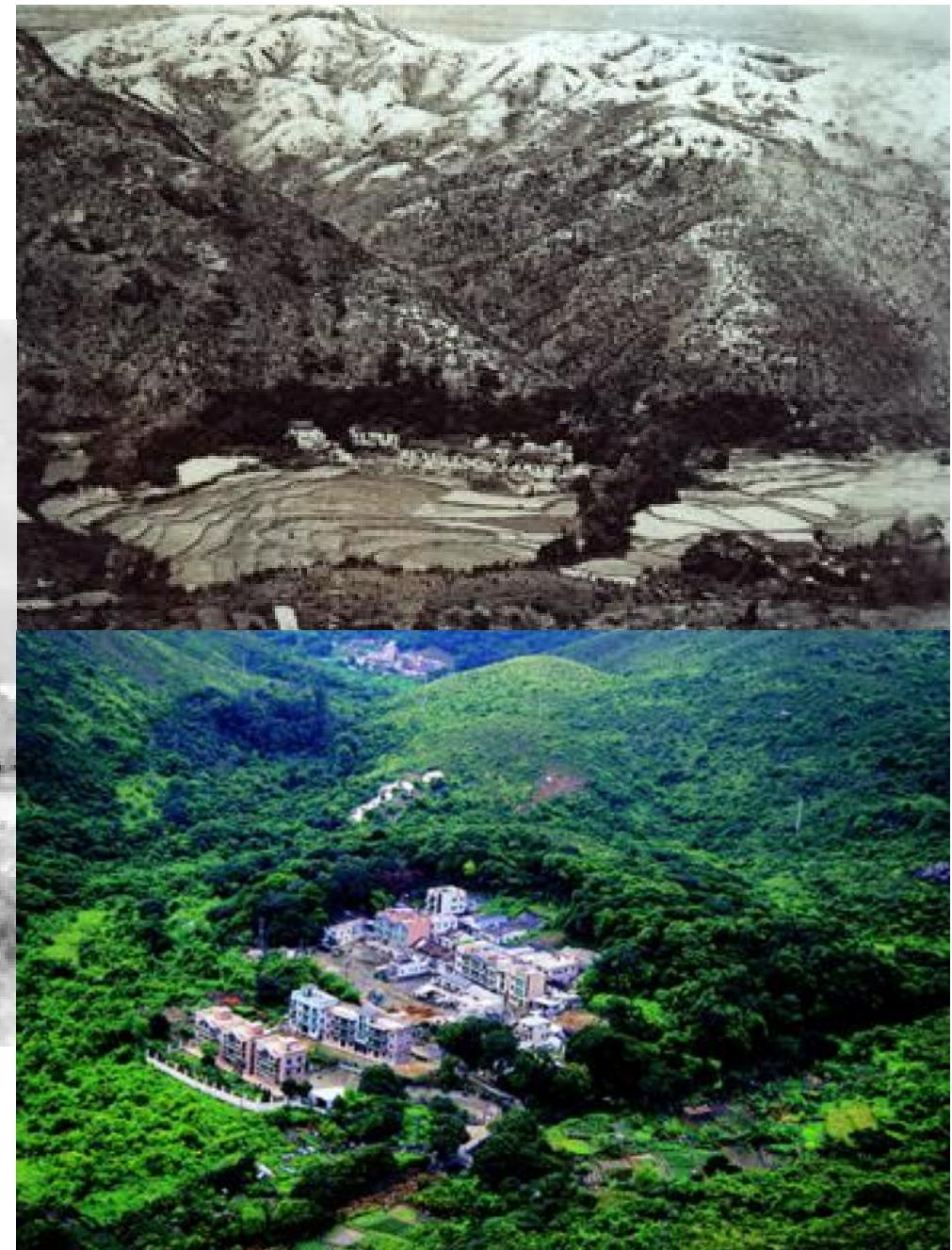
3) Fung shui wood

- located in the New Territories, fung shui woods
- have a higher biodiversity than the other two forest types.
- e.g., Shing Mun Fung Shui Wood inside Shing Mun Country Park, which has been around since the 17th century, possesses 76 different plant species.

	Fung shui wood	Lowland Secondary Forest	Forest Plantation
History	The oldest fung shui wood dates back more than 300 years	The majority of secondary forests were developed from grasslands naturally after the Second World War	Most woods were planted after the Second World War
Canopy	Dense and tall	Dense but shorter	Sparse
Undergrowth	Dense	Dense	Sparse
Tree Sizes	More old trees and large vines	Trees of all sizes	Tree size is fairly uniform
Plant Species	Diverse, with mostly native shade-tolerant species	Diverse, with mostly native sun-loving pioneer species	Diversity is low. Includes both exotic and native pioneer species



A typical layout of fung shui woods



Pak Mong fung shui wood on Lantau Island

Shrublands and Grasslands

- Most of the hillside habitats are grasslands and shrubland
- Grasslands and shrublands are alternating due to human-induced hill fires
- Grasslands
 - dominated by the family Poaceae; can recover promptly after fire by preserving nutrient in underground vegetative parts
- Shrublands
 - replace grasslands if a habitat is protected from hill fire for at least 10 years
 - common species: Rose Myrtle (*Rhodomyrtus tomentosa*), Asian melastome (*Melastoma candidum*), Oblong-leaved Litsea (*Litsea rotundifolia*), etc. Once the shrublands grow mature, they tend to have a stronger fire resistance



Dragon's Back, Hong Kong

TASTE the ATMOSPHERE
EASON CHAN



Sunset Peak, Lantau Island

Rose Myrtle
崗櫧





Asian melastome
野牡丹

Stone wall trees



Chinese banyan (*Ficus microcarpa*) 細
葉榕
Forbes Street, Kennedy Town





Camphor
tree
樟樹
(*Cinnamomum
camphora*)



- deciduous tree with greyish brown bark
- can reach a height of 30 m
- produces aromatic resin which accounts for the sweet fragrance
- palmately 3-lobed and 3-veined leaves

Sweet Gum 楓香
(*Liquidambar formosana*)



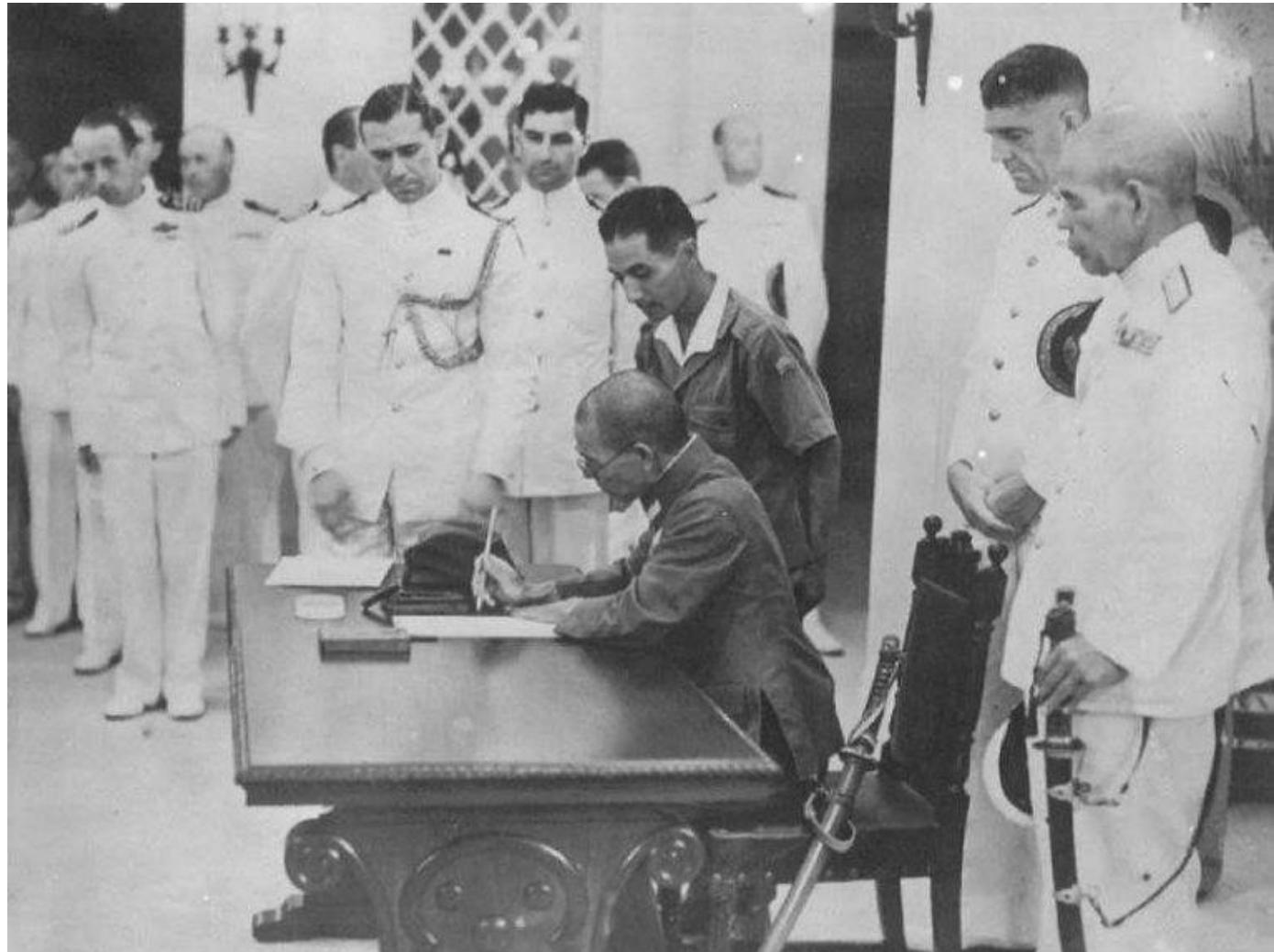
History of Forest in Hong Kong

- Forests clearing started in the 11th and 12th Centuries due to Chinese immigration
- Hong Kong became a centre for lime production, huge amounts of trees were fallen to fire the kilns
- On the high ground, e.g., Tai Mo Shan, indigenous and pioneer tree species were fallen for tea plantations
- During World War II, the Japanese cleared forests for cooking fuel and construction, leaving much of Hong Kong little more than "barren rock"

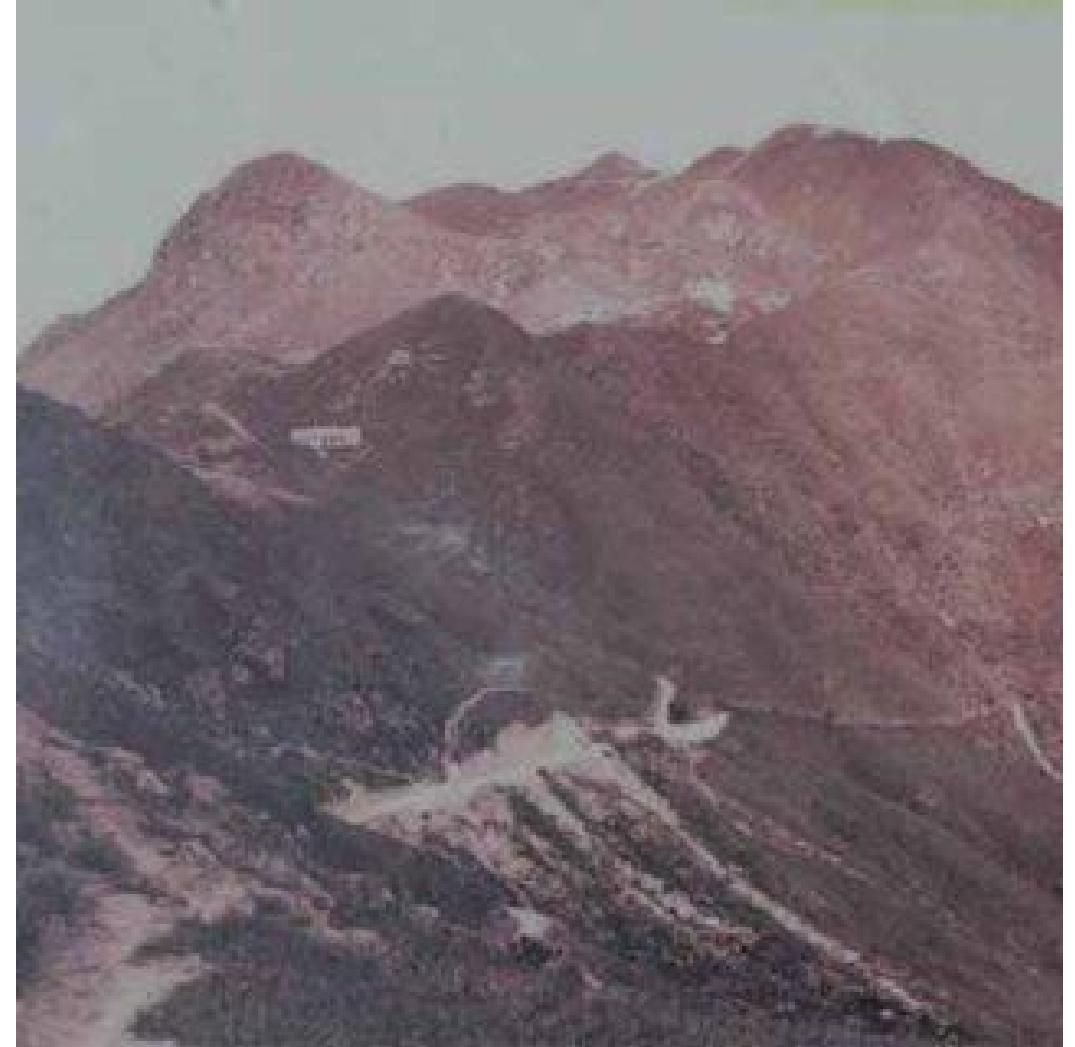
Hong Kong surrendered
on Christmas Day, 1941



The document of surrender was signed by Japan on 16 September 1945 in Hong Kong



- By the end of the war, less than 4% of the land was covered by forests
- The lost of forests led to severe water shortage



'Barren and tree-less' Victoria Peak, Hong Kong Island viewed from Mt. Gough ca 1870.

- Over the next two decades, reservoirs were built for potable water
- Tree plantation was started in 1976 to prevent soil erosion and stop reservoirs silting up
 - hardy and fast-growing species able to cope with the poor soil quality were grown
 - exotic non-native species like Brisbane box, Taiwan Acacia and slash pine
- 38% of the land area of Hong Kong were designated as country parks and restricted areas
- In 2013, the forests covered about 26,400 hectares, about 23.8% of Hong Kong's total land area

First reservoir in Hong Kong, completed in 1863
(capacity: 260,000 m³)



In 1865, Hong Kong had a population of 125,504

Completed in 1973, Capacity: 230 million m³, Area: 12.04 km²



Plover Cove Reservoir – official opening
1969





High Island Reservoir

Completed in 1979

Capacity:

273 million m³

Area:

6.67 km²

Reservoirs

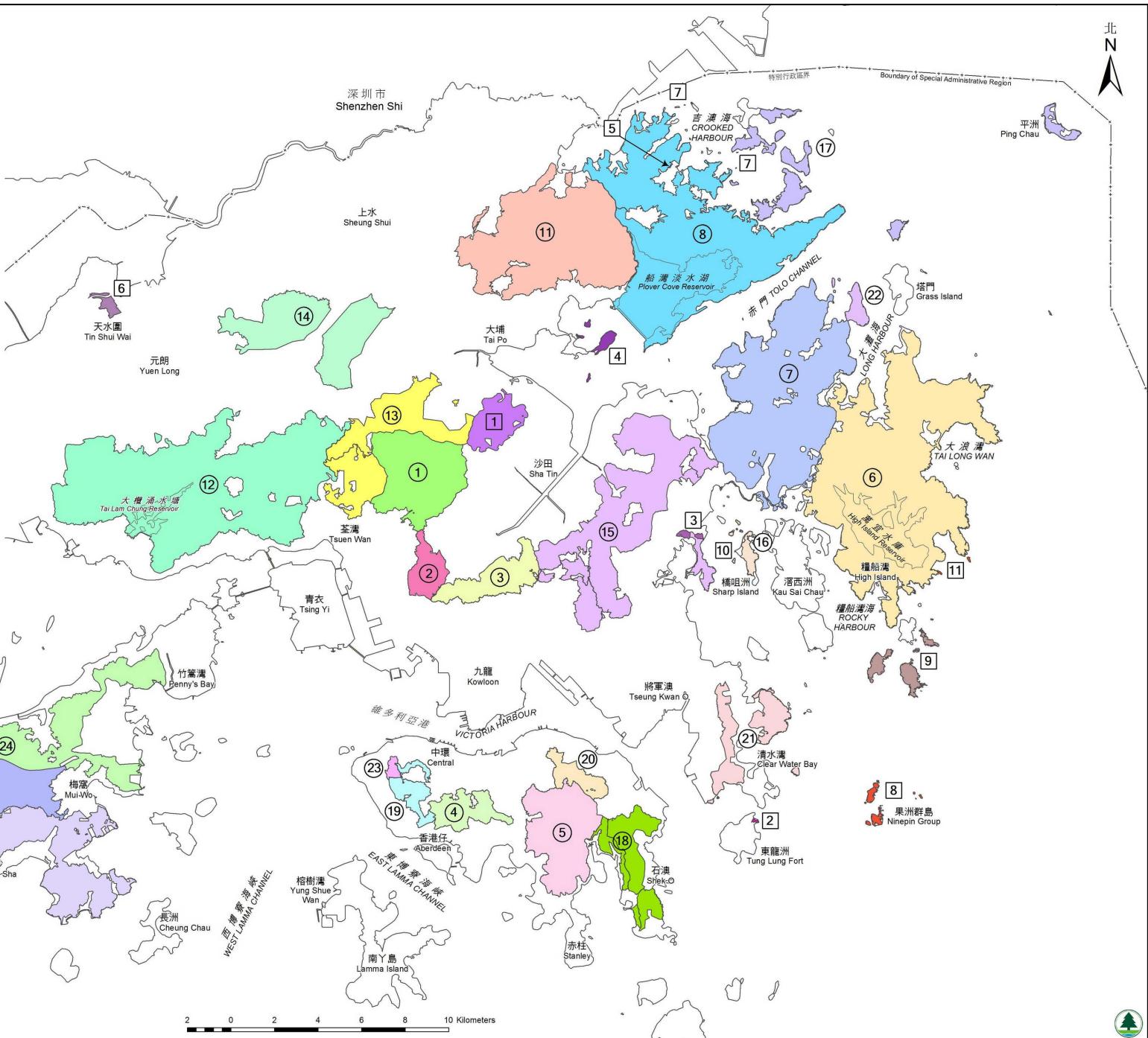


Irrigation Reservoirs



香港現已劃定的郊野公園 Designated Country Park in Hong Kong			
編號 No.	地點 Location	面積 (公頃) Area (ha)	指定日期 Date of Designation
1	城門 Shing Mun	1400	24/6/1977
2	金山 Kam Shan	339	修訂於/Revised on 30/12/2013
3	獅子山 Lion Rock	557	24/6/1977
4	香港仔 Aberdeen	423	28/10/1977
5	大潭 Tai Tam	1315	28/10/1977
6	西貢東 Sai Kung East	4494	修訂於/Revised on 30/12/2013
7	西貢西 Sai Kung West	3000	3/2/1978
8	船灣 Plover Cove	4600	修訂於/Revised on 1/12/2017
9	南大嶼 Lantau South	5646	修訂於/Revised on 1/12/2017
10	北大嶼 Lantau North	2200	18/8/1978
11	八仙嶺 Pat Sin Leng	3125	18/8/1978
12	大欖 Tai Lam	5412	修訂於/Revised on 30/12/2013
13	大帽山 Tai Mo Shan	1440	23/2/1979
14	林村 Lam Tsuen	1524	23/2/1979
15	馬鞍山 Ma On Shan	2884	修訂於/Revised on 18/12/1998
16	橋咀 Kiu Tsui	100	1/6/1979
17	船灣(擴建部分) Plover Cove (Extension)	630	1/6/1979
18	石澳 Shek O	701	修訂於/Revised on 22/10/1993
19	薄扶林 Pok Fu Lam	270	21/9/1979
20	大潭(訓魚涌擴建部分) Tai Tam (Quarry Bay Extension)	270	21/9/1979
21	清水灣 Clear Water Bay	615	28/9/1979
22	西貢仔(漁仔擴建部分) Sai Kung West (Wan Tsai Ext.)	123	14/6/1996
23	龍虎山 Lung Fu Shan	47	18/12/1998
24	北大嶼(擴建部分) Lantau North (Extension)	2360	7/11/2008
總面積 Total Area			43467

香港現已劃定的特別地區(位於郊野公園外) Designated Special Area in Hong Kong Outside Country Park			
編號 No.	地點 Location	面積 (公頃) Area (ha)	指定日期 Date of Designation
1	大埔滘自然護理區 Tai Po Kau Nature Reserve	460	13/5/1977
2	東龍洲炮台 Tung Lung Fort	3	22/6/1979
3	蕉坑 Tsiu Hang	24	18/12/1987
4	馬屎洲 Ma Shi Chau	61	9/4/1999
5	荔枝窩 Lai Chi Wo	1	15/3/2005
6	香港濕地公園 Hong Kong Wetland Park	61	1/10/2005
7	印洲塘 Double Haven	0.8	1/1/2011
8	果洲群島 Ninepin Group	53.1	1/1/2011
9	鹽缸群島 Ung Kong Group	176.8	1/1/2011
10	橋咀洲 Sharp Island	0.06	1/1/2011
11	糧船灣 High Island	3.9	1/1/2011
總面積 Total Area			845



Lophostemon confertus (Brisbane box) 紅膠木

- Evergreen tree native to Australia
- Commonly grown as a street tree, due to its disease and pest resilience, high tolerance for smog, drought and poor drainage



Acacia confusa (Taiwan acacia) 台灣 相思

- Perennial tree native to South-East Asia
- The bark may be ground into a powder to create a tea, or as a spice and taste enhancer
- Wood is also converted to charcoal



Pinus elliottii (slash pine, 愛氏松)

- Native to the lower coastal plain within the southeastern USA
- Widely introduced into other countries for various products, ranging from lumber to pulpwood
- An important contribution to the resin production industry



Plantation Enrichment Project

In 2015, the AFCD planted 400,000 tree seedlings in Hong Kong's country parks. 80% of them were native species.



<https://www.kfbg.org/eng/>



- A native tree nursery was established in 1997
 - Produces 25,000 seedlings every year for forest restoration



Freshwater Streams

- Many faults and joints in Hong Kong's bedrock favours the formation of streams and rivers. No large rivers present, many streams are ephemeral.
- The larger rivers are mainly in the northwest: Shan Pui River, Shenzhen River, Kam Tin River, Sheung Yue River, and Ng Tung River.
- Over 200 rivers, streams and nullahs in Hong Kong. Among these, 33 of them are designated as Ecologically Important Streams.



雙魚河
Sheung Yue River

石上河
Shek Sheung River

天水圍明渠
Tin Shui Wai Nullah

山貞河
Shan Pui River

錦田河
Kam Tin River

林村河
Lam Tsuen River

屯門河
Tuen Mun River

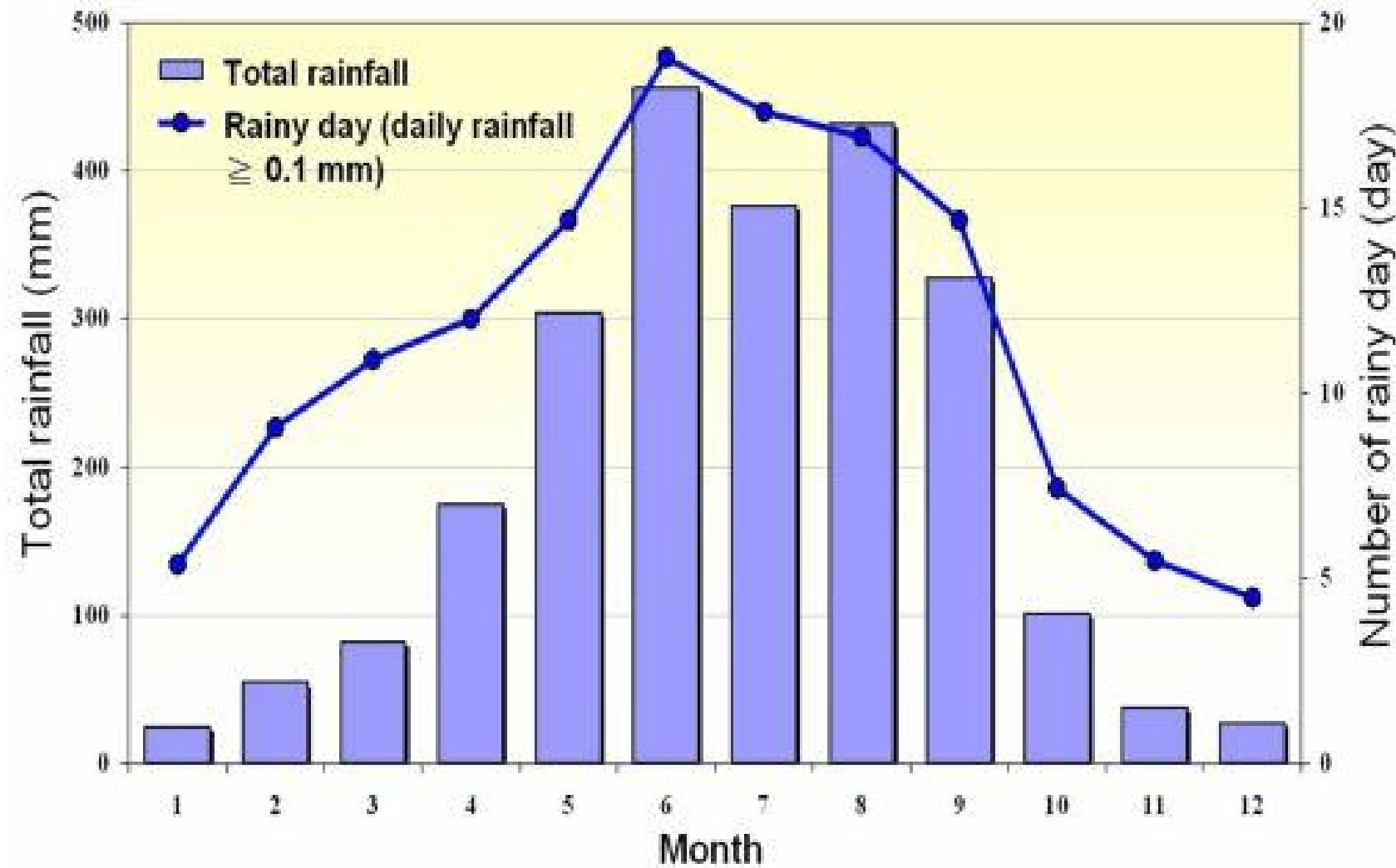
大城石澗
Tai Shing Stream

城門河道
Shing Mun Main Channel

啟德明渠
Kai Tak Nullah

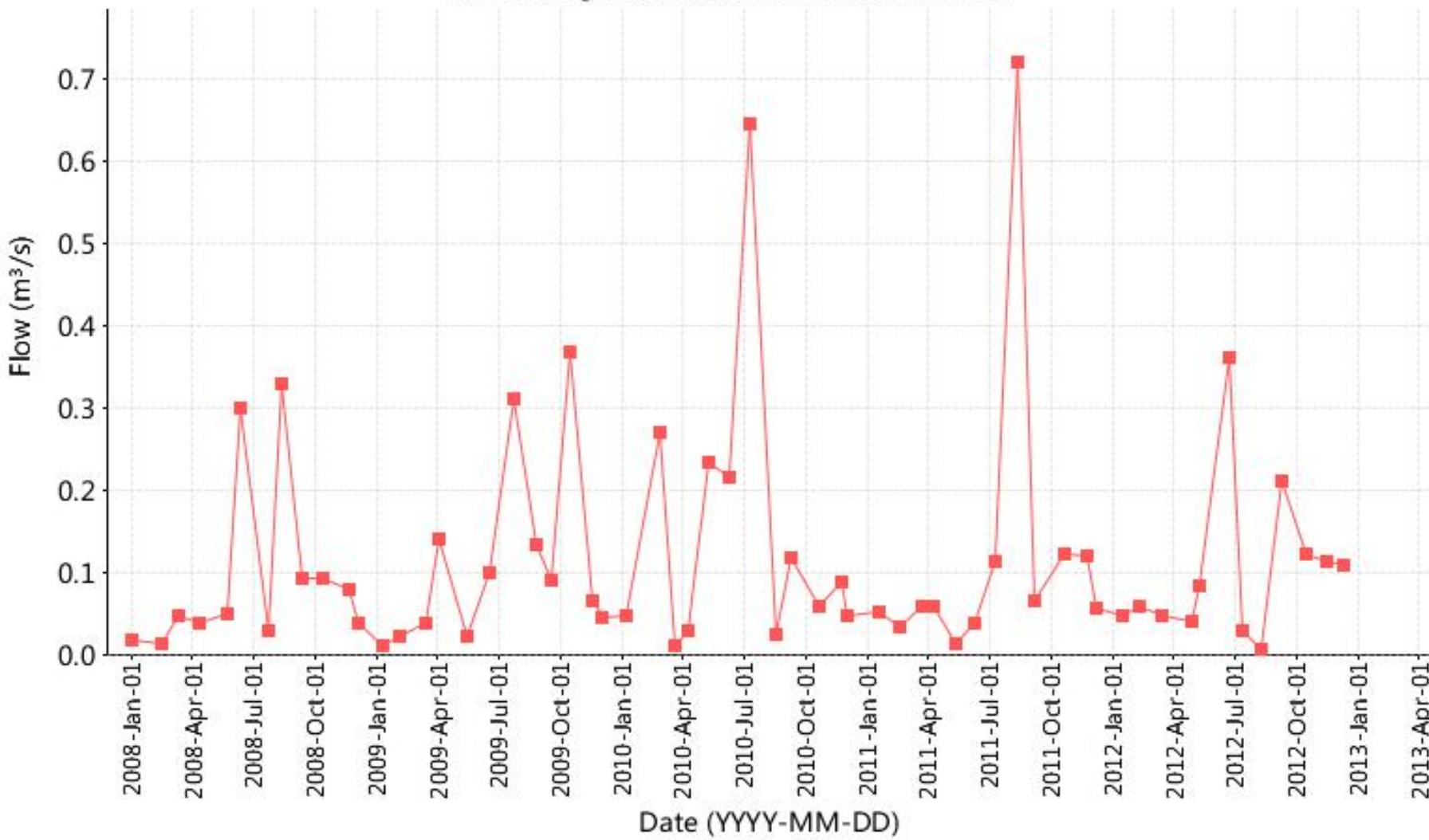
東涌河
Tung Chung River

大蠔河
Tai Ho Stream



Monthly means of total rainfall and number of rainy day recorded at the Hong Kong Observatory between 1981 and 2010.

River Water Quality Data:
Period: 2008-01-01 to 2012-12-31
Monitoring Station:Lam Tsuen River (TR12H)



Silvermine Waterfall (Mui Wo, Lantau)





Tai Po Kau Forest Stream



Bride's Pool



Sheung Yue River

Ng Tung River



Channelization of Hong Kong rivers





FIGURE 18 FISH LADDER AT HO CHUNG RIVER (LEFT) AND PAK NGAN HEUNG RIVER (RIGHT).
FOR PAK NGAN HEUNG RIVER, THE FISH LADDER MAY BE FURTHER IMPROVED THROUGH
THE USE OF NATURAL SUBSTRATES AND SLOPING GRADIENTS FOR THE EMBANKMENTS AT
THE WEIR UPSTREAM TO FACILITATE ANIMAL PASSAGE.



FIGURE 20 IN-CHANNEL SHALLOW POND AT YUEN LONG BYPASS FLOODWAY

Caddisflies

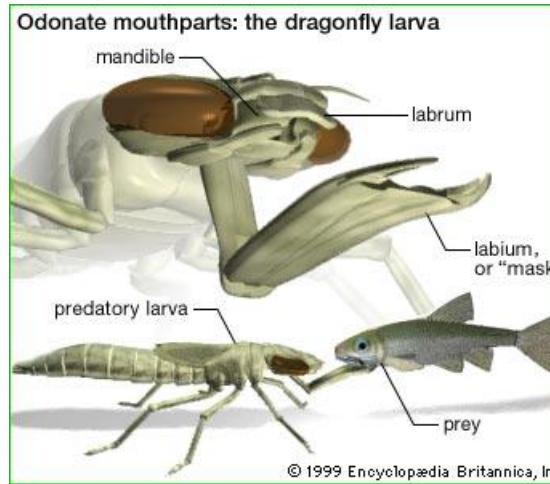
- Most diversified freshwater insect group
- Producing silk for case-building, net-spinning, pupation
- Nets for passively collecting living or dead food items in flowing water
- Found in areas with weak water current and accumulation of organic debris
- Life span of less than a month







Odonates (dragonflies and damselflies)



Dragonfly



Damselfly

Rare lowland species



Chinese rasbora (*Rasbora steineri*)

- Rare, only found at two localities in the Northern District of Hong Kong
- Lives in hill streams and lower reaches of lowland streams

Hong Kong paradise fish
(*Macropodus hongkongensis*)

- The first freshwater fish named after the territory
- Juveniles - inhabit sluggish, swampy water bodies
- Adults - in marshes and streams



Amphibians: Hong Kong Newt

- Juveniles with feathery external gills around their necks
- Feed on invertebrates
- Living on land except during breeding period (Sep – Mar)



Hong Kong Marine

Habitats



海寶圖 Marine Biodiversity Map

珊瑚群落 Coral Communities

- 石珊瑚 Hard Coral
- 軟珊瑚 (軟珊瑚 - 雜類) Octocoral (Soft Coral, Gorgonian)
- 黑珊瑚 Black Coral

海岸礁的生境地 Intertidal Habitats

- 紅樹林 Mangrove
- 泥灘 Intertidal Mudflat
- 馬來蟹 Horseshoe Crab
- 海草 Seagrass

海洋哺乳動物 Marine Mammals

- 中國白海豚分佈密度 Chinese White Dolphin Distribution Density
- 低至中 Low to Medium
- 高 High
- 江豚分布密度 Finless Porpoise Distribution Density
- 低至中 Low to Medium
- 高 High

海鷺 Seabird

- 白腹海鷺繁殖地 White-bellied Sea Eagle Nesting Site

其他「海寶」 Other Precious Species

- 綠蠵龜產卵地點 Green Turtle Nesting Site
- 文胸魚生息地 Amphibian Habitat

海洋保護區 Marine Protected Area

- 海濱公園 Marine Park
- 海濱保育區 Marine Reserve

大嶼山
Lantau Island

新界
New Territories

九龍
Kowloon

香港島
Hong Kong Island



Corals in Hong Kong

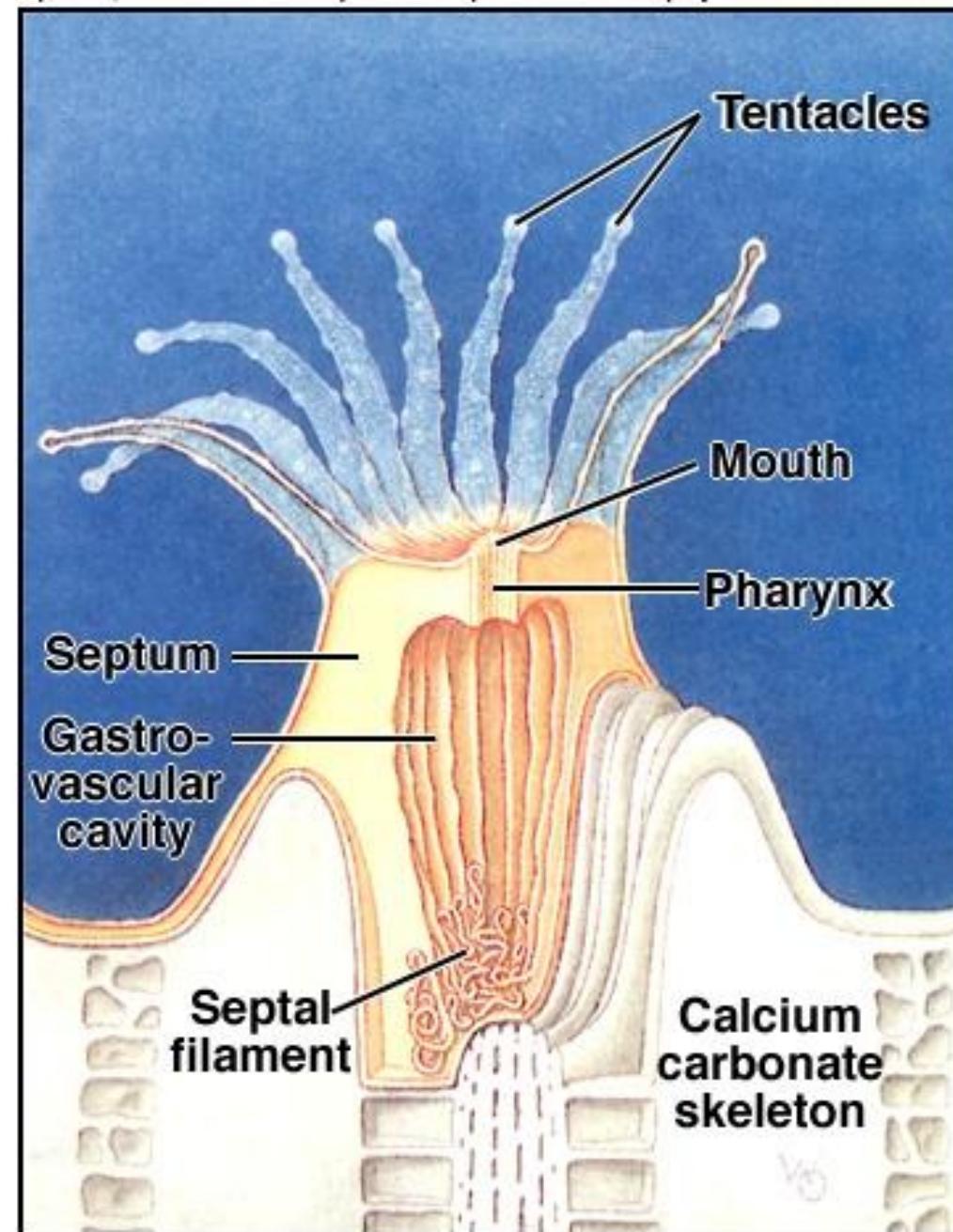
- Corals form scattered fringing coral communities along the coast
- They assemble into small sub-tidal reefs because of the low air temperature in winter
- Reef-building corals: 84 species
- Gorgonian corals: 26 species
- Black corals: 8 species

- Zoantharia
 - including sea anemones, stony corals (reef building or non-reef building), exoskeleton
 - Hexamerous body plan, unbranched tentacles
- Octocorallia
 - including soft and horny corals, such as sea fans, sea pens, sea pensies
 - pinnately branched tentacles in multiples of eight
 - endoskeleton consists of spicules and horny protein

A *Zoantharian* polyp



Coral skeleton



LESLIE CHAN ©



Stony corals in Hong Kong

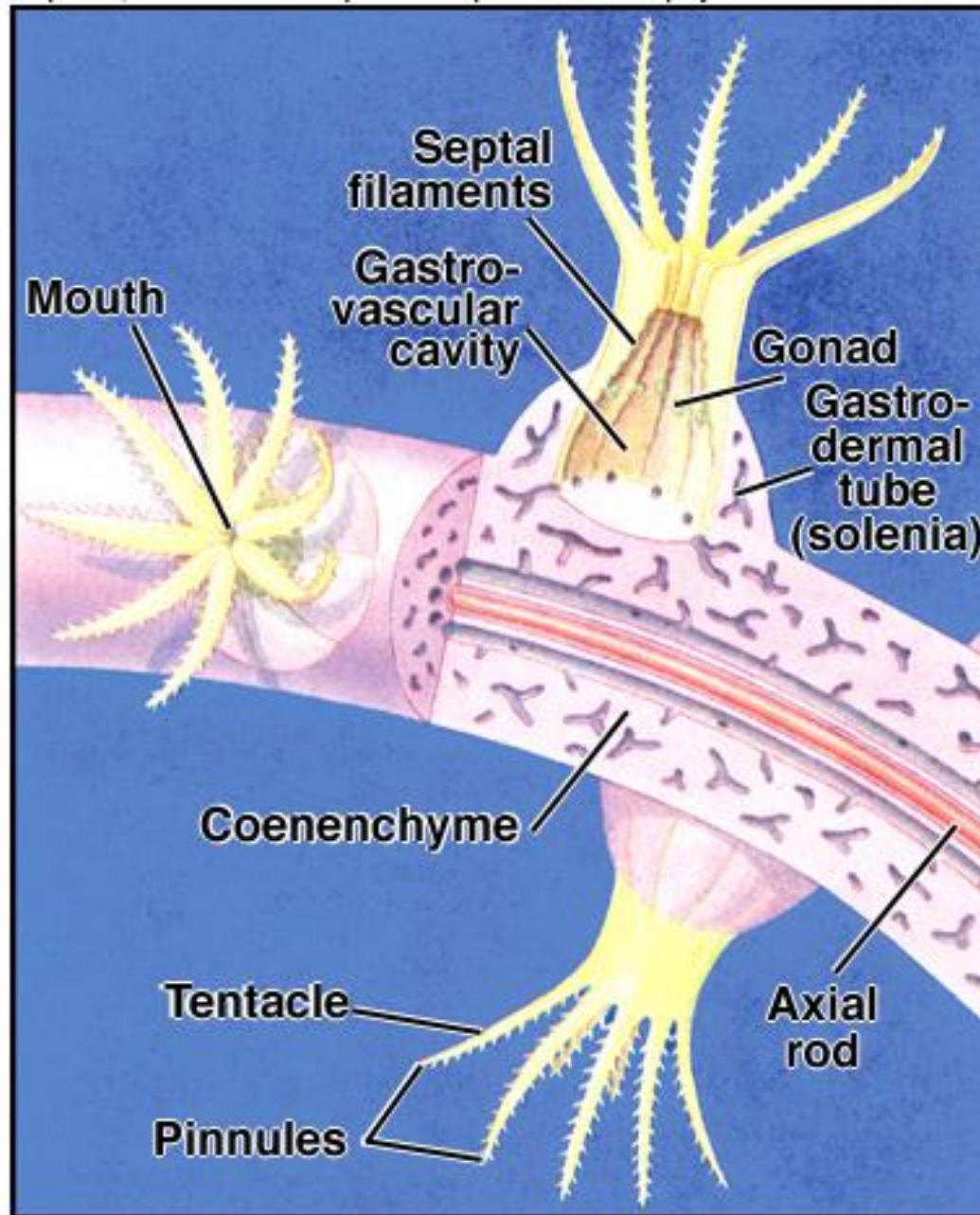
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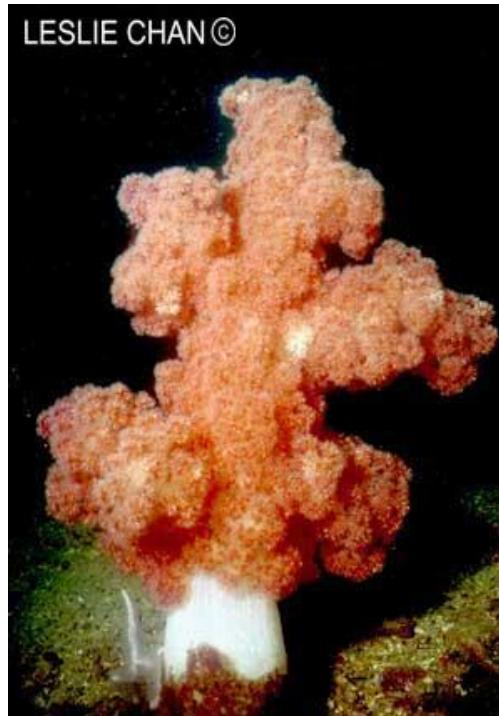
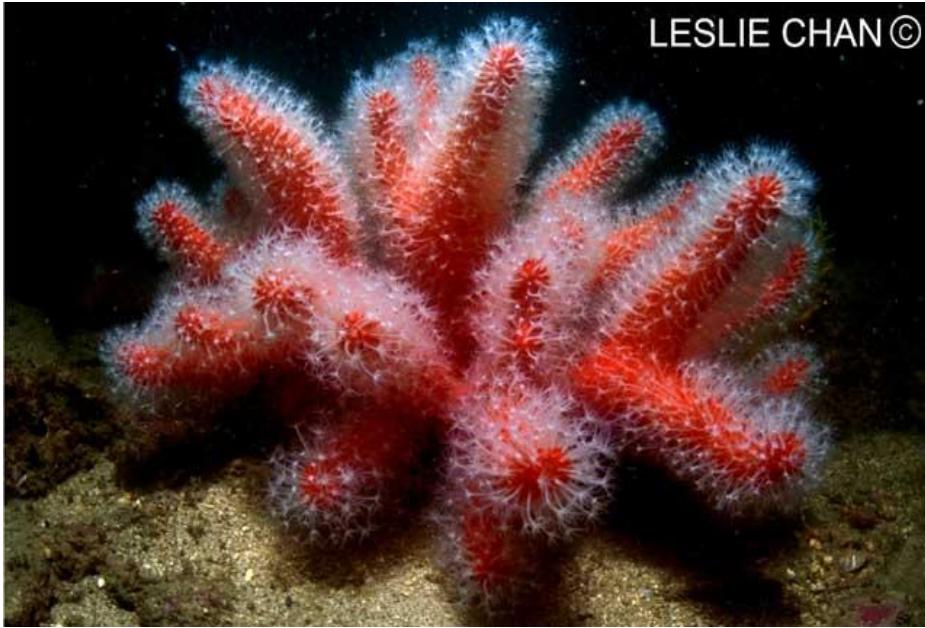
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Alcyonarian coral polyps

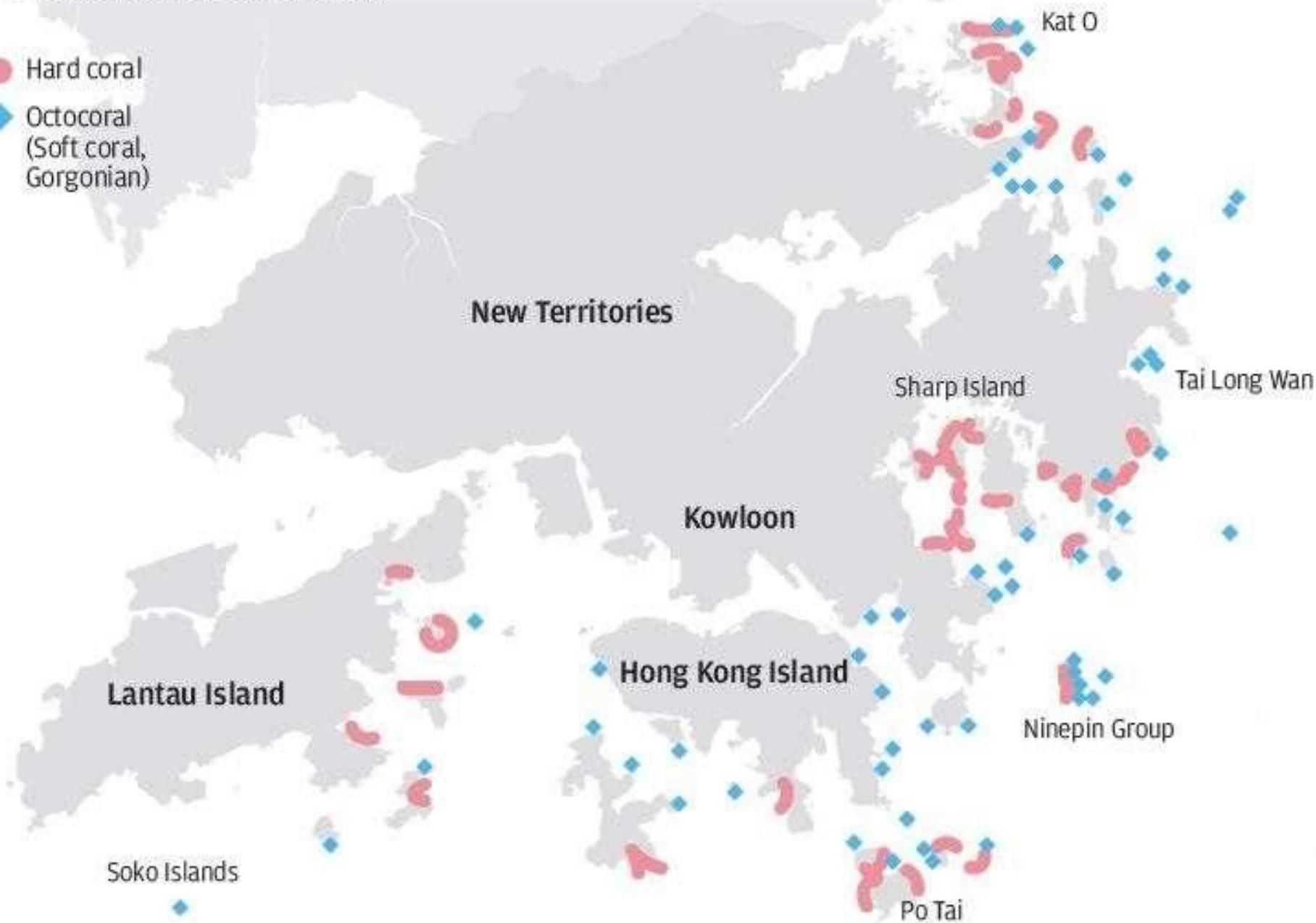


Soft Corals in Hong Kong



Coral communities in Hong Kong

- Hard coral
- ◆ Octocoral
(Soft coral, Gorgonian)



Exposed sandy shore (Big Wave Bay)



Sheltered sandy shore (Starfish Bay, Ma On Shan)



Enclosed mudflat (Mai Po)



Exposed sandy beaches



Ghost crab



Sand crab (Matuta)

Sheltered sandy beaches

- Moon shell
 - shell is enveloped by the muscular side-lobes of the foot
 - road foot is used to grip and envelop bivalves
 - acid is secreted to bore the bivalve shell with the radula



Fiddler crabs on soft shores

- Males have one large chela
- Live on **mid** shore on sandy shore, burrow during high tide
- Feed on detritus and algal mats in sediments



Soldier crab (*Mictyris longicarpus*)

- Walk forward not sideway as other crabs do
- Move in close and crowded formations over mid shore in low tide; burrow in sand during high tide





- Surface dwelling gastropods, leaving trails on mud surface at low tide
- Feed on biofilm and detritus from sediments

Mudskippers

- 3 species in HK
 - *Periophthalmus modestus* (Common Mudskipper)
 - *Boleophthalmus pectinirostris* (Bluespotted Mud Hopper)
 - *Scartelaos viridis* (Blue Mud Hopper)
- Gills and skin for respiration
- Either carnivorous (Common Mudskipper), feeding on algae/humus (Bluespotted Mud Hopper) or omnivorous (Blue Mud Hopper)
- Territorial



Common
Mudskipp
er



Bluespotted Mud Hopper



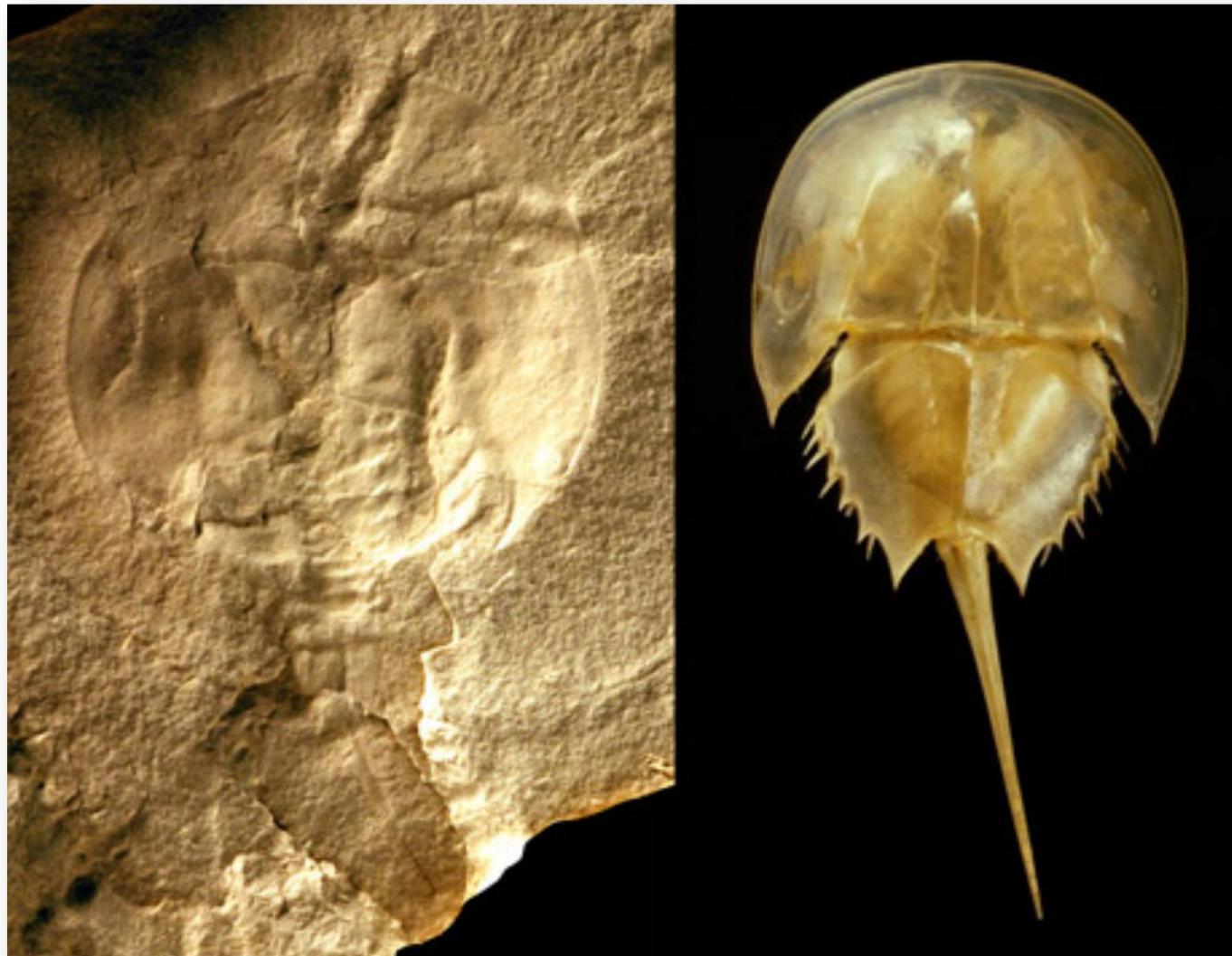
Blue Mud Hopper



Horseshoe crab

驥

Living fossil





美洲𩷶

American
horseshoe
crab

巨𩷶

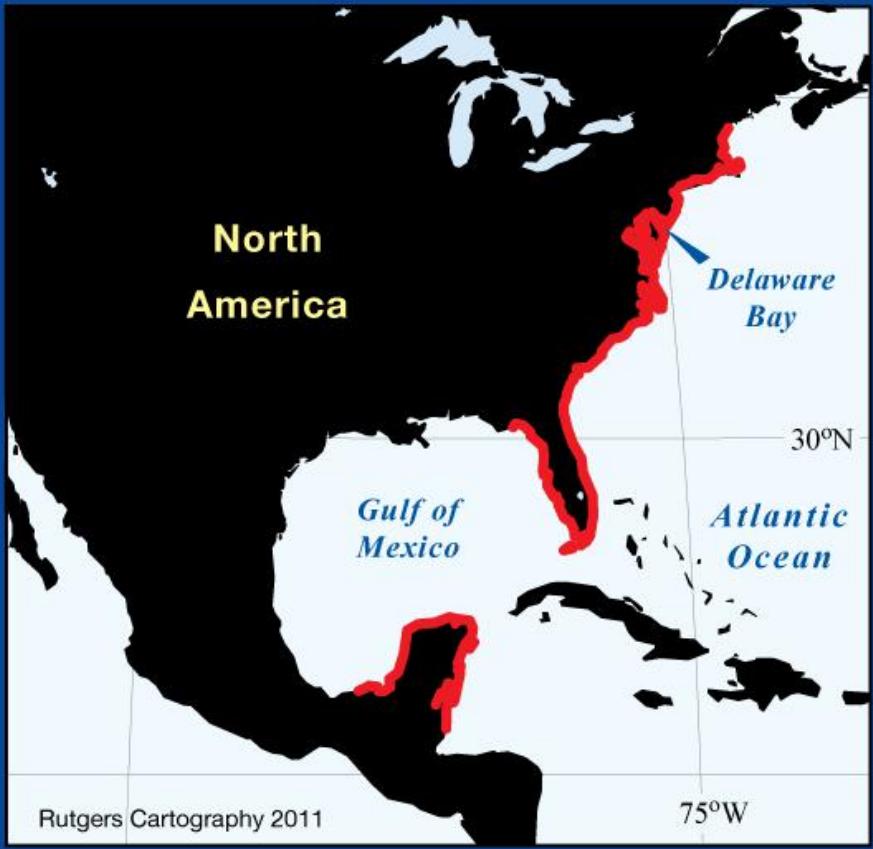
Giant
horseshoe
crab

中國𩷶

Chinese
horseshoe
crab

圓尾𩷶

Mangrove
horseshoe
crab



Primary Range of the Horseshoe Crab

- Limulus polyphemus
- Tachypleus tridentatus
- Tachypleus gigas*
- Carcinoscorpius rotundicauda*

*These two species share the same habitat

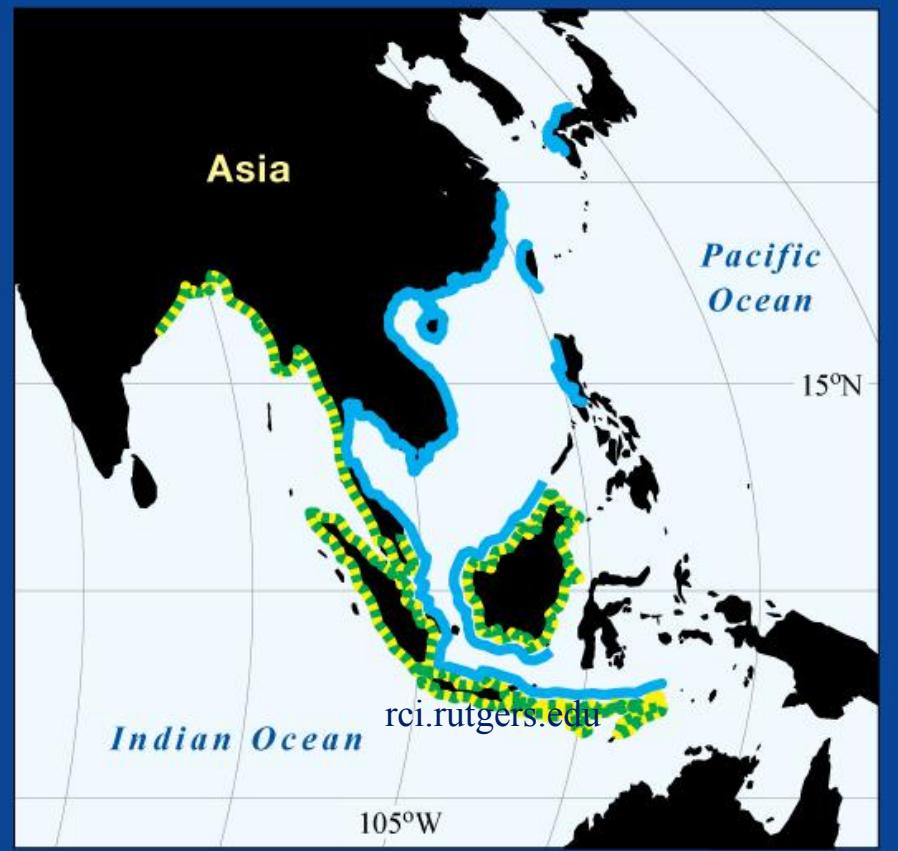
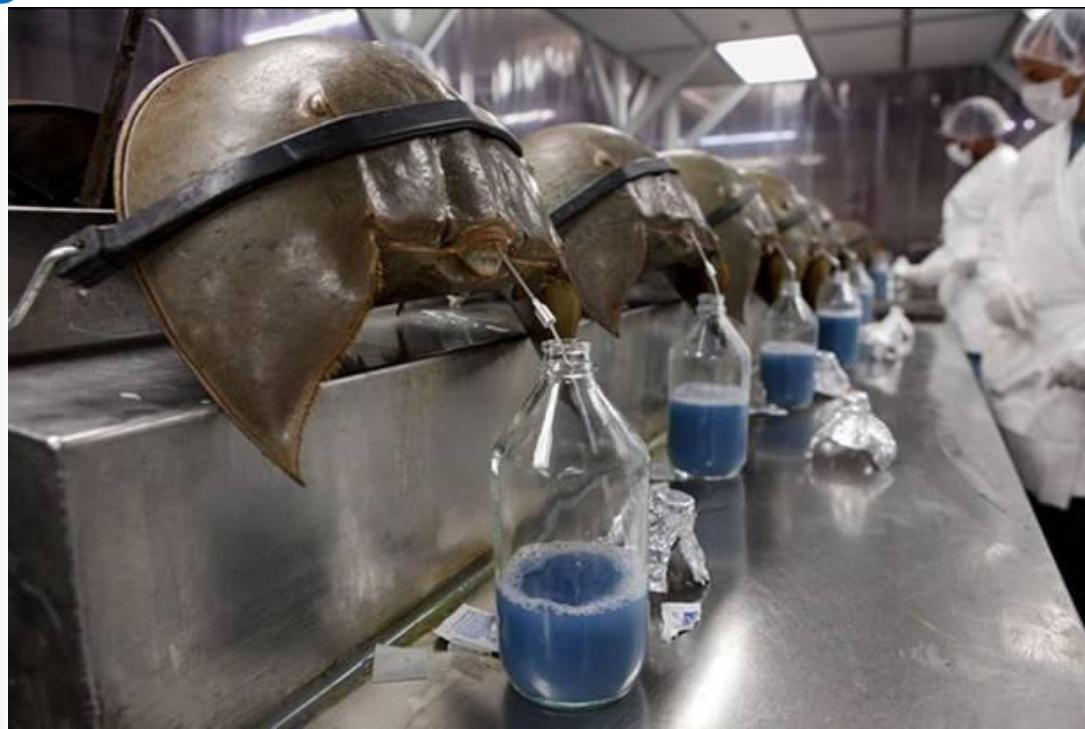


Figure 2.2



Its blood can be used to produce LAL for the detection of bacterial contamination of pharmaceutical products





zh.wikipedia.org

現在的馬鞍山
Ma On Shan (nowadays)



weshare.hk

1970 年代的馬鞍山
Ma On Shan in 1970s



Eugene Tang/BangkokSights.com



Tri-spine Horseshoe Crab

Tachypleus tridentatus

CITATION

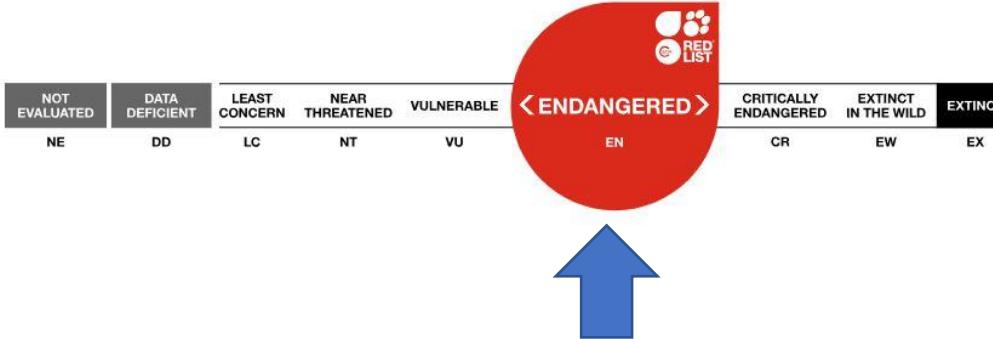
Laurie, K., Chen, C.-P., Cheung, S.G., Do, V., Hsieh, H., John, A., Mohamad, F., Seino, S., Shin, N., Shin, P. & Yang, M. 2019. *Tachypleus tridentatus*. The IUCN Red List of Threatened Species 2019: e.T21309A133299524. Downloaded on 01 April 2019.

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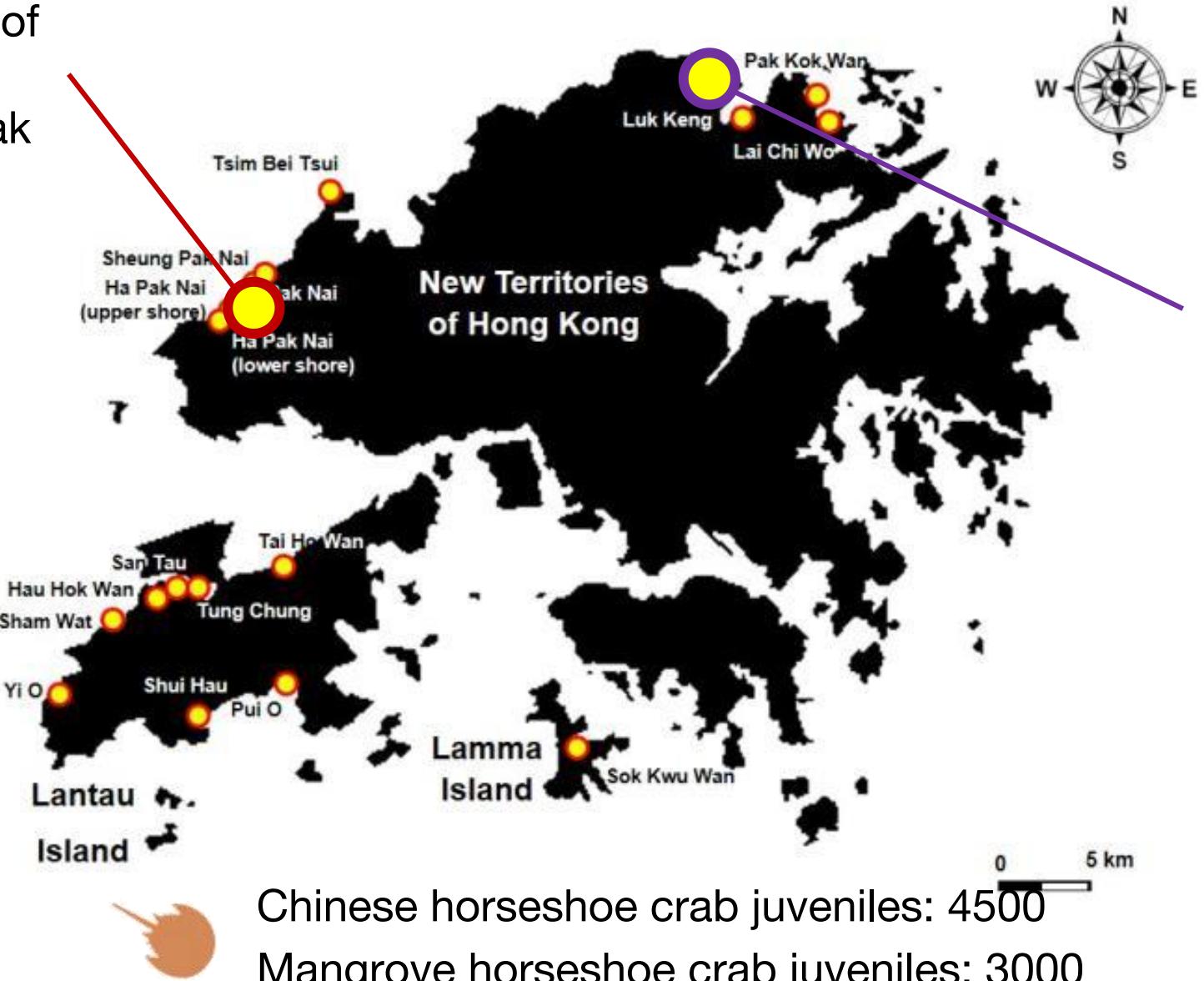
LAST ASSESSED
22 July 2018

SCOPE OF ASSESSMENT
Global

[Skip to Assessment in detail](#)

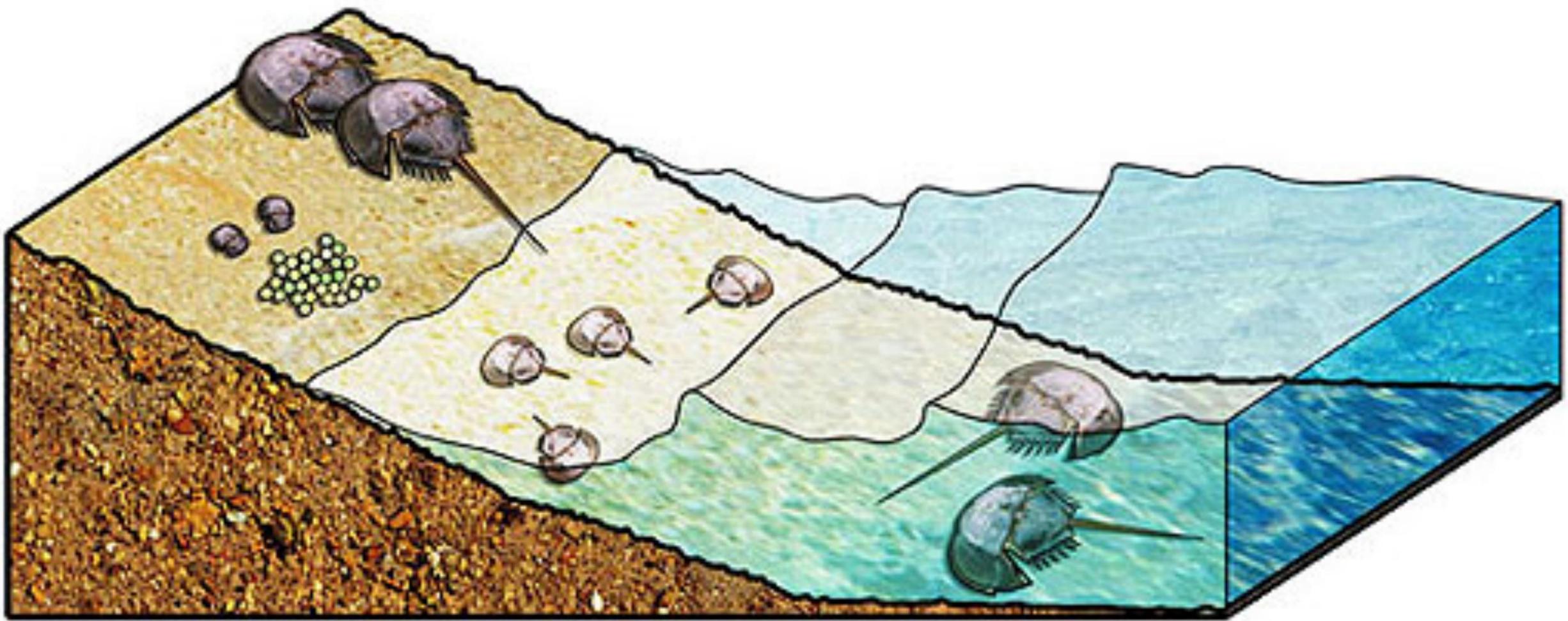
The status of Tri-spine horseshoe crab was changed from “data deficient” to “endangered” in March 2019!

60% of the juveniles of Chinese horseshoe crabs are from Ha Pak Nai



Half of the juveniles of the mangrove horseshoe crab come from Luk Keng

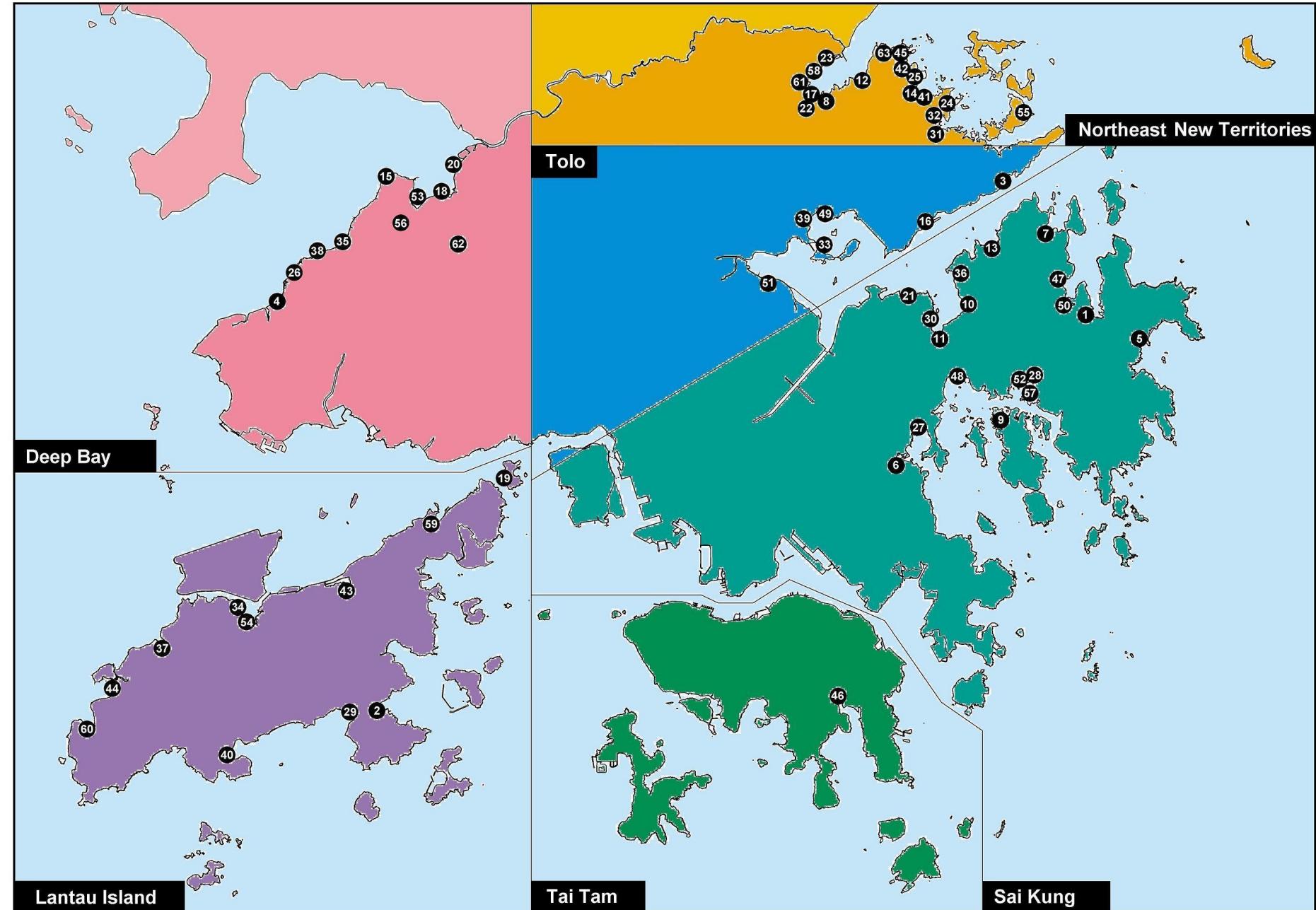
Life cycle and habitat utilization of horseshoe crab



Mangrove habitats

- Unique wetland ecosystem found in sheltered tropical and subtropical shores
- Receiving inputs from tidal flushing and from freshwater streams and rivers
- Characterized by high temperature, fluctuating salinity, alternating aerobic and anaerobic conditions, periodically wet and dry, unstable and shifting substratum.
- Hong Kong has 8 true mangrove species

1. Chek Keng 赤徑
2. Chi Ma Wan 艾麻灣
3. Fung Wong Wai 凤凰笏
4. Ha Pak Nai 下白泥
5. Ham Tin 鹤田
6. Ho Chung 蝶涌
7. Hoi Ha Wan 海下灣
8. Kai Kuk Shue Ha 雞谷樹下
9. Kau Sai Chau 滘西洲
10. Kei Ling Ha Hoi 企嶺下海
11. Kei Ling Ha Lo Wai 企嶺下老圍
12. Kuk Po 谷埔
13. Lai Chi Chong 荔枝莊
14. Lai Chi Wo 荔枝窩
15. Lau Fau Shan 流浮山
16. Lo Fu Wat 老虎笏
17. Luk Keng 鹿頸
18. Lut Chau 亂洲
19. Ma Wan 馬灣
20. Mai Po 米埔
21. Nai Chung 泥涌
22. Nam Chung Yeung Uk 南涌楊屋
23. Nga Yiu Tau 瓦窩頭
24. Ngau Shi Wu Wan 牛屎湖灣
25. Pak Kok Wan 白角灣
26. Pak Nai 白泥
27. Pak Sha Wan 白沙灣
28. Pak Tam Chung 北潭涌
29. Pui O Wan 貝澳灣
30. Sai Keng 西徑
31. Sam A Chung 三極涌
32. Sam A Tsuen 三極村
33. Sam Mun Tsai 三門仔
34. San Tau 碗頭
35. Sha Kong Tsuen 沙江村
36. Sham Chung 深涌
37. Sham Wat 深屋
38. Sheung Pak Nai 上白泥
39. Shuen Wan 船灣
40. Shui Hau 水口
41. Siu Tan 小灘
42. So Lo Pun 鎮羅盤
43. Tai Ho Wan 大螺灣
44. Tai O 大澳
45. Tai Sham Chung 大深涌
46. Tai Tam 大潭
47. Tai Tan 大灘
48. Tai Wan 大環
49. Ting Kok 汀角
50. To Kwa Peng 土瓜坪
51. Tolo Pond 吐露港
52. Tsim Chuk Wan 新竹灣
53. Tsim Bei Tsui 尖鼻咀
54. Tung Chung 東涌
55. Tung Wan 東灣
56. Wetland Park 濕地公園
57. Wong Yi Chau 黃宜洲
58. Wu Shek Kok 烏石角
59. Yam O 陰澳
60. Yi O 二澳
61. Yim Tso Ha 鹽灶下
62. Yuen Long Industrial Estate 元朗工業邨
63. Yung Shue Au 榆樹凹



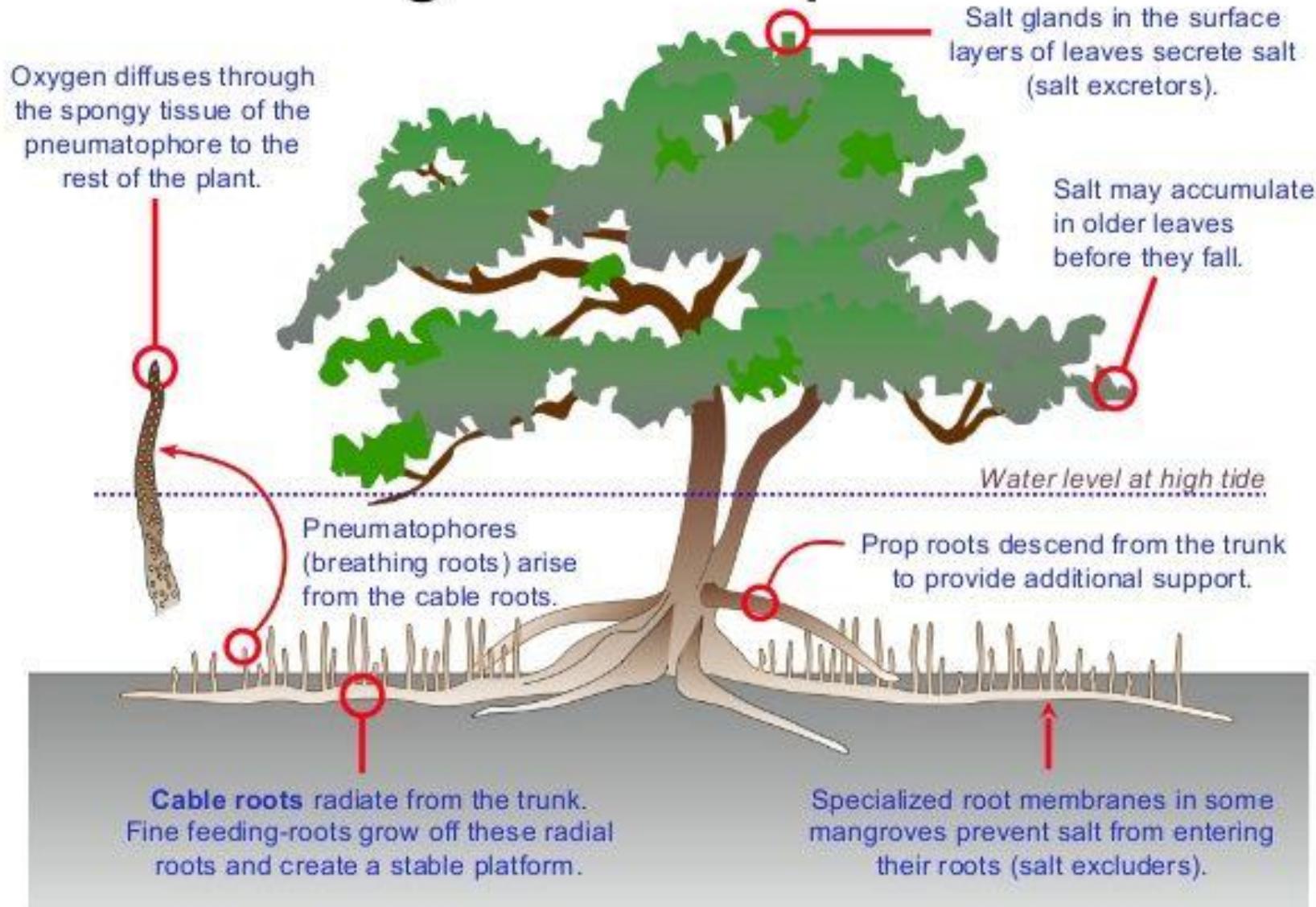
Ting Kok



Adaptations of mangrove plants

- Gaseous exchange
 - Pneumatophores
 - Knee joints
- Increase stability
 - Buttress roots
 - Prop roots
- Excretion of salts
 - Salt glands
- Reproduction
 - Viviparous (droppers)

Mangrove Adaptations



Knee joint and prop root of *B. gymnorhiza*



Pneumatophores



Buttress root of *H. littoralis*



Salt crystals on mangrove leaves

白骨壤 (*Avicennia marina*)



Acanthus ilicifolius



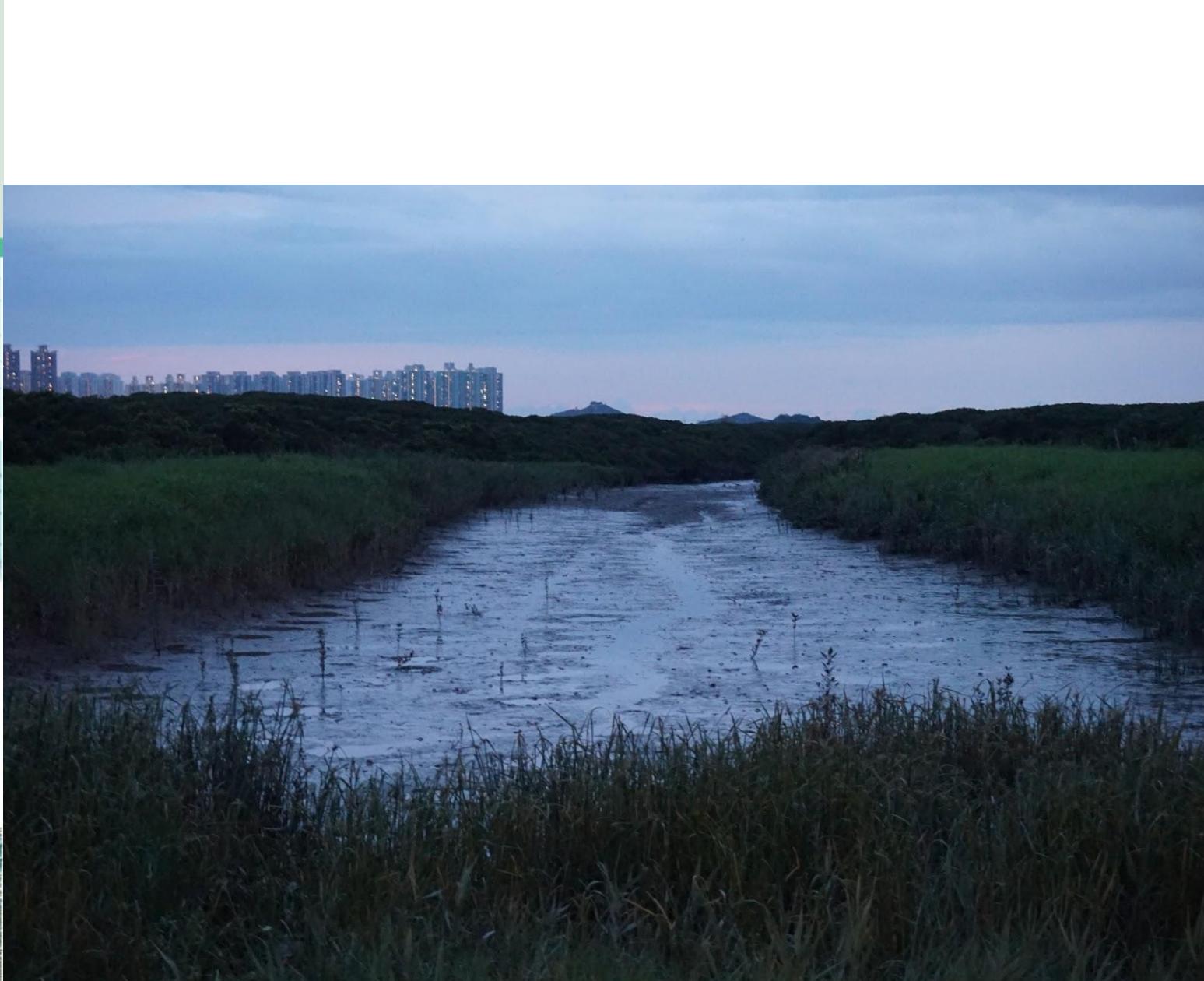
Development of Bruguiera's Dropper



Mai Po Marshes

- A nature reserve (Ramsar Site) in Deep Bay
- Inter-tidal mangroves along with traditionally operated shrimp ponds (Gei Wai)
- > 400 bird species, > 100 species of butterfly species, 50 dragonfly and damselfly species, > 40 crab species, > 250 plant species, 20 reptile species, 8 amphibian species
- Housed over 55,000 migrating birds, including Saunder's gull (*Chroicocephalus saundersi*) and black-faced spoonbill (*Platalea minor*)





Gei wais

dominated by the mangrove plant *Kandelia candel* and the reed *Phragmites communis*

Phragmites communis

perennial grass with tall cane-like annual shoots and an extensive rhizome system, flowers from mid summer to late autumn, seeds set in autumn

Kandelia obovata



Phragmites communis





斑肋濱螺 *Littoraria ardouiniana*

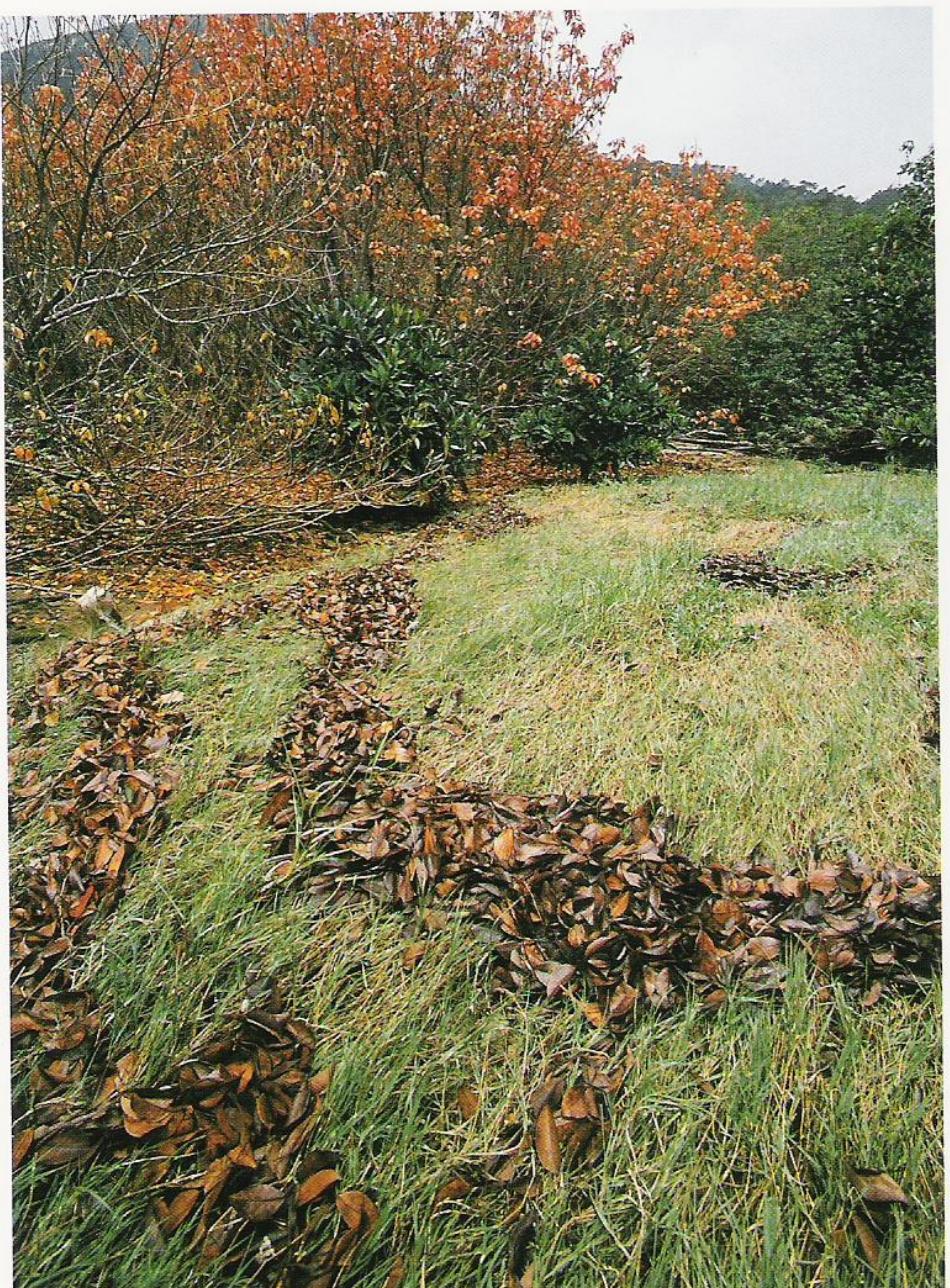


斑肋濱螺 *Littoraria ardouiniana*



黑口濱螺 *Littoraria melanostoma*

Grazing snails in Mai Po



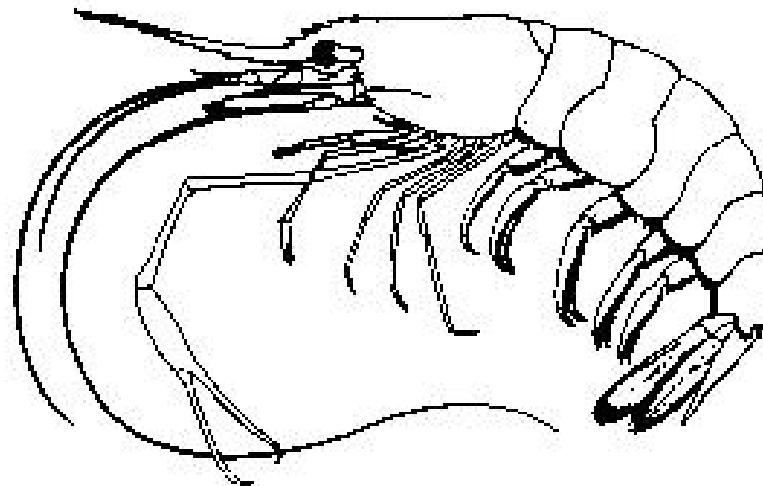
紅樹的有機產物 — 落葉碎屑 Organic production of mangrove - leaf litter



相手蟹 *Sesarma serenii*

Metapenaeus ensis
(de Haan, 1844)

麻蝦 / 沙蝦 / 基圍蝦 / 中蝦

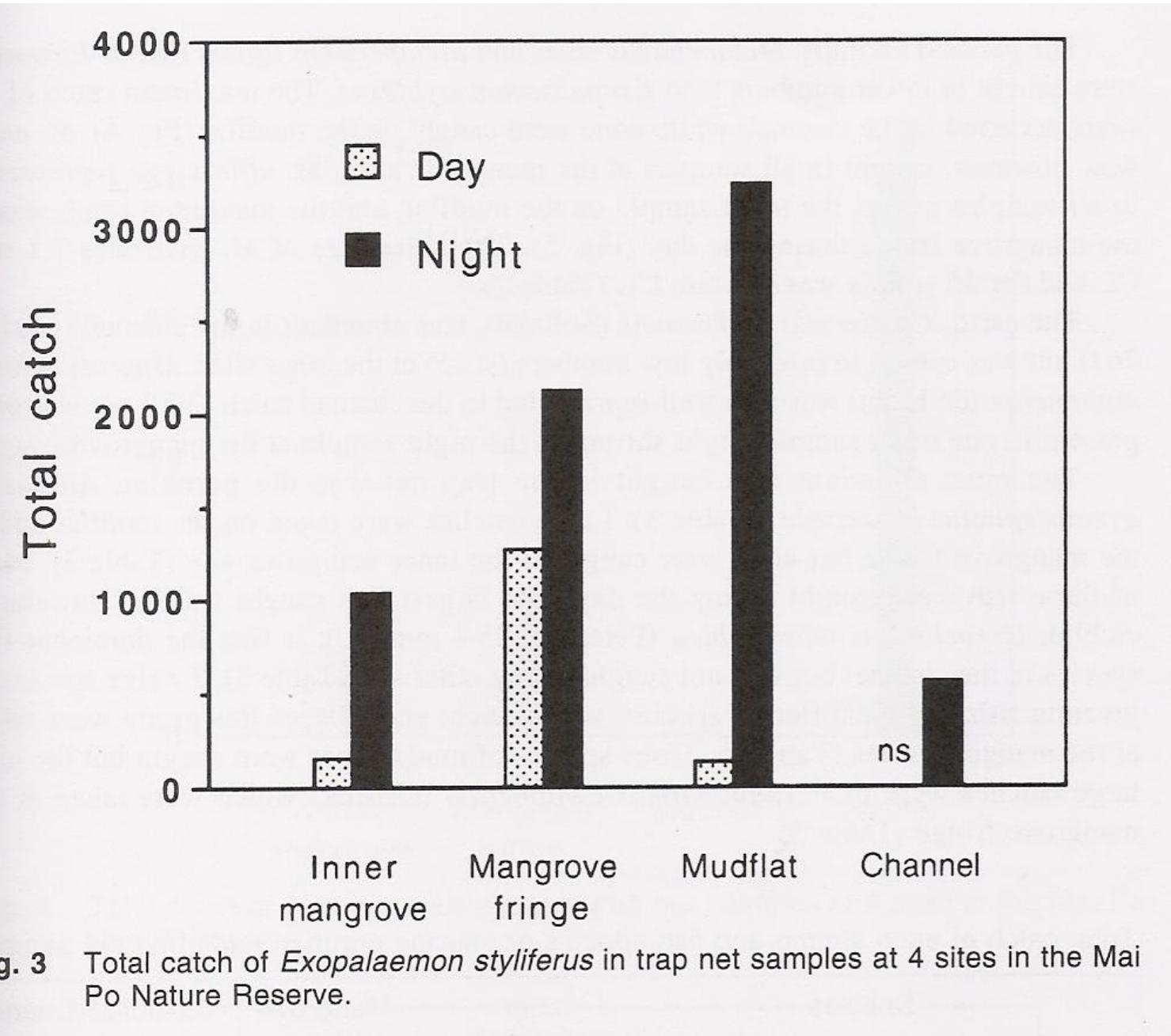


Exopalaemon styliferus

Exopalaemon styliferus

Rostrum long and slender, with an elevated crest of 5 to 7 teeth over the eye, most of the distal part of margin toothless, save for 1 or 2 subdistal teeth; ventral margin with 6 to 10 teeth

Colour: whitish



g. 3 Total catch of *Exopalaemon styliferus* in trap net samples at 4 sites in the Mai Po Nature Reserve.

Black-faced spoonbill





If you truly love nature, you
will find beauty everywhere.

Vincent van Gogh