For Discussion on
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Advisory Council on the Environment
Nature Conservation Subcommittee

Ecological Monitoring and Habitat Management Programme of Hong Kong Wetland Park

Purpose

1. This paper informs Members with an overview of the ecological monitoring and habitat management programme of the Hong Kong Wetland Park (HKWP). Members' comments on the habitat management programme of the HKWP in 2012 are also sought.

Background

2. The 60-hectare outdoor wetland reserve of the HKWP is composed of diverse habitats such as freshwater marsh, pond, reedbed, mangrove, mudflat and woodland (**Annex 1**). In general, the habitats of the HKWP are managed for the purposes of demonstrating the diversity of Hong Kong's wetland ecosystem and providing an education and recreation venue with a theme on the functions and values of wetlands for use by local residents and overseas visitors. Since the opening of the HKWP to public in May 2006, it has hosted more than 3.2 million visitors.

Ecological Monitoring Programme

3. Systematic ecological monitoring programme has been undertaken in the HKWP since 2003. The purpose of undertaking ecological monitoring is to record the species diversity of representative taxon groups occurring in different habitats of the HKWP. Taxon groups being monitored include birds, fishes, crabs, herpetofauna, odonates, butterflies, fireflies, mammals and plants. Monitoring data are collected according to the HKWP ecological monitoring manual; whereas records from causal observation were also included. The number of species recorded in the HKWP as at September 2011 is shown in **Annex 2**. The monitoring results have been used to evaluate and enhance the habitat management practices of the HKWP. In general, the biodiversity of the HKWP have reached a stable and healthy condition after years of concerted efforts on recreating and enhancing the habitats.

Birds

4. Bird monitoring including general site-wide monitoring and waterbird monitoring is conducted two to four times a month over the year. A total of 238 bird species has been recorded in the HKWP since 2003, which accounts for 48% of the bird species in Hong Kong. Wetland-dependent birds such as Kingfishers and Collared Crows have been recorded throughout the year. To record the migratory waterbirds stopping over at the HKWP, bird monitoring is carried out more intensively from September to April of the following year. A large diversity of waterbirds, including cormorants, ardeids, ducks, grebes, rails, coots, shorebirds, gulls and terns have been recorded, and the peak counts of waterbirds increased from 1,271 in 2003 to 4,951 (389%) in 2010. In particular, the HKWP has attracted an increasing number of the globally endangered Black-faced Spoonbills. The highest count of Black-faced Spoonbills in the HKWP was 93 individuals in November 2010, accounting for nearly 4% of their global population.

Fishes and Crabs

5. Fish monitoring is conducted in summer. A total of 20 fish species have been recorded in the HKWP. Being the wildlife attractions of the HKWP, the brackish fish species Common Mudskipper and Bluespotted Mudskipper are easily seen on both sides of the Mangrove Boardwalk during low tide. Freshwater fish species commonly found in the HKWP includes Chinese Barb and Barcheek Goby.

6. Crab monitoring takes place at the mangrove habitat in the HKWP in summer. A total of 16 crab species have been recorded, where five out of the six known fiddler crab species in Hong Kong can be found in the HKWP.

Herpetopfauna

7. Herpetofaunal monitoring is conducted twice a year in spring and autumn. A total of nine amphibian species and 27 reptile species have been recorded in the HKWP. Common examples of amphibians recorded include Asian Common Toad and Asiatic Painted Frog, and reptile species such as Chinese Skink and Bowring's Gecko are also easily found.

Insects

8. Odonate monitoring is conducted once every month from March to October.

There have been records of 50 odonate species in the HKWP, which is 43% of odonate species in Hong Kong. The number of odonate species recorded has been increasing stably, indicating that the water quality and environment in the HKWP are favourable to them. Special records of odonates in the HKWP include Elusive Adjutant which is a new Hong Kong record, and a large population of Four-spot Midgets which is identified by the IUCN as a near threatened species.

9. Butterfly monitoring is conducted once every month from March to November. A total of 152 butterfly species have been recorded in the HKWP, which accounts for 63% of butterfly species in Hong Kong. There have been sightings of rare butterfly species such as Swinhoe's Chocolate Tiger, Red Lacewing and Yellow Coster, and a new Hong Kong record, Club Beak, was found in the HKWP in July 2011.

10. Firefly has been included in the monitoring programme since 2010, and the monitoring is conducted once every month from March to November. Three species of fireflies have been recorded, of which a new firefly species *Pteroptyx maipo* was first recorded in the HKWP in 2009.

Mammals

11. Mammal monitoring is undertaken by auto-trigger cameras and mammal traps. Eleven mammal species have been found in the HKWP so far. Repeated occurrences of Small Indian Civets and Leopard Cats have been recorded in the woodland areas throughout the year by the auto-trigger cameras. In the annual small mammal trapping programme in late summer, small mammals such as Indochinese Forest Rats were recorded. These animals are released immediately after the record taking.

Plants

12. Flora monitoring in the HKWP aims to record the species diversity and their conditions. Growth of aquatic plants around the shorelines of freshwater marshes in the HKWP is recorded in every summer. According to the monitoring results in recent years, the aquatic plant community has reached a stable composition of about 100 plant species.

13. Monitoring of the reedbed in the HKWP is carried out in summer to measure the percentage of flowering reed stems, length of the reed stems and depth of the leaf litter. The reedbed has been kept in healthy conditions and has served a useful function in water filtering as indicated by the water quality monitoring results covering 14 locations of the freshwater bodies in the HKWP.

Habitat Management Programme

14. Habitat management for wildlife is mainly conducted through planting and creating suitable micro-habitats. Different habitats in the HKWP are managed according to their respective management objectives (**Annex 3**). For instance, native plants including berry trees, nectar plants and butterfly larval food plants are selected for enrichment planting in the HKWP with a view to provide abundant roosting places and natural food source for wildlife such as woodland birds and butterflies.

Management of mudflat and freshwater habitats

15. In the mudflat and freshwater marshes of the HKWP, Phragmite (Common Reedgrass) is removed regularly in order to maintain an open landscape in the areas as feeding and roosting habitats for birds such as ducks and egrets, and facilitate visitors to enjoy bird watching. Parts of the freshwater marshes are kept vegetative and less disturbed to attract 'shy' birds such as Greater Painted Snipe and Waterhen to roost and nest.

16. Sluice gates in the mudflat are carefully controlled to manage the water level and mud exposure throughout the year to control growth of vegetation in summer, and create an environment favourable for waterbirds in winter. Vegetation and debris on the mudflat are removed in late summer to prepare for roosting and feeding grounds for massive migratory waterbirds especially waders arriving in winter. Otherwise, human disturbance to the mudflat is kept minimal. According to the monitoring data, the highest waterbird abundance record in the HKWP was 4,951 individuals in 2010.

Management of mangrove habitats

17. Mangroves are the key flora of the HKWP in terms of ecological importance and public enjoyment. To encourage more luxuriant mangrove growth, selective locations along the cross channel in the HKWP have been sowed with mangrove droppers. In addition, seedlings of the locally uncommon true mangrove Coastal Heritiera have been planted in the landward side of the channel.

Management of habitats for odonates and butterflies

18. In order to enhance the habitats for odonates, slow flowing streams with gentle slopes and shallow water level are maintained in selective locations in the HKWP. Along the Stream Walk, various isolated freshwater pools free of predatory fish are

maintained to encourage the growth of odonate larvae. Various emergent plants are also planted in the pools to facilitate the emergence of the odonate adults.

19. In 2010, the Butterfly Garden was expanded by doubling the size to 2,000m^2 and vegetating with over 60 plant species. Indian Birthwort has been planted as larval food plant for the uncommon butterfly Common Rose and protected butterflies Common Birdwing and Golden Birdwing. King Snake Creeper, the larval food plant of Red Lacewing, was also planted and has attracted this uncommon butterfly to breed in the HKWP. The expansion of Butterfly Garden brought positive impacts by recording more butterfly species and increasing visitors' viewing opportunities of butterflies.

Installation of artificial bird nest and bat boxes

20. Different sizes of artificial nest boxes for birds have been installed in the visitation area and woodlands of the HKWP. Monitoring of these nest boxes is conducted twice a month in the breeding season from April to August. While the small nest boxes have been occupied by birds such as Great Tits and Oriental Magpie Robins, the big nest boxes have been used by Collared Scops Owls and Asian Barred Owlets for breeding. Bat boxes of different designs have also been set up at various locations in the HKWP to provide roosting places for bats including Japanese Pipistrelle and Lesser Yellow Bat.

Control of invasive exotic species

21. Exotic species are plants, animals and other organisms introduced either unintentionally or deliberately to areas outside their natural geographical ranges. Some exotic species which have fast growth rate, high reproduction rate, strong dispersal ability and tolerance to different environment are invasive in nature and would affect native species in the same habitat.

22. Invasive exotic plant species, namely the creeper Mikania (Mile-a-minute Weed), White Popinac and the exotic mangrove Sonneratia have been found in the HKWP, and removal of these species has been taken place regularly in order to control their impacts on the native plants in the HKWP.

23. Control of invasive exotic animal species such as Mozambique Tilapia, Nile Tilapia, Red Imported Fire Ant and Golden Apple Snail are also carried out regularly. Tilapias and Golden Apple Snails have been found damaging aquatic plants in shallow water in the HKWP. Tilapias are controlled mainly by trapping, and Golden Apple

Snails and their eggs are removed by handpicking. Red Imported Fire Ants are controlled by applying specific insecticide at the ant mounts and its population in the HKWP has substantially declined due to the continuous efforts over the years.

Landscape maintenance

24. Landscape maintenance work such as watering, fertilising, weeding and enrichment planting are carried out to keep the visitation area of the HKWP tidy and to maintain the vegetation as designed. Regular tree risk assessment is carried out to inspect the health and structural conditions of trees in the visitation area, particularly those near footpaths and structures, and identify if maintenance work to the trees such as pruning of dead branches or thinning of trees are needed.

Conservation education

25. To enhance visitors' enjoyment and education value of the HKWP, panels and labels are installed to introduce plants and wildlife which can be seen in the Park. The latest wildlife information is published through various channels such as newsletters, e-newsletters and the HKWP website to attract public attention on the seasonal highlights and special species recorded in the HKWP. The HKWP also organises public education programmes ranging from guided tours for visitors' general enjoyment of the habitats and wildlife, to special workshops on wildlife identification and nature photography.

Programmes for the Year 2012

26. The HKWP strives to balance biodiversity conservation and public education by creating suitable habitats for wildlife and increasing viewing opportunities for visitors; meanwhile disturbance to wildlife is minimised as far as possible. Various conservation projects are being implemented or planned in the HKWP to increase its attractiveness to wildlife. Projects currently on trial include installing artificial swallow nests under the roof of buildings and artificial nests for kingfishers in mudflat, setting up wood piles in woodlands to attract insects, and constructing floating rafts for waterbirds in freshwater marshes.

27. To cater for the need of individual visitors, more interpretative panels introducing interesting plants will be set up in the visitation area. A path showing various native plants related to 'Hong Kong' is also underway. Furthermore, the HKWP will launch the Bird Watching Festival in the coming winter with special themes on ducks. In spring 2012, a thematic flower festival will be organised to

provide thematic guided tours and an exhibition on flowers and wetland plants in the HKWP. The Park will also participate in the Hong Kong Flower Show 2012 to display the plants and attractions of the HKWP to the general public.

Advice Sought

28. Members are invited to note and comment on the ecological monitoring and habitat management programme of the HKWP.

Agriculture, Fisheries and Conservation Department
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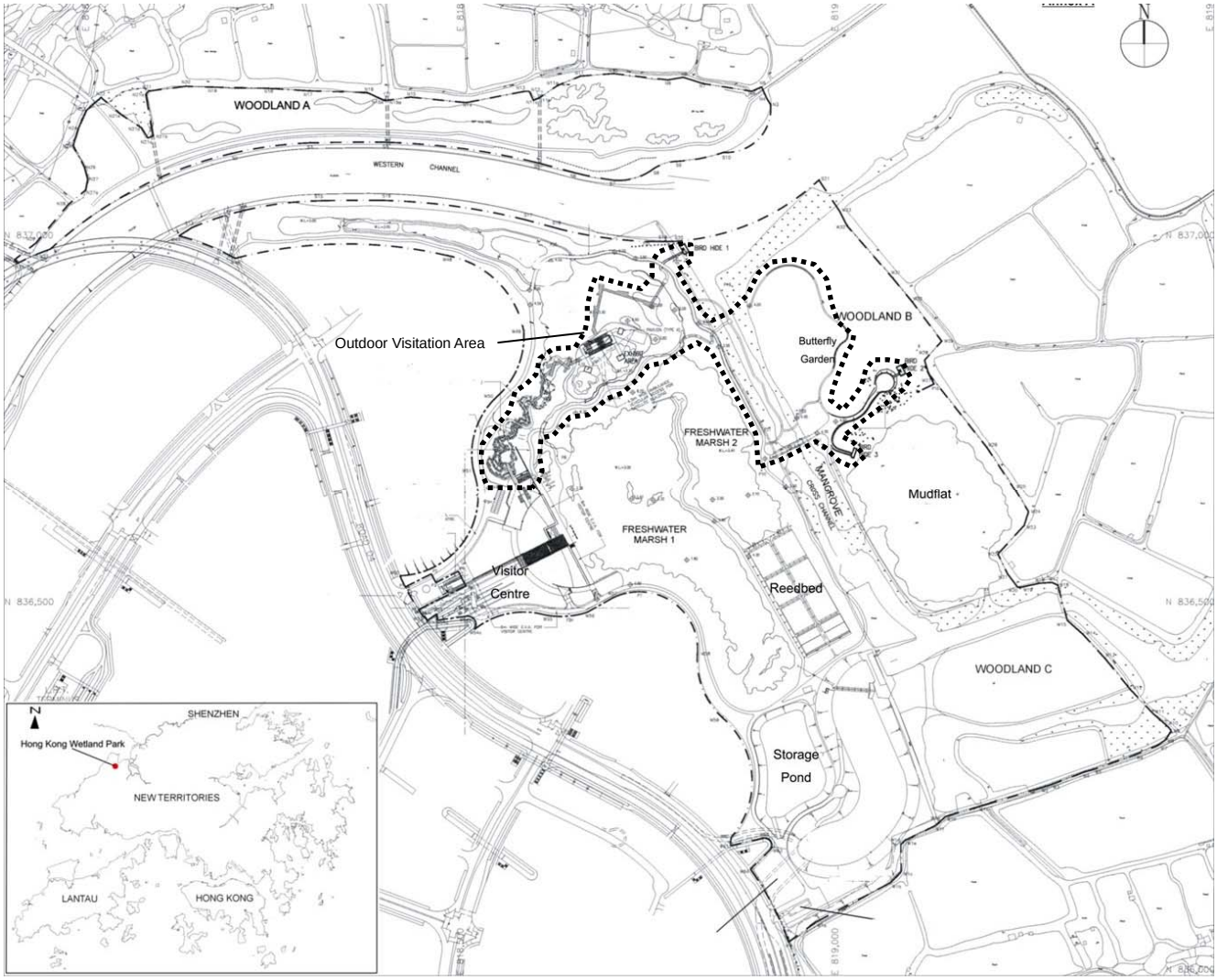
Annex 1

Map of the Hong Kong Wetland Park



Annex 2

Number of Species Recorded in the HKWP as at September 2011

	No. of Species Recorded in the HKWP
Birds	238
Fishes	20
Crabs	16
Amphibians	9
Reptiles	27
Dragonflies	50
Butterflies	152
Fireflies	3
Mammals	11
Plants	553

Annex 3

Habitats in the HKWP and Their Management Objectives

Habitat	Area	Management Objectives
Visitation Area	3.7 ha	To keep the vegetation in a neat, tidy and well-maintained condition for the enjoyment of visitors; to maintain the vegetation around Stream Walk, Wetland Discovery Centre and Succession Walk as designed; to provide diverse freshwater habitats for frogs and fish, and aquatic macroinvertebrates especially odonates; plantings along access paths provide natural screen and landscape for amenity purposes.
Freshwater Marsh 1	2.5 ha	To provide islands with less vegetation for ducks, moorhens, herons and egrets; to provide open water for ducks and cormorants.
Freshwater Marsh 2	1.5 ha	To provide dense emergent vegetation for waterbirds especially the 'shy' birds, (i.e. Waterhen, Moorhen and Greater Painted Snipe), and areas of floating-leaved plants for Pheasant-tailed Jacana and Little Grebe.
Reedbed	0.9 ha	To maintain reeds in healthy condition. Reedbeds provide stormwater treatment and habitat for birds and insects.
Mudflat	2.2 ha	To maintain the surface of mudflat free of vegetation and to control the water level for waterbirds especially waders.
Mangroves along cross channel	2 ha	To maintain mangroves in good condition and remove excessive climbers and invasive plants; to create viewing opportunities for visitors on floating board walk; to support crabs, mudskippers and other intertidal animals.
Woodland A	9.7 ha	To improve the condition of the woodlands by enrichment planting; to provide disturbance-free breeding habitats for woodland birds and mammals; to monitor mammals through auto trigger cameras and trapping.
Woodland B	2.4 ha	
Woodland C	4.2 ha	
Butterfly Garden	0.2 ha	To provide abundant larval food plants and nectar plants for butterflies.
Storage Pond	0.7 ha	To store water for the freshwater circulation in the park.