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**Management for Sustainable Development in  
Mai Po Nature Reserve and Wetland Park, Hong Kong**

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**Abstract**

Wetlands are ‘cradles of biodiversity’ capable of supporting a large range of biotic species. Located en route of migratory waterbirds’ annual flight to wintering grounds in Southeast Asia all the way to Australia, Hong Kong’s wetlands serves as an important feeding and resting ground. The Mai Po Nature Reserve and Hong Kong Wetland Park are two managed wetlands aimed at preserving rich biodiversity and fulfill the objectives of public education and recreation. Both of them have employed sustainable management strategies to fulfill their respective objectives and functions to achieve sustainable development.

**Introduction**

In such a vibrant, international city like Hong Kong, visitation to natural areas is inevitable, especially when the Hong Kong Tourism Board (HKTB) are now campaigning to promote ‘Hong Kong’s Great Outdoors’ to overseas travelers (HKTB, 2010). Admitting visitors to these areas would gain vital public appreciation and societal support (Zedler and Leach, 1998) for conservation work; the need to educate the public and ever-growing demands for tourism in natural areas (Andres-Abellan, Alamo, Landete-Castillejos, Lopez-Serrano, Gracia-Morote and

Cerro-Barja, 2005; Zedler et al.,1998) should also be addressed. In the long run, for the operation of a managed natural area, monetary contributions from visitors (user fees) are a non-negligible source of income (Guillemain, Blanc, Lucas and Lepley, 2008).

Wetlands are ‘cradles of biodiversity’ capable of supporting a large range of biotic species and involve an intricate food chain with complex natural process; yet, the ecosystems are very vulnerable to human’s development activities. Located en route of migratory waterbirds’ annual flight to wintering grounds in Southeast Asia all the way to Australia, Hong Kong’s wetlands serves as an important feeding and resting ground. Mai Po Nature Reserve (‘Mai Po’) and Hong Kong Wetland Park (‘Wetland Park’) are two managed wetlands aimed at preserving rich biodiversity and achieving sustainable development. The management of Mai Po Nature and Wetland Park call for great care, expertise and experience to achieve sustainable development where both the health of an ecosystem could be maintained and visitor needs could be satisfied.

This paper aims to examine visitor management methods employed in Mai Po and Wetland Park for their effectiveness in achieving respective site objectives. It will first provide detailed background information on Mai Po and Wetland Park, addressing that both parks operate on multi-objective approaches. Despite having similar objectives, the ranked priorities of the two Parks vary greatly. Through the methods of secondary data analysis, on-site observation and informal conversation with the staff in the both parks, the authors have identified several management approaches for visitor management including admission control and zoning (or park design). Pricing and quota setting are the two aspects of admission control for detailed discussion, and a detailed comparison of the intentions and effects of zoning in Mai Po Nature Reserve and

park design of Hong Kong Wetland Park will be discussed.

## **Research methods**

Site visits to Mai Po Nature Reserve and Hong Kong Wetland Park were conducted in November 2008; interviews with Reserve and Park staff were carried out and photos were taken. Visiting the site was also an excellent opportunity to investigate the effects of park zoning on the peripheral areas and observe how management minimizes the effects of conflicting human activities on birds and the environment. Update of information with park staff through email communications were carried out from August to November 2010, mainly to confirm statistics such as the size of visitor centers and the number of staff. Much of the information was based on Park publications whereas the findings and suggestions on present management strategies are constructed upon existing literature on wetland conservation and visitor management in protected areas.

## **Background**

### Mai Po Nature Reserve

With an area of 378.1 ha, Mai Po Nature Reserve is part of the Inner Deep Bay Ramsar site which has an expanse of 1,513 ha (Ramsar, 1997). The Inner Deep Bay is a Ramsar site under the Ramsar Convention, meaning it is a wetland of international importance (Ramsar, 1997). Having the largest coastal mangrove and reedbeds in Hong Kong, over 350 species of birds, and great biodiversity of plants and other animals, Mai Po is an important feeding habitat for migratory waterbirds (Smith, 2008). The management intention of Mai Po as a 'biodiversity management zone' under the Ramsar Convention is to 'provide a refuge for waterfowl (including

high tide roosts) and a focus for biodiversity conservation, education and training in a relatively intensively managed environment.’(WWF Hong Kong, 2008).

Mai Po was established in 1983 and is managed by the World Wildlife Fund Hong Kong. The Reserve was converted from *gei wais* – traditional shrimp ponds, and the original structure of the ponds were kept – elongated ponds separated by bunds which now serve as the main pathways for visitor movement. (WWF Hong Kong, 2008)

According to the Information Sheet on Ramsar Wetlands (RIS) for Mai Po (Ramsar, 1997), apart from conservation, current uses of the Reserve includes scientific research on the ‘ecology, hydrology and geology of the area’, conservation education through organization of guided educational tours, and the building of an education centre with exhibitions set up by the Hong Kong Agricultural, Fisheries and Conservation Department (AFCD). It is also used as a ground for training wetland reserve staff and government officials. Recreation and tourism is another important function of Mai Po, where over 100,000 visitors (since 2000) have participated in a wide and expanding range of tours organized by the WWF. In addition, *Gei wai* shrimp harvesting is conducted every year around November to March (WWF Hong Kong, 2008) by local community, and sustainable fish farming is encouraged in fish-ponds in and around the reserve (WWF Hong Kong, 2008a). As for recreation uses, it includes bird watching, leisure tours, and fund-raising activities (e.g. Walk for Nature). Bird spotting competitions such as the Hong Kong Bird Race and photography workshops are often held too.

The following facilities were established to full the multiple functions described above. The Peter Scott Visitor Center located near the entrance of Mai Po can accommodate around 15

people, and the Panda Shop area connected to the visitor center can be used for presentations and talks for up to 25 visitors. The Education Center located inside the Reserve displays bird models and information on the major bird species in Mai Po. It is a larger venue for talks and presentations for up to 40 audiences. With regard to the personnel, three wetland management training staff, one community officer and about 20 general park staff work for the reserve. Volunteer numbers vary from year to year, and come down to an average of 500 people annually (personal communication with Mai Po manager, 2008).

### Hong Kong Wetland Park

The Hong Kong Wetland Park is 61 hectares of constructed wetlands, managed by the AFCD. Another authority that has influenced its development direction is the HKTB, which aims to promote Wetland Park as a ‘world-class ecotourism facility’ (HKTB, 2007). Opened in 2006, it is constructed as an ecological mitigation area and buffer zone to Mai Po from the urban area of Tin Shui Wai (Hong Kong Wetland Park, 2008) which is a necessary feature for retaining habitat value (Zedler et al., 1998) at Mai Po. With a strong recreation-oriented function, the visitor center at Wetland Park is 10,000m<sup>2</sup>, with a capacity of 4,000 people. There are approximately 70 full-time staff and 1,037 registered as volunteers of Hong Kong Wetland Park between Jan – Oct 2010 (personal communication with Wetland Park staff, 2008). There is also a Wetland Discovery Center for carrying out park-organized activities; three bird-hides were built for close observation of birds and other facilities include Stream Walk, Mangrove Boardwalk and Butterfly Garden (HKTB, 2010). Apart from serving as a tourist spot as recreation purpose, education (includes school and outreach programmes and volunteer training), exhibition, reservation and ecological monitoring (Hong Kong Wetland Park, 2008; RTHK, 2006) are also

conducted in the Wetland Park.

### **Park Objectives and Goals**

Multi-objective environmental management is gaining popularity in conservation sites (Benyamine, Backstrom and Sanden, 2004); as long as activities are designed with the requirement that diversity is preserved simultaneously, they will complement each other and what wetlands will become depends on how managers balance the consequences of different uses (Zedler et al.,1998) . Both Mai Po and the Wetland Park have multiple objectives in their operation, however different objectives receive varying degrees of focus.

#### ***Objectives of Mai Po Nature Reserve***

The first and foremost objectives stipulated by Mai Po Nature Reserve (WWF Hong Kong, 2006) are (a) to manage the Reserve as to maintain and increase the diversity of habitats appropriate for south China coastal wetlands and the richness of native wildlife in the area; (b) to promote the area for educational purposes; (c) to realize the training potential to promote wise use and conservation of such Ramsar wetlands; (d) to promote relevant scientific research, and (e) to support measures to minimize threats and habitat to the wildlife.

#### ***Objectives of Hong Kong Wetland Park***

As stated in the website of the Park (Hong Kong Wetland Park, 2010) and its introductory pamphlets, its primary objective is to ‘create a visitor attraction of international status’ where the public’s general interest in wild life and ecology is met; its mission is to raise the public’s awareness, knowledge and understanding of the inherent values of wetlands in order to build up

their support and action for wetland conservation. Other objectives include (a) demonstrating the diversity of Hong Kong's wetland and its need for conservation; (b) providing an attraction of a different kind for overseas tourists; (c) serving the recreational needs of residents nearby; (d) providing a facility that will both complement and supplement those offered at the Mai Po Nature Reserve, and (e) providing opportunities for education and public awareness (Hong Kong Wetland Park, 2010).

### **The objectives at variance between the two parks**

The Mai Po Reserve is managed by the World Wide Fund for Nature (WWF Hong Kong, 2006) with a mission to stop degradation of the world's environment (WWF Hong Kong, 2008); also, as a party to the Ramsar Convention, Mai Po has to abide by the Convention's mission of conservation and wise use of wetlands according to its guidance documents (Ramsar, 2007). Therefore, it is apparent that the objectives focus on the environment and the biodiversity, running closely along with the strong-sustainable use approach. If these objectives are followed closely, it is very likely that Mai Po's biodiversity may be maintained and conservation works will be successful. As for Wetland Park, apart from objective (d) providing a facility that will both complement and supplement those offered at the Mai Po Nature Reserve, and the fact that the silhouette of the black-faced spoonbill is used as the logo of the Park which are directed at wetlands, the main objectives and mission of the Park are focused on visitors' experience and its significance to both the local and overseas tourism industry can be seen from the promotion on the HKTB website.

Chen and Lin (2006) strongly contended that the goals of the Wetland Park have been diverted



from the focus of wildlife biodiversity to building a park for humans. The Wetland Park was originally intended as an ecological mitigation area to compensate for lost wetlands and as a buffer to Mai Po Nature Reserve (Hong Kong Wetland Park, 2008) which is a necessary feature for retaining habitat value (Zedler et al., 1998) of Mai Po. According to Mr. Eric Wong, Hong Kong Wetland Park Manager, out of the \$30 million funding the Park receives from the Agricultural, Fisheries and Conservation Department (AFCD) annually, most is used on the maintenance of the exhibition hall and visitor center. This definitely reinforces the above view that there is a shift of the focus from an orientation of biodiversity conservation to more recreation-oriented function. Some people might argue that more resources should be employed in the conservation works. This generates an interesting question: how do we judge whether a park is sustainably used? Even though some people might argue that the Wetland Park's objectives do not qualify for a strong-sustainable use approach, the following reasons may be the basis to giving leeway to it.

Firstly, unlike Mai Po, the Wetland Park is fully under the authority of the AFCD with significant influence from the Tourism Board and has been expected to provide more choices for overseas tourists. Secondly, the "International Wetland Park and Visitor Centre Feasibility Study" was conducted by the two departments and the decision of making the area a park was only made after results rendered it feasible to do so and the original intention as a mitigation zone would not be affected (Hong Kong Wetland Park, 2008). With organizational and technical issues justified, the objectives are acceptable as long as the original intention of ecological mitigation is not compromised, which this paper will later address whether it is the case.

## **Visitor Management**

### *Admission Control of Visitors*

Mai Po has around 30,000 visitors per year (Smith, 2008) and the Wetland Park has an annual visitor number of over 120,000 (China Internet Information Center, 2007). This great difference in annual visitation is owed to different management methods; pricing and quota setting are the main controlling mechanisms. In view of such huge numbers, disturbance to the fragile area has to be minimized with appropriate facilities and management control measures (Guillemain et al., 2008), overcrowding must also be avoided in order to ensure visitors' enjoyment of the area visited (Hong Kong Wetland Park, 2008).

### Quota setting

Mai Po uses a permit system to limit visitor numbers whereas Wetland Park controls entries by fixing the number of tickets available each day. The maximum number of visitors allowed in Mai Po daily is 285 for the *gei wai* area and 300 for the mangrove area (Smith, 2008). Moreover, Mai Po requires visitors to make reservations in advance and approval from Reserve staff is required before a visit is confirmed; the permit system is strongly backed up by legislation where trespass is strictly prohibited<sup>1</sup>. However, Wetland Park tickets are readily available at the Park entrance or may be purchased online as a matter of convenience. This difference in admission is not the most significant, as it is a procedural matter; at the end of the day, it is the quota set for admission that is a more important decision for management to consider. The low number of permits allowed daily reflects the AFCD's intention to better conserve Mai Po's wildlife (AFCD,2006), and with registration for tours beforehand, the WWF will be in full-control of the

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<sup>1</sup> Schedule 6 of the Wild Animals Protection Ordinance (Cap. 170) deem the area as restricted and the maximum fine is \$50,000

number of visitors each day. Moreover, tour sizes are limited to a maximum of 30 people, so that the crowd may be under control of the park guide can also be more concentrated.

As for Wetland Park there is a daily ticket sales quota: 2,500 on weekdays and 8,500 on weekends and public holidays<sup>2</sup>. Out of these numbers, group tickets are only available for on-line reservation (Hong Kong Wetland Park, 2008a) in order to avoid groups arriving at the park when tickets are sold out.

Dissimilar to the regular increase of ticket sales on specific days, Mai Po only increases the number of permits once a year during- ‘Walk for Nature’—an annual fund-raising event. The 2008 walk hosted 2,500 visitors; Mr. Bena Smith, Reserve Manager, commented that this is only a one-off event, and increase of permits was negotiated with the AFCD. Moreover, the disturbance caused is minimized since the areas that are most ecologically sensitive were avoided.

### Pricing

It is generally agreed that implementation of fees and pricing will affect people’s choice and frequency of visiting sites (Schroeder and Louviere, 1999; Schwartz & Lin, 2006). Admission prices of Mai Po range from HKD \$70 to \$480 (USD \$ 8.9- \$61.5), varying for tours. Whereas the costs of Wetland Park tickets are HK\$30 (USD \$3.9) for adults and HK\$15 (USD \$1.8) for students; there are also annual pass programmes and group discounts encouraging more visitors. The price may be as low as HK\$21 (USD \$ 2.69) for adults and HK\$10.5 (USD \$1.4) for children with group discounts (Hong Kong Wetland Park, 2008a).

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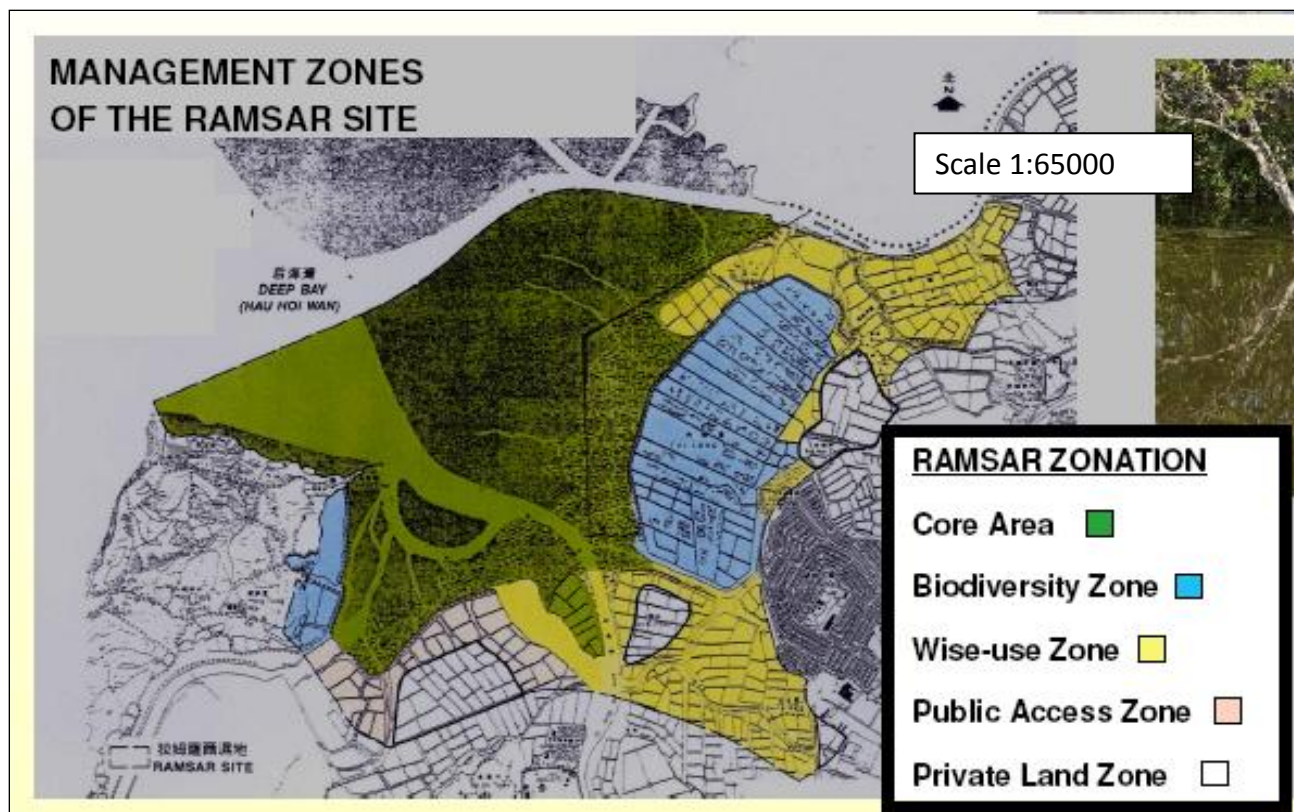
<sup>2</sup> The total 6,000 tickets would be sold separately: 3,000 for the morning session and 3,000 for the afternoon session.

The higher prices set for Mai Po Nature Reserve reflects the management's intention to admit visitors with heightened interests in wetland ecology. On the other hand, with a lower price, Wetland Park is more attractive to the general public and families desiring an educational activity for children. It is also with a low price that Wetland Park can achieve their mission of fostering public awareness about wetlands' inherent values and to call for support for related conservation works and campaigns. (Hong Kong Wetland Park, 2010)

### Park Zoning and Visitor Channeling

#### ***Zoning in Mai Po***

Mai Po, managed as a Ramsar Site, is divided into 5 zones as illustrated by Fig. 1, namely the core area, biodiversity zone, wise-use zone, public access zone and private land zone. All visitor activities are conducted in the core zone and biodiversity zone, and they are the inter-tidal mudflats and the *gei wais* respectively (WWF Hong Kong, 2006). Private land zones and public access zones are generally fish ponds with on-going fish-farming activities. Most important to ecological preservation is the wise use zone. According to a Ramsar Information Paper (Ramsar, 2007), the meaning of wise use is the 'maintenance of its (wetlands) ecological character' through the implementation of sustainable ecosystem approaches.



**Fig. 1 Ramsar Zonation of Mai Po**

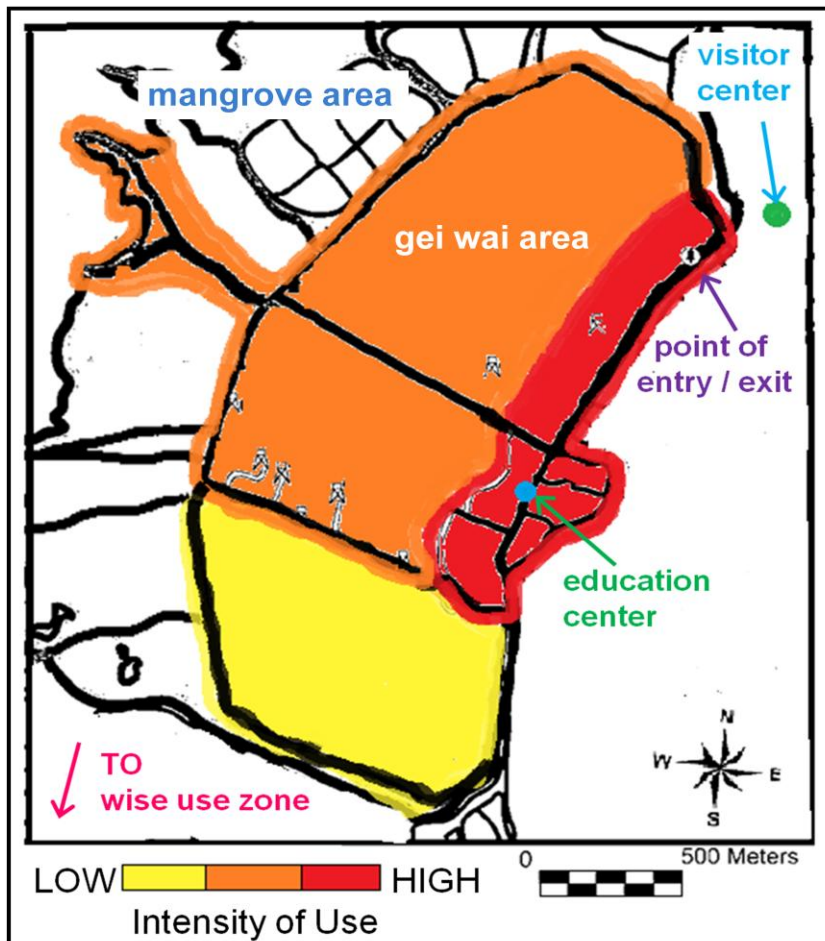
Source: WWF Hong Kong (2008) and Centamap (2008).

At a smaller-scale, the biodiversity and core zone are further sub-divided into zones of high, moderate and low intensity use (Fig.2). It may show overlapping of zones of different intensity-use, but it is normal since it would be difficult for zoning to be very clear-cut without the use of strict delineations such as concrete walls – things which will definitely not be used in Mai Po due to its incompatibility with the surroundings.

As seen from Fig. 2 below, the path between the Reserve entrance and the education center is of high intensity use (red in colour); this area is furthest away from the core area of mudflats and noises or other disturbance from visitors will not affect the birds in the wise use zone either. The

most common route for park visitors is similar to that of the ‘Walk for Nature’ – beginning from the visitor center, down the path to the education center, along the footpath between the moderate (orange in colour) and low intensity (yellow in colour) use zones, then along the Closed Area (white in colour on the left) and back to the visitor center (Smith, 2008).

The *gei wai* area is chosen as the biodiversity zone since the different *gei wais* may be managed as a different habitat, giving rise to a great variety; secondly, the bunds between *gei wais* are used as pathway for visitors and no separate road has to be built, saving construction costs and minimizing disturbance. Moreover, the low intensity zone (yellow in colour) itself is not only of great biodiversity, also, the low intensity of use would serve as a buffer zone to the wise use zone further south.

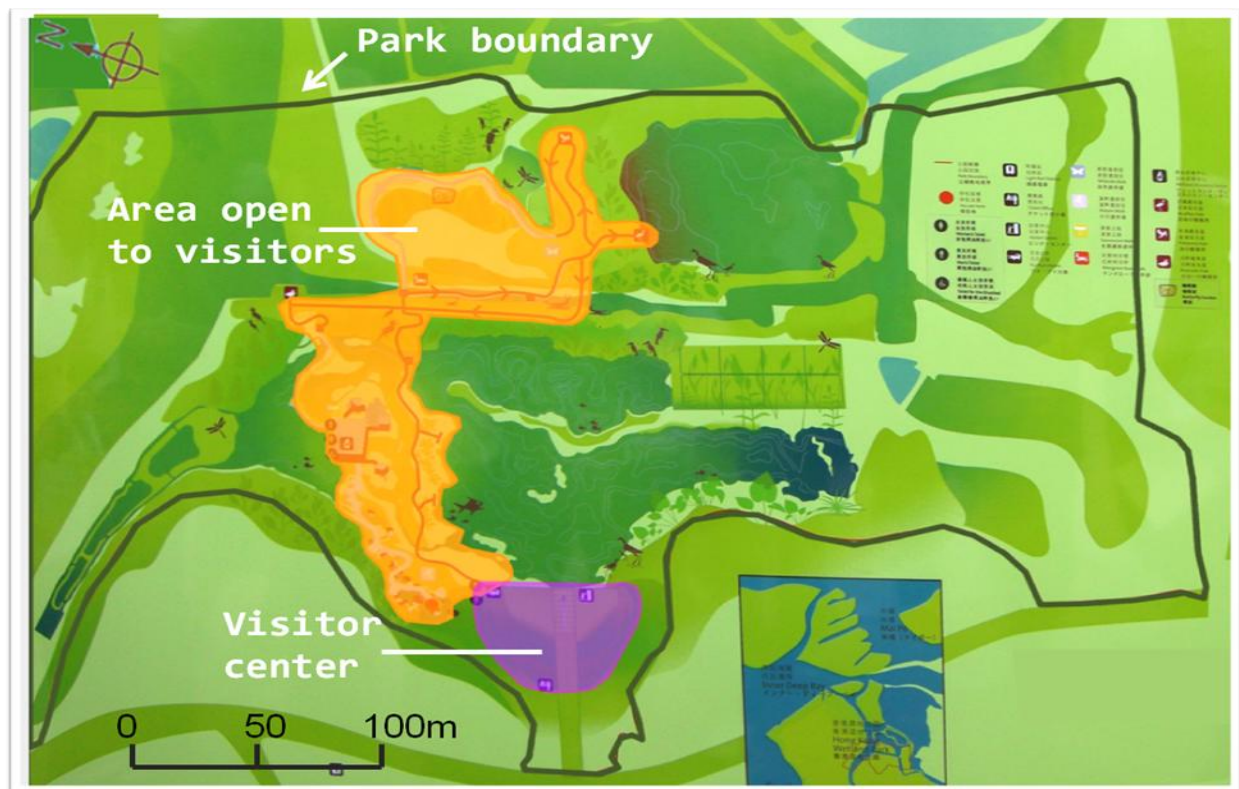


**Fig. 2 Zoning by Intensity of Use in Mai Po**

Adapted from Smith (2008)

### ***Zoning in Wetland Park***

As illustrated by Fig. 3, Wetland Park concentrates visitor activities in the central part of the wetlands (area in orange), with other areas closed from the public. According to the Manager of the Wetland Park, the most diverse and flourishing ecology are in the area in orange. From the plan, it can be seen that the only area that opens to public is shaded in yellow, which is relatively small. The Wetland Park website suggests different tours to be undertaken by visitors including 'wildlife exploration', 'leisure trip' and 'visitor center trip' (Hong Kong Wetland Park, 2011). It illustrates that although the area that opens to public is relatively small, it can satisfy visitors' needs by providing a variety of learning experiences, whether venture in the park or staying indoors.



**Fig. 3 Zoning of Wetland Park**

Adapted from Hong Kong Wetland Park (2010a).

## **Visitor Channeling**

For both wetlands, observation of wildlife is a main part of tours and education; the mangroves or wetland plants are mainly observed along the constructed paths, and as for bird species, they are being observed in bird hides situated around *gei wais* and on the mudflat in Mai Po or ponds in the Wetland Park respectively.

### ***Observation of Wildlife in Mai Po***

Mai Po has eight bird hides in the biodiversity zone (*gei wais*) and two floating bird hides on the mudflats. They are all of wood, a camouflage brown colour and of similar heights to the surrounding trees and also has screens along the path to the entrances. There is no lighting in the hides and only narrow window openings are available; all the above architectural details are designed so that the movements of people in the hide will not distract the birds.

As for the paths visitors travel on, there are concrete or dirt paths between the *gei wais* and boardwalks across some ponds. By concentrating activities on these paths, it would minimize the effects of trampling on soils which would affect plant growth or accelerate erosion (Andres-Abellan et al., 2005). These also allow visitors to observe mangrove and water plants closely without making substantial damage. However, activities which allow visitors such close proximity to Nature should be closely monitored by park staff since some visitors might tear leaves off plants or touch poisonous fruits.

### ***Observation of Wildlife in Wetland Park***

Wetland Park has boardwalks with and without wire fences and three bird hides for observation



purpose; the big glass window at the visitor centre also assists such a purpose. When compared with Mai Po, it seemed that the bird hides are very similar in construction, with screens along the path to the hide entrance and even the better technology of double-screening. However, one of the bird hides, the Riverside Hide, is three-storeys high and it was situated in a rather open part of the pond. Without surrounding trees of similar height makes it very obvious to birds. In addition, the top storey was of French glass windows, a spectacular design but rather exaggerating when compared with the more subtle designs of narrow windows in Mai Po.

## **Conclusion**

All in all, park or more specifically, wetland management is a balancing exercise between conservation and restoration, and meeting visitors' needs, who are an important tool to spread the message of conservation. Environment-wise, Mai Po, as a Ramsar site, fulfills its role of preserving a wetland ecosystem for wildlife. Wetland Park, on the other hand, functions as a mitigation zone to Mai Po by buffering impacts from the urban area. Socially, Wetland Park caters to the mass public for recreation and education whereas Mai Po is strict for the levels of visitor use and mainly caters hard-core nature-based visitors. Both Mai Po and Wetland have employed sustainable management strategies to fulfill their respective objectives and functions, together they weave a very promising future for wetland habitat and public education in Hong Kong.

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