Appendix 1: Plants Sub-group Report

Status, Trends and Recommendations on Vegetation Types and Plant Diversity

Overview of status and trends

Hong Kong is situated near the northern boundary of the Southeast Asian floristic region, sharing similar genera, species and community structure with the vegetation of coastal Guangdong Province, as well as that of the wider seasonal Asian tropics (the so-called Indo-Burma biodiversity hotspot).

The original vegetation of Hong Kong no longer exists after centuries of human disturbance through his fire and axe. Continuous efforts in afforestation, coupled with various conservation measures, have transformed the formerly bare hillsides and slopes into impressive woodlands and other habitats. Currently, over 22% and 26% of Hong Kong's land area are covered by woodlands and shrublands respectively. The existing woodlands are mainly secondary forests developed in the latter half of the twentieth century through natural succession, as well as plantations established through continued efforts in afforestation after the Second World War and the establishment of the Country Parks in late 1970s. Nevertheless, Hong Kong's vegetation is subject to ongoing anthropogenic disturbance in the form of urban development, land use changes and hill fire.

It is believed that many species of plants have gone extinct within Hong Kong as a result of anthropogenic environmental change in the past few centuries. These include, for example, orchids such as *Dendrobium anosmum*, *D. crumenatum* and *Renanthera coccinea*. The former flora of Hong Kong was considered to show stronger biogeographic affiliation with that of tropical and sub-tropical Asia, and with the Indo-Burma Hotspot specifically. The extinction of these species probably reflects the loss of habitats and complex ecological interactions (such as pollination and seed dispersal) which are sensitive to human modification of the environment, especially at lower elevations.

The major vegetation types of Hong Kong comprise woodland, shrubland and grassland in a dynamic continuum. Minor formations occur in special habitats in relation to freshwater and coastal environments, such as mangroves, sandy shores and marshes. Patches of agricultural land still exists in the New Territories in the

vicinity of traditional villages, although some of them have long been abandoned.

There are currently 24 country parks and 22 special areas with a total area of about 442 km^2. These represent over 65% of the forests (including secondary forests and plantations) and around 50% of the shrublands in Hong Kong (Table 1). The protected areas also cover all the fresh water reservoirs and most of the upper sections of streams. The designation and management of these protected areas enables the *in-situ* conservation of the wildlife in their natural habitats. Lowland habitats such as fung shui woods, freshwater/brackish wetland, fish ponds, mangroves and other intertidal habitats are comparatively less well represented in the country parks and special areas (Table 1).

Despite its small size, Hong Kong has a rich flora comprising about 2,100 species of native vascular plants. The table below summarises vascular plant species diversity and conservation status derived from published sources.

Taxon	**No. of Species in HK**	**No. of Species in IUCN Red List Threatened Categories**	**No. of Species of Conservation Concern Assessed Locally**
Native vascular plant	2175 [a]	CR – 2; EN – 2; VU – 12	Corlett et al. (2000) assessed local status based on abundance. Likely to be outdated; Hu (2003) also listed 100 precious and valuable species but this is not exhaustive
● Orchid	125[b]	EN - 1	Barretto et al. (2011) - CR – 33; EN – 32; VU – 27

a - AFCD (2012b). *Check List of Hong Kong Plants*. Hong Kong Herbarium. AFCD, HKSAR Government.219 pp.

b - Barretto, G., Cribb, P. & Gale, S. (2011). *The Wild Orchids of Hong Kong*. Natural History Publications, Borneo. xviii + 697 pp.

Corlett, R., Xing, F., Sai-Chit, N., Chau, L. & Wong, L. (2000). Hong Kong Vascular Plants: Distribution and Status. Memoirs of the Hong Kong Natural History Society 24: 1-157.

Hu, Q.M. (editor in chief). (2003). Rare and Precious Plants of Hong Kong. Agriculture, Fisheries and Conservation Department, Hong Kong. 234 pp.

An analysis of Hong Kong's endemic or nationally and/or globally threatened plant

species, as well as its important plant habitats, showed that most are represented in the protected areas.

	No. of species in Hong Kong	No. and % recorded in Country Parks and Special Areas
Plant species endemic to Hong Kong [a,b,c]	21	15 (71%)
Nationally threatened plant species listed in the China Red Plant Data Book[d]	14	13 (93%)
Globally threatened plant species listed in the IUCN Red List of Threatened Plants[e]	18	16 (89%)

[a] Hu, Q.M. (editor in chief). 2003. Rare and Precious Plants of Hong Kong. Agriculture, Fisheries and Conservation Department, Hong Kong. 234 pages.

[b] Hu, Q. M., D. L. Wu & N. H. Xia (editors). 2007–2011. Flora of Hong Kong, Vol. 1–4. Agriculture, Fisheries and Conservation Department, Hong Kong.

[c] Wu, Z. Y., Hong, D.Y. & P. H. Raven (editors). 1994–2011. Flora of China, Vol. 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24 & 25. Science Press, Beijing.

[d] Fu. L.K. (editor in chief). 1992. China Plant Red Data Book – Rare and Endangered Plants, Volume 1. Science Press, Beijing. 741 pages.

[e] International Union for Conservation of Nature (IUCN) Special Survival Commission. 2012. IUCN Redlist of Threatened Species. IUCN. Available from http://www.iucnredlist.org/ (accessed April 2013).

Major Threats Identified

a) **Targeted poaching** is a major threat to certain plant species with high commercial value. The local population of the incense tree, *Aquilaria sinensis*, has been severely impacted by an intense increase in organised poaching over the past ten years. Certain orchids remain at risk of opportunistic poaching, with the level of threat probably being more-or-less constant over the same period. Collection pressure on Buddhist Pine (*Podocarpus macrophyllus*) is thought to be gradually abating, but some observed that here are increasing collections of common plants with medicinal uses along hiking paths.
b) **Loss or degradation of marginal habitats** due to urban development, especially in Country Park enclaves, was identified a major threat to plant communities. **Low-lying wetlands and marshes**, especially those near the coast

and occupying former agriculture land, are at risk of being drained and converted to other land uses. They are also in decline as a result of natural succession into scrub The marginal habitats that succession of former anthropogenic sites gives rise to are thought to play a role in the spread of non-native invasive species. Although the expansion of alien species does not appear to be a significant component in this process, their longer-term impact demands ongoing monitoring. **Woodland habitats associated with traditional villages**, including both *fung shui* forest and patches of secondary lowland and hill forest, are also now highly vulnerable to degradation and trashing, often as a precursor to development.

c) Given the **increased visitor numbers and diversifying amenity uses** (including illegal uses such as off-road motor biking) in the Country Parks, some members were concerned about potential adverse impacts, e.g. heightened soil compaction and erosion, littering and dumping, and damage to vegetation. However, there was no study or data on this aspect.
d) Some members have highlighted the potential impact of **feral cattle** on vegetation dynamics, natural regeneration and plant species diversity, especially at higher elevations within Country Parks. However, there was no study or data on this aspect.
e) The local extinction of some species due to anthropogenic activities is considered to lead to **ongoing ecological erosion** that is probably contributing to latent "extinction debt": that is, the loss (past or future) of ecological interactions, resulting in the inability of some species to effectively complete their life cycle. An example is *Bulbophyllum bicolor*, which is currently rare and fragmented in Hong Kong, and which is thought to no longer reproduce sexually in Hong Kong due to impoverished genetic diversity, obligately outcrossing mating system and the possible local extinction of its pollinator.

Major Knowledge Gaps to be Filled

a) There is a lack of updated information on **vegetation coverage**. It is considered a priority to initiate a study on the mapping of vegetation cover, to monitor the status and trends of habitats. The study can also include information on habitat connectivity and existence of corridors connecting different habitats.
b) When this group conducted assessment of species using the IUCN Red List criteria, it was noted that there was no **long-term** (or multiple-year) **monitoring** of the majority of the flora in Hong Kong including species with conservation importance. Hence, there was no data to allow the evaluation of any "extreme

fluctuation" of the populations of most of the annual herbaceous species, such as all seagrass and wetland herbs. It was also not possible to assess the "gene flow between sub-populations" of almost all species in HK, which is associated with lack of any genetic study. Long-term monitoring of species (or vegetation types) of conservation concern should be encouraged.

c) The Red List assessment might leave out species of ecological importance that are not subject to obvious threats. However, we have little information about species of ecological importance. Trends and interaction of **pollinators and seed-dispersal agents** should be studied.
d) **Fungi**, both in terms of species diversity and conservation status, as well as their ecological function and role in forest regeneration, are under-studied. In addition, there is currently very little information on algae and lower plants such as bryophytes. More training and studies should be encouraged.
e) More information and monitoring of **invasive alien plant species** needed.
f) It is recommended that more studies be conducted on **locally extinct taxa**, so as to facilitate restoration and reintroduction as necessary.
g) Given the lack of existing information on the impact of increased visitor numbers and feral cattle on the vegetation of country parks (i.e. Items (c) and (d) of Major Threats Identified), it is recommended that studies be conducted in these areas.

Vegetation Types and Species Requiring Priority Actions

a) Condition of vegetation in ***fung shui*** **woods and freshwater wetlands** need to be monitored, given the lack of updated data and threats
b) ***Aquilaria sinensis*** is recommended a priority species requiring urgent action
c) This group did not have the time and resources to assess the entire flora of Hong Kong to identify the priority species that need conservation actions. Nevertheless, ten native **orchid species** have already been highlighted by Gale et al. (2013) for priority conservation. Conservation of their habitats (e.g. Mt. Stenhouse, Man Hang and Au Pui Wan stream) is recommended.

Table 1 Area and Percentage Cover of Habitat/Land Use Types in Hong Kong

Habitat/Land Use Type[a]	Area (km^2)	% of total area	% in CP&SA[b]
Fung Shui Wood	2	0.2	24
Montane Forest	1	0.1	98
Lowland Forest	238	21.0	66
Plantation /Plantation-mixed Forest	6	0.5	80
Mixed Shrubland	182	16.1	52
Shrubby Grassland	234	20.6	47
Grassland	183	16.1	30
Cultivation	21	1.9	1
Freshwater / Brackish Wetland	5	0.4	<1
Fishpond / Gei wai	10	0.9	<1
Natural Watercourse	6	0.5	22
Modified Watercourse	27	2.3	78
Mangrove	5	0.5	1
Intertidal Mudflat	7	0.6	0
Seagrass Bed	<1	<0.1	0
Sandy Shore	5	0.4	8
Rocky Shore	14	1.3	19
Bare rock or soil	25	2.2	8
Golf course/ Urban park	14	1.2	0
Others (urban & highly modified areas, landfill, quarry)	148	13.0	<1
Total	**1,135**	**100**	

[a] Habitat/land use types follow ERM (2009). *2008 Update of Terrestrial Habitat Mapping and Ranking Based on Conservation Value.* Report submitted to the Sustainable Development Unit, HKSARG.

[b] "CP&SA" refers to country parks and special areas

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