



**MAI PO INNER DEEP BAY
RAMSAR SITE
MANAGEMENT PLAN**



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PART A

OVERALL REVIEW OF RAMSAR SITE MANAGEMENT PLAN (RSMP)

1. INTRODUCTION

1.1 BACKGROUND

In 1997, the then Agriculture and Fisheries Department (renamed Agriculture, Fisheries and Conservation Department in 2000 (AFCD)) completed the study on “Development of a Comprehensive Strategy and a Management Plan in Relation to the Listing of Mai Po and Inner Deep Bay as a Wetland of International Importance under the Ramsar Convention” (the Ramsar Site Study) which produced the first Ramsar Site Strategy and Management Plan (RSMP) for Hong Kong.

The RSMP provided a general framework of management zoning and an outlined management programme for the long term conservation and wise use of wetlands of the Ramsar Site at Mai Po and Inner Deep Bay area in Hong Kong. The government adopted the RSMP for implementation in 1998 and regularly reviewed the management programme and issues of concern.

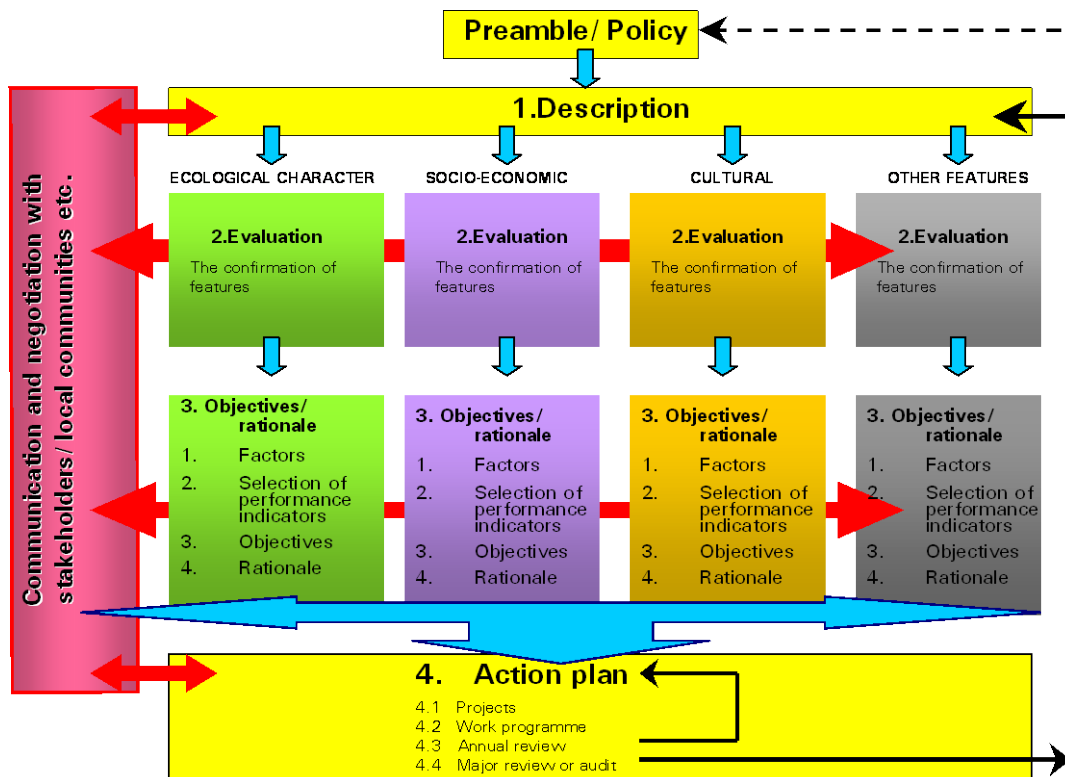
1.2 RENEWAL OF RAMSAR SITE MANAGEMENT PLAN

In 2008-09, an overall review on the implementation of the RSMP has been conducted taking account of actions undertaken in the management programme and updated the status of issues of concern for the renewal of the RSMP. In considering that the implementation of the RSMP is a continuous process, the first RSMP adopted in 1998 was regarded as the first stage of RSMP and the renewed RSMP is regarded as the second stage, referred as RSMPII.

Since the listing of the Mai Po Inner Deep Bay Ramsar Site of Hong Kong in September 1995, there have been developments of the Ramsar Convention as results of several meetings of the Conference of the Parties to the Convention on Wetlands (Ramsar, Iran, 1971) (Ramsar COP). The development of Ramsar Convention relevant to the review and renewal of the RSMP included: the inputs required in the “Information Sheet on Ramsar Wetlands” (RIS) and the “Ramsar National Report” (RNR), the focus of “Ramsar Strategic Plan” and the Ramsar Convention’s programme on communication, education, participation and awareness (CEPA).

At the Ramsar COP 10 (Changwon, 2008), the Ramsar Strategic Plan 2009-2015 (Resolution X.1) and the Convention’s programme on communication, education, participation and awareness (CEPA) 2009-2015 (Resolution X.8) have been adopted for providing guidance on the implementation of the Ramsar Convention for the next 6 years. In the RSMPII, opportunity has been taken to keep in line with the above developments.

The renewal of the RSMP followed the “New guidelines for management planning for Ramsar Sites and other wetlands” as outlined in Annex to Resolution VIII.14 adopted at Ramsar COP 8 (Valencia, 2002) which is shown in the figure below:



The documentation on the overall review and renewal of the RSMP is organized into two parts, i.e. Part A: Overall review of RSMP, and Part B: Ramsar Site Management Plan II (RSMPII).

Part A: Overall review of RSMP covered the development of the Ramsar Convention which provided guidance relevant for the continuous implementation of the RSMP, updating on goals and objectives, values, management zonings and compartments, updating on status of the management programme particularly the annual monitoring programmes of the Ramsar Site including the Baseline Ecological Monitoring Programme (BEMP), the Waterbird Monitoring Programme (WMP), habitat mapping projects and also annual habitat management work/ projects carried out by the WWF-Hong Kong (WWFHK) within the Mai Po Marshes Nature Reserve (MPMNR) and the project proposals listed under the RSMP. The current implementation of the CEPA programme by the Hong Kong Wetland Park is briefly accounted.

Besides, issues related to the conservation of the Ramsar Site, including: siltation, mangrove colonization and management, wintering waterbird conservation and wetland habitats management in MPMNR, the status of development proposals in and around of the Ramsar Site, water borne pollution, formulation of preventive measures against cormorant predation on commercial fish culture, conservation and wise use of wetlands and climate change were highlighted and suggested actions were discussed.

Part B: Ramsar Site Management Plan II (RSMPII) consists of three sections. Section 1: General descriptions and updates on the current conditions of the Ramsar Site. Section 2: The evaluation on features that are regarded as important for the Ramsar Site and also analysis of factors that influenced the management programme. The list of objectives/ rationales is updated, highlighting goals to be achieved under the Ramsar Convention and management strategies/objectives of the RSMP. The management zonings are updated which followed the review in Part A. Section 3: The Action Plan and Management Programme which included the routine day to day management actions and projects/ studies that are planned to be carried out to address issues for conservation management of the Ramsar Site.

The reviews and updating of the RSMP undertaken by AFCD in 2008-09 are summarized in the following paragraphs.

A1. THE DEVELOPMENTS OF THE RAMSAR CONVENTION

Information Sheet on Ramsar Wetlands (RIS), New guidelines for management planning for Ramsar Sites and other wetlands (New Guidelines), Ramsar National Report (RNR), Ramsar Strategic Plan and Ramsar Convention's programme on communication, education, participation and awareness (CEPA)

The mechanisms/ tools of the Ramsar Convention in guiding Contracting Parties on their management planning, implementation and reporting of progress are: the RIS, New Guidelines, RNR, Ramsar Strategic Plan, and the Ramsar Convention's CEPA programme which are commonly adopted by all Ramsar Contracting Parties for the conservation and management of the Ramsar Sites worldwide. In the RSMPII, these mechanisms/ tools have been followed closely.

Information Sheet on Ramsar Wetlands (RIS) and New guidelines for management planning for Ramsar Sites and other wetlands (New Guidelines)

The RIS is the means by which Contracting Parties present information on the Ramsar wetlands. This Information Sheet also provides an internationally standardized format for describing wetlands. The items reported include factual data on the Ramsar Site (e.g. altitude, wetland types, locations etc), justification for the Criteria cited for designation of the Ramsar Site, the flora and fauna information, socio-cultural factors, conservation measures and potential threats. The input required for RIS has been regularly updated and reviewed in several COPs. The information in the RIS provided inputs to the "Ramsar Site Database" and forms a basis both for monitoring and analysis of the ecological character of the site and for assessing the status and trends of wetlands regionally and globally.

According to Article 3.2 of the Ramsar Convention, "*each Contracting Party shall arrange to be informed at the earliest possible time if the ecological character of any wetland in its territory and included in the List has changed, is changing or is likely to be changed.*" Therefore, the description of ecological character of the Ramsar Site is an important part of the management planning process. The ecological descriptions constitute a complementary basis to the RIS for detecting and notifying changes in ecological character. In Resolution VI.13 at Ramsar COP 6 (Brisbane, 1996), it urged the Parties to update and resubmit the RIS for their Ramsar Sites to the Secretariat at least every six years, so as to maintain a certain currency in the data available to the public from the "Ramsar Site Database". The updating also serves as a management tool for the detection and monitoring of changes of the site over time.

The RIS asks for details of all wetland types present within the designated Ramsar Site boundaries and the wetland types description followed the "Classification System for Wetland Type" approved by the Recommendation 4.7 at Ramsar COP 4 (Montreux, 1990). The System was further amended by Resolutions VI.5 at Ramsar COP 6 (Brisbane, 1996) and VII.11 Ramsar COP 7 (San Jose, 1999) which provided a very broad framework to aid rapid identification of wetland

habitats represented at each site. In the Ramsar Site Management Plan (RSMP), such wetland type system was followed.

In order to fulfill the requirement from the Ramsar Convention, the ecological information of the Mai Po Inner Deep Bay Ramsar Site has been updated regularly through the Baseline Ecological Monitoring Programme and Waterbird Monitoring Programme and data so obtained are fed into the RIS for submission to the Ramsar Secretariat.

The Contracting Parties committed themselves earlier in Resolution VI.13 at COP 6 (Brisbane, 1996) to providing updated RIS information for all of their Ramsar Sites no later than every six years or on the occasion of any significant change in the sites' ecological character. At Ramsar COP 8 (Valencia, 2002), the latest version of the RIS and its explanatory note and guidelines were adopted in Resolution VIII.13, with significant additions and changes adopted by COP 9 (Kampala, 2005) in Resolution IX.1 Annex B. Also, in COP 8 (Valencia, 2002) the New Guidelines (Annex to Resolution VIII.14) were adopted which is followed in the RSMPII.

Ramsar National Report (RNR)

The RNRs are official documents of the Ramsar Convention prepared by Contracting Parties before Ramsar COP. The format of the RNR has been approved by the Ramsar Standing Committee for the Contracting Parties. The RNR followed similar format of the Ramsar Strategic Plan in such a way that it reported how a Contracting Party implement the Convention. Indicator questions (which reflected the key result areas) are grouped under each of the Strategies to aid the Contracting Parties to gather information and report on the key aspects of scientific, technical and CEPA implementation under the Ramsar Convention. The RNR not only facilitated reporting on past achievements but also assisted the Contracting Parties in structuring their activities within the framework of the Ramsar Strategic Plan.

Upon receipt and verification of the RNRs, the Ramsar Secretariat would enter the information in a database that will provide basis for reporting by the Secretariat to each COP on the global and regional achievement and the implementation progress of the Convention. RNRs are also made publicly available through their posting on the Ramsar Convention's website. As the RNRs provide data and information on how the Contracting Parties implement the Ramsar Convention, it also served as a mean for the Contracting Parties to be accountable for their obligations under the Ramsar Convention. At the same time, RNRs are also useful for the Contracting Parties to assess and monitor its progress in implementation, capture lessons for developing future action plans and priorities of management plan.

The RNR on implementation of the Ramsar Convention is structured according to the current Ramsar Strategic Plan and seeking information on each Contracting Party's success in progressing the operational objectives and their respective actions in that Plan. Each triennium, the Standing Committee of the Ramsar Convention adopts a "National Report Format" (NRF) to be distributed to the Parties well in advance of each meeting of the Ramsar COP.

The RNR of all the Ramsar Sites in China (including the Mai Po Inner Deep Bay Ramsar Site which is among the 37 Ramsar Sites of China (as at July 2010)) is prepared by the State Forestry Administration (SFA), the Ramsar Administration Authority of the government of the People's Republic of China responsible for reporting to Ramsar COP. Information on the progress of implementation of the Ramsar Convention in Hong Kong Mai Po Inner Deep Bay Ramsar Site has been provided to SFA for input into China's RNR. In adopting/following the general requirements of the Ramsar Strategic Plan and inputs required for RNR in the renewal of RSMP, it also facilitate the data and information input from the Mai Po Inner Deep Bay Ramsar Site for the preparation of RNR by SFA for the next Ramsar COP.

Ramsar Strategic Plan

Since the listing of the Mai Po Inner Deep Bay Ramsar Site in 1995, three Ramsar Strategic Plans have been developed for the operation of Ramsar Convention. The Ramsar Convention's first Strategic Plan 1997-2002 was adopted by Resolution VI.14 at Ramsar COP 6 (Brisbane, 1996). It was regarded as a ground breaking document as the first plan of its kind for a global environmental Convention. The second Strategic Plan 2003-2008 was adopted by Resolution VIII.25 at Ramsar COP 8 (Valencia, 2002). The second Strategic Plan refined the general and operational objectives by taking into account the fact that a broader approach to wetland conservation and sustainable development was needed.

The current one being the third Strategic Plan for 2009-2015 adopted under Resolution X.1 at Ramsar COP 10 (Changwon, 2008). The Plan set out five Goals which are essentially the five general objectives of the second Plan, i.e. (i) Wise Use of Wetlands, (ii) Development of the Ramsar List, (iii) International Cooperation, (iv) Implementation capacity and (v) Membership in the Convention. In order to achieve these Goals, 28 Strategies with their respective "Key Result Areas" are provided to help Contracting Parties to assess the extent of achievement. These Strategies represented a general consensus of the most important priorities for most Contracting Parties to implement the Convention.

The Strategic Plan 2009-2015 called for actions to be undertaken by different bodies within the Ramsar community, i.e. the Secretariat, the International Organization Partners and the Contracting Parties. It should be noted that the Plan has taken into account the fact that different Contracting Parties differ substantially in their own situations including economic capacities to carry out activities, the conservation status and type of wetlands of the Ramsar Sites and their existing legal and institutional frameworks etc. Therefore, each Contracting Party will wish to establish their own priorities within the framework of the Ramsar Strategic Plan to develop their own work plan for implementing the activities and consider their own use of resources.

RNR, Ramsar Strategic Plan and RSMPII:

In the RSMPII, the NRF of RNR for Ramsar COP10 (Changwon, 2008) is followed and the goals and strategies of the Ramsar Strategic Plan 2009-2015 are adopted and modified to suit the Hong Kong context as appropriate. The 'Key Result Areas' of the Ramsar Strategic Plan 2009-2015 served as 'performance indicators' on assessing the implementation and achievement of objectives of the Ramsar Convention in Hong Kong. Action Plans or projects listed out the actions required to be undertaken for achieving the Strategies. The Goals, Strategies and Action Plans are further elaborated in Section 3 of the RSMPII.

CEPA programme

The current CEPA Programme is the third one and is intended to be operated for a six-year period (2009-2015) in conjunction with the third Strategic Plan of the Convention adopted at Ramsar COP10 (Changwon, 2008). As the CEPA Programme implemented and develops, there is an evolving approach to include community participation and education in wetland management planning and there is a need for enhancing participatory techniques in the CEPA skills. The CEPA Programme indeed offers tools to help public understand the values of wetlands so that they are motivated to become advocates for wetland conservation and wise use and may act to become involved in relevant policy formulation, planning and management.

In the past, CEPA refers to Communication, Education and Public Awareness. As the programme progress, the new CEPA Programme 2009-2015 for the coming two triennia refers to Communication, Education, Participation and Awareness, with an emphasis on "Participation". According to Appendix I of Resolution X.8 at Ramsar COP 10 (Changwon, 2008), 'Participation' is the active involvement of "stakeholders" in the common development, implementation and evaluation of strategies and actions for the wise use of wetlands. As reflected from Strategy 3.2 of the CEPA programme 2009-2015, it recognizes the importance of multi-stakeholder participation in wetland management. For those communities who depend on the wetlands for their livelihoods or stakeholder groups with cultural or economic links to wetlands, their participation for wetland management should be given a high priority. The local wetland knowledge held by indigenous and local communities should also be respected and integrated into site management plans. The CEPA Programme 2009-2015 is therefore in line with the guidance available in Resolution VII.8 adopted at Ramsar COP 7 (San Jose, 1999) Guidelines for establishing and strengthening local communities' and indigenous people's participation in the management of wetlands, incorporated in Handbook 5 of the Ramsar Handbooks for the Wise Use of Wetlands. CEPA programme of the Mai Po Inner Deep Bay Ramsar Site is detailed in Section 1.4.3 of RSMPII and Appendix X.

A2 A REVIEW AND UPDATE OF GOALS AND OBJECTIVES, VALUES, MANAGEMENT ZONINGS AND COMPARTMENTS OF THE MANAGEMENT PLAN

Goals and Objectives (Strategies and Action Plans)

The goals and long term objectives adopted in the RSMP which delivers Articles 2, 3, 4 and 5 of the Ramsar Convention are generally valid for RSMPII. In line with the Ramsar Strategic Plan 2009-2015 (Resolution X.1 adopted at Ramsar COP 10 (Changwon, 2008)) which provided guidance on the focus of effort for implementing the Convention, RSMPII followed the Goals (except Goal 5)* listed in Ramsar Strategic Plan 2009-2015 that are relevant to and within the capacity of Hong Kong SAR for implementation are highlighted as follows:

Goals

- Goal 1. Wise Use. (In delivery of Articles 3.1, 4.3, 4.4, and 4.5 of the Convention.)
- Goal 2. Wetlands of International Importance. (In delivery of Articles 2.1, 2.2, 2.5, 2.6, 3.1, 3.2, 4.1, and 4.2 of the Convention.)
- Goal 3. International cooperation. (In delivery of Articles 5 of the Convention.)
- Goal 4. Institutional capacity and effectiveness. (In delivery of Articles 6.7 and 8 of the Convention.)

(*Goal 5 of the Ramsar Strategic Plan 2009-2015 concerning “Membership” has been excluded as the Goal “*To progress towards universal membership of the Convention*” delivers Articles 2.4 and 9 of the Convention and is for action at the Secretariat, Standing Committee and Contracting Parties at the national levels.)

Values and evaluation

During the past 10 years of monitoring under the BEMP of the Ramsar Site, there has been no drastic change detected, as such the values of the Ramsar Site have been more or less maintained. An updated evaluation is presented in Section 2 of RSMPII.

Strategies/ Objectives

The strategies/ objectives of RSMPII followed the Ramsar Strategic Plan 2009-2015. The strategies/ objectives to achieve the Goals have been adapted suitably for the needs and the capacities of Hong Kong SAR in the implementation of the Ramsar Convention. The detail strategies/ objectives and action plan are listed in Section 3 of RSMPII.

Review of Management Zones and Compartments

The existing RSMP as implemented since 1998 delineated the Ramsar Site into five different management zones based on the habitat types, ecological values and existing land uses as shown in Figure A1.1, i.e. the Core Zone, the Biodiversity Management Zone, the Wise Use Zone, the Public Access Zone, and the Private Land Zone.

The site characteristics and management intention of the current Management Zones are summarized in the table below:

Management Zones	Present site characteristics	Management Intention
Core Zone	<ul style="list-style-type: none"> • An undisturbed, largely natural reference area which include the intertidal mudflat and mangroves along open coastal area where biological interest is concentrated. 	<ul style="list-style-type: none"> • Maintenance of natural processes. • Access is generally limited to essential management, monitoring and research purposes.
Biodiversity Management Zone	<ul style="list-style-type: none"> • Ponds and wetland habitats of Mai Po Marshes Nature Reserve. 	<ul style="list-style-type: none"> • To provide refuge for waterbirds. • A focus for biodiversity conservation, education and training.
Wise Use Zone	<ul style="list-style-type: none"> • Fish Ponds 	<ul style="list-style-type: none"> • Encourage maintenance and operation of fish ponds in an ecologically sustainable manner. • Act as buffer zones outside the Ramsar Site.
Public Access Zone	<ul style="list-style-type: none"> • Fish Ponds 	<ul style="list-style-type: none"> • Visitors may have unrestricted but managed access (subject to cooperation of individual pond owner) to a part of the Ramsar Site for public education. • Additional function to buffer zones outside Ramsar Site.
Private Land	<ul style="list-style-type: none"> • Fish Ponds 	<ul style="list-style-type: none"> • Recognize private lands status. • Cooperate with owners concerned to manage

Management Zones	Present site characteristics	Management Intention
		ecologically sustainable and consistent with the adjacent management zone.

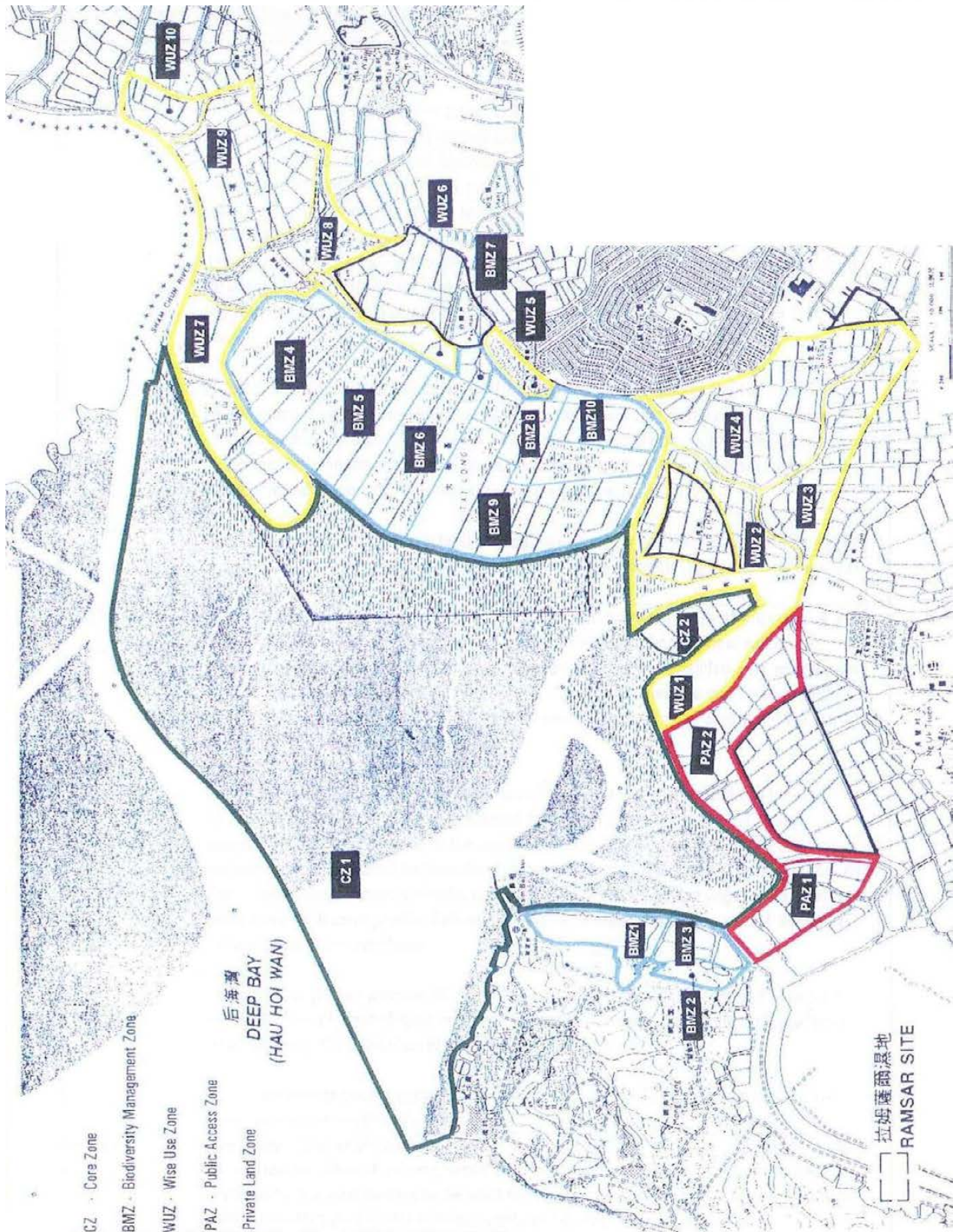
Core Zone (CZs 1-2)

Core Zone 1 (CZ1) covers the mudflat, water channels and the intertidal mangroves in the Inner Deep Bay which are also part of two SSSIs namely Mai Po Marshes and Inner Deep Bay. In order to protect the ecological integrity of the CZ1 from human disturbance, for example, cross boundary fishermen who enter the mudflats to collect mudskippers or setting up nets or traps for harvesting of other marine products, the Restricted Area designated under the Wild Animals Protection Ordinance (Cap 170) was extended to cover the intertidal mudflat areas and shallow waters of Inner Deep Bay. The extended Restricted Area came into effect on 15 February 1996. It should be noted that the Restricted Area does not cover the main water channels where local fishermen and villagers could make use for access.

Whilst possible extension of the core mudflat is limited by deep water areas such as river channels including Shan Pui River and Shenzhen River, the mudflat might have the potential of extending outward to the western side of Tsim Bei Tsui as sedimentation processes takes place. The Ramsar Site boundary and CZ1 could be extended accordingly if it is shown that the ecological values of such “new” potential mudflat area (which could be regarded as an ecological unit) is comparable to that of the existing mudflat in the CZ1. Further studies on the ecological values of any newly formed mudflat and the feasibility of revising the boundary of the management compartment would be required. The detail of the study will be elaborated in Project M3 of Action Plan in Section 3 of RSMPII.

Core Zone 2 (CZ2) covered an isolated island with four abandoned fish ponds. This island is not covered by any land use zoning. It was recommended in the existing RSMP that some non-intervention management of fish ponds could be carried out in these ponds with monitoring to evaluate consequential ecological changes of these abandoned fish ponds. In recent years, while there was no specific non-intervention management being arranged, it was observed that this site has been used by Cormorant and waterbirds such as gulls for roosting during winter. Starting from July 2010, the scope of the monthly waterbird monitoring programme has been extended to cover the bird use of these abandoned ponds. Updated management intentions of the Core Zone compartments are shown in Section 2.5 of RSMPII.

In summary, the ecological character of the Core Zone and the management intentions of the Core Zone 1 and Core Zone 2 have been maintained since the designation of the Ramsar Site.



- CZ - Core Zone
- BMZ - Biodiversity Management Zone
- WUZ - Wise Use Zone
- PAZ - Public Access Zone
- Private Land Zone

后海湾
DEEP BAY
(HAU HOI WAN)

拉姆薩爾濕地
RAMSAR SITE

香港特別行政區政府康樂、文化及自然護理處
Hong Kong Special Administrative Region Government 2010

Title
Management
Compartment Plan

DATE: Aug 2010 FIGURE No. A.1.1



BIODIVERSITY MANAGEMENT ZONE (BMZs 1-3):

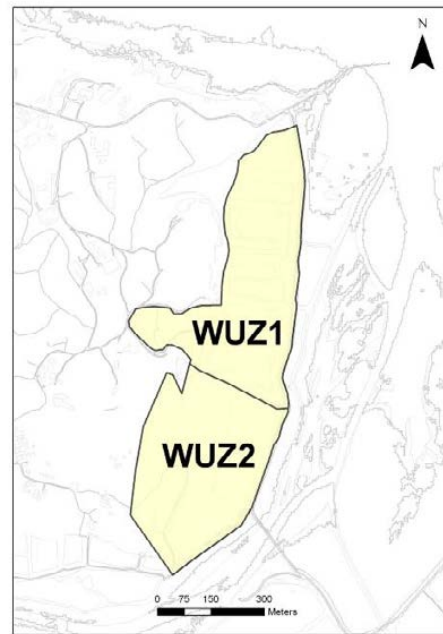
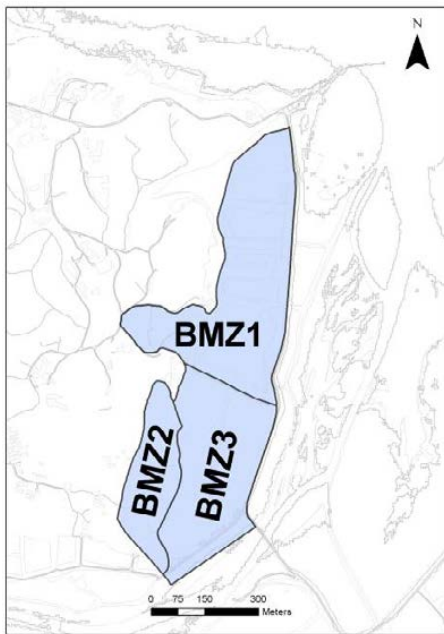
According to the Lau Fau Shan and Tsim Bei Tsui Outline Zoning Plan (OZP No. S/YL-LFS/7), the land use zoning of BMZ 1-3 is “SSSI” which recognizes the Site of Special Scientific Interest status. BMZ 1 could be sub-divided into two parts including the wooded area and the *gei wai*. These two portions are part of the two SSSIs namely the Tsim Bei Tsui Egretty SSSI (TBTE SSSI) and the Inner Deep Bay SSSI (IDB SSSI) respectively. The whole of BMZ 2 is included in TBTE SSSI while the whole of BMZ 3 is within the IDB SSSI. The land use zoning of the Ramsar Site is described in Section 2 of RSMPII and shown in Figure 2.1.

According to the most recent information available, the egretty located at the TBTE SSSI has been abandoned since 1991. As the egretty has been abandoned for a long period of time, the egretty status of the wooded area of BMZ 1 and the BMZ 2 is no longer important. On the other hand, the remaining areas of BMZ1 and BMZ3 are *gei wai* and abandoned fish ponds respectively which inhabit a number of waterbirds. Egrets/herons and Common Greenshanks are the waterbird species that are commonly found there, some other birds also make use of BMZ 2 as a roosting site.

Proposed Renaming of BMZs 1-3:

The purpose of Biodiversity Management Zone is to provide refuge for waterfowl and a focus for biodiversity conservation, education and training in a relatively intensively managed environment. There is no current habitat management arrangement for BMZs 1-3 due to unclear land ownership issues. In order to allow for alternative management considerations as the complicated land ownership issues may not be easily resolved in the short term, it is proposed to rename these three BMZs to be Wise Use Zone (WUZ), as the existing *gei wai* and fish ponds there are regarded as wise use of wetlands, as follows:

- (i) the original BMZ 1 will be renamed as WUZ 1 in view that it is an existing *gei wai*;
- (ii) the original BMZ 2 and 3 will be renamed as WUZ 2 as they form a fish pond entity as roosting and feeding grounds for birds.



It should be noted that the proposed renaming of the management compartments would only provide guidance on the objectives of management of the Ramsar Site but would not affect the statutory development control of the sites which is subjected to land use and planning control mechanisms. These compartments are already zoned as SSSI under the Lau Fau Shan and Tsim Bei Tsui OZP (S/YL-LFS/7) and therefore the actual land use for these compartments would be controlled by the statutory planning requirement under the Town Planning Ordinance.

Given that the concerned ponds are within the Priority Sites under the New Nature Conservation Policy, AFCD will keep in view for any opportunity to carry out conservation management works of the subject ponds under the MA scheme.

Consequential renumbering of BMZ 4-10 within the Mai Po Marshes Nature Reserve:

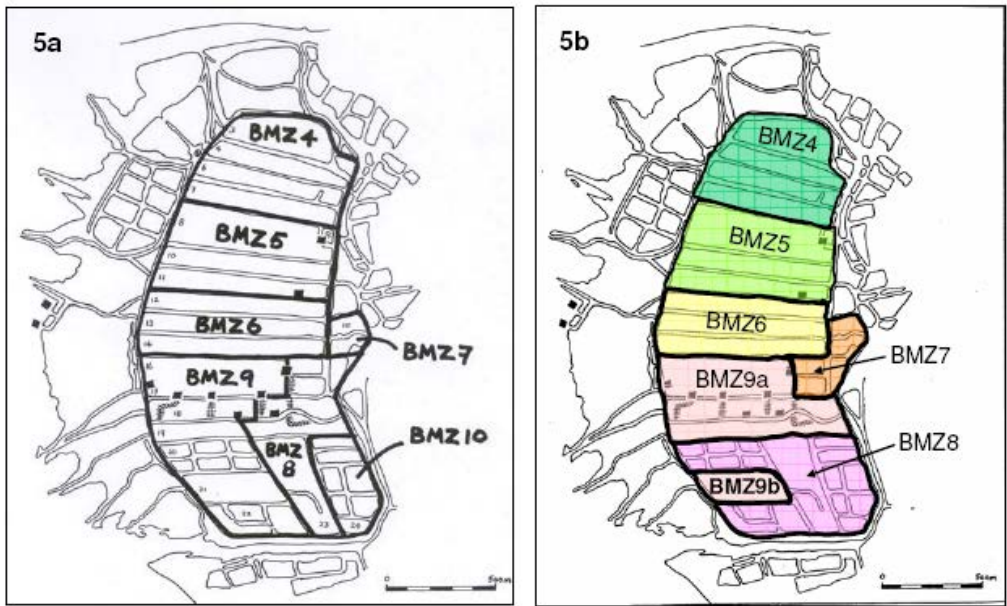
In RSMP, besides BMZs 1- 3, there are seven other compartments of the BMZ zone (i.e. BMZ 4-10) which covered *gei wais* 3-4, 6-24 of the Mai Po Marshes Nature Reserve (MPMNR). According to the existing RSMP, the broad objective of BMZ in MPMNR is to provide a refuge for waterfowl and a focus on biodiversity conservation, education and training. The MPMNR is sub-divided into seven management compartments which cover different *gei wais* for different management intentions. WWFHK has carried out habitat management works for each compartment with reference to the existing RSMP. However, WWFHK in the “Management Plan for the Mai Po Marshes Wildlife Education Centre and Nature Reserve 2006-2010” (MPMP 2006-2010) made note that in view of the actual physical conditions and experiences gained from the habitat management works, the management intention and boundaries of some management compartments had been revised.

As detailed in the MPMP, the management intention and boundaries of BMZ 4 (*gei wais* 3,4,6,7) and BMZ 5 (*gei wais* 8-11) remains the same as that specified in the RSMP. However, the following changes in the management regimes had been adopted in the MPMP for compartment BMZ 6-10 as in the table:

BMZ	Issues that came up to justify the change	The changes adopted in the Mai Po Management Plan 2006-2010
<p>BMZ 6 (<i>gei wais</i> 12,13,14): <i>Management intention:</i> In the long term, to maintain traditionally managed production <i>gei wai</i> with areas of mangrove vegetation.</p>	<p>It was suggested to convert <i>gei wai</i> 14 as a settling pond for saline water before it enters <i>gei wai</i> 16/17. It is noted that the floor of <i>gei wai</i> 16/17 is higher than that in <i>gei wai</i> 14, it would not be feasible for water to flow from <i>gei wai</i> 14 to 16/17 without large scale earth moving works.</p>	<p>No need to change the boundaries of this BMZ but the proposal for converting <i>gei wai</i> 14 as a settling pond was not implemented.</p>
<p>BMZ 7 (<i>gei wai</i> 15a, b): In the long-term, to maintain and improve the Education Centre and its associated waterfowl collection.</p>	<p>In recent years, <i>gei wai</i> 15c and Pond 16b has been developed for education purposes. In 2007, enhancement works had been completed in <i>gei wai</i> 17b and it has been turned into a freshwater habitat. <i>Gei wai</i> 17b was in BMZ 8 in the Plan which was intended to be filled by treated wastewater from Fairview Park. However, such proposal was not carried forward anymore.</p>	<p>It was suggested that the boundary of BMZ 7 enlarged to include <i>gei wai</i> 15c, 16b and 17b for education purposes.</p>
<p>BMZ 8 (<i>gei wai</i> 15c, east of 16/17, east of 18 and 19, 23): In the medium term, adjust conditions in favour of creating an open freshwater roosting area with fringing reeds and mangroves, shingle or tree-topped islands and pools/channels with varying sizes, heights and depths.</p>	<p>It was suggested in the MPMP that treated wastewater from the Fairview Park can be discharged into <i>gei wai</i> 15c, then passed to <i>gei wai</i> 17b, then to the landward halves of <i>gei wai</i> 18 and 19 and finally into <i>gei wai</i> 23 before it is discharged through its sluice gate into the Fairview Nullah. However, since the treated effluent still has a high level of phosphate, the proposal is considered impractical. Also, no earth moving works had been carried out</p>	<p>It was suggested that the boundary of BMZ 8 to be revised to include <i>gei wai</i> 20, 21 – 24 which are now maintained as open freshwater area for wintering ducks.</p>

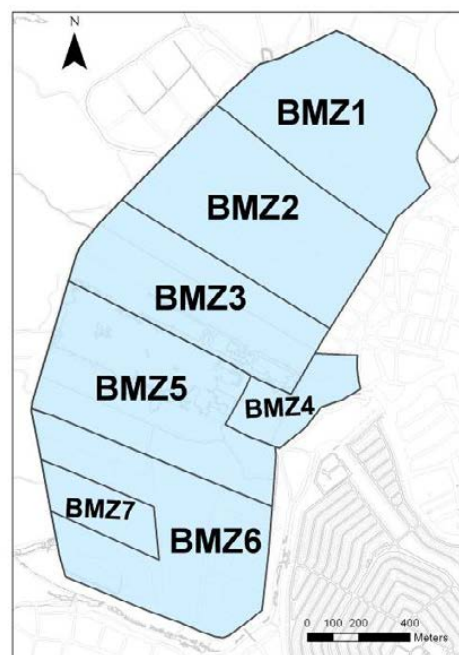
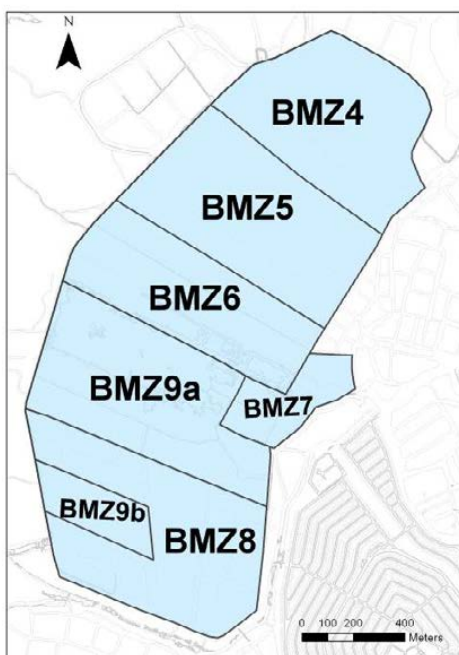
BMZ	Issues that came up to justify the change	The changes adopted in the Mai Po Management Plan 2006-2010
	to divide the <i>gei wai</i> 18 and 19 into 'landward' and 'seaward' parts.	
<p>BMZ 9 (<i>gei wai</i> 16/17 (west), 18 and 19 (west), 20, 21, 22): In the medium term, adjust conditions in favour of creating an open, tidal area with fringing reeds and mangroves, shingle or tree-topped islands and pools/channels with varying sizes, heights and depths that can act as a secure high-tide roost or wintering waterfowls.</p>	<p>The whole <i>gei wai</i> 18 & 19 will be used as tidal high-tide roost as no earth moving works had been carried out to divide the <i>gei wai</i> 18 and 19 into 'landward' and 'seaward' parts. <i>Gei wai</i> 21 will be enhanced as an alternative high-tide roost by dredging away the reeds and mangrove there so that a larger area of shallow water, mud and low islands would be created for roosting waterbirds. The enhancement works would be completed in 2009. <i>Gei wai</i> 20 & 22 which are originally in BMZ 9 are being successfully managed as a rain-fed pond for wintering waterfowl,</p>	<p>It was suggested that the boundary of BMZ 9 to be revised to include <i>gei wai</i> 16a/17a, the whole of <i>gei wai</i> 18, 19 and 21. As the former three <i>gei wai</i> are adjacent to each other, it was suggested to use BMZ 9a for 16/17-19 whilst the isolated <i>gei wai</i> 21 will be renamed as BMZ 9b.</p>
<p>BMZ 10 (<i>gei wai</i> 24): In the medium term, to adjust conditions in favour of creating a series of freshwater lakes of varying depth with surrounding areas of marsh.</p>	<p>As the intention of BMZ 10 is similar to that of BMZ 8, it is considered that these two BMZ should be merged to improve efficiency.</p>	<p>It was suggested that BMZ 10 to be merged within the boundary of the revised BMZ 8 and therefore BMZ 10 is to be deleted.</p>

The figures in the next page show a comparison of the original BMZ compartment (5a) and the revised BMZ compartments (5b) as adopted by the MPMP 2006-2010 which meant to reflect and incorporate the current situation of the management regimes of the *gei wais*:



In order to rectify the change of boundaries of BMZ compartments made in the MPMP 2006-2010 and to streamline the numbering sequence of all BMZs due to the proposed renaming of the BMZ 1-3 (renamed as WUZ 1-2 as discussed above) to WUZ, renumbering of the respective compartment numbers of the BMZs inside the MPMNR is proposed as follows:

BMZ compartments	Proposed renumbering
BMZ 4	BMZ 1
BMZ 5	BMZ 2
BMZ 6	BMZ 3
BMZ 7	BMZ 4
BMZ 8	BMZ 6
BMZ 9a	BMZ 5
BMZ 9b	BMZ 7



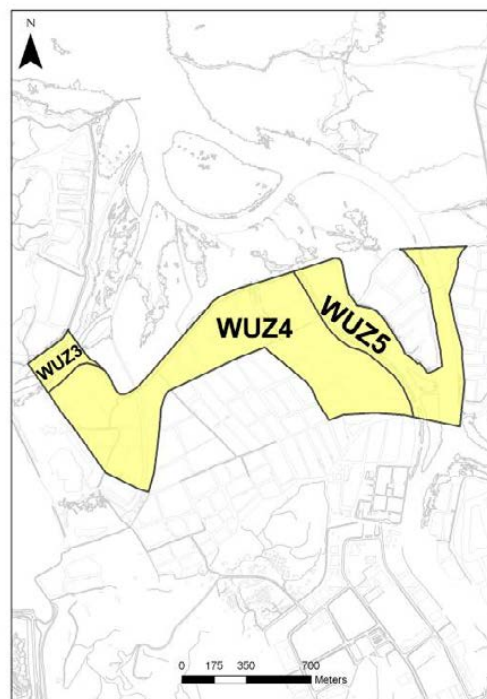
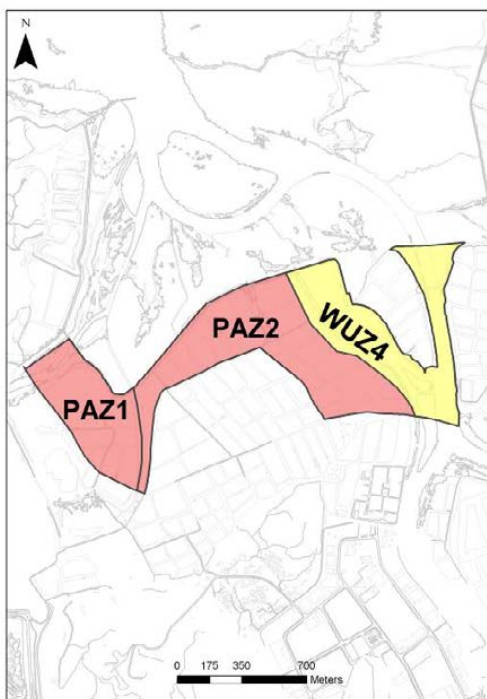
PUBLIC ACCESS ZONE (PAZs 1-2)

The two existing Public Access Zones (PAZs) in the existing Plan are mainly fish ponds and also included a section of the Tin Shui Wai drainage channel. They are located at the north eastern side of the Hong Kong Wetland Park (HKWP) and along the northern boundary of the proposed Wetland Nature Reserve (WNR) of the proposed development site at Fung Lok Wai. The two PAZs are zoned 'SSSI' as they are part of the IDB SSSI, the remaining portions are zoned 'Conservation Area' (CA) on the approved Lau Fau Shan and Tsim Bei Tsui OZP Plan No. Z/YL-LFS/7 (see Figure 2.1) to protect these fish ponds from incompatible developments. The section of the water channel is not covered by any land use zoning.

The operators of several existing fish ponds in PAZ 1 and PAZ 2 participated in the Accredited Fish Farm Scheme managed by AFCD which are detailed in Section 2 of RSMPII. The fish ponds within PAZ 1 and PAZ 2 are in fact contiguous with the proposed enhanced fish ponds in the proposed WNR at Fung Lok Wai (Private Land zone at Fung Lok Wai). Since the establishment of the HKWP, it has taken up the role for public education and awareness programmes on wetland conservation and there is no need to develop the two PAZs for public awareness programmes. As such, to reflect more appropriately their existing function as a fish pond in the Ramsar Site, the PAZ would be renamed as Wise Use Zone (WUZ).

In considering that the drainage channel is regarded as a kind of 'wise use' of wetland and the channel at Tin Shui Wai which forms part of the original PAZ 1 would be renamed as a Wise Use Zone compartment as follows:

- (i) the outlet of the drainage channel at Tin Shui Wai to be renamed as WUZ 3
- (ii) PAZ 1 + PAZ 2 to be renamed as WUZ 4.



WISE USE ZONES (WUZs)

The updated definition of ‘Wise Use’ as defined in the Ramsar Handbook 1 – Wise Use of Wetlands is: “*Wise Use of wetlands is the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development.*” An elaboration of the Wise Use concept is also provided in the Handbook which stated that “Within the context of ecosystem approaches, planning processes for promoting the delivery of wetland ecosystem benefits/services should be formulated and implemented in the context of the maintenance or enhancement, as appropriate, of wetland ecological character at appropriate spatial and temporal scales.”

Fish pond operation and water channels are regarded as wise use of wetland. It is therefore important that in consideration of the change of land use within the Wise Use Zones, the ecological functions of these fish ponds and water channels should be maintained so that they will continue to provide feeding and roosting sites for wintering waterbirds in the Ramsar Site.

There are altogether 10 compartments in Wise Use Zones (WUZ) in the existing RSMP and they are covered by two types of land use zonings, namely SSSI and CA as listed below:

WUZ compartment	Land Use Zoning	OZP No.
WUZ 1	Unzoned (water channel)	-
WUZ 2	SSSI (1)	Mai Po & Fairview Park OZP Plan No. S/YL-MP/6
WUZ 3	CA	Nam Sang Wai OZP Plan No. S/YL-NSW/8
WUZ 4	CA	Mai Po & Fairview Park OZP Plan No. S/YL-MP/6
WUZ 5	CA	Mai Po & Fairview Park OZP Plan No. S/YL-MP/6
WUZ 6	CA	Mai Po & Fairview Park OZP Plan No. S/YL-MP/6
WUZ 7	SSSI	Mai Po & Fairview Park OZP Plan No. S/YL-MP/6
WUZ 8	CA	Mai Po & Fairview Park OZP Plan No. S/YL-MP/6
WUZ 9	CA	Mai Po & Fairview Park OZP Plan No. S/YL-MP/6
WUZ 10	CA	San Tin OZP Plan No. S/YL-ST/8

As specified in the existing RSMP, management zones are sub-divided into different compartments which will have different management activities. Therefore, compartments of a management zone delineate areas within that zone which will be managed for the same purpose. The boundaries of the compartments are not fixed permanently but could be changed as an understanding of particular situation develops. The compartments are also identified on the basis of the existing situation and the need to simplify management as much as possible.

It is noted from the existing RSMP that management intentions of some of the WUZ compartments (e.g. WUZ 7-10) were related to the works of the Shenzhen River Regulation Project Stage II which have been completed. In fact, the principle of the management intention of the WUZ is to follow the wise use guidelines of the Ramsar Convention as well as the local socio-economic circumstance, there is a need to revise the boundaries of the compartments of the

WUZ to reflect the current situations. The following revisions (and renumbering) have taken into account their locations and existing conditions.

WUZ 1 to be renumbered as WUZ 5

This zone consists of two drainage channels originated from the Kam Tin River and Shan Pui River. This drainage area is important for flood alleviation for the whole North West N.T. area which is also regarded as a kind of wise use of wetlands. It is subjected to routine maintenance dredging by the Drainage Service Department to maintain water flow and the management intention of this zone remains unchanged. In view of the renaming of BMZs 1-3 as WUZs 1-2, PAZs 1-2 as WUZs 3-4 and in order to streamline the sequencing in the numbering of the WUZ compartments, it is proposed to renumber WUZ 2 as WUZ 5 in the RSMPII.

WUZ 2 to be renumbered as WUZ 6

This zone consists of contiguous fish ponds at Lut Chau to the south of the MPMNR which is also part of the Mai Po Marshes SSSI. WUZ 2 together with the 'Private Land Zone' at Lut Chau are zoned Site of Special Scientific Interest (1) zone on the Mai Po & Fairview Park OZP Plan No. S/YL-MP/6 (OZP Plan). As specified in the Notes of the OZP Plan, any development or redevelopment within the SSSI (1) zone is required to be developed in a comprehensive and integrated manner with the fish pond areas in Nam Sang Wai which is zoned OU(CDWEA1) on the Nam Sang Wai OZP. While the planning intention of this zone is to conserve ecological value and function of the existing fish ponds, alternative ecologically beneficial uses in the form of a nature reserve with similar ecological function may be considered. It is also noted that quite a number of fish ponds within this zone are under the Accredited Fish Farm Scheme which means aquaculture activities within this zone are still active.

In view of its unique development requirement as specified by the OZP which is different from the other WUZ, it should be maintained as a separate compartment of the WUZ and be renumbered as WUZ 6 in the RSMPII.

WUZ 3 and 4 to be grouped and renumbered as WUZ 7

These zones are zoned CA to protect the ecological integrity of the Ramsar Site. Some of these fish ponds are managed under the Accredited Fish Farm Scheme while some are under license for fish pond operations. In view that the fish ponds within these two zones form contiguous and continuous fish pond networks and there is no difference in the management intention of these two zones, it is proposed to group them together to form one WUZ compartment and be renumbered as WUZ 7 in the RSMPII.

WUZ 5 to be renumbered as WUZ 8

WUZ 5 is situated at the outlet of the water treatment plant of Fairview Park and it is currently a piece of vegetated land. Since the water quality from the Fairview Park Nullah is not considered as suitable for the use of a marsh, the original management intention of developing this zone into a freshwater marsh for dragonfly is not considered feasible. Instead, BMZ 7 which included Pond 15c, 16b and 17b within the MPMNR have been maintained as freshwater areas successfully for education purposes. Nevertheless, it still serves as a buffer against any disturbance from the Fairview Park on the BMZ in the MPMNR. In view of

its marshy habitat, it would be remained as a separate WUZ compartment and renamed as WUZ 8 in the RSMPII.

WUZ 6,8,9,10 to be grouped and be renumbered as WUZ 9

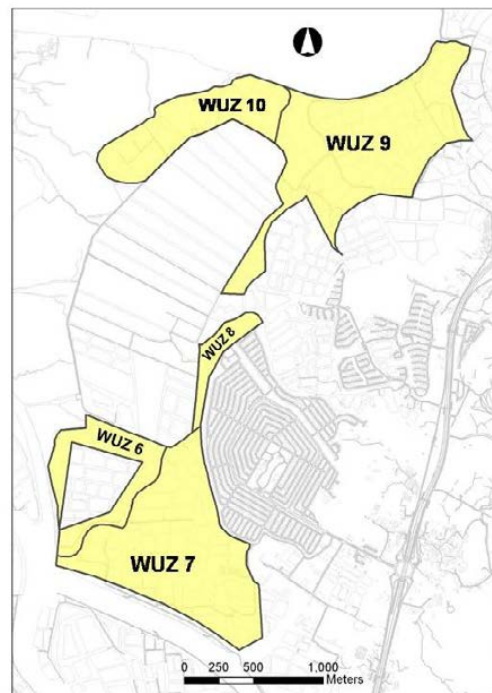
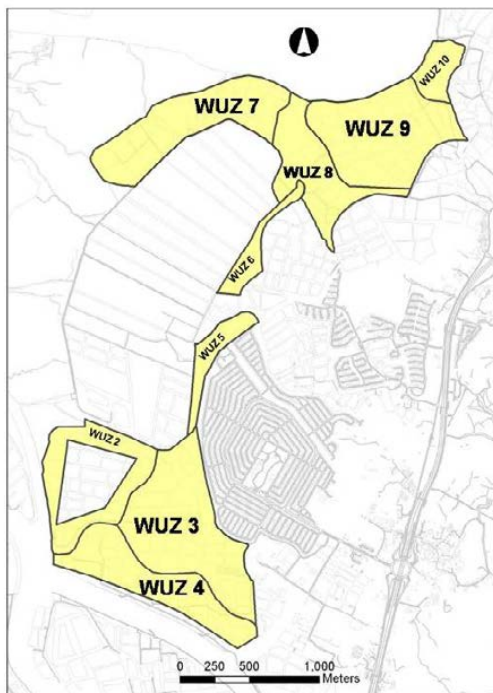
WUZ 6 consists of fish ponds arranged in a linear manner separating the BMZ 4 and 5 of the MPMNR from the private land at Pak Hok Chau. AFCD's warden post is also located within this zone. The fish ponds within this zone served as an important buffer for protection of the MPMNR. A large portion of the fish ponds within this zone are under the Accredited Fish Farm Scheme meaning that the fish ponds within this zone are under active management.

The original WUZ 8 contained the Peter Scott Field Study Centre and the police post at Tam Kon Chau. The two larger ponds at the northern portion of the zone are under 'Government Land Allocation' which are abandoned ponds possibly restored after the Shenzhen River regulatory project.

Several fish ponds within the WUZ 9 are under active management and joined the Accredited Fish Farm Scheme. In fact, it is considered that the fish ponds within these four zones form a continuous and contiguous fishponds networks which connected with the other fish ponds in the WCA, there is in fact no difference in the management objectives among the four compartments, Therefore, it is proposed to group these four compartments in one WUZ compartment and be renumbered as WUZ 9 in the RSMPII.

WUZ 7 to be renumbered as WUZ 10

These fish ponds are part of the Mai Po Marshes SSSI which are operated currently by fish farmers from the Shenzhen side. The operation and management of the fish ponds are considered as in line with the management intention of this zone. Since the fish ponds are located outside the boundary fence road, it is proposed to be separated from other compartments and be renamed as WUZ 10 in the RSMPII.

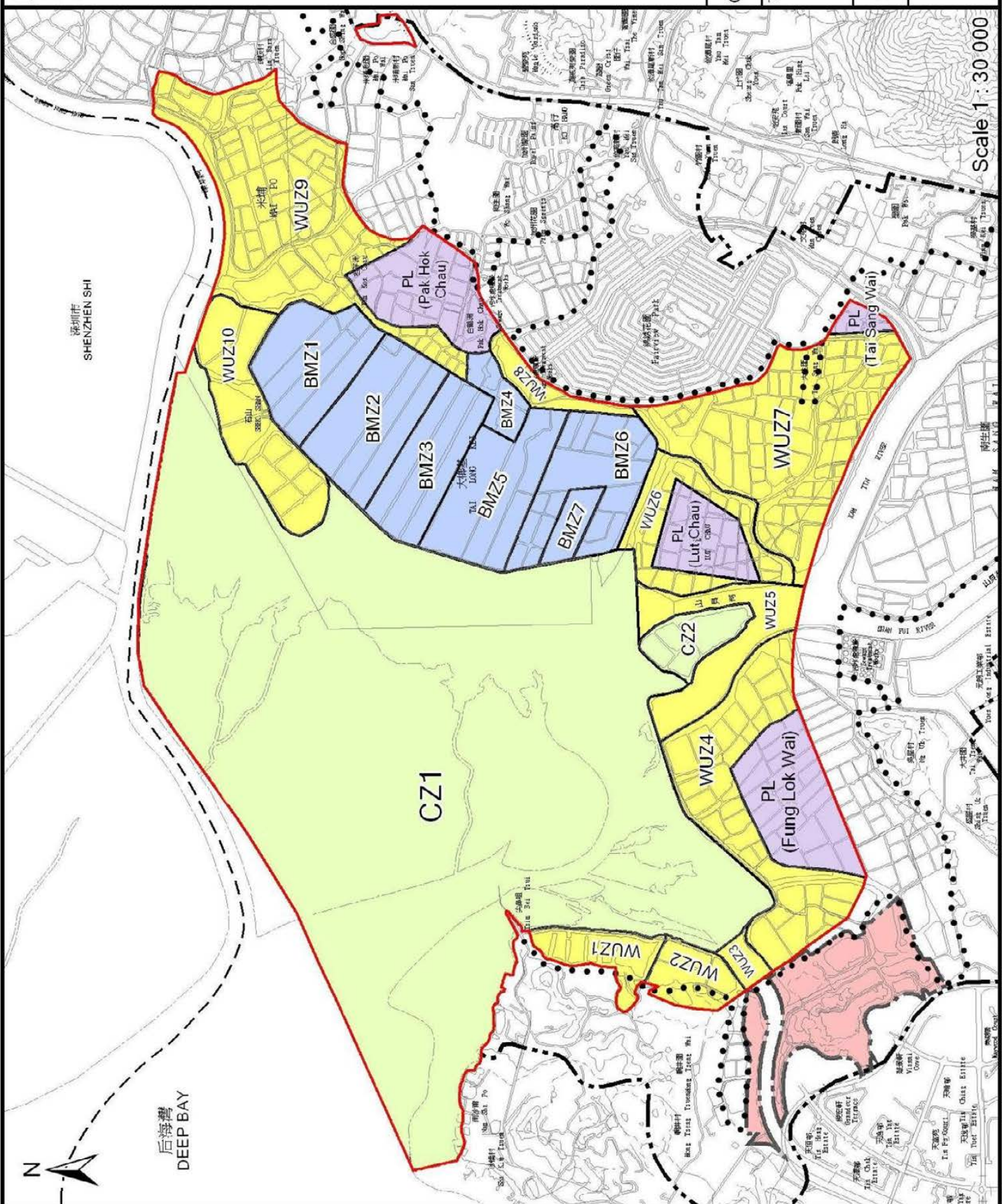


In summary, the proposed changes to the management zonings are listed below:

compartment	Proposed changes
BMZ 1	WUZ 1
BMZ 2 + BMZ 3	WUZ 2
Water channel of PAZ 1	WUZ 3
PAZ 1 + PAZ 2	WUZ 4
WUZ 1 (water channels)	WUZ 5
WUZ 2	WUZ 6
WUZ 3 + WUZ 4	WUZ 7
WUZ 5	WUZ 8
WUZ 6, 8, 9, 10	WUZ 9
WUZ 7	WUZ 10

The new management compartments are shown in the diagram in Figure A1.2.

LEGEND	Ramsar Site
Core Zone	Wise Use Zone
Biodiversity Management Zone	Private Land Zone
Hong Kong Wetland Park	Wetland Conservation Area
Wetland Buffer Area	



香港特別行政區政府 康樂二署
 Hong Kong Special Administrative Region Government 2010

Title
 New Management
 Compartment Plan

DATE: Jan 2011 FIGURE No. A1.2

漁農自然護理處
 Agriculture, Fisheries and Conservation Department

M_2011_002_A1.2 & B2.6

A3. REVIEW AND UPDATE ON STATUS OF MANAGEMENT PROGRAMME

The RSMP suggested groups of projects for the action plan/ management programme. The projects that had been achieved are listed in Table 1. Projects which had been partly achieved are listed in Table 2 and for projects that had not been proceeded further are listed in Table 3 with their present status updated for further action as appropriate.

TABLE 1

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
Establish and maintain the institutional infrastructure, staff capacity, equipment, planning and reporting systems, work schedules and other resources required to manage the Ramsar Site adequately.	IN1: Ramsar Management Authority (RMA) IN2: Staff Structure and Recruitment IN3: Staff Training IN4: Infrastructure Development IN5: Infrastructure Maintenance IN6: Equipment IN7: Supplies and Consumables IN8: Finance MP1:Project Register MP2 Management Plan Review MP3:Ramsar Site Monitoring Digest	IN 1/1- 1/2	All projects of the management programme have been achieved as follows: <input type="checkbox"/> IN1/1-1/2: The Wetland Advisory Committee (WAC) was set up in February 1999 to advice on the initial implementation of the Ramsar Convention. Two Sub-Committees namely Scientific Sub-Committee and Management Sub-Committee were also set up under the WAC in 1999. Regular meetings have been held to discuss matters related to the management of the Ramsar Site. As the requirement of Ramsar Convention has been smoothly implemented, the last term of the WAC ended in May 2004. The function of WAC has since been subsumed in the Nature Conservation Sub-Committee of

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		<p>IN 2/1- 2/13</p> <p>IN 3/1-3/2</p> <p>IN 5/1</p> <p>IN4/1 and IN 5/2</p>	<p>the Advisory Council on the Environment.</p> <ul style="list-style-type: none"> <li>❑ IN2/1-2/13: The Wetland and Fauna Conservation Division was established in 1998 in AFCD and has been responsible for matters on the implementation of Ramsar Convention and conservation management of the Ramsar Site such as the deployment of staff to take law enforcement action, arrangement of monitoring programmes, habitat management works as detailed in the RSMP. <li>❑ IN3/1-3/2: Relevant training on administrative procedures, legislations and monitoring techniques etc have been arranged. <li>❑ IN5/1. Mai Po Warden Post: the existing warden post at Mai Po is maintained. <li>❑ IN 4/1 and IN 5/2. Tsim Bei Tsui Ramsar Centre: The proposed Ramsar Centre, which is intended for supporting the management of Ramsar Site, has been

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		<p>IN 4/2 and IN 5/3</p> <p>IN 6/1-6/6 IN 7/1-7/4</p> <p>IN 8/1-8/2</p>	<p>established at Nam Sang Wai instead of Tsim Bei Tsui. The management center has been operational since 2006 (with the support of the Mai Po Nature Warden Post) and provided facilities as described by Project IN 4/1. Prior to the establishment of this management centre, the main office was located in Yuen Long Government Offices with the support of the Mai Po Nature Warden Post.</p> <ul style="list-style-type: none"> <li>❑ IN 4/2 and IN 5/3. Paths and Hides: Hides have been developed in the Hong Kong Wetland Park (HKWP) by the AFCD as the Ramsar Management Authority (RMA). The paths in the HKWP and those in Nam Sang Wai are maintained by the government. Hides and paths in Mai Po Marshes Nature Reserve (MPMNR) are maintained by WWFHK. <li>❑ IN6 & IN7: Site management assets, equipments, supplies and consumables are kept under proper inventory and maintenance. <li>❑ IN8: The annual Ramsar Site management

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		<p>MP 1/1</p> <p>MP 2/1-2/5</p>	<p>budget has maintained at the reasonable level.</p> <ul style="list-style-type: none"> <li> <input type="checkbox"/> MP1/1: The Project Register. A complete record of projects or researches undertaken within the Ramsar Site has been kept updated under the Baseline Ecological Monitoring Programme (BEMP). <li> <input type="checkbox"/> MP2/1-2/4: Site visit to the Ramsar Site and general review of progress of work plan. General review of progress of work plan has been conducted by AFCD regularly. Site visit to the Ramsar Site has been arranged for WAC members during their terms and the administration authorities. The Management Sub-Committee of WAC was regularly updated on issues for the management of the Ramsar Site and the general work plan of the Site. Reports of the Sub-Committee were submitted to the WAC regularly for updating. Site visits to developments that would likely affect the Ramsar Site would be arranged for members of the Nature

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		MP 3/1	<p>Sub-Committee of the Advisory Council on the Environment in the future as necessary.</p> <ul style="list-style-type: none"> <li>❑ MP2/5: General review of the overall 5-year management plan: The RSMP has been regularly reviewed through specific monitoring programmes including BEMP, Waterbird Monitoring Programme and through regular meetings with stakeholders including fish farmers and WWFHK. <li>❑ MP3/1: Annual Executive Summary of the monitoring results is provided under the BEMP.
Identify, monitor and adhere to all legal obligations pertaining to Ramsar Site designation, ownership and occupation, administration and management.	LG1: Catalogue of Applicable Law and Policies LG2: Enforcement of Ordinances	LG 1/1	<p>All projects of the management programme have been achieved as follows:</p> <ul style="list-style-type: none"> <li>❑ LG1/1: Catalogue of applicable law and policies. Copies of CAP 170 are kept for reference in the Nam Sang Wai management centre and the Mai Po Warden Post.

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		LG 2/1-2/2	<ul style="list-style-type: none"> <li>☐ LG2/1: Site patrols have been arranged on regular basis within MPMNR and various spots within the Ramsar Site. Regular patrols by hovercrafts, the Mudsurfers have been arranged especially during low tide at the mudflat areas. <li>☐ LG2/2: Guidelines and notes in the form of operation manual for law enforcement/ prosecutions procedures are maintained and updated for easy reference of all nature wardens.
Formulate and apply appropriate legislation and regulations to secure and enhance Ramsar Site protection and management.	FL1: Ramsar Site Legislation FL2: Ramsar Site Regulations FL3: Modifying Leasehold Conditions	<p>FL 1/1-1/4</p> <p>FL 2/1-2/2</p>	<p>All projects of the management programme have been achieved as follows:</p> <ul style="list-style-type: none"> <li>☐ The projects included: FL1/1: Review of Options; FL1/2: Confer appropriate legal status; FL1/3: Review legal status; FL2/1: Develop and notify Ramsar Site regulations; FL2/2: Review and amend Ramsar Site regulations. <li>☐ For FL1/1-1/3 and FL2/1-2/2: Different existing Ordinances and their respective regulations are applicable for

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
			<p>the protection of the Ramsar Site as well as for maintaining the wise use of wetlands. There are existing Ordinances and mechanisms for protecting the ecological integrity of the Ramsar Site from adverse on-site and off-site disturbance impacts. For example, the core zone of the Ramsar Site is protected through designation as ‘Restricted Area’ under Cap. 170 to minimize disturbance impacts by restricting human access, while the developments of the landward side of the Ramsar Site are controlled by the land lease administered by the Lands Department and the land use control mechanism under Town Planning Ordinance. Prevention on illegal entries to the Hong Kong waters is enforced by the Police.</p> <p><input type="checkbox"/> FL1/4: Extend Restricted Area: the boundary of the Restricted Area has been extended from the MPNR (BMZ 4-10) to cover the mudflat areas of the Ramsar Site in 1998.</p>

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		FL 3/1-3/3	<ul style="list-style-type: none"> <li>❑ FL 3/1: Compile Leasehold Register. Land leases records are properly maintained by Lands Department or Lands Registry. Nevertheless, the records of the land leases record of all <i>gei wais</i> within MPMNR have been compiled and kept for easy reference. <li>❑ FL 3/2: Negotiate Environmental Care Clause: <ul style="list-style-type: none"> <li>◆ Modification to clauses in fish pond land lease for conservation purposes was not practicable and not preceded further. Instead, similar objective could be achieved through the means of voluntary partnership programmes between NGOs and fish farmers on carrying out fish pond culture with conservation objectives. NGOs were encouraged to apply funding under the Environment and Conservation Fund for projects in agreement with land owners for managing the fish ponds with

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
			<p>conservation objectives.</p> <ul style="list-style-type: none"> ◆ Also, the land use of fish ponds in the Inner Deep Bay is achieved by stringent development control mechanisms through the establishment of the planning guidelines under Town Planning Ordinance (TPO) and the requirement of the EIAO. In order to preserve the ecologically important fishponds and other wetlands in the whole Deep Bay area, the Town Planning Board (TPB) has promulgated the “<i>Town Planning Board Guidelines for Application for Developments within Deep Bay Area under Section 16 of the Town Planning Ordinance (TPB PG-No. 12B)</i>” under the TPO to put land use and planning in the Deep Bay area under control. ◆ The guideline also allows consideration of sustainable development of fish ponds with conservation objectives.

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
			<ul style="list-style-type: none"> <li>❑ FL 3/3: Leasehold Resumption: The resumption of land lease is not practicable and not preceded further. Nevertheless, TPB may consider development of fish ponds in private ownership with conservation objectives in area zoned Other Specified Use (Comprehensive Development and Wetland Enhancement Area) within the WCA or Other Specified Use (Comprehensive Development to include Wetland Restoration Area) in WBA under a private-public partnership approach. This approach allows consideration of limited low-density private residential/recreational developments at the landward fringe of the WCA and WBA in exchange for committed long-term conservation and management of the remaining ponds or restoration of degraded wetlands within the development site.
Mark and monitor the Ramsar Site boundaries and internal	BD1: Demarcation of Boundary and Zones		The following projects of the management programme have been achieved:

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
zones.		BD 1/1-1/5	<ul style="list-style-type: none"> <li>❑ BD1/1: Signage with a Ramsar Site map showing the boundary of the Restricted Area under the Wild Animals Protection Ordinance (Cap. 170) has been erected at main entrance to the Ramsar Site but it was impractical to install boundary markers and sign posts along boundaries of neither the Ramsar Site nor the management compartments. <li>❑ BD 1/3: Maintenance of Boundary and Zone Markers: About 20 warning signs have been setup at the entrance or access points to the MPMNR. AFCD conducts foot patrols within the MPMNR daily. For other parts of the Ramsar Site, regular patrols are also conducted. <li>❑ BD 1/4-1/5 Zones and boundaries are reviewed regularly. <p>*BD 1/2: Plant Boundary Hedges was considered impractical and not proceeded. (See (1) in Table 2).</p>
Establish and conduct a Ramsar	BM1:Geo-physical		All projects of the management programme

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
Site monitoring programme for management of biodiversity conservation and use of resources within their carrying capacity employing standardised methods of data collection and compilation utilising GIS techniques.	Characteristics BM2:Biological Characteristics BM3:Chemical Characteristics BM4:Economic Activities BM5:Event Recording BM6:Infractions BM7:Publications TM1:Targeted Monitoring: Compartments TM2:Targeted Monitoring: Visitors TM3:Targeted Monitoring: Species	BM 1/1-1/4 BM 2/1-2/21	have been achieved as follows: <input type="checkbox"/> BM1/1: A GIS has been developed and is available to store, organize and analyze the monitoring datasets. The system is equipped with base map, digital aerial photos, and satellite images (IKONOS and Quickbird, as available). <input type="checkbox"/> BM1/2: Weather information for each sampling incidents under the BEMP are recorded. <input type="checkbox"/> BM1/3: Photos of habitat conditions are recorded annually. <input type="checkbox"/> BM1/4: Soil-type information is recorded under the BEMP. <input type="checkbox"/> BM2/1: A Technical Manual has been developed and adopted for implementation. <input type="checkbox"/> BM2/2: Monitoring data are reviewed annually. The quality of the chemical analysis data is verified by a HOKLAS

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
			<p>laboratory separately.</p> <ul style="list-style-type: none"> <li>❑ BM2/3: Species inventory and record of distribution map of intertidal mangroves is in place. <li>❑ BM2/4: The record on changes of mangrove distribution and extent is in place. <li>❑ BM2/5, BM2/15-18: Species inventory and record of major animal groups including mammal, bird, reptiles, amphibians, fish, dragonflies and butterflies is in place. <li>❑ BM2/6 and BM2/7: Distribution and species diversity of mammal are tracked by camera trapping. Surveys for bats are also undertaken periodically. There is no recent record of marine mammals presence in the Ramsar Site. <li>❑ BM2/8 and BM2/12: Monthly waterbird monitoring programme for the Deep Bay

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
			<p>area is in place.</p> <p>BM2/9: Annual egret survey for the entire territory including Deep Bay is in place.</p> <ul style="list-style-type: none"> <li>❑ BM2/11: A bird ringing programme carried out by the Hong Kong Bird Ringing Group is in place. <li>❑ BM2/13: Benthic invertebrate survey is included in the BEMP. <li>❑ BM2/14: Freshwater invertebrate survey has been undertaken and a species inventory is in place. <li>❑ BM2/19: surveys for <i>Perisesarma maipoensis</i> have been conducted. <li>❑ BM2/20: exotic and pest survey: Since 2000 when the presence of exotic mangrove <i>Sonneratia</i> was found in the Inner Deep Bay, the species has been monitored and precautionary measures taken to remove this exotic species. (see

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
			<p>Section A6)</p> <ul style="list-style-type: none"> <li>❑ BM2/21: Before winter 2004, carcasses of Black-faced Spoonbills and wintering ducks found in the Inner Deep Bay area had been sent to AFCD’s veterinary laboratory for post-mortem examinations to find out the cause of death. In some cases, collection of carcasses and post-mortem examinations was conducted in collaboration with WWFHK and KFBG. In response to the potential risk of highly pathogenic H5N1 avian influenza, the post-mortem examinations have been stepped up to cover all dead wild birds collected from the Inner Deep Bay area since winter 2004 as part of the AI surveillance programme. Subsequently, the tests have been extended to cover the dead birds found from the whole territory after October 2005. <li>❑ BM3/1 and BM3/2: Water quality in Inner Deep Bay and gei wai 12 and 13 are analyzed monthly under the BEMP.

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		<p>BM 3/1-3/3</p> <p>BM 4/1</p> <p>BM 5/1</p> <p>BM 6/1</p> <p>BM 7/1-7/3</p>	<ul style="list-style-type: none"> <li>❑ BM3/3: Toxic residues in sediment including heavy metals, total DDTs, total PAH, total PCB are analyzed monthly under the BEMP. Ad hoc projects have also been undertaken to analyze the risks of POPs and PBDE on waterbirds. <li>❑ BM4/1: the assessment on shrimp and fish harvests: AFCD maintained a record of the species of fish reared in fish ponds. <li>❑ (E) BM5/1: Event record log: The records of unusual events discovered during patrols are kept for the Ramsar Site and adjacent fish pond areas such as Ma Tso Lung. <li>❑ (E) BM6/1: Infraction Register: A database is maintained on observations of illegal activities and prosecutions undertaken against the Cap.170. <li>❑ BM7/1: Scientific literature relevant to site management. A summary list of

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		TM 1/1-1/4	<p>publication for studies undertaken in the Ramsar Site is compiled annually by the contractor of the BEMP.</p> <ul style="list-style-type: none"> <li>❑ BM7/2: Press coverage. Press materials have been kept by the Information Unit. <li>❑ BM7/3: Correspondence and miscellaneous. All relevant materials have been properly filed for record. <li>❑ TM1/1: Non-intervention management of fish ponds. The fishponds in CZ 2 have been abandoned due to the construction of Main Drainage Channels (MDC) in early 1990s. In recent years, it was observed that CZ2 serves as one of the roosting sites for Cormorants and waterbirds during winter. The coverage of the waterbird monitoring programme has been extended since the 2010/11 winter to include the whole CZ2. The additional information would be useful for planning non-intervention habitat management work.

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		TM 2/1-2/2	<ul style="list-style-type: none"> <li>❑ TM1/2: Tidal Waterfowl Roost in BMZ 9. BMZ 9 is within the MPMNR with the primary objective to provide a secure high tide roosting area for waterbirds. As the zone is managed as a high tide roost for waterbirds, regular monitoring for the utilization of the zone by the waterbirds, particularly waterfowls are undertaken by WWFHK. <li>❑ TM1/3: Freshwater marsh and lakes for ducks in BMZ 10. BMZ 10 consists of a series of freshwater ponds within the MPMNR. Regular monitoring for the use of the zone by waterfowls has been carried out by WWFHK. <li>❑ TM2/1-2/2: the entry to the BMZ of MPMNR has been restricted and is controlled by permits issued by AFCD. WWFHK has monitored the number of public visitors/ students joining their programme in the MPMNR each day. The number of visitors/ students is

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		TM 3/1	<p>stabilized at around 40,000 numbers per year. There is no visitor survey of the BMZ in Tsim Bei Tsui, which is not a Restricted Area. The HKWP has carried out daily monitoring and regular visitor surveys.</p> <ul style="list-style-type: none"> <input type="checkbox"/> TM3/1: Cormorant use of MPMNR for feeding. The Cormorant number during wintering season has been monitored. <p>The following projects have been partially proceeded further:</p> <ul style="list-style-type: none"> <input type="checkbox"/> BM2/10: Non-colonial Breeding Bird Survey. Not achieved (see 2 of table 2) <input type="checkbox"/> TM1/4: Dragonfly marsh: The proposal to convert the WUZ 5 of the RSMP into a freshwater habitat for dragonfly has not been proceeded further (see (3) of Table 2).
Develop and coordinate the scientific research opportunities the Ramsar Site provides into a coherent programme, particularly	SR1: RMA Scientific Sub-Committee SR2: Research Projects	SR 1/1-1/2	<p>The following project of the management programme has been achieved.</p> <ul style="list-style-type: none"> <input type="checkbox"/> SR1/1-1/2. The Scientific sub-Committee under the WAC was established in 1999

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
where this can assist applied management of the Ramsar Site.		SR 2/1-2/2	<p>to oversee the minor conservation projects and studies related to the Ramsar Site.</p> <p>The following were partially or not proceeded further:</p> <ul style="list-style-type: none"> <input type="checkbox"/> SR2/1: Ecosystem Function Analysis. (see (4) of Table 2). <input type="checkbox"/> SR2/2: Model of Intertidal Mangrove/Mudflat Dynamics. The proposed study on investigating the model of the mudflat/mangrove dynamics will be further studied (see (1) of Table 3)
Formulate response plans to deal with accidents and emergencies.	EM1:Contingency Plans	EM 1/1-1/4	<p>All projects of the management programme are in place as follows:</p> <ul style="list-style-type: none"> <input type="checkbox"/> EM1/1: Access for Service Vehicle. All vehicle accesses are shown in the updated map of the area. <input type="checkbox"/> EM1/2: oil-spill plans. The response plan is maintained and updated by Marine Department. An update copy is kept and filed. <input type="checkbox"/> EM1/3: Flooding. The Drainage Service Department is responsible.

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
			<input type="checkbox"/> EM1/4: Fire. The Fire Services Department is responsible.
<p>Encourage community-led projects for ecologically sustainable development based on the Ramsar Site's resources, particularly those which can attract private investment.</p>	<p>SD1: Liaison with Owners, Occupiers and Businesses SD2: Wise Use Finance Mechanisms BM4: Economic Activities</p>	<p>SD 1/1-1/5</p>	<p>The projects of the management programme have been achieved as follows:</p> <ul style="list-style-type: none"> <input type="checkbox"/> SD1/1. Deterrence of Fish-eating Birds. Measures including pond-wiring by individual fish farmers, stocking of trash fish in <i>gei wais</i> within MPMNR by WWFHK and management measures to enhance the <i>gei wais</i> as feeding grounds within the MPMNR by WWFHK are in place as one of the means to reduce the cormorant predation on commercial fish ponds. This issue is reviewed in Section A7. <input type="checkbox"/> SD1/2. Socio-economic study. The information of fish farmers and their operations in the Ramsar Site is maintained and updated by AFCD. <input type="checkbox"/> SD1/3. Protocols for ecologically sustainable development: the Town Planning Board Guideline 12B

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		<p>BM 4/1</p> <p>SD 1/4</p> <p>SD 2/1</p>	<p>promulgated in 1999 put developments in the Inner Deep Bay under control for conservation and protection of ecologically important wetlands. It also provides guidelines for ecologically sustainable development in the area.</p> <ul style="list-style-type: none"> <li>❑ SD1/5. Eco-labelling Scheme: the feasibility on establishing the Eco-labelling scheme on fish produced from fish ponds within the Ramsar Site is being developed. (see Section 2 of RSMPII). <li>❑ BM4/1: the assessment on shrimp and fish harvests. AFCD maintained a record of the species of fish reared in fish ponds. <p>The following projects were partially or not proceeded further:</p> <p>SD 1/4. Potential Sustainable Resource Utilisation. (see (5) in Table 2).</p> <p>SD 2/1: Feasibility Study on Ecological Investment Fund (see (2) in Table 3).</p>

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
			<p>over-wintering for a short period (i.e. from a few weeks to some months). Most of these species, except Saunders's Gull and Nordmann's Greenshank, are scarce or they are just irregular visitors, for example, only two sightings of Oriental Stork were recorded in the Inner Deep Bay in the past decade.</p> <p>Conservation measures for these species are already in place. In fact, these species are receiving levels of protection and management measures comparable to those laid down in the Conservation Plan for the BFS in Hong Kong. The major overwintering site of these species in the Mai Po and Inner Deep Bay area has been listed as a Restricted Area under the Wild Animals Protection Ordinance to protect them from hunting and disturbance. Besides, with a view to achieving the management goals of providing suitable roosting and feeding habitats for BFS and for a significant population of shorebirds and wintering waterfowls in the Deep Bay, the <i>gei wais</i> habitats in MPMNR have been intensively managed by WWFHK as either high-tide</p>

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		TM 3/1	<p>roosts for the shorebirds species (<i>gei wais</i> 16/17, 18, 19 and 21) or freshwater habitats (<i>gei wais</i> 20, 21-24) for waterfowls. The WCA/WBA system under TPB PG 12B and EIAO offered land use and development controls on the wetlands in Deep Bay which may be used by this species. Furthermore, the Ramsar Site has also joined the East Asian-Australasian Shorebird Site Network and the Anatidae Site Network in the East Asian Flyway to facilitate information exchange for the conservation of migratory shorebirds and waterfowls along the flyway.</p> <p>Nevertheless, the conservation status of these species in the regional context would be reviewed in the conservation project “Reviewing of Data and Methodology of the Monthly Waterbird Monitoring Programme” (see O4 in Section 3, RSMPII). Further studies and measures for the conservation of these species would be recommended under the study if necessary.</p> <p>TM3: Achieved as detailed above.</p>

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
<p>Prepare and implement conservation plans for all other species of waterfowl for which the Ramsar Site supports a significant proportion of the global or biogeographic population.</p>	<p>CP1: Great Cormorant CP2: Chinese Pond Heron CP3: Little Egret CP4: Eastern Great Egret (Eastern Great Egret) CP5: Common Shelduck CP6: Greater Sand Plover CP7: Curlew Sandpiper CP8: Black-tailed Godwit CP9: Spotted Redshank CP10: Marsh Sandpiper CP11: Greenshank CP12: Black-headed Gull</p>	<p>CP 1/1</p>	<p>CP1/1-12/1: Prepare Draft Conservation Plan. The objectives of preparing draft Conservation Plans have been achieved. The Ramsar Site remains to support a significant proportion of the biogeographic populations of CP1-12 except CP5. The local conservation measures of these species are reviewed as follows:</p> <p>CP1: Cormorant. Fish pond operators' responses to Cormorant's predation on commercial fishponds are potential threats to the conservation of the species. To continue the wise-use of fishponds and to maintain the conservation of Cormorants, a number of field trial studies on pond-wiring methods to deter Cormorant predation on commercial fishponds had been implemented and evaluated. The effectiveness of any new measures is also studied regularly. The measures serve to minimize conflicts between the species and fish pond operators. The conservation measures as mentioned in RP 2-12 also protect these species and their foraging/roosting sites.</p>

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		<p>CP 2-4/1</p> <p>CP 5/1</p> <p>CP 6-12/1</p>	<p>CP 2-4: These three species of ardeids present in relatively large numbers in the Ramsar Site, including both migratory and nesting individuals. In addition to the conservation measures as mentioned in RP 2-12 above, the major egrettries in Deep Bay have been listed as SSSI. Egrettry survey has been conducted annually by AFCD since 1998 and systematic study on the foraging habitats and flight lines of the ardeids was also conducted in 2008. Survey data are closely monitored to check for any abnormality by AFCD.</p> <p>CP 5: The number of Common Shelduck in Deep Bay has experienced a rapid decline since the late 1990s. A review conducted by the Hong Kong Bird Watching Society provided no clues for the decline of this species in Hong Kong. Nevertheless, the conservation measures as mentioned in RP 2-12 also offer protection for this species and its foraging/roosting sites.</p> <p>CP 6-12: The concerned species are winter-migrants, including shorebirds and waterfowls</p>

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
			<p>that only stay in Hong Kong shortly. They are protected by the conservation measures as mentioned in RP 2-12. Furthermore, the monthly waterbird monitoring programme which monitors their numbers in the Inner Deep Bay area would provide updates of their biogeographic populations.</p> <p>The conservation status of these species in the regional context would also be reviewed in the conservation project “Reviewing of Data and Methodology of the Monthly Waterbird Monitoring Programme” (see O4 in Section 3, RSMPII). Further studies and measures for the conservation of these species would be recommended under the study if necessary. AFCD would also solicit information from the East Asian-Australasian Shorebird Site Network and the Anatidae Site Network in the East Asian Flyway to facilitate the conservation of these species along the flyway.</p>
<p>Maintain the capacity of the Ramsar Site to support internationally important numbers of waterfowl.</p>	<p>BM2:Biological Characteristics</p>	<p>BM 2/1 -2/21</p>	<p>All projects have been achieved (see details above).</p>

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
Ensure the adequate protection and maintenance of all organisms for which the Ramsar Site is a taxonomic type locality.	BM2:Biological Characteristics	BM 2/1 -2/21	All projects have been achieved (see details above).
Maintain and where appropriate increase the numbers of other species of conservation importance.	SP1: Schrenck’s Bittern SP2: Black-headed Ibis SP3: Mandarin Duck SP4: Grey-headed Lapwing SP5: Eastern Curlew (Far-eastern Curlew) SP6: Asian Dowitcher SP7: Styan’s Grasshopper Warbler SP8: Red-bill Starling (Silky Starling) SP9: Chestnut-cheeked Starling SP20: Indo-Pacific hump-backed dolphin SP21: Chinese Otter SP30: Damselfly <i>Mortonagrion hirosei</i>	SP 1-9/1	SP1/1-9/1, SP20/1, SP21/1 and SP30/1: Prepare Draft Species Plan. The objectives of preparing draft Species Plans have been achieved. SP1-9: All of the concerned species are migratory and only stay in Hong Kong briefly (from a few weeks to some months). Apart from Asian Dowitcher and Red-billed Starling, all the other species visited Hong Kong in small numbers and some are rare winter visitors. They are adequately protected by the conservation measures as mentioned in RP 2-12. Furthermore, the monthly waterbird monitoring programme which monitors their numbers in the Inner Deep Bay area would provide updates of their biogeographic population. The conservation status of these species in the regional context would also be reviewed in the

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		<p>SP 20/1</p> <p>SP 21/1, SP 30/1</p>	<p>conservation project “Reviewing of Data and Methodology of the Monthly Waterbird Monitoring Programme” (see O4 in Section 3, RSMPII). Further studies and measures for the conservation of these species would be recommended under the study if necessary.</p> <p>SP20: Indo-Pacific humpbacked dolphin: All marine mammals in Hong Kong are protected by the Wild Animals Protection Ordinance (Cap. 170). The conservation plan of this species is being implemented by the Marine Conservation Division of AFCD.</p> <p>SP21: Chinese Otter and SP30: Damsselfly <i>Mortonagrion Hirosei</i>: The territory-wide biodiversity survey programme conducted by AFCD includes surveys on the distribution of these two species in Hong Kong. Moreover, monitoring of the distribution, abundance and habitat uses of these two species within MPMNR are included in the Research and Monitoring Programme Plan for Mai Po Nature Reserve 2007-2011.</p>

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
Identify and prepare distribution maps of exotic or invasive species, evaluate their ecological functions, and prevent any deleterious extension in the Ramsar Site.	BM2: Biological Characteristics EX1: Control of Exotic Species EX2: Control of Pests and Diseases	BM2/1-2/21 EX 1/1 EX 2/1	All projects of the management programme have been achieved. <input type="checkbox"/> BM2/1-2/21: see details above. <input type="checkbox"/> EX1/1: WWFHK carried out annual removal works to Mikania within the MPMNR under AFCD's service contract. <input type="checkbox"/> EX2/1: survey and monitoring of the Sonneratia invasion has been going on since 2001. At present, there are no other pest or disease organisms which appear to have chronic effect on species and habitats of the Ramsar Site.
Maintain and improve wetland habitat quality, including the restoration of wetland habitats.	HQ1: Operational Plans for Zone Compartments TM1: Targeted Monitoring: Compartments	HQ 1/1-1/24	All projects of the management programme have been achieved: <input type="checkbox"/> HQ1/1-1/2: CZ1-2 .CZ 1 is the core zone of the Ramsar Site which has been protected within the Restricted Area under Cap. 170. The two zones are managed according to the management objectives as set out by the RSMP. <input type="checkbox"/> HQ1/3-1/5: BMZ1-3. After reviewing the current situation (e.g. the abandonment of egrettries), a change in the management intentions for BMZ1-3 is proposed in the

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		TM 1/1-1/4	<p>RSMP II (see Section A2 above).</p> <ul style="list-style-type: none"> <input type="checkbox"/> HQ 1/13-1/14: PAZ1-2: Public education and access to wetland habitats has been achieved under the CEPA programme carried out by the HKWP <input type="checkbox"/> HQ1/15-1/24: WUZ1-10. The management objectives of these zones follow the wise use principle. <input type="checkbox"/> HQ1/6-1/12: BMZ 4-10 within the MPMNR. A Management Plan for the Mai Po Marshes Wildlife Education Centre and Nature Reserve 2006-2010 has been prepared by WWFHK which detailed the management regimes for each BMZ within the MPMNR. <input type="checkbox"/> TM1/2-1/4: achieved, see above for details.
Promote and facilitate community involvement in all aspects of the Ramsar Site and its management.	CI1: RMA Management Sub-Committee SD1: Liaison with Owners, Occupiers and Businesses	CI 1/1-1/2	<p>The following projects of the management programme have been achieved:</p> <ul style="list-style-type: none"> <input type="checkbox"/> CI1/1: Convene meeting of the Management Sub-Committee: The Management Sub-Committee under the WAC was established in 1999 and meetings have been regularly hold to

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		SD 1/1-1/5	<p>discuss management issues of the Ramsar Site.</p> <ul style="list-style-type: none"> <input type="checkbox"/> CI1/2: Publication of a popular version of the RSMP: The Executive Summary of the Management Plan has been uploaded to the AFCD website for public information. <input type="checkbox"/> SD1/1: Deterrence of Fish-eating Birds. (see above) <input type="checkbox"/> SD1/3: Protocols for ecologically sustainable development (see above). <input type="checkbox"/> SD1/5: Eco-labelling Scheme (see above). <p>The following projects are not proceeded further:</p> <p>SD 1/4: Potential Sustainable Resource Utilisation. See (6) in Table 2.</p>
Remove rubbish, scrap, disused machinery and dilapidated structures from the Ramsar Site.	RR1: Removal of Rubbish, Scrap and Dilapidated Structures	RR 1/1-1/2	<p>All projects of the management programme have been achieved.</p> <ul style="list-style-type: none"> <input type="checkbox"/> RR1/1. Clear away litter, rubbish and scrap. The works within the MPMNR was taken up by WWFHK. The Food and Environmental Hygiene Department

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
			<p>(FEHD) is responsible for removal of rubbish. A refuse collection point is located next to the Mai Po Warden Post.</p> <ul style="list-style-type: none"> <input type="checkbox"/> RR1/2. In case if there is any need to demolish dilapidated and disused structures within the MPMNR, WWFHK will discuss with AFCD and FEHD for proper disposal of waste. Lands Department is responsible for land management and legal status of structure on land.
Maintain features of historic or cultural value.	HC1: Conservation of Historic and Cultural Features	HC 1/1-1/2	<p>All projects of the management programme have been achieved.</p> <ul style="list-style-type: none"> <input type="checkbox"/> HC1/1. Continue operation of <i>gei wais</i>. WWFHK carried out habitat management works as to maintain the traditional operation of the <i>gei wais</i> within the BMZ6 compartment. <input type="checkbox"/> HC1/2. Enhancement of Historic and Cultural features. WWFHK maintained historic and culture features in MPMNR. The HKWP organized CEPA programmes which included introduction of conservation of historic and cultural

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
			features of wetlands.
Develop the potential of the Ramsar Site for environmental education and raising awareness in harmony with the ecological objectives of the Ramsar Site.	EE1: Environmental Education Programme PA1: Public Access Programme IN4: Infrastructure Development IN5: Infrastructure Maintenance TM2: Targeted Monitoring: Visitors	EE 1/1-1/3 PA1/1-1/2	The following projects of the management programme have been achieved: <ul style="list-style-type: none"> <input type="checkbox"/> EE1/1. Prepare draft Environmental Education Strategy: Educational use of the site is mainly undertaken by both WWFHK and the HKWP, especially the implementation of CEPA programme. <input type="checkbox"/> EE1/2. School Visits to Mai Po Nature Reserve. 300 secondary and 100 primary school visits to MPMNR have been arranged by WWFHK annually and a subvention has been provided by the Education Bureau to cover some of the costs for organizing/ providing the school visits. <input type="checkbox"/> EE1/3. Wetland Management Training Courses. Both WWFHK and the HKWP organized training programmes for wetland centre managers. <input type="checkbox"/> PA1/1. Prepare Draft Public Access Strategy: The CEPA programme is undertaken by the HKWP and there is no intention to introduce public access in these zones for wetland education

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		IN 4/1-4/2 IN 5/1-5/3 TM 2/1-2/2	purposes. <input type="checkbox"/> PA1/2: Design and Produce Ramsar Site Newsletter: A booklet introduced the Ramsar Site has been produced but not newsletter. The HKWP also publish newsletter regularly. <input type="checkbox"/> IN4/1-4/2: see details above. <input type="checkbox"/> IN 5/1-5/3: see details above. <input type="checkbox"/> TM2/1-2/2: Achieved. See details above.
Facilitate increased public access to the Ramsar Site for uses that are in harmony with the ecological objectives of the Ramsar Site and which can encourage investment from the private sector.	PA1: Public Access Programme IN4: Infrastructure Development IN5: Infrastructure Maintenance TM2: Targeted Monitoring: Visitors	PA1/1-1/2 IN 4/1-4/2 IN 5/1-5/3 TM 2/1-2/2	See details above.
Cooperate with external organisations, especially internationally, to broaden experience and generate support for the implementation of the management plan.	EC1: Ministry of Forestry, PRC EC2: Hong Kong-Guangdong Environmental Protection Liaison Group EC3: Ramsar Bureau EC4: International	EC 1/1	The following projects of the management programme have been achieved: <input type="checkbox"/> EC1/1. Department of Wildlife & Forest Plant Protection. Communication with the Office of Wetland Convention and Management of the State Forestry Administration of PRC has been closely

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
	Conservation Bodies EC5: Bilateral Exchange Programme	EC 2/1 EC 3/1-3/2 EC 4/1-4/2	<p>maintained.</p> <ul style="list-style-type: none"> <li>❑ EC2/1: Hong Kong - China Liaison. Communication has been maintained at the national, provincial, and local levels. <li>❑ EC3/1. Prepare and submit Annual Report. Reports are submitted to Ramsar Bureau as required. <li>❑ EC3/2. Participate in meetings with Parties to the Ramsar Convention (triennial). HKSAR government attended COP and Asian Regional Meetings as a member of the PRC delegation. <li>❑ EC4/1. Wetlands International. Sharing of bird information is achieved and would be continued. <li>❑ EC4/2. WWF International. Sharing of information on conservation of birds is achieved through communication with WWFHK and would be continued. <li>❑ EC4/4. Birdlife International. Sharing of information on conservation of birds is achieved and would be continued. Mai Po and Inner Deep Bay area had been designated as an “Important Bird Area” in 1990s.

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		<p>EC 5/1</p> <p>EC4/3, EC5/2-5/4</p>	<p><input type="checkbox"/> EC5/1. Futian National Nature Reserve (FNNR), PRC. Communication with the management of FNNR has been maintained.</p> <p>The following projects are partially or not proceeded further: EC 4/3. Collaboration with IUCN. See (6) in Table 3. EC 5/2: Red River Ramsar Site, Vietnam. See (6) in Table 2. EC 5/3: Bharatpur Wildlife Sanctuary, India. See (7) in Table 3. EC5/4. Titchwell Bird Reserve, UK. See (7) in Table 2.</p>
<p>Participate in activities relating to the improved conservation of wetlands and waterfowl in the East Asian/Australasian flyway.</p>	<p>FW1:East Asian/Australasian Flyway Programme BM2:Biological Characteristics</p>	<p>FW 1/1</p>	<p>The following projects of the management programme have been achieved.</p> <p><input type="checkbox"/> FW1/1. Participation in Flyway Programme. The Ramsar Site joined the East Asian-Australasian Shorebird Site Network and the Anatidae Site Network in the East Asian Flyway to facilitate information exchanges such as on zoonotic diseases and population trends</p>

Management Objectives of the original Management Plan	Relevant Project Groups	Project Titles	Progress
		BM2/1-2/21	<p>for migratory birds and waterbirds conservation works.</p> <p><input type="checkbox"/> BM2/1-2/21: all achieved. See details above.</p>
<p>Identify areas outside the Ramsar Site which are important for the continued existence of species within the Ramsar Site and draw them to the attention of the competent authorities in order to protect them.</p>	<p>RP1: Black-faced Spoonbill RP2: Saunders’s Gull RP3: Nordmann’s Greenshank RP5: Swinhoe’s Egret RP7: Baikal Teal RP11: Spoon-billed Sandpiper RP12: Japanese Yellow Bunting CP2: Chinese Pond Heron CP3: Little Egret CP4: Eastern Great Egret CP5: Common Shelduck BM2: Biological Characteristics TM3: Targeted Monitoring: Species</p>	<p>RP 1/1-1/3 RP 2/1 RP 3/1 RP 4/1 RP 5/1 RP 7/1 RP 10/1 RP 11/1 CP 2/1 CP 3/1 CP 4/1 CP 5/1 BM2/1-2/21 TM 3/1</p>	<p>Achieved, see details above.</p>

**TABLE 2:
PROJECTS THAT ARE PARTLY PROCEEDED FURTHER:**

	Projects	Updated Position
1	BD 1/2: Plant Boundary Hedges.	<input type="checkbox"/> Planting boundary hedges is not practical as parts of the boundary fall within the coastal mudflat areas and private lands. Currently, public access to the Ramsar Site is restricted in the Frontier Closed Area, Mai Po Nature Reserve and the mudflat. About 20 warning signs have been setup at the boundary of the Mai Po Marshes Nature Reserve where public access is restricted.
2	BM2/10: Non-colonial breeding bird survey	<input type="checkbox"/> The current waterbird monitoring programme provides baseline information for the assessment of the abundance of all waterbirds and other wetland-dependent species within the Ramsar Site throughout the year (i.e. cover both breeding and non-breeding seasons). The information on waterbirds so obtained from the monitoring programme provided the necessary information for the assessment of the conditions of the Ramsar Site for all seasons. <input type="checkbox"/> In addition, both breeding and non-breeding bird surveys have also been conducted by HKBWS which covers the whole territory including the Ramsar Site since mid 1990s. The information would be available from HKBWS upon request.
3	TM1/4: Dragonfly marsh:	<input type="checkbox"/> The WUZ 5 is a piece of marshy area situated close at the outfall of the Fairview Park nullah. It was suggested that treated wastewater from the Fairview Park sewage treatment plan could be discharged into this marsh before passing to Pond 15c, Pond 17b and the landward halves of <i>gei wai</i> 18 & 19 of the MPMNR for the converted freshwater habitats. In the Management Plan for the Mai Po Marshes Wildlife Education Centre and Nature Reserve 2006-2010, it was revealed that the treated effluent has a high level of phosphate making it undesirable for discharge into MPMNR, therefore, the proposal to convert this piece of marsh into dragonfly marsh is not proceed further.

		<ul style="list-style-type: none"> <input type="checkbox"/> On the other hand, a freshwater marsh was created inside MPMNR specifically designed for dragonfly.
4	SR2/1: Ecosystem Function Analysis	<ul style="list-style-type: none"> <input type="checkbox"/> The Baseline Ecological Monitoring Programme and the Waterbird Monitoring Programme have been carried out to quantify the ecosystem function of the Ramsar Site which is reported and regularly updated in the form of the Ramsar Information Sheet (RIS) as required by the Ramsar Secretariat.
5	SD 1/4. Potential Sustainable Resource Utilisation: the study on Potential Sustainable Resource Utilisation.	<ul style="list-style-type: none"> <input type="checkbox"/> Information on individual fish ponds including the fisherman, the species of fish reared and the maricultural practices is maintained and updated by AFCD. <input type="checkbox"/> The Accredited Fish Farm Scheme and the Organic fish farming Scheme are being implemented or developed by the Fisheries Branch which helped to maintain the industry in a sustainable way.
6	EC 5/2: Red River Ramsar Site, Vietnam	<ul style="list-style-type: none"> <input type="checkbox"/> There is currently no direct contact developed between AFCD and the Red River Ramsar Site. However, the annual BFS global census coordinated by HKBWS (AFCD has actively joined the census) covered the Red River Ramsar Site, which is one of the wintering ground for the BFS. Hence, information of BFS could also be exchanged and updated regularly.
7	EC5/4. Titchwell Bird Reserve, UK.	<ul style="list-style-type: none"> <input type="checkbox"/> Instead of developing a direct contact between AFCD and the Titchwell Bird Reserve, the Hong Kong Wetland Park has made twinning agreement with London Wetland Centre in UK and Sungei Buloh Wetland Reserve in Singapore. The twinning would help the wetland centres to develop joint marketing and training programmes, as well as staff exchanges programmes to develop capacity. These agreements also facilitate the exchange of information, expertise and enable better collaboration with these wetland centres in the future. <input type="checkbox"/> Both the Hong Kong Wetland Park (AFCD) and the Mai Po Nature Reserve (WWFHK) are Wetland Education Centres of the Wetland Link International Asia, building capacity for the

		CEPA programmes.
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**TABLE 3:
PROJECTS THAT ARE NOT PROCEEDED FURTHER:**

	Projects	Updated Position
1	SR2/2: Model of Intertidal Mangrove/Mudflat Dynamics.	<input type="checkbox"/> The proposed study on investigating the model of the mudflat/mangrove dynamics will be further studied and reviewed in RSMPII.
2	SD 2/1: Feasibility Study on Ecological Investment Fund	<input type="checkbox"/> The New Nature Conservation Policy proposes two new conservation measures for enhanced conservation for 12 Priority Sites. First, NGOs may apply for funding from the government for entering into Management Agreements with the Landowners for enhancing conservation of the priority sites identified, including the Ramsar Site and Deep Bay wetlands outside the Ramsar Site. The Environment and Conservation Fund Committee has allocated funds to implement pilot projects for this measure. <input type="checkbox"/> Second, the Public-private Partnership allows developments at an agreed scale at the ecologically less sensitive portion of any of the Priority Sites identified provided that the developer undertakes to conserve and manage the rest of the site that is ecologically more sensitive on a long-term basis. The Town Planning Board Guideline No. 12B also specifies that under the approach, private developers have to secure funding arrangement for long-term commitment to maintain wetlands to be conserved as part of the development proposals in Deep Bay area. <input type="checkbox"/> Given the new measures have a wider scope of protection, the feasibility study on Ecological Investment Fund will not proceeded further.
3	EC 4/3: Collaboration with IUCN.	<input type="checkbox"/> Currently, no regular liaison with IUCN regarding bird conservation was maintained.

4	EC 5/3: Bharatpur Wildlife Sanctuary, India	<input type="checkbox"/> The major flyway covering India during bird migration is “Indian Flyway” but not the “East Asian-Australasian Flyway”. As the flyways and species composition during migration are different, no direct contact was developed from wild bird conservation point of view. However, information exchange for bird-related issue would be explored in future.
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A4. THE CURRENT IMPLEMENTATION OF RAMSAR CEPA PROGRAMME

The Hong Kong Wetland Park implements the CEPA programme as detailed in Section 1.4.3 and Appendix X of RSMPII and is complementary to the conservation management of the Ramsar Site.

A5. SILTATION

The intertidal mudflat in Inner Deep Bay was formed from accretion of sediments discharged from the Pearl River and the inland streams. As part of a river system, the sedimentation process will continue to bring sediment over the existing mudflat as ecological succession operates. There are concerns that the succession process may increase the time of exposure between tides and the mudflat would dry up eventually. The Baseline Ecological Monitoring Programme (BEMP) of the Ramsar Site has monitored the annual change of elevation of the mudflat using GPS for geodetic surveying which is of centimetric accuracy. Measurement at eight fixed stations reveals substantial changes in elevation, which amount up to 10cm, in different years but could not lead to definite conclusion on whether the mudflat is experiencing accretion or erosion at specific locations. However, the results do indicate that the sediment transport is a very dynamic process and is influenced by certain environmental processes such as flooding and typhoon in addition to tide and topography. BEMP would be continued to record the annual change of elevation at the eight fixed stations.

AFCD has also constructed topographic profiles of the mudflat adjacent to the *gei wais* by sampling of elevation of random points using GPS for geodetic surveying. Comparison of the profiles showed that both accretion and erosion took place in different parts of the mudflat. Sedimentation (increase in elevation) is particularly evident outside the old intertidal birdhides. The finding tallies with the observation as revealed by the analysis of a high-resolution Ikonos satellite image acquired in October 2003 and a World View 1 satellite image acquired in November 2009 of Inner Deep Bay, when the tide was about or over 2m, a small hump of sediment was found outside the birdhide. Whether the localized sedimentation is due to the presence of the birdhide deserves further investigation. AFCD will continue to monitor the long-term changes of mudflat-wide topographic profiles annually. AFCD has also recorded the sediment elevation around the new birdhide of WWFHK to examine whether sedimentation is more pronounced on mudflat off the birdhides (see Project M2 in Section 3 – Action Plan of RSMPII).

In the man-made habitats of the Ramsar Site including *gei wais* and fishponds, sedimentation is not a concern in the fishponds, which are depending on rain as water source. In addition, individual fishpond operators always maintain the function of their ponds by frequent dredging or re-profiling to control silting up. On the other hand, there are signs of silting up of *gei wais* in the MPMNR as indicated in aerial photographs acquired in the past twenty years. *Gei wais* are connected to open water by inlet channels running through the mangroves and the productivity of *gei wais* relies on regular exchange of water. As water exchange takes place each time in the *gei wais*, the incoming water from Inner Deep Bay would also bring in silt which deposits and accumulates on the floor, perimeter,

and cross and inlet channels of the *gei wais* that would eventually raise up the muddy floor. In the past, individual *gei wai* operators dredged their *gei wai* and the inlet channels to facilitate water exchange. When *gei wai* are not operated as commercial tidal shrimp ponds and water exchange, dredging were no longer carried out as a kind of routine *gei wai* maintenance practice, the land-building process encourage the invasion of terrestrial plants like grasses, climbers or reeds to the wetland habitats which would kill the mangrove trees or causes the drying out of stands of mangroves within the *gei wais*. The inlet channels are also colonized by mangroves making water exchange inefficient. The original wetland habitats in the *gei wais* would gradually be lost over time. In response to this natural phenomenon, maintenance de-silting operations to dredge away the silt that have built-up in the perimeter and cross channels of *gei wais* have been carried out by WWFHK since 2006. Maintenance dredging along water channels or cross channels have been completed in *gei wais* #3, 4, 7 in 2006, *gei wai* #23 in 2007, *gei wai* #12 in 2008, *gei wai* #19 in 2009 and *gei wai* #18 in 2010. In order to minimize any potential impacts on wintering waterbirds using the *gei wais*, all the dredging works were carried out during the summer times and completed before the end of October each year.

In summary, Deep Bay is an area of open waters under the influence of the Pearl River and continuous sedimentation is a natural process which resulted in the natural habitats of mudflat and mangroves in the Ramsar Site. The long-term effect of the process may lead to the gradual extension of existing mudflats further seaward to the west. In the long term, a study (see Project M3 in Section 3 – Action Plan in RSMPII) would be required to review the ecological values of the extended mudflat areas outside the Ramsar Site to evaluate whether their ecological values meet the designation criteria of the Ramsar Convention.

De-silting dredging works

In 2003, Highways Department awarded a contract to construct the part of Hong Kong Shenzhen-Western Corridor (SWC) inside Hong Kong which stretches across the intertidal mudflat in the Inner Deep Bay. According to the EIA report, potential ecological impacts as a result of the SWC Project were considered not significant. However, there were concerns on whether the bridge piers in the Inner Deep Bay would possibly increase sedimentation rate by locally disrupting the tidal flow. In view of the ecological sensitive nature of the Inner Deep Bay, additional enhancement measures were proposed to bring about a long-term beneficial effect to the Deep Bay ecosystem. As a result, in August 2003 dredging works to the deposited sediment in the inlet water channel leading to *gei wai* # 16 & 17 in the MPMNR was carried out at the commencement of the construction works of the SWC. The additional enhancement works aimed to restore the hydrological function of *gei wais* at MPMNR by dredging the water channel to one metre below the existing channel bottom to restore the water exchange regime at the silted up channel which connects the *gei wai* with the mudflat. The works was expected to increase the availability of prey to birds using the *gei wai* habitat and lead to a better water quality in the *gei wais*. The dredging works was completed at the end of October 2003 and there is a need to monitor the effectiveness of such channel restoration which is expected to enhance the ecological performance of *gei wai* #16/17. The ecological monitoring programme of MPMNR undertaken by WWFHK would help to provide information in this regard.

A6. MANGROVE COLONIZATION AND MANAGEMENT

Mangrove Management

Since 1940's, the mangrove inshore of Inner Deep Bay area began their extension seaward naturally after a substantial part of the mangroves were felled to clear land for construction of *gei wais*. It was reported that the mangrove fringe at MPMNR has extended seaward by 3.5 to 7.6 m per year. Extension growth of mangrove was obvious among the water channels originated from *gei wai* at MPMNR and the mudflat at the south-eastern part of Tsim Bei Tsui and the outlet of Shan Pui River. In terms of area coverage, mangrove at the Ramsar Site increased from some 220 hectares in 1993 to 320 hectares in 2007. The rate at which mangrove extended seaward into the mudflat and along drainage channels has raised concerns with regard to possible reduction of mudflat habitat for benthic fauna and waterbirds and adverse impact on the hydraulic capacity of drainage channels against flooding in Yuen Long area.

Back in 2001, Drainage Services Department (DSD) received flooding complaints in Yuen Long area and expressed concern that the outgrowth of mangrove at the river mouth might eventually undermine the channel capacity for discharging flood in Yuen Long area. The Yuen Long District Council and the Heung Yee Kuk New Territories raised similar concerns that mangrove blocking water flow in the floodway causing flooding in Yuen Long area. They requested the government to consider prompt measures to control the growth of mangrove at the river outlet. The need to manage mangrove associated with flood control and encroachment of mangroves onto the mudflat was discussed at the Scientific Sub-Committee and Management Sub-Committee of the Wetland Advisory Committee in May 2001. In September 2001, DSD started the mangrove management work at the outlet of Shan Pui River (Figure 2.5). The cutting works lasted from September to November 2001 and then resumed during the summer months in 2002. As a result, approximately 8 hectares of mangrove (some 56,000 number of mangrove plants) had been cut to maintain the openness of drainage channels in the area. Ecological monitoring works had also been carried out after the removal works and the results showed that the cutting works did not affect the bird use and benthic fauna in the area.

In the recent years, the cut stumps of the mangrove were found re-growing in this area. In 2008, DSD started another survey (Agreement No. CE46/2007(DS)) on the community structure of the mangroves found at the same location with a view to investigating the stand density and the strategy for controlling the mangroves there. A meeting was held among AFCD, DSD and WWFHK in 2008 to discuss the possible treatment to the mangroves in this area. The idea of removing the mangroves in that area could open up more mudflats and be beneficial for bird use in the Ramsar Site as raised in the meeting could be explored/ further studied.

Mangrove colonization across the inter-tidal mudflat could also have a major influence on the usage of the site by benthic fauna and waterbirds as a result of reduction in open mudflat area where benthic fauna is abundant. A number of studies have raised the issue of potential encroachment of mangroves onto the Inner Deep Bay mudflat. The physical feature of "Core Zone 1" as delineated under the RSMP is mainly mudflat. Within the Core Zone, the management intention is to provide an undisturbed, largely natural area. RSMP has included the

control of mangrove encroachment as one of the management items. Each year, WWFHK carry out mangrove management works to remove mangrove seedlings that are growing on the mudflat through natural colonization in front of WWFHK's floating hides so as to provide an open view for bird watchers and maintain this area open as a feeding and roosting site for waterbirds. Similarly, within the MPMNR, mangroves and trees in *gei wais* (e.g. *gei wais* # 16/17 and 21) that lie within the management compartment designated for providing high tide roosting area had been removed by WWFHK so as to provide more open shallow water areas. Small and low islands are constructed in these *gei wais* which act as a high tide roosting grounds for waterbirds.

On the other hand, there are alternative views that oppose the idea of removing mangroves to open up mudflats. The views emphasize the ecological significance of mangroves played in the ecosystem of Inner Deep Bay, in particular their roles on the ecological values of the mudflats, and their growth is sporadic. In this connection, they object indiscriminate removal of mangroves without scientific evidence. In fact, the first global assessment of mangroves jointly completed by the United Nation Environmental Programme and other international NGOs in July 2010 revealed that mangrove forests continued to be lost at a rate three to four times higher than land-based global forests, despite positive restoration efforts by some countries. According to the report, about one fifth of all mangroves are thought to have been lost since 1980. Although losses are slowing down, the report warns that any further destruction will cause significant economic and ecological decline. Under the global decline of mangroves, the finding of the report further highlights the conservation significance of the healthy mangroves in Inner Deep Bay which together with the mudflats warrant a management plan built upon scientific evidence.

The Management Sub-Committee of the Wetland Advisory Committee held in 2001 also discussed the need to manage the mangroves that encroached onto the mudflat. There were concerns that since mangroves at the mouth of Shenzhen River were spreading very quickly and it was possible that the northern side of the mudflat would be lost to mangroves. Whilst it seemed difficult for the core mudflat to advance outward due to the containment of Shan Pui River and Shenzhen River, the mudflats might have the potential to be extended further west of Tsim Bei Tsui. Members agreed that while there was a need to conserve the mudflat area since it serves as the feeding site for waterbirds. Taking into account that mangroves is also an important wetland habitat, a multi-disciplinary study (see Project M4 in Section 3 – Action Plan of RSMPII) is required to examine holistically issues related to mudflat and mangrove to provide information for formulation of a practicable management plan.

SONNERATIA IN THE RAMSAR SITE

The history of the discovery of the two species of exotic mangrove *Sonneratia* is described in Section 1 of RSMPII. In order to understand the general biology and ecology of these two *Sonneratia* species, namely *Sonneratia caseolaris* and *Sonneratia apetala* in Hong Kong, AFCDC commissioned the City University of Hong Kong to investigate the possible ecological impacts of these exotic mangrove and recommend how to manage these *Sonneratia* so as to maintain the mudflat habitat as the feeding and roosting grounds of waterbirds in 2007.

Sonneratia species are mainly distributed in the outlets of Shenzhen River, along water channels and foreshore mudflat outside MPMNR. They have not only fast growth rate, rapid colonization ability, they produce flowers and fruits nearly all year round. According to the Study, the habitat that favours their colonization are the areas with thick soft mud, high organic matter and nutrients, low salinity and open area with strong sunlight. In view of their high colonization ability especially in the open mudflat at the seaward fringe, their invasive potential and long-term impacts should not be overlooked. It was recommended that physical removal as a precautionary approach to avoid any intrusion of Sonneratia into the native mangrove and the open mudflat. The strategy was that mature trees, saplings and seedlings should be eradicated as soon as possible.

Since year 2001, AFCD has carried out works for physical removal of Sonneratia found on the mudflat of Inner Deep Bay nearly every year. Together with other parties including WWFHK, CEDD, DSD and HyD, more than 46,000 individuals of Sonneratia seedlings and mature trees have been removed which are summarized in the table below.

A summary of the Sonneratia removed from 2001 to 2010:

Year of removal	No. of Sonneratia removed
2001	270
2002	400
2003	750
2004	1,150
2006	1,420
2007	2,500
2008	12,300
2009	8,600
2010	19120
Total	46,510

Under the current estimation, about 50,000 Sonneratia individuals are still found along the fringe of the mangroves on the seaward side in Inner Deep Bay as shown in Figure 2.3, Section 2 of RSMPII.

Up to present, although there is no evidence to show the adverse impact posed by the Sonneratia on the native mangrove communities, in view that physical removal is the most effective precautionary measures to manage the Sonneratia found in the Ramsar Site, this project will be continued every year during the summer season (see Project W8 in Section 3 – Action Plan of RSMPII).

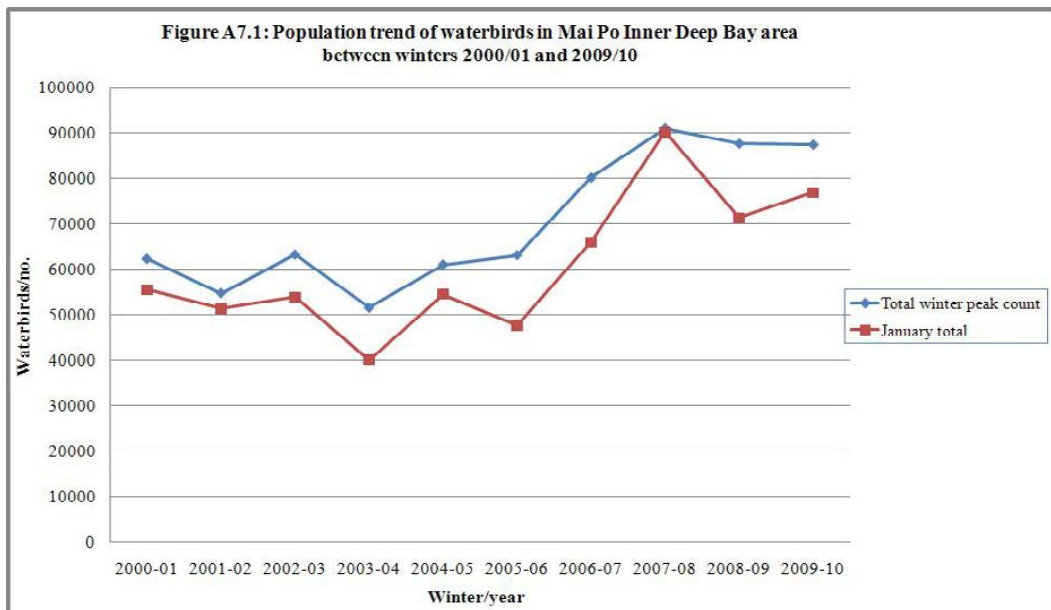
A7. WINTERING WATERBIRD CONSERVATION

WATERBIRD MONITORING

Monitoring of the population of the migratory waterbirds gives important environmental baseline information and the trends in bird numbers and species occurring at the site.

In Hong Kong, a long-term Waterbird Monitoring Programme at the Ramsar Site has been conducted since December 1997 as a fundamental part of the management strategy and as an indicator of the status of the Deep Bay ecosystem. Coordinated counts of wintering waterbirds form an important component for the Waterbird Monitoring Programme, the surveys involve monthly counts of waterbirds up to species level in a synchronised manner from October to March.

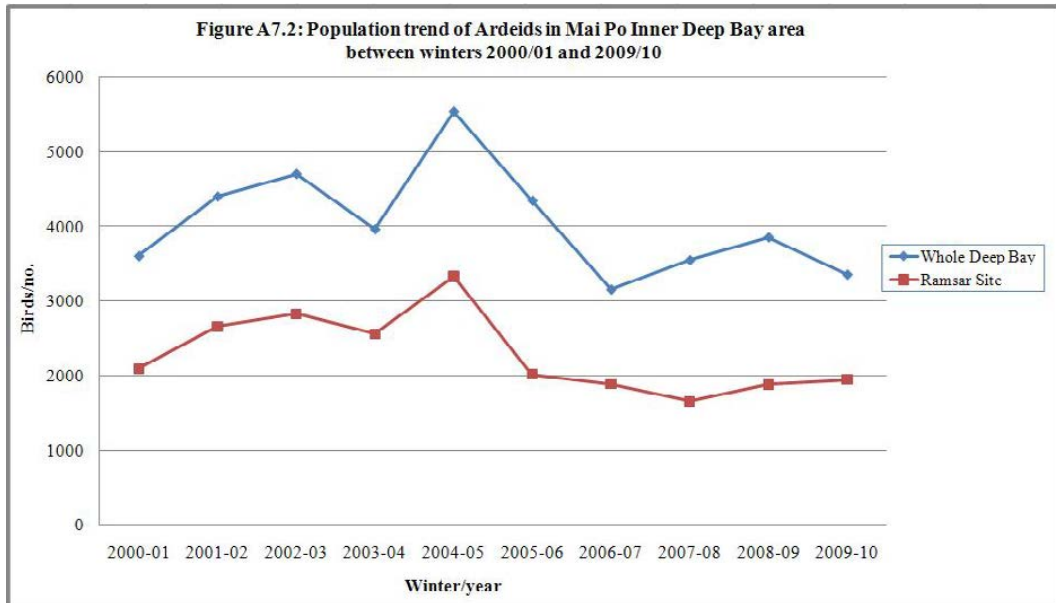
Every winter thousands of waterbirds including migratory ducks, gulls, shorebirds, cormorants and egrets/herons are recorded in the Ramsar Site and Deep Bay area. As shown in Figure A7.1, the total winter peak counts had once been stabilized within a range around 60,000 individuals since the 2000/01 winter. The peak counts have reached the 80,000 and 90,000 individuals in 2006/07 and 2007/08 respectively. The peak number of waterbirds remained stable at 80,000 to 90,000 in 2008/09 and 2009/10 winters, and the number within the Ramsar Site ranged between 70,000 and 80,000 individuals. The dynamic of the major waterbird groups will be discussed in the following paragraphs.



Egrets and Herons

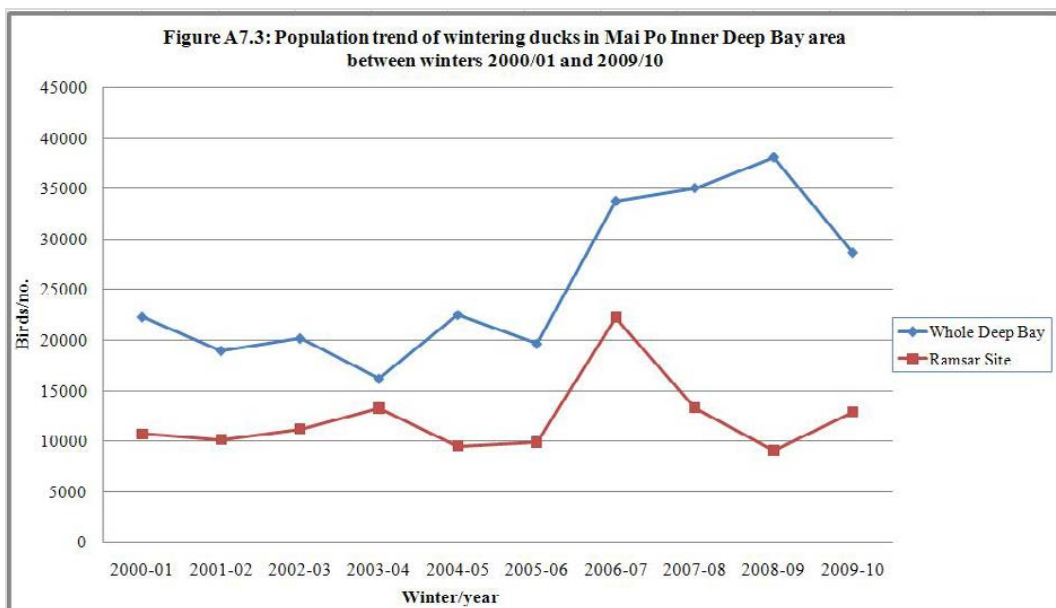
The main ardeid species commonly recorded in the Deep Bay area during winter period include Great Egret, Little Egret, Cattle Egret, Chinese Pond Heron, Black-crowned Night Heron and Grey Heron. These species comprise both residents and winter visitors. Little Egret is the most abundant ardeid species, followed by Grey Heron and Great Egret. The peak number of egrets and herons in the Deep Bay area fluctuated in the last decade, ranged from about 3,100 to 5,500 as shown in Figure A7.2. Apart from the monthly waterbird monitoring, there is an annual egretty survey covering the whole territory to monitor the number of nests of the

ardeid species in each egretty. Feeding habitats and foraging flight lines of the major egrettries would also be studied periodically (see Project O5 in Section 3 – Action Plan of RSMPII).



Ducks

The main wintering duck species commonly found in the Deep Bay area include Common Teal, Northern Pintail, Northern Shoveler, and Eurasian Wigeon. As shown in Figure A7.3, for the period between winters 2000/01 and 2005/06, the peak count of wintering ducks appeared to stabilise in a range of 16,000-22,000 individuals. The total peak count then dramatically increased to 33,000 to 38,000 individuals in winters between 2006/07 and 2008/09, and reduced to 28,700 in 2009/10 winter. The counts from the Shenzhen side made significant contribution to the increase since the winter in 2006/07. In addition to more bird counting efforts at the Shenzhen side, the increase may be attributed to other environmental or ecological factors which remain to be identified.

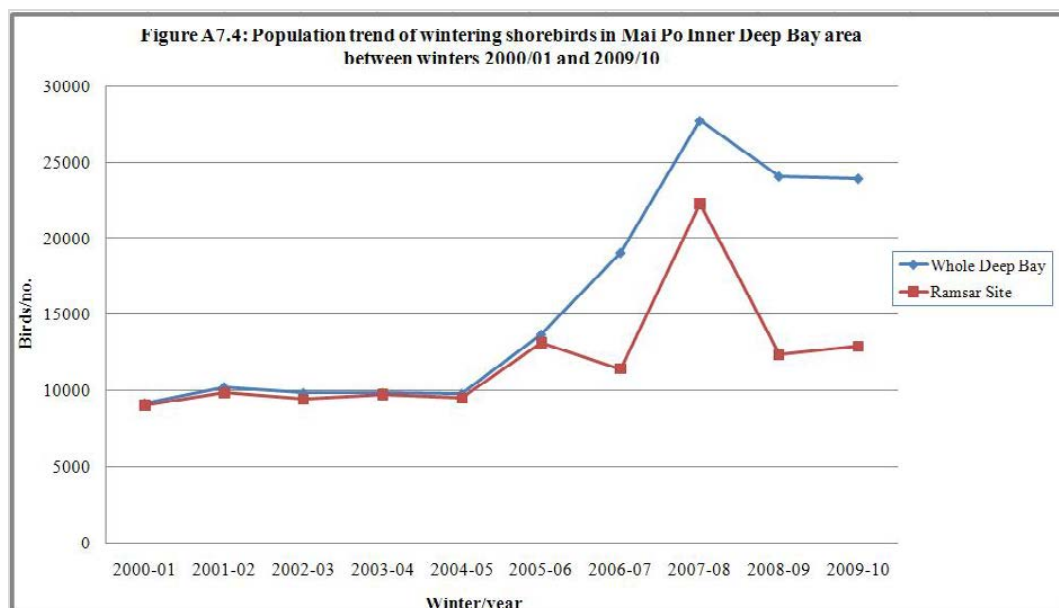


According to the waterbird monitoring results, it is observed that the composition of the total numbers of wintering ducks has significantly changed in the past decade. For instance, Common Shelduck *Tadorna tadorna*, which was one of the most abundant wintering duck species in Deep Bay, had dramatically dropped from over 1,200 individuals before the year 2000 to only six individuals in winter 2009/10. On the contrary, the peak wintering numbers of Tufted Duck *Aythya fuligula* had increased from 200 to 300 individuals before the year 2000 to about 6,740 in winter 2008/09 and 4,871 in winter 2009/10.

In the early 2000s, wintering ecology of Anatidae including habitat usage in intertidal mudflat, fishpond and *gei wai* have been studied. In order to provide clues to explain the recent change of number and species composition of wintering Anatidae, reviews on parameters such as food resources and habitat quality of the Deep Bay area for the wintering Anatidae are recommended to be carried out. The information would facilitate better management of the wetland habitats within the Ramsar Site (see Project O6 in Section 3 – Action Plan of RSMPII).

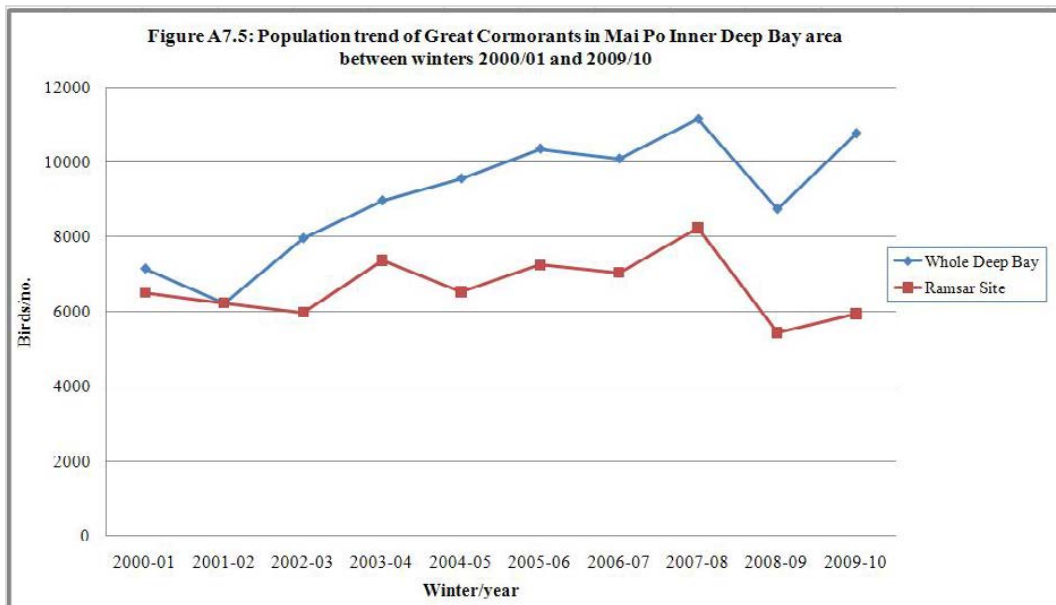
Shorebirds

In recent winters, the most numerous shorebird species recorded in the Inner Deep Bay area included Pied Avocet, Kentish Plovers, Dunlin, Common Greenshank, Eurasian Curlew and Marsh sandpiper. For the period between winters 2000/01 and 2004/05, the winter peak count of wintering waders appeared to stabilize at around 10,000 individuals. Since winter 2005/06, an increasing trend was observed and the total peak waders count have significantly increased, up to about 27,700 individuals in 2007/08 and slightly declined to 24,000 individuals in 2008/09 and 2009/10 (Figure A7.4). Apart from improvement in habitat conditions, species specific fluctuation also contributed to the increasing trend for waders. For example, there was a ten-fold increase of the wintering Pied Avocet in the last two decades, from 200-1,600 individuals in the 10 years between 1991-2000, to 11,000-16,000 individuals between 2006/07 to 2009/10.



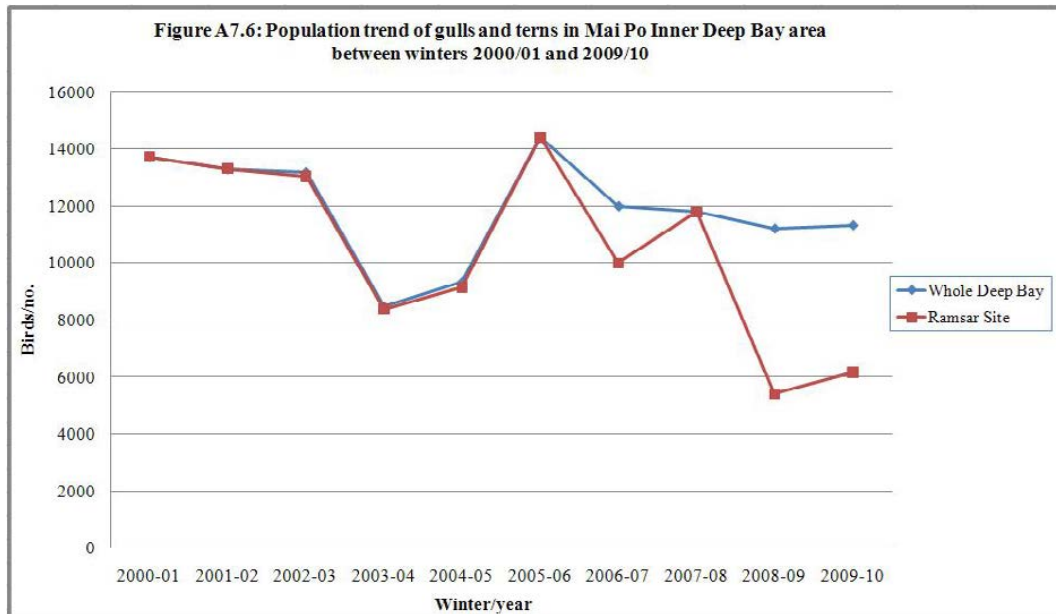
Cormorants

Great Cormorant is one of most numerous piscivorous waterbird species wintering in Hong Kong. An increasing trend is observed for the wintering population during the past decade from 7,000 to 11,000 individuals (Figure A7.5). Up to 80% of Cormorants in the Deep Bay area was recorded in the MPMNR and adjacent intertidal mudflat (Anon 2010). Apart from the existing measures to deter the Cormorant predation in the commercial fishponds, further studies on the ecology of the species would be conducted (see Projects O7 in Section 3 – Action Plan of RSMPII) so as to explore alternative measures to further address the fishpond operators’ concern (see Projects O8 in Section 3 – Action Plan of RSMPII).



Gulls and Terns

“Gulls and terns” make up a large part of the waterbird population in the Ramsar Site during winter period. Black-headed Gull is the main component of the bird group and over 10,000 individuals of the species could be found on the inter-tidal mudflat of the Inner Deep Bay area every winter. The peak counts within Deep Bay fluctuated between winters 2000/01 and 2005/06. Since 2006/07, the number of individual has become stable at around 11,000 individuals. (Figure A7.6). The reasons for the fluctuation of the numbers of the Black-headed Gull are unknown.



Way forward of the monthly waterbird monitoring programme

To keep track of the dynamics of waterbirds that visit the Ramsar Site, the current waterbird monitoring works in the Ramsar Site and Deep Bay area will be continued (see Project O1 in Section 3 – Action Plan of RSMPII). In parallel, the survey areas of the programme have been extended since the monitoring period of 2010-11 to enhance the representativeness of the waterbird monitoring. The additional survey areas included part of the area to the west of Tsim Bei Tsui and the isolated fishponds near the outlet of Shan Pui River. In addition, a review on the data collected in the past 10 years and the methodology of the monthly waterbird monitoring programme would be conducted (see Project O4 in Section 3 – Action Plan of RSMPII). Based on the statistical analysis of the bird count data, the status of the species of conservation concern in the local context would be reviewed and follow-up actions including research projects and species-specific conservation plans, would be proposed if necessary. The challenges to the monitoring procedure (e.g. poor visibility and unfavorable day-time tidal conditions for conducting surveys) would also be addressed. The findings of the review would be adopted to update and revise the monitoring scope and methodology and/or to propose research projects where appropriate.

Communication

During migration, shorebirds depend on a chain of staging sites along the flyway, where they temporarily stay to feed before undertaking the next leg of migration (Geering *et al.*, 2007). The Ramsar Site is one of the important staging sites (migratory stopovers) along the East Asian-Australasian Flyway. Hence, the Ramsar Site joined the “East Asian – Australasian Shorebird Site Network” and “The Anatidae Site Network in the East Asian Flyway” in 1996 and 2001 respectively to facilitate information exchange for migratory bird conservation work with other staging sites. In 2008, the two networks were merged to form the new “East Asian-Australasian Flyway Site Network” to continue the roles in coordinating communications and cooperations. The implementation of the monthly waterbird monitoring serves to comply with the obligation in the framework of the Network. In addition, AFCD maintains close liaison with

Futian National Nature Reserve in Shenzhen which shares the Inner Deep Bay wetland system and has recently commenced to strengthen communication with the wetland reserves in China especially those in the Pearl River Delta.

The effectiveness of conservation of waterbirds could be further enhanced through cooperation among the countries within the flyway. For instance, the success of conservation for the globally threatened Black-faced Spoonbill is a good example of international cooperation. Hence, to better understand the population change within the flyway, communication as well as co-operation between the countries of the flyway should be maintained and even enhanced (see O2 in Section 3 – Action Plan of RSMPII).

CONSERVATION PLAN FOR BLACK-FACED SPOONBILLS (BFS) IN HONG KONG

Conservation plans are useful planning tools for focusing and prioritising attention on species or species groups, in particular globally endangered species, for which concerted and co-ordinated action is often needed for their successful conservation (Boere *et al.*, 2006). For selected globally endangered species that have specific needs, development of single species action plans is encouraged.

Subsequent to the “International Workshop on the Conservation of Black-faced Spoonbill” held in Taipei, Taiwan, the first International Species Action Plan for BFS was published by BirdLife Asia Council in 1995 for the conservation of BFS. The Action Plan included general recommendations and country-specific recommendations for each range state. According to the country-specific recommendations, AFCD commissioned a consultancy study on the development of a Conservation Plan for the BFS in Hong Kong in 1998. The objectives of this study were to identify, prioritise and promote the actions necessary to maintain the population of the species in Hong Kong and to contribute to the conservation of its global population. A Conservation Plan for BFS was formulated based on the recommendations of the study in 2001.

The Conservation Plan aims at maintaining the Ramsar Site in a favourable environment for the wintering population of BFS and makes recommendations on species conservation, habitat management, monitoring and research, education and training as well as promotion of regional cooperation. The specific measures for the conservation of BFS in Hong Kong are elaborated in Section 2.2.1.8 of RSMPII.

In March 2010, BirdLife International and the Secretariat of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) published a renewed International Species Action Plan for BFS. The renewed Action Plan does not contain substantial new recommendations on top of those in the old plan. Instead, it attempts to highlight the new threats arisen in the past 10 years, including the over-concentration of the wintering population in a few wintering grounds which lead to an elevated risk from infection and disease outbreak, and the lack of protection and good management of many key sites (e.g. sites in Fujian Province, China). According to the plan, these threats would probably remain as the main challenges for the conservation of BFS as a whole in the next 10 years.

The steady increase in the number and the stable age structure of BFS in Hong Kong indicate that the local conservation measures undertaken for protecting the species and their habitats are effective. Also, the local Conservation Plan has already covered the recommendations of the renewed International Species Action Plan which has been implemented by the Hong Kong Government for nearly a decade. As the conservation authority of the territory, AFCD will continue the existing measures and closely monitor the wintering BFS population. In order to enhance the conservation of the species, further actions, such as satellite tracking and feeding ecology study, would be conducted. The local Conservation Plan would be updated based on the availability of the additional information on population dynamics, migratory routes and other relevant aspects (see Project O9 in Section 3 – Action Plan of RSMPII).

CORMORANT PREDATION

As Great Cormorant is a large piscivorous bird and their wintering population in Hong Kong has been on the rise during the past three decades, fishpond operators has raised serious concern about the predation of Great Cormorants in commercial fishponds since mid 1990s. A series of meetings was held between the representatives of fishpond operators, WWFHK and AFCD (then AFD) to discuss ways to reduce the Cormorant predation pressure on commercial fishponds. In order to maintain sufficient habitats for different types of waterbirds residing at the MPMNR, WWFHK adjusted the draining schedule so that the *gei wais* were drained down sequentially during the winter season to provide habitats of different water levels for waterbirds. Small fish and shrimps were not harvested for sale but retained in the *gei wais* as prey for piscivorous waterbirds. In addition, AFCD held regular meetings with WWFHK and the HK(NT) Fish Culture Association (香港新界養魚協進會) (HKNTFCA) so as to address specifically their concerns (see Project O3 in Section 3 – Action Plan of RSMPII).

Stocking of Trash Fish

To attract the Great Cormorants and other migratory birds to forage within the MPMNR and to reduce their predation in commercial fishponds, WWFHK has collaborated with AFCD to stock trash fish (mainly *Tilapia spp.*) to the *gei wai* at the MPMNR since the winter of 1997-98 with funding provided by AFCD. The supply of trash fish was arranged through HKNTFCA which coordinated the supply and delivery of trash fish at an agreed price with interested fishpond operators according to a confirmed schedule by WWFHK and HKNTFCA under the supervision of AFCD.

Since 2002, the trash fish stocking exercise has been adopted by the then KCRC (now MTRC) Spur Line project in the fishponds (15.5ha) at Lok Ma Chau as a measure to attract waterbirds feeding there. Fish stocking had also been occasionally undertaken in other locations (e.g. Hong Kong Wetland Park, mitigation wetlands of the Yuen Long Bypass Floodway project and Lok Ma Chau Public Transport Interchange) nearby the MPMNR for various purposes, including attracting the waterbirds.

Starting from 2011/12 winter, WWFHK decided to discontinue its involvement in the stocking exercise of trash fish in *gei wais* which has been running for over a decade as part of the integrated strategy to deal with the Cormorant predation issue. Without the participation of WWFHK in fish stocking, AFCD would

explore other effective measures to deal with the issue (see Project O8 in Section 3 – Action Plan of RSMPII).

Wiring of fishponds

Apart from the above complementary measures to minimize Great Cormorant predation from commercial fishponds, there was another measure in place which involved installation of wires (i.e. mono-filamentous line) over commercial fishponds to deter Great Cormorant predation.

In the mid 1990s, AFCD (then AFD) conducted field trials on the use of different grid arrangements of mono-filamentous line and the use of coloured strings and ribbons installed over commercial fishponds to study their effectiveness to deter Cormorants. The trials showed that the line grids were successful in deterring Cormorants. A guideline on the type of net, arrangement of grids and mesh size was prepared by AFCD which were distributed to fish farmers for their attention in particular before the wintering season. Another consultancy study, which was completed in 2001, recommended that the installation of “wire” (i.e. mono-filamentous line) over fishponds as one of the effective measures for reducing Cormorant predation in Hong Kong.

In the winters from 2001/02 to 2005/06, field trial studies were conducted with the assistance of HKNTFCA for pond-wiring of some total of 455 commercial fishponds which is about 37% of the total fishponds (i.e. total of some 1,240 fishponds in Deep Bay area in 2006). The results of the field trial studies revealed that pond-wiring has been effective in reducing Cormorant predation in commercial fishponds in Deep Bay area. The studies also revealed that most of the Cormorants were recorded in the MPMNR and intertidal mudflat of the Inner Deep Bay.

Subsequently, the overall effectiveness and conditions of the pond-wiring as a long-term measure for deterring of Cormorant predation in commercial fishponds in Inner Deep Bay area was reviewed in winter 2006/07 (Anon. 2008a). The review concluded that as the Cormorant abundance in fishponds was found to be low (only 1.4 birds per hectare) and further installation of wires at remaining unwired ponds may not be needed. However, it also recommended regular maintenance of installed wires (by individual pond operators on voluntary basis) would be necessary to keep up their current functions on reducing Cormorant aggregation in fishponds. AFCD has advised concerned fishpond owners to carry out associated maintenance/repair accordingly.

To sum up, monitoring of the wintering Cormorant population should be continued to keep updating the population trend, distribution and flight paths of the species in the Mai Po and Inner Deep Bay area by the routine monthly waterbird monitoring and studies on their diurnal movements (see Projects O1 and O7 in Section 3 – Action Plan of RSMPII). Apart from this, it might also consider to further explore any suitable alternative measures to deal with Cormorant predation in commercial fishponds (see Project O8 in Section 3 – Action Plan of RSMPII).

A8. DEVELOPMENT PRESSURE

The wetlands in the Inner Deep Bay area around the Ramsar Site are subjected to pressures from development including on-site habitat loss by land filling for housing, open storage, infrastructure projects, chemical or biological pollution. Disturbance from the increasing human population means including off-site traffic, industrial activities, scrap and refuse dumping, illumination, and noise from residential areas; and on-site disturbance from fishpond operations, habitat management works and visitors within the MPMNR, boat traffic, and illegal access in particular the mudskipper collectors in the intertidal mudflat. Disturbance caused by these developments (whether during construction or operation) can force shorebirds to abandon preferred roost sites for sites more remote from their feeding grounds and thus incurring additional energy expenses as well as reducing the time available for feeding at low tide (Geering, *et al.*, 2007).

Open Storage and Port back up facilities

At present, there are four land crossings between Hong Kong and the Mainland, i.e. Lok Ma Chau, Sha Tau Kok, Man Kam To and Shenzhen Bay, among them, Lok Ma Chau is the busiest control point in terms of cross-boundary vehicular traffic volume with a daily flow of around 32 000 vehicles. This port is also closest to the Ramsar Site and the Wetland Conservation Area (WCA). With the opening of the Shenzhen Bay Bridge in 2007, cross boundary traffic is expected to increase which also lead to increase in the demand for open storage or port back up facilities. According to the Planning Department, taking into consideration on the contribution of open storage and port back up facilities to our economy and other relevant issues including land use compatibility, availability of transport infrastructure, impacts on transport, environment, drainage and local residents, also the proximity to boundary control points, some 600 hectares of land in the North West and North East New Territories has been designated for open storage and port back uses. Relevant land use zonings to meet such purposes includes "Open Storage" ("OS"), "Other Specified Uses ("OU") annotated "Port Back-up Uses" ("OU(PBU)") or "Container Back-up Area" or "Container Storage and Repair Depot" or "Service Station" ("SS") and "Industrial (Group D) ("I(D)").

According to the four current Outline Zoning Plans covering the areas around Deep Bay area as follows:

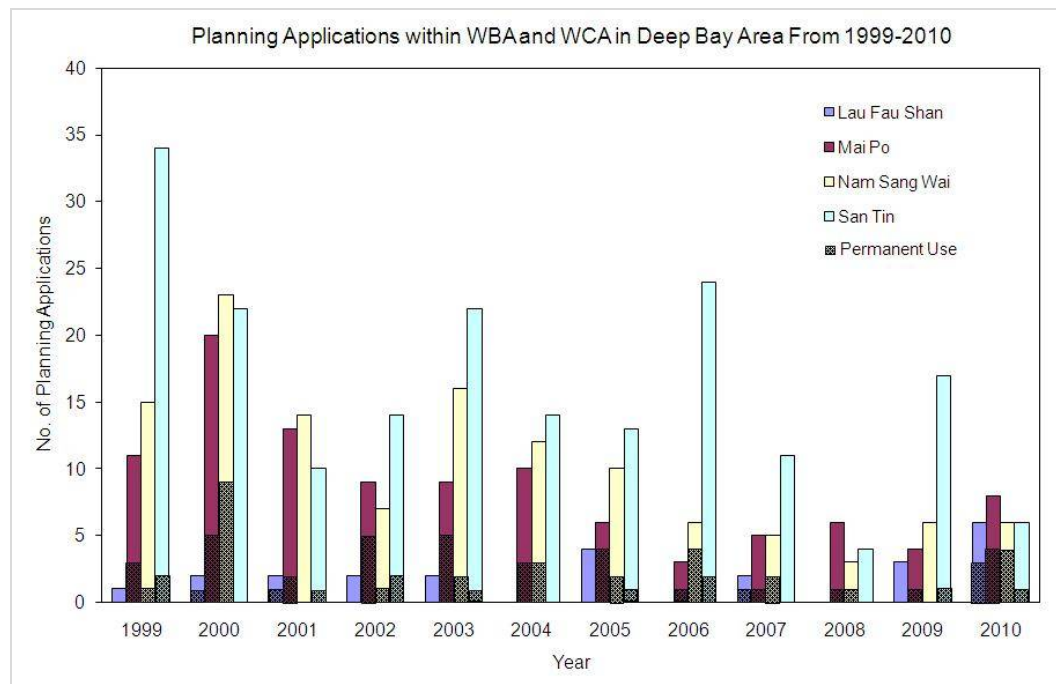
- LFS = Lau Fau Shan and Tsim Bei Tsui (S/YL-LFS/7);
- NSW = Nam Sang Wai (S/YL-NSW/8);
- MP = Mai Po and Fairview Park (S/YL-MP/6); and
- ST = San Tin (S/YL-ST/8).

A total of about 27 hectares of land are zoned "OS", "OU (SS)" and "I(D)" which could be used as container back-up area and open storage space for containers around Deep Bay. Nevertheless, no such land uses are found within the WCA and even when they exist in the Wetland Buffer Area (WBA), they are restricted to the landward side only. In order to meet the needs of the trade and the increasing demand following the opening of the Shenzhen Bay Bridge, additional land for open storage and port back up facilities are earmarked in the Ngau Tam Mei and Ha Tsuen area to meet the demand.

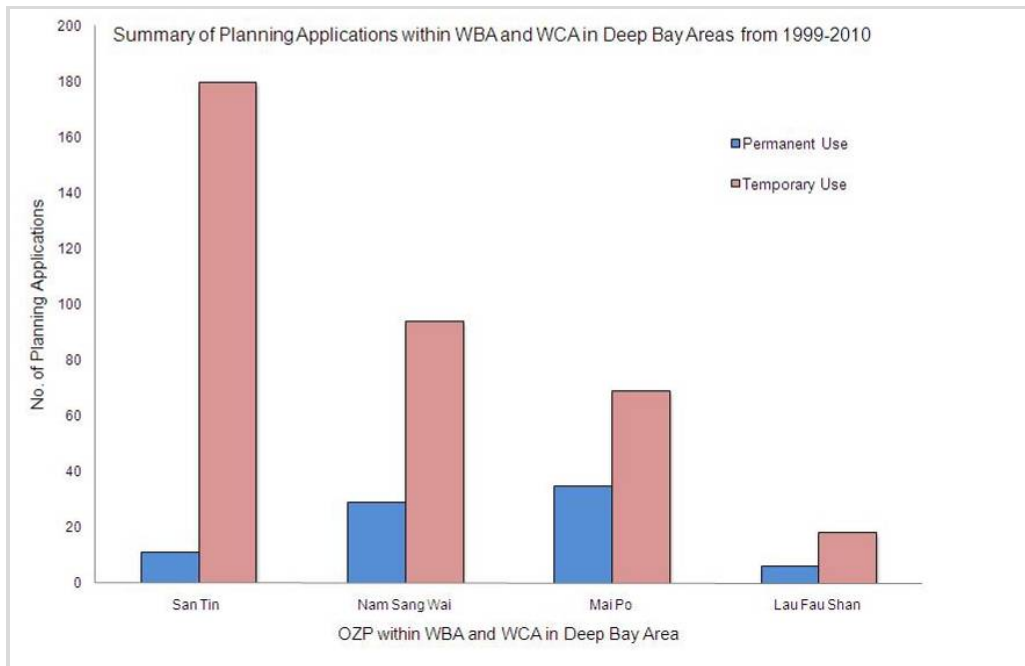
Residential Development

In the pipeline, known large scale development proposals in the Inner Deep Bay include residential developments at Wo Shang Wai, Fung Lok Wai, Yau Mei San Tsuen, Nam Sang Wai and Tin Fook Wai. There are also other smaller scale residential developments including New Territory Exempted Houses. These development proposals are subject to the development control under both the Town Planning Ordinance (TPO) and the Environmental Impact Assessment Ordinance (EIAO) as appropriate.

A summary of the planning applications under the TPO within the WBA and WCA in the regions covered by the four OZPs from 1999 to 2010 are summarized and reviewed. There are applications for reclamation of fish ponds for residential developments, open storage areas and other development activities around the Inner Deep Bay which are regulated under the TPO and might be rejected subject to no adverse impacts. Other public works include drainage related works, road works and the subsequent routine maintenance of the drainage channels in the surrounding area. As shown in the following figure, most of the applications are found in the San Tin areas while the least number of applications are found in the Lau Fau Shan region.



In the past 10 years, most of the planning applications are temporary in nature including open storage of vehicles, container trailer/tractor, construction machinery and material, workshop or warehouses uses. Applications for permanent uses included residential use, public facilities or for recreational, cultural or sport use. As shown in Figure below, most of the applications are temporary uses for 2-3 years for open storage related to containers facilities which are also mostly found in the San Tin area, which may due to the fact that the busiest control point Lok Ma Chau area is covered by the San Tin OZP. In some way it also reflected the great demand for port back-up facilities in the area.



Planning Guidelines to protect the Ramsar Site through land use control

“Study on the ecological value of fish ponds in the Deep Bay Area’ (the Fish Pond Study) completed in 1997 leads to a new era of conservation measures for the wetlands in the Deep Bay area which are dominated by fish ponds. The Fish Pond Study concluded that fish ponds contiguous to Deep Bay and the Ramsar Site have their intrinsic ecological values in terms of species richness and abundance and serve as feeding and roosting grounds for a wide range of bird species, in particular for herons and egrets. The Fish Pond Study concluded that the fish ponds outside the Ramsar Site serve similar functions as the wetland habitats inside the Ramsar Site and therefore they form an integral part of the Deep Bay ecosystem, it is difficult to justify removal of certain individual fish pond. The Study also found that larger pond areas and increasing distance to human disturbance are the main factors that contributed to the high bird usage.

The findings of the Study lead to the very important foundation for the conservation of fish ponds in Deep Bay: the precautionary approach to maintain no-net-loss of existing fish pond principle. This approach implies that there should be no decline in the ecological functions served by the existing ponds and any alternative uses should provide similar ecological functions as the surrounding fish ponds. Based on this principle, the WCA which mainly consist of about 746 hectares of contiguous fish ponds outside the Ramsar Site and the WBA which consist of a 500 metre-wide land strip outside the WCA (total land area about 1018 hectares) were established under the Town Planning Board Guidelines for Application for Developments within the Deep Bay Area under Section 16 of the Town Planning Ordinance” (TPB Guideline 12B), which specified the planning intention for conservation of ecological value of fish ponds in Deep Bay area and protection of the Ramsar Site as explained in Section 1 of RSMPII.

Protection Mechanism: Wetland Conservation Area (WCA)

Within the WCA, new developments are not allowed unless it is required to support the conservation of the ecological integrity of the wetland ecosystem or the development is an essential infrastructural project with overriding public interest. The control of land use within the WCA is through the Outline Zoning Plan mechanism. As explained in Section 1 of RSMPII, land uses and development around the Deep Bay area are regulated through the land use zoning system under the following four approved Outline Zoning Plans (OZPs):

- Lau Fau Shan and Tsim Bei Tsui (S/YL-LFS/7);
- Nam Sang Wai (S/YL-NSW/8);
- Mai Po and Fairview Park (S/YL-MP/6); and
- San Tin (S/YL-ST/8).

The ‘conservation-related’ zonings including “Site of Special Scientific Interest” (SSSI) and “Conservation Area” (CA) zones together cover about 72% of land within the Ramsar Site and WCA. The SSSIs within the Ramsar Site covers an area of 510 hectares and was discussed in detail in Section 1 of RSMPII. The land use zonings of the Ramsar Site are shown in Figure 2.1.

As for the CA zone, which cover 647 hectares of existing continuous and contiguous fish ponds within the WCA, has the planning intention to conserve the ecological value of the wetland and fish ponds which forms an integral part of the wetland ecosystem in Deep Bay area. In fact, this zoning group strictly restricted developments and therefore indirectly keeps the natural environment in its existing state. There are only a limited number of uses that can be carried out without the need to obtain the prior approval from the TPB, viz. column 1 uses. In addition, all development proposals in the conservation-related zonings, except for some minor works, are classified as ‘designated projects’ under the EIAO. As for application of uses under Column 2, prior approval from the TPB is also required. In the course of examining applications under this category, relevant government authority may request the development proponent to conduct environmental assessment and to identify suitable mitigation or compensation measures as necessary. Therefore, it is considered that since the majority of lands in the WCA are zoned as CA and SSSI, development threat to these ecologically important wetlands is considered low and the Ramsar Site could be protected from development and incompatible land uses.

Having regard to the precautionary principle of “no-net-loss in wetland” approach and that human intervention in the form of proper management to certain specific limits would maintain or even enhance the ecological values of the fish ponds, the TPB adopted a private-public partnership approach for developments on ecologically sensitive privately owned land within the WCA through zoning the area as “Other specified Uses (Comprehensive Development and Wetland Enhancement)”. Limited private development that involved minimum amount of pond filling on the landward side of the WCA is allowed in exchange for a long-term committed enhancement and management scheme of the remaining wetland within the development site. An application of such development proposal to the TPB should be in a form of comprehensive scheme to include a layout plan with supporting documents including an ecological impact assessment. Most important

of all, the application should include a wetland conservation and enhancement scheme, including its detailed design, maintenance and management plan with implementation details, arrangement of funding and monitoring programme to ensure the long-term management of the enhanced wetland. Presently, a total area of 405 hectares of fish ponds in three areas within the WCA are zoned for this kind of land use zoning including about 43 hectares at Fung Lok Wai within the Ramsar Site as follows:

- (i) Fung Lok Wai (partly within the Ramsar Site) (81.67 hectares) under Approved Lau Fau Shan and Tsim Bei Tsui OZP Plan No. Z/YL-LFS/7,
- (ii) Nam Sang Wai (151.03 hectares) under Approved Nam Sang Wai OZP Plan No. S/YL-NSW/8 and
- (iii) San Tin (171.95 hectares) under Approved San Tin OZP Plan No. S/YL-ST/8.

An example of residential development within OU(CDWEA) zone: Fung Lok Wai Development:

The fishponds at Fung Lok Wai within the Ramsar Site are privately owned and zoned as “OU(CDWEA)”. The proposed development at Fung Lok Wai involved residential development of some 4 hectares of land by filling the fish ponds on the landward side of Fung Lok Wai and a Wetland Nature Reserve (WNR) of 76 hectares. About half of the proposed WNR (i.e. 43 hectares) is within the ‘Private Land Zone’ (PLZ) of the Ramsar Site. The purpose of PLZ in the Ramsar Site is to recognize the existing legal status of the private land. It is intended to obtain and maintain cooperation of the owners concerned to conduct their management in an ecologically sustainable manner consistent with the purpose of the surrounding or adjacent management zones.

Based on the EIA carried out for the proposed development, compensation for the 4 hectares of habitat loss will be achieved through reconfiguration and enhancement of fishponds in the WNR. The proposed WNR would be managed as a nature reserve with fish pond operation continued in most part of the WNR while some other fish ponds would be converted to a complex of freshwater marsh. The objective and design principles would achieve no net loss of wetland area and the wetland functions would also be enhanced for use of wildlife. For the portion of the proposed development within the Ramsar Site which is part of the WNR, it is generally in line with the management objective of the Ramsar Site for conservation of wetland.

Its EIA report was approved with conditions on 27 November 2009 under EIAO.

Wetland Buffer Area (WBA)

As explained in Section 1 of RSMPII, in the outer region of the Ramsar Site within the WBA (1093 hectares in area), various kinds of land use zonings are found. Unlike the zonings found within the WCA which are intended for conservation, the zonings within the WBA could be categorized into (a) Non-development zonings which included Green Belt (GB) and Open Space (O) and accounted for about 21% (227.6 hectares) of the areas within the WBA. They are not intended for development but wetlands within such zoning are subjected to impacts arising from small scale development allowed in this zoning group such as picnic areas,

camping ground and barbecue spots. The second group of zoning (b) Development zonings included Residential (R), Industrial (I), Commercial (C), Government, Institution or Community (GIC), Comprehensive Development Area (CDA), Open Storage (OS), Recreation (REC) and various Other Specified Uses (OU) for public utilities projects like sewage treatment plant or service stations etc. This group of land uses zoning accounted for 32% (353.4 hectares) of the WBA would result in some wetland loss as they are intended for development.

Similarly, wetlands under the third type of zonings (c) Village Type Development zone which is intended for construction of new village house (NT exempted houses) accounted for 17% (186 hectares) of the WBA will also be lost. However, most of the wetlands under the V zone within the WBA are already degraded, disturbed or lost.

There is also a small piece of land (20 hectares) near Shan Pui Tsuen which is zoned 'Undetermined' as the site has been subjected to impacts from the Yuen Long Bypass Floodway project which has been completed in 2007. Developments in this area are also subjected to planning approval but the site has already been degraded.

In a glance, about 50 % of land within the WBA is zoned for Development zoning and Village type development. However, it should be noted that a substantial amount of fish ponds have already been lost over the past 20 years through pond filling for use as open storage, workshops, car parks or container/trailer parks which are regarded as degraded and most of the group (b) and (c) types of zonings are located in these degraded areas. In fact, in order to provide the incentive for restoration of degraded wetlands that are adjoining the existing fish ponds and to encourage the phasing out of sporadic open storage and port back-up uses on degraded wetlands, four such areas within the WBA have been zoned as "Other Specified Use (Comprehensive Development to include Wetland Restoration Area)" "OU(CDWRA)". The degraded wetlands within such a zoning could be restored through comprehensive residential and/or recreational development to include a wetland restoration area and with buffer proposals to separate the development from and minimize its impact on the fish pond areas. A total of 121 hectares (11%) of areas are zoned under OU(CDWRA) zone which are:

- (i) Near Lin Barn Tsuen (17.14 hectares) under Approved San Tin OZP Plan No. S/YL-ST/8;
- (ii) Wo Shang Wai (25.88 hectares) under Approved Mai Po and Fairview Park OZP Plan No. S/YL-MP/6;
- (iii) Near Tai Sang Wai, Man Yuen Chuen and Wing Kei Tsuen under Approved Nam Sang Wai OZP Plan No. S/YL-NSW/8 and
- (iv) Area north of Shan Pui Road under Approved Nam Sang Wai OZP Plan No. S/YL-NSW/8 (a total of 78.44 hectares under the Nam Sang Wai OZP).

In these target areas, the development or redevelopment which requires planning permission would be developed in a comprehensive manner meaning that the applicant is required to submit a comprehensive development scheme which includes a layout plan with supporting documents similar to the requirement for application under the OU(CDWEA) zone for the consideration of the TPB. To be

in line with the rural settings of the area, only low-rise residential developments not more than 6 storeys and a maximum plot ratio of 0.4 would be allowed in this zone. For those disturbed areas abutting the WCA, the development should provide a wetland and visual buffer to separate the development from the WCA to minimize its impacts on the wetland and to restore some of the lost fish ponds to an appropriate form of wetland adjoining the WCA.

An example of residential development within OU(CDWRA) zone : Wo Shang Wai Development:

The proposed development consists of an area of 16.62 hectares for residential development and 4.74 hectares of restored wetland to compensate for the loss of 4.69 ha of seasonal marsh and freshwater marsh/reedbed. The proposed Wetland Restored Area (WRA) consists of a variety of wetlands like reed bed, marsh, open water of varying depths etc. The design of the WRA provides suitable habitats for a number of target species including waterbirds. Temporary impacts through habitat loss during the construction of the WRA are minimised by scheduling this construction work to be carried out early in the construction period, in order to reinstate wetland habitats within the Project Area within the first year of occupation.

The EIA report of the project was considered and approved by ACE with condition on 31 July 2008 and an Environmental Permit (EP) was issued on 9 September 2008. An application for variation of Environmental Permit was approved to allow slight adjustment of the WRA boundary and the finalization of the detailed design of WRA on 23 February 2010. A second application for variation of EP was approved to permit changes in the project site boundary due to the concurrent construction of Guangzhou-Shenzhen-Hong Kong Express Rail Link on 29 July 2010. In both applications for variation of EP, the overall area of wetlands habitats in the WRA remains the same as in the approved scheme.

The planning application of this development was also approved by the Town Planning Board with conditions on 9 September 2008. The project proponent is attempting to fulfill the planning conditions.

OU(CDWPA)

A third type of 'Other Specified Uses' is found in an area of 8.31 hectares near Yau Mei San Tsuen located to the south of Palm Springs which is within both the WCA and WBA. This area is zoned OU(Comprehensive Development and Wetland Protection Area) ("OU(CDWPA)") under the approved Mai Po and Fairview Park OZP (S/YL-MP/6) with the planning intention to allow consideration of comprehensive low-density residential development or redevelopment provided that all existing continuous and contiguous fish ponds on site are protected and conserved in order to maintain the ecological integrity of the Deep Bay wetland ecosystem as a whole. The 'No-net-loss in wetland' principle shall also apply in this zone. Development or redevelopment within this zone should involve no pond filling and no decline in wetland function of the fish ponds. The requirements for submission of technical reports are similar to both the OUCDWEA and OUCDWRA zones.

Protection mechanisms provided by EIAO:

Developments within the conservation zonings viz CA, SSSI etc, except for some minor works, are classified as ‘designated projects’ under the Environmental Impact Assessment Ordinance (EIAO). Residential developments within Deep Bay Buffer Zone 1 or 2 (which are more or less same as the alignment of WBA and WCA) are designated projects under the EIAO. Under the EIAO, the proponent of a designated project is required to assess and mitigate all possible adverse environmental impacts arising from the project. In case ecological impacts are identified, mitigation measures to be implemented to ensure that the proposed development would not result in any significant residual impacts, should include, in the order of priority, avoidance of impacts, minimization of impacts, and compensation for loss of ecological functions. AFCD works closely with the Environmental Protection Department in the implementation of this statutory EIA mechanism to protect sites of high ecological value.

The current development control mechanisms of planning application and EIA allow involvement of the public including environmental Non-Governmental organizations, local communities and academics.

As revealed from the above, developments in the surrounding area of the Ramsar Site (i.e. WBA and WCA) are subjected to stringent control under the measures including the ‘no-net-loss in wetland’ principle as set out in the TPB guidelines and statutory requirements as set out in TPO and EIAO. AFCD is responsible for providing expertise advices and comments from the ecological and wetland wise use perspectives on the technical reports prepared by project proponents as required under the TPO and EIAO to make sure that any adverse impacts on the Ramsar Site are properly addressed and mitigated. AFCD shall continue to take this role to make sure that relevant statutory requirements from the wise use of wetlands perspective are met. See Projects W2, W4, W5, W6 & W7 in Section 3 – Action Plan in RSMPII.

A9. WATER BORNE POLLUTION

The water and sediment quality of Inner Deep Bay is largely influenced by the discharge from Pearl River, Shenzhen River and channels in Hong Kong. Over the past twenty years, rapid urban developments in Shenzhen and the livestock farms and unsewered villages on the Hong Kong side of the northwestern New Territories have seriously affected the water quality of the Deep Bay area. This has resulted in poor water and sediment quality in Inner Deep Bay. A panel of mitigation measures is in place at both sides, attempting to address the issues, e.g., buying off farm licence, provision of sewer for unsewered villages and improvement in capacity of existing wastewater treatment plant (Hong Kong side); rectification of sanitary and surface water sewer networks, construction of waste water treatment plants (Shenzhen side). While remaining poor at the moment, the water quality of Inner Deep Bay is expected to gradually improve over time.

Water Quality

Baseline Ecological Monitoring Programme (BEMP) indicates that the open waters in Inner Deep Bay is contaminated with wastewater discharge containing high levels of nutrients as revealed by low dissolved oxygen, high biochemical oxygen demand, ammoniacal nitrogen, total Kjeldahl nitrogen, ortho-phosphate, total phosphorus, chlorophyll a and suspended solids. Taking the gradients of ammoniacal nitrogen, total Kjeldahl nitrogen and BOD₅ in Inner Deep Bay into account, the pollutants come from both Shenzhen River and Shan Pui River. Such chemical environment will pose a long-lasting impacts on the sediment characteristics, such as the low availability of oxygen in sediment, accumulation of nutrients, high availability of toxic metals, and the composition of benthic infauna that are an important food sources to waterbirds.

There has been increasing evidence that Mai Po Marshes and Inner Deep Bay ecosystem was under threat from a range of contaminants. In particular, high levels of chlorinated pesticides in the marine sediments around the Deep Bay and various types of wastes and wastewater, which are heavily polluted by domestic, industrial and livestock waste as well as agrochemical wastes. In fact, the inputs from the heavily polluted nearby streams, have also been of major concern to long-term sustainability of the internationally important Mai Po and Inner Deep Bay ecosystem (De Luca-Abbott *et al.*, 2001). Besides, De Luca-Abbott *et al.* (2001) also reviewed that about 58% of the carbon input into Deep Bay originates from anthropogenic sources and the decline of water quality has led to the contamination of many aquatic and terrestrial organisms in the area.

On the other hand, chlorophyll a concentrations are much higher in *gei wai* than in the open waters, indicating much stronger eutrophication supporting active growth of algae, particularly the availability of nitrogen and phosphorus. It is apparent that the clarity of water in *gei wai* is responsible for the algal growth. This phenomenon is due to relatively infrequent water exchange in *gei wais*, resulting in settlement of suspended solids which are abundant in the open waters, where the growth of algae and phytoplankton is comparably lower. Water quality monitoring under the BEMP will be continued (see Project M2 in Section 3 – Action Plan of RSMPII).

Sediment Quality

The low redox potential of sediment indicates an anaerobic environment due to heavy loading of organic materials, as revealed from total organic carbon, total kjeldahl nitrogen, total nitrogen, total phosphorus and total sulfide, and high decomposition activity by the microorganisms. The levels of cadmium and arsenic are also high in certain monitoring seasons and deserve our attention.

The short supply of molecular oxygen and high levels of nutrients limit the establishment, biodiversity and community structure of benthic infauna. The major infauna groups are oligochaete and polychaete, they are low in biodiversity but are high in abundance and tolerant to pollution.

Risk assessment

AFCO commissioned a consultancy study to examine the levels of the 12 persistent organic pollutants (POPs) listed under the Stockholm Convention and Polybrominated diphenylethers (PBDEs) which is expected to be controlled under the convention soon in the eggs of ardeids nesting in Hong Kong, including two egretty in Deep Bay, namely Mai Po Village and Mai Po Lung Village (Lam, 2008). In this study, the ecological risks of selected POPs where critical effects concentrations are available in the literature were further assessed.

According to the assessment, PCDDs/DFs, DDE and PBDE99 were found to have potential causes for concern. PCDDs/DFs might cause abnormalities in hatchlings in a minor proportion of the population, or growth depression, depending on the methods of interpretation. Exposure to DDE in eggs might cause a reduction in the survival of young. There are potential hazards to ardeid populations from oxidative stress due to BDE99 in eggs. However, the study also noted that annual egretty survey syndicated an overall increasing trend of the nest counts of the Ardeids in Hong Kong including those in the Deep Bay colonies which form the largest share in Hong Kong. Further studies are needed to regularly monitor the levels of POPs in the ardeid nesting populations and to elucidate the interplay between the POPs levels and the breeding success of the Ardeids in Deep Bay and other parts of Hong Kong.

As Hong Kong is also a contracting party of Stockholm Convention, EPD has their own action plan in this regard. We could have a regular monitoring covering the whole territory should be in place at a 5-10 year interval) (see Project M5 of Action Plan in Section 3 of RSMPII).

A10 CONSERVATION AND WISE-USE OF WETLAND

The “Wise Use” concept is the centre of the philosophy of the Ramsar Convention. The most updated ‘wise use’ definition is "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development". As described by the website of the Ramsar Convention on Wetlands, wise use has at its heart the conservation and sustainable use of wetlands and their resources, for the benefit of humankind. This section illustrates the measures that facilitate the conservation of the Deep Bay Wetlands with emphasis on the application of “Wise Use” concept.

Fish Pond Culture

Fish pond operation is regarded as the major wise use of wetland in the Ramsar Site. The commercial fishpond culture in the Northwest New Territories has been practiced since the 1930’s, serving as the major supply of freshwater fish for local consumption. The Study on the Ecological Value of Fish Ponds in Deep Bay Area completed in 1997 has confirmed the unique international and regional ecological importance of the fish pond system in the Deep Bay area particularly to the ardeids. Their importance is exemplified when they are drained for maintenance in the winter. In the traditional practice, pond operators would leave the small fish and invertebrates which have no economic values on the drained ponds, providing waterbirds especially ardeids an opportunity for foraging.

However, in the mid 1990’s, the freshwater fish market in Hong Kong was challenged by the increasing import of the cheaper freshwater fish from Mainland China. In facing the price challenge, many pond-fish farmers intensified the management regime by more frequent harvest without complete drain down of their ponds, or converted the coastal fishponds to monoculture of brackish species such as giant grouper and scat. There are also many fish farmers who have left the industry and abandon their ponds because they suffered financial difficulties or they are too old to continue with their business. In fact, a lot of fish farmers in the Deep Bay are over 60s but very few younger generations in Hong Kong are willing to practice in this industry. The abandonment of the fishponds may reduce the opportunities for waterbirds to feed in drained fish ponds in winter. At the same time, Cormorant predation has been a long-term problem and received more attention from the fish farmers since 1990’s.

Despite changes in pond fish farming practices in recent years, the size or coverage of fish ponds in the Inner Deep Bay region did not change or decline since the designation of the Ramsar Site in 1995. Enhancement in communications with fish pond operators and private land owners are necessary for the means of/alternatives as appropriate for maintenance of the fishponds so that the long-term sustainability of the habitat which is part of the wetland ecosystem would largely be maintained. Measures to sustain pond fish farming practices in the long term include (i) improvement of management practice of fish ponds, (ii) partnership with NGOs and fishermen to carry out fish pond operations which also serve as education/ training activities, (iii) the provision of technical advice and setting up of trials on wiring and other measures in fish ponds to deter cormorants, and (iv) private-public partnership approach to provide incentives for private developers to carry out long-term management of fish ponds (or wetland)

within their development site for conservation purposes. These measures are summarized in the following paragraphs.

Improvement of Management of Fish Ponds

AFCD introduced a voluntary Accredited Fish Farm Scheme in mid 2005. Fish farms that participate in this scheme are required to adopt a set of 'best aquaculture practices' so as to raise the overall environmental hygiene standards of the farms and the quality of cultured fish. Before the cultured fish are sold in the market, AFCD conducted a series of quality assurance tests, including analyses of drug residues and heavy metals in fish, to ensure that all cultured fish meet food safety standards.

In addition, AFCD has promoted the quality of local aquaculture farms by implementing a Voluntary Registration Scheme since early 2007 for local pond fish farms. Improved culture techniques and good management practices were introduced to farmers through seminars, on-farm demonstrations and advisory leaflets. Through these measures, it is hoped that the pond fish farming industry, in particular those fishponds in the Ramsar Site could be sustained in the future.

These Schemes aim to enhance the competitiveness of the local aquaculture industry and are further discussed in Section 2.3.2.2, RSMPII.

Improvement of Culture Practice - Trials of New Fish Species

AFCD has introduced some new fish species that are suitable for local rearing to the fishermen. In 2004, the Department introduced Jade Perch to Hong Kong. After a few years of study, the species is found to be adaptable to the local culture environment, disease-resistant and could be sold for a higher market price. Furthermore, it could grow to marketable size in about six months and could be harvested before the overwintering waterbirds arrive Hong Kong. As of 2010, the Department successfully hatched fish fry of Jade Perch from broodstocks in Au Tau Fisheries Office for 18 Accredited Fish Farms which have joined a study with AFCD to further evaluate the culturing conditions, economic values and overwintering of the species in Hong Kong.

Organic fish farming

In 2009, AFCD developed a code of practice for organic fish farming in Hong Kong with a view to coping with the demand for safe and healthy food. Practical guidelines are in preparation to facilitate interested fish farmers to engage in organic aquaculture. In February 2011, two fish farms in Deep Bay were awarded Organic Aquaculture Certification by the Hong Kong Organic Resource Centre of Hong Kong Baptist University. To obtain the Certification, fish farms need to meet certain organic aquaculture requirements regarding their cultivating environment, species, feeds, health treatment, transportation and slaughtering. In organic aquaculture cultivation, plants around the ponds must be free from chemical fertilizers and pesticides. No genetically modified items should be placed in the pond, to avoid any kind of contamination. Fish farmers usually choose organic feeds, but they can also place algae and shrimps in the ponds as and when necessary to create an eco-chain for a diversified array of nutrients to remain and circulate in the ponds. The first batch of organic freshwater fish to be introduced to the market will include grey mullets, bighead carps and grass carps. Given the higher capital costs for operating organic fish farms, the fish price will

be one- to two-folds higher than that from non-organic practice. Nevertheless, farm operators are optimistic that organic fish will secure a market share and the revenue will also be higher.

Cormorant Predation

Great Cormorant is a large piscivorous bird wintering in Hong Kong from October to March. During the peak time in January, some 7,000 – 9,000 Cormorants came roosting and feeding in the Ramsar Site and its vicinity. It has been a concern of fishpond farmers that wintering Cormorants would predate fish in their commercial fishponds. In this connection, there are regular meetings among AFCD, WWFHK and the HK (NT) Fish Culture Association (香港新界養魚協進會) to discuss ways to address the concern. All along, AFCD has implemented three complementary measures to minimize Cormorant predation from commercial fishponds, i.e.

- a) stocking of trash fish in the Ramsar Site;
- b) enhancing the foraging ground for waterbirds in the MPMNR; and
- c) deterring Cormorant by setting up wirings and other measures over commercial fishponds by pond operators.

The issue has been reviewed in details in A7 in Part A and Section 2.3.2.2, RSMPII.

Partnership between NGO and Fish Farmers

In 2006, WWFHK launched a five-year community-based wetland conservation project with the aim to conserve the fish ponds around the Inner Deep Bay area. The scheme involved signing management agreements with fish farm operators so that they have to continue to manage their fish ponds in a way to maintain their ecological values. Through a fish pond adoption scheme from public donation and WWFHK's corporate members, the participating public would become the 'foster parents' to the fish ponds. The donation would provide some financial incentives to local fish farmers and they are required to follow the prescribed management methods to farm their fish ponds which are beneficial to wildlife in particular to waterbirds.

In 2007, WWFHK launched a scheme for development of a new business model for farming 'eco' fish. It is an initiative to form Management Agreements with fishpond owners to carry out fish farming practices that can benefit both the local fish farming community and wildlife in a sustainable manner. The role of WWFHK was to assist the fish pond farmers to develop the new business model to locally produce the eco-friendly, organically-cultivated eco-fish so that the fish farmers can sell these fish at a higher market value. The scheme aims to help fishpond farmers around Deep Bay to manage pond-fish farming in the traditional manner and the sale of the fish after one year of cultivation in 2009 was reported to be encouraging.

Wise Use concept for Development in Wetland Conservation Area (WCA) and Wetland Buffer Area (WBA)

Apart from maintaining the pond fish farming in the Ramsar Site, the government adapted a "No-net-loss" in wetlands approach which implies that there should be no decline in the ecological functions served by the existing ponds and any alternative uses should provide similar ecological functions as the surrounding fish ponds. Based on this principle, a WCA which mainly consist of contiguous

fish ponds outside the Ramsar Site and the WBA which consist of a 500 metre-wide land strip outside the WCA were established under the Town Planning Board Guidelines for Application for Developments within the Deep Bay Area under Section 16 of the Town Planning Ordinance” (TPB Guideline 12B), which specified the planning intention for conservation of ecological value of fish ponds in Deep Bay area and protection of the Ramsar Site as detailed in A8 above. The planning intention of “Other Specified Use (Comprehensive Development and Wetland Enhancement Area)” on the relevant Outline Zoning Plans within the WCA permits limited low-density private residential/recreational development at the landward fringe of the WCA in exchange for committed long-term conservation and management of the remaining ponds within the development site under a private-public partnership approach. Similarly, areas that are zoned “Other Specified Use (Comprehensive Development to include Wetland Restoration Area)” encourage private sectors to restore degraded or lost wetlands in the WBA by allowing consideration of limited scale of development under the land use zoning. The examples of approved development in Fung Lok Wai and Wo Shang Wai as detailed in A8 above showed how a balance between conservation and development of wetlands could be achieved.

A11. CLIMATE CHANGE

Climate Change and Wetlands

Climate change is one of the most discussed issues in the recent decade. As early as 2002, the Scientific & Technical Review Panel (STRP) of the Ramsar Convention prepared a review report on wetlands and climate change and provided to COP 8 (Valencia, 2002) as an Information Paper (COP8 DOC.11, available at www.ramsar.org/cop8/cop8_doc_11_e.htm). The Resolution VIII.3 of COP 8 (Valencia, 2002) recognized the potentially serious implications of climate change for ensuring the continued conservation and wise use of wetlands and called upon Contracting Parties (CPs) to manage their wetlands in such a way as to increase their resilience to climate change and extreme climatic events. Since COP8 (Valencia, 2002) there have been a range of significant developments in the understanding of climate change impacts and the roles of wetlands, in particular for some wetland types, on climate mitigation and adaptation.

According to the most recent (i.e. the Fourth) Assessment Report released in November 2007 by the Intergovernmental Panel on Climate Change (IPCC), an intergovernmental scientific body specifically evaluate the science of climate change, there were observational evidences to show that many natural systems, including wetlands, are being affected by regional climate changes. Resolution X.24 of COP 10 (Changwon, 2008) summarized findings of the IPCC 4th Assessment Report and aware that based on growing evidences and observations, climate changes have effects on global warming, glacial retreat, water level rises, uneven precipitation rates, more severe storms etc. which inevitably have effects on hydrological systems and eventually affecting ecosystems to various degrees. There are studies showing that global climate change is likely to exacerbate the loss and degradation of wetlands which will not only lead to reduction in the ecosystem services provided to well-being of mankind, but also a reduction of the capacity of wetlands to mitigate impacts.

In fact, there is also increasing evidence to show that some types of wetlands play important roles as carbon sinks within plant communities and soil. They slow down carbon dioxide from being released into the atmosphere, this help to moderate climate conditions. Wetlands can attenuate the impact of climate change through the following ways:

- (a) Conservation and wise use of wetlands enable organisms to adapt to the climate change by providing connectivity, corridors and flyways along which they can move;
- (b) Marshes, floodplains and lakes can temporary store water and reduce peak flood flows in periods of extreme rainfall or glacier melt.
- (c) Mangrove forest, delta ecosystems or coral reefs form natural buffers against storms or salt water intrusion.
- (d) Wetlands store and release water slowly, it is particularly important during drought or insufficient rainfall.
- (e) Wetlands provide nurseries for coastal fisheries. For humans, wetlands provide sources of fish, food and building materials, as well as keeping floodplain farmlands fertile.

Resolution X.24 of COP 10 (Changwon, 2008) urges CPs of the Ramsar Convention to manage wetlands wisely so as to reduce the multiple pressures the

wetlands face and thereby increase their resilience to climate change with a view to reduce the impact of climate change. CPs should make sure that mechanisms are in place to maintain the ecological character of wetlands, particularly with respect to water allocations for wetland ecosystems.

In Hong Kong, the Hong Kong Observatory is responsible for translating the international climate change projection to the local context, which helped to predict the temperature and rainfall scenarios for the territory. According to their analysis of observed data, the climate change in Hong Kong could be attributed to the combined effect of global warming, emission of greenhouse gases and urbanization, and there are observed increase in the trend of temperature, rainfall, mean sea level, cloud amount and hours with reduced visibility. The consequences is that Hong Kong will suffer from more frequent heat waves, more storm surges, reduction in agricultural production, ecological and environmental imbalance, enhanced spread of infectious disease and more frequent floods and droughts. In 2008, the Environmental Protection Department started a study named "Study of Climate Change in Hong Kong – Feasibility Study" (Agreement No. CE 45/2007) with a view to provide scientific basis for the government to review and update the inventories of greenhouse gas (GHG) emissions in Hong Kong; formulate long-term strategies and measures for Hong Kong to mitigate GHG emissions and to adapt climate change, and also assess the cost-effectiveness of the proposed measures.

Since the major cause of climate change is the excessive consumption of energy and resources by human beings which lead to excessive emission of the GHG from power generation, the most direct and effective method would be energy saving and enhancement of the overall energy efficiency of our society. While the government have set up an Inter-departmental Working Group on Climate Change (IWGCC) comprising of 5 bureaux and 16 departments to co-ordinate, develop and promote the work in reducing greenhouse gas, for example, power companies are encouraged to take measures to maximize the use of natural gas in electricity generation, explore the use of renewable energy such as sunlight and wind; reduction in electricity consumption through improving efficiency and savings; less use of land transportation etc, environmental education on conserving our wetlands and natural environment is also important.

The theme of "World Wetlands Day 2010" is "Wetlands, Biodiversity and Climate Change". The Hong Kong Wetland Park organized a series of educational and promotional activities under this theme which are in line with Ramsar Convention's "Communication, Education, Participation and Awareness (CEPA)" programme to promote a wise use of wetland resources and the importance of conserving wetlands in combating the climate change effects. Educational activities include cooperation with the Hong Kong Observatory to publish articles in newspaper to educate the public on the interrelationship between climate change and well beings of man kind, public lectures, Bird Watching Festival, interactive dramas etc.

Besides, since a likely effect of sea level rises is the reduction in the area of mudflat in the Inner Deep Bay which will result in a reduction in the roosting and feeding grounds for wintering waterbirds, continuous monitoring of the size of mudflat in the Mai Po Inner Deep Bay Ramsar Site is essential. Also, as birds are

regarded as bio-indicator to the environment, and bird records have been used to show the effect of climate change, the waterbird monitoring programme would also be an essential programme to be continued.

PART B

MAI PO INNER DEEP BAY RAMSAR SITE MANAGEMENT PLAN II (RSMPII)

PREAMBLE

In September 1995, the Mai Po and Inner Deep Bay area was listed as a Wetland of International Importance (Ramsar Site) under the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention). Following the return of sovereignty in 1997, the Ramsar Convention continues to be applied to Hong Kong Special Administrative Region (Hong Kong SAR) through the Peoples's Republic of China (PRC) which joined as a Contracting Party since March 1992. This Ramsar Site is the seventh one of China.

In 1996, the government commissioned a study for the "Development of a Comprehensive Conservation Strategy and a Management Plan in Relation to the Listing of Mai Po and Inner Deep Bay as a Wetland of International Importance under the Ramsar Convention" (the Study) which was completed and adopted in 1997 for the implementation of the Ramsar Convention in Hong Kong SAR. The Study prepared a Ramsar Site Strategy and Management Plan (RSMP) which followed the format accepted internationally under the Ramsar Convention. The RSMP listed out basic site information of value, identify the key features, assess the natural and human-induced trends that may have management implications and set up the conservation management strategy and action plan for the managers of the Ramsar Site. The RSMP thus provided a general framework for long term conservation and wise use of wetlands in the Ramsar Site and has been implemented in Hong Kong SAR since 1998.

An overall review of RSMP has been conducted during 2008-09 as discussed in Part A. The RSMP has been renewed and referred as Mai Po Inner Deep Bay Ramsar Site Management Plan II (RSMPII) for continue implementation of the Ramsar Convention in Hong Kong SAR. To gather comments and opinions on the review and renewal exercise of the RSMP, AFCD has consulted 7 non-governmental organizations including Hong Kong Bird Watching Society, Green Power, Conservancy Association, Friends of the Earth, Tai Po Environmental Association, Kadoorie Farm and Botanic Garden, WWF Hong Kong as well as the Mai Po Management Committee under WWFHK. Furthermore, AFCD has presented to the Advisory Council on the Environment – Nature Conservation Subcommittee which is a statutory body to advise the Hong Kong Government on the nature conservation matters and to examine conservation proposals, including the management of the Mai Po Inner Deep Bay Ramsar Site. Comments gathered from the consultation process have been taken to further enrich the RSMP II where appropriate. The comments from consulted parties and responses from AFCD are summarized in Appendix XII.

The renewed plan has adopted the Goals and Strategies identified in the current Ramsar Strategic Plan which covers 2009-2015. Regular review under the monitoring programmes and review of the habitat management work in Mai Po Marshes Nature Reserve will also be carried out annually and regularly and that the current condition has been stable generally. Taking the consideration into account, unless there are indications of drastic changes detected under the regular reviews, it would be desirable to conduct an overall review of RSMPII within the next eight to ten years i.e. before 2018.

The government is committed to the implementation of the Ramsar Convention and conservation of the Ramsar Site. In this regard, the Agriculture, Fisheries and

Conservation Department (AFCD) is responsible for matters related to Ramsar Convention and overall conservation management of the Ramsar Site.

RAMSAR SITE MANAGEMENT GOALS AND STRATEGIES

The goals and long term objectives which delivers Articles 2, 3, 4 and 5 of the Ramsar Convention adopted in RSMP has been reviewed and are generally valid for RSMPII. In line with the Ramsar Strategic Plan 2009-2015 (Resolution X.1 adopted in (Ramsar COP 10)) which provided guidance on the focus of effort for implementing the Convention, RSMPII follows the goals (except goal 5)* listed in Ramsar Strategic Plan 2009-2015 that are relevant to and within the capacity of Hong Kong SAR for implementation are highlighted as follows:

GOALS

- Goal 1. Wise Use. (In delivery of Articles 3.1, 4.3, 4.4, and 4.5 of the Convention.)
- Goal 2. Wetlands of International Importance. (In delivery of Articles 2.1, 2.2, 2.5, 2.6, 3.1, 3.2, 4.1, and 4.2 of the Convention.)
- Goal 3. International cooperation. (In delivery of Articles 5 of the Convention.)
- Goal 4. Institutional capacity and effectiveness. (In delivery of Articles 6.7 and 8 of the Convention.)

(*Goal 5 of the Ramsar Strategic Plan 2009-2015 concerning “Membership” has been excluded as the goal “To progress towards universal membership of the Convention,” delivers Articles 2.4 and 9 of the Convention and is for action at the Secretariat, Standing Committee and Contracting Parties at the national levels.)

STRATEGIES/ OBJECTIVES

The detail strategies / objectives to achieve the goals are presented in Section 2 of RSMPII and the action plans are listed in Section 3 of the RSMPII.

SECTION 1. DESCRIPTION

1.1 GENERAL SITE INFORMATION

1.1.1 LOCATION

The Mai Po Inner Deep Bay Ramsar Site is located in the North West New Territories of Hong Kong SAR, lying between 22°29'N and 22°31'N and between 113°59'E and 114°04'E. It occupies the southern part of Inner Deep Bay, which itself forms the apex of Deep Bay, an eastern branch of the Pearl River estuary (see Figure 1.1).

1.1.2 GENERAL SITE DESCRIPTION

The Ramsar Site covers about 1,500 hectares. More than half of this comprises a shallow bay receiving input from five rivers so that the waters are generally brackish (salinity varies between the dry and wet seasons). The extensive estuarine intertidal organically-rich mudflats attract internationally important numbers of waterbirds during the winter, including threatened bird species such as Black-faced Spoonbill *Platalea minor*, Saunders's Gull *Larus saundersi* and Nordmann's Greenshank *Tringa guttifer*. About half of the area is reclaimed wetland, mostly empoldered since the early 1900s - originally for mariculture (oysters and shrimps) but now mainly for pond fish culture. The *gei wais* (tidal shrimp ponds) are within the Mai Po Marshes Nature Reserve (MPMNR) which has been maintained under conservation management and for biodiversity enhancement carried out on behalf of the government by the World Wide Fund for Nature Hong Kong (WWFHK) since 1983. The site supports regionally significant dwarf mangal and reedbed communities, which are homes to a huge diversity of wildlife. The mangal is the largest in the Pearl River catchment.

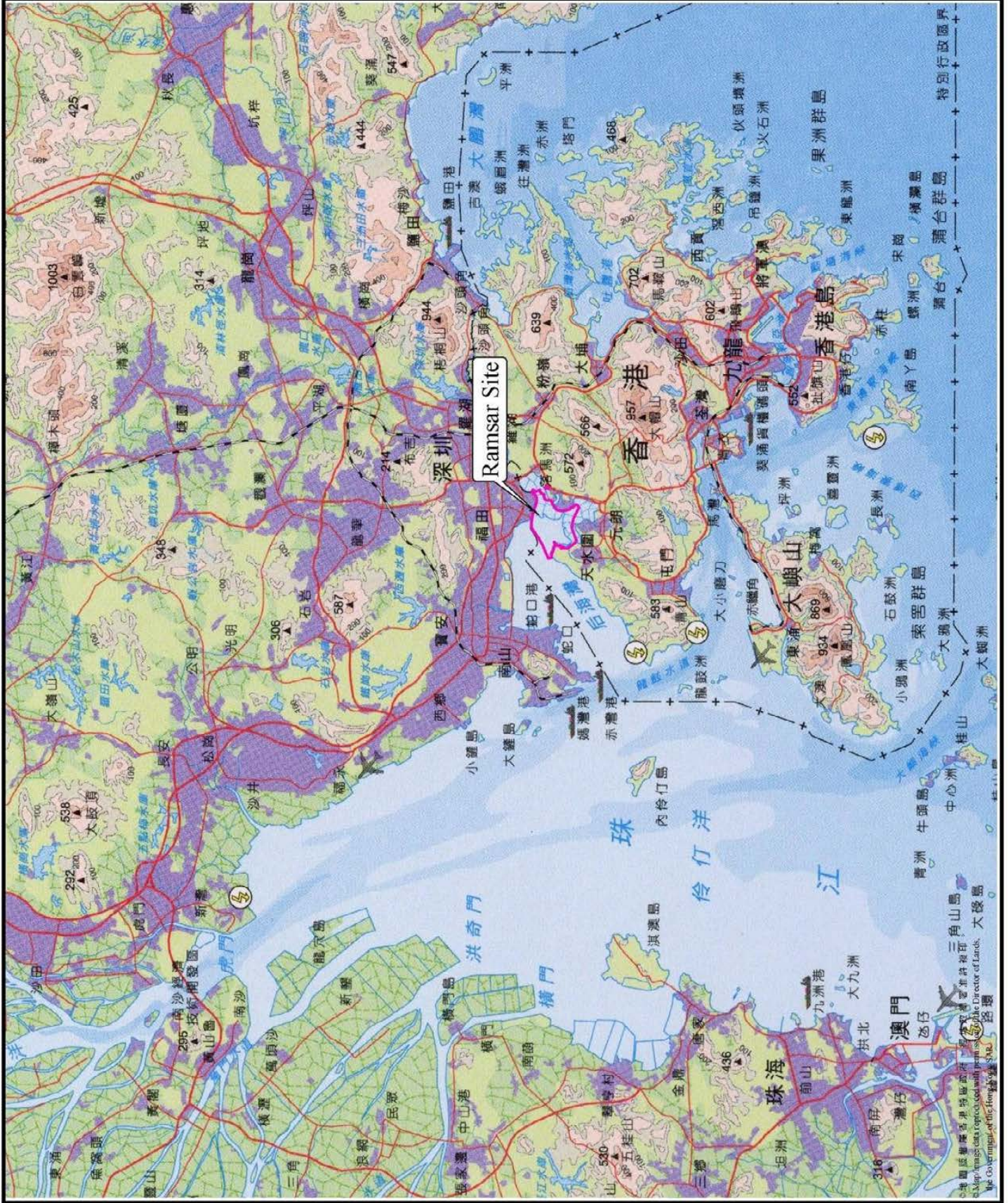
1.1.3 SITE BOUNDARIES, ACCESS AND TOPOGRAPHY

1.1.3.1 BOUNDARIES

As shown in Figure 1.2, the northern boundary of the Ramsar Site is formed primarily by the channel of the Shenzhen River, projected to the western tip of the Tsim Bei Tsui peninsula; from here the boundary follows the peninsula east to the promontory, then southwards and inland to include the ponds at Mong Tseng Wai. The boundary then proceeds southeast skirting Hong Kong Wetland Park (HKWP) and then curves eastwards, crossing the Shan Pui River opposite to the Yuen Long Sewage Treatment Works, following the north bank of Kam Tin River to a point about 500m south of Tai Sang Wai. After angling shortly to the northeast, the boundary continues in a northwesterly arc edging the Fairview Park estate to Pak Hok Chau. Thereafter, the boundary trends generally to the northeast, encompassing Tam Kon Chau, to Lin Barn Tsuen. Thereafter the boundary trends generally northwards and west along a channel draining into the Shenzhen River.

1.1.3.2 ACCESS

Public vehicular access to the eastern portion of ponds area is gained via the Castle Peak Road (running from Yuen Long to Sheung Shui) turning off west to a



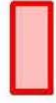
香港特別行政區政府 地政總署 二零一零年
 © Hong Kong Special Administrative Region Government 2010

Title
 Regional Location Map

DATE: Aug 2010 FIGURE No. 1.1

漁農自然護理處
 Agriculture, Fisheries and Conservation Department

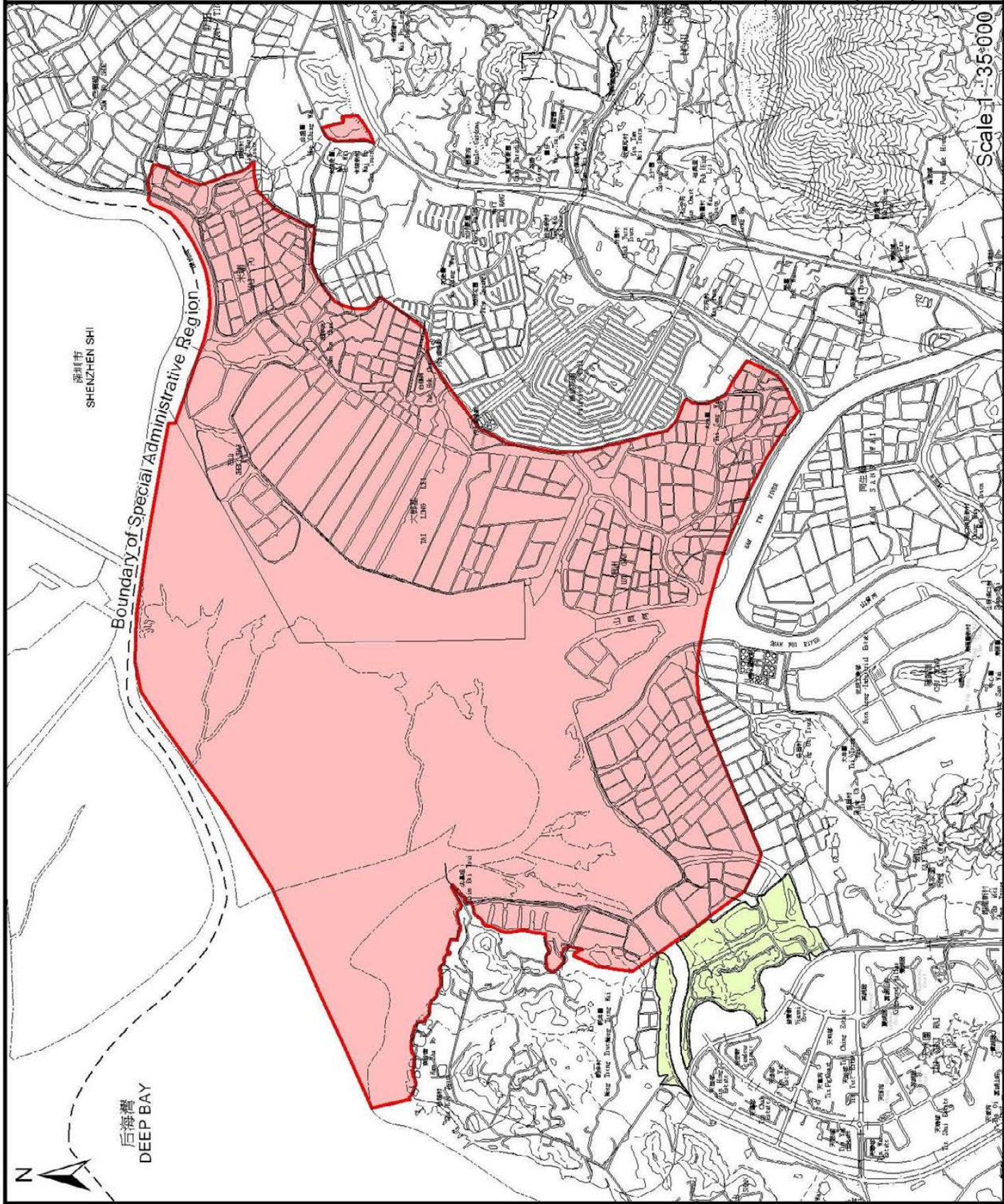
LEGEND



Ramsar Site



Hong Kong Wetland Park



香港特別行政區政府 地政總署 二零一零
Hong Kong Special Administrative Region Government, 2010

Mai Po Inner Deep Bay Ramsar Site
Management Plan

Title

Site Location map

DATE: Aug 2010 FIGURE No. 1.2



漁農自然護理處

Agriculture, Fisheries and Conservation Department

M_2010_147_B1.2

narrow Tam Kon Chau Road through the villages of Mai Po San Tsuen and Mai Po Lo Wai. For areas such as Tai Sang Wai and Lut Chau in the southern part of this eastern portion can be reached by a narrow Yau Pok Road which is connected to Fairview Park Boulevard off from the Castle Peak Road. (Note: Helicopter pads (mainly for police and emergency use) are situated at the Police's Pak Hok Chau Operational Base and the southern end of the access road in MPMNR).

The western coastal part is served by a narrow Deep Bay Road from Lau Fau Shan, which continues around the Tsim Bei Tsui peninsula as far as the mouth of the Shan Pui River.

MPMNR is within the Mai Po Marshes Restricted Area scheduled under the Wild Animals Protection Ordinance (Cap. 170). Access to MPMNR is restricted at all times of the year except holders of permits issued by AFCD.

1.1.3.3 TOPOGRAPHY

The Ramsar Site is a natural shallow estuarine bay lying within the Yuen Long Basin, oriented north-south at the edge of a range of steep, rugged hills rising to the peak of Kai Kung Leng (585 m) in the Lam Tsuen Country Park. A lower range of hills borders the southwestern part of the plain, with an elevation of 121m at Kai Shan.

1.1.4 MAP COVERAGE, AERIAL PHOTO AND SATELLITE IMAGERY

1.1.4.1 MAP COVERAGE

The Survey and Mapping Office (SMO) of the Lands Department holds maps covering the Ramsar Site in both digital and paper map format from scale 1:1,000 upwards (see Table 1.1).

TABLE 1.1: Topographic base maps for the Ramsar Site.

Scale	Coverage	Sheet Ref.
1:1000	Various sheets under sub-districts 2-SW and 2-SE maintained by the Lands Department	
1:5,000	Mai Po	2-SE-A
1:5,000	Inner Deep Bay	2-SW-B
1:5,000	Fairview Park	2-SE-C
1:5,000	Lut Chau and Tsim Bei Tsui	2-SW-D
1:5,000	Mong Tseng and Wetland Park	2-SW-C
1:20,000	San Tin	2
1:20,000	Yuen Long	6
1:50,000	Yuen Long	1

1.1.4.2 AERIAL PHOTO AND SATELLITE IMAGERY

SMO undertakes colour aerial photography of the area periodically at high altitudes and also keep archival photographs acquired since 1946 including occasional oblique views. The office maintains a photo inventory recording details of the available aerial photos. Satellite imagery that are available to the general public include the medium spatial resolution Landsat, medium (panchromatic) to high (multispectral) spatial resolution SPOT5, and the high spatial resolution Ikonos, Quickbird, WorldView-1 and WorldView-2.

1.1.5 LAND TENURE

1.1.5.1 GENERAL

The general land ownership pattern and statutory designations within the Ramsar Site and its surrounding areas is shown in Figures 1.3. The great majority of land within the Ramsar Site is government land but most fishponds have been leased or licensed to operators engaged in fish farming. Within the Ramsar Site, there are some 100 hectares of private land (i.e. the areas between Tam Kon Chau and Pak Hok Chau; at Lut Chau; and north of Ng Uk Tsuen/Fung Lok Wai). Most of the private land located within the Ramsar Site was granted under Block Government Leases* to existing owners by the Government in the early 1900s. The use of the land specified in the Block Government leases is usually residential or agricultural. In the surroundings there are brackish/freshwater fishponds, open storage, villages and residential areas. The land matters are administered by the Lands Department (LandsD) through the District Lands Office/ Yuen Long (DLO/YL). The land use planning and development is regulated under the Town Planning Ordinance (Cap.131) which is administered by the Planning Department (PlanD).

(*A Block Government Lease is a common lease granted for blocks of land contained within the same DD and comprising many lots and different landowners. Most of the private land located within the Ramsar Site was granted under Block Government Leases to existing owners by the Government in the early 1900s.)

1.1.5.2 MAI PO MARSHES NATURE RESERVE (MPMNR)

The MPMNR was scheduled as a Restricted Area under the Wild Animals Protection Ordinance in 1975. A brief history on the establishment and conservation management of the MPMNR is given in the Annex. There are 21 *gei wais* (i.e. *gei wais* 3, 4, 6-24) of about 226 hectares within the MPMNR which have been managed by WWFHK since 1984 on a short-term lease basis under Special Licences issued by the Lands Department. The key conditions in the Special Licence included that:

- the licence is granted for 1 year and thereafter is renewable on an annual basis, nominal for one dollar per year;
- the licence may be revoked by the Government upon three months' notice;
- the licence area shall not be used for any purpose other than as a nature reserve;
- approval for the erection of structures must be sought from the Government;
- compliance with the Buildings Ordinance, Town Planning Ordinance, and all ordinances, by-laws, regulations and rules in force in Hong Kong for the control of pollution (including air, noise, water and waste pollution), and protection of the environment is required;
- no cutting back, removal or setting back of any land within the licence area or any Government land adjoining the licence area is allowed except with prior approval from the Government; and
- no trees growing on the licence area or adjacent area shall be interfered with or removed without prior approval from the Government.

1.1.6 HONG KONG WETLAND PARK (HKWP)

The HKWP is located at the north-eastern part of Tin Shui Wai adjacent to the south-western part of the Ramsar Site and is a world-class conservation, education and tourism facility. The importance of the HKWP is its unique role in support of a wide range of conservation education activities and programme for the implementation of the communication, education, participation and awareness (CEPA) programme of the Ramsar Convention. Records of CEPA programme organized by HKWP are detailed in Appendix V.

The site of the HKWP is government land and was originally intended to be an ecological mitigation area (EMA) to compensate for the wetlands lost due to the development of Tin Shui Wai New Town. The development of the HKWP also enhanced the ecological function of the EMA. The HKWP has 10,000m² indoor exhibition halls and 61 hectares of outdoor restored wetland which serves to demonstrate the diversity of the Hong Kong's wetland ecosystem and highlights the need to conserve them. It presents an opportunity to provide an education and recreation venue with a theme on the functions and values of wetlands for the use by local residents and overseas visitors. In October 2005, the HKWP was designated as the HKWP Special Area under the Country Parks Ordinance (Cap 208) for the control, management and operation to be undertaken by AFCD as the Country and Marine Parks Authority. It was opened to public use in June 2006.

1.1.7 STATUTORY DESIGNATIONS AND PROVISIONS, AND PLANNING GUIDELINES

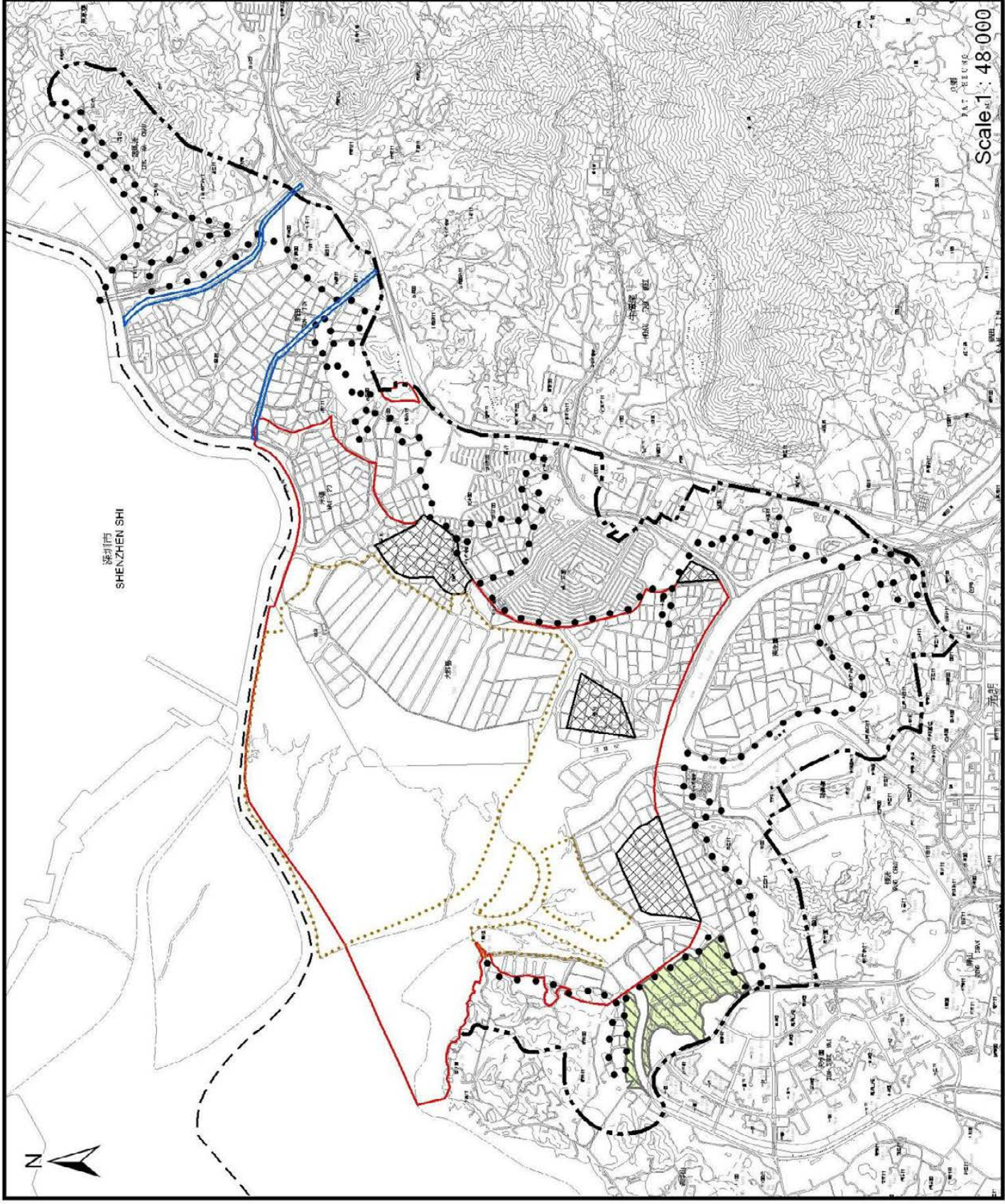
The statutory designations within the Ramsar Site and its environs are shown in **Figure 1.3** and **Figure 1.4** for conservation and protection based on a variety of different legislations:

- i) the listing of Restricted Areas under the Wild Animals Protection Ordinance (Cap. 170);
- ii) planning statutory controls (Outline Zoning Plans), constraints and guidelines (SSSI designations, Wetland Conservation Area and Wetland Buffer Area) under Town Planning Ordinance (Cap. 131);
- iii) access to parts of the Ramsar Site is controlled under the Public Order Ordinance (Cap.245);
- iv) water control zones in Deep Bay under Water Pollution Control Ordinance (Cap. 358);

Other statutory provisions relevant to the conservation and protection of the Ramsar Site are:










- i) the statutory environmental impact assessment (EIA) process and the requirement of environmental permits for designated projects specified under the Environmental Impact Assessment Ordinance (Cap. 499);
- ii) the protection of forests, plantations territory-wide provided under the Forests and Countryside Ordinance (Cap 96).

The detail of relevant provisions of the above mentioned Ordinances are in the following paragraphs.



Scale 1:48 000

LEGEND

-  拉姆薩爾濕地
Ramsar Site
-  野生動物保護條例第170章—附表六
Wild Animals Protection Ordinance
(Cap. 170) - Sixth Schedule
-  禁區 B
Restricted Area B
-  城市規劃委員會規劃指引所定的
后海湾濕地保育及緩衝區界線：
Deep Bay Wetland Conservation and
Buffer Areas Boundaries designated
under Town Planning Board Guidelines-
-  濕地保育區
Wetland Conservation Area
-  濕地緩衝區
Wetland Buffer Area
-  香港濕地公園
Hong Kong Wetland Park
-  私人土地
Private Land
-  排水保留區
Drainage Reserve

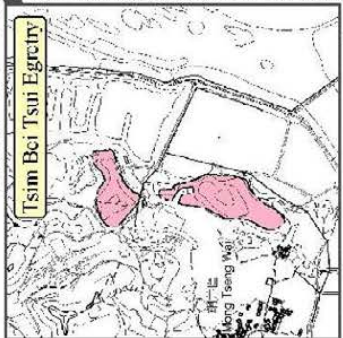
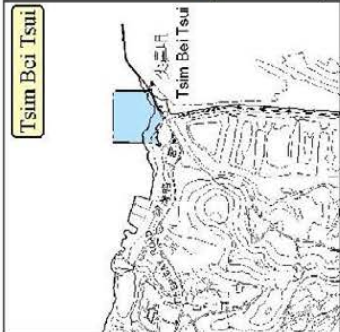
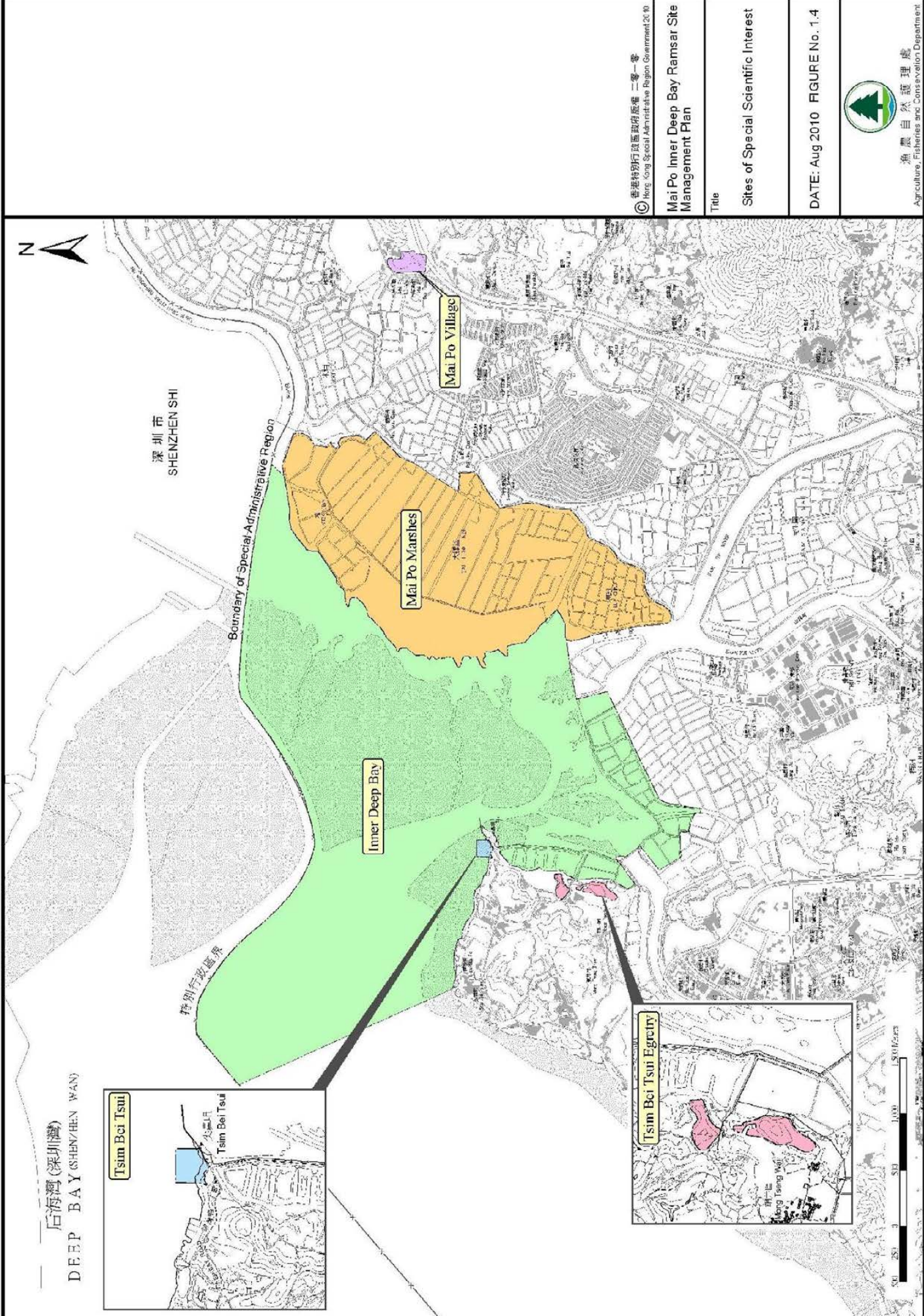
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Hong Kong Special Administrative Region Government 2010

Title
Private Land and
Statutory Designations

DATE: Aug 2010 FIGURE No. 1.3



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M_2010_147_B13




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Mai Po Inner Deep Bay Ramsar Site Management Plan

Title

Sites of Special Scientific Interest

DATE: Aug 2010 FIGURE No. 1.4

 漁農自然護理處
 Agriculture, Fisheries and Conservation Department

M_2010_147_31.4

1.1.7.1 WILD ANIMALS PROTECTION ORDINANCE (CAP. 170)

The Wild Animals Protection Ordinance (Cap.170) provides protection to local wildlife by prohibiting hunting, and the possession, export or sale of protected wild animal species. All wild birds and most wild mammals, except for domestic animals which have gone astray or have been abandoned, are protected under this Ordinance. Prior to the listing of the Ramsar Site, the Mai Po Marshes area had been designated as a Restricted Area since 1975 under Schedule 6 of Cap. 170. In February 1996, the Restricted Area was extended to cover the Inner Deep Bay intertidal mudflats and the total area now is of some 807 hectares. Access to the Restricted Area of the Ramsar Site is restricted at all times of the year to holders of permits issued by the Director of Agriculture, Fisheries and Conservation. Nature Wardens of AFCD regularly patrol the Ramsar Site and take law enforcement actions if irregularity is detected. Development proposals, if any in the Restricted Area, incompatible with the objectives of the Ordinance are not entertained.

1.1.7.2 OUTLINE ZONING PLANS (OZP) UNDER TOWN PLANNING ORDINANCE (CAP 131)

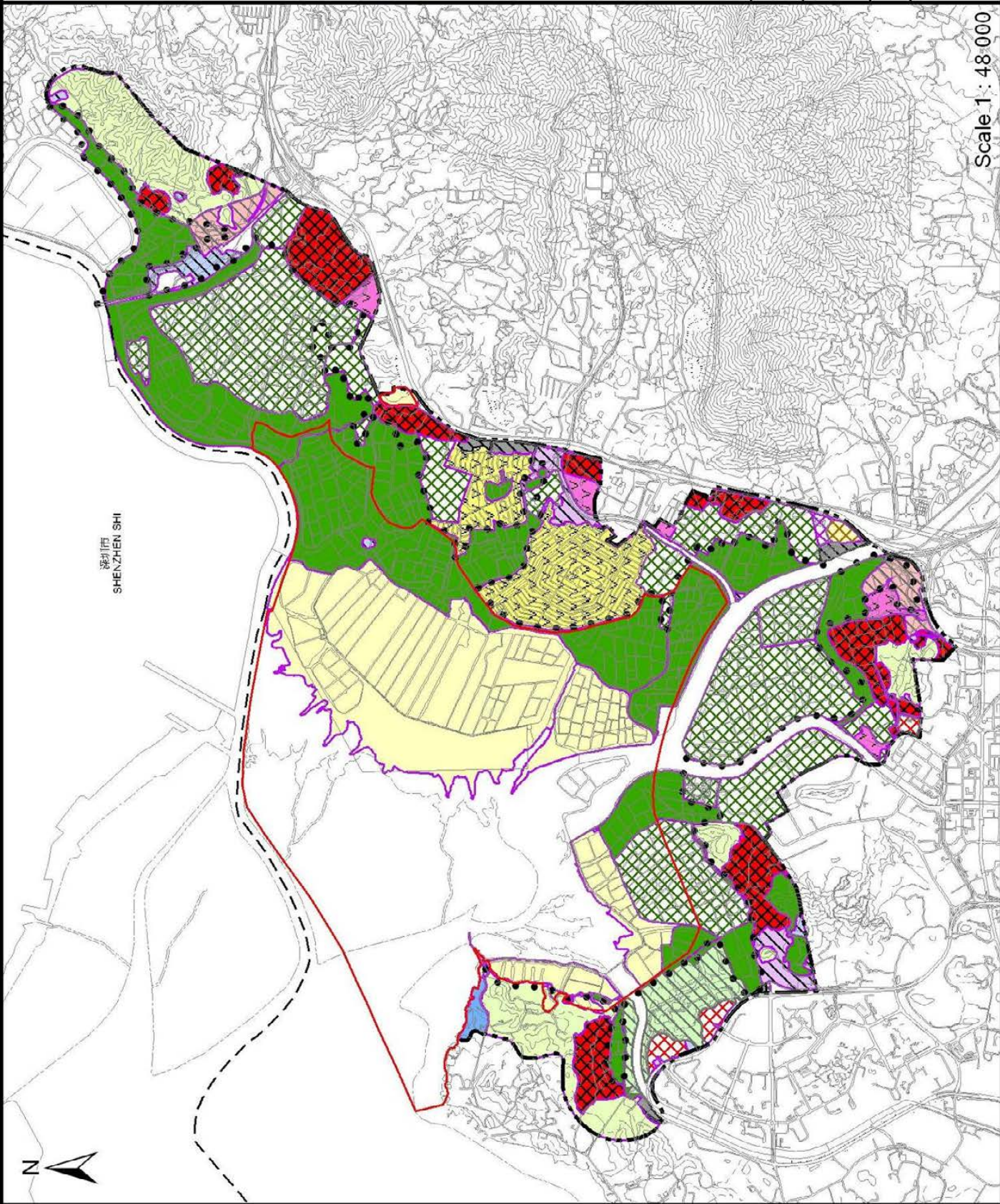
The land area around Deep Bay including the Ramsar Site is covered by Outline Zoning Plans (OZPs) which are the statutory planning tool for control of land-use and development under Sections 16 and 17 of the Town Planning Ordinance (TPO) (Cap. 131) administered by the PlanD. The Town Planning Board (TPB) is formed under the TPO and is responsible for preparing statutory plans and considering applications for planning permission to these plans. The OZPs identify permitted uses and uses for which a planning application to the TPB is required. The greater part of the Ramsar Site is covered by four approved OZPs, in which various land-use zones are outlined. The four approved OZPs are as follows:

- Lau Fau Shan and Tsim Bei Tsui (S/YL-LFS/7);
- Nam Sang Wai (S/YL-NSW/8);
- Mai Po and Fairview Park (S/YL-MP/6); and
- San Tin (S/YL-ST/8).

In the OZPs, “conservation-related zonings” such as “Site of Special Scientific Interest” (SSSI) and “Conservation Area” (CA) zones, only a very limited number of uses, which are mainly related to nature conservation or agriculture, can be carried out without the need to obtain prior approval from the TPB. Also, developments within “conservation-related zonings”, except for some minor works, are classified as ‘designated projects’ under the Environmental Impact Assessment Ordinance (EIAO) (Cap.499). The existing land use zoning of the inland area of the Ramsar Site and the surrounding area is shown in Figure 1.5.







1.1.7.3 SITES OF SPECIAL SCIENTIFIC INTEREST (SSSIs)

The town planning mechanism recognizes SSSIs which are listed under a register to ensure that government departments are aware of the scientific importance of such sites, and that due consideration is given to conservation when developments in or near these sites are proposed. Unless covered by statutory zoning plans under SSSI zone, the SSSIs are created as an administrative device without statutory status.





















深圳市
SHEN ZHEN SHI

LEGEND

-  拉薩碼頭濕地
Ramsar Site
-  城市規劃委員會規劃指引所定的
后海灣濕地保育及緩衝區界線：—
Deep Bay Wetland Conservation and
Buffer Areas Boundaries designated
under Town Planning Board Guidelines:-
-  濕地保育區
Wetland Conservation Area
-  濕地緩衝區
Wetland Buffer Area
-  香港濕地公園
Hong Kong Wetland Park
-  OZP Zoning

Zone

-  CR -
-  CA - Conservation Area
-  CDA - Comprehensive Development Area
-  CPA - Coastal Protection Area
-  GIC - Government, Institution or Community
-  OS - Green Belt
-  ID - Industrial (group D)
-  O - Open space
-  OS - Open Storage
-  OU - Other Use
-  R(A) -
-  R(B) -
-  R(C) -
-  R(D) -
-  REC - Recreation
-  SSSI - Site of Special Scientific Interest
-  U - Undetermined
-  V - Village Type Development

香港特別行政區政府 二零一零
Hong Kong Special Administrative Region Government 2010

Title
OZP Zoning in Deep Bay Area

DATE: Aug 2010 FIGURE No. 1.5



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Agriculture, Fisheries and Conservation Department

Scale 1 : 48 000

At present there are four SSSIs situated inside the Ramsar Site (Figure 1.4) which are all covered by statutory zoning plans (except for Inner Deep Bay SSSI of which the relevant OZP covers the land area only) for development control. The total areas that are covered by the SSSI zones under OZPs accounted for 510 hectares. Close by in Lau Fau Shan, Pak Nai SSSI is used as a high tide roost by birds from Deep Bay (see Table 1.2).

TABLE 1.2: The ecological importance and the date of designation of the SSSIs in the Deep Bay area.

Name of SSSI	Date	Importance
Mai Po Marshes	15/9/76	The Marshes support large numbers of ducks, shore and marsh birds and are of importance in Hong Kong SAR for scientific and education purposes. The Marshes contain the largest and most important area of dwarf mangrove in Hong Kong SAR. This highly productive inter-tidal mangrove habitat backed by the man-made <i>gei wais</i> and fish ponds provided an important feeding and resting grounds for both resident and migratory birds, as well as nesting habitats for a number of species.
Mai Po Village	16/2/79	The site supports an egretty. There are breeding records of the colonial breeding ardeid species, namely <i>Nycticorax nycticorax</i> (Black-crowned Night Heron), <i>Egretta garzetta</i> (Little Egret), <i>E. alba</i> (Eastern Great Egret), <i>Bubulcus ibis</i> (Cattle Egret) and <i>Ardeola bacchus</i> (Chinese Pond Heron).
Pak Nai	05/02/80	The Site consists of a mangrove stand, patches of the locally uncommon seagrass beds of <i>Halophila beccarii</i> (Beccari's Halophila) which support an interesting assemblage of marine invertebrates. Area consists of sand pit is used as a high tide roost site for gulls and herons. The Site also provides an important nursery ground for two species of horseshoe crabs <i>Carcinoscorpius rotundicauda</i> and <i>Tachypleus tridentatus</i> , which are of marine conservation importance.
Tsim Bei Tsui	10/01/85	The Site contains a mature mangrove community, progressing from the high zoned mangroves of the landward fringe to the pioneer species at the water edge. Mangroves in the Site include the rare <i>Bruguiera gymnorrhiza</i> . The mangrove stand provides habitat for the large mangrove pulmonate snail, <i>Ellobium polita</i> .

Inner Deep Bay	18/03/86	The shallow waters, mudflat and mangroves provide abundant food supply and are feeding and resting grounds for some 50,000 waterbirds of about 300 species every winter.
Tsim Bei Tsui Egretry	5/01/89	The egretry used to be the nesting and breeding place for several hundred pairs of egrets and herons and had been abandoned since the early 1990s according to data of the the Hong Kong Bird Watching Society and AFCD's field surveys. It has been proposed to be de-listed.

1.1.7.4 WETLAND CONSERVATION AREA AND WETLAND BUFFER AREA

In order to conserve the Ramsar Site which consisted of ecologically important fishponds and other wetland habitats in the Deep Bay area, the TPB has promulgated the “*Town Planning Board Guidelines for Application for Developments within Deep Bay Area under Section 16 of the Town Planning Ordinance* (TPB PG-No. 12B)” in 1999 as reference to guide land use and planning in the Deep Bay area.

The TPB adopts a “precautionary approach” with the principle of “no-net-loss in wetland” in considering development proposals in the Deep Bay area to protect and conserve the ecological value of contiguous fishponds and the maintenance of the ecological integrity of the Deep Bay area wetland ecosystem as a whole to prevent fragmentation of wetland habitats.

According to the TPB guidelines, the fundamental land use planning concept for the Deep Bay area includes avoidance of loss of fishponds and habitat fragmentation as well as mitigation of negative impact from undesirable land uses and human disturbance.

A two-pronged approach to land use planning control is adopted through the designation of the Wetland Conservation Area (WCA) and Wetland Buffer Area (WBA) which replaced the former Buffer Zones 1 and 2 established in the early 1990s under previous guidelines.

The WCA basically covers all existing continuous and adjoining active/abandoned fishponds mostly in the landward part of the Ramsar Site with the planning intention to conserve the ecological value of the fishponds which form an integral part of the wetland ecosystem in the Deep Bay area. The designation of the WBA, which generally comprises a strip of land of about 500m wide along the landward side of the WCA, is to protect the ecological integrity of the fishponds and wetlands within WCA and to prevent developments that would have a negative off-site impact on the ecological value of fishponds.

All new developments or alternative uses of the existing fishponds within the WCA and WBA should not result in a decline in wetland area or in ecological functions served by the original ponds (i.e. the “no-net-loss in wetland” principle) and are required to submit an ecological impact assessment to demonstrate that the

development would not result in a net loss in wetland function and negative disturbance impact.

TPB may also consider development with conservation objectives in area zoned Other Specified Use (Comprehensive Development and Wetland Enhancement Area) within the WCA under a private-public partnership approach. This approach allows consideration of limited low-density private residential/recreational developments at the landward fringe of the WCA in exchange for committed long-term conservation and management of the remaining ponds within the development site.

To encourage the private sector to restore wetlands that have been lost or degraded over time by pond filling and the presence of open storage use, such areas in the WBA are zoned Other Specified Use (Comprehensive Development to include Wetland Restoration Area). The land use intention is to provide incentive for the restoration of degraded wetlands through comprehensive residential and/or recreational development to include wetland restoration area.

It should be noted that essential infrastructure projects needed for public purpose, such as rail, emergency vehicular access and footpath, road, drainage and flood protection project and public utility project, for which no suitable alternative locations outside the WCA could be identified, would also be considered by the TPB. However, any such proposed project should include a practical wetland compensation scheme for the consideration of the TPB. It should not add to the pollution loading of the Deep Bay area.

1.1.7.5 LAND USE ZONING OF THE RAMSAR SITE

As shown in Figure 1.5, the majority of the land areas for a total of about 803 hectares in the Ramsar Site are zoned ‘SSSI’ or ‘CA’ as outlined in relevant statutory OZPs under the TPO (viz Lau Fau Shan and Tsim Bei Tsui (S/YL-LFS/7); Nam Sang Wai (S/YL-NSW/8); Mai Po and Fairview Park (S/YL-MP/6) and San Tin (S/YL-ST/8)) for conservation and protection of this internationally important wetland .

Within the Ramsar Site, among some 100 hectares of private land found at three sites (i.e. the areas between Tam Kon Chau and Pak Hok Chau currently zoned CA; at Lut Chau currently zoned SSSI; and north of Ng Uk Tsuen/Fung Lok Wai currently zoned “Other Specified Use” annotated “Comprehensive Development and Wetland Enhancement Area” (OU(CDWEA))), the area of the part of private land site at Fung Lok Wai zoned (OU(CDWEA) is about 43 hectares. The planning intention is for conservation and enhancement of ecological value and functions of the existing fish ponds or wetland through consideration of application for development or redevelopment under the “private-public partnership approach” Under this land use zoning, consideration of limited low-density private residential/recreational developments at the landward fringe of the WCA is allowed in exchange for committed long-term conservation and management of the remaining ponds within the development site subject to the “no-net-loss in wetland” principle.

1.1.7.6 ENVIRONMENTAL IMPACT ASSESSMENT ORDINANCE (CAP. 499)

The EIAO (Cap 499) comes into operation on 1.4.1998 and is administrated by the Environmental Protection Department (EPD). Developments within CA or SSSI zonings, except for some minor works, are classified as 'designated projects' under Schedule 2 of the EIAO (Cap.499). The proponent of a designated project is required to assess and mitigate all possible adverse environmental impacts arising from the project. In case ecological impacts are identified, mitigation measures would include, in the order of priority, avoidance and minimization of impacts, and compensation for loss of ecological functions. EPD takes advice of AFCD on matters of EIA report related to nature conservation, ecological assessment, agriculture, animal and plant health, and fisheries. AFCD works closely with the EPD in the implementation of a statutory EIA mechanism to protect sites of high ecological value. Under the EIAO, it has been specified that residential or recreational developments (other than NT exempted houses) within Deep Bay Buffer Zone 1 or 2 (which are more or less same as the alignment of WBA and WCA) are designated projects.

1.1.7.7 PUBLIC ORDER ORDINANCE (CAP. 245)

A two-kilometre strip of land along the border, from Ma Tso Lung to Mai Po, inclusive of the mangroves west of the MPMNR, is located within the Frontier Closed Area declared under the Public Order Ordinance. Special permits issued by Police are required for public access to this area under the provisions of this Ordinance.

1.1.7.8 DEEP BAY WATER CONTROL ZONE

The Inner Deep Bay area lies within the Deep Bay Water Control Zone, one of the ten water control zones in Hong Kong with water quality objectives defined in 1991. Under Water Pollution Control Ordinance (Cap.358), EPD is responsible for enforcing controls in these zones so as to achieve defined water quality objectives. The full implementation of statutory controls on livestock waste will eventually result in significant reduction of organic pollution entering Deep Bay from the Hong Kong side.

1.1.7.9 DRAINAGE RESERVES

The Drainage Services Department (DSD) has identified corridors known as drainage reserves. These have no legal status but serve to alert planners and site managers to areas that may be required for drainage-related projects in future. Current land management is not affected, but the DSD officials have the right of free access at all times to the area for the purpose of inspecting or repairing of drains, sewers and other services. A number of drainage reserves that were identified in the 1990s have been constructed as drainage channels, e.g. the drainage channel at Tin Shui Wai, Kam Tin River, Yuen Long Bypass Floodway etc.

1.1.7.10 FORESTS AND COUNTRYSIDE ORDINANCE (CAP.96)

This Ordinance protects forests, plantations, and valuable plants territory-wide. It prohibits felling, cutting, burning, or destroying of trees, as well as growing plants in forests and plantations on government land. Its subsidiary Regulations prohibit the picking, felling or possession of listed rare and protected plant species. The Ordinance covers all the government land within the Ramsar Site and adjacent areas.

1.2 RAMSAR CONVENTION MATTERS AND CONSERVATION MANAGEMENT

The Secretariat of the Ramsar Convention communicates officially with the governments of the Contracting Parties (or Member States) by means of formal notifications through diplomatic channels, usually directed to each government's permanent mission to the United Nations in Geneva or some similar official contact specified by the Contracting Parties.

In the PRC, the State Forestry Administration (SFA) is the national Ramsar Administrative Authority and represents the government on Ramsar Convention matters, in particularly the international rights and obligations of a contracting party. AFCD maintained close liaison with the SFA especially its Office of Wetland Convention and Management. Also, AFCD maintained close liaison with the relevant authorities in Guangdong province and Futian National Nature Reserve in Shenzhen on matters related to nature conservation including wetland conservation.

The Ramsar Convention holds the Conference of the Contracting Parties (Ramsar COP) every 3 years. Representatives of AFCD join the PRC delegation in Ramsar COP and keeps abreast of the development of the Ramsar Convention.

1.2.1 CONSERVATION MANAGEMENT STRUCTURE

The AFCD being responsible for overall nature conservation is the administrative authority of the Ramsar Site in Hong Kong SAR. Other government departments, such as PlanD, EPD, Police, DSD, LandsD work closely with AFCD and are involved in the control and management of the statutory provisions and leasehold arrangements discussed above. Within the Ramsar Site in the MPMNR, habitat management and conservation educations including various facilities there are undertaken by WWFHK.

1.2.1.1 Agriculture, Fisheries and Conservation Department (AFCD)

The Wetland and Fauna Conservation Division of AFCD is responsible for the implementation of the RSMP and daily management of the Ramsar Site, including regularly patrol of the Restricted Area and law enforcement under the Wild Animals Protection Ordinance (Cap. 170), monitoring of ecological conditions, advising on wise use of wetland for planning/ development proposals especially those in WCA and WBA, partnership with non-governmental organizations for conservation projects/ studies and public education (such as partnership with the WWFHK to carry out habitat management in MPMNR and the Hong Kong Bird Watching Society for bird monitoring programme).

The Wetland Park Division of AFCD being responsible for the management of the Hong Kong Wetland Park (HKWP) also implements the Ramsar Convention's key outreach programme i.e. CEPA programme and the organization of World Wetland Day celebration activities each year. The HKWP supports the Wetland Link International-Asia (WLI-Asia) network established in June 2005 for the better implementation of CEPA programmes across Asia. Currently, 38 Asian wetland centres have joined WLI-Asia which provides a forum to enhance

international collaboration in promoting the importance of conserving wetlands and their wildlife with a regional perspective. The First WLI-Asia Symposium was held at the HKWP in January 2007 and attended by over 80 delegates from 19 countries/places. Managers from Asian wetland centres are using the HKWP as a model for wetland centre management and CEPA programmes. In September 2007, a multi-lingual WLI-Asia website (www.wli-asia.org) was inaugurated and maintained by the HKWP for wetland centres in the region for information exchange and experience sharing. WWT's London Centre in UK and Sungei Buloh Wetland Reserve in Singapore are the Twin Centres with HKWP.

1.2.1.2 NATURE CONSERVATION SUBCOMMITTEE

The Nature Conservation Subcommittee (NCSC) under the Advisory Council on the Environment (ACE) advises the Administration, through the Secretary for the Environment, on nature conservation matters, including the management of the Mai Po Inner Deep Bay Ramsar Site. AFCD regularly briefs and seeks advice of NCSC on nature conservation matters including wetland conservation.

1.2.1.3 WORLD WIDE FUND FOR NATURE HONG KONG (WWFHK)

The WWFHK is in partnership with the government for the management of the MPMNR and the work of which has been organized generally into five groups, i.e. community awareness; habitat & infrastructure management; monitoring & research; visitor marketing & management; and South China wetland management training. In 2007, WWFHK recruited a new Centre Manager (CM) to be responsible for the overall management and administration works to ensure the smooth operation of the MPMNR. Under the CM, a Reserve Manager (RM) is responsible for habitat & infrastructure management and monitoring & research. WWFHK carries out daily management in the MPMNR in accordance with the "*Management Plan for the Mai Po Marshes Wildlife Education Centre and Nature Reserve 2006-2010*" (MPMP 2006-2010) which was prepared with reference to the objectives and requirements of the "Biodiversity Management Zones" of the Ramsar Site Management Plan (RSMP). In the MPMNR, wetland habitats including *gei wais*, ponds, mangroves and reed beds are managed to provide roosting and foraging sites suitable to the migratory birds. In fulfilling the purpose of the wetland nature, conservation measures have been in place such as maintaining high tide roosting sites, management of water levels and stocking of fish in *gei wais* to provide feeding site for migratory birds including cormorants. WWFHK also offers educational programmes in the MPMNR to students and the general public.

The current MPMP 2006-2010 is the third one of its kind which emphasizes on two management goals:

- To manage the MPMNR so as to maintain and, if possible, increase the diversity of habitats appropriate for south China coastal wetlands, and the richness of native wildlife in the area.
- To promote scientific research relevant to the management and conservation of wetlands and their biota.

In order to achieve these goals, a number of management objectives have been identified for MPMNR as follows:

- i) Monitor the baseline ecology of the Reserve as well as the result of habitat management project in order to assess their success. The results will then feedback into improving the management of the Reserve.
- ii) Remove the silt and invasive grasses that have built up in the *gei wai* by dredging the perimeters and cross channels, as well as in the central portions of certain *gei wai* (e.g. 12, 18, 19) to address the long-term problem of the *gei wai* 'drying-out'.
- iii) Reduce the landscape profile through management of the height and sideways growth of selected trees growing along the *gei wai* bunds. This will address the problem of declining waterbirds using the shallow water roost due to tall trees around the roost site.
- iv) Enhance the ecological value of the *gei wai* by appropriate habitat management works, some of which may be on a trial basis, e.g. targeted water level management, re-profiling the pond floor (such as by creating new islands or deeper channels, planting of aquatic vegetation, management of the grasses along the pond bunds by a schedule of cutting or grazing by domestic animals etc. The aim will be to maintain and if possible, increase the diversity and abundance of wildlife using MPMNR.

A number of facilities have been constructed at MPMNR including: Wildlife Education Centre; Peter Scott Field Studies Centre; Waterfowl Collection; *Gei Wai* Museum; A 3-storey Tower Hide; 10 bird-watching hides 3 floating bird hides; a piled boardwalk of 200 metres long; two rainshelters; nature trails with 4 km of concreted footpaths; a 540 metre floating boardwalk which extends through the mangroves to the edge of the Deep Bay mud flats; A number of huts retained from former operation at the edges of different *gei wais* for storage of equipment and materials.

WWFHK has established a Mai Po Management Committee which advises and guides on the overall management of the MPMNR. The Committee is consisted of invited individual academics from the local tertiary institutes and representatives of local environmental groups and meets quarterly to discuss issues related to the habitat management and ecological monitoring works, annual work plans and research studies and projects of MPMNR. AFCD is represented in the Committee to maintain close communication on matters related to the Ramsar Convention and to offer views on the management of MPMNR in accordance with RSMP.

1.3 ENVIRONMENTAL DESCRIPTION

1.3.1 PHYSICAL

1.3.1.1 CLIMATE

Hong Kong's climate is sub-tropical, tending towards temperate for nearly half the year. During November and December there are pleasant breezes, plenty of sunshine and comfortable temperatures.

January and February are cloudier, with occasional cold fronts followed by dry northerly winds. It is not uncommon for temperatures to drop below 10 °C in urban areas. The lowest temperature recorded at the Hong Kong Observatory is 0 °C, although sub-zero temperatures and frost occur on high ground and in the New Territories infrequently.

March and April can also be very pleasant although there are occasional spells of high humidity. Fog and drizzle can be particularly troublesome on high ground which is exposed to the southeast.

May to August are hot and humid with occasional showers and thunderstorms, particularly during the mornings. Afternoon temperatures often exceed 31 °C whereas at night, temperatures generally remain around 26 °C with high humidity. There is usually a fine dry spell in July which may possibly last for one to two weeks, or for even longer in some years.

September is the month during which Hong Kong is most likely to be affected by tropical cyclones, although gales are not unusual at any time between May and November.

The mean annual rainfall ranges from around 1700 millimetres at Shek Kwu Chau to more than 2800 millimetres in the vicinity of Tate's Cairn. The mean annual rainfall of the Ramsar Site of approximately 1,400 mm is low compared with the rest of the territory because the site is situated in the rain shadow of the Tai Mo Shan range. About 80 percent of the rain falls between May and September. The wettest month is August, when rain occurs about four days out of seven and the average monthly rainfall at the Observatory is 444.6 millimetres. The driest month is January, when the monthly average is only 24.9 millimetres and rain falls only about six days a month.

Severe weather phenomena that can affect Hong Kong include tropical cyclones, strong winter and summer monsoon, monsoon troughs, and thunderstorms with associated squalls that are most frequent from April to September. Waterspouts and hailstorms occur infrequently, while snow and tornadoes are rare.

1.3.1.2 HYDROLOGY

Deep Bay is the largest estuary in Hong Kong with a surface area of 112 km². It forms part of the Pearl River estuary, which is the largest river in southern China, having a catchment of around 450,000 km² and an annual flow of around 308 billion m³. The maximum depth of Deep Bay at high tide is only 6 m, with an average depth of 2.9 m. Given a maximum tidal range of 2.8 m, extensive

intertidal mudflats are therefore exposed at Inner Deep Bay at low tide. The water retention time in the bay is about 15 days.

The Pearl River has a significant influence on the Deep Bay area. During the summer wet season, the salinity in Deep Bay can be relatively low (even approaching fresh water) due to the discharges from the Pearl River and rainfall. The Ramsar Site also receives direct discharges from five major rivers/channels, namely the Shenzhen River, Fairview Park Nullah, Kam Tin River, Shan Pui River (Yuen Long Creek), and Tin Shui Wai Drainage Channel. The discharge from Shenzhen River gathers inputs from both Hong Kong and Shenzhen.

The water quality in Deep Bay has been monitored by the Environmental Protection Department since 1986. Agriculture, Fisheries and Conservation Department has also undertaken the baseline ecological monitoring programme for the Ramsar Site including water quality since 2001. Over the past twenty years, rapid urban developments in Shenzhen and the livestock farms and unsewered villages on the Hong Kong side of the northwestern New Territories have seriously affected the water quality of the Deep Bay area. This has resulted in poor water quality especially in Inner Deep Bay, which typically records high levels of organic and inorganic pollutants and low levels of dissolved oxygen. A panel of mitigation measures is in place at both sides attempting to address the issues (EPD, 2006). While remaining poor at the moment, the water quality of Deep Bay is expected to gradually improve over time.

FLOODS

The Ramsar Site and its surrounding areas are floodplains which are regularly subject to serious flooding. The flooding problem has been further exacerbated in the rural areas due to increasing built up and paved areas. Rainwater which formerly stored in fields or fish ponds or infiltrated as groundwater would now become surface runoff. When existing drainage system is incapable of coping with the additional flow, this would lead to flooding problems. In 1996, Drainage Services Department (DSD) commissioned the Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wan Drainage Master Plan Study (YLDMP) in order to investigate the secondary and local drainage systems of this 131 km² catchment area to provide recommendation on short and long term measures to deal with the flooding problem.

Since the completion of the river training works at Shan Pui River (山貝河) and the lower reach of Kam Tin River, the flooding situation in NWNT has been substantially alleviated. DSD also carried out 19 flood protection schemes to 30 villages in Tin Shui Wai, Yuen Long, Kam Tin and San Tin to protect these low-lying villages which included building protective bund to enclose the village areas to prevent external flood water from entering into the village, cleaning of stormwater drains and building floodwater pumping stations.

According to information from the website of the Drainage Services Department (www.dsd.gov.hk), about 32 km of drainage channels have been constructed in Yuen Long, Kam Tin and Ngau Tam Mei areas since 1997. The flooding situation near Wo Shang Wai, Chuk Yuen Tsuen, Yau Mei San Tsuen, Yau Tam Mei San Tsuen and Wai Tsai has been improved due to the completion of Main Drainage Channel at Ngau Tam Mei in March 2005. Whilst the flooding problem at low-

lying areas at the east of San Tin and Ki Lun Tsuen and Yuen Long town have basically been resolved upon the completion of the 2.2 km of San Tin Eastern Main Drainage Channel and the 3.8 km of Yuen Long By-pass Floodway in April and November 2006 respectively. The construction work for another 8 km of river channels is underway including the upper reaches of Kam Tin River, San Tin Western drainage channel and some smaller channels in Kam Tin, Ngau Tam Mei and San Tin have been started in 2006 for overall completion by 2009.

1.3.1.3 GEOLOGY

The Ramsar Site lies within the Yuen Long Basin. The bedrock is sedimentary Carboniferous (300 million ybp) sands and silts that were metamorphosed during the Jurassic period (150 million ybp) to produce limestone and shales ascribed to the Lok Ma Chau formation. Microfossil evidence suggests that this formation is of Tournassian or Namurian-Westphalian age, formed when the area was a neritic swamp (Langford *et al.* 1989). Lower layers are composed of silts, fine sand and carbonaceous horizons, probably deposited in a deltaic floodplain. As the delta built up, the sediments gradually changed to medium sand, coarse sand and pebbles.

Colluvium (>15,000 ybp)

During the last Ice Age, the sea level was about 120 m below today's level. Erosion of the hillsides resulted in the deposition of colluvium, and sandy, rocky soil at the bottom of the slopes.

Alluvial Deposits (>8,000 ybp)

With the retraction of the ice caps and resultant rise in sea levels, the Yuen Long Basin was transformed into a broad alluvial plain. Rivers flowed across it and deposited sands and clays.

Marine Deposits (8,000 – 6,000 ybp)

Sea levels continued to rise until about 6,000 ybp. During this time, marine incursions resulted in the deposition of a thick layer of clayey marine sediments; these contain sub-fossil 'window-pane' oysters *Placuna placenta*.

1.3.1.4 GEOMORPHOLOGY

The landscape of the Deep Bay region at the close of the last Ice Age (about 15,000 years ago) was very different from that of today. Then, the sea level was as much as 120 m below what it is today, meaning that the Ramsar Site, and indeed the whole of Deep Bay, would have been a considerable distance inland (Irving and Morton 1988). As the ice retreated, the sea level rose rapidly until, about 6,000 years ago, the sea stabilised at its present level. Many hill summits and ridges became surrounded by water. The present-day names of these rocky outcrops often include the suffix *chau*, meaning island. Wang Chau, near Yuen Long, and Tam Kon Chau, at Mai Po marshes, are good examples. Subsequently, the land area has increased as a result of shoreline progradation from further deposition of alluvial sediments from the Shenzhen and Shan Pui Rivers which are estimated to be 90,982m³/yr and 251,600m³/yr respectively (estimated for sediment modelling on Shenzhen River Regulation Project, Table 7.7 Final EIA Report; and from Territorial Land Drainage and Flood Control Strategy Study, section 4.9.2 Phase II report). This deposition is augmented during flood tides by sediments from the Pearl River, which carries an estimated 85 million tons of

sediment per year. The rate of shoreline progradation has been accelerated by entrapment of silt particles in the mangrove stands fringing the bay: these stands are gradually extending seawards and are an indication of the continuing natural evolution of the landscape and habitats in the Ramsar Site.

1.3.1.5 SOILS/SUBSTRATES

The soils in the Ramsar Site belong to the Mai Po Association, formed from alluvial deposits and colluvial material derived from the rocks of the Lok Ma Chau Formation, with elements of the Tai Mo Shan Porphyrites (**Grant, 1960**). The soils are poorly drained and frequently highly saline, rendering them of little agricultural use.

1.3.2 BIOLOGICAL

1.3.2.1 OVERVIEW

The Mai Po and Inner Deep Bay area is prized for its rich diversity of animals and plants. Up to the end of 2010, the number of native species recorded from the site included 26 mammals, 386 birds, 23 reptiles, 9 amphibians, 44 fish, over 400 invertebrates and 186 plants. Many of these species, especially the birds and mammals, are protected by Hong Kong legislation. Without doubt, the migratory birds and mangroves in the area are of great ecological value. Nevertheless, there are also other important fauna and flora in the Ramsar Site all of which deserve recognition.

The success of the Ramsar Site as a managed habitat is reflected by the increase in biodiversity, especially the number and diversity of waterbirds which are of major ecological significance to the Inner Deep Bay. The Ramsar Site fulfilled no less than 4 Ramsar Criteria when it was designated in 1994. An update on the current position of the biodiversity supported by the Ramsar Site under the relevant Criteria is shown in the following table:

Criteria	Situation in 1990-94 (Designation)	Situation in 2005-10 (Current)
Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.	It held 13 globally threatened species.	It held 35 globally threatened species.
Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.	It is the type locality of 13 endemic species of invertebrate, including one crab species <i>Perisesarma maipoensis</i> which could be found nowhere else in the world.	Situation remains unchanged.

Criteria	Situation in 1990-94 (Designation)	Situation in 2005-10 (Current)
Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.	It supported an average of 48,500 waterbirds in Deep Bay.	It supported an average of 81,830 waterbirds in Deep Bay.
Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.	There were 6 species in the site having more than 1% of threshold population of Eastern Asia.	It held 19% of the global population of black-faced spoonbill, 3% of Nordmann's Greenshank, and 3% of Eurasian Curlew. There are 17 species in the site having more than 1% of threshold population of Eastern Asia.

To better understand the natural assets and facilitate nature conservation work, AFCDD has been conducting baseline ecological surveys regularly to take inventory and update on the status of the biodiversity since 2002. In the surveys, the distribution and diversity of different wildlife groups, including plants, mammals, reptiles and amphibians, butterflies, dragonflies and birds were studied. The findings of the surveys are summarized in Appendices I to VII which intricate the food-web of the Ramsar Site.

In the MPMNR, the MPMP implemented by WWFHK included a research and monitoring plan for 2007-2011 with the objective of conducting long-term monitoring and baseline surveys on priority wildlife species/groups and key habitats. The biodiversity data input from MPMNR would contribute to compiling of an overall database of the Ramsar Site. The research and monitoring works would also provide information for the detection of ecological changes due to various management practices in the MPMNR.

1.3.2.2 FLORA

Mangrove

The most prominent flora in the Ramsar Site is possibly the mangrove stands. The largest area of mangroves found in Hong Kong is situated in the Ramsar Site which covers a total area of about 320 hectares. A total of six species of mangroves has been recorded in the Deep Bay, namely: *Acanthus ilicifolius*, *Aegiceras corniculatum*, *Avicennia marina*, *Bruguiera gymnorrhiza*, *Excoecaria agallocha* and *Kandelia obovata*. A small number of looking-glass mangrove, *Heritiera littoralis*, was planted along the bunds of *gei wais* in the mid 1980s for education purposes. A recent study (Department of Geography and Resource Management CUHK, 2008) showed that the intertidal mangal in Inner Deep Bay exhibited zonation. On the top canopy, *K. obovata* is the most dominant and occupies both the landward and seaward zones while *A. marina* is found in between. Both *A. corniculatum* and *A. ilicifolius* are distributed along the edge and under the top canopy. *B. gymnorrhiza* is only found as understory and the distribution is limited. There are only a few but large trees of *E. agallocha*

remained. The majority of this landward species was probably removed when *gei wais* were constructed from the landward side during the Second World War. Due to the creation of *gei wais*, fish ponds, and bunds, the landward successional stages of mangroves in Deep Bay are now largely absent. On the other hand, mangrove stands are also well-established in several *gei wais* inside MPMNR, the predominant species being *K. obovata* and *A. marina*, together with other mangroves such as *A. corniculatum* and *A. ilicifolius*.

In early year 2000, AFCD staff found some exotic mangrove plants belonging to the genus *Sonneratia* which have never been recorded in Hong Kong on the exposed mudflat close to the mouth of Shenzhen River in the Deep Bay region. Field observation found that there were two species of *Sonneratia* which showed diagnostic differences. Specimens of the mangrove were sent to the Royal Botanic Gardens of Kew in UK for identification. They were later identified as *Sonneratia caseolaris* 海桑 (L.) Engl and *Sonneratia apetala* 無瓣海桑 Buch. -Ham.

Because of their fast growing nature and the occurrence range in the low intertidal level, *Sonneratia* are often used for stabilization of the coastline or mudflat (Zan *et al.*, 2003). In the 1990s of last century, *Sonneratia* have been widely adopted for afforestation in South China including the eastern and western Guangdong Province and Fujian Province (Chen *et al.*, 2003). In view of the close proximity of the Futian Nature Reserve and the Mai Po Inner Deep Bay Ramsar Site, and the fact that the two species of *Sonneratia* found in Hong Kong also occurred in Futian, it was suspected that the origin of the *Sonneratia* in Hong Kong might come from Futian. According to current field observations, the *Sonneratia* are mainly distributed in the outlets of stream and channels where the salinity is relatively lower. They were also found either in the outermost region of mangrove forests or in isolated ‘pockets’ within the mangrove forests where light could penetrate.

As in 2009, it is estimated that there are more than 50,000 individuals of mature *Sonneratia* which mainly distributed in the intertidal area and channels where the salinity is relatively lower. In view of their fast growing rate and there are concerns on their possible impacts on the native mangrove species, AFCD carry out regular removal to these species when funding is available.

Marshes

Natural freshwater marsh is not common in the Ramsar Site. In the late 1990s, a series of rain-fed freshwater ponds were created within the MPMNR and freshwater plants were planted. Nevertheless, the overall plant diversity of freshwater marshes within the Ramsar Site is fairly low and dominated by grasses and sedges and dominant species include *Phragmites australis*, *Paspalum distichum* and *Eleocharis equisetina*. Other common sedges include *Cyperus malaccensis*, *C. alternifolius* and *C. polystachyos*.

Several plants are exotics, and invasive, for example *Bidens pilosa*, *Eichhornia crassipes*, *Lantana camara*, and *Mikania micrantha*.

Mai Po Marshes Nature Reserve (MPMNR)

A small herbarium of the plants found in the MPMNR has been established at the Education Centre.

The vine *Derris trifoliata* is also common in the canopy of the mangroves, especially along the fringe, in the MPMNR. In the landward mangrove inside *gei wais*, these climbers, together with other species including *Strophanthus divaricatus* and *Paederia scandens* may cover the mangrove canopy if they are left unchecked. WWFHK carried out regular management to these climbers. Other mangrove associates including *Acrostichum aureum*, *Canavalia maritima* and the planted *Cerbera manghas* are also present. In many slow flowing channels in the MPMNR, the exotic weed *Eichhornia crassipes* completely covers the surface of some sections of the channels.

Besides mangroves, native grasses and sedges are very common in the Ramsar Site. The reed *Phragmites australis* is the dominant component of emergent vegetation and now forms large beds in the *gei wais* of MPMNR with an area of some 40 hectares. It supports a few hundred species of insect in the Ramsar Site. They also provide shelters to Warblers, Rails and Coots and other fauna. Two sedges, short-leaved malacea galingale and coastal bulrush, are also frequently seen in the intertidal mudflat and *gei wais*.

Local rarity included the saline water seagrass, *Ruppia maritime*. It was not recorded in the *gei wais* in the last decade but was rediscovered in some of the fishponds along the footpath leading to WWFHK's Education Centre and in *gei wai* #8 in March 2010. The plants were colonizing along the bunds or submerged in water. They were bearing seeds upon discovery but were declining afterwards. As at June 2010, the majority of the plants in fish ponds was found dead but those in *gei wai* #8 remained healthy. Monitoring on the occurrence of this rare seagrass will be continued.

A list of the flora found in the Ramsar Site is at Appendix I.

1.3.2.3 FAUNA

Birds

The species of wild bird found in the Ramsar Site are shown in Appendix II. The list has been compiled based on the information of HKBWS, WWFHK and AFCD. The Mai Po Inner Deep Bay Ramsar Site supports a very high diversity of birds. Some 389 species, representing about 77% of Hong Kong's birds, have been recorded here. In particular, the Ramsar Site is the only location where a number of the recorded bird species (e.g. Dalmatian Pelican and Oriental Stock) had been found in Hong Kong.

The *gei wais*, intertidal mudflat and fishponds of the Deep Bay area are the habitats for waterbirds including migratory waterbirds and wetland dependent species. A total of 157 species of waterbirds have been recorded at the Deep Bay area although a few of the species had only observed one or two times (e.g. Eurasian Oystercatcher). "Cormorants", "Ducks/Grebes", "Ardeids", "Waders" and "Gulls and Terns" are the major waterbird groups in the Inner Deep Bay area, with over 70 species of 80,000-90,000 individuals have been recorded each year. The site is especially important for wintering and migratory birds, 35 species of which are globally threatened and near-threatened, have been recorded (Table 1.3)

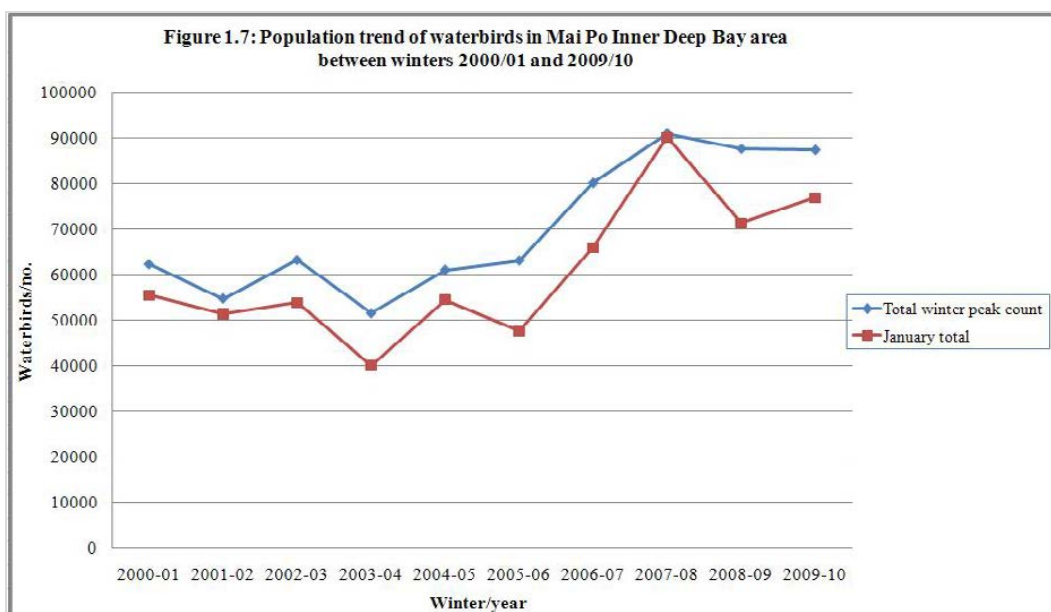
Table 1.3: IUCN Red List of Threatened Bird Species Recorded in Inner Deep Bay Area, Hong Kong (as at 2010) (Source: IUCN, 2010)

屬極危品種	Category: Critically Endangered
1. 白腹軍艦鳥	Christmas Island Frigatebird <i>Fregata andrewsi</i>
2. 白鶴	Siberian Crane <i>Grus leucogeranus</i>
3. 勺嘴鷸	Spoon-billed Sandpiper <i>Eurynorhynchus pygmeus</i>
屬瀕危品種	Category: Endangered
4. 青頭潛鴨	Baer's Pochard <i>Aythya baeri</i>
5. 東方白鸛	Oriental Stork <i>Ciconia boyciana</i>
6. 黑臉琵鷺	Black-faced Spoonbill <i>Platalea minor</i>
7. 小青腳鷸	Nordmann's Greenshank <i>Tringa guttifer</i>
屬易危品種	Category: Vulnerable
8. 卷羽鵜鶘	Dalmatian Pelican <i>Pelecanus crispus</i>
9. 黃嘴白鷺	Swinhoe's Egret <i>Egretta eulophotes</i>
10. 花臉鴨	Baikal Teal <i>Anas formosa</i>
11. 棕頸鴨	Phillippine Duck <i>Anas luzonica</i>
12. 小白額雁	Lesser White-fronted Goose <i>Anser erythropus</i>
13. 烏鵂	Greater Spotted Eagle <i>Aquila clanga</i>
14. 白肩鵂	Imperial Eagle <i>Aquila heliaca</i>
15. 紅腰杓鷸	Eastern Curlew <i>Numenius madagascariensis</i>
16. 大濱鷸	Great Knot <i>Calidris tenuirostris</i>
17. 遺鵂	Relict Gull <i>Ichthyaetus relictus</i>
18. 黑嘴鵂	Saunders's Gull <i>Chroicocephalus saundersi</i>
19. 仙八色鸚	Fairy Pitta <i>Pitta nympha</i>
20. 史氏蝗鶯	Styan's Grasshopper Warbler <i>Locustella pleskei</i>
21. 遠東葦鶯	Manchurian Reed Warbler <i>Acrocephalus tangorum</i>
22. 白喉林鶯	Brown-chested Jungle Flycatcher <i>Rhinomyias brunneatus</i>
23. 硫黃鶯	Japanese Yellow Bunting <i>Emberiza sulphurata</i>
24. 黃胸鶯	Yellow-breasted Bunting <i>Emberiza aureola</i>
屬漸危品種	Category: Near threatened
25. 黑頭白鸚	Black-headed Ibis <i>Threskiornis melanocephalus</i>
26. 羅紋鴨	Falcated Duck <i>Anas falcata</i>
27. 白眼潛鴨	Ferruginous Duck <i>Aythya nyroca</i>
28. 禿鶯	Eurasian Black Vulture <i>Aegypius monachus</i>
29. 白腰杓鷸	Eurasian Curlew <i>Numenius arquata</i>
30. 黑尾塍鷸	Black-tailed Godwit <i>Limosa limosa</i>
31. 半蹼鷸	Asian Dowitcher <i>Limnodromus semipalmatus</i>
32. 斑背大尾鶯	Japanese Swamp Warbler <i>Megalurus pryeri</i>
33. 紫壽帶	Japanese Paradise Flycatcher <i>Terpsiphone atrocaudata</i>
34. 白頸鴉	Collared Crow <i>Corvus torquatus</i>
35. 紅頸葦鶯	Japanese Reed Bunting <i>Emberiza yessoensis</i>

A long-term waterbird monitoring programme of the Ramsar Site has been conducted since December 1997, as a fundamental part of the management

strategy, and as an indicator of the status of the Deep Bay ecosystem. Monthly counts of waterbirds in the Inner Deep Bay area have been conducted by the Hong Kong Bird Watching Society in collaboration (currently under service contract) with AFCD. The surveys have been conducted in a synchronised manner. The counting of waterbirds in the Ramsar Site has been part of the AFCD's baseline ecological monitoring programme since 2001.

The numbers of the total winter peak counts of migratory waterbirds have been stabilized within a range of 80,000 to 90,000 in recent winters. Among the waterbird groups Black-headed Gull *Chroicocephalus ridibundus*, Great Cormorant *Phalacrocorax carbo*, Pied Avocet *Recurvirostra avosetta*, Northern Shoveler, Eurasian Wigeon *Anas penelope*, Northern Pintail *Anas acuta*, Tufted Duck *Aythya fuligula*, Little Egret *Egretta garzetta*, Common Greenshank *Tringa nebularia* and Kentish Plover *Charadrius alexandrinus* are the most numerous waterbird species recorded there.



The large expanse of open mudflat in Deep Bay and the rich invertebrate food sources support a large concentration of wintering and migratory waterbirds in the Pearl River estuary. These birds arrive from breeding grounds as far away as Arctic Siberia, and many of the shorebirds may move on to wintering grounds in Australia. The Deep Bay mudflats are thus of particular importance as a staging post for migratory waders on the East-Asian – Australasian flyway. Besides, the vegetation (e.g. mangroves and reedbeds) of the Inner Deep Bay area also attract various bird species for feeding, roosting and even breeding throughout the year.

Mammals

Mammals which have been recorded in various habitats inside the Ramsar Site include Small Asian Mongoose *Herpestes javanicus*, Small Indian Civet *Viverricula indica*, Leopard Cat *Felis bengalensis* and Ryukyu Mouse *Mus caroli*, Musk Shrew *Suncus murinus*. Bats include Japanese Pipistrelle *Pipistrellus abramus* which can occur in considerable numbers (>100) when high densities of aquatic emergent insects are present over the fish ponds, Lesser Yellow Bat *Scotophilus kuhlii*, Common Bent-winged Bat *Miniopterus schreibersii*, Brown

Noctule *Nyctalus noctula*, Short-nosed Fruit Bat *Cynopterus sphinx* and Leschenault's Rousette *Rousettus leschenaulti* are also found. (Appendix III)

Eurasian Otter *Lutra lutra chinensis* is probably the most unusual large mammal which uses freshwater marsh habitats in the area. This is also one of the Territory's rarest mammals, with probably fewer than six adults in the Deep Bay area. Otter tracks have been observed in the mud on the marshes. Recent records of Eurasian Otter were also found in Lok Ma Chau, San Tin and MPMNR according to AFCD's camera trap survey since 2002.

Several predatory mammals have been recorded hunting in the Ramsar Site by AFCD's camera trap survey, which included Small Asian Mongoose, Leopard Cat and Eurasian Otter (Shek 2006). Crab-eating Mongoose had also been reported at the edge of the mangal (Lau 1991). However, this species has only been found in Northeast N.T. according to AFCD's ongoing camera trap survey since 2002.

Amphibian and Reptiles

Among the 9 species of amphibians that are found in the Ramsar Site, common toad *Bufo melanostictus*, Gunther's frog *Rana guntheri*, brown tree frog *Polypedates megacephalus* and paddy frog *Fejervarya limnocharis* are common near rain-fed *gei wais* and freshwater fishponds in MPMNR. The freshwater fishponds in Tsim Bei Tsui are also home to ornate pigmy frog *Microhyla ornate* and marbled pigmy frog *Microhyla pulchra pulchra* (Appendix IV).

22 native species of reptiles are recorded in the Ramsar Site. The Chinese skink *Eumeces chinensis* appears in the mangrove fringe. The chequered keelback *Xenochrophis piscator* and Chinese water snake *Enhydris chinensis* prey on fish and frogs and are associated with freshwater fishponds. Chinese cobra *Naja atra*, red-necked keelbacks *Rhabdophis subminiatus helleri*, many-banded krait *Bungarus multicinctus*, copperhead racer, Indo-chinese rat snake and Oriental rat snake could be seen at the fringe or within the marshes.

Chinese soft-shelled turtle *Pelodiscus sinensis* is the only native species of turtles that has been recorded nesting in the fishpond of the Deep Bay area (Lau 1995; Lau, unpublished data).

The only reptile known to inhabit the intertidal mudflat within the Ramsar Site is the mangrove water snake *Enhydris bennettii*. It is specially adapted to live in the mudflat but is widely distributed in the Ramsar Site including the mangal and *gei wai*. The species has been recorded up to the Tin Shui Wai Drainage Channel where the discharge is basically freshwater (AFCD, unpublished data). The Burmese python has also been found in the mangroves in Deep Bay (A. J. Brandt pers. comm.) indicating that it occasionally uses mangrove as a foraging ground or as a resting place.

Fauna: Other Invertebrates

A detailed study of the invertebrates of the Mai Po mudflats and mangrove forest was conducted by Lee (1993). A total of 81 species were recorded 13 of which were new to science (see Appendix V). The species occurring in high density or biomass in various micro-habitats of the mudflat are predominantly Crustacea. Indeed, these species are important structural and functional components of the

ecosystem. For instance, the numerically dominant species in the muddy substrate at Mai Po, the tanaid *Dsicapseudes* spp., probably increase the nutrient flux and aeration in the mudflat by their burrowing behaviour. The most updated list of crabs found in the MPMNR has been drawn up by Lee & Leung (1999) with *Parasesarma maipoensis* being the species of particular conservation concern because it is only recorded from limited locations in Hong Kong and in Macau.

The baseline ecological monitoring programme of the Ramsar Site also monitors the dynamics of the benthic infauna in the mudflat when sampling is taken place in February, May, August and November. Annelids (both polychaete and oligochaete) generally dominate in the first three quarters. The former leads in biomass while the latter leads in abundance. As the large polychaete *Neanthes glandicineta* dies off in August and November, gastropods and crustaceans take up the dominant roles in November in terms of both abundance and biomass. The benthic infauna was generally low in species diversity and comprises mainly pollutant-tolerant species which are opportunistic, high in density but low in biomass. The features are typical in the community under the influence of organic pollution and/or other disturbance.

The list of butterflies and dragonflies found in the Ramsar Site is at Appendix VI - 1 and VI -2. A total of 41 species of butterflies and 40 species of dragonflies are recorded in the Ramsar Site. WWFHK also compiled a list of butterflies, moths and dragonflies identified in the MPMNR in the implementation of the MPMP 2006-2010. Among the notable species is the rare damselfly *Mortonagrion hirosei*, a species specific to reedbeds that at present is otherwise known only from Japan (Reels 1994).

Fauna: Fish

Some 40 species of fish are also found in fish ponds, *gei wais*, rivers and mudflat are shown in Appendix VII. Of these the mudskippers are the most characteristic and peculiar. They are small amphibious fish of tropical and warm sub-tropical estuaries, particularly where the shores have been colonised by mangroves. Among the three species occurring in Hong Kong, only *Periophthalmus cantonensis* is widely distributed. *Boleophthalmus pectinirostris* occurs at Deep Bay, Tung Chung and Tai O, and *Scartelaos viridis* is abundant at Mai Po. *B. pectinirostris* and *S. viridis* are dominant on the open mudflat while *P. cantonensis* is limited to areas near to the mangroves. *P. cantonensis* is carnivorous, appearing to feed on polychaetes and insects, while *B. pectinirostris* and *S. viridis* are detritus feeders. The latter two, hence, play an important role in surface nutrient cycling on the mudflats, as they become the prey of numerous wading birds. Mudskippers are also prized by local people as a delicacy and at one time considerable quantities were caught for local consumption. In the early 1950s about 30,000 mudskippers were estimated to be caught annually. Even today, fishermen from Hong Kong or Mainland (e.g. Futian, Shenzhen) sometimes collect mudskippers at low tide on the mudflats in Deep Bay.

1.4 CULTURAL

1.4.1 HISTORIC / PAST LAND USE

Leung (1999) gave a useful outline of the land use history of the Ramsar Site and its neighbourhood areas over the last century. The Yuen Long plain including the Mai Po area was largely mangrove marshland. After 1900, the most intensive period of reclamation occurred in the Deep Bay area as many of the settlers were fishermen and they reclaimed the marshes by building bunds to enclose the marshland, draining the area and removing the mangrove and other vegetation. The reclaimed land were then used for agricultural and other uses including rice cultivation, shrimp farming, oyster cultivation, production of salt, lime (from oyster shells) and bricks (from estuarine clays). More than 1,700 hectares of former marshland had been reclaimed.

As this trend progressed seawards, soil salinity and poor drainage conditions made red rice cultivation increasingly difficult. In the 1930s, during the process of creating polders, draining them and flushing with (mainly rain-fed) freshwater, farmers growing brackish water red rice discovered that they could also generate a by-catch of shrimps. By 1945, the production of shrimps had superseded rice cultivation and the specially managed polders, known as *gei wais*, had become the dominant land use in the Deep Bay marshlands, occupying about 35% of the land reclaimed since 1900. The shrimps that were produced from these specially managed polders were known as the '*gei wai* shrimp'.

After the mid-1960s, as *gei wai* shrimp farming became less profitable, and with the introduction of better production techniques (including multi-species culture) and machinery such as bulldozers and water pumps that reduced labour costs, farmers modified their *gei wais* to some deep water pond by blocking up the sluice gate so that more fish were kept. As only rainwater was allowed, these ponds were virtually freshwater; they were periodically drained down by water pumps when fish were harvested. By the early 1980s, fish ponds became the dominant land use in the Deep Bay area. Today, the only *gei wais* that are left in the Deep Bay area and still operated in a traditional manner are in the MPMNR, which are managed by WWFHK for their values of biodiversity and cultural heritage.

Since the mid 1980s, urban development has taken over as the major pressure for change in the Deep Bay (Lee, 1999). Fish ponds were filled up for development of new town in Tin Shui Wai and several large scale low density residential development in the region.

1.4.2 CURRENT LAND USE WITHIN RAMSAR SITE

Fish Ponds

Despite the rapid urban development in the North West New Territories (NWNT) which involved filling of fish ponds in the 1980s and 1990s, fishponds are the most dominant habitat type in the Ramsar Site in terms of size. They are the main supply of freshwater fish in the territory. In 2009, the local inland ponds, covering an area of approximately 1,160 hectares, produced 2,105 tonnes of freshwater fish amounting to \$35 million. About 92% of the farms are engaged in polyculture (big carp, grass carp, common carp, silver carp, tilapia or grey mullet). The remaining 8% practice monoculture of carnivorous species such as giant groupers, seabreams

and spotted scats in brackish fish ponds close to the coastline. Majority of the fry and fingerlings are imported from the Mainland and Taiwan. Some of the grey mullet fry may also be caught in local coastal waters. Traditionally, fry are stocked in early spring and most fish species reach marketable size in eight to twelve months.

Various studies reported that fish ponds in the Deep Bay area support many species of birds, including warblers, starlings, mynahs, egrets, herons and buntings (about 150 species) (e.g. Wong 1991, Britton 1993, Young 1993a and Aspinwall & Company 1996b). The Study on the Ecological Value of Fish Ponds in the Deep Bay Area completed in 1997 has confirmed the ecological importance of the fish pond system in the Deep Bay area particularly for herons and egrets. The key step in fish pond operation which contributes most to its ecological function is the draining of the ponds. Drainage for commercial harvesting of the fish ponds usually occurs between October and March, during which the site supports the most abundant number of wintering waterfowl. As the pond water level fell during draining, the non-commercial fish and shrimps were trapped in small pools where they became prey for piscivorous birds. Young (1998) reported that up to about 50% of individuals of Little Egret used drained ponds in Deep Bay when the ponds were drained for harvesting in winter/spring. The pattern of drainage, however, is not regular over the entire winter or the entire area, since harvesting is driven by commercial considerations. When drainage is relatively infrequent a bottleneck in the food resource exists and this factor is probably a key determinant limiting the actual maximum population sustained. The heterogeneity inherent in a system where ponds are at various stages of the maintenance cycle at any one time, acts as an important ecological attribute for maintaining high biological diversity in the area.

Gei wais

Gei wais are tidal shrimp ponds traditionally used for the farming of penaeid shrimps in South China and Asia. In Deep Bay, *gei wais* were created from the intertidal mangrove during the 1930's and were formed by building bunds confining the mangrove. Vegetations inside the ponds are preserved because their fallen leaves or parts are the natural food supply to the shrimps and fish. *Gei wais* are connected with the open water through sluice gates, where nets can be mounted, installed at the seaward bund. Fish and shrimp fries can be drawn from the estuary into the *gei wais* in autumn when the tide is high. During harvesting, *gei wais* are kept drained for about a week to collect the retained fish and shrimp. Large numbers of waterbirds are then attracted to feed on the remaining small fish or invertebrates without profit. This explains why *gei wais* under the traditional practice are important habitats to the waterbirds, particularly the harvesting period. Currently, the only remaining operating *gei wais* in Deep Bay are located in the MPMNR which are managed as roosting and foraging habitats for migratory birds or freshwater habitats for dragonflies. When water quality permits, *gei wais* 12-14 could be managed traditionally for prawn farming. *Gei wais* show how the naturally high productivity of the estuary can be utilized and how artificial or semi-artificial habitats could support a high diversity of wildlife under proper management. The harvesting of *gei wais* served as a kind of public education for traditional use of *gei wais*.

1.4.3 COMMUNICATION, EDUCATION, PARTICIPATION AND AWARENESS (CEPA) PROGRAMMES OF RAMSAR CONVENTION

THE HONG KONG WETLAND PARK

The mission of the Hong Kong Wetland Park is to foster public awareness, knowledge and understanding of the inherent values of wetlands throughout the East Asian region and beyond, and to marshal public support and action for wetland conservation. The Hong Kong Wetland Park implements CEPA programme of the Ramsar Convention and the organization of World Wetland Day celebration activities each year. The education programmes of Hong Kong Wetland Park included workshops, guided tours and public lectures are offered to schools and general public.

The Wetland Park Volunteer Scheme was established in 2002 with the aims to promote the awareness of wetland protection through direct participation and provide opportunities for the nature-lovers to serve the community. It also meant to be a coordinated effort of the government and the community to protect wetlands in Hong Kong.

The Hong Kong Wetland Park provides ecotourism facility to serve both local residents and overseas tourists. It comprises a 10,000m² visitor centre, the Wetland Interactive World and a 60-hectare man-made Wetland Reserve which provides an education and recreation venue with a theme to demonstrate the functions and values of wetlands to local residents and overseas visitors.

The Wetland Interactive World has five themed exhibition galleries, namely What Are Wetlands?, Living Wetlands, Viewing Gallery, Human Culture, and Wetland Challenge, covering different aspects of wetlands and their interaction with human. It also includes a theatre of 200 seating capacity, a souvenir shop, an indoor play area (swamp adventure) for children and a resource centre. The resource centre comprises a small library, a classroom with 50 seats and a wetland laboratory, aiming to encourage the public to further the pursuit of knowledge about wetland and nature conservation. The Wetland Reserve provides 60 hectares of man-made and carefully designed wetland habitats specially designed for waterfowls and other wildlife, including freshwater marsh, ponds, reedbed, mudflat, mangroves, grassland and woodland. Visitors can follow designated routes to explore the wonders along the way.

There is a Wetland Discovery Centre located in the Wetland Reserve which provides visitors with hands-on experience on local wetlands. The Life Lab and Wet Lab in the Wetland Discovery Centre are classrooms cum laboratory space for students to study stream and pond life at ease. It is also an outdoor education centre where visitors may explore wetland wildlife using interactive facilities. Other facilities include boardwalks and Bird Hides that are situated next to the fish pond, mudflat and riverside which would lead visitors to observe different habitats of wildlife.

EDUCATIONAL PROGRAMMES OF MPMNR

WWFHK offers educational walks to students and the general public in the MPMNR. Since 1985, the school visit programme at MPMNR has grown steadily

and the then Education Department (now Education Bureau) provides sponsorship for 400 schools groups (300 secondary and 100 primary school) to visit the MPMNR and Hoi Ha Marine Life Centre annually. WWFHK offered a variety of public visits to MPMNR which included the 3-hour guided public visits which are conducted each Saturday, Sunday, and public holiday. Workshops with different themes (e.g. photographic or insect watch) are being organized in different seasons. Other special tours like *gei wai* shrimp harvesting tour are organized so that the visitors would learn about the traditional operations of *gei wais* and participate in the harvesting of the *gei wai* shrimps. In recent years, night visits are also arranged with the theme to introduce the nocturnal animals including roosting birds, bats, fire flies, moths, amphibian and reptiles and possibly some mammals that are found in the Reserve.

Since 1991, WWFHK has been organizing the Wetland Management Training Programme at the MPMNR for wetland managers and decision makers, who are responsible for the management and conservation of wetlands in the East Asia – Australasian Flyway for migratory waterbirds. The programmes provide participants with fundamental concepts, principles and updated techniques for wetland conservation, nature reserve management and environmental education. Every year, over 12 training course and three to five study tour are organized which are attended by some 130 participants who are mainly from Mainland China. AFCD provides briefing for the training programme on the overall management of the Ramsar Site. This programme has been sponsored by the Hong Kong and Shanghai Banking Corporation Ltd. since 1988.

SECTION 2. EVALUATION, GOALS AND MANAGEMENT ISSUES

2.1 VALUES OF THE SITE AS A RAMSAR SITE

2.1.1 WETLAND TYPES IN THE RAMSAR SITE

The Ramsar Convention defines wetland broadly as follows:

“Wetlands are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres” (Article 1.1 of the Ramsar Convention). A Ramsar Site “may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands” (Article 2.1 of the Ramsar Convention).

The codes of the Ramsar Classification System for Wetland Type was first adopted by Ramsar COP 4 Recommendation IV.7 (Montreux 1990) and amended by Ramsar COP 6 Resolutions VI.5 (Brisbane 1996). The latest Ramsar Classification System for Wetland Type was reviewed and adopted by the Ramsar COP 7 Resolution VII.11 (San Jose 1999). The wetland types applicable to the Mai Po Inner Deep Bay Ramsar Site followed the System adopted in Ramsar COP 7 Resolution VII.11 as listed in Table 2.1:

Table 2.1: Wetland types in Mai Po Inner Deep Bay Ramsar Site

Wetland categories	Wetland types in the Ramsar Site	Percentage of extent in the Ramsar Site
Human-made wetlands – 1 (Aquaculture, e.g. fish/shrimp ponds)	Fishponds and tidal shrimp ponds (<i>gei wais</i>)	50%
Marine/Coastal wetlands – G (Intertidal mud, sand or salt flats)	Intertidal mudflats	23%
Marine/Coastal wetlands – I (Intertidal forested wetlands, include mangrove swamps, nipah swamps and tidal freshwater swamp forests).	Intertidal mangal	19%

2.1.2 DESIGNATION CRITERIA AS A RAMSAR SITE

The updated designation criteria for Ramsar Sites were adopted in Ramsar COP 7 Resolution VII. 11 Annex V (San Jose, 1999) as set out in Table 2.2.

Table 2.2: Designation criteria

<p>Group A of the criteria</p> <p>Sites containing representative, rare or unique wetland types</p>		<p>Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.</p>
<p>Group B of the criteria:</p> <p>Sites of international importance for conserving biodiversity</p>	<p><i>Criteria based on species and ecological communities</i></p>	<p>Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.</p> <p>Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.</p> <p>Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.</p>
	<p><i>Specific criteria based on waterbirds</i></p>	<p>Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.</p> <p>Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.</p>

	<i>Specific criteria based on fish</i>	<p>Criterion 7: A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.</p>
		<p>Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.</p>
	<i>Specific criteria based on other taxa</i>	<p>Criterion 9: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species.</p>

Among the above nine Criteria, Criterion 2, 3, 5 and 6 of Group B applied to the designation of the Mai Po Inner Deep Bay Ramsar Site. The assessment of the Ramsar Site with these 4 criteria is as follows.

2.1.2.1 GROUP B OF THE CRITERIA: SITES OF INTERNATIONAL IMPORTANCE FOR CONSERVING BIODIVERSITY. CRITERIA BASED ON SPECIES AND ECOLOGICAL COMMUNITIES.

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities:

The Ramsar Site regularly holds 35 globally threatened and near threatened species, according to the 2010 IUCN Red List (compare with 13 species listed in 1990-94) as shown in Table 1.3. Three of them are critically endangered while four are endangered.

Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region:

The Ramsar Site is the type locality for 13 species of invertebrates as shown in Appendix V. The crab species *Perisesarma maipoensis* is found nowhere else in

the world and plays significant role in the mangrove ecosystem of the Ramsar Site.

2.1.2.2 GROUP B OF THE CRITERIA: SITES OF INTERNATIONAL IMPORTANCE FOR CONSERVING BIODIVERSITY. CRITERIA BASED ON WATERBIRDS.

Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds:

Between mid-winters of 2005 and 2010, the Ramsar site supports an average of 81,830 (compare with 48,500 in 1990-94) waterbirds in the Deep Bay.

Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird:

The Ramsar Site regularly holds 19% and 3% of the global population of Black-faced Spoonbill (*Platalea minor*) and Nordmann's Greenshank (*Tringa guttifer*) in 2005-2010 respectively. There are another 17 species (compare with 6 species in 1990-94) in this site having more than 1% of threshold population of Eastern Asia (Appendix VIII).

A copy of the Ramsar Information Sheets as described in A1 of Part A which provided a summary of key features of the Ramsar Site is in Appendix IX for reference.

2.2 EVALUATION OF FEATURES

According to the “New Guidelines” and the Ramsar Handbook 16 for the wise use of wetlands: Managing Wetlands (the Handbook), evaluation is the process of identifying or confirming the important features or foci for management planning. Evaluation of important features should be undertaken for different major areas of interest including ecological character values, socio-economic values, cultural values and any other important features such as education values, scientific research or long-term monitoring. It is important that management objectives would be defined for each important feature in the evaluation process.

The RSMPII followed the above guidance and adopted the criteria as list below from the Handbook for evaluation of ecological character features. ‘Size’ has been added to the criteria. As *gei wais* and fish ponds in the Ramsar Site have both the socio-economic and cultural values, their evaluation have taken into account of these two values.

2.2.1 ECOLOGICAL EVALUATION

2.2.1.1 SIZE

The inter-tidal mudflats of the Ramsar Site are at the mouth of the Shenzhen River, with some 300 hectares exposed at low tide which is the largest one in Hong Kong. At the landward side of the mudflat, the intertidal mangal covers some 320 hectares which is not only the largest in Hong Kong but one of the few largest in southern China. The reedbed found in the Ramsar Site, covering some 40 hectares, is the largest in Hong Kong and Guangdong Province. The other habitats in the Ramsar Site are fishponds and *gei wais*. The *gei wais* that are found within the Mai Po Marshes Nature Reserve (MPMNR) covers some 230 hectares are the largest remaining tidal shrimp ponds in Hong Kong that are still functional. Although the *gei wais* are no longer used for commercial farming of shrimps, some *gei wais* in the MPMNR are still operated traditionally to provide a living exhibition of agricultural heritage. The rest are managed as roosting and foraging habitats for migratory birds while some are changed into freshwater habitats for wildlife including dragonflies.

Fishponds are the most dominant habitat found in the Ramsar Site which covered some 540 hectares. Most of the fishponds are still managed for freshwater fish production and remained as an important commercial activity around the Mai Po and Inner Deep Bay area. The fish ponds in the Ramsar Site, together with those in the Inner Deep Bay area, formed the largest contiguous and continuous fish pond system in Hong Kong which has the intrinsic values as an important habitat for roosting and feeding waterbirds. Overall speaking, the size of various types of wetland habitats found within the Ramsar Site are significant in the context of Hong Kong and have the significance in maintaining the overall ecological values of the Ramsar Site.

2.2.1.2 BIOLOGICAL DIVERSITY

Inner Deep Bay holds five major habitat types, including the largest mangrove stand in the Pearl River estuary (Liu *et al.*, 2005), one of the largest reedbeds in southern China, and an extensive area of inter-tidal mudflat, *gei wais* and fishponds as described in Section 2.2.1.1. These habitats hold a rich diversity of

flora and fauna, especially in relation to the small overall extent of the site. The mangroves exhibit a high diversity in comparison to other mangrove communities at similar latitudes (i.e. at the northern edge of their distribution) and are important sources of litter for benthic organisms. The terrestrial flora, though, is fairly impoverished, with no species of particular conservation importance. Deep Bay is highly eutrophic and is believed to have low benthic species diversity. Nevertheless, it is the type locality for 13 species of marine invertebrates that according to current information are only known to occur within Deep Bay or the Pearl River estuary (Lee, 1993).

The Site has a high avian diversity (386 species or about 78% of birds species found in Hong Kong have been recorded at MPMNR and adjacent intertidal mudflat) and it is particularly important for wintering and migratory waterbirds, several species of which are globally threatened and/or occur in internationally important numbers. Besides, various studies (Wong 1991, Britton 1993, Young 1993 and Aspinwall & Company 1996a) reported that fish ponds in the Deep Bay area support many species of birds, including warblers, starlings, mynahs, egrets, herons and buntings (about 150 species). The Study on the Ecological Value of Fish Ponds in the Deep Bay Area completed in 1997 has confirmed the ecological importance of the fish pond system in the Deep Bay area particularly for herons and egrets.

At least 21 species of mammal (i.e. >30% of the mammals species found in Hong Kong) as shown in Appendix III in Section 1 occur regularly at the Ramsar Site, of which Eurasian Otter is of particular conservation importance, which has not been reported from anywhere else in Hong Kong. Amphibians and dragonflies found in the Ramsar Site also have moderate diversity ($20\% < \text{diversity} \leq 50\%$). The biological diversity of the Ramsar Site is considered as high.

2.2.1.3 NATURALNESS

The major habitats of the Site including mudflats, mangroves and marine waters of Deep Bay are of natural origin. Fishponds and *gei wais*, which accounted for half of the areas of the Ramsar Site are man-made features but they are very important for avifauna. The mangroves exhibit a truncated succession due to the creation of fish ponds and *gei wais* behind them. Although artificially modified, fish ponds and *gei wais* have a high biodiversity and hold many species of particular conservation importance, often in very high numbers. The nutrient enrichment of Deep Bay may have increased the productivity of the ecosystem and so increased the benthic biomass. This effect in turn may be partially responsible for the presence of large numbers of waterbirds that feed on the mudflats. For instance, up to some 90,000 waterbirds were recorded there in January 2008, forming the highest count of overwintering waterbird since the commencement of the monthly waterbird monitoring programme.

2.2.1.4 RARITY

Taking into account the size, the wetland habitats within the Ramsar Site including the mudflat, mangrove, reedbed and *gei wais* are considered as large and diverse habitats in the local context. In the larger context in the southern China, the site holds the only traditionally operated *gei wais* in Hong Kong and probably in Guangdong Province. Mudflats and mangroves are also relatively rare in South China, largely as a result of coastal developments, so Inner Deep Bay now holds

one of the largest area in China (Fan 1993) and the largest in the Pearl River (Liu *et al.*, 2005).

Several rare or globally threatened species, including some potentially endemic invertebrates are also found in the Ramsar Site (see detailed description in Section 2.1.2.1 and Appendix IX). The endangered Black-faced Spoonbill *Platalea minor*, of which about 19.7 % of the total world population of around 2,347 individuals were found wintering in the Deep Bay area in January 2010.

2.2.1.5 FRAGILITY

The combination of the large mudflat area, mangrove stand, fish ponds and *gei wai* is unique in Hong Kong. Given its complex habitat types and ecological functions, the Ramsar Site could unlikely be re-created.

Geering *et al* (2007) stated that wetlands used by resident and migratory shorebirds are threatened by environmental changes at the regional and even global scale. Similarly, natural habitats within Deep Bay have been subjected to considerable pollution and other perturbations (e.g. flooding after tropical storms or cyclones). In particular, the Site is vulnerable to increasing human disturbance (physical presence and intrusion, glare from lights, noise and dumping) associated with urban and industrial development particularly from Shenzhen side that almost completely encircles the area.

2.2.1.6 TYPICALNESS

Cartographic evidence from the late 19th and early 20th centuries suggests that the mudflats and mangrove communities of the Site were typical of those found throughout Deep Bay at the time. Despite that Deep Bay habitats have now been highly modified, particularly through eutrophication, they represent a substantial example of estuarine ecosystem. Although fish ponds and *gei wais* are artificial habitats, they are typical of southern China, though traditionally operated *gei wais* can now be found only in the MPMNR.

2.2.1.7 NOTEWORTHY FLORA

The intertidal mangrove is the largest mangrove stand in Hong Kong and Pearl River Estuary, it provides shelter and food to a large diversity of aquatic fauna, including some valuable aquaculture species such as penaeid shrimps and the commercially important Mangrove Crab *Scylla paramamosain*. The native mangrove species in Inner Deep Bay include *Kandelia obovata*, *Avicennia marina*, *Aegiceras corniculatum*, *Acanthus ilicifolius*, *Bruguiera gymnorrhiza* and *Excoecaria agallocha*. Remote sensing studies of high resolution satellite images and ground truthing reveal that *K. obovata* and *A. marina* are the two major canopy species in the intertidal area. *A. corniculatum*, *A. ilicifolius* could be found on the edges and understorey of the mangal. The backshore species *B. gymnorrhiza* and *E. agallocha* are scarce in particular the latter, indicating the construction of *gei wai* during the Second World War might have removed most of these species and altered the community structure of the mangal in Inner Deep Bay. *Sonneratia* spp. originated from the plantation along Shenzhen River and in Futian National Nature Reserve are also found spreading along the seaward fringe of the native mangrove in recent years.

In Inner Deep Bay, aerial photos and satellite images from 1945 onwards show that mangroves are extending on the intertidal mudflat in a punctuated instead of continual manner. New mangrove trees extend the fronts for a number of years and the process then ceases until the next growth commences. The recent advancement of mangroves, concentrated at the outlet of Shenzhen River, started in early 1990's and seemed to be suspended in mid 2000's. So far, there is no evidence that the extension of mangroves would significantly minimize the mudflat available for bird use.

The reed *Phragmites australis* forms large beds in the *gei wais* of MPMNR. It supports a few hundred species of insect in the Ramsar Site and provides shelters to Warblers, Rails and Coots and other fauna.

Seagrass *Halophylla beccarii* and *Ruppia maritima* have been recorded in the Ramsar Site. Two sedges, short-leaved malacca galingale and coastal bulrush, are also frequently seen in the intertidal mudflat and *gei wais*.

2.2.1.8 NOTEWORTHY FAUNA

The area regularly supports a very high diversity of birds. Some 389 species, representing about 77% of the birds found in Hong Kong, have been recorded here. According to the Waterbird Monitoring Programme conducted by the Hong Kong Bird Watching Society under AFCD's service contracts, over 70 species of waterbirds, with some 80,000-90,000 individuals, use the area during recent winters. On average, more than 100,000 waterbirds can be seen throughout the year. The area is also especially important for wintering and migratory birds, 35 of which are globally threatened.

Black-faced Spoonbill

The most spectacular species in the site is perhaps the Black-faced Spoonbill *Platalea minor* (BFS). Under the IUCN Red List, BFS was once classified as Critically Endangered in 1994 and the ranking has been revised as Endangered since 2000. It is a migratory bird endemic to East Asia. Its known breeding sites are located at islets located in the De-militarised Zone on the western side of Korea Peninsula, islands of Changshan Qundao off the coast of Lianoning Province and eastern coastal area of Far East Vladivostok Bay of Russia. It migrates south in autumn and winter. Surveys of migratory routes indicated that BFS migrate to wetlands and coastal areas in Taiwan, Hong Kong, North-eastern China, Japan and Vietnam every year, where they use mudflats, marshes, fishponds and mangroves. The major known wintering grounds are Tsengwen estuary in Taiwan, Mai Po Marshes and Inner Deep Bay in Hong Kong and the Red River Delta in Vietnam.

BFS's habitat in Hong Kong mainly falls within the Ramsar Site. The MPMNR is the most important habitat for wintering BFS in Hong Kong. In January 2010, about 462 BFS (or 19.7% of global population) utilized the Deep Bay area (including both Hong Kong and Shenzhen sides) as wintering or stop-over sites in their migration. The Deep Bay area holds the second largest wintering population of the species in the world.

BFS is protected under the Wild Animals Protection Ordinance Cap 170. Their core over-wintering habitats in Hong Kong, the intertidal mudflat and MPMNR,

are listed as Restricted Area scheduled under Cap 170. According to the RSMP II, BMZ 1 (previously BMZ 4 in the RSMP) in MPMNR is specifically managed for providing a roosting and foraging habitats for BFS together with some other *gei wais* which also form their foraging and roosting habitats. According to the “Management Plan for the Mai Po Marshes Wildlife Education Centre and Nature Reserve 2006-2010”, WWFHK is committed to manage MPMNR in favour of supporting higher numbers of the BFS. These *gei wais* would be drained down slowly and in rotation, and by maintaining their site context and vegetation in order to provide suitable foraging and roosting grounds.

AFCD has conducted a series of studies on the ecology of BFS in Hong Kong since 1998, including age structure assessments of BFS and radio tracking on habitat utilization. Until late 1990s, information on the migratory routes of BFS was scarce, though it was suspected to migrate along the east China coast. The northward migration route of BFS from Hong Kong has been confirmed after a satellite tracking study was successfully conducted in spring 1999. The satellite tracking has provided valuable information on the migration routes and movement of this endangered species. In particular, the satellite tracking can identify key sites (e.g. breeding, stopping-over and summering sites) of the species, which should all be protected and managed. Besides, the global census was listed as of high priority by the first International Species Action Plan because it was proved to be an effective means for providing annual figures on the population and distribution of wintering BFSs through international cooperation. The Hong Kong Bird Watching Society, a BirdLife International Partner Designate, has started coordinating this census since 2003 onwards. The results of these studies have provided detailed information on the population trends of the species in Hong Kong and background information on habitat requirements and other aspects of its behaviour.

According to the data collected in the past two decades, there has been a steady increase in the global population of BFS since the 1990s. The global population was 294 in 1990, increasing to 430 in 1995, 660 in 2000, 1,475 in 2005 and 2,347 in 2010. The global population of the species has increased 8-times from 294 to more than 2,347 individuals in about 20 years. One of the possible reasons for this increase is that more concerted efforts from different organisations are gathered to collect more comprehensive information on this species among its wintering sites and migratory paths. Progress in nature conservation and education programmes are also major contributing factors.

Invertebrates

The aquatic invertebrate community in intertidal mudflat is numerically important and functional components of the ecosystem, occurring at high densities or biomass in various microhabitats. The endemic sesarminae crab *Perisesarma maipoensis* was described by Soh (1978) as a new species with Mai Po as the type locality. This species has a narrow habitat inhabiting on raised levees of drainage channels and drier bunds near tidal limit of the mangrove forest in Mai Po as described by Lee & Leung (1999). They have a secretive behavior, they can dig burrows that up to 1m deep and rarely seen on the mangrove forest floor. In fact, their distribution in Hong Kong is also very limited, apart from Mai Po, they had only been recorded from Tung Chung. In a larger geographic context, they were also observed in Futian, Shenzhen and Macau (Easton & Leung 1993). However,

their records were regarded as too scanty to ascertain their geographic range along the southern Chinese coast (Lee & Leung, 1999). They have not been recorded in Hong Kong for the past 10 years or so.

Benthic fauna including the infauna (e.g. the nematodes and molluscs) and epifauna (e.g. crabs and mudskippers) are important faunal groups in the Inner Deep Bay ecosystem. They recycle nutrient in the mudflat and serve as an important food source to water birds. They are also biological indicators reflecting the environmental quality of the surrounding environment. The Baseline Ecological Monitoring Programme shows that the infauna in Inner Deep Bay are low in biodiversity but are high in abundance and tolerant to pollution. The major infauna are prevailed by annelids (oligochaetes and polychaetes) and followed by molluscs and crustaceans, they play influential roles in spatial and temporal variation of community structure. Major polychaete species include *Capitella capitata* (a global indicator of pollution), *Heteromastus filiformis*, *Neanthes glandicineta* and *Potamilla acuminata*. They are opportunistic species tolerant of pollution or stressful conditions.

2.2.1.9 RECORDED HISTORY

The site has been relatively well documented, with some records of land-use dated back as far as 1,000 years (Melville & Morton 1983). A detailed study of land-use changes in Deep Bay between 1903 and 1985 was undertaken by Irving & Leung (1987). A review of land-use changes for Deep Bay between 1961 and 1994 and the whole catchment (including the Shenzhen side) has been carried out for the Fish Pond Study (Aspinwall and Company 1996b). A more updated review was carried out by Lee (1999) who analyzed the land use change of the Mai Po Marshes and the surrounding mangroves and fish ponds, Tsim Bei Tsui and Tin Shui Wai from 1979 to 1997 by the geographic information system and remote sensing technique. Flora and fauna are not well studied/ documented in the past except for birds, which have been well recorded by the volunteers of the Hong Kong Bird Watching Society Limited (HKBWS) since 1979. Since 2001, different working groups have been formed in AFCD for conducting regular ecological surveys to take inventory and update on the status of biodiversity in Hong Kong. The surveys cover all major habitats of high conservation values in Hong Kong. Based on the survey findings, a systematic ecological database on geographic information system (GIS) was developed in 2006 to store the baseline information on Hong Kong's biodiversity.

Monitoring works currently undertaking in the Mai Po Inner Deep Bay Ramsar Site include the monitoring of the baseline ecological conditions and monthly wintering bird monitoring programmes.

2.2.1.10 POTENTIAL FOR IMPROVEMENT

The Ramsar Site already exhibits considerable inherent value for conservation. Wetland habitats of the MPMNR in the Ramsar Site are under active conservation management. The Management Plan 2006-2010 for MPMNR indicated as one of its management goals to maintain, and if possible, increase the diversity of habitats appropriate for south China coastal wetlands, and the richness of native wildlife in the area. Since 1990s, some freshwater ponds and high-tide roosts had been created in the Reserve. Other habitat management works including maintenance dredging of side and cross water channels within *gei wais*, vegetation

management works and controlling water levels in *gei wais* for providing suitable habitats for waterbirds have been carried out.

Currently, wetland habitats in the Hong Kong Wetland Park adjacent to the Ramsar Site are under active management and monitoring. The value of these wetland habitats will be maintained not only for education, public appreciation but also for conservation purposes including promotion of wise use of wetland.

Existing Town Planning Board Guideline 12B provided mechanism for wetland enhancement in Wetland Conservation Area (WCA) and wetland restoration in Wetland Buffer Area (WBA). Having regard to the no-net-loss in wetland principle, for sites that are zoned “Other Specified Use (Comprehensive Development and Wetland Enhancement Area)” on the relevant Outline Zoning Plans within the WCA, limited low-density private residential/recreational development at the landward fringe of the WCA might be considered in exchange for committed long-term conservation and management of the remaining ponds within the development site under a private-public partnership approach. This kind of development proposal should include a feasible wetland enhancement and management scheme to demonstrate that such kind of development would not result in, or be able to fully compensate, for any loss of the total ecological function of the original ponds on the site and that the development impact can be mitigated. The rationale is that the ecological values of fish ponds would be enhanced under appropriate management or modified by appropriate reconfiguration. Presently, a total area of 405 hectares of fish ponds in three areas (viz. Fung Lok Wai, Nam Sang Wai and San Tin) within the WCA are zoned for this kind of land use zoning.

Enhancement project to abandoned fish ponds – Spurline Terminus Station

The first project that involved enhancement and management of abandoned fish ponds for mitigating wetland loss was the construction of the station terminus of the Lok Ma Chau to Sheung Shui Spur Line project by the then Kowloon Canton Railway Corporation (which merged into MTRC since 2007). The station terminus was constructed within the WCA. According to the EIA report, the construction works had caused a loss of about 7 hectares of inactive fish ponds that are utilized by waterbirds and some 16 hectares of fishponds of indirect disturbance impact to waterbirds that utilize the fishpond areas around the station. These impacts were compensated for through the enhancement of an area of 27 hectares fishponds (later called Lok Ma Chau Ecological Enhancement Area, EEA) by intensive and repeated stocking of fish to raise the carrying capacity of the ponds for target waterbirds species that included Black-faced Spoonbill, Great Cormorant, Great Egret and Grey Heron. Other enhancement measures include re-profiling of pond bunds to create shallows and management of water levels to maximize feeding opportunities for target species.

In a related project for the construction of Lok Ma Chau Public Transport Interchange (LMCPTI) adjacent to the terminus for provision of public transportation service, 0.35 hectares of reedbed had been lost. According to the EIA report, 3.45 hectares compensatory wetland converted from two fishponds adjacent to the EEA was used for mitigating the ecological impacts generated from the construction works. These two ponds are now under the management of AFCD.

Potential for improvement outside the Ramsar Site in WBA

In the outer region of the Ramsar Site in the Deep Bay area within the WBA, a substantial amount of fish ponds have already been lost over the past 20 years through pond filling for use as open storage, workshops, car parks or container/trailer parks which are regarded as degraded. The Government has also taken efforts through the TPB Guidelines to encourage private sectors to restore degraded or lost wetlands in the WBA by allowing consideration of limited scale of development under the land use zoning “Other Specified Use (Comprehensive Development to include Wetland Restoration Area)”. Four such areas within the WBA with a total of 121 hectares of land have been zoned for such zoning. This kind of restoration measures, if successfully implemented, could be considered as compensation or re-creation of wetland for the lost wetlands arising from developments in the WBA and served as a kind of habitat improvement to the area.

2.2.2 EVALUATION OF OTHER VALUES

The evaluation of other features of importance in the following section would focus on the values and functions, goods and services provided by the wetland in support of human well-being and their significance especially for local communities and indigenous people.

2.2.2.1 SOCIAL, ECONOMIC AND CULTURAL VALUES

The commercial fishpond culture has been practiced since the 1930's providing freshwater fish for local consumption. Most fishponds practice polyculture of carps mixed with tilapia or grey mullet and the remaining ones practice monoculture of snakehead or catfish. However, in the mid 1990s, the freshwater fish market in Hong Kong was challenged by the increasing import of the cheaper freshwater fish from Mainland China. In facing the price challenge, many pond-fish farmers intensified the management regime by more frequent harvest without complete drain down of their ponds, or converted the coastal fishponds to monoculture of brackish species such as scat, seabream and pompano.

On the other hand, there are also many fish farmers who leave the industry and abandon their ponds because they suffered financial difficulties or they are too old to continue with their business. In fact, a lot of fish farmers in the Deep Bay are over 60s but very few younger generations in Hong Kong are willing to practice in this industry. The abandonment of the fishponds may reduce the opportunities for waterbirds to feed in drained fish ponds in winter.

MPMNR is the only place in Hong Kong where *gei wais*, the example of traditional way of sustainable farming of penaeid shrimp utilizing the naturally high productivity of estuary are preserved. Each *gei wai* at Mai Po has an area of approximately 10 hectares and they are now managed by WWFHK for conservation purposes. Similar to fish ponds, when *gei wai* is drained down for harvest, the bottom is exposed leaving the areas of shallow water or exposed mud which provides feeding habitats for fish-eating birds such as herons, egrets and even the endangered Black-faced Spoonbill during the winter times. From November to March, some of the *gei wais* at Mai Po are drained down on a

rotational basis so as to provide feeding habitats for the migratory waterbirds that are passing through, or wintering in Deep Bay. WWFHK also organize evening *gei wai* shrimp harvesting tour in June to August to demonstrate the technique of harvesting *gei wai* shrimp to educate the public on this traditional sustainable use of wetlands.

2.2.2.2 COMMUNICATION, EDUCATION, PARTICIPATION AND AWARENESS VALUES

CEPA programme of the Hong Kong Wetland Park (HKWP)

The HKWP was opened to the public on 20 May 2006. Since then, it has taken the lead and became the platform for the promotion of Communication, Education and Public Awareness (CEPA) programmes, both locally and in the Asian Pacific Region. The Government of HKSAR is delivering its obligations with regard to CEPA under the Ramsar Convention through the HKWP.

Among the CEPA activities organized worldwide, the World Wetland Day is one of the most important as it commemorates the signing of the Ramsar Convention in Ramsar, Iran on 2 February 1971. On every 2 February, Contracting Parties from all over the world would celebrate this meaningful day with a view to raising public awareness of wetland values and inviting public participation in wetland conservation. In Hong Kong, the celebration of World Wetland Day has been undertaken by the HKWP in collaboration with various local schools and organizations since 2007. Each World Wetland Day promotes the wise use of wetland resources under a specific theme. It has become one of the key education programme for conservation in Hong Kong.

Up to 2010, it has attracted more than 2.9 millions visitation. Through the programmes provided by the HKWP, the Government is delivering its obligations with regard to the promotion of Communication, Education, Participation and Awareness (CEPA) programme of Ramsar Convention both locally and in the south-east Asian region. Since its opening, the HKWP has organised over 26,225 CEPA activities for over 999,000 participants.

The goal of the HKWP CEPA Programme is to support the Convention's CEPA Programme (Resolution X.8, 2008) for promoting conservation and wise use of wetlands. The strategic objective of the Programme is to serve HKWP as a hub of wetland conservation education in Hong Kong and south-east Asia.

The following operation objectives of the HKWP CEPA Programme are in line with the goals and strategies of the CEPA Programme of the Ramsar Convention, in particular to promote wise use of wetlands at local and regional levels. Programme details are listed in Appendix X.

- 1 Arranging educational programmes on the wise use of wetlands and understanding of wetland biodiversity in Hong Kong.
- 2 Arranging education programmes on wetland conservation for schools and general public.
- 3 Building up public support and developing their capacity on wetland conservation.

- 4 Supporting the WLI-Asia network for better implementation of CEPA programmes across Asia.

CEPA programme of the World Wide Fund for Nature Hong Kong (WWFHK)

WWFHK offers various educational walks, special tours, and workshops to the general public in MPMNR. Since 1991, WWFHK has been organizing the Wetland Management Training Programme at the MPMNR for wetland managers and decision makers, who are responsible for the management and conservation of wetlands in the East Asia – Australasian Flyway for migratory waterbirds, especially those from the Mainland. These activities are complementary to the CEPA activities undertaken by the HKWP. Please refer to Section 1.4.3 for the details of these programmes.

2.2.2.3 RESEARCH AND STUDY VALUES

Mai Po and Inner Deep Bay have long been the active study sites for continual or one-off ecological and environmental researches by different organisations including AFCD, WWFHK, HKBWS, Hong Kong Bird Ringing Group, local and international academic institutions and individuals.

Waterbird monitoring has been carried out since 1979. The Waterbird Monitoring Programme within the Ramsar Site is currently conducted by HKBWS under contract of AFCD. Also, voluntary bird ringing activities in MPMNR have been conducted by local bird experts since 1966.

WWFHK and members of the Mai Po Management Committee compiled a list of priority research topics relevant to the Deep Bay wetlands. The list provides a focus for research work and is intended to encourage new or further study in research areas considered important to help conserve and protect Deep Bay's wetland biodiversity. The bibliography list of known research subjects and topics relating to the Mai Po and Inner Deep Bay area can be downloaded from the website of WWFHK.

2.2.2.4 OTHER VALUES

The wetland habitats within the Ramsar Site helped to alleviate flood problems in the northwest of the territory. The mangrove is of value in stabilizing the shore of the bay. The Site is also used for bird watching and nature appreciation.

2.3 FACTORS INFLUENCING SITE MANAGEMENT

The factors which would influence the attainment of site management objectives and the implementation of management practices include natural trends, human-induced trends, legal constraints and external impacts.

2.3.1 NATURAL TRENDS

The natural processes occurring in the Ramsar Site which may play a significant role in the management of the Ramsar Site are reviewed below.

2.3.1.1 SILTATION

The existing sedimentation conditions have been discussed in A.5 of Part A. In summary, the wetland system in Inner Deep Bay including the mudflat and the *gei wai* are under the influence of the Pearl River and open sea, so continuous sedimentation is a natural process. At present, there is no evidence showing that the sedimentation process has affected the ecological values of the Ramsar Site. The long-term effect of the process may lead to the gradual extension of existing mudflat area further seaward to the west. In the long term, a review of the ecological values of the new mudflat area and whether the inclusion of such area to the existing Ramsar Site would meet the designation criteria would be studied. A suggested further study (see Project M3) on this issue is elaborated in Section 3-Action Plan.

2.3.1.2 VEGETATION SUCCESSION

Within the Ramsar Site and its environs, shallow areas of the wetland habitats including freshwater marsh, *gei wais*, mudflat, open water or channels would be invaded by vegetation including mangrove and reedbeds if their natural proliferations are not managed. A.6 in Part A discussed the management works on mangrove by different parties in the Inner Deep Bay. While there were concern on the fast spreading of mangrove at the mouth of Shenzhen River and the subsequent loss of the northern side of the mudflat, the potential extension of the mudflat area on the west of Tsim Bei Tsui should be kept in view closely. As it is important to conserve the mudflat area as the feeding site for waterbirds on one hand and the need to conserve mangrove habitat on the other hand, a multi-disciplinary study would be required to look at issues (including the need for flood control) related to mudflat and mangrove holistically for the formulation of a management plan for mangroves. The suggested further study (see Project M4) on this issue is elaborated in Section 3 – Action Plan.

2.3.1.3 WINTERING WATERBIRD POPULATION TRENDS

During migration, waterbirds depend on a chain of staging sites along the flyway, where they temporarily stay to feed before undertaking the next leg of migration (Geering *et al.*, 2007). Monitoring of the population of the migratory birds provides important environmental baseline information and the trends in bird numbers and species occurring at the site. In view that thousands of waterbirds including migratory ducks, gulls, shorebirds, cormorants and egrets/herons visit the Ramsar Site and Deep Bay area every winter, a long-term waterbird monitoring works at the Ramsar Site has been conducted since December 1997, as a fundamental part of the management strategy, and as an indicator of the status of the Deep Bay ecosystem.

As reviewed and discussed in A7 of Part A, the trends of wintering waterbirds have remained quite steady over the years. Nevertheless, the effectiveness and accuracy of the monitoring results might be further studied including a review of the data collected, the survey methodology and the scopes of the wintering waterbird monitoring programmes is elaborated in Section 3 – Action Plan (see Project O4).

2.3.1.4 PESTS

As reported by Young (1999), *Avicennia marina* in the Deep Bay area has limited regeneration capacity due to the impact of the herbivorous moth caterpillar of species *Domitorina rostrata*. These caterpillars emerge in early summer to feed selectively on the leaves of *A. marina* and cause massive defoliation of the trees every year. This phenomenon has been occurring for some 20 years and affected the flowering and fruiting of the stand. However, it is noted that the degree of defoliation in recent years has been less severe. Observations of seedlings of *A. marina* in the past two years indicated that the pests did not seriously affect the reproductive potential of this mangrove.

It has also been observed that some mangroves at the landward edge at MPMNR were covered by the creepers or climbers like *Derris trifoliata*, *Strophanthus divaricatus* and *Paederia scandens* in recent years, possibly as a result of organic enrichment or silting up of the *gei wai* channels. As reported by Young (1999), the cover of *D. trifoliata* and other weeds including the invasive *Mikania* are increasing in both the intertidal mangroves and those within the *gei wais*. They grew on the mangrove where they may smother and kill the trees. On the other hand, tall vegetation like reeds or grasses growing on pond bunds would make the *gei wais* unattractive to those waterbirds that favoured open areas for roosting and loafing. With funding provided by AFCD for service contract work in the MPMNR, WWFHK has carried out vegetation management there including clearance of climbers from mangrove and control on the spread of reed and grass.

2.3.1.5 WILD BIRDS AND AVIAN FLU

The current wild bird surveillance undertaken in Hong Kong is in line with the Ramsar COP 10 Resolution X.21 (Changwon, 2008), particularly the role of the wetland management authority in maintaining healthy wetland habitat. Basically, the Resolution highlights the important points for sample collection, species identification, and post-mortem as well as safety aspects when conducting surveillance.

In the case of Hong Kong, day-to-day monitoring is being conducted by government i.e. AFCD collects dropping samples daily in the MPMNR and the HKWP where most of the migratory waterbirds gathered for H5 tests as part of AI surveillance programme since winter 2002. The testing results provided invaluable information indicating the health conditions of migratory birds under the surveillance. Detail of the surveillance programme is in Appendix XI. The scale of waterbirds surveillance in MPMNR and HKWP would be stepped up during peak migratory period. Whenever a sick or dead bird is found, AFCD would arrange for collection the carcass for examination. Post-mortem examination is undertaken by qualified laboratory. Other bio-security measures have also been implemented in the territory to minimise the risk of spread of H5N1 virus. Apart

from the above, public awareness and education are also important tasks when dealing with the avian flu.

Communication with wetland manager in mainland China (e.g. Futian National Nature Reserve) has been maintained and countries (e.g. Australia and Japan) within the East Asian-Australasian Flyway, particularly when there is an identified positive case. Information on the status of migratory birds within the flyway would be sought when necessary.

2.3.2 HUMAN-INDUCED TRENDS

2.3.2.1 DEVELOPMENT PRESSURE

A review of the measures and the development control mechanisms for conservation and to address the possible development pressure of the Deep Bay area was carried out in A.8 of Part A. The review showed that the TPB guidelines TPB PG-No. 12B has established a fundamental land use planning concept for the Deep Bay area with a view to protecting the ecologically important fishponds and wetlands in the area.

The existing development control mechanisms through the land use zoning system under the TPO regulates land uses through different statutory land use zoning plans in the area and the “designated project” approach under the EIAO which check and control the loss of wetlands arising from developments. The map showing the updated land use zoning of the Ramsar Site is shown in Figure 2.1. The checking and reviews of application of wise use of wetlands in development proposals, wetland management plans and land use planning of WBA and WCA of Inner Deep Bay to make sure that any adverse impacts on the Ramsar Site are properly addressed and mitigated would be continued. Such projects (see Project W2, W5, W6 & W7) would be elaborate in Section 3 – Action Plan.

2.3.2.2 FISH POND MANAGEMENT

The current situation of the commercial fish pond management for fish farming is described in Section 1.4. Pond fish farming is regarded as a kind of wise use of wetlands in the Ramsar Site. It is important that this practice, which is also the livelihood of local communities and has the social, economic and cultural values, be sustained. Some changes to the traditional ways of fish pond farming are recorded below:

Accredited Fish Farm Scheme

AFCD introduced a voluntary Accredited Fish Farm Scheme to local mariculturists and pond fish farmers in mid 2005 to enhance the competitiveness of the local aquaculture industry. Fish farms that participate in this scheme are required to adopt a set of ‘best aquaculture practices’ so as to raise the overall environmental hygiene standards of the farms and the quality of cultured fish. Before the cultured fish are sold in the market, AFCD conducted a series of quality assurance tests, including analyses of drug residues and heavy metals in fish, to ensure that all cultured fish meet food safety standards. The scheme has been very well received. By December 2010, a total of 38 inland pond farms (213 ponds), representing 21% of the total area of registered fish ponds in Hong Kong, had joined the scheme. A map showing the locations of inland pond farm under the Scheme is in Figure 2.2. In collaboration with the Fish Marketing

LEGEND

拉姆薩爾濕地
Ramsar Site

城市規劃委員會規劃指引所定的
后海灣濕地保育及緩衝區界線：

Deep Bay Wetland Conservation and
Buffer Areas Boundaries designated
under Town Planning Board Guidelines-

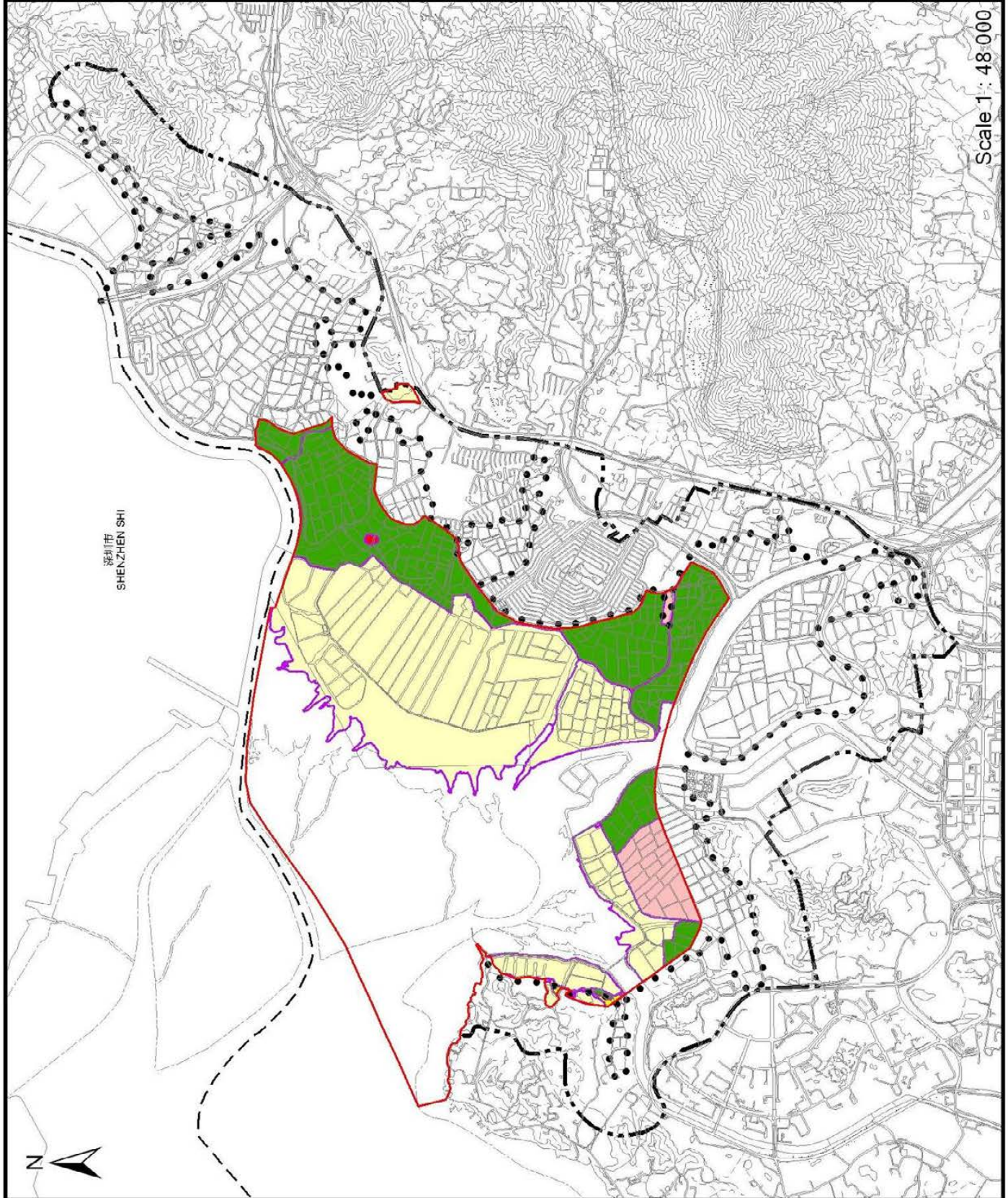
濕地保育區
Wetland Conservation Area

濕地緩衝區
Wetland Buffer Area

OZP Zoning

Zone

- CA - Conservation Area
- GIC - Government, Institution
or Community
- GB - Green Belt
- OU - Other Use
- SSSI - Site of Special
Scientific Interest



深圳市
SHENZHEN SHI

香港特別行政區政府 二零一零
Hong Kong Special Administrative Region Government 2010

Title

OZP Zoning in Ramsar Site

DATE: Aug 2010 FIGURE No. 2.1



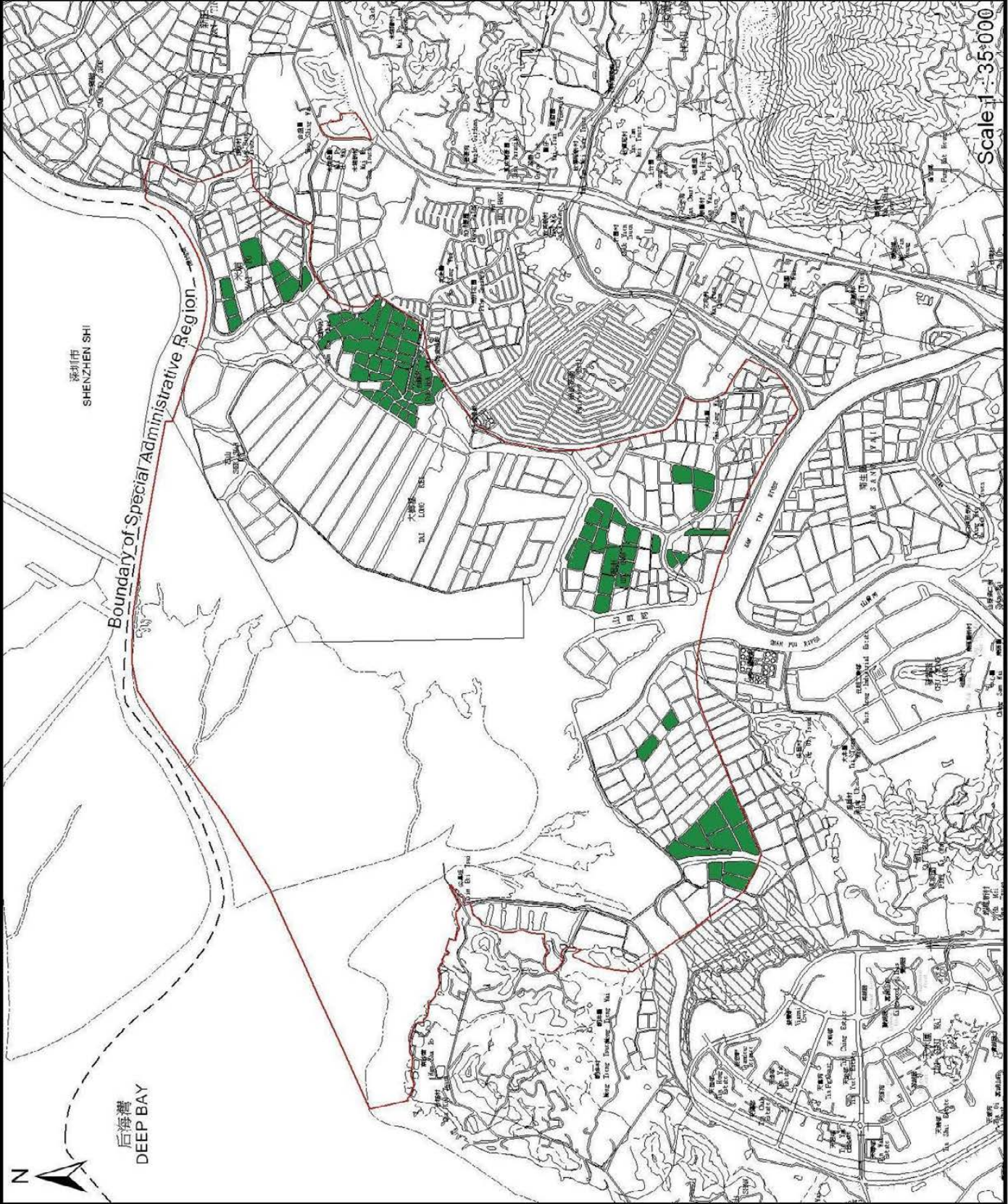
漁農自然護理處
Agriculture, Fisheries and Conservation Department

M_2010_147_52.1

Scale 1 : 48 000

LEGEND

-  Ramsar Site
-  Hong Kong Wetland Park
-  Accredited Fish Farm



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Hong Kong Special Administrative Region Government 2010

Title
Accredited Fish Farm Inside
The Mai Po Inner Deep Bay
Ramsar Site

DATE: Feb 2011 FIGURE No. 2.2



漁農自然護理處
Agriculture, Fisheries and Conservation Department

Organisation, the Department continues to publicize and promote the marketing of fish products under this brand name. Project W3 as elaborated in Section 3 – Action Plan is relevant.

Apart from the above scheme, AFCD also promote the quality of local aquaculture farms by implementing a voluntary registration scheme in early 2007 for local pond fish farms. As of February 2011, 274 pond fish farmers in Hong Kong had been registered. Improved culture techniques and good management practices were introduced to farmers through seminars, on-farm demonstrations and advisory leaflets. Through these measures, it is hoped that the pond fish farming industry, in particular those fishponds in the Ramsar Site could be sustained in the future.

Organic fish farming

In 2009, AFCD developed a code of practice for organic fish farming in Hong Kong with a view to coping with the demand for safe and healthy food. Practical guidelines are in preparation to facilitate interested fish farmers to engage in organic aquaculture. In February 2011, two fish farms in Deep Bay were awarded Organic Aquaculture Certification by the Hong Kong Organic Resource Centre of Hong Kong Baptist University. To obtain the Certification, fish farms need to meet certain organic aquaculture requirements regarding their cultivating environment, species, feeds, health treatment, transportation and slaughtering. Please refer to A10 in Part A for the details.

Recreational Fishing

In recent years, some fish ponds in the Deep Bay area were converted for recreational fishing purposes; however there is no official statistics on such activities. The operators usually installed some simple on-site facilities such as chairs and shelter along the pond bunds so that visitors could carry out recreation fishing. Applications for such change of land use to the Town Planning Board are required. It is anticipated that such low intensity activities that maintained the fish pond function would not pose serious disturbance impacts to the Inner Deep Bay ecosystem.

Partnership between NGO and fish farmers

In 2006, WWFHK launched a five-year community-based wetland conservation project with the aim to conserve the fish ponds around the Inner Deep Bay area. The scheme involved signing management agreements with fish farm operators and they have to continue to manage their fish ponds to maintain their ecological values. Through a fish pond adoption scheme from public donation and WWFHK's corporate members, the participating public would become the 'foster parents' to the fish ponds. The donation would provide some financial incentives to local fish farmers and they are required to follow the prescribed management methods to farm their fish ponds which are beneficial to wildlife in particular to waterbirds.

In 2007, WWFHK launched a scheme for development of a new business model for farming 'eco' fish. The role of WWFHK was to assist the fish pond farmers to develop the new business model to locally produce the eco-friendly, organically-cultivated eco-fish so that the fish farmers can sell these fish at a higher market value. (See Project W11 in Section 3 – Action Plan).

Cormorant Predation

Great Cormorant is a large piscivorous bird wintering in Hong Kong from October to March. During the peak time in January, some 7,000 – 9,000 Cormorants came roosting and feeding in the Mai Po Inner Deep Bay Ramsar Site and its vicinity. It has been a concern of fishpond farmers that wintering Cormorants would predate fish in their commercial fishponds.

All along, there have been three complementary measures in practice to minimize Cormorant predation from commercial fishponds, i.e.

- a) stocking of trash fish in MPMNR;
- b) enhancing the foraging ground for waterbirds in the MPMNR; and
- c) deterring cormorant by setting up wirings over commercial fishponds by pond operators.

A7 in Part A provides an overview of these existing measures. Since cormorant predation in commercial fish ponds has been a concern over the years, there are regular meetings among AFCD, WWFHK and the HK (NT) Fish Culture Association (HKNTFCA, 香港新界養魚協進會) to discuss ways to address the concern. Further study would be considered for investigation and exploration of suitable alternative measures to deal with Cormorant predation in commercial fishponds (see Project O8 in Section 3 – Action Plan).

Conservation of fishponds

Fish pond operation is considered a wise use of wetlands in Hong Kong. While local fishpond operation is diminishing due to competition from cheaper import of freshwater fish, different parties including the government and NGOs could work together in partnership with fish pond operators to maintain fishpond operation as a cultural activity for conservation education/ training purpose. As described in A.8 of Part A, the private-public partnership approach (e.g. the Fung Lok Wai development) not only provide incentives for private developers to carry out long-term management of fish ponds (or wetland) within their development site, it also help to provide an opportunity to involve fish farmers in projects of conservation value.

One of the possible options to better conserve the ecological values of fish ponds lie in the provisions of the New Nature Conservation Policy (NCCP). Non-governmental organisations (NGOs), including green groups, educational institutions and community organisations, may apply for funding from the Environment and Conservation Fund for entering into Management Agreements (MA) with the landowners of sites with high ecological values. The NGOs will provide the landowners with financial incentive in exchange for management rights over their land or their cooperation in enhancing conservation of the sites concerned. Therefore, NGOs may invite fish ponds operators to join the scheme to implement measures, e.g. to drain down ponds to provide feeding grounds for waterbirds for enhancing the conservation values of the fish ponds in Deep Bay. The operators would receive financial subsidy in return for carrying out the measures. It is anticipated that the MA scheme could be a sustainable measure to benefit both the fishermen as well as the waterbirds in Deep Bay in the long run.

Despite changes in pond fish farming practices in recent years, the size or coverage of fish ponds in the Inner Deep Bay region did not change or decline since the designation of the Ramsar Site in 1995. Enhancement in communications with fish pond operators/owners or developers/ private land owners are necessary for the means of/alternatives as appropriate for maintenance of the fishponds so that the long-term sustainability of the habitat which is part of the wetland ecosystem would largely be maintained.

2.3.2.3 EXOTIC SPECIES

Mikania




The exotic climbers *Mikania micrantha*, are mainly found in open and disturbed areas where there are ample sunlight and damp soil. Therefore they are common in roadside areas or the edge of woodlands. In wetland habitats, however, they are more commonly found on fish pond bunds or *gei wai* bunds. Within the MPMNR, *Mikania* are found expanding from the *gei wai* bunds to the mangrove trees, in particular for the BMZ 6 which is designated for maintenance and management of mangrove habitats. In tackling this problem, WWFHK has included the clearance and monitoring of the spread of *Mikania* in mangrove habitat in *gei wais* #12-14 in the management plan since 2006. *Mikania* has very deep underground roots and manual removal of the roots is practicable but highly labour intensive, WWFHK has carried out manual removal of the aerial part of the *Mikania* every year which is funded by AFCD under service contracts arrangement as part of the routine vegetation management works. Project W9 as elaborated in Section 3 – Action Plan is relevant.

Sonneratia

Sonneratia spp., which is exotic to the territory, has been found in the Ramsar Site since year 2000. They are probably the descendents of the mangrove planted for afforestation in the Futian National Nature Reserve which shares the same waters in close proximity to the Ramsar Site. Most of the *Sonneratia* trees distributed along Shenzhen River or at the fringe of the existing native mangrove forests (Figure 2.3). A review of the removal works on *Sonneratia* has been discussed in Section A6 in Part A. The removal of *Sonneratia* species as a precautionary measure will be continued in the Ramsar Site (see Project W8 as elaborated in Section 3 – Action Plan).



LEGEND

-  Ramsar site
-  Mangrove
-  Sonneratia

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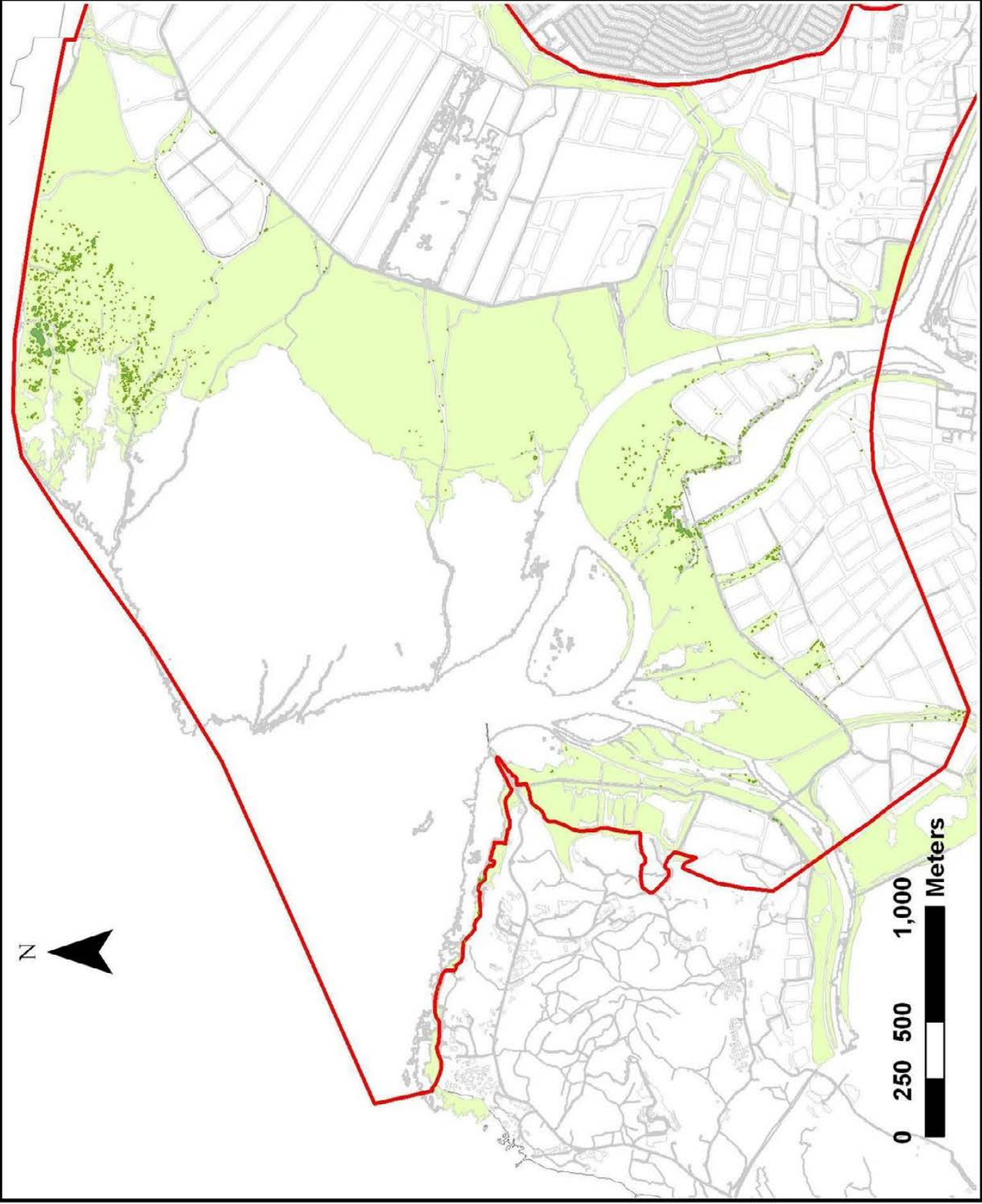
Title

Distribution of Sonneratia
inside the Ramsar Site

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2.3.3 TENURE AND STATUTORY CONSTRAINTS

The areas of private land and government leaseholds, and the coverage of planning and security designations within the Ramsar Site have been described in Section 1. Apart from the 270 hectares of MPMNR and some small part of the intertidal mangrove and mudflat which are under intensive habitat management by WWFHK, the other areas within the Ramsar Site are mainly consisted of fish ponds mostly under private operation not targeted for conservation purposes.

Among the fishponds, some are abandoned and some are not under active management for fish farming. As explained, the fish ponds at Fung Lok Wai, Nam Sang Wai and San Tin consisted of mainly privately owned land and is zoned OUCDWEA, which allowed consideration of the limited low-density private residential/recreational development at the landward fringe of the WCA and provides the incentive for long-term commitment for conservation and management of the remaining fish ponds within the development site. If planning permission is granted by the TPB for such kind of development with conservation objectives, fishponds within this kind of zoning would be under proper management and monitoring for wetland conservation.

2.3.4 EXTERNAL IMPACTS

2.3.4.1 WATER POLLUTION

The water and sediment quality of Inner Deep Bay is influenced by discharges into Pearl River, Shenzhen River and channels in Hong Kong and is currently in poor conditions as revealed by regular water quality monitoring programmes of EPD. The issue of water-borne pollution was discussed in A.9 in Part A.

The situation is expected to gradually improve over time by the implementation of mitigation measures by both pollution control authorities of the Shenzhen and Hong Kong sides to regulate the pollution discharges into the waters in Inner Deep Bay area.

Water Quality

The Ramsar Site Baseline Ecological Monitoring Programme (BEMP) indicates that the open waters in Inner Deep Bay are contaminated with wastewater discharge containing high levels of nutrients. The situation will pose a long-lasting impacts on the sediment characteristics, such as the low availability of oxygen in sediment, accumulation of nutrients, high availability of toxic metals, and the composition of benthic infauna that are an important food sources to waterbirds. At the same time, the infrequent water exchange in *gei wais* may have resulted in much stronger eutrophication and settlement of suspended solids and support active growth of algae.

Sediment Quality

The sediment in the inner Deep Bay has a heavy loading of organic materials and is anaerobic. The levels of cadmium and arsenic are also high in certain areas of the mudflat and deserve further investigation. The short supply of molecular

oxygen and high levels of nutrients give rise to a community of benthic infauna which are at present low in biodiversity but high in abundance and tolerant to pollution.

Persistent organic pollutants

According to the risk assessment of concerned persistent organic pollutants (POPs) from ardeid eggs collected from Mai Po Village and Mai Po Lung Village, polychlorinated dibenzodioxins/dibenzofurans (PCDDs/DFs), dichlorodiphenyldichloroethylene (DDE) and polybrominated diphenyl ethers (PBDE) 99 were found to have potential causes for concern. However, annual egret survey indicates an overall increasing trend of the nest counts of the ardeids in Hong Kong including those in the Deep Bay colonies which form the largest share in Hong Kong. Further studies are needed to regularly monitor the levels of POPs in the ardeid nesting populations and to elucidate the interplay between the POPs levels and the breeding success of the ardeids in Deep Bay and other parts of Hong Kong (see Project M5 as elaborated in Section 3 – Action Plan).

The water borne pollution issue in the Ramsar Site will be closely monitored through the BEMP (see Project M2 as elaborated in Section 3 – Action Plan). Close liaison with EPD would also be necessary for updating on the overall control of water borne pollution situation in Inner Deep Bay area .

Chemical spill

The Ramsar Site is influenced by the discharge from both Hong Kong and Shenzhen. The Environmental Protection Department has established a notification system with the Shenzhen government to handle Mainland land-based pollution incidents that affect surface waters connected to the watercourses of the Shenzhen River, the Sha Tau Kok River and their vicinity. If pollution incidents take place under the scope of the system, AFCD would be informed to take follow-up actions as appropriate.

For oil spillage within Hong Kong, the Government maintains a Maritimetime Oil Spill Response Plan (MOSRP) which is coordinated by the Marine Department (MD). MOSRP aims to ensure a timely and effective response to oil spillages and/or their potential threats in the waters of Hong Kong. In addition to oil spill, the Environmental Protection Department is also formulating a contingency plan as required under Article 4 of the Protocol on Preparedness, Response and Co-Operation to Pollution Incidents by Hazardous and Noxious Substances (OPRC-HNS Protocol) adopted by the International Maritime Organisation. The contingency plans serves to coordinate relevant government departments to respond in a collaborative manner in case of HNS spillage. Under MOSRP and the proposed contingency plan for HNS spillage, MD will notify AFCD to assist in the combating of the spills if the incidents take place near the Ramsar Site.

On top of the cross-border notification system and government-wide contingency plans, AFCD also maintains its own Departmental Oil/Chemical Spill Contingency Plan. This contingency plan serves as a guide for coordinating response of different divisions inside AFCD when oil/chemical spill takes place in sensitive sites including the fish culture zone, oyster culture zone, SSSI, coral sites and Ramsar Site. AFCD will advise and assist MD in cleaning up spill

oil/chemicals in and around the sensitive sites.

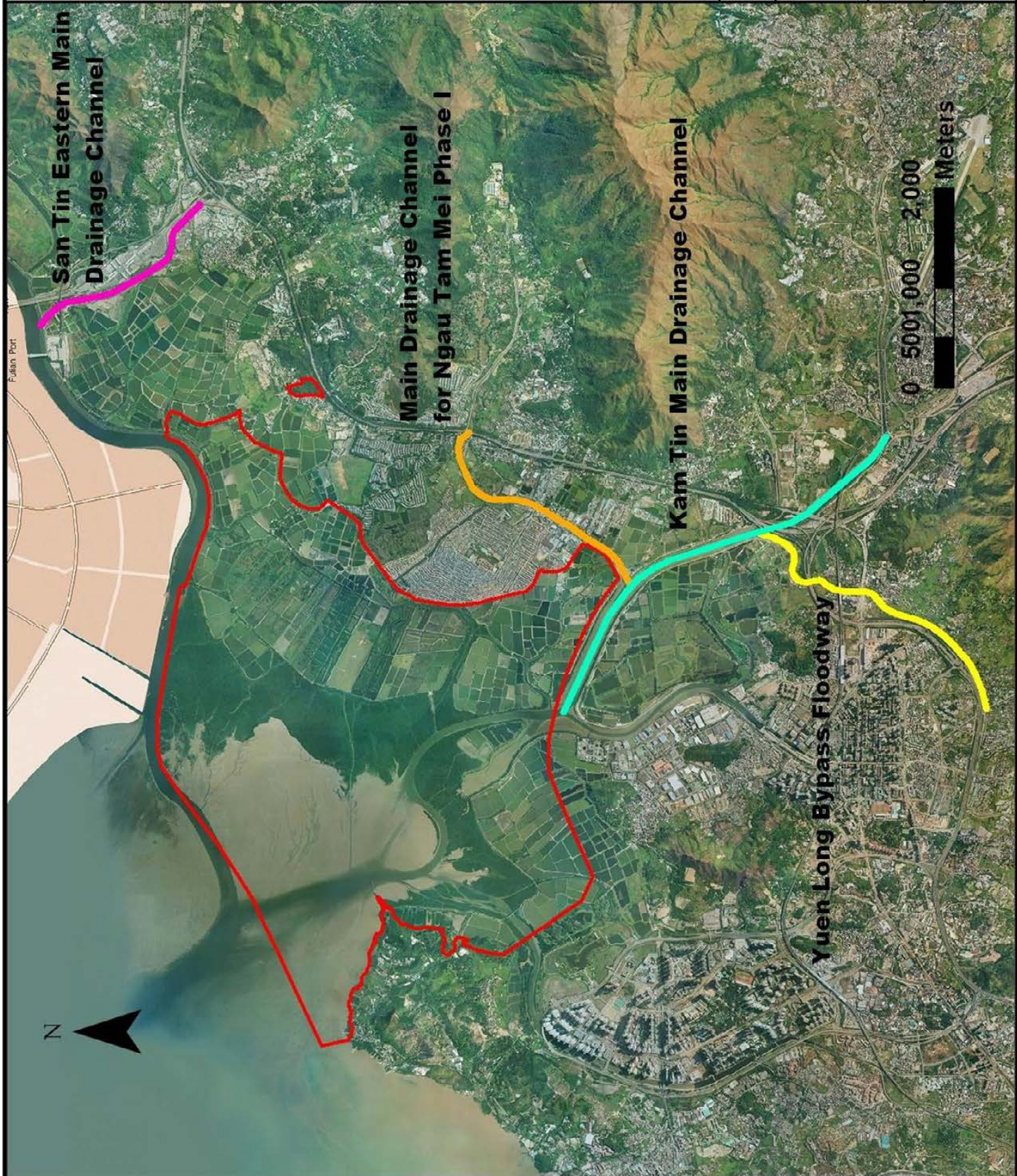
2.3.4.2 DRAINAGE AND RIVER DIVERSION

Drainage projects

A number of drainage related works have been completed in the past 15-20 years. Subsequent routine maintenance of the drainage channels at the site include regular dredging of the river banks. About 32 km of drainage channels have been constructed in Yuen Long, Kam Tin and Ngau Tam Mei areas since 1997, including the Main Drainage Channel for Ngau Tam Mei Phase 1, the Yuen Long By-pass Floodway from Sham Chung Tsuen to Kam Tin River near Sha Po Tsuen, San Tin Eastern Main Drainage Channel from Castle Peak Road along the western side of San Sham Road to Shenzhen River (see Figure 2.4). The construction works for the upper reaches of Kam Tin River, San Tin Western drainage channel and some smaller channels in Kam Tin, Ngau Tam Mei and San Tin have also been started since 2006.

Some of the ecological mitigation works resulted from these drainage works had kept some of the wetland habitats in Deep Bay better managed for nature conservation. The earth bottom lining and mangrove plantation on the embankments of the newly channelized drainage channel at Kam Tin River provides favourable sheltering and foraging grounds for wetland birds, particularly the Ardeids and wintering ducks (Lai *et al.*, 2007). Globally endangered Black-faced Spoonbill *Platalea minor* and regionally important Eurasian Spoonbill *Platalea leucorodia* were recorded in the channel section. Hundreds of the Black-headed Gull *Larus ridibundus*, waders and Great Cormorant *Phalacrocorax carbo* were also recorded at various sections of the drainage channels during winter migratory period.

The Yuen Long Bypass Floodway project, which was a government drainage improvement works implemented by DSD and the Civil Engineering and Development Department, was completed in 2006. Under the project, the loss of 7 hectares of fish ponds due to the construction of drainage channel has been compensated by the restoration and enhancement of about 7 hectares of disused fishponds near Tin Fook Wai. The habitat enhancement works for these wetland habitats included re-profiling of ponds, planting aquatic vegetation and stocking fish in the ponds. The restored wetland has been under the management and monitoring by AFCD since 2007. Habitat maintenance works include management of water level, water quality, vegetation and fish stock have been actively carried out. An ecological monitoring programme is being implemented for adaptive management purpose.



Fukien Port

San Tin Eastern Main Drainage Channel

Main Drainage Channel for Ngau Tam Mei Phase I

Kam Tin Main Drainage Channel

Yuen Long Bypass Floodway



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Title

Major Drainage Channels
Constructed Since 1997

DATE: Aug 2010 FIGURE No. 2.4



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Hydrology

The hydrology of Inner Deep Bay, which is a shallow water bay, is primarily influenced by sedimentation. While the the Deep Bay Integrated Environmental Management Study Final Report (1988) identified the Shenzhen River Flood Control Works as potentially adding the largest sediment loads to Deep Bay, it is found that the open waters in Inner Deep Bay have also been a source of sediments influencing the Shenzhen River. Assessments in other channels feeding the Inner Deep Bay revealed that the sediment load in the discharge was limited. On the other hand, there are concerns that mangroves in Inner Deep Bay might have blocked the drainage flows of Shan Pui River and Tin Shui Wai Drainage Channel. In 2001-02, mangroves at the outlet of Shan Pui River were cut to help improve water flow (Figure 2.5). DSD has commissioned a consultancy study "Review of Drainage Master Plans in Yuen Long and North Districts - Feasibility Study" which is expected to provide information for better understanding of the hydrology of Inner Deep Bay as a dynamic ecosystem. While the study has yet to be finalized, computer modeling supported by field measurement has initially revealed that clearing of the mangroves at Shan Pui River outlet or dredging the outlet would not bring down the water levels to a significant levels in a 50-year or a 200-year flood.

2.3.5 VISITOR DEMAND

The public interest in the uses of the HKWP and the MPMNR has been discussed in Section 1. As described above, both the HKWP and the MPMNR serve for the Ramsar CEPA programme for different target visitors. Apart from providing educational and recreational facilities for local residents, the HKWP also provides attractions with special interest in wildlife and ecology to diversify visitor experience for all, especially overseas visitors. Both the HKWP and the MPMNR will continue their roles to complement each other in CEPA programme for the implementation of Ramsar Convention in Hong Kong.



~45m

Mangroves at
outlet of
Shan Pui
River

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Title
Mangroves trimmed at Shan Pui
River outlet in 2001/02

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2.4 GOALS AND OBJECTIVES

The Goals to be achieved under RSMPII are adopted from Resolution X.1 of Ramsar COP 10 (Changwon, 2008) and the Ramsar Strategic Plan 2009-2015. Essentially, there are Five Goals identified by the Ramsar Strategic Plan and under which '28 strategies' that represent a general consensus of the most important priorities for most Contracting Parties. The Ramsar Strategic Plan 2009-2015 has called for actions to be undertaken by the Ramsar Secretariat, the International Organization Partners and the Contracting Parties. Since each Contracting Party differ substantially in their situations, therefore each will examine the Ramsar Strategic Plan and determine their own responses as their resources would allow.

Among the five Goals identified by the Ramsar Strategic Plan, four Goals are considered as relevant in the context of Hong Kong for implementation of the Convention as follows (Goal 5 of the Ramsar Strategic Plan 2009-2015 concerning "Membership" has been excluded as the goal "To progress towards universal membership of the Convention," delivers Articles 2.4 and 9 of the Convention and is for action at the Secretariat, Standing Committee and Contracting Parties at the national levels.):

Goal 1: 'Wise Use'. To work towards achieving the wise use of all wetlands by ensuring that all Contracting Parties develop, adopt and use the necessary and appropriate instruments and measures, with the participation of the local indigenous and non-indigenous population and making use of traditional knowledge, while at the same time ensuring that conservation and wise use of wetlands contribute to poverty eradication, mitigation of and adaptation to climate change, as well as prevention of disease and of natural disasters. This Goal delivers Articles 3.1, 4.3, 4.4, and 4.5 of the Convention.

Goal 2: 'Wetlands of International Importance'. To develop and maintain an international network of wetlands that are important for the conservation of global biological diversity, including waterbird flyways and fish populations and for sustaining human life, by ensuring that all Contracting Parties appropriately implement the Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance and by appropriate management and wise use of those internationally important wetlands that are not yet formally designated as Ramsar Sites but have been identified as qualifying through domestic application of the Strategic Framework or an equivalent process. This Goal delivers Articles 2.1, 2.2, 2.5, 2.6, 3.1, 3.2, 4.1 and 4.2 of the Convention.

Goal 3: 'International Cooperation' To enhance the conservation and wise use of wetlands using effective international cooperation, through inter alia the active application of the Guidelines for international cooperation under the Ramsar Convention. This Goal delivers Article 5 of the Convention.

Goal 4: 'Institutional capacity and effectiveness'. To progress towards fulfillment of the Convention's mission by ensuring that it has the required mechanisms, resources, and capacity to do so. This Goal delivers Articles 6, 7, and 8 of the Convention.

After evaluating the important features and factors that may affect the management of the Ramsar Site in Section 2, the relevant factors that are likely to affect the important features and relevant management objectives are listed in the Table below. The projects and action plans that are required to carry the objectives forward is elaborated in Section 3.

Important Features	Relevant Factors	Management Objectives to be achieved (and Strategies to achieve the Management Objectives)
<p>Wetland habitat: Mudflat is important for its</p> <ul style="list-style-type: none"> (i) size; (ii) naturalness (iii) rarity; (iv) fragility; (v) capacity to support high diversity and endangered species of avian; and (vi) research and study, recreational values. 	<ul style="list-style-type: none"> ◆ Natural trend: <ul style="list-style-type: none"> (i) effect of siltation on the ecological performance of mudflat; and (ii) vegetation colonization. ◆ Human-induced trend: <ul style="list-style-type: none"> - exotic species including Sonneratia colonization. ◆ External impact: <ul style="list-style-type: none"> (i) water, sediment pollution and Persistent organic pollutant; and (ii) drainage projects that affect hydrology. 	<ul style="list-style-type: none"> ● Wetland Inventory and Assessment. To describe, assess and monitor the extent and condition of all types of wetland habitats for the application of wise use of wetlands under the Convention. (Action Plan of Strategy 1a in Section 3) ● Science-based management of wetlands. Promote successful implementation of the wise use concept by ensuring that national policies and wetland management plans are based on the best available scientific knowledge, including technical and traditional knowledge. (Action Plan of Strategy 1d in Section 3) ● Invasive alien species. To develop an inventory of invasive alien species that currently and/or potentially impact the ecological character the Ramsar Site, and develop guidance and promote procedures and actions to prevent, control or eradicate such species in wetland systems. (Action Plan of Strategy 1g in Section 3) ● Ramsar Site designation. To maintain the Ramsar Information Sheets and constantly update it with the best available information. (Action Plan of Strategy 2a in Section 3) ● Ramsar Site ecological character. Maintain the ecological character of all designated Ramsar Sites, through planning and management. (Action Plan of Strategy 2b in Section 3) ● Shared wetlands, river basins and migratory species. To promote inventory and cooperation for the management of shared wetlands and hydrological basins, including cooperative monitoring and management of shared wetland-dependent species. (Action Plan of

Important Features	Relevant Factors	Management Objectives to be achieved (and Strategies to achieve the Management Objectives)
<p>Wetland habitat: Coastal Mangrove is important for their</p> <ul style="list-style-type: none"> (i) size; (ii) naturalness, (iii) rarity; (iv) fragility; (v) high biological diversity; (vi) research and study; (vii) recreational values; and (viii) as protection of coastline. 	<ul style="list-style-type: none"> ◆ Natural trend: <ul style="list-style-type: none"> - pest invasion, creepers and climbers invasion, ◆ Human-induced trend: <ul style="list-style-type: none"> - exotic species including Mikania and Sonneratia invasion. ◆ External impact: <ul style="list-style-type: none"> (i) water and sediment pollution; and (ii) drainage project that affect hydrology. 	<p>Strategy 3a in Section 3)</p> <ul style="list-style-type: none"> ● Wetland Inventory and Assessment. To describe, assess and monitor the extent and condition of all types of wetland habitats for the application of wise use of wetlands under the Convention. (Action Plan of Strategy 1a in Section 3) ● Science-based management of wetlands. Promote successful implementation of the wise use concept by ensuring that national policies and wetland management plans are based on the best available scientific knowledge, including technical and traditional knowledge. (Action Plan of Strategy 1d in Section 3) ● Invasive alien species. To develop an inventory of invasive alien species that currently and/or potentially impact the ecological character the Ramsar Site, and develop guidance and promote procedures and actions to prevent, control or eradicate such species in wetland systems. (Action Plan of Strategy 1g in Section 3) ● Ramsar Site ecological character. Maintain the ecological character of all designated Ramsar Sites, through planning and management. (Action Plan of Strategy 2b in Section 3)
<p>Wetland habitat: Reedbed is important for their</p> <ul style="list-style-type: none"> (i) size; (ii) naturalness; (iii) rarity; (iv) fragility; 	<ul style="list-style-type: none"> ◆ Natural trend: <ul style="list-style-type: none"> (i) colonization of terrestrial vegetation; and (ii) pest e.g. bug invasion. ◆ External impact: <ul style="list-style-type: none"> - water and sediment 	<ul style="list-style-type: none"> ● Wetland Inventory and Assessment. To describe, assess and monitor the extent and condition of all types of wetland habitats for the application of wise use of wetlands under the Convention. (Action Plan of Strategy 1a in Section 3) ● Science-based management of wetlands. Promote successful implementation of the wise use concept by ensuring that national

Important Features	Relevant Factors	Management Objectives to be achieved (and Strategies to achieve the Management Objectives)
(v) research and study; (vi) recreational values; and (vii) as habitats for wildlife.	pollution.	<p>policies and wetland management plans are based on the best available scientific knowledge, including technical and traditional knowledge. (Action Plan of Strategy 1d in Section 3)</p> <ul style="list-style-type: none"> ● Ramsar Site ecological character. Maintain the ecological character of all designated Ramsar Sites, through planning and management. (Action Plan of Strategy 2b in Section 3)
<p>Wetland habitat: Fish ponds are important for their</p> (i) size; (ii) the high biodiversity and species of conservation concern found in there; (iii) typicalness; (iv) their potential for improvement or restoration; and (v) socio-economic value, culture value.	<ul style="list-style-type: none"> ◆ Human-induced trend: (i) development pressure; (ii) fish pond management; and (iii) cormorant predation. ◆ Tenure and statutory constraints. ◆ External impact: mitigation works of drainage project. 	<ul style="list-style-type: none"> ● Wetland Inventory and Assessment. To describe, assess and monitor the extent and condition of all types of wetland habitats for the application of wise use of wetlands under the Convention. (Action Plan of Strategy 1a in Section 3) ● Policy, Legislation and Institutions. To develop and implement policies, legislation, and practices, including growth and development of appropriate institutions to ensure that the wise use provisions of the Convention for sustainable development. (Action Plan of Strategy 1b in Section 3) ● Cross-sectoral recognition of wetland service. To increase recognition of and attention in decision-making to the significance of the values and functions of different wetlands. (Action Plan of Strategy 1c in Section 3) ● Integrated Water Resources Management. To ensure that an ecosystem-based approach is included in the planning activities and decision-making processes, particularly concerning groundwater management, catchment/river basin management, coastal and nearshore marine zone planning, and climate change mitigation

Important Features	Relevant Factors	Management Objectives to be achieved (and Strategies to achieve the Management Objectives)
		<p>and/or adaptation activities. (Action Plan of Strategy 1e in Section 3)</p> <ul style="list-style-type: none"> ● Wetland Restoration. To identify priority wetlands and wetland systems where restoration or rehabilitation would be beneficial and yield long-term environmental, social, or economic benefits, and implement the necessary measures to recover these sites and systems. (Action Plan of Strategy 1f in Section 3) ● Private sector. To promote the involvement of the private sector in the conservation and wise use of wetlands. (Action Plan of Strategy 1h in Section 3) ● Incentive measures. To promote incentive measures that encourage the application of the wise use provisions of the Convention. (Action Plan of Strategy 1i in Section 3) ● CEPA. To support the Convention’s Communication, Education, Participation and Awareness Programme (Resolution X.8) for promoting the conservation and wise use of wetlands. (Action Plan of Strategy 4 in Section 3)
<p>Wetland Habitat: <i>Gei wais</i> are important for their</p> <ul style="list-style-type: none"> (i) size; (ii) rarity; (iii) fragility; (iv) typicalness; (v) the high biodiversity and species of 	<ul style="list-style-type: none"> ◆ Natural trend: <ul style="list-style-type: none"> (i) effect of siltation ecological performance <i>gei wai</i>; (ii) creepers invasion to bunds and mangrove found within the <i>gei wais</i>; and 	<ul style="list-style-type: none"> ● Wetland Inventory and Assessment. To describe, assess and monitor the extent and condition of all types of wetland habitats for the application of wise use of wetlands under the Convention. (Action Plan of Strategy 1a in Section 3) ● Cross-sectoral recognition of wetland service. To increase recognition of and attention in decision-making to the significance of the values and functions of different wetlands. (Action Plan of Strategy 1c in Section 3)

Important Features	Relevant Factors	Management Objectives to be achieved (and Strategies to achieve the Management Objectives)
<p>conservation concern found in there;</p> <p>(vi) their social and cultural value; and</p> <p>(vii) public educational values.</p>	<p>(iii) avian flu for affecting the CEPA value.</p> <p>◆ Human-induced trend: -exotic species including Mikania.</p> <p>◆ External impact: (i) water and sediment pollution; and (ii) visitor demand.</p>	<ul style="list-style-type: none"> ● Science-based management of wetlands. Promote successful implementation of the wise use concept by ensuring that national policies and wetland management plans are based on the best available scientific knowledge, including technical and traditional knowledge. (Action Plan of Strategy 1d in Section 3) ● Invasive alien species. To develop an inventory of invasive alien species that currently and/or potentially impact the ecological character the Ramsar site, and develop guidance and promote procedures and actions to prevent, control or eradicate such species in wetland systems. (Action Plan of Strategy 1g in Section 3) ● Ramsar Site ecological character. Maintain the ecological character of all designated Ramsar Sites, through planning and management. (Action Plan of Strategy 2b in Section 3) ● Shared wetlands, river basins and migratory species. To promote inventory and cooperation for the management of shared wetlands and hydrological basins, including cooperative monitoring and management of shared wetland-dependent species. (Action Plan of Strategy 3 in Section 3) ● CEPA. To support the Convention’s Communication, Education, Participation and Awareness Programme (Resolution X.8) for promoting the conservation and wise use of wetlands. (Action Plan of Strategy 4 in Section 3)

2.5 THE RENEWED MANAGEMENT PLAN – RSMPII

As recommended by Recommendation V.3 adopted by Ramsar COP 5 (Kushiro, 1993), there is a need to develop zoning measures, which should involve protection in key zones and various forms of wise use for the benefit of human populations in other zones. In Handbook 8 Managing Wetlands of The Ramsar Handbook for the wise use of wetlands, it recommended that establishing zonation and management objectives for each zone and hence what activities should and should not be permitted within such zone is an important part of the process of establishing a close involvement of local communities, indigenous people and other stakeholders in the management of the wetland.

In managing protected areas or areas designated for conservation, it is necessary to:

- protect sensitive elements of the ecosystem from disturbance;
- separate incompatible uses; and
- prioritize various uses or purposes.

The purpose, management intention, permitted and incompatible activities of each management zone and compartment as listed in the RSMP have been discussed in A2 of Part A. While the management intentions of some compartments are required to be updated to reflect the current situations, the purpose, permitted and incompatible activities of each zone are still considered valid for achieving the Goals and Management Objectives above.

The management compartments under the renewed RSMPII are shown in Figure 2.6. The specific characteristics and management intentions of each management compartment are summarized in Tables 2.3 – 2.5 as follows:

2.5.1 THE MANAGEMENT OBJECTIVES

2.5.1.1 CORE ZONE

Purpose

The purpose of the Core Zone is to provide an undisturbed, largely natural reference area. It includes open marine water, intertidal mudflat and mangal. Maintenance of natural processes has priority and access is generally limited to essential management, monitoring and research purposes.

Permitted Activities

Navigation in the existing main channels; inspection of drainage and pre-notified maintenance; control/removal of non-native species; prescribed monitoring and approved research.

Incompatible Activities

Activities contrary to the purposes of the zone, including: reclamation; hunting, harvesting, unauthorised collection, destruction, or disturbance of indigenous wild fauna and flora; livestock grazing; unauthorised access (including by boat) outside the existing main channels; storage, dumping or disposal of waste including untreated effluent; construction of industrial facilities or dwelling places;

unauthorised use or application of chemicals (fertilizers, biocides, etc.); mining; removal of aggregates; and introduction of non-native species.

Activities Requiring Management Approval

Activities which are neither permitted nor clearly incompatible with the purposes of the zone, including: channel dredging; control of mangrove encroachment; habitat management intervention; non-prescribed monitoring and research; limited predetermined and controlled access; and discharge of treated effluents.

TABLE 2.3: Management intentions for Core Zone compartments

CORE ZONE	
Compartment	Management Intention
CZ1	To maintain natural processes by minimizing disturbance to this zone. Activities are restricted to patrolling against unauthorized entry to the mudflat areas, ecological monitoring and research and removal of exotic species.
CZ2	In the medium to long term, monitoring of bird use of these abandoned ponds should be carried out which provide baseline information on bird use of abandoned ponds.

The Police and AFCD carry out regular patrols to deter unauthorized cross boundary activities and access to the Restricted Area respectively. Other regular management actions, including the removal of the exotic mangrove, *Sonneratia* by AFCD and the removal of mangrove seedlings and grasses in front of the floating bird hides by WWFHK will continue to be carried out.

2.5.1.2 BIODIVERSITY MANAGEMENT ZONE

Purpose

The purpose of the Biodiversity Management Zone is to provide a refuge for waterfowl (including a high tide roost) and a focus for biodiversity conservation, education and training in a relatively intensively managed environment.

Permitted Activities

Existing land use practices including operation of *gei wais* where conservation of biodiversity or cultural values is the major objective; predetermined controlled access, including for purposes of education and training; prescribed monitoring and approved research; and routine and/or prescribed habitat management and maintenance including control/removal of invasive, exotic or pest species.

Incompatible Activities

Activities contrary to the purposes of the zone, including: hunting, intensive commercial harvesting, unauthorized collection, destruction, or disturbance of indigenous wild fauna and flora; intensive commercial livestock grazing; unauthorized access (including by boat); storage, dumping or disposal of waste including untreated effluent; construction of industrial facilities or dwelling places (other than dwellings required for management purposes); unauthorized use or application of chemicals (fertilizers, biocides, etc.); mining; removal of aggregates; and introduction of non-native species.

Activities Requiring Management Approval

Activities which are neither permitted nor clearly incompatible with the purposes of the zone, including: exceptional or novel habitat management intervention; change of land use or production system; keeping of limited number of livestock; construction of dwelling places required for management purposes, visitor facilities or other infrastructure; discharge of treated effluents; establishment or maintenance of collections of living organisms.

TABLE 2.4: Management intentions for Biodiversity Management Zone compartments.

Biodiversity Management Compartment	Management Intention
BMZ 1	(<i>gei wais</i> 3,4,6,7): In the medium term, to adjust conditions in favour of supporting higher numbers of the Black-Faced Spoonbill.
BMZ 2	(<i>gei wais</i> 8,9,10,11): In the medium term, to adjust conditions in favour of supporting a substantial block of reedbed habitat (plus the small existing patch of bulrush vegetation).
BMZ 3	(<i>gei wais</i> 12,13,14): In the medium term, to maintain traditionally managed production <i>gei wai</i> with areas of mangrove vegetation.
BMZ 4	(<i>gei wai</i> 15a, b): In the long-term, to maintain and improve the Education Centre and its associated waterfowl collection.
BMZ 5	(north of <i>gei wai</i> 16/17, 18, 19): In the medium term, to adjust conditions in favour of creating an open, tidal area with fringing reeds and mangroves, shingle or tree-topped islands and pools/channels with varying sizes, heights and depths that can act as a secure high-tide roost or wintering waterfowls.
BMZ 6	(<i>gei wai</i> 20, 21-23): In the medium term, to adjust conditions in favour of creating an open freshwater roosting area with fringing reeds and mangroves, shingle or tree-topped islands and pools/channels with varying sizes, heights and depths. (<i>gei wai</i> 24): In the medium term, to adjust conditions in favour of creating a series of freshwater lakes of varying depth with surrounding areas of marsh.
BMZ 7	(<i>gei wai</i> 21): To maintain as an open high-tide roosting site as an alternative to <i>gei wai</i> 16/17.

WWFHK in MPMNR will continue to enhance the foraging ground for wintering waterbirds with appropriate management of water levels in *gei wais* to minimize Cormorant predation in commercial fishponds.

2.5.1.3 WISE USE ZONE

Purpose

The purpose of the Wise Use Zone is to allow ecologically sustainable use of wetland and other natural resources to be carried out in a way compatible with the Ramsar site management goals and objectives and, where appropriate, to be encouraged and promoted. The Wise Use Zone also provides a buffering function additional and complementary to that provided by buffering zones outside the Ramsar Site.

Permitted Activities

Existing land use practices including drainage maintenance and operation of fish ponds. *Gei wais* operation conducted in an ecologically sustainable manner (including harvesting of managed stocks of fauna such as fish and shrimp); prescribed harvesting of commercial species of indigenous wild fauna and flora; controlled livestock grazing; access as required (including by boat); prescribed monitoring and approved research; routine and/or prescribed habitat management and maintenance including control/removal of invasive, exotic or pest species.

Incompatible Activities

Activities contrary to the purposes of the zone, including: hunting, unauthorized harvesting, collection, destruction, or disturbance of indigenous wild fauna and flora; storage, dumping or disposal of waste including untreated effluent; construction of industrial facilities; unauthorized use or application of chemicals (fertilizers, biocides, etc.); mining; removal of aggregates; and introduction of non-native species other than those approved for use in fish ponds and *gei wai*.

Activities Requiring Management Approval

Activities which are neither permitted nor clearly incompatible with the purposes of the zone, including: exceptional or novel habitat management intervention; change of land use or production system; discharge of effluents; construction of ancillary structures and other facilities required for authorized economic activities.

TABLE 2.5: Management intentions for Wise Use Zone compartments.

WISE USE ZONE	
Compartment	Management Intention
WUZ1	The land use should be compatible with the Wise Use of wetlands concept of the Ramsar Convention taking account of local socio-economic circumstances. This compartment is a <i>gei wai</i> which also serves as a roosting site for waterbirds.
WUZ2	The land use should be compatible with the Wise Use of wetlands concept of the Ramsar Convention taking account of local socio-economic circumstances.
WUZ 3	The land use should be compatible with the Wise Use of wetlands concept of the Ramsar Convention taking account of local socio-economic circumstances. This compartment is a drainage which is subject to routine management by government.
WUZ4	The land use should be compatible with the Wise Use of wetlands concept of the Ramsar Convention taking account

WISE USE ZONE	
Compartment	Management Intention
	of local socio-economic circumstances.
WUZ 5	The land use should be compatible with the Wise Use of wetlands concept of the Ramsar Convention taking account of local socio-economic circumstances. This compartment is a drainage which is subject to routine management by government.
WUZ6	The planning intention of this zone is to be developed as a nature reserve together with the adjacent Private Land Zone. The land use should be compatible with the Wise Use of wetlands concept of the Ramsar Convention taking account of local socio-economic circumstances.
WUZ7	The land use should be compatible with the Wise Use of wetlands concept of the Ramsar Convention taking account of local socio-economic circumstances.
WUZ8	This compartment consists of a piece of marshland and fishponds that surround the MPMNR. This compartment provides a very important buffer against any possible disturbance effect arise from the Fairview Park and privately owned land on the MPMNR. The land use should be compatible with the Wise Use of wetlands concept of the Ramsar Convention taking account of local socio-economic circumstances and its important status as buffer to the Ramsar Site.
WUZ 9	The land use should be compatible with the Wise Use of wetlands concept of the Ramsar Convention taking account of local socio-economic circumstances.
WUZ 10	This compartment is used by fish pond operators from Shenzhen. The land use should be compatible with the Wise Use of wetlands concept of the Ramsar Convention taking account of local socio-economic circumstances.









2.5.1.4 PRIVATE LAND ZONE

Purpose

The purpose of the Private Land Zone is to recognize the existing legal status of the land.

The Ramsar Site boundary includes some areas of land in private ownership. While the private ownership status means that the land is not subject to the prescriptions of this management plan, existing planning constraints mitigate against any significant change to current use. It is intended to obtain and maintain the cooperation of the owners concerned to conduct their management in an ecologically sustainable manner consistent with the purposes of the surrounding or adjacent management zone.

LEGEND

-  Ramsar Site
-  Core Zone
-  Wise Use Zone
-  Biodiversity Management Zone
-  Private Land Zone
-  Hong Kong Wetland Park
-  Wetland Conservation Area
-  Wetland Buffer Area

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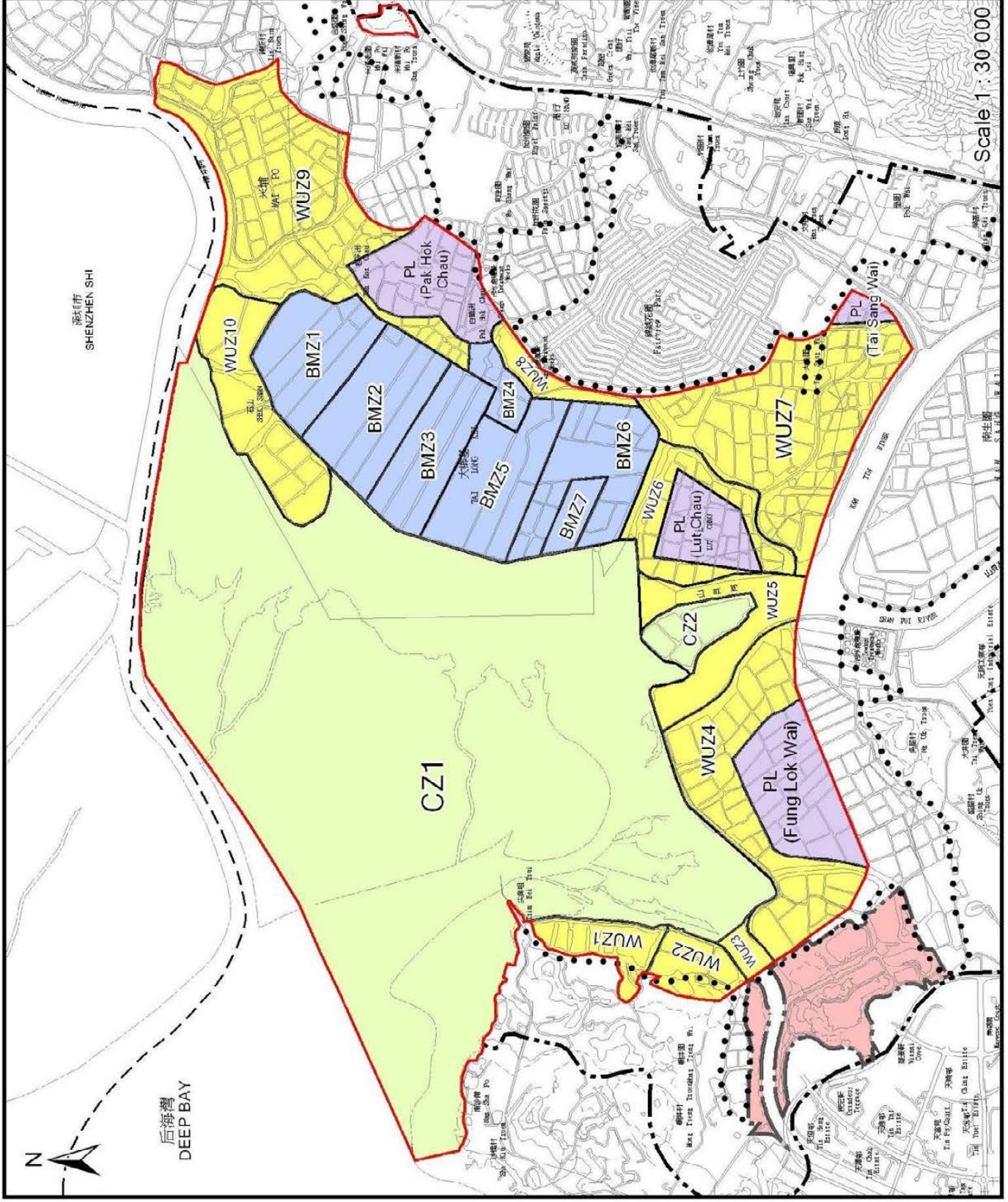
Title
New Management
Compartment Plan

DATE: Jan 2011 FIGURE No. 2.6



漁農自然護理處
Agriculture, Fisheries and Conservation Department

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2.6 MONITORING PROGRAMME

2.6.1 BASELINE MONITORING SCHEME

In 1998, AFCD initiated a study “Development of an Ecological Monitoring Programme for the Mai Po and Inner Deep Bay Ramsar Site” (Agreement No. CE 17/98) to prepare for the implementation of the Baseline Ecological Monitoring Programme (BEMP) for the Ramsar Site. A Technical Manual (TM) was prepared in 2000 as a result of the study to provide a standard to guide the implementation of the monitoring programme.

To comply with the government tendering requirement, the monitoring activities are arranged into continual projects, each of 12 months in duration. The first monitoring project was commenced in October 2001. The programme includes monitoring of both core ecological parameters including analyses on benthic fauna, habitat quality and changes and waterbird count and supplementary data namely water quality, sediment quality and sedimentation rate.

The fundamental objective of BEMP is to monitor the ecological conditions of the Ramsar Site so that the ecological values of the area can be maintained and improved through management measures. In the long run, it is expected that an ecological baseline database of the Ramsar Site could be established based on the dataset of BEMP for the assessment of trends as appropriate in future.

2.6.2 TARGETED MONITORING SCHEME

Ecological research/ studies have been undertaken by different organisations at the MPMNR including AFCD, WWFHK, HKBWS, Hong Kong Bird Ringing Group, local and international academic institutions and individuals.

To better understand the natural assets and facilitate the formulation of nature conservation work, different working groups have been formed under AFCD which conducted regular ecological surveys since 2001 for taking inventory and updating the status of biodiversity in a continuous manner. The surveys cover all major habitats of high conservation value in Hong Kong SAR including the Ramsar Site.

The counting of wintering waterbirds could be traced back to late 1970s. The volunteers of the HKBWS have organized an annual January count of wintering waterbird in Deep Bay since 1979. This also formed a part of the Asian Waterbird Census coordinated by the Wetland International – Asia Pacific for the Asia region. In November 1992, this waterbirds count exercise was extended to include the whole of the winter period and from then onwards, counts have taken place from November to March.

Since December 1997, a long-term monthly waterbirds monitoring at the Ramsar Site has been conducted by the HKBWS in collaboration with AFCD as a fundamental part of the management strategy, and which provided an indication of the status of the Deep Bay ecosystem. The surveys have been conducted in a synchronized manner. The counting of waterbirds in the Ramsar Site has also been part of the AFCD’s ecological monitoring programme since 2001. This

annual programme provides essential statistics on the abundance and diversity of over 70 species of waterbirds each year visiting the Ramsar Site. The figures are essential to identify the dynamics of the migratory waterbirds, and the species of conservation significance utilizing the Ramsar Site and nearby area. The variations of their population utilizing the Ramsar Site might also reveal the habitat qualities of the area, when the data collected over a long term is analyzed.

3. GOALS, STRATEGIES AND ACTION PLANS

3.1 GOALS AND STRATEGIES

This part of the Management Plan sets out the Goals to be achieved under the Ramsar Convention, the Strategies and Action Plans that are required to be undertaken to achieve these Goals for implementation of the Convention. Issues that are considered in Part A which may have influences on the site management have been taken into account for developing the Action Plans.

The Goals and Strategies identified are adopted from Resolution X.1 and the Ramsar Strategic Plan 2009-2015 (Ramsar COP 10 (Changwon, 2008)) provides the necessary indicators to measure the effectiveness of the implementation of the Convention. In view that the Contracting Parties differ substantially with their own resources and circumstances, they should develop their own Strategic Plan to establish their countries own priorities and work plan for implementing the Convention.

Four Goals are adopted from the Strategic Plan of Resolution X.1 namely 'Wise Use of Wetlands', 'Development of the Ramsar List for Wetlands of International Importance', 'International Cooperation' and 'Implementation Capacity'. The 10 Strategies listed under these Goals provide the approach for the Management Plan of the Mai Po Inner Deep Bay Ramsar Site. The Key Result Areas indicate the extent of the Strategies to be achieved. Action Plans/Projects list out the actions required to be undertaken in order to achieve the Strategies.

Projects that are marked with an asterisk* are new initiatives and their scopes are further described in Section 3.3.

3.1.1 GOAL 1. WISE USE

This Goal delivers Articles 3.1, 4.3, 4.4 and 4.5 of the Ramsar Convention.

TABLE 3.1: Strategies serving Goal 1

(E = Enforcement Issues, M = Monitoring Issues, O = Ornithological issues, W= Wise use issues, CEPA = Communication, Education, Participation and Awareness Programmes)

Strategies	Key Result Areas	Action Plans/ Projects
<p>1a Wetland Inventory and Assessment To describe, assess and monitor the extent and condition of all types of wetland habitats for the application of wise use of wetlands under the Convention.</p>	<ul style="list-style-type: none"> The Wetland Inventory data and information in Hong Kong is updated periodically. 	<p>W1*: Reviewing and updating the Wetland Inventory which included wetland habitat types and their distribution, wetlands for restoration and location of under-represented wetland types.</p>
<p>1b Policy, Legislation and Institutions To develop and implement policies, legislation, and practices, including growth and development of appropriate institutions to ensure that the wise use provisions of the Convention for sustainable development.</p>	<ul style="list-style-type: none"> Wise use of wetlands in Hong Kong follows the Town Planning Board Guideline 12B which adopted a “precautionary approach” with the principle of maintaining “no-net-loss in wetland” in considering development proposals in the Deep Bay area to ensure sustainable use of wetlands for protecting and conserving the ecological integrity of the Deep Bay area wetland ecosystem. 	<p>W2: Annual review of application of wise use of wetlands in development proposals and land use planning of WBA and WCA of Inner Deep Bay.</p>

Strategies	Key Result Areas	Action Plans/ Projects
<p>1c Cross-sectoral recognition of wetland services To increase recognition of and attention in decision-making to the significance of the values and functions of different wetlands.</p>	<ul style="list-style-type: none"> • Fish pond culture is maintained as a wise use of wetlands in HK. • The cultural values as well as the ecological services of the wetlands in HK are part of the educational programmes of the HKWP. • The cultural values of <i>gei wai</i> operations have been maintained within the MPMNR. 	<p>W3: Updating the progress of the implementation of Accredited Fish Farm Scheme which aims to enhance the competitiveness of the local aquaculture industry.</p> <p>CEPA1: Arranging educational programmes on the wise use of wetlands and understanding of wetland biodiversity in Hong Kong.</p> <p>W4: Provision of support to the implementation of MPMP 2006-2010 for maintaining <i>gei wai</i> operation in MPMNR.</p>
<p>1d Science-based management of wetlands To promote successful implementation of the wise use concept by ensuring that national policies and wetland management plans are based on the best available scientific knowledge, including technical and traditional knowledge.</p>	<ul style="list-style-type: none"> • The wetland management plans of development proposals are based on updated ecological impact assessment reports. • The MPMP 2006-2010 is based on updated ecological monitoring programme and management experiences in the MPMNR. • The ecological information of the RSMPII is based on the most updated AFCD ecological database on fauna and flora and the on-going Baseline 	<p>W5: Checking the wetland management plans of development proposals against the relevant statutory guidelines including the Technical Memorandum and Guidance Notes of EIAO, Town Planning Board Guideline 12B.</p> <p>M1: Reviewing the annual ecological monitoring programmes of MPMNR</p>

Strategies	Key Result Areas	Action Plans/ Projects
	<p>Ecological Monitoring Programme and Monthly Waterbird Monitoring Programme managed by AFCD.</p>	<p>carried out by WWFHK.</p> <p>M2: Implementing the Baseline Ecological Monitoring Programme of the Ramsar Site annually.</p> <p>M3*: Conducting a study on the ecological values of the newly formed mudflat in the vicinity of the Ramsar Site.</p> <p>M4*: Conducting a study on the carrying capacity of the intertidal mudflat that serves as a foraging ground for waterbirds.</p> <p>M5: Examining the levels of POPs listed under the Stockholm Convention in ardeids nesting in the territory with particular reference to the egret in Deep Bay catchment.</p> <p>O1: Implementing the Waterbird Monitoring Programme annually.</p>
<p>1e Integrated Water Resources</p>	<p>• Functions of wetlands within WBA and WCA in</p>	<p>W6: Reviewing development proposals which</p>

Strategies	Key Result Areas	Action Plans/ Projects
<p>Management To ensure that an ecosystem-based approach is included in the planning activities and decision-making processes, particularly concerning groundwater management, catchment/river basin management, coastal and near shore marine zone planning, and climate change mitigation and/or adaptation activities.</p>	<p>Inner Deep Bay are maintained.</p>	<p>require ecological impact assessment under TPO and EIAO to make sure that any adverse impacts on the Ramsar Site, including the impacts to the groundwater, are properly addressed and mitigated.</p>
<p>1f Wetland Restoration To identify priority wetlands and wetland systems where restoration or rehabilitation would be beneficial and yield long-term environmental, social, or economic benefits, and implement the necessary measures to recover these sites and systems.</p>	<ul style="list-style-type: none"> • The 64 hectares of wetland mitigation area at Tin Shui Wai was a major wetland restoration/rehabilitation project which has been developed as the HKWP for conservation, education and tourism. • Areas of degraded wetlands within the WBA have been identified as target areas for wetland restoration. 	<p>W7: Reviewing the performance of restored wetlands in WBA through an in-house EM&A exercise to be carried out by AFCD's Wetland Expertise Group.</p>
<p>1g Invasive alien species To develop an inventory of invasive alien species that currently and/or potentially impact the ecological character the Ramsar Site, and develop guidance and promote procedures and</p>	<ul style="list-style-type: none"> • Precautionary measures have been taken to remove exotic species (Sonneratia and Mikania) within the Ramsar Site. 	<p>W8: Carrying out physical removal of Sonneratia within the Ramsar Site annually.</p> <p>W9: Supporting WWFHK to carry out removal of Mikania or other exotic</p>

Strategies	Key Result Areas	Action Plans/ Projects
actions to prevent, control or eradicate such species in wetland systems.		weeds within MPMNR.
1h Private sector To promote the involvement of the private sector in the conservation and wise use of wetlands	<ul style="list-style-type: none"> Adoption of the Private-public partnership approach for private development proposals with conservation objectives in the WCA as stipulated in the Town Planning Guidelines 12B to ensure long-term commitment for conservation and management of ponds within the development site. 	W2 and W5 are relevant.
1i Incentive measures To promote incentive measures that encourage the application of the wise use provisions of the Convention.	<ul style="list-style-type: none"> Enhanced wildlife use of ecologically important wetlands under private ownership. 	W10: Supporting projects for management of ecologically important wetlands under private ownership.

3.1.2 GOAL 2. WETLANDS OF INTERNATIONAL IMPORTANCE

This goal delivers Articles 2.1, 2.2, 2.5, 2.6, 3.1, 3.2, 4.1 and 4.2 of the Ramsar Convention.

TABLE 3.2: Strategies serving Goal 2

Strategies	Key Result Areas	Action Plans / Projects
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Strategies	Key Result Areas	Action Plans / Projects
<p>2a Ramsar Site designation To maintain the Ramsar Information Sheets and constantly update it with the best available information.</p>	<ul style="list-style-type: none"> The only qualified site has been designated. The Ramsar Information Sheet of the Mai Po Inner Deep Bay has been duly completed for submission to the Ramsar Bureau. 	M6: Updating and reviewing the Ramsar Information Sheet regularly.
<p>2b Ramsar site ecological character To maintain the ecological character of all designated Ramsar Sites, through planning and management.</p>	<ul style="list-style-type: none"> An existing Conservation Strategy and Management Plan for the Ramsar Site (RSMP) is in place. Reviews are undertaken on the existing RSMP. A Nature Conservation Sub-Committee has been established under the Advisory Council on the Environment (ACE-NCSC) which looks after Ramsar Site and wetland matters. 	<p>All: Reviewing the existing RSMP.</p> <p>All: Consultation of ACE-NCSC on new projects.</p>

3.1.3 GOAL 3. INTERNATIONAL COOPERATION

This goal delivers Articles 5 of the Ramsar Convention.

TABLE 3.3: Strategy serving Goal 3

Strategies	Key Result Areas	Action Plans / Projects
3 Shared wetlands, river basins and	<ul style="list-style-type: none"> Close liaison with Futian National Nature 	M7: Enhancing communications with Futian

Strategies	Key Result Areas	Action Plans / Projects
<p>migratory species. To promote inventory and cooperation for the management of shared wetlands and hydrological basins, including cooperative monitoring and management of shared wetland-dependent species.</p>	<p>Reserve which shares the Inner Deep Bay wetland system.</p> <ul style="list-style-type: none"> • Joined the East Asian-Australasian Shorebird Site Network and the Anatidae Site Network in the East Asian Flyway to facilitate information exchange for migratory bird conservation works. 	<p>National Reserve.</p> <p>O2: Enhancing communications with migratory bird networks.</p>

3.1.4 GOAL 4. INSTITUTIONAL CAPACITY AND EFFECTIVENESS

This goal delivers Articles 6, 7 and 8 of the Ramsar Convention.

TABLE 3.4: Strategy serving Goal 4

Strategies	Key Result Areas	Action Plans / Projects
<p>4 CEPA To support the Convention's Communication, Education, Participation and Awareness Programme (Resolution X.8) for promoting the conservation and wise use of wetlands</p>	<ul style="list-style-type: none"> • CEPA programmes to raise community awareness of wetlands are being implemented by the HKWP. • The HKWP has developed the Wetland Park Volunteer Scheme to establish long-term support from the public on conserving wetlands. • The MPMNR has provided training programme for wetland site/nature reserve officials of the 	<p>CEPA2: Arranging education programmes on wetland conservation for school and general public</p> <p>CEPA3: Building up public support and developing their capacity on wetland conservation.</p>

Strategies	Key Result Areas	Action Plans / Projects
	<p>nearby region.</p> <ul style="list-style-type: none"> • Regular meetings with fish pond operators to discuss issues of concern. • NGOs have been involved in partnership with fisherman/farmers on carrying out fish pond culture/wet agriculture operations which also serve as education/training activities. 	<p>CEPA4: Supporting the WLI-Asia network for better implementation of CEPA programmes across Asia.</p> <p>M8: Supporting wetland manager training courses arranged by WWFHK.</p> <p>O3: Arranging meetings with fish pond operators and NGOs to discuss ways to tackle the Cormorant predation on commercial fish ponds.</p> <p>W11: Supporting partnership programmes between NGOs and fisherman/farmers.</p>

3.2 ACTION TIME TABLE

The Project Timetable is an overview of the complement of management projects, and their relative priority, over a five year period of the Management Plan. It should be used as an indicator of management progress, and updated annually. As the updating of RSMP is a continuous process, the need to implement the projects especially those not conducted annually would be reviewed on a regular basis.

Key to Priorities

1 = core projects that should be implemented from the internal budget.

2 = projects that ought to be implemented if resources become available; priority 2 projects are normally dependent on achievement of priority 1 projects and may therefore progress to priority 1 as time elapses.

3 = projects that are not regarded as urgent at the present time; they may be undertaken if resources allow, or increase in priority if circumstances change.

TABLE 3.5: Project Timetable

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
W1*	1a	Reviewing and updating the Wetland Inventory which included wetland habitat types and their distribution, and wetlands for restoration.	<input type="checkbox"/> Locations of wetlands in Hong Kong including rivers and streams, fish ponds, agricultural land, marshes, reservoirs and channels will be updated by making	1				

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
			<p>reference to the existing wetland inventory, aerial photos and carrying out field visit as necessary.</p> <ul style="list-style-type: none"> <input type="checkbox"/> The locations and size of wetlands will be mapped out and stored in a tailor-made GIS database. 					
W2	1b 1h	Annual review of application of wise use of wetlands in development proposals and land use planning of WBA and WCA of Inner Deep Bay.	<ul style="list-style-type: none"> <input type="checkbox"/> A record will be stored in AFCD for land use planning or developments within the WBA and WCA that require planning applications. <input type="checkbox"/> The locations and extent of developments will also be marked in AFCD's record. <input type="checkbox"/> A summary on such development will be carried 	1	1	1	1	1

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
			out annually to review the type and kinds of developments in and around the Ramsar Site.					
W3	1c	Updating the progress of the implementation of Accredited Fish Farm Scheme which aims to enhance the competitiveness of the local aquaculture industry.	<input type="checkbox"/> The location and information of the fish pond farms that joined the Accredited Fish Farm Scheme will be updated periodically.		1			1
W4	1c	Provision of support to the implementation of MPMP for maintaining <i>gei wai</i> operation in MPMNR.	<input type="checkbox"/> To arrange service contract every year for <i>gei wai</i> management works in MPMNR with the aim of providing a suitable roosting and feeding grounds for wintering waterbirds.	1	1	1	1	1

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
W5	1d 1h	Checking of wetland management plans of development proposals against the relevant statutory guidelines including the Technical Memorandum and Guidance Notes of EIAO, Town Planning Board Guideline 12B.	<input type="checkbox"/> To offer expertise advices on wetland management plans from the wetland conservation perspectives to make sure that the relevant statutory requirements are met.	1	1	1	1	1
W6	1e	Reviewing development proposals which require ecological impact assessment under TPO an EIAO to make sure that any adverse impacts on the Ramsar Site, including the impacts to the groundwater are properly addressed and mitigated.	<input type="checkbox"/> To offer expertise advices on EcoIA from the wetland conservation perspectives to make sure that the relevant statutory requirements are met and any potential impacts on wetlands arising from the development are properly addressed and mitigated.	1	1	1	1	1
W7	1f	Reviewing the performance of restored wetlands in WBA through an in-house EM&A exercise to be carried out by AFCD's Wetland Expertise Group.	<input type="checkbox"/> To offer expertise advices on the EM&A reports to make sure that the performance indicators of the restored wetlands are met.	1	1	1	1	1

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
W8	1g	Carrying out physical removal of Sonneratia within the Ramsar Site annually.	<input type="checkbox"/> Updating of the distribution of Sonneratia trees and seedling. <input type="checkbox"/> Post monitoring of the cleared areas to check the recruitment of seedlings. <input type="checkbox"/> NGO and volunteers are involved in the detection and removal of exotic Mikania, Spartina and Sonneratia in Inner Deep Bay to be coordinated by the HKWP.	1	1	1	1	1
W9	1g	Supporting WWFHK to carry out removal of Mikania within MPMNR.	<input type="checkbox"/> To arrange service contracts every year for carrying out vegetation management works within the MPMNR including removal of Mikania.	1	1	1	1	1
W10	1i	Supporting projects for management of ecologically important wetlands under private ownership.	<input type="checkbox"/> To offer expertise advice from the wetland conservation perspective to make sure that	1	1	1	1	1

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
			ecologically important wetlands under private ownership are protected and conserved.					
W11	4a	Supporting partnership programmes between NGOs and fisherman/farmers	<input type="checkbox"/> To support partnership programmes between NGOs and fisherman/farmers on carrying out fish pond culture/wet agriculture operations which also serve as education/training activities on wetland conservation (e.g. WWFHK's Eco-fish scheme).	1	1	1	1	1
M1	1d	Reviewing the annual ecological monitoring programmes of MPMNR carried out by WWFHK.	<input type="checkbox"/> To review the data of the annual ecological monitoring programmes and compare with other monitoring data where appropriate.	1	1	1	1	1

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
M2	1d	Implementing the Baseline Ecological Monitoring Programme of the Ramsar Site annually.	<input type="checkbox"/> To obtain baseline ecological data including changes of major habitat extent, benthic fauna dynamics, water quality, sediment quality and sedimentation rate annually.	1	1	1	1	1
M3*	1d	Conducting a study on the ecological values of the newly formed mudflat in the vicinity of the Ramsar Site.	<input type="checkbox"/> To study the ecological values, e.g. bird use and species diversity, benthic fauna abundance, and profile of the newly formed mudflat, if any, in the vicinity of the Ramsar Site.		1			
M4*	1d	Conducting a study on the carrying capacity of the intertidal mudflat that serves as a foraging ground for waterbirds.	<input type="checkbox"/> To estimate the carrying capacity of the mudflat in Inner Deep Bay for supporting	1				

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
			foraging waterbirds and to formulate a holistic management plan for the mudflat and mangroves therein.					
M5	1d	Examining the levels of POPs in ardeids nesting in the Deep Bay catchment.	<input type="checkbox"/> To analyze the concentration and risk of POPs listed under the Stockholm Convention in ardeids nesting in Deep Bay every 5 to 10 years as described in A9. This would form part of a territory-wide programme with particular reference to the egret in Deep Bay catchment.					2
M6	2a	Updating and review the Ramsar Information Sheet (RIS) regularly.	<input type="checkbox"/> To update and review the contents of RIS as per the		1			

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
			requirement of the Ramsar Secretariat by making use of data from the Baseline Ecological Monitoring and Waterbird Monitoring Programmes.					
M7	3a	Enhancing communications with Futian National Nature Reserve.	<input type="checkbox"/> To enhance communications and information exchange on the ecology of Inner Deep Bay by participating in regular meetings with the Reserve.	1	1	1	1	1
M8	4a	Supporting wetland manager training courses arranged by WWFHK.	<input type="checkbox"/> To assist in giving presentations on the roles of AFCDC in nature and wetland conservation in Hong Kong and share experience on wetland conservation works	1	1	1	1	1

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
			with the course participants.					
O1	1d	Implementing the Waterbird Monitoring Programme annually.	<input type="checkbox"/> To continue service contract every year for waterbird monitoring in Mai Po and Inner Deep Bay area with the aim of providing up-to-date information of population of waterbirds, especially the species wintering in the Deep Bay. <input type="checkbox"/> For the new contract for 2010-11, the scope of the survey has been expanded to include a mudflat area to the west of Tsim Bei Tsui and the isolated fishponds near the outlet of Shan Pui River.	1	1	1	1	1

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
O2	3a	Enhancing communications with migratory bird networks.	<input type="checkbox"/> By participating or attending visits, relevant meetings and workshops to enhance communications and information exchange with members of the Flyway networks on population change of migratory birds and zoonotic diseases etc.	3	3	3	3	3
O3	4a	Arranging meetings with fishpond operators and local NGOs to discuss ways to tackle the Cormorant predation to commercial fish ponds.	<input type="checkbox"/> Regular meetings with HKNTFCA and NGOs to discuss the ways to deal with the Cormorant predation issue are being arranged before winter every year.	1	1	1	1	1
All	2b	Reviews are undertaken on the existing conservation strategy and management						

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
		<p>plan for the Ramsar Site.</p> <p>Projects included:</p> <p>W12: Reviewing and cooperating with WWFHK to carry out habitat management projects within MPMNR.</p>	<input type="checkbox"/> To arrange annual service contracts with WWFHK to carry out management works on <i>gei wai</i> operations, vegetation management and freshwater management within the MPMNR.	1	1	1	1	1
		<p>M9*: Reviewing the data and methodology of the on-going BEMP of the Ramsar Site.</p>	<input type="checkbox"/> To review the data and methodology of BEMP in order to have a more in-depth views of the environmental conditions of the Ramsar Site and produce an updated Technical Manual so as to		1			

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
			streamline the monitoring process and to cover new aspects.					
		O4* : Reviewing the data and methodology of the monthly waterbird monitoring programme.	<input type="checkbox"/> To review the data and methodology of the monthly waterbird monitoring programme in order to have a more in-depth understanding of the patterns of migratory birds in the Deep Bay and to resolve the current challenges to the monitoring procedure.	2				
		O5* : Studying the feeding habitats and foraging flight lines of major egrettries.	<input type="checkbox"/> To study the feeding habitats and foraging flight lines of major egrettries regularly. The study would provide baseline information on the		2			

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
			conservation and habitat management of the egrettries.					
		O6* : Studying the recent changes of distribution and species composition of wintering ducks in Inner Deep Bay.	<input type="checkbox"/> To investigate the possible reasons for the recent changes of distribution and species composition of wintering ducks in Inner Deep Bay.			3		
		O7* : Studying the day-time movements of Cormorant in Deep Bay.	<input type="checkbox"/> To gain more information on the daily movement of Cormorants in Deep Bay including flight lines, habitat selection and early morning movement.	1				
		O8* : Reviewing the effectiveness of preventive measures against Cormorant predation in commercial fishponds.	<input type="checkbox"/> To review the effectiveness of past and present preventive measures and explore		2	2	2	2

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
			alternative measures for dealing with Cormorant predation in pond fish farming.					
		O9* : Reviewing the Hong Kong Conservation Plan for BFS.	<input type="checkbox"/> The local Conservation Plan would be updated based on the availability of the up-to-date information on population dynamics, migratory routes etc.		2	2		
		E1: Reviewing the patrolling to the Restricted Areas and the Ramsar Site against illegal activities.	<input type="checkbox"/> To define and implement routine foot, vehicle and hovercraft patrols over the Restricted Areas and the Ramsar Site with sufficient frequency against illegal activities.	1	1	1	1	1
		E2: Enhancing communications with the	<input type="checkbox"/> To maintain a contact	1	1	1	1	1

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
		Police and the Mainland side to deter illegal cross border fishermen from entering the Restricted Area.	phone/email list or a mechanism to inform relevant parties on any incidence of illegal fishermen activities in the Restricted Area.					
All	2b	Consultation of ACE-NCSC on new projects.	<input type="checkbox"/> To prepare consultation papers and arrange presentation and briefing to the ACE-NSCS on new projects that affect the Ramsar Site as a whole.	1	1	1	1	1
CEPA1	1c	Arranging educational programmes on the wise use of wetlands and understanding of wetland biodiversity in Hong Kong.	<input type="checkbox"/> To develop education materials, and organize education programmes to provide credible information to the public.	1	1	1	1	1

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
CEPA2	4	Arranging education programmes on wetland conservation for school and general public.	<input type="checkbox"/> To organize regular school activities including guided tours, school lectures and teachers' workshops for schools. <input type="checkbox"/> To organize regular public activities including themed guided tours, workshops, public lectures and exhibitions. <input type="checkbox"/> To organise themed events (e.g. World Wetlands Day) or activities for a wide range of audience.	1	1	1	1	1
CEPA3	4	Building up public support and developing their capacity on wetland conservation.	<input type="checkbox"/> To recruit public and develop a volunteer programme with training and capacity building elements for conservation	1	1	1	1	1

Project Group Ref. No.		Project Title		Year 1	Year 2	Year 3	Year 4	Year 5
CEPA4	4	Supporting the WLI-Asia network for better implementation of CEPA programmes across Asia.	<p>education activities.</p> <input type="checkbox"/> To organize joined activities among wetlands centres such as staff exchange programme for sharing of CEPA information and expertise	1	2	2	2	2

3.3 DESCRIPTION OF NEW PROJECTS

W1: Reviewing and updating the wetland inventory which included wetland habitat types and their distribution, and wetlands for restoration.

The Wetland Inventory is one of the deliverables of the “Study on Wetland Compensation” which was completed in 2005. The Inventory is intended to provide baseline information on the wetlands in Hong Kong for a variety of uses, e.g. EIA study. Wetlands in Hong Kong including rivers and streams, fish ponds, agricultural land, marshes, reservoirs and channels were mapped by aerial photo interpretation and verified by field investigation. The results are compiled in a GIS format in the Wetland Inventory which covers the type, area, zoning and general land status of wetlands.

As the mapping study was conducted over a decade ago, updating of the wetland data is necessary. A review and update of the Wetland Inventory would be conducted, the wetland data will be updated by making reference to existing information in GIS, literatures, recent aerial photos and satellite images, base maps provided by the Lands Department, agricultural and aquacultural records and biodiversity records maintained by AFCD. If necessary, field verification would be conducted and boundary of the wetlands would be delineated by field surveys.

M3: Conducting a study on the ecological values of the newly formed mudflat in the vicinity of the Ramsar Site.

The intertidal mudflat is the core area of the Ramsar Site where the overwintering waterbirds forage and roost. The intertidal mudflat is subjected to the natural process of continuous sedimentation under the influence of Shenzhen River and even the Pearl River. The long-term effect of the process may lead to the gradual extension of existing mudflats further seaward to the west, i.e. in areas close to Tsim Bei Tsui. In that case, the mudflats, if formed, will have the potential to be developed into another foraging and roosting site for waterbirds.

Given the proximity of the concerned area to the Ramsar Site, a study is proposed to look into the ecological values of the area, including bird use and diversity, benthic fauna abundance, topographic profile and inundation pattern, and the seasonal changes of these parameters. The data so obtained would be reviewed to determine whether the ecological values of the concerned areas would fulfill the designation criteria for the Ramsar Site and if there is a need to revise the boundary of the Ramsar Site.

M4: Conducting a study on the carrying capacity of the intertidal mudflat in Inner Deep Bay that serves as a foraging ground for waterbirds

There have been arguments that native mangroves in the Inner Deep Bay have advanced too fast that they will soon colonize the entire intertidal mudflat, leaving no room for the overwintering waterbirds to forage. Supporters of this notion suggest felling mangroves to maintain an ample extent of the open mudflat for the use by waterbirds. On the other hand, opponents reckon that the idea has neglected the ecological significance of mangroves and their roles played in the ecosystem of the mudflats in the Inner Deep Bay. In fact, the first global assessment of

mangroves jointly completed by the United Nation Environmental Programme and other international NGOs in July 2010 revealed that mangrove forests continue to be lost at a rate three to four times higher than land-based global forests, despite positive restoration efforts taken by some countries. In view of the global decline of mangroves at an alarming rate, indiscriminate removal of healthy native mangroves in the Inner Deep Bay without scientific backup is not acceptable.

To address the seemingly contradictory views on retaining mudflat or mangrove, it is first and foremost to understand the carrying capacity of the intertidal mudflat in Inner Deep Bay which serves as a foraging ground for waterbirds. It is proposed to conduct a study to estimate the amount of food available to foraging waterbirds provided by the existing mudflats by taking into account the available foraging areas, abundance of benthic and epifauna and the energy demand of waterbirds. Based on field and experimental findings and literature review, including the extension rates of mangroves, the study would provide an idea on the carrying capacity of the intertidal mudflat for supporting foraging waterbirds. The findings would be helpful for formulating a holistic management plan for the mudflat and mangroves of the Inner Deep Bay with a view to maintaining the overall ecological values of its intertidal community.

M9: Reviewing the data and methodology of the on-going BEMP for the Ramsar Site.

Following the designation of the Mai Po and Inner Deep Bay as a Ramsar Site, AFCD, as the local Ramsar administrative authority, is obliged to conduct ecological monitoring of the Ramsar Site so that the changes in ecological characters of the Ramsar Site could be detected and information of such changes could be reported to the Ramsar Bureau as appropriate. A consultancy study was commissioned to formulate a Technical Manual which served as the methodology and guideline for the implementation of the monitoring programme. Based on this Manual, the Baseline Ecological Monitoring Programme (BEMP) for the Ramsar Site was commenced in 2001.

BEMP has been contracted to and conducted by local university researchers for nearly a decade. It is proposed to review and analyze the data collected so far in a statistical approach to establish a more in-depth view of the relationship between concerned environmental parameters, especially the water and sediment quality, mudflat profile, and benthic fauna community of the Ramsar Site. The review would also shed light on the management of the Ramsar Site and MPMNR. Besides, a review on how the scope and monitoring procedures of the BEMP could be streamlined would be made by making reference to suggestions/comments made by the contractors, local scientists, and the Study Management Group over the years with a view to improving the efficiency of the programme without compromising its robustness. Based on the finding of the study, the Technical Manual as well as the BEMP will be updated accordingly.

O4: Reviewing the data and methodology of the monthly waterbird monitoring programme.

The monthly waterbird monitoring programme was commenced in 1998/99 and is currently contracted to the Hong Kong Bird Watching Society. The monitoring methodology used for over a decade has experienced challenges including deterioration in visibility during winter times and availability of suitable high tide for counting.

A review on the data collected in the past 10 years and the methodology of the monthly waterbird monitoring programme will be conducted. The data will be scrutinized by statistical analysis in order to see if trend and pattern of migration of wintering waterbird could be identified. Based on the statistical analysis of the bird count data, the conservation status of the species of concerns in the local context would be reviewed and follow-up actions, e.g. research projects and species-specific conservation plans, would be proposed if necessary. For the species/bird group that a decreasing trend is observed, further studies may be required. The survey methodology would be reviewed with emphasis to resolve the current challenges to the monitoring procedure (e.g. poor visibility in winter and unavailability of high tide for counting in the day time). The findings of the review will be adopted to update the monitoring scope and methodology and/or to propose further research projects where appropriate.

O5: Studying the feeding habitats and foraging flight lines of major egretries regularly.

Egrets and herons are often the most prominent of wetland ecosystems owing to their relative large size and high adaptability to various wetland habitats. They can serve as research targets, indicators of wetland ecosystem and icons for promoting nature education. Thus, the conservation of these waterbirds and their nesting colonies are important.

Egretries may shift annually, a phenomenon likely associated with the change in food availability to the nesting ardeids. The shift poses difficulty to the allocation of conservation efforts. To keep track of the changes, the feeding ecology and foraging flight lines of the breeding ardeids should be updated and reviewed from time to time for better conservation of the species. In general, all the counting should be made at suitable vantage points to record all the foraging grounds as far as practicable. Each selected egretty as well as the associated landing sites shall be recorded on relevant location map(s) in appropriate scale with grids.

O6: Studying the recent change of distribution and species composition of wintering ducks in Inner Deep Bay.

The monthly waterbird monitoring programme has recorded the highest range of overwintering waterbird counts in Deep Bay since 2005/06. A closer look of the data indicated that the high count was contributed by high numbers of ducks, which were dominated by a few species. Furthermore, most of the counts were recorded in the Shenzhen side.

A study is proposed in an attempt to find out the possible clues on the recent changes of the distribution and species composition of wintering ducks in the Inner Deep Bay. The study would involve field observation of the wintering ducks

in both Hong Kong and Shenzhen, field surveys of food sources, review of habitat conditions (e.g. water depth) and environmental factors (e.g. disturbance) and also survey methodology.

O7: Studying the day-time movements of Cormorant in Deep Bay.

Despite the complaints from fishpond operators that Great Cormorants predate heavily on the fish ponds in early morning and at dawn, previous field surveys revealed a contrasting phenomena that Cormorants prefer to forage and roost in intertidal mudflat.

A study will be conducted on the diurnal movement of Cormorants in Deep Bay for foraging and roosting including flight line study, habitat selection, and early morning counts in selected ponds to address the issue of foraging pressures on commercial fish ponds. The findings would be useful to formulate a holistic strategy to deal with Cormorant predation in Deep Bay.

O8: Reviewing the effectiveness of preventive measures against Cormorant predation in commercial fishponds.

The fish pond operators have complained that the measures implemented over a decade, including fish stocking in MPMNR and pond-wiring over fish ponds, could not effectively prevent Cormorant predation in commercial fishponds. In view of their concerns, a review on the effectiveness of past and present measures and alternative measures available from recent publication or overseas experience would be conducted. Further field trials in fish ponds would be considered based on finding of the review.

O9: Reviewing the Hong Kong Conservation Plan for BFS

A Conservation Plan for BFS in Hong Kong was formulated based on the recommendations of a consultancy study in 2001. The Conservation Plan aims at maintaining the Ramsar Site in a favourable condition for the wintering population of BFS and makes recommendations on species conservation, habitat management, monitoring and research, education and training as well as promotion of regional cooperation. A review on the renewed International Species Action Plan for BFS published in March 2010 has been conducted. It is noted that the local Conservation Plan has essentially covered most of the recommended conservation measures of the renewed International Species Action Plan. In fact, these measures have been implemented in Kong Kong since 2001. The steady increase in the number and the stable age structure of the species in Hong Kong indicates that the measures are effective.

In view that the current local Conservation Plan has been implemented for nearly a decade and new information regarding the ecology and biology of the species has been obtained, it is timely to update the Plan. The updated Plan would include data on the local and global populations of BFS as well as their habitats and the migratory routes after wintering. New conservation measures or studies would also be recommended in the updated Plan where appropriate.

BACKGROUND ON CONSERVATION MANAGEMENT OF MAI PO AREA

The ecological importance of the Mai Po area was recognized in the early 1960s. A brief history on the establishment of the MPMNR is as follows:

- in 1964 a recommendation was made to the Hong Kong Government by Sir Peter Scott (Director of the Wildfowl Trust and a founder of WWF) that the area be set aside as a scientific and educational study centre;
- in 1974 hunting and the carrying of firearms were prohibited in the Mai Po area through designation under the Wild Birds and Wild Animals Protection Ordinance (superseded by the Wild Animals Protection Ordinance Cap 170 now);
- in 1975 access to Mai Po Marshes restricted area is limited to permit holders authorized by the then Director of Agriculture and Fisheries (DAF; now the Director of Agriculture, Fisheries and Conservation DAFC);
- in 1976 the Mai Po marshes was designated as a Site of Special Scientific Importance (SSSI);
- In March 1981, World Wide Fund for Nature Hong Kong (WWFHK) was founded.
- 1982/83 the Hong Kong Government approved in principle WWFHK's request to develop a nature reserve at Mai Po and WWFHK started raising funds to acquire *gei wais* in Mai Po Marshes;
- In June 1983, ExCo noted WWFHK's proposal to establish and operate a Wildlife Education Centre and Nature Reserve in Mai Po Marshes.
- During 1983-1992, WWFHK raised some \$32 million for the management of Mai Po Marshes which included acquiring a total of about 100 ha. (12 numbers) of *gei wais* from operators, providing and management of facilities.
- in 1983 AFD started organising guided visits to MPMNR for the general public;
- In 1984, WWFHK employed a Reserve Manager for management of the MPMNR.
- in 1985 WWF HK began school visits to Mai Po;
- in 1986 the Mai Po Wildlife Education Centre was opened, in July, Education Department funded visits by school children to MPMNR;
- in 1990 the Peter Scott Field Studies Centre was opened and Reserve management training courses were started for Reserve staff in East Asia;
- in April 1993, the ExCo agreed the proposal to clear operators in about 90 hectares of *gei wai* in Mai Po Marshes for handing over to WWFHK for management under Special Licences.
- In 1994, the proposed designation of Mai Po and Inner Deep Bay as a Wetland of International Importance under the Ramsar Convention was mentioned in 1994 Policy Address as one of new initiatives in nature conservation. (MPMNR is part of the proposed Ramsar Site.). The Government agreed in the same year to spend about HK\$17 million to terminate the operators of the remaining 9 *gei wai* and then issued licences for all 21 *gei wais* to WWFHK for management as Nature Reserve.

- in February 1995 WWFHK took over management of all the remaining *gei wais*.
- Since 1996, annual subvention was granted by DAF (now DAFC) to WWFHK for meeting partial expenditure for habitat management of MPMNR.

List of Plants**Trees**

Acacia confusa (Ex)
Albizia lebbek
Bambusa sp.
Bauhinia purpurea
Carica papaya (Ex)
Cassia sp.
Casuarina equisetifolia (Ex)
Celtis sinensis
Cleistocalyx operculata
Crataeva religiosa (Ex)
Croton crassifolius
Delanix regia (Ex)
Dimocarpus longan (Ex)
Eucalyptus citriodora (Ex)
Ficus gibbosa
Ficus microcarpa
Ficus superba var. *japonica*
Glyptostrobos pensilis
Litsea glutinosa
Macaranga tanarius
Melia azedarach (Ex)
Microcos paniculata
Morus alba
Musa paradisiaca (Ex)
Musa sp.
Paliurus ramosissimus
Phyllanthus emblica
Psidium guajava (Ex)
Psidium guajava (Ex)
Rhus chinensis
Salix babylonica (Ex)
Sapium sebiferum
Scolopia chinensis
Sterculia lanceolata

Herbs

Achyranthes aspera
Achyranthes bidentata
Ageratum conyzoides
Alocasia macrorrhiza
Alternanthera philoxeroides (Ex)
Alternanthera sessilis
Amaranthus viridis

Shrubs

Atalantia buxifolia
Breynia fruticosa
Cansjera rheedii
Clerodendrum inerme
Codiaeum variegatum (Ex)
Corchorus acutangulus
Crotalaria muctonata
Desmos chinensis
Hibiscus rasa-sinensis (Ex)
Lantana camara (Ex)
Ligustrum sinensis
Melastoma sp.
Phyllanthus reticulatus
Plumbago capensis (Ex)
Psychotria rubra
Sesbania cochinchinensis
Sesbania sp.
Sida rhombifolia
Strophanthus divaricatus
Urena lobata
Urena procumbens
Wikstroemia indica

Vines

Basella alba (Ex)
Benincasa hispida var. *chieh-qua* (Ex)
Canavalia maritima
Cardiospermum halicacabum
Cocculus trilobus
Cuscuta chinensis
Dioscorea sp.
Gymnema alterniflorus
Ipomoea aquatica (Ex)
Ipomoea babatas (Ex)
Ipomoea brasiliensis
Ipomoea cairica (Ex)
Ipomoea purpurea (Ex)
Ipomoea triloba (Ex)
Merremia sp.
Mikania micrantha (Ex)
Morinda umbellata
Paederia scandens

Bidens alba (Ex)
Bidens pilosa (Ex)
Blumea lacera
Canna indica (Ex)
Cassia tora
Centella asiatica
Chenopodium album
Commelina communis
Commelina nudiflora
Conyza bonariensis
Crassocephalum crepidiodes (Ex)
Dianella ensifolia
Eclipta prostrata
Eichhornia crassipes (Ex)
Emilia sonchifolia
Euphorbia heterophylla (Ex)
Halophila beccaria
Lactuca sp.
Lemna minor
Lindernia crustacea
Melochia corchorifolia
Mimosa pudica
Phyllanthus urinaria
Phytolacca acinosa (Ex)
Pluchea indica
Polygonum perfoliatum
Polygonum chinense
Portulaca oleracea
Rumex dentatus (Ex)
Ruppia maritima
Senecio scandens
Solanum armericanum
Solanum torvum
Sonchus oleraceus
Suaeda sp.
Taraxicum officinale
Vernonia cinerea
Wedelia trilobata (Ex)
Zeuxine strateumatica
Sedges and rushes
Cyperus alternifolius (Ex)
Cyperus iria
Cyperus malaccensis
Cypefls polystachyus
Cyperus rotundus
Juncus effusus

Passiflora foetida
Stephania sp.
Grasses
Apluda mutica
Arundinella setosa
Brachiaria mutica (Ex)
Coix lachryma-jobi
Cynodon dactylon
Dichanthium annulatum
Digitaria radicata
Digitaria sanguinalis
Echinachloa colanum
Eleusine indica
Eragrostis sp.
Eragrostis uniloides
Eragrostis zeylanica
Imperata cylindrica
Ischaemum aristatum
Ischaemum indicum
Leptochloa chinensis
Microstegium ciliatum
Neyraudia reynaudiana
Panicum maximum (Ex)
Panicum repens
Paspalum conjugatum
Paspalum distichum
Paspalum scrobiculatum
Paspalum sp.
Pennisetum polystachyum (Ex)
Pennisetum purpureum (Ex)
Phragmites australis
Pogonatherum crinitum
Rhynchelytrum repens
Saccharum officinarum (Ex)
Sporobolus fertilis
Sporobolus virginicus
Zoysia sinica
Mangroves and associates
Acanthus ilicifolius
Acrostichum aureum
Aegiceras corniculatum
Avicennia marina
Bruguiera gymnorrhiza
Cerbera manghas
Derris alborubra
Derris trifoliata

Ferns

Blechnum orientale
Ceratopteris thalictroides
Cyclosorus interruptus
Dicranopteris linearis
Lycopodium cernuum
Lygodium japonicum
Lygodium microphyllum
Nephrolepis hirsutata
Nephrolepis sp.
Pityrogramma calomelanos (Ex)
Pteris longifolia
Stenochlaena hainanensis

Excoecaria agallocha
Hibiscus tiliaceus
Kandelia obovata
Pandanus tectoris

Appendix II

List of Birds (as at the end of 2010)

	Scientific name	English Common Name	中文名稱
1	<i>Tachybaptus ruficollis</i>	Little Grebe	小鸕鶿
2	<i>Podiceps cristatus</i>	Great Crested Grebe	鳳頭鸕鶿
3	<i>Podiceps auritus</i>	Horned Grebe	角鸕鶿
4	<i>Podiceps nigricollis</i>	Black-necked Grebe	黑頸鸕鶿
5	<i>Pelecanus crispus</i>	Dalmatian Pelican	卷羽鵜鶘
6	<i>Phalacrocorax carbo</i>	Great Cormorant	鸕鷀
7	<i>Fregata andrewsi</i>	Christmas Island Frigatebird	白腹軍艦鳥
8	<i>Fregata ariel</i>	Lesser Frigatebird	白斑軍艦鳥
9	<i>Ardea cinerea</i>	Grey Heron	蒼鷺
10	<i>Ardea purpurea</i>	Purple Heron	草鷺
11	<i>Egretta alba</i>	Eastern Great Egret	大白鷺
12	<i>Egretta intermedia</i>	Intermediate Egret	中白鷺
13	<i>Egretta garzetta</i>	Little Egret	小白鷺
14	<i>Egretta eulophotes</i>	Swinhoe's Egret	黃嘴白鷺
15	<i>Egretta sacra</i>	Pacific Reef Egret	岩鷺
16	<i>Bubulcus ibis</i>	Cattle Egret	牛背鷺
17	<i>Ardeola bacchus</i>	Chinese Pond Heron	池鷺
18	<i>Butorides striatus</i>	Striated Heron	綠鷺
19	<i>Nycticorax nycticorax</i>	Black-crowned Night Heron	夜鷺
20	<i>Ixobrychus sinensis</i>	Yellow Bittern	黃葦鶉
21	<i>Ixobrychus eurhythmus</i>	Schrenck's Bittern	紫背葦鶉
22	<i>Ixobrychus cinnamomeus</i>	Cinnamon Bittern	栗葦鶉
23	<i>Dupetor flavicollis</i>	Black Bittern	黑鶉
24	<i>Botaurus stellaris</i>	Great Bittern	大麻鶉
25	<i>Ciconia nigra</i>	Black Stork	黑鶴
26	<i>Ciconia boyciana</i>	Oriental Stork	東方白鶴
27	<i>Threskiornis melanocephalus</i>	Black-headed Ibis	白鸕
28	<i>Plegadis falcinellus</i>	Glossy Ibis	彩鸕
29	<i>Platalea leucorodia</i>	Eurasian Spoonbill	白琵鷺
30	<i>Platalea minor</i>	Black-faced Spoonbill	黑臉琵鷺
31	<i>Dendrocygna javanica</i>	Lesser Whistling Duck	栗樹鴨
32	<i>Cygnus cygnus</i>	Whooper Swan	大天鵝
33	<i>Anser anser</i>	Greylag Goose	灰雁
34	<i>Anser albifrons</i>	Greater White-fronted Goose	白額雁
35	<i>Anser erythropus</i>	Lesser White-fronted Goose	小白額雁
36	<i>Tadorna ferruginea</i>	Ruddy Shelduck	赤麻鴨
37	<i>Tadorna tadorna</i>	Common Shelduck	翹鼻麻鴨
38	<i>Nettapus coromandelianus</i>	Cotton Pygmy-goose	棉鳧
39	<i>Aix galericulata</i>	Mandarin Duck	鴛鴦
40	<i>Anas penelope</i>	Eurasian Wigeon	赤頸鴨
41	<i>Anas falcata</i>	Falcated Duck	羅紋鴨
42	<i>Anas strepera</i>	Gadwall	赤膀鴨
43	<i>Anas formosa</i>	Baikal Teal	花臉鴨
44	<i>Anas crecca</i>	Common Teal	綠翅鴨
45	<i>Anas carolinensis</i>	Green-winged Teal	美洲綠翅鴨
46	<i>Anas platyrhynchos</i>	Mallard	綠頭鴨
47	<i>Anas luzonica</i>	Philippine Duck	棕頸鴨
48	<i>Anas poecilorhyncha</i>	Indian Spot-billed Duck	印緬斑嘴鴨
49	<i>Anas zonorhyncha</i>	Chinese Spot-billed Duck	中華斑嘴鴨

50	<i>Anas acuta</i>	Northern Pintail	針尾鴨
51	<i>Anas querquedula</i>	Garganey	白眉鴨
52	<i>Anas clypeata</i>	Northern Shoveler	琵嘴鴨
53	<i>Aythya ferina</i>	Common Pochard	紅頭潛鴨
54	<i>Aythya baeri</i>	Baer's Pochard	青頭潛鴨
55	<i>Aythya nyroca</i>	Ferruginous Duck	白眼潛鴨
56	<i>Aythya fuligula</i>	Tufted Duck	鳳頭潛鴨
57	<i>Aythya marila</i>	Greater Scaup	斑背潛鴨
58	<i>Melanitta fusca</i>	Velvet Scoter	斑臉海番鴨
59	<i>Melanitta nigra</i>	Black Scoter	黑海番鴨
60	<i>Bucephala clangula</i>	Common Goldeneye	鵞鴨
61	<i>Mergellus albellus</i>	Smew	白秋沙鴨
62	<i>Mergus serrator</i>	Red-breasted Merganser	紅胸秋沙鴨
63	<i>Pandion haliaetus</i>	Osprey	鶚
64	<i>Aviceda leuphotes</i>	Black Baza	黑冠鵞隼
65	<i>Pernis ptilorhyncus</i>	Crested Honey Buzzard	鳳頭蜂鷹
66	<i>Elanus caeruleus</i>	Black-winged Kite	黑翅鳶
67	<i>Milvus migrans</i>	Black Kite	黑鳶
68	<i>Haliaeetus indus</i>	Brahminy Kite	栗鳶
69	<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle	白腹海鷗
70	<i>Aegypius monachus</i>	Eurasian Black Vulture	禿鷲
71	<i>Spilornis cheela</i>	Crested Serpent Eagle	蛇鵟
72	<i>Butastur indicus</i>	Grey-faced Buzzard	灰臉鵞鷹
73	<i>Circus melanoleucos</i>	Pied Harrier	鵞鵝
74	<i>Circus spilonotus</i>	Eastern Marsh Harrier	白腹鵞
75	<i>Accipiter trivirgatus</i>	Crested Goshawk	鳳頭鷹
76	<i>Accipiter soloensis</i>	Chinese Goshawk	赤腹鷹
77	<i>Accipiter gularis</i>	Japanese Sparrowhawk	日本松雀鷹
78	<i>Accipiter virgatus</i>	Besra	松雀鷹
79	<i>Accipiter nisus</i>	Eurasian Sparrowhawk	雀鷹
80	<i>Buteo buteo</i>	Common buzzard	普通鵟
81	<i>Aquila clanga</i>	Greater Spotted Eagle	烏鵟
82	<i>Aquila heliaca</i>	Imperial Eagle	白肩鵟
83	<i>Hieraaetus fasciatus</i>	Bonelli's Eagle	白腹隼鵟
84	<i>Aquila nipalensis</i>	Steppe Eagle	草原鵟
85	<i>Falco tinnunculus</i>	Common Kestrel	紅隼
86	<i>Falco amurensis</i>	Amur Falcon	阿穆爾隼
87	<i>Falco subbuteo</i>	Eurasian Hobby	燕隼
88	<i>Falco peregrinus</i>	Peregrine Falcon	遊隼
89	<i>Coturnix japonica</i>	Japanese Quail	鶉鶉
90	<i>Turnix tanki</i>	Yellow-legged Button-quail	黃腳三趾鶉
91	<i>Turnix suscitator</i>	Barred Button-quail	棕三趾鶉
92	<i>Grus grus</i>	Common Crane	灰鶴
93	<i>Grus leucogeranus</i>	Siberian Crane	白鶴
94	<i>Gallirallus striatus</i>	Slaty-breasted Rail	灰胸秧雞
95	<i>Rallus aquaticus</i>	Eastern Water Rail	普通秧雞
96	<i>Porzana cinerea</i>	White-browed Crake	白眉田雞
97	<i>Porzana pusilla</i>	Baillon's Crake	小田雞
98	<i>Porzana fusca</i>	Ruddy-breasted Crake	紅胸田雞
99	<i>Amaurornis phoenicurus</i>	White-breasted Waterhen	白胸苦惡鳥
100	<i>Gallinix cinerea</i>	Watercock	董雞
101	<i>Gallinula chloropus</i>	Common Moorhen	黑水雞
102	<i>Fulica atra</i>	Eurasian Coot	骨頂雞
103	<i>Hydrophasianus chirurgus</i>	Pheasant-tailed Jacana	水雉

104	<i>Rostratula benghalensis</i>	Greater Painted-snipe	彩鶺
105	<i>Haematopus ostralegus</i>	Eurasian Oystercatcher	蠣鶺
106	<i>Esacus recurvirostris</i>	Great Thick-knee	大石鶺
107	<i>Himantopus himantopus</i>	Black-winged Stilt	黑翅長腳鶺
108	<i>Recurvirostra avosetta</i>	Pied Avocet	反嘴鶺
109	<i>Glareola maldivarum</i>	Oriental Pratincole	普通燕鶺
110	<i>Vanellus vanellus</i>	Northern Lapwing	鳳頭麥雞
111	<i>Vanellus cinereus</i>	Grey-headed Lapwing	灰頭麥雞
112	<i>Pluvialis fulva</i>	Pacific Golden Plover	太平洋金斑鶺
113	<i>Pluvialis squatarola</i>	Grey Plover	灰斑鶺
114	<i>Charadrius hiaticula</i>	Common Ringed Plover	劍鶺
115	<i>Charadrius placidus</i>	Long-billed Plover	長咀劍鶺
116	<i>Charadrius dubius</i>	Little Ringed Plover	金眶鶺
117	<i>Charadrius alexandrinus</i>	Kentish Plover	環頸鶺
118	<i>Charadrius mongolus</i>	Lesser Sand Plover	蒙古沙鶺
119	<i>Charadrius leschenaultii</i>	Greater Sand Plover	鐵嘴沙鶺
120	<i>Charadrius veredus</i>	Oriental Plover	東方鶺
121	<i>Limosa limosa</i>	Black-tailed Godwit	黑尾塍鶺
122	<i>Limosa lapponica</i>	Bar-tailed Godwit	斑尾塍鶺
123	<i>Numenius minutus</i>	Little Curlew	小杓鶺
124	<i>Numenius phaeopus</i>	Whimbrel	中杓鶺
125	<i>Numenius arquata</i>	Eurasian Curlew	白腰杓鶺
126	<i>Numenius madagascariensis</i>	Eastern Curlew	大杓鶺
127	<i>Tringa erythropus</i>	Spotted Redshank	鶴鶺
128	<i>Tringa totanus</i>	Common Redshank	紅腳鶺
129	<i>Tringa stagnatilis</i>	Marsh Sandpiper	澤鶺
130	<i>Tringa nebularia</i>	Common Greenshank	青腳鶺
131	<i>Tringa guttifer</i>	Nordmann's Greenshank	小青腳鶺
132	<i>Tringa flavipes</i>	Lesser Yellowlegs	小黃腳鶺
133	<i>Tringa ochropus</i>	Green Sandpiper	白腰草鶺
134	<i>Tringa glareola</i>	Wood Sandpiper	林鶺
135	<i>Xenus cinereus</i>	Terek Sandpiper	翹嘴鶺
136	<i>Actitis hypoleucos</i>	Common Sandpiper	磯鶺
137	<i>Heteroscelus brevipes</i>	Gery-tailed Tattler	灰尾漂鶺
138	<i>Arenaria interpres</i>	Ruddy Turnstone	翻石鶺
139	<i>Phalaropus lobatus</i>	Red-necked Phalarope	紅頸瓣蹼鶺
140	<i>Phalaropus fulicarius</i>	Red Phalarope	灰瓣蹼鶺
141	<i>Scolopax rusticola</i>	Eurasian Woodcock	丘鶺
142	<i>Gallinago stenura</i>	Pintail Snipe	針尾沙錐
143	<i>Gallinago megala</i>	Swinhoe's Snipe	大沙錐
144	<i>Gallinago gallinago</i>	Common Snipe	扇尾沙錐
145	<i>Limnodromus scolopaceus</i>	Long-billed Dowitcher	長嘴半蹼鶺
146	<i>Limnodromus semipalmatus</i>	Asian Dowitcher	半蹼鶺
147	<i>Calidris canutus</i>	Red Knot	紅腹濱鶺
148	<i>Calidris tenuirostris</i>	Great Knot	大濱鶺
149	<i>Calidris alba</i>	Sanderling	三趾濱鶺
150	<i>Calidris ruficollis</i>	Red-necked Stint	紅頸濱鶺
151	<i>Calidris minuta</i>	Little Stint	小濱鶺
152	<i>Calidris temminckii</i>	Temminck's Stint	青腳濱鶺
153	<i>Calidris subminuta</i>	Long-toed Stint	長趾濱鶺
154	<i>Calidris melanotos</i>	Pectoral Sandpiper	斑胸濱鶺
155	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	尖尾濱鶺
156	<i>Calidris alpina</i>	Dunlin	黑腹濱鶺
157	<i>Calidris ferruginea</i>	Curlew Sandpiper	彎嘴濱鶺

158	<i>Eurynorhynchus pygmeus</i>	Spoon-billed Sandpiper	勺嘴鷸
159	<i>Limicola falcinellus</i>	Broad-billed Sandpiper	闊嘴鷸
160	<i>Philomachus pugnax</i>	Ruff	流蘇鷸
161	<i>Stercorarius longicaudus</i>	Long-tailed Jaeger	長尾賊鷗
162	<i>Larus crassirostris</i>	Black-tailed Gull	黑尾鷗
163	<i>Larus canus</i>	Mew Gull	海鷗
164	<i>Larus heuglini</i>	Heuglin's Gull	灰氏銀鷗
165	<i>Larus cachinnans</i>	Caspian Gull	黃腳銀鷗
166	<i>Larus vegae</i>	Vega Gull	織女銀鷗
167	<i>Larus schistisagus</i>	Slaty-backed Gull	灰背鷗
168	<i>Larus glaucescens</i>	Glaucous-winged Gull	灰翅鷗
169	<i>Larus hyperboreus</i>	Glaucous Gull	北極鷗
170	<i>Ichthyaetus ichthyaetus</i>	Pallas's Gull	魚鷗
171	<i>Chroicocephalus brunnicephalus</i>	Brown-headed Gull	棕頭鷗
172	<i>Ichthyaetus relictus</i>	Relict Gull	遺鷗
173	<i>Chroicocephalus ridibundus</i>	Black-headed Gull	紅嘴鷗
174	<i>Chroicocephalus genei</i>	Slender-billed Gull	細嘴鷗
175	<i>Hydrocoloeus minutus</i>	Little Gull	小鷗
176	<i>Chroicocephalus saundersi</i>	Saunders's Gull	黑嘴鷗
177	<i>Rissa tridactyla</i>	Black-legged Kittiwake	三趾鷗
178	<i>Chlidonias hybrida</i>	Whiskered Tern	鬚浮鷗
179	<i>Chlidonias leucopterus</i>	White-winged Tern	白翅浮鷗
180	<i>Gelochelidon nilotica</i>	Gull-billed Tern	鷗嘴噪鷗
181	<i>Hydroprogne caspia</i>	Caspian Tern	紅嘴巨鷗
182	<i>Sterna hirundo</i>	Common Tern	普通燕鷗
183	<i>Sterna sumatrana</i>	Black-naped Tern	黑枕燕鷗
184	<i>Sterna albifrons</i>	Little Tern	白額燕鷗
185	<i>Sterna bergii</i>	Greater Crested Tern	大鳳頭燕鷗
186	<i>Columba livia</i>	Rock Dove	原鴿
187	<i>Streptopelia orientalis</i>	Oriental Turtle Dove	山斑鳩
188	<i>Streptopelia tranquebarica</i>	Red Turtle Dove	火斑鳩
189	<i>Spilopelia chinensis</i>	Spotted Dove	珠頸斑鳩
190	<i>Chalcophaps indica</i>	Emerald Dove	綠翅金鳩
191	<i>Cacatua sulphurea</i>	Yellow-crested Cockatoo	小葵花鳳頭鸚鵡
192	<i>Psittacula krameri</i>	Rose-ringed Parakeet	紅領綠鸚鵡
193	<i>Clamator coromandus</i>	Chestnut-winged Cuckoo	紅翅鳳頭鸚
194	<i>Hierococcyx sparveriioides</i>	Northern Hawk Cuckoo	北方鷹鸚
195	<i>Cuculus micropterus</i>	Indian Cuckoo	四聲杜鵑
196	<i>Cuculus optatus</i>	Oriental Cuckoo	中杜鵑
197	<i>Cacomantis merulinus</i>	Plaintive Cuckoo	八聲杜鵑
198	<i>Surniculus lugubris</i>	Drongo Cuckoo	烏鵲
199	<i>Eudynamys scolopacea</i>	Common Koel	噪鵲
200	<i>Centropus sinensis</i>	Greater Coucal	褐翅鴉鵂
201	<i>Centropus bengalensis</i>	Lesser Coucal	小鴉鵂
202	<i>Tyto longimembris</i>	Eastern Grass Owl	草鴞
203	<i>Otus sunia</i>	Oriental Scops Owl	紅角鴞
204	<i>Glaucidium cuculoides</i>	Asian Barred Owlet	斑頭鴞鵂
205	<i>Ninox japonica</i>	Northern Boobook	鷹鴞
206	<i>Asio flammeus</i>	Short-eared Owl	短耳鴞
207	<i>Caprimulgus jotaka</i>	Grey Nightjar	普通夜鷹
208	<i>Caprimulgus affinis</i>	Savanna Nightjar	林夜鷹
209	<i>Collocalia brevirostris</i>	Himalayan Swiftlet	短嘴金絲燕

210	<i>Hirundapus caudacutus</i>	White-throated Needletail	白喉針尾雨燕
211	<i>Hirundapus cochinchinensis</i>	Silver-backed Needletail	灰喉針尾雨燕
212	<i>Apus apus</i>	Common Swift	普通雨燕
213	<i>Apus pacificus</i>	Pacific Swift	白腰雨燕
214	<i>Apus affinis</i>	Little Swift	小白腰雨燕
215	<i>Ceryle rudis</i>	Pied Kingfisher	斑魚狗
216	<i>Alcedo atthis</i>	Common Kingfisher	普通翠鳥
217	<i>Halcyon smyrnensis</i>	White-throated Kingfisher	白胸翡翠
218	<i>Halcyon pileata</i>	Black-capped Kingfisher	藍翡翠
219	<i>Halcyon chloris</i>	Collared Kingfisher	白領翡翠
220	<i>Merops viridis</i>	Blue-throated Bee-eater	藍喉蜂虎
221	<i>Merops philippinus</i>	Blue-tailed Bee-eater	栗喉蜂虎
222	<i>Eurystomus orientalis</i>	Dollarbird	三寶鳥
223	<i>Upupa epops</i>	Eurasian Hoopoe	戴勝
224	<i>Jynx torquilla</i>	Eurasian Wryneck	蟻鴛
225	<i>Alauda arvensis</i>	Eurasian Skylark	雲雀
226	<i>Alauda gulgula</i>	Oriental Skylark	小雲雀
227	<i>Riparia chinensis</i>	Grey-throated Martin	褐喉沙燕
228	<i>Riparia dilutaf</i>	Pale Martin	淡色沙燕
229	<i>Hirundo rustica</i>	Barn Swallow	家燕
230	<i>Cecropis daurica</i>	Red-rumped swallow	金腰燕
231	<i>Delichon dasypus</i>	Asian House Martin	煙腹毛腳燕
232	<i>Delichon urbicum</i>	Common House Martin	白腹毛腳燕
233	<i>Dendronanthus indicus</i>	Forest Wagtail	山鵲鶇
234	<i>Motacilla tschutschensis</i>	Eastern Yellow Wagtail	黃鵲鶇
235	<i>Motacilla citreola</i>	Citrine Wagtail	黃頭鵲鶇
236	<i>Motacilla cinerea</i>	Grey Wagtail	灰鵲鶇
237	<i>Motacilla alba</i>	White Wagtail	白鵲鶇
238	<i>Anthus richardi</i>	Richard's Pipit	理氏鶇
239	<i>Anthus hodgsoni</i>	Olive-backed Pipit	樹鶇
240	<i>Anthus cervinus</i>	Red-throated Pipit	紅喉鶇
241	<i>Anthus gustavi</i>	Pechora Pipit	北鶇
242	<i>Anthus rubescens</i>	Buff-bellied Pipit	黃腹鶇
243	<i>Anthus spinoletta</i>	Water Pipit	水鶇
244	<i>Coracina melaschistos</i>	Black-winged Cuckoo-shrike	暗灰鶇鶇
245	<i>Pericrocotus cantonensis</i>	Swinhoe's Minivet	小灰山椒鳥
246	<i>Pericrocotus divaricatus</i>	Ashy Minivet	灰山椒鳥
247	<i>Pycnonotus jocosus</i>	Red-whiskered Bulbul	紅耳鶇
248	<i>Pycnonotus sinensis</i>	Chinese Bulbul	白頭鶇
249	<i>Pycnonotus aurigaster</i>	Sooty-headed Bulbul	白喉紅臀鶇
250	<i>Hypsipetes castanonotus</i>	Chestnut Bulbul	栗背短腳鶇
251	<i>Hypsipetes leucocephalus</i>	Black Bulbul	黑短腳鶇
252	<i>Lanius tigrinus</i>	Tiger Shrike	虎紋伯勞
253	<i>Lanius bucephalus</i>	Bull-headed Shrike	牛頭伯勞
254	<i>Lanius cristatus</i>	Brown Shrike	紅尾伯勞
255	<i>Lanius schach</i>	Long-tailed Shrike	棕背伯勞
256	<i>Luscinia sibilans</i>	Rufous-tailed Robin	紅尾歌鶇
257	<i>Luscinia calliope</i>	Siberian Rubythroat	紅喉歌鶇
258	<i>Luscinia cyane</i>	Siberian Blue Robin	藍歌鶇
259	<i>Luscinia svecica</i>	Bluethroat	藍喉歌鶇
260	<i>Tarsiger cyanurus</i>	Red-flanked Bluetail	紅脇藍尾鶇
261	<i>Copsychus saularis</i>	Oriental Magpie Robin	鶇鶇
262	<i>Phoenicurus aureoreus</i>	Daurian Redstart	北紅尾鶇
263	<i>Rhyacornis fuliginosus</i>	Plumbeous Redstart	紅尾水鶇

264	<i>Saxicola torquata</i>	Common Stonechat	黑喉石(即鳥)
265	<i>Saxicola ferrea</i>	Grey Bushchat	灰林(即鳥)
266	<i>Monticola gularis</i>	White-throated Rock Thrush	白喉磯鶇
267	<i>Monticola solitarius</i>	Blue Rock Thrush	藍磯鶇
268	<i>Zoothera citrina</i>	Orange-headed Thrush	橙頭地鶇
269	<i>Zoothera dauma</i>	White's Thrush	虎斑地鶇
270	<i>Turdus cardis</i>	Japanese Thrush	烏灰鶇
271	<i>Turdus merula</i>	Common Blackbird	烏鶇
272	<i>Turdus hortulorum</i>	Grey-backed Thrush	灰背鶇
273	<i>Turdus pallidus</i>	Pale Thrush	白腹鶇
274	<i>Turdus obscurus</i>	Eyebrowed Thrush	白眉鶇
275	<i>Turdus naumanni</i>	Dusky Thrush	斑鶇
276	<i>Garrulax perspicillatus</i>	Masked Laughingthrush	黑臉噪鶇
277	<i>Garrulax canorus</i>	Chinese Hwamei	畫眉
278	<i>Yuhina castaniceps</i>	Chest-collared Yuhina	栗耳鳳鶇
279	<i>Paradoxornis webbianus</i>	Vinous-throated Parrotbill	棕頭鴉雀
280	<i>Megalurus pryeri</i>	Japanese Swamp Warbler	斑背大尾鶇
281	<i>Urosphena squameiceps</i>	Asian Stubtail	鱗頭樹鶇
282	<i>Cettia pallidipes</i>	Pale-footed Bush Warbler	淡腳樹鶇
283	<i>Cettia canturians</i>	Manchurian Bush Warbler	日本樹鶇
284	<i>Cettia fortipes</i>	Brownish-flanked Bush Warbler	強腳樹鶇
285	<i>Bradypterus luteoventris</i>	Brown Bush Warbler	棕褐短翅鶇
286	<i>Bradypterus mandelli</i>	Russet Bush Warbler	高山短翅鶇
287	<i>Locustella lanceolata</i>	Lanceolated Warbler	矛紋蝗鶇
288	<i>Locustella certhiola</i>	Pallas's Grasshopper Warbler	小蝗鶇
289	<i>Locustella ochotensis</i>	Middendorff's Grasshopper Warbler	北蝗鶇
290	<i>Locustella pleskei</i>	Styan's Grasshopper Warbler	史氏蝗鶇
291	<i>Acrocephalus bistrigiceps</i>	Black-browed Reed warbler	黑眉葦鶇
292	<i>Acrocephalus tangorum</i>	Manchurian Reed Warbler	遠東葦鶇
293	<i>Acrocephalus agricola</i>	Paddyfield Warbler	稻田葦鶇
294	<i>Acrocephalus concinens</i>	Blunt-winged Warbler	鈍翅葦鶇
295	<i>Acrocephalus dumetorum</i>	Blyth's Reed Warbler	布氏葦鶇
296	<i>Acrocephalus orientalis</i>	Oriental Reed Warbler	東方大葦鶇
297	<i>Acrocephalus aedon</i>	Thick-billed Warbler	厚嘴葦鶇
298	<i>Cisticola juncidis</i>	Zitting Cisticola	棕扇尾鶇
299	<i>Cisticola exilis</i>	Golden-capped Cisticola	金頭扇尾鶇
300	<i>Prinia flaviventris</i>	Yellow-bellied Prinia	黃腹鷓鶇
301	<i>Prinia inornata</i>	Plain Prinia	純色鷓鶇
302	<i>Orthotomus cuculatus</i>	Mountain Tailorbird	金頭縫葉鶇
303	<i>Orthotomus sutorius</i>	Common Tailorbird	長尾縫葉鶇
304	<i>Phylloscopus collybita</i>	Common Chiffchaff	嘜喳柳鶇
305	<i>Phylloscopus fuscatus</i>	Dusky Warbler	褐柳鶇
306	<i>Phylloscopus armandii</i>	Yellow-streaked Warbler	棕眉柳鶇
307	<i>Phylloscopus schwarzi</i>	Radde's Warbler	巨嘴柳鶇
308	<i>Phylloscopus proregulus</i>	Pallas's Leaf Warbler	黃腰柳鶇
309	<i>Phylloscopus inornatus</i>	Yellow-browed Warbler	黃眉柳鶇
310	<i>Phylloscopus borealis</i>	Arctic Warbler	極北柳鶇
311	<i>Phylloscopus plumbeitarsus</i>	Two-barred Warbler	暗綠樹鶇
312	<i>Phylloscopus tenellipes</i>	Pale-legged Leaf Warbler	淡腳柳鶇
313	<i>Phylloscopus borealoides</i>	Sakhalin Leaf Warbler	庫頁島柳鶇
314	<i>Phylloscopus coronatus</i>	Eastern Crowned Warbler	冕柳鶇
315	<i>Sylvia curruca</i>	Lesser Whitethroat	白喉林鶇
316	<i>Rhinomyias brunneatus</i>	Brown-chested Jungle Flycatcher	白喉林鶇

317	<i>Muscicapa griseisticta</i>	Grey-streaked Flycatcher	灰紋鶇
318	<i>Muscicapa sibirica</i>	Dark-sided Flycatcher	烏鶇
319	<i>Muscicapa dauurica</i>	Asian Brown Flycatcher	北灰鶇
320	<i>Muscicapa ferruginea</i>	Ferruginous Flycatcher	棕尾褐鶇
321	<i>Eumyias thalassina</i>	Verditer Flycatcher	銅藍鶇
322	<i>Ficedula zanthopygia</i>	Yellow-rumped Flycatcher	白眉姬鶇
323	<i>Ficedula narcissina</i>	Narcissus Flycatcher	黃眉姬鶇
324	<i>Ficedula mugimaki</i>	Mugimaki Flycatcher	鴝姬鶇
325	<i>Ficedula albicilla</i>	Red-throated Flycatcher	紅喉姬鶇
326	<i>Cyanoptila cyanomelana</i>	Blue-and-white Flycatcher	白腹姬鶇
327	<i>Cyornis hainanus</i>	Hainan Blue Flycatcher	海南藍仙鶇
328	<i>Culicicapa ceylonensis</i>	Grey-headed Flycatcher	方尾鶇
329	<i>Hypothymis azurea</i>	Black-naped Monarch	黑枕王鶇
330	<i>Terpsiphone paradisi</i>	Asian Paradise Flycatcher	壽帶
331	<i>Terpsiphone atrocaudata</i>	Japanese Paradise Flycatcher	紫壽帶
332	<i>Remiz consobrinus</i>	Chinese Penduline Tit	中華攀雀
333	<i>Parus venustus</i>	Yellow-bellied Tit	黃腹山雀
334	<i>Parus major</i>	Great Tit	大山雀
335	<i>Dicaeum cruentatum</i>	Scarlet-backed Flowerpecker	朱背啄花鳥
336	<i>Aethopyga christinae</i>	Fork-tailed Sunbird	叉尾太陽鳥
337	<i>Zosterops erythroleurus</i>	Chestnut-flanked White-eye	紅脇繡眼鳥
338	<i>Zosterops japonicus</i>	Japanese White-eye	暗綠繡眼鳥
339	<i>Melophus lathami</i>	Crested Bunting	鳳頭鵯
340	<i>Emberiza buchanani</i>	Grey-necked Bunting	灰頸鵯
341	<i>Emberiza tristrami</i>	Tristram's Bunting	白眉鵯
342	<i>Emberiza fucata</i>	Chestnut-eared Bunting	栗耳鵯
343	<i>Emberiza pusilla</i>	Little Bunting	小鵯
344	<i>Emberiza chrysophrys</i>	Yellow-browed Bunting	黃眉鵯
345	<i>Emberiza aureola</i>	Yellow-breasted Bunting	黃胸鵯
346	<i>Emberiza rutila</i>	Chestnut Bunting	栗鵯
347	<i>Emberiza melanocephala</i>	Black-headed Bunting	黑頭鵯
348	<i>Emberiza sulphurata</i>	Japanese Yellow Bunting	硫黃鵯
349	<i>Emberiza spodocephala</i>	Black-faced Bunting	灰頭鵯
350	<i>Emberiza pallasi</i>	Pallas's Reed Bunting	葦鵯
351	<i>Emberiza yessoensis</i>	Japanese Reed Bunting	紅頸葦鵯
352	<i>Emberiza schoeniclus</i>	Common Reed Bunting	蘆鵯
353	<i>Emberiza rustica</i>	Rustic Bunting	田鵯
354	<i>Fringilla montifringilla</i>	Brambling	燕雀
355	<i>Carduelis sinica</i>	Grey-capped Greenfinch	金翅雀
356	<i>Carduelis spinus</i>	Eurasian Siskin	黃雀
357	<i>Carpodacus erythrinus</i>	Common Rosefinch	普通朱雀
358	<i>Eophona migratoria</i>	Yellow-billed Grosbeak	黑尾蠟嘴雀
359	<i>Lonchura striata</i>	White-rumped Munia	白腰文鳥
360	<i>Lonchura punctulata</i>	Scaly-breasted Munia	斑文鳥
361	<i>Lonchura atricapilla</i>	Chestnut Munia	栗腹文鳥
362	<i>Passer rutilans</i>	Russet Sparrow	山麻雀
363	<i>Passer montanus</i>	Eurasian Tree Sparrow	樹麻雀
364	<i>Ploceus philippinus</i>	Baya Weaver	黃胸織布鳥
365	<i>Sturnia malabaricus</i>	Chestnut-tailed Starling	灰頭椋鳥
366	<i>sericeus sericeus</i>	Red-billed Starling	絲光椋鳥
367	<i>Agropsar philippensis</i>	Chestnut-cheeked Starling	紫背椋鳥
368	<i>Agropsar sturninus</i>	Purple-backed Starling	北椋鳥
369	<i>Pastor roseus</i>	Rose-colored Starling	粉紅椋鳥
370	<i>Sturnus vulgaris</i>	Common Starling	紫翅椋鳥

371	<i>Spodiopsar cineraceus</i>	White-cheeked Starling	灰椋鳥
372	<i>Gracupica nigricollis</i>	Black-collared Starling	黑領椋鳥
373	<i>Sturnia sinensis</i>	White-shouldered Starling	灰背椋鳥
374	<i>Acridotheres tristis</i>	Common Myna	家八哥
375	<i>Acridotheres cristatellus</i>	Crested Myna	八哥
376	<i>Oriolus chinensis</i>	Black-naped Oriole	黑枕黃鸝
377	<i>Dicrurus macrocercus</i>	Black Drongo	黑卷尾
378	<i>Dicrurus leucophaeus</i>	Ashy Drongo	灰卷尾
379	<i>Dicrurus hottentottus</i>	Hair-crested Drongo	髮冠卷尾
380	<i>Garrulus glandarius</i>	Eurasian Jay	松鴉
381	<i>Urocissa erythrorhyncha</i>	Red-billed Blue Magpie	紅嘴藍鵲
382	<i>Pica pica</i>	Eurasian Magpie	喜鵲
383	<i>Corvus dauuricus</i>	Daurian Jackdaw	達烏里寒鴉
384	<i>Corvus corone</i>	Carrion Crow	小嘴烏鴉
385	<i>Corvus macrorhynchos</i>	Large-billed Crow	大嘴烏鴉
386	<i>Corvus torquatus</i>	Collared Crow	白頸鴉

Footnotes:

- The checklist is based on the information of Hong Kong Bird Watching Society, World Wide Fund Hong Kong and AFCD;

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- 2 Hong Kong Bird Watching Society (1994-2007). *Hong Kong Bird Reports, vol. 1993-2001/02*. Hong Kong Bird Watching Society Limited, Hong Kong.
- 3 Hong Kong Bird Watching Society (2010). Updated Checklist of Birds of Hong Kong (unpublished record). Hong Kong Bird Watching Society Limited, Hong Kong.
- 4 Viney, C., Phillipps, K. and Lam, C.Y. (2005). *Birds of Hong Kong and South China*. Government Printer, Hong Kong.

Appendix III

List of Mammals

No.	Genus	Species	Common Name	Chinese Name
1	<i>Cynopterus</i>	<i>sphinx</i>	Short-nosed Fruit Bat	短吻果蝠
2	<i>Nyctalus</i>	<i>noctula</i>	Brown Noctule	褐山蝠
3	<i>Rousettus</i>	<i>leschenaulti</i>	Leschenault's Rousette	棕果蝠
4	<i>Scotophilus</i>	<i>kuhlii</i>	Lesser Yellow Bat	中黃蝠
5	<i>Pipistrellus</i>	<i>abramus</i>	Japanese Pipistrelle	東亞家蝠
6	<i>Miniopterus</i>	<i>pusillus</i>	Lesser Bent-winged Bat	南長翼蝠
7	<i>Suncus</i>	<i>murinus</i>	Musk Shrew	臭鼩
8	<i>Rattus</i>	<i>norvegicus</i>	Brown Rat	褐家鼠
9	<i>Bandicota</i>	<i>indica</i>	Greater Bandicoot Rat	板齒鼠
10	<i>Rattus</i>	<i>rattus</i>	Roof Rat	屋頂鼠
11	<i>Mus</i>	<i>caroli</i>	Ryukyu Mouse	卡氏小鼠
12	<i>Niviventer</i>	<i>fulvescens</i>	Chestnut Spiny Rat	針毛鼠
13	<i>Rattus</i>	<i>andamanensis</i>	Indochinese Forest Rat	印支林鼠
14	<i>Hystrix</i>	<i>brachyura</i>	East Asian Porcupine	東亞豪豬
15	<i>Lutra</i>	<i>lutra chinensis</i>	Eurasian Otter	歐亞水獺
16	<i>Herpestes</i>	<i>javanicus</i>	Small Asian Mongoose	紅頰獾
17	<i>Viverricula</i>	<i>indica</i>	Small Indian Civet	小靈貓
18	<i>Prionailurus</i>	<i>bengalensis</i>	Leopard Cat	豹貓
19	<i>Canis</i>	<i>lupus familiaris</i>	Domestic Dog	野狗
20	<i>Felis</i>	<i>catus</i>	Domestic Cat	野貓
21	<i>Sus</i>	<i>Scrofa</i>	Eurasian Wild Pig	野豬

Appendix IV

List of Amphibians

No.	Genus	Species	Common Name	Chinese Name
1	<i>Bufo</i>	<i>melanostictus</i>	Asian Common Toad	黑眶蟾蜍/癩蝦蟆
2	<i>Kalophrynus</i>	<i>interlineatus</i>	Spotted Narrow-mouthed Frog	條紋狹口蛙
3	<i>Kaloula</i>	<i>pulchra pulchra</i>	Asiatic Painted Frog	花狹口蛙
4	<i>Microhyla</i>	<i>ornata</i>	Ornate Pigmy Frog	飾紋姬蛙
5	<i>Microhyla</i>	<i>pulchra</i>	Marbled Pigmy Frog	花姬蛙
6	<i>Polypedates</i>	<i>megacephalus</i>	Brown Tree Frog	斑腿泛樹蛙
7	<i>Rana</i>	<i>guentheri</i>	Günther's Frog	沼蛙
8	<i>Rana</i>	<i>limnocharis</i>	Paddy Frog	澤蛙
9	<i>Rana</i>	<i>rugulosa</i>	Chinese Bullfrog	虎紋蛙/田雞

List of Reptiles

No.	Genus	Species	Common Name	Chinese Name
1	<i>Boiga</i>	<i>multomaculata</i>	Large-spotted Cat Snake	繁花林蛇
2	<i>Bungarus</i>	<i>multicinctus</i>	Many-banded Krait	銀環蛇
3	<i>Calotes</i>	<i>versicolor</i>	Changeable Lizard	變色樹蜥
4	<i>Chinemys</i>	<i>reevesii</i>	Reeves' Terrapin	烏龜
5	<i>Elaphe</i>	<i>radiata</i>	Copperhead Racer	三索錦蛇
6	<i>Enhydryis</i>	<i>bennettii</i>	Mangrove Water Snake	黑斑水蛇
7	<i>Enhydryis</i>	<i>chinensis</i>	Chinese Water Snake	中國水蛇
8	<i>Eumeces</i>	<i>chinensis chinensis</i>	Chinese Skink	石龍子
9	<i>Gehyra</i>	<i>mutilata</i>	Four-clawed Gecko	截趾虎
10	<i>Gekko</i>	<i>chinensis</i>	Chinese Gecko	壁虎
11	<i>Hemidactylus</i>	<i>bowringii</i>	Bowring's Gecko	原尾蜥虎
12	<i>Naja</i>	<i>atra</i>	Chinese Cobra	眼鏡蛇
13	<i>Oligodon</i>	<i>formosanus</i>	Taiwan Kukri Snake	台灣小頭蛇
14	<i>Ophiophagus</i>	<i>hannah</i>	King Cobra	眼鏡王蛇
15	<i>Pelodiscus</i>	<i>sinensis</i>	Chinese Soft-shelled Turtle	鱉/水魚
16	<i>Ptyas</i>	<i>korros</i>	Indo-Chinese Rat Snake	灰鼠蛇
17	<i>Ptyas</i>	<i>mucosus</i>	Common Rat Snake	滑鼠蛇
18	<i>Python</i>	<i>molurus bivittatus</i>	Burmese Python	蟒蛇
19	<i>Ramphotyphlops</i>	<i>braminus</i>	Common Blind Snake	鈎盲蛇
20	<i>Scincella</i>	<i>reevesii</i>	Reeve's Smooth skink	南滑蜥
21	<i>Takydromus</i>	<i>sexlineatus ocellatus</i>	Grass Lizard	南草蜥
22	<i>Xenochrophis</i>	<i>piscator</i>	Checkered Keelback	漁游蛇

List of Species New to Science

Taxonomy	Species
Arthropoda	
1. Sesarminae, Decapoda	<i>Perisesarma maipoensis</i>
2. Aoridae, Amphipoda	<i>Grandidierella</i> sp. nov.
3. Corophidae, Amphipoda	<i>Kamaka</i> sp. nov.
4. Melitidae, Amphipoda	<i>Melita</i> sp. nov.
5. Melitidae, Amphipoda	<i>Victoriopisa</i> sp. nov.
6. Talitridae, Amphipoda	<i>Talorchestia</i> sp. nov.
7. Apseudidae, Tanaidacea	<i>Discapseudes</i> sp. nov.
Arachnida	
8. Scheloribatidae, Acarina	<i>Domotorina rostrata</i>
Annelida	
9. Oligochaeta	<i>Limnodriloides biforis</i>
10. Oligochaeta	<i>L. fraternus</i>
11. Oligochaeta	<i>Rhizodrilus russia</i>
Mollusca	
12. Bivalvia	<i>Pseudopythina maipoensis</i>
Nemertea	
13. Nemertea	<i>Procephalothrix orientalis</i>

List of Butterflies

No.	Genus	Species	Common Name	Chinese Name
1	<i>Acytolepis</i>	<i>puspa</i>	Common Hedge Blue	鈕灰蝶
2	<i>Argyreus</i>	<i>hyperbius</i>	Hong Kong Fritillary	斐豹蛺蝶
3	<i>Ariadne</i>	<i>ariadne</i>	Angled Castor	波蛺蝶
4	<i>Cupha</i>	<i>erymanthis</i>	Rustic	黃襟蛺蝶
5	<i>Danaus</i>	<i>chrysippus</i>	Plain Tiger	金斑蝶
6	<i>Delias</i>	<i>hyparete</i>	Painted Jezebel	優越斑粉蝶
7	<i>Delias</i>	<i>pasithoe</i>	Common Black Jezebel	報喜斑粉蝶
8	<i>Euchrysops</i>	<i>cnejus</i>	Gram Blue	棕灰蝶
9	<i>Euploea</i>	<i>core</i>	Common Crow	幻紫斑蝶
10	<i>Euploea</i>	<i>midamus</i>	Blue-spotted Crow	藍點紫斑蝶
11	<i>Eurema</i>	<i>hecabe</i>	Common Grass Yellow	寬邊黃粉蝶
12	<i>Faunis</i>	<i>eumeus</i>	Common Faun	串珠環蝶
13	<i>Graphium</i>	<i>doson</i>	Common Jay	木蘭青鳳蝶
14	<i>Graphium</i>	<i>agamemnon</i>	Tailed Greed Jay	統帥青鳳蝶
15	<i>Graphium</i>	<i>sarpedon</i>	Common Bluebottle	青鳳蝶
16	<i>Hebomoia</i>	<i>glaucippe</i>	Great Orange-Tip	鶴頂粉蝶
17	<i>Heliophorus</i>	<i>epicles</i>	Purple Sapphire	斜斑彩灰蝶
18	<i>Hypolimnas</i>	<i>bolina</i>	Great Eggfly	幻紫斑蛺蝶
19	<i>Junonia</i>	<i>atlites</i>	Grey Pansy	波紋眼蛺蝶
20	<i>Melanitis</i>	<i>leda</i>	Common Evening Brown	暮眼蝶
21	<i>Mycalesis</i>	<i>mineus</i>	Darkbrand Bush Brown	小眉眼蝶
22	<i>Papilio</i>	<i>demoleus</i>	Lime Butterfly	達摩鳳蝶
23	<i>Papilio</i>	<i>polytes</i>	Common Mormon	玉帶鳳蝶
24	<i>Papilio</i>	<i>helenus</i>	Red Helen	玉斑鳳蝶
25	<i>Papilio</i>	<i>memnon</i>	Great Mormon	美鳳蝶
26	<i>Papilio</i>	<i>xuthus</i>	Swallowtail	柑橘鳳蝶
27	<i>Phalanta</i>	<i>phalantha</i>	Small Leopard	玳蛺蝶
28	<i>Remelana</i>	<i>jangala</i>	Chocolate Royal	萊灰蝶
29	<i>Danaus</i>	<i>genutia</i>	Common Tiger	虎斑蝶
30	<i>Zizeeria</i>	<i>maha</i>	Pale Grass Blue	酢漿灰蝶
31	<i>Papilio</i>	<i>paris</i>	Paris Peacock	巴黎翠鳳蝶
32	<i>Catopsilia</i>	<i>pyranthe</i>	Mottled Emigrant	梨花遷粉蝶
33	<i>Hestina</i>	<i>assimilis</i>	Red Ring Skirt	黑脈蛺蝶
34	<i>Euploea</i>	<i>mulciber</i>	Striped Blue Crow	異型紫斑蝶
35	<i>Borbo</i>	<i>cinnara</i>	Formosan Swift	袖弄蝶
36	<i>Phaedyma</i>	<i>columella</i>	Short-banded Sailer	柱菲蛺蝶
37	<i>Parnara</i>	<i>guttata</i>	Common Straight Swift	直紋稻弄蝶
38	<i>Jamides</i>	<i>bochus</i>	Dark Cerulean	雅灰蝶
39	<i>Rapala</i>	<i>manea</i>	Slate Flash	燕灰蝶
40	<i>Cyrestis</i>	<i>thyodamas</i>	Common Mapwing	網絲蛺蝶
41	<i>Hypolimnas</i>	<i>misippus</i>	Danaid Eggfly	金斑蛺蝶

List of Dragonflies

No.	Genus	Species	Common Name	Chinese name
1	<i>Acisoma</i>	<i>panorpoides</i> <i>panorpoides</i>	Asian Pintail	錐腹蜻
2	<i>Anaciaeschna</i>	<i>jaspidea</i>	Common Evening Hawker	碧翠蜓
3	<i>Anax</i>	<i>guttatus</i>	Pale-spotted Emperor	斑偉蜓
4	<i>Brachydiplax</i>	<i>chalybea</i> <i>flavovittata</i>	Blue Dasher	藍額疏脈蜻
5	<i>Brachythemis</i>	<i>contaminata</i>	Asian Amberwing	黃翅蜻
6	<i>Ceriagrion</i>	<i>auranticum</i> <i>ryukyuanum</i>	Orange-tailed Sprite	琉球橘黃螳
7	<i>Coeliccia</i>	<i>cyanomelas</i>	Blue Forest Damsel	黃紋長腹螳
8	<i>Copera</i>	<i>ciliata</i>	Black-kneed Featherlegs	白狹扇螳
9	<i>Copera</i>	<i>marginipes</i>	Yellow Featherlegs	黃狹扇螳
10	<i>Crocothemis</i>	<i>servilia</i> <i>servilia</i>	Crimson Darter	紅蜻
11	<i>Diplacodes</i>	<i>trivialis</i>	Blue Percher	紋藍小蜻
12	<i>Euphaea</i>	<i>decorata</i>	Black-banded Gossamerwing	方帶幽螳
13	<i>Ictinogomphus</i>	<i>pertinax</i>	Common Flangetail	霸王葉春蜓
14	<i>Ischnura</i>	<i>senegalensis</i>	Common Bluetail	褐斑異痣螳
15	<i>Lyriothemis</i>	<i>elegantissima</i>	Forest Chaser	華麗寬腹蜻
16	<i>Mortonagrion</i>	<i>hirosei</i>	Four-spot Midget	廣瀨妹螳
17	<i>Orthetrum</i>	<i>glaucum</i>	Common Blue Skimmer	黑尾灰蜻
18	<i>Orthetrum</i>	<i>pruinatum</i> <i>neglectum</i>	Common Red Skimmer	赤褐灰蜻
19	<i>Orthetrum</i>	<i>sabina sabina</i>	Green Skimmer	狹腹灰蜻
20	<i>Pantala</i>	<i>flavescens</i>	Wandering Glider	黃蜻
21	<i>Potamarcha</i>	<i>congener</i>	Blue Chaser	濕地狹翅蜻
22	<i>Prodasineura</i>	<i>autumnalis</i>	Black Threadtail	烏齒原螳
23	<i>Pseudagrion</i>	<i>rubriceps</i> <i>rubriceps</i>	Orange-faced Sprite	丹頂斑螳
24	<i>Pseudothemis</i>	<i>zonata</i>	Pied Skimmer	玉帶蜻
25	<i>Rhinocypha</i>	<i>perforata</i> <i>perforata</i>	Common Blue Jewel	三斑鼻螳
26	<i>Rhodothemis</i>	<i>rufa</i>	Ruby Darter	紅胭蜻
27	<i>Rhyothemis</i>	<i>variegata</i> <i>arria</i>	Variiegated Flutterer	斑麗翅蜻
28	<i>Tholymis</i>	<i>tillarga</i>	Evening Skimmer	雲斑蜻
29	<i>Tamea</i>	<i>virginia</i>	Saddlebag Glider	華斜痣蜻
30	<i>Trithemis</i>	<i>aurora</i>	Crimson Dropwing	曉褐蜻
31	<i>Trithemis</i>	<i>festiva</i>	Indigo Dropwing	慶褐蜻
32	<i>Urothemis</i>	<i>signata</i> <i>signata</i>	Scarlet Basker	赤斑曲鈎脈蜻
33	<i>Zygonyx</i>	<i>iris insignis</i>	Emerald Cascader	彩虹蜻
34	<i>Zygomma</i>	<i>petiolatum</i>	Dingy Dusk-darter	細腹綠眼蜻
35	<i>Pseudagrion</i>	<i>microcephalum</i>	Blue Sprite	綠斑螳
36	<i>Epophthalmia</i>	<i>elegans</i>	Regal Pond Cruiser	閃藍麗大蜻
37	<i>Macrodiplax</i>	<i>cora</i>	Coastal Glider	高翔潁蜻
38	<i>Neurothemis</i>	<i>tullia</i>	Pied Percher	截斑脈蜻

39	<i>Paracercion</i>	<i>melanotum</i>	Eastern Lilysquatter	黑背尾鳉
40	<i>Hydrobasileus</i>	<i>croceus</i>	Amber-winged Glider	臀斑楔翅蜻

Appendix VII

List of Fish

No.	Scientific name	Common Name	Chinese Name
1	<i>Acentrogobius caninus</i>	Dog-toothed goby, Tropical sand goby	犬牙細棘蝦虎魚
2	<i>Ambassis gymnocephalus</i>	Bald Glassy	眶棘雙邊魚
3	<i>Anguilla japonica</i>	Japanese Eel	日本鰻鱺
4	<i>Aristichthys nobilis</i>	Bighead Carp	鱮 / 大頭鱮
5	<i>Baleophthalmus pectinirostris</i>	Bluespotted Mudhopper	大彈塗魚
6	<i>Bostrychus sinensis</i>	Chinese Black Sleeper	中華烏塘鱧
7	<i>Butis butis</i>	Crimon-tipped Flathead Gudgeon	峭塘鱧
8	<i>Chanos chanos</i>	Milkfish	虱目魚
9	<i>Cirrhinia malitarella</i>	Mud Carp	鯪魚
10	<i>Clarias fuscus</i>	Catfish	鬍鯰
11	<i>Ctenopharyngodon idellus</i>	Grass Carp	草魚
12	<i>Cyprinus carpio</i>	Common Carp	鯉魚
13	<i>Eleotris oxycephala</i>	Sharphead Sleeper	黑筍殼
14	<i>Elops saurus</i>	ladyfish	海鱧
15	<i>Gambusia affinis</i>	Mosquito Fish	食蚊魚
16	<i>Gerres filamentosus</i>	Whipfin silver-biddy	長棘銀鱸
17	<i>Gerres sp.</i>		銀鱸屬
18	<i>Glossogobius giuris</i>	Fork Tongue Goby	舌鰕虎魚
19	<i>Hypophthalmichthys molitrix</i>	Silver Carp	鱧魚
20	<i>Hyporhamphus gernaerti</i>	Halfbeaks	鱗魚
21	<i>Lateolabrax japonicus</i>	Japanese seaperch	日本真鱸
22	<i>Lates calcarifer</i>	Giant seaperch	尖吻鱸
23	<i>Liza haematocheila</i>	Redeye mullet	鯪魚
25	<i>Magalops cyprinoides</i>		
26	<i>Mugil cephalus</i>	Grey Mullet	鰱
27	<i>Mugilogobius abei</i>		阿部鰱蝦虎魚
24	<i>M. myxodermus</i>		粘皮鰱蝦虎魚
28	<i>Oreochromis nilotica</i>	Nile Tilapia	尼羅口孵非鯽
29	<i>Odontamblyopus rubicundus</i>	Red eelgoby	紅鰻蝦虎魚
30	<i>Ophiocephalus maculatus</i>	Snakehead	斑鱧
31	<i>Oreochromis mossambicus</i>	Mozambique tilapia.	莫桑比克口孵非鯽
32	<i>Periophthalmus cantonensis</i>	Mudskipper	廣東彈塗魚
33	<i>Platycephalus indicus</i>	Flathead	印度鱮 / 牛鰍
34	<i>S. macrocephalus</i> (= <i>Sparus macrocephalus</i> / <i>Acanthopagrus schlegelii schlegelii</i>)	Black porgy	黑棘鯛
35	<i>Scartelaos viridis</i>	Mudskipper	青彈塗魚/劍鰭彈塗
36	<i>Scatophagus argus</i>	Spotted Scat	金錢魚
37	<i>Sparus latus</i>	yellowfin black porgy	黃鰭鯛
38	<i>Taenioides cirratus</i>	Bearded worm goby	鬚鰻蝦虎魚
39	<i>Terapon jarbua</i>	Grunter	細鱗及鱒
40	<i>Tridentiger trionocephalus</i>	Chameleon Goby	紋縞蝦虎魚

Appendix VIII

Species with important biogeographical (flyway) populations		Mean maximum count (2005-2010) *	Biogeographic population size**	% of biogeographic population
Black-faced Spoonbill	<i>Platalea minor</i>	429***	2,347***	18.2%
Nordmann's Greenshank	<i>Tringa guttifer</i>	31	1,000**	3%
Dalmatian Pelican	<i>Pelecanus crispus</i>	3.6	30	12%
Great Cormorant	<i>Phalacrocorax carbo</i>	10,758	100,000	10.7%
Tufted Duck	<i>Aythya fuligula</i>	4,871	250,000	1.9%
Northern Shoveler	<i>Anas clypeata</i>	20,008	500,000	4%
Eastern Great Egret	<i>Egretta alba</i>	1,190	100,000	1.2%
Common Greenshank	<i>Tringa nebularia</i>	3,510	100,000	3.5%
Common Redshank	<i>Tringa totanus</i>	2,483	100,000	2.5%
Spotted Redshank	<i>Tringa erythropus</i>	1,770	100,000	1.8%
Pied Avocet	<i>Recurvirostra avosetta</i>	13,883	100,000	14%
Black-tailed Godwit	<i>Limosa limosa</i>	2,449	160,000	1.5%
Eurasian Curlew	<i>Numenius arquata</i>	1,122	35,000	3.2%
Marsh Sandpiper	<i>Tringa stagnatilis</i>	2,547	90,000	2.8%
Terek Sandpiper	<i>Xenus cinereus</i>	617	50,000	1.2%
Curlew Sandpiper	<i>Calidris ferruginea</i>	9,350	180,000	5.2%
Kentish Plover	<i>Charadrius alexandrinus</i>	4,303	100,000	4.3%

Sources:

* - Shorebird Monitoring at the Mai Po Inner Deep Bay Ramsar Site 2004-2010 (Anon., 2010a, Anon., 2009a, Anon., 2008a, Anon., 2007a, and Anon., 2006a); Monthly Waterbird Counts Data 2004-2010 (Anon 2010b, Anon 2009b, Anon 2008b, Anon 2007b, and Anon 2006b);
** - World and biogeographic populations (Wetlands International 2006).
***-The International Black-faced Spoonbill Census 2009 and 2010 (Y. T. Yu, 2010).

Percentage of world and biogeographical populations are based on mean maximum counts over 5 years (2005-2010) compared to the top end of a coded range of population size, as recommended by Wetlands International (2006). All population size refers to individuals.

Reference (for Appendix VIII)

Anon., (2006)a. Shorebird Monitoring at the Mai Po Inner Deep Bay Ramsar Site: 2005-06. Report by Hong Kong Bird Watching Society to the Agriculture, Fisheries and Conservation Department, HKSAR.

Anon., (2007)a. Shorebird Monitoring at the Mai Po Inner Deep Bay Ramsar Site: 2006-07. Report by Hong Kong Bird Watching Society to the Agriculture, Fisheries and Conservation Department, HKSAR.

Anon., (2008)a. Shorebird Monitoring at the Mai Po Inner Deep Bay Ramsar Site: 2007-08. Report by Hong Kong Bird Watching Society to the Agriculture, Fisheries and Conservation Department, HKSAR.

Anon., (2009)a. Shorebird Monitoring at the Mai Po Inner Deep Bay Ramsar Site: 2008-09. Report by Hong Kong Bird Watching Society to the Agriculture, Fisheries and Conservation Department, HKSAR.

Anon., (2010)a. Shorebird Monitoring at the Mai Po Inner Deep Bay Ramsar Site: 2009-10. Report by Hong Kong Bird Watching Society to the Agriculture, Fisheries and Conservation Department, HKSAR.

Anon., (2006)b. Winter 2005-06 Report on Waterbird Monitoring at the Mai Po Inner Deep Bay Ramsar Site. Report by Hong Kong Bird Watching Society to the Agriculture, Fisheries and Conservation Department, HKSAR.

Anon., (2007)b. Winter 2006-07 Report on Waterbird Monitoring at the Mai Po Inner Deep Bay Ramsar Site. Report by Hong Kong Bird Watching Society to the Agriculture, Fisheries and Conservation Department, HKSAR.

Anon., (2008)b. Winter 2007-08 Report on Waterbird Monitoring at the Mai Po Inner Deep Bay Ramsar Site. Report by Hong Kong Bird Watching Society to the Agriculture, Fisheries and Conservation Department, HKSAR.

Anon., (2009)b. Winter 2008-09 Report on Waterbird Monitoring at the Mai Po Inner Deep Bay Ramsar Site. Report by Hong Kong Bird Watching Society to the Agriculture, Fisheries and Conservation Department, HKSAR.

Anon., (2010)b. Winter 2009-10 Report on Waterbird Monitoring at the Mai Po Inner Deep Bay Ramsar Site. Report by Hong Kong Bird Watching Society to the Agriculture, Fisheries and Conservation Department, HKSAR.

Wetlands International. 2006. *Waterbird Population Estimates – Fourth Edition*. Wetlands International, Wageningen, The Netherlands

Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.
2. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Bureau. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

1. Name and address of the compiler of this form:

Wetland and Fauna Conservation Officer (Monitoring),
Wetland and Fauna Conservation Division,
Agriculture, Fisheries and Conservation Department,
Government of Hong Kong Special Administrative
Region,
7/F., Cheung Sha Wan Government Offices,
303 Cheung Sha Wan Road,
HONG KONG, CHINA.

FOR OFFICE USE ONLY.

DD MM YY

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Designation date

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Site Reference Number

Tel.: 852 2150 6922
Fax: 852 2377 4427
Email: ks_cheung@afcd.gov.hk

2. Date this sheet was completed/updated:

17 May 2006.

3. Country:

The People's Republic of China.

4. Name of the Ramsar site:

Mai Po Marshes and Inner Deep Bay (also referred as 米埔內后海灣 or Mai Po Inner Deep Bay)

5. Map of site included:

Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps.

a) **hard copy** (required for inclusion of site in the Ramsar List): *yes*

b) **digital (electronic) format** (optional): *yes*

6. Geographical coordinates (latitude/longitude):

Centre coordinates: 022°29'20.194" N 114°01'44.023" E

7. General location:

Include in which part of the country and which large administrative region(s), and the location of the nearest large town.

Yuen Long, Northwest New Territories, Hong Kong Special Administrative Region.

8. Elevation: (average and/or max. & min.)

9. Area: (in hectares)

0 m (sea level) about 1,540 (updated from 1995 figure).

10. Overview:

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

A shallow bay with extensive intertidal mudflats backed by mangal, tidal shrimp ponds (*gei wais*), fishponds, and reedbed in some *gei wais* and along the coast. The site serves as an important over-wintering site to the waterbirds of the East Asian and Australasian Shorebird Flyway and accommodates a wide variety of flora and fauna. The mangal is the largest in Hong Kong and one of the few largest in the China while the reedbed is the largest in Hong Kong and Guangdong Province. The fishponds are largely used for commercial fish farming. The *gei wais* which were used for traditional culturing of penaeid shrimps in Hong Kong have been preserved as an important semi-artificial or artificial habitat for the waterbirds.

11. Ramsar Criteria:

Circle or underline each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11).

1 • 2 • 3 • 4 • 5 • 6 • 7 • 8

12. Justification for the application of each Criterion listed in 11. above:

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Status of Ramsar Criteria 2, 5 and 6 is updated with reference to 1999-2000 to 2004-05 (the recent 6 winters) waterbird monitoring data and 2006 IUCN Redlist. Figures used to justify the designation of the Ramsar Site are also included in parentheses for reference.

Criterion 2: The site regularly holds 22 globally threatened species in 1999-2005, according to the 2006 IUCN RedList (13 listed species in 1990-94) as shown in the following table. 2 of them are critically endangered while 3 are endangered.

Category: Critically Endangered
1. Christmas Island Frigatebird <i>Fregata andrewsi</i>
2. Siberian Crane <i>Grus leucogeranus</i>
Category: Endangered
3. Oriental Stork <i>Ciconia boyciana</i>
4. Black-faced Spoonbill <i>Platalea minor</i>
5. Nordmann's Greenshank <i>Tringa guttifer</i>
Category: Vulnerable
6. Baikal Teal <i>Anas formosa</i>
7. Manchurian Reed Warbler <i>Acrocephalus tangorum</i>
8. Baer's Pochard <i>Aythya baeri</i>
9. Greater Spotted Eagle <i>Aquila clanga</i>
10. Imperial Eagle <i>Aquila heliaca</i>
11. Swinhoe's Egret/Chinese Egret <i>Egretta eulophotes</i>

12. Japanese Yellow Bunting <i>Emberiza sulphurata</i>
13. Spoon-billed Sandpiper <i>Eurynorhynchus pygmeus</i>
14. Relict Gull <i>Larus relictus</i>
15. Saunders's Gull <i>Larus saundersi</i>
16. Styan's Grasshopper Warbler <i>Locustella pleskei</i>
17. Dalmatian Pelican <i>Pelecanus crispus</i>
Category: Near threatened
18. Eurasian Black Vulture <i>Aegypius monachus</i>
19. Ferruginous Duck <i>Aythya nyroca</i>
20. Asian Dowitcher <i>Limnodromus semipalmatus</i>
21. Japanese Paradise Flycatcher <i>Terpsiphone atrocaudata</i>
22. Black-headed Ibis <i>Threskiornis melanocephalus</i>

Criterion 3: The site is the type locality for 13 species of invertebrates as shown in the following table. The crab species *Perisesarma maipoensis* is found nowhere else in the world and plays significant role in the mangrove ecosystem of the Ramsar site.

Taxonomy	Species
Arthropoda	
Sesarminae, Decapoda	<i>Perisesarma maipoensis</i>
Aoridae, Amphipoda	<i>Grandidierella</i> sp. nov.
Corophidae, Amphipoda	<i>Kamaka</i> sp. nov.
Melitidae, Amphipoda	<i>Melita</i> sp. nov.
	<i>Victoriopisa</i> sp. nov.
Talitridae, Amphipoda	<i>Talorchestia</i> sp. nov.
Apeudidae, Tanaidacea	<i>Discapseudes</i> sp. nov.
Arachnida	
Schelorbitidae, Acarina	<i>Dometorina rostrata</i>
Annelida	
Oligochaeta	<i>Limnodriloides biforis</i>
	<i>L. fraternus</i>
	<i>Rhizodrilus russia</i>
Mollusca	
Bivalvia	<i>Pseudopythina maipoensis</i>
Nemertea	
Nemertea	<i>Procephalothrix orientalis</i>

Criterion 5: In 1999-2005, Deep Bay supported on average 58,363 waterfowl in mid-winter (compared to 48,500 in 1990-94).

Criterion 6: The site regularly holds on average 178 numbers or 17% of the global population of Black-faced Spoonbill (*Platalea minor*) in 1999-2005. There are another 9 species (6 species in 1990-1994) in this site having more than 1% of threshold population of Eastern Asia.

Species	Number/ Percentage (rounded fig.)	1% threshold
Dalmatian Pelican <i>Pelecanus crispus</i>	16/16%	1%=1
Great Cormorant <i>Phalacrocorax carbo</i>	6684/6.7%	1%=1000; sub-spp <i>sinensis</i> , non-breeding
Pied Avocet <i>Recurvirostra avosetta</i>	2873/2.9%	1%=1000
Eurasian Curlew <i>Numenius arquata</i>	859/2.5%	1%=350
Marsh Sandpiper <i>Tringa stagnatilis</i>	1566/1.7%	1%=900
Kentish Plover <i>Charadrius</i>	1322/1.3%	1%=1000

<i>alexandrinus</i>		
Spotted Redshank <i>Tringa erythropus</i>	1182/1.2%	1%=1000
Common Greenshank <i>Tringa nebularia</i>	624/1.1%	1%=550
Common Black-headed gull <i>Larus ridibundus</i>	11234/1.1-11.2%	1%=1,000 to 10,000; the regional population ranges from 100,000 to 1,000,000

Reference: Wetlands International. 2002. Waterbird Population Estimates – Third Edition. Wetland International Global Series No. 12, Wageningen, The Netherlands.

It should be cited that the population of Great Egret *Egretta alba* is increasing in and around the Ramsar Site. The peak count was 632 in winter 1990-2000 which reached up to 1941 in 2004-2005 which counts for about 0.86% of the East Asian population.

13. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:

Eastern Asia

b) biogeographic regionalisation scheme (include reference citation):

Based on the breeding and non-breeding zone scheme of waterbird populations adopted in: Wetlands International. 2002. Waterbird Population Estimates – Third Edition. Wetland International Global Series No. 12, Wageningen, The Netherlands.

14. Physical features of the site:

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

The Ramsar site is a natural shallow estuarine bay lying within the Yuen Long Basin. The average water depth is about 2.9 m and the mean tidal range is 1.4 m. Inner Deep Bay receives water and sediments from both Hong Kong and Shenzhen.

The bedrock is sedimentary sands and silts that were metamorphosed and formed when the area was a neritic swamp. Sediments of varying grain sizes continued to deposit as the deltaic floodplain built up. The shoreline progradation has been strengthened by the presence of the mangal fringing the bay.

The soils in the Ramsar site were formed from alluvial deposits and colluvial material. The soil is poorly drained and frequently highly saline, rendering them of little agricultural uses. The sediment forming the core part of the intertidal mudflat is predominantly clay and silt.

Salinity of the intertidal water shows a clear trend dependent on the seasonality in which the values tend to increase from late summer and approach the highest in winter/early spring. After entering the late spring and early summer, salinity could drop to very low due to the increase of rainfall. There is no stratification of the water of Deep Bay because the bay is shallow. Relatively high levels of organic nutrients are present in the water and have direct consequence on the concentration of dissolved oxygen.

The climate of Hong Kong is sub-tropical, and under the strong influence of monsoons. The temperature ranges from 12°C to 32°C and begins to increase from mid-March. Rainfall occurs mainly from April to September. The mean annual rainfall of the Ramsar site of approximately

1,400 mm is low compared with the rest of the territory because the site is situated in the rain shadow of the Tai Po Shan range. Heavy rain associated with tropical cyclones may last for a few days. From November, the temperature starts to decrease until mid-March.

15. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, general land use, and climate (including climate type).

In addition to the essential information recorded in Section 14, the Deep Bay area forms part of the Pearl River estuary, which is the largest river in southern China, having a catchment of around 450,000 km² and an annual flow of around 308 billion m³.

16. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

The site helps to alleviate flood problems in the northwest of the territory. The mangal are of value in stabilizing the shore of the bay.

17. Wetland Types

a) presence:

Circle or underline the applicable codes for the wetland types of the Ramsar “Classification System for Wetland Type” present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

Marine/coastal: A • B • C • D • E • F • G • H • I • J • K • Zk(a)

Inland: L • M • N • O • P • Q • R • Sp • Ss • Tp Ts • U • Va • Vt • W • Xf • Xp • Y • Zg • Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

b) dominance:

List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

Wetland categories	Wetland types in the Ramsar site	Percentage of extent in the Ramsar site
1	Fishponds and tidal shrimp ponds (<i>gei wais</i>)	50%
G	Intertidal mudflats	21%
I	Intertidal mangal	18%

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

The intertidal mudflat supports a large number of waterbirds along the East Asian and Australasian Shorebird Flyway. The rich organic materials in the sediment support an abundance of benthic fauna e.g. oligochaete and polychaete worms, mudskippers, fiddler crabs which in turn become the food of the waterbird.

The intertidal mangal is one of the most prominent feature in the Ramsar site. It was developed from the fringe of intertidal mangal remaining after the construction of fishponds and *gei wais* during the 30’s (see below). *Kandelia obovata* is the most dominant species and is followed by *Avicennia marina*. *Aegiceras corniculatum* and *Acanthus ilicifolius* are also common at the edge or under

the top canopy. A few old trees of the landward species *Bruguiera gymnorrhiza* and *Excoecaria agallocha* in the *gei wais* reveal the floristic composition of the intertidal mangal before the construction of *gei wais*.

The fishponds are the most dominant habitat type in the Ramsar site in terms of size. They are the main supply of freshwater fish in the territory. The commercial fishpond activity is a wise use of wetland in the Ramsar site. Both freshwater and marine species are farmed here. Like *gei wais*, fishponds would be drained during harvesting and maintenance. Waterbirds would be attracted to feed on the remaining small fish or invertebrates without profit. They could also forage in the abandoned fishponds where fish and invertebrates are available.

Gei wais are tidal shrimp ponds traditionally used for the farming of penaeid shrimps in South China and Asia. In Deep Bay, *gei wais* were created from the intertidal mangal during the 30's and were formed by building bunds confining the mangal. Vegetations inside the ponds are preserved because they are the natural food supply to the shrimps and fish. *Gei wais* are connected with the open water through sluice gates, where nets can be mounted, installed at the seaward bund. Fish and shrimp fries can be drawn from the estuary in autumn when the tide is high. During harvesting, *gei wais* are kept drained for about a week to collect the retained fish and shrimp. Large number of waterbirds is attracted to feed on the remaining small fish or invertebrates without profit. This explains why *gei wais* under the traditional practice are important habitats to the waterbirds. Most of the *gei wais* in the Ramsar site are now managed as roosting and foraging habitats for migratory birds or freshwater habitats for dragonflies. *Gei wais* show how the naturally high productivity of the estuary can be utilized and how artificial or semi-artificial habitats could support a high diversity of wildlife under proper management.

The reedbed (*Phragmites australis*) supports a few hundred species of insect in the Ramsar site. They also provide shelters to Warblers, Rails and Coots and other fauna. Other common grasses and sedges include Short-leaved Malacca Galingale *Cyperus malaccensis* var. *brevifolius* and Coastal Bulrush *Scirpus littoralis*.

19. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

The intertidal mangal provides shelter and food to a large diversity of aquatic fauna, including some valuable aquaculture species such as penaeid shrimps and the Mangrove Crab *Scylla paramamosain*.

Seagrass *Halophila beccarii* and *Ruppia maritima* have been recorded in the Ramsar site.

Sonneratia spp., which is exotic to the territory, can be found in the Ramsar site. They are probably the descendents of the mangrove afforestation in the Futian National Nature Reserve of Shenzhen which is in close proximity to the Ramsar site. The ecological role of the species in the area has been a subject of further investigation.

20. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

The area regularly supports a large numbers of over 110 species waterbirds in winter including 22 globally threatened species. The most spectacular species in the site is perhaps the Black-faced Spoonbill. It is an endangered species specialized to the intertidal habitats. The Ramsar site accommodated about 17% of the over-wintering population, which was the second largest in the

world, of the species in 1999-2005. Black-faced Spoonbills prefers to forage and roost in the intertidal mudflat and *gei wais* which are managed for the user of the species in winter. A tailored made conservation plan is in place for the better protection of this species.

The aquatic invertebrate community in intertidal mudflat are numerically important and functional components of the ecosystem, occurring at high densities or biomass in various microhabitats. The endemic sesarminae crab *Perisesarma maiipoensis* is a conspicuous component of the mangrove floor community and acts as an important agent effecting mangrove litter turnover. Together with *Parasesarma affinis* and *Perisesarma bidens*, *P. maiipoensis* can consume more than 50% of the daily litter production in landward mangroves.

21. Social and cultural values:

e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values.

The commercial fishpond culture has been practiced since the 30's providing freshwater fish for local consumption. Most fishponds practice polyculture of carps mixed with tilapia or grey mullet and the remaining ones carry out monoculture of snakehead or catfish. However, more recent maricultural practices in many coastal fishponds are changing to monoculture of brackish species such as scat, seabream and pompano.

This is also the only place in Hong Kong where *gei wais*, the traditional way of farming penaeid shrimp utilizing the naturally high productivity of estuary are preserved. The site is one of the well-known sites in the territory for environmental education to students and the general public. Education centers, birdhides and boardwalks are available for indoor exhibition on wetland conservation, outdoor wetland experiences and birdwatching. A small museum is in place in the Mai Po Marshes Nature Reserve to demonstrate the operation of *gei wai* practice.

22. Land tenure/ownership:

(a) Within the Ramsar site: the great majority of the site is government land, but most fishponds have been leased or licensed to operators engaged in fish farming.

(b) Surrounding the site is mainly leased or licensed land used for fish farming or residential uses in accordance with the land use zones as appropriate.

23. Current land (including water) use:

(a) Within the Ramsar site: Nature conservation, scientific research, nature education and ecotourism, bird watching and nature appreciation, fish farming, and small-scale rural settlement.

(b) In the surroundings/catchment: Brackish/freshwater fishponds, open storage, and residential area. The Hong Kong Wetland Park (HKWP) located at the northern part of Tin Shui Wai adjacent to the Ramsar site is a 61 hectares nature-based theme park. The HKWP project upgrades the originally intended ecological mitigation area into a conservation, education and eco-tourism facility for local residents and overseas visitors. The Phase 1 of the Park has been operational since 2000 and the whole project is scheduled for completion in 2006.

24. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:

(a) Site: There have been and will also be necessary to have drainage related works and the subsequent routine maintenance of the drainage channels at the site. Pollutants, mainly organic nutrients, from the Shenzhen River and Shan Pui Rivers existed and their accumulation could adversely affect the ecological values of the Ramsar site.

(b) Surrounding area: Major development activities which may have detrimental effect on the site included pollution in the catchment, and applications for reclamation of fish ponds for residential developments, open storage areas and other activities around the site. There have been and will be necessary to have drainage related works and road works and the subsequent routine maintenance of the drainage channels at the surrounding area.

25. Conservation measures taken:

List national category and legal status of protected areas, including boundary relationships with the Ramsar site; management practices; whether an officially approved management plan exists and whether it is being implemented.

The overall conservation management of the Ramsar site is overseen by the Agriculture, Fisheries and Conservation Department (AFCD). Since 1998, a Conservation Strategy and Management Plan for the Ramsar site have been implemented. The plan lays down a general framework for the conservation and wise use of the area – and to raise public awareness of the importance of Mai Po and Inner Deep Bay wetlands. Based on the habitats, ecological values and existing land uses, the plan divides the Ramsar site into five different management zones, i.e. the Core Zone, the Biodiversity Management Zone, the Wise Use Zone, the Public Access Zone, and the Private Land Zone. Each management zone has its specific management objective and restrictions.

AFCD has also implemented a Baseline Ecological Monitoring Programme to keep track of the ecological conditions of the Ramsar site since 2001. The monitoring programme focuses on the ecological characters including the community dynamics of benthic fauna which are one of the food sources of the migratory bird, the habitat extent and condition and land use changes using the satellite image interpretation and analysis of bird count records. In parallel, water quality, sediment quality and sedimentation rate of the inter-tidal mudflats are monitored to provide supplementary information on the ecological conditions. The results of the programme would be useful in the formulation of management plan.

The World Wide Fund Hong Kong (WWF HK) has assisted the Government to manage the Mai Po Marshes Nature Reserve (MPMNR) of about 270 hectares since 1984. The prime goals of their management are to conserve, maintain and improve wetland habitats and the biodiversity and key species in the Deep Bay area. WWF HK carries out their daily management of the MPMNR based on a Management Plan for the Mai Po Marshes Wildlife Education Centre and Nature Reserve which was prepared according to the objectives and restrictions of the management zones of the Ramsar site. Wetland habitats including *gei wais* and reed bed are managed to provide roosting and foraging sites suitable to the migratory birds. WWF HK offers educational walks to students and the general public under entry quota.

Prior to the listing of the Ramsar site, the Mai Po Marshes area was designated as a Restricted Area in 1975 under the Wild Animals Protection Ordinance as the Mai Po Marshes Restricted Area. The Restricted Area was extended to cover the Inner Deep Bay intertidal mudflats for a total area of 850 hectares in February 1996. The same ordinance also prohibits hunting or possession of protected animals (including all birds) throughout the territory. AFCD Nature Wardens regularly patrol the Ramsar site which included the Restricted Area.

There are five Sites of Special Scientific Interests inside the Ramsar site. The Mai Po and Inner Deep Bay area also joined the East Asian – Australasian Shorebird Site Network and the Anatidae Site Network in the East Asian Flyway Network with a view to better protect migratory birds of the region.

The land area around Deep Bay including the Ramsar Site is covered by statutory land use plans and development is controlled by the Town Planning Ordinance. All development proposals must be made to the Town Planning Board for consideration in accordance with the Ordinance. To protect the ecological integrity of the Ramsar site from incompatible development, the Board

has designated a Wetland Conservation Area (WCA) and a Wetland Buffer Area (WBA) for the Deep Bay area and provided guidelines to guide and control developments within the area.

The WCA basically covers the landward part of the Ramsar site. The Guidelines stipulate that new development within WCA should not be allowed unless it is required to support the conservation of the area's natural features and scenic qualities. New development within WBA would not be considered unless the applicant demonstrates that the proposed development would have insignificant impact on the environment, ecology, drainage, sewerage and traffic in the area including the Ramsar site.

The Inner Deep Bay has been declared Water Quality Control Zone with water quality objectives defined in 1991. Moreover, the full implementation of statutory controls on livestock waste has eventually resulted in significant reduction of organic pollution entering Deep Bay.

26. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc.

The respective five years management plans of Mai Po Marshes Nature Reserve and the Ramsar site are being reviewed by WWF HK and AFCD respectively. The management plans for the next five years cycle will be prepared with updated information and ecological conditions of the Ramsar site.

27. Current scientific research and facilities:

e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

The tertiary institutes in the territory have been conducting studies on the ecology, hydrology and geology of the area. WWF HK has a field studies centre in the Mai Po Marshes Nature Reserve providing field laboratory and accommodation facilities for training and scientific studies purposes in the area.

28. Current conservation education:

e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

Since 2000, the Agriculture, Fisheries and Conservation Department manages the Hong Kong Wetland Park which has the phase 1 exhibition containing indoor wetland model displays and film show, and outdoor wetland plants displays opened to public. Guided educational tours of the Ramsar site have been organized.

WWF HK has an education centre, 1 field studies center, 1 *gei wai* museum, 1 nature trail, 2 boardwalks and 11 observation hides at the Mai Po Marshes Nature Reserve. The Conservancy Association carried out education programmes on the conservation of the Ramsar site. The Hong Kong Bird Watching Society conducted the waterbird monitoring programme of the Ramsar site and training for bird watchers.

29. Current recreation and tourism:

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

Since 2000, over 100,000 visitors annually visited phase 1 of the Hong Kong Wetland Park which is open to public. Within the Mai Po Marshes Nature Reserve, over 40,000 people annually, of which 11,000 are students, visited for bird watching or informal education visits which were guided by WWF HK.

30. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

The site is within the Hong Kong Special Administrative Region of the People's Republic of China. The Agriculture, Fisheries and Conservation Department takes charge of the overall conservation management of the Ramsar site.

31. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

Wetland and Fauna Conservation Division,
Agriculture, Fisheries and Conservation Department,
7/F Cheung Sha Wan Government Offices,
303 Cheung Sha Wan Road, Kowloon,
Hong Kong, China.

Tel.: 852 2150 6922

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Email: wetland@afcd.gov.hk

32. Bibliographical references:

scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

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Hong Kong Laws:

Forests and Countryside Ordinance, Chapter 96

Town Planning Ordinance, Chapter 131

Wild Animals Protection Ordinance, Chapter 170

Water Pollution Control Ordinance, Chapter 358

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CEPA programmes organised by the Hong Kong Wetland Park

The following is the workplan and summary of the Communication, Education, Participation and Awareness (CEPA) programme organised by Hong Kong Wetland Park (HKWP), Agriculture, Fisheries and Conservation Department (AFCD).

Goal:

To support the Convention's Communication, Education, Participation and Awareness Programme (Resolution X.8, 2008) for promotion of the conservation and wise use of wetlands



Strategic objective:

To serve as hubs of wetland education in Hong Kong and in south-east Asia

Operation objectives and Actions:







(1) Arranging educational programmes on the wise use of wetlands and understanding of wetland biodiversity in Hong Kong.

Action: 1.1 To develop education materials to facilitate provision of credible information to the education sector and the public

<p>(a) The HKWP has published a comprehensive "HKWP Education Kit", resource packs and factsheets. These materials facilitate teaching of ecology and conservation at schools by allowing teachers to make use of the resources at HKWP. Students can make use of the information as self-learning materials. These materials are available for download at the HKWP website.</p>	
<p>(b) The HKWP has published field guides and pamphlet on birds, dragonflies, butterflies, aquatic plants, waterside plants, climate change, our relationship with river, etc. to facilitate the public to access information of animals and plants, and wise use of wetlands. These information are available for download at the HKWP website.</p>	

(2) Arranging education programmes on wetland conservation for school and general public

Action: 2.1 To organise regular activities including guided tours, school lectures, and teachers' workshops for schools.

<p>2.1.1 <i>Park Experience Guided Tours</i> A 2-hour tour for students at all levels to study wetlands through guided interpretation, on-site field studies and classroom activities.</p>	
<p>2.1.2 <i>Learning at Wetland / Day Camps</i> A half-day or whole-day activities for secondary and primary students to acquire in-depth experience on wetlands, including guided tours, workshops, wildlife watch, laboratory sessions, outdoor conservation work and social service.</p>	
<p>2.1.3 <i>Summer Park Adventure</i> A 2-hour field study tour organised at Summer Vacation for communities to take a closer look at wildlife, and understand the close relationship between human and wetlands.</p>	
<p>2.1.4 <i>School Lectures</i> 45mins to 1-hr lectures of different topics are given at kindergartens, primary schools, secondary schools or tertiary institutions to promote conservation and wise use of wetlands</p>	
<p>2.1.5 <i>Education Roadshow</i> HKWP provides education display panels of different topics for schools for exhibition or project study.</p>	
<p>2.1.6 <i>Teacher's Workshop</i> Teacher's workshops are organised to introduce education facilities in HKWP. They also equip teachers with experience in planning and developing strategies for organising trips or study tours to HKWP</p>	

Action: 2.2 To organise regular public activities including themed guided tours, workshops, public lectures and exhibitions.

2.2.1 *Thematic Guided Tours*

Thematic guided tours are organised for visitors to explore the interesting wetland ecology and life in the Wetland Reserve of HKWP. Currently HKWP provides 4 types of thematic guided tour:

- (a) “Know More” guided tour is 1.5-hr tour designed for individual and family visitors to on topics related to learn about “Wetland Reserve”, “Birds”, and “Insects”. It organises on weekends and public holidays.
- (b) “Daily Guided Visit” is 1.5-hr tour in English, Putonghua and Cantonese designed for individual or overseas visitors on topics related to “Aquatic Plants” and “Insects”. It organises on weekdays.
- (c) “Eco-Interpretation Point” is 20-mins short-guided visit for visitors who walk pass the stream, freshwater ponds and mangrove environment. It organises on weekends and public holidays.
- (d) “Enjoy our Wetlands—Guided Tours for the Communities” is 1-hr guided tour for underprivileged groups or people in need to learn about the wetland environment and enjoy the nature.



2.2.2 *Education Workshops*

Regular workshops on themed topics are organised to provide visitor with information of adaptive features of plants and animals in wetlands.

- (a) Workshops at Wet Lab Wetland Discover Centre are organised in form of talks, workshop and experiments, cover topics on life of wetlands, including but not limited to pond life, mangrove ecology, aquatic plants, and aquatic creatures. They are organised everyday.
- (b) Workshops at Life Lab of Wetland Discovery Centre are organised in form of DIY workshops to provide visitors with hands-on experience on making handcrafts of wetland plants and animals. They are organised on weekends and public holidays.



2.2.3 *Public Lectures*

Monthly public lectures on a wide range of topics under the theme of wetland conservation were arranged.



Action: 2.3 To organise themed events or activities for a wide range of audience.

2.3.1 World Wetlands Day

In Hong Kong, the celebration of World Wetland Day has been undertaken by the HKWP in collaboration with various local schools and organisations since 2007. HKWP has developed a series specific programmes with local element (e.g. Wetland Kaleidoscope, Bird Watching Festival, etc) to echo World Wetland Day theme of each year, and to promote the wise use of wetland resources. The programme series include guided tours, snapshot/photo contest, story-telling competitions, performance, inter-school bird race and fun fair are organised.



(b) Special Seasonal Programme

HKWP has also organised short-term and seasonal exhibitions and education activities with specific highlights during festive season each year. Highlights of the festive season include but not limit to Chinese New Year Holidays, Earth Day, World Environmental Day, Labour Day, National Day and Establishment Day of Hong Kong Special Administrative Region.



(3) Building up public support and developing their capacity on wetland conservation

Action: 3.1 To recruit public and develop a volunteer programme with training and capacity building element for conservation.

3.1.1 HKWP Volunteer Scheme

The HKWP has developed the Wetland Park Volunteer Scheme to establish long-term support from the public to conserving wetlands. A series of trainings were provided, and in turn, they provided interpretation tours and outdoor vegetation management workshops for HKWP. Through the scheme, Hong Kong citizens learn about wetlands and help to spread the message of conservation. Since the opening of the HKWP (i.e. from 2006 to 2009), these volunteers have contributed over 18,604 man-days at the HKWP in providing guided tour interpretation and outdoor vegetation management work.



3.1.2 *Partnership Programmes*

The HKWP has also established partnership with local schools and tertiary institutions (School Partnership Programme); non-governmental organisations and government department (Community Service Network); and corporate bodies (Corporate Community Service Programme) to widen the scope of community involvement. The volunteer programme has also extended to tertiary institutes through an internship programme (Summer Internship Programme), which encourage students to acquire working experience in the field of wetland conservation.



(4) Supporting the WLI-Asia network for better implementation of CEPA programmes across Asia

Action: 4.1 To organise jointed activities among wetland centres for sharing of CEPA information and expertise.

4.1.1 *International Linkage*

The HKWP currently serves as a supporting role for the Wetland Link International-Asia (WLI-Asia) network which was established in June 2005 for the better implementation of CEPA programmes across Asia. In September 2007, a multi-lingual WLI-Asia website (www.wli-asia.org) was inaugurated and maintained by HKWP for wetland centres in the region for information exchange and experience sharing. Currently, there are 33 wetland centres which have joined as a part of the WLI-Asia network. The HKWP has also developed “twin centres” relationship with London Wetland Centre in England in 2007, and Sungei Buloh Wetland Reserve in Singapore in 2009



4.1.2 *Project Studies*

Project study competitions are organised to build up cooperation network with secondary schools in Hong Kong, and/or wetland centres in the Asian region



Table 1. Table showing Operation Objectives of HKWP CEPA Programme corresponding to the Goal and Strategies of CEPA Programme of Ramsar Convention

Operation Objectives of HKWP CEPA Programme	Goal and strategies of CEPA Programme of Ramsar Convention (Resolution X.8, 2008) (extracted)
<p>(1) Arranging educational programmes on the wise use of wetlands and understanding of wetland biodiversity in Hong Kong.</p> <p>(2) Arranging education programmes on wetland conservation for schools and general public.</p>	<p>Goal 1: Communication, education, participation and awareness are used effectively at all levels of the Convention to promote the value of wetlands.</p> <p>Strategy 1.1 Foster sustained national and subnational campaigns, programmes and projects to raise community awareness of the important ecosystem services provided by wetlands, including their social, economic, and cultural values.</p> <p>Key result 1.1.1 Campaign, programmes or projects have been undertaken with key partners to raise awareness, build community support, and promote stewardship approaches and attitudes towards wetlands.</p> <p>Key result 1.1.2 World Wetlands Day has been celebrated with appropriate national and local events and promotions and resource materials have been distributed, in order to raise awareness of wetland values and functions.</p> <p>Key result 1.1.3 Collaboration with the media has helped to inform decision-makers, key wetland users, and the broader society about the values and benefits of wetlands.</p> <p>Goal 2: Support and tools have been provided for the effective implementation of national and local wetland-related communication, education, participation and awareness (CEPA) activities.</p> <p>Strategy 2.3 Recognize and support the role of wetland education centres and other environment centres as catalysts and key actors for CEPA activities that promote Ramsar objectives.</p> <p>Key result 2.3.1 Education centres have been established at Ramsar and other wetland sites to provide focal points for local and national CEPA activities.</p> <p>Key result 2.3.2 The capacity of existing centres at wetlands and the development of new centres to deliver high quality CEPA programmes has been supported and enhanced.</p> <p>Key result 2.3.3 Where wetland education centres exist, the information they present has been reviewed to ensure that it is helping to promote the Ramsar Convention and its wise use principle in suitable ways. The centres have helped to foster communication and, where appropriate, participation among local wetland management "actors" and stakeholders.</p>
<p>(3) Building up public support and developing their capacity on wetland conservation.</p>	<p>Goal 3: People are motivated and enabled to act for the wise use of wetlands.</p> <p>Strategy 3.1 Improve the individual and collective capacity and opportunities of people to participate in and contribute to using wetlands wisely.</p> <p>Key result 3.1.3 Resources have been sought through appropriate mechanisms to support the training and capacity building identified as priorities through Key Result Areas 3.1.1 and 3.1.2, ensuring that key groups such as women and indigenous and rural communities have not been overlooked. (Note: in Hong Kong – Tin Shui Wai / Yuen Long communities)</p>
<p>(4) Supporting the WLI-Asia network for better implementation of CEPA programmes across Asia.</p>	<p>Goal 2: Support and tools have been provided for the effective implementation of national and local wetland-related communication, education, participation and awareness (CEPA) activities.</p> <p>Strategy 2.2 Transfer, exchange and share CEPA information and expertise that promotes and results in the wise use of wetlands.</p> <p>Key result 2.2.7 An on-line searchable listing of CEPA expertise & CEPA Focal Points has been established & maintained to assist CEPA at national & international levels, & this service has been promoted to assist CEPA programmes and activities..</p> <p>Strategy 2.3 Recognize and support the role of wetland education centres and other environment centres as catalysts and key actors for CEPA activities that promote Ramsar objectives.</p> <p>Key result 2.3.4 Wetland education centres have been encouraged to participate in the Wetland Link International network of WWT (the Wildfowl & Wetlands Trust, UK) as a mechanism for gaining access to global and national expertise in CEPA and sharing of experience.</p>

Operation Objectives of HKWP CEPA Programme	Goal and strategies of CEPA Programme of Ramsar Convention (Resolution X.8, 2008) (extracted)
	Key result 2.3.5 Efforts have been made to promote and resource the twinning of wetland education centres to encourage the exchange and transfer of information and expertise among centres in developed countries and those in developing countries and countries in transition.

Table 2: Logistical Framework Analysis (LFA) for the HKWP CEPA Programme in 2009/10

Hong Kong Wetland Park CEPA Programme in 2009/10		Period April 2009 – March 2010	
Summary of objectives / activities	Objectively verifiable indicators	Means of verification	Assumptions
<u>Goal:</u> To support the Convention's Communication, Education, Participation and Awareness Programme (Resolution X.8, 2008) for promotion the conservation and wise use of wetlands			
<u>Strategic Objective:</u> To facilitate HKWP as hubs of wetland education in Hong Kong and in Asia.	Implementation of HKWP CEPA Programme and operation objective in 2009/10	-	
<u>Operation objective:</u> (1) Arranging educational programme on the wise use of wetlands and understanding of wetland biodiversity in Hong Kong (2) Arranging education programmes on wetland conservation for schools and general public (3) Building up public support and developing their capacity on wetland conservation (4) Supporting the WLI-Asia network for better implementation of CEPA programme across Asia		Workplan 2009/10 Statistic and result of activities Feedback / written statements from schools, authorities, and target stakeholders	AFCD support HKWP CEPA Programme Funding is secured Activities / events are held on time All events are well publicised and known local and target groups
<u>Summary of action:</u> 1.1 To develop education materials and organize education programmes to provide credible information to the public.	<u>OVI</u> 1.1.1 HKWP Education kit placed on HKWP website for public download 1.1.2 1 set of education resource pack developed and produced 1.1.3 1 book of "A Photography Guide to the Birds of Hong Kong" @1,000 copies designed and printed 1.1.4 1 book of "My Dragonfly Snap Shot Photo Album" @1,000 copies designed and printed. 1.1.5 4 sets of pamphlets @20,000 pcs designed and printed 1.1.6 2 sets @ 3,000 pcs of wildlife origami produced 1.1.7 1 education poster on birds designed and produced 1.1.8 Publication of 2 issues of HKWP newsletter 1.1.9 Publication of 9 issues of CP / HKWP / GP / MP E-newsletter 1.1.10 4 sets of exhibition panels designed and produced. 1.1.11 9 articles for newspaper developed and published. 1.1.12 Interpretative scripts of School programme, Outreach programme and Volunteer programme developed 1.1.13 Operation Manual for CEPA programme developed	<u>MOV</u> Distribution network Documentation and feedback from users / visitors Audience / readers' feedback Hit-rate of websites Loan and return record for the panels	Sufficient resources; Willingness to promote; Improvement in education quality
2.1 To organise regular school activities including guided tours, school lectures, teachers' workshops for schools	2.1.1 736 Park Experience programme 2.1.2 81 Day Camp / Learning at Wetlands 2.1.3 46 Summer Park Adventure tours 2.1.4 61 School Lectures 2.1.5 14 Education Roadshows 2.1.6 2 Teachers' workshops	Monitoring and assessment PE programme No. of students participated in events Review of education	PE programme match with existing education curriculum Collaborators interest in review the curriculum High demand of wetland

		material and training notes Feedback from participants Operation Manual	education among education sectors Sufficient manpower and resource to conduct the activities
2.2 To organise regular public activities including themed guided tours, workshops, public lectures and exhibitions	2.2.1 Thematic guided tours (a) 533 “Know More” guided tour (b) 551 Daily Guided Visit (c) 1627 Eco-Interpretation Point (d) 127 guided tour for underprivileged 2.2.2 Education Workshops (a) 1,998 workshops at Wet Lab (b) 1,690 workshops at Life Lab 2.2.3 Public Lectures – 13 public lectures	No. of tours organised, no. of visitors. Questionnaires survey result Training and teaching material Operation Manual	Sufficient number of weekday and weekend manpower Volunteers willing to offer support Target audience are open to participate in the activities
2.3 To organise themed events or activities for a wide range of audiences	2.3.1 WWD 2010 - 178 activities are organised from October 2009 to February 2010 for 7,393 participants. 2.3.2 Special Seasonal Programme (a) Dragonfly Festival – 217 activities; 11942 participants (b) Cultural Festival – 18 activities, 6526 participants (c) Celebrate X’mas with BFS – 124 activities, 1,053 participants (d) Wetland Cultural Festival – 76 activities, 1,695 participants	No. of application forms received. Feedback from participants No. of meetings, minutes and feedback No. of media report / enquiries	Experienced staff / volunteers willing to take the lead to oversee the management side. High visibility to promotion material Demand from the community Support from partnership organizations
3.1 To recruit public and develop a volunteer programme with training and capacity building element for conservation education activities.	3.1.1 HKWP Volunteer Scheme (a) 1,909 individuals and 116 organisations registered as volunteers. (b) 276 trainings and outdoor workshops organised. (b) 461 qualified volunteers completed full-sets of trainings to provide wetland conservation and interpretation support at the HKWP. (c) Volunteers served 6,513 man-days at HKWP 3.1.2 Partnership Programme (a) School Partnership Programme – 150 students from 6 schools (including 2 primary, 2 secondary and 2 tertiary institutes) (b) Community Service Network – 5 network organizations joined to provide regular service at HKWP (c) Corporate Community Service Programme – 4 corporate joined to provide regular service at HKWP (d) Summer Internship Programme – 30 students from 6 institutes joined the programme	No. of application forms received. No. of schools / participants / community / corporate reached or recruited No. of man-day service per volunteer No. of trainings Feedback from volunteers Attendance record No. of beneficiary	Volunteers remain commit to the HKWP Volunteer Scheme Training cycle could be complete in each 2 months Experienced volunteers willing to take the lead to oversee the management side. Volunteers support the implementation and attend their assigned duties on-time
4.1 To organise jointed activities among wetland centres for sharing of CEPA information and expertise	4.1.1 International linkage (a) HKWP maintained a multi-lingual WLI-Asia website (www.wli-asia.org) for wetland centres in the region for information exchange and experience sharing. (b) Currently 35 wetland centres in the Asian region joined the WLI-Asia network (c) HKWP developed “twin centre” relationship with London Wetland Centre in England in 2007, and Sungei Buloh Wetland Reserve in	No. of schools and student participate in the study. No. of interflow questions on the internet Feedback from teachers / facilitators	Active monitoring management to the web-based project learning platform Support from WLI-Asia members on the website

	<p>2009.</p> <p>4.1.2 Project studies</p> <p>(a) One WLI-Asia Inter-school Education Programme organised in collaboration with 13 wetland centres from 9 countries/regions in academic year 2007/08</p> <p>(b) One Sister Wetland Affiliate Programme organised in collaboration with wetland centre in Singapore in academic year 2008/09</p> <p>(c) One Inter-school News reporting competition organised in 2009/10 to bring students from Hong Kong to visit wetlands in mainland China.</p>		
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Bird surveillance programme in response to H5N1

Basically, the current wild bird surveillance being undertaken in Hong Kong is in line with the international scientific guidances in wild birds as described by the UN Food and Agriculture Organisation (FAO) and Global Avian Influenza Network for Wild Bird Surveillance (GAINS). At present, AFCD monitors the wild birds at MPMNR and HKWP to detect for unusual signs of sick or dead birds daily.

AFCD has been collecting samples of wild bird droppings (swabs) and dead wild birds in MPMNR for H5 tests since December 2002 as part of the government's effort in wild bird surveillance. Since October 2005, AFCD has also provided sick and dead wild bird collection service in response to reports from the public. When any dead, sick or injured bird is found, it would be sent to AFCD's veterinary laboratory for testing immediately and subject to post-mortem examination to establish whether the cause of death was related to avian influenza infection.

In addition, The University of Hong Kong also regularly collects wild bird droppings at the MPMNR and the EEA at Lok Ma Chau (area adjacent to the Ramsar Site) for the above tests.

In December 2006, the guidelines for the closure of the MPMNR, HKWP and other walk-in aviaries to reduce public exposure to wild birds have been established. The guidelines were reviewed and adopted by the Panel on Food Safety and Environmental Hygiene of the Legislative Council in November 2010. If there 3 or more live or dead birds confirmed with HPAI virus infection within the 3km-radius of MPMNR, the outdoor section of the HKWP and other walk-in-aviaries within a period of 10 days in the same area, these sites will be closed for 21 days from the day of collection of the last positive bird sample. If there are less than 3 live or dead birds confirmed with HPAI virus infections, the sites will remain open to the public and the existing precautionary measures will be strengthened to prevent the transmission of the virus from potentially infected wild birds to humans in the area concerned. These include stepping up and increasing the frequency of the cleansing of handrails, boardwalks etc and placing warning signage at prominent locations to warn the public that HPAI virus may be present in the area.

When a sample (either dead bird or dropping) is tested H5 positive by AFCD, the Centre for Health Protection will immediately be informed which will take over all the responsibility, including case investigation, laboratory and diagnostic support, hospital and bed mobilization plan, infection control strategy, stockpiles of protective personal equipment and drugs, staff deployment, and information release to public. Meanwhile, the government will announce to the public as soon as information of the H5 positive case is available.

Communication between Mainland (e.g. Futian and other cities) and Hong Kong on the wild bird surveillance, particularly the positive case identified, is maintained. Moreover, communication among the countries (e.g. China, Australia and Japan)

within the Asian-Australasian Flyway is also being kept and the information of the variation of migratory birds within the flyway would be shared when necessary.

Records of Consultations on the Review and Renewal of the Ramsar Site Management Plan

Date	Party	Comments	AFCD' Response
18 August 2010	Hong Kong Bird Watching Society	<ul style="list-style-type: none"> ➤ The active management strategy undertaken by AFCD has succeeded in raising the ecological values of the Ramsar Site. ➤ The scientific approach in managing the Ramsar Site through ecological monitoring programmes provided a very comprehensive health check on the Site. ➤ Hong Kong Wetland Park has been successful in meeting the public education need but there are rooms for developing more areas in the Inner Deep Bay for such purpose. ➤ Control of illegal fisherman entering the mudflat of the Ramsar Site could be enhanced. ➤ There was concern on the decreasing number of waders roosting in Mai Po fishponds and welcome efforts to reverse such declining trend. ➤ There are concerns on development pressure in the buffer zones of the Ramsar Site. 	<ul style="list-style-type: none"> ➤ The existing conservation measures for managing the Ramsar Site, including habitat management of the Mai Po Marshes Nature Reserve and implementation of conservation plans for important species will continue and be enhanced where appropriate. ➤ Communications with Futian Nature Reserve in Shenzhen, which share the same Inner Deep Bay wetland system, will be enhanced with a view to maintain and improve the ecological values of the area. ➤ Joint operations with Border/Marine Police will be enhanced to curb illegal fishermen's activities in the Inner Deep Bay. ➤ Support on management works on ecologically important wetlands under private ownership and WWFHK's habitat management works inside MPMNR will be continued. ➤ The work to ensure sustainable use of wetlands for protecting and conserving the ecological integrity of the Deep Bay area wetland ecosystem will be continued.
14 September 2010	Green Power	<ul style="list-style-type: none"> ➤ What is the role of WWFHK in managing the Mai Po Marshes Nature Reserve (MPMNR), including its role in conservation education in the Ramsar Site? 	<ul style="list-style-type: none"> ➤ WWFHK manages the MPMNR according to the 5-year Mai Po Management Plan. WWFHK seek endorsement on the work programmes and management proposals from the Mai Po Management Committee quarterly. ➤ The roles of HKWP and MPMNR in conservation

Date	Party	Comments	AFCD' Response
			<p>education are complementary. HKWP provides a wide range of conservation education activities for visitors of all ages. On the other hand, MPMNR is a Restricted Area under the Wild Animals Protection Ordinance. Access to the area is controlled and AFCD issued entry permits to WWFHK for conducting guided visits. WWFHK has to maintain a ceiling of visitors to be allowed inside the Reserve each day.</p>
		<p>➤ Opportunities of improving the habitat conditions in the abandoned pond in the new WUZ1 and the public access to the area via an alternative route through HKWP could be considered.</p>	<p>➤ The ponds in the new WUZ1 are held by aquaculture license. Prior agreement with the licensees is required if habitat improvement work is to be carried out. AFCD will keep in view for any opportunity to carry out conservation management of the subject ponds in the new WUZ1 in the future, Green Power is also welcome to submit such proposals for our reference.</p> <p>➤ The concerned area that connects HKWP and the ponds in the new WUZ1 is reserved for wildlife conservation and would not be opened for public access.</p>
		<p>➤ There are concerns on the sedimentation problem in Inner Deep Bay and the protection of the newly formed land.</p>	<p>➤ Sedimentation is a natural process in the estuary wetlands. Sediment is expected to be deposited on the core mudflat as well as the coastal area of the Ramsar Site. The preliminary results of the Baseline Ecological Monitoring Programme reveal that both sedimentation and erosion take place at different time over the intertidal mudflat, indicating the process does not have a definite trend or pattern. AFCD would continue to monitor the sedimentation in Inner Deep Bay.</p> <p>➤ Given that the Ramsar Site is confined by channels, new mudflat may be formed in the western coastal areas of the</p>

Date	Party	Comments	AFCD' Response
			<p>Ramsar Site. AFCD would study the ecological values of such new mudflat if formed to determine whether it will meet the designation criteria under the Ramsar Convention.</p> <ul style="list-style-type: none"> ➤ Drastic management action including dredging of the mudflat could only be considered if it is supported by strong scientific information.
		<ul style="list-style-type: none"> ➤ Given that water channels in the Inner Deep Bay are also important habitats for waterbirds, it seems more appropriate to incorporate the channels in the Core Zone (CZ). 	<ul style="list-style-type: none"> ➤ CZ is intended to include habitats which are essentially pristine and do not require substantial management inputs, e.g. the mudflat and mangroves. Channels are artificial habitats with certain wetland functions which serve human uses, regular management measures such as maintenance dredging is required. It is considered that water channels fulfill the Wise Use concept of the Ramsar Convention and should be remained in the WUZ.
		<ul style="list-style-type: none"> ➤ To better understand the influences from different water sources feeding into Inner Deep Bay, AFCD could consider conducting a more detailed hydrological modeling of the area. 	<ul style="list-style-type: none"> ➤ These studies are undertaken by the Drainage Services Department and Environmental Protection Department. AFCD would be informed of the results and, if necessary, may consider to conduct a separate study.
27 September 2010	Conservancy Association	<ul style="list-style-type: none"> ➤ Renaming of BMZ1-3 to WUZ1-2 might give a false impression that the area dedicated for active habitat management is reduced in the renewed Plan. 	<ul style="list-style-type: none"> ➤ The management objectives of the original BMZ1-3 for relatively intensive habitat management works of the wetland habitats was not materialized because the licensees' consent could not be sought. ➤ Taking note that the uses and conditions of the concerned <i>gei wai</i> and fishponds have remained unchanged for the last decade, AFCD has taken this opportunity to update the management intentions of these ponds to reflect their present uses. AFCD will also

Date	Party	Comments	AFCD' Response
			<p>keep in view for any opportunity to carry out conservation management works of the subject <i>gei wai</i> in the new WUZ1 in the future.</p>
		<p>➤ AFCD may consider extending the boundaries of the Ramsar Site, including the Lok Ma Chau enhancement area and the wetland restoration areas under development projects in or close to the Ramsar Site which would provide recognition to the success of these wetland mitigation programmes and to safeguard the continual management of these programmes.</p>	<p>➤ Flight-lines studies on egret and cormorant feeding grounds revealed that waterbirds prefer foraging in intertidal mudflat to fishponds. Therefore, mudflat areas in the Inner Deep Bay would have the higher priority for consideration as the candidate sites to be included in the Ramsar Site.</p> <p>➤ AFCD has a plan to study and review the ecological values of the adjacent wetland areas to see if they meet the designation criteria under the Ramsar Convention. In order to record the bird use of these adjacent mudflats, HKBWS has agreed to include the mudflat areas to the west of Tsim Bei Tsui in the new waterbirds monitoring programme.</p> <p>➤ Natural mudflats seem to have higher potential to be included into the Ramsar Site as mitigation wetlands are semi-artificial and management inputs are required to enhance their wetland functions.</p>
		<p>➤ The new management plan shall include contingency or response plans on the potential ecological impacts due to wetland loss caused by the residential developments in or close to the Ramsar Site, e.g. the Fung Lok Wai and Wo Shang Wai development.</p>	<p>➤ There are stringent development controls in the Inner Deep Bay area under the TPB Planning Guidelines 12B and EIAO, in particular the fulfillment of the 'no net loss in wetland' requirement.</p> <p>➤ Reviewing development proposals and land use planning for WBA and WCA which require ecological impact assessment under TPO and EIAO, checking of the wetland management plans of development proposals against the relevant statutory guidelines including the</p>

Date	Party	Comments	AFCD' Response
			<p>Technical Memorandum and Guidance Notes of EIAO, TPB PG 12B had been part of AFCD's routine work to safeguard the ecological values of the Ramsar Site and wise use of wetlands. These works would be continued and have been included in the management plan.</p>
		<ul style="list-style-type: none"> ➤ Consideration may be given to re-create more freshwater wetlands for the agriculture-associated waterbird species which have exhibited declining trends over the past 3 decades. 	<ul style="list-style-type: none"> ➤ A number of <i>gei wais</i> inside the MPMNR have been converted and managed as freshwater habitats according to the Ramsar Site Management Plan and Mai Po Management Plan. ➤ Given the extensive management efforts required for maintaining the ecological characters of artificial habitats, it may impose too much disturbance on the natural habitats if additional areas are to be converted and managed as freshwater habitats in the Ramsar Site.
		<ul style="list-style-type: none"> ➤ AFCD's efforts to deal with the illegal entry of fishermen from Shenzhen are appreciated. Nevertheless, AFCD may consider if there are additional effective measures to be implemented which may help to resolve this problem. 	<ul style="list-style-type: none"> ➤ Considering the site constraints and potential danger associated with the enforcement operation, AFCD is working closely with the Border and Marine Police to deter the illegal fishermen. ➤ A balance between effective enforcement actions to be taken and minimal disturbance to the waterbirds should be maintained. ➤ AFCD keeps close contact with the relevant authority in the mainland China with a view to formulating a solution which could manage the problem.
		<ul style="list-style-type: none"> ➤ There are concerns on whether there is a Contingency plan in place to handle chemical spills in Inner Deep Bay. 	<ul style="list-style-type: none"> ➤ There are existing contingency plans and established communication mechanism between Shenzhen and Hong Kong to deal with chemical spills causing cross-border concerns. ➤ Locally, there is also a contingency plan that listed out

Date	Party	Comments	AFCD' Response
			<p>the responsibilities of different departments in dealing with the spills. In case the spill affects the Ramsar Site, AFCD would be alerted to provide comments and take appropriate actions to clean up the spill.</p>
30 September 2010	Friends of the Earth	AFCD should impose tight control on the development projects in PLZ so that the ecological values of the Ramsar Site would not be undermined.	<ul style="list-style-type: none"> ➤ PLZ is covered by “Other Uses-(Comprehensive Development and Wetland Enhancement Area) Zone” (OUCDWEA) under the respective Outline Zoning Plans prepared by the Planning Department. OUCDWEA has controls on the ways of residential development in the zoning, e.g. the development has to be sited towards the landward side so that the impacts on the Deep Bay wetland are minimal. ➤ Using the Fung Lok Wai project as an example, the actual development portion is located outside the Ramsar Site and falls within the Wetland Buffer Area which is meant to keep development away from the contiguous fish ponds in Deep Bay. ➤ Planning Department will also seek AFCD’s comments on the planning applications in the Deep Bay area.
		Are there any guidelines on the management of <i>gei wais</i> ?	<ul style="list-style-type: none"> ➤ RSMP defines the broad management objectives of the Biodiversity Management Zone for the management of <i>gei wais</i> which are the major habitat type in MPMNR. WWFHK manages the MPMNR according to the 5-year Mai Po Management Plan which provides more specific management targets for the <i>gei wais</i>, e.g. the number of waterbirds to use a <i>gei wai</i>. ➤ For project awarded, AFCD’s subvention and management projects to WWFHK set out objectives for the management of MPMNR. WWFHK also seek

Date	Party	Comments	AFCD' Response
			endorsement on the work programmes and management proposals from the Mai Po Management Committee quarterly. Having said that, WWFHK is given sufficient flexibility to carry out the management projects.
		➤ In addition to WWFHK, could other NGOs carry out conservation projects in the Ramsar Site?	All NGOs are welcome to submit proposals for conservation and education projects in the Ramsar Site.
		➤ How will AFCD handle NGO's comments collected during the consultation?	AFCD will compile NGO's comments and our responses as a chapter in the renewed plan. For relevant comments which have not been addressed in the draft plan, AFCD will add additional paragraphs in response to these comments.
30 September 2010	Tai Po Environmental Association	Increase in development and populations will lead to increase in water pollution.	Deep Bay Water Control Zone adopts a no net increase in water pollutant levels. The increase in development and populations must come with mitigation measures to minimize the net increase in water pollution.
		Fung Yuen is experiencing noise impacts due to the nearby residential development. Is Ramsar Site facing the same problem?	Works are in general not permitted in the Deep Bay area. In the large scale development projects in Deep Bay area, e.g. the Wo Shang Wai project, a reserve which serves as buffer and roosting sites to the waterbirds would normally be constructed before the commencement of actual building works. The arrangement would minimize disturbance to the waterbirds.
14 October 2010	Kadoorie Farm and Botanic Garden	➤ KFBG have no major comment on the reviewing process.	Noted with thanks.
		➤ How would AFCD tackle the issues of concerns?	➤ In RSMP II, there are individual sections to review the issues of concerns in details. Studies are also proposed to address these issues where background information is insufficient. The scopes of each of these new projects are described so as to facilitate the formulation of study

Date	Party	Comments	AFCD' Response
		<ul style="list-style-type: none"> ➤ AFCD should bear in mind in the management of the Ramsar Site that wetland is the climax in ecological succession. 	<p>plans.</p> <ul style="list-style-type: none"> ➤ The long-term and regular monitoring should produce datasets which could tell the trend of the Ramsar Site in the succession process.
		<ul style="list-style-type: none"> ➤ It is good to study the trend and pattern of migratory waterbird but the study may not be able to resolve the problems identified. 	<ul style="list-style-type: none"> ➤ A study is proposed to look at the carrying capacity of the Ramsar Site as a foraging ground for the waterbirds. The finding of the study may tell whether the change in waterbird number is related to the conditions of the Ramsar Site.
		<ul style="list-style-type: none"> ➤ It seems that some of the fish ponds in Deep Bay are so intensively farmed that it is not wise-use of wetlands. 	<ul style="list-style-type: none"> ➤ Intensive fish farming is very limited in Deep Bay. AFCD is exploring the feasibility to work with NGOs to reach management agreement with fish pond operators to allow waterbird to forage in fish ponds drained for harvesting and maintenance. It is hoped that such management agreement could improve the ecological and wise-use values of the fish ponds.
		<ul style="list-style-type: none"> ➤ AFCD may wish to carry out a study on the ecological values of abandoned fish ponds. The study could just cover representative ponds if funds are limited. 	<ul style="list-style-type: none"> ➤ AFCD will look into the feasibility of the study.
		<ul style="list-style-type: none"> ➤ AFCD should provide the finalized RSMP II for public access. 	<ul style="list-style-type: none"> ➤ AFCD is planning to upload the softcopy of the finalized report to our website for public access.
26 October 2010	Mai Po Management Committee	<ul style="list-style-type: none"> ➤ AFCD should take this opportunity to review the boundary of the Ramsar Site, for example, to exclude the Mai Po Village egretty in view that it had been abandoned for years. 	<ul style="list-style-type: none"> ➤ AFCD has a plan to study and review the ecological values of the adjacent wetland areas of the Ramsar Site to determine whether they meet the designation criteria under the Ramsar Convention. The information obtained would be used for consideration of whether the boundary of the Ramsar Site would be revised, including addition or deletion of areas.

Date	Party	Comments	AFCD' Response
		<ul style="list-style-type: none"> ➤ Is there a special reason to review the RSMP every 8-10 years? 	<ul style="list-style-type: none"> ➤ The implementation of the RSMP is a continuous process and it is subjected to regular reviews through different ecological monitoring programmes. The renewed plan adopted the Goals and Strategies identified in the Ramsar Strategic Plan 2009-2015 and if there is no detection of drastic changes, overall review of this strategic plan in about 10 years' time is considered as appropriate.
		<ul style="list-style-type: none"> ➤ AFCD could conduct some in-house review on the wintering waterbirds trend by looking at globally threatened species as a start. 	<ul style="list-style-type: none"> ➤ AFCD will follow up in this regard.
		<ul style="list-style-type: none"> ➤ Renaming of BMZ1-3 to WUZ may give an impression that the areas dedicated for protection and active habitat management is reduced in the renewed Plan. 	<ul style="list-style-type: none"> ➤ Renaming the ponds is to reflect their current uses but it would not affect the land use/development control mechanisms. ➤ Given that the ponds are within the Priority Sites under the New Nature Conservation Policy, AFCD will keep in view for any opportunity to carry out conservation management works of the subject ponds under the Management Agreement scheme.
		<ul style="list-style-type: none"> ➤ Would the renaming of BMZ1-3 facilitate development applications during the town planning procedure? 	<ul style="list-style-type: none"> ➤ Renaming the ponds is to reflect their current uses and it would not affect the land use/development control mechanisms.
		<ul style="list-style-type: none"> ➤ MPMC supported AFCD's review and renewal exercise of the RSMP. 	<ul style="list-style-type: none"> ➤ Noted with Thanks.
1 November 2010	Worldwide Fund for Nature Hong Kong	<ul style="list-style-type: none"> ➤ The rationale of renaming the Wise Use zones needs clarification. 	<ul style="list-style-type: none"> ➤ The management intentions of the existing WUZs are updated, for those zones that have the same intention would be grouped together for the ease of identification.

Date	Party	Comments	AFCD' Response
			<ul style="list-style-type: none"> ➤ As a result of the renaming of BMZ1-3 and PAZ1-2 to WUZ, the percentage increase of WUZ when compared with the existing plan is about 25%, however, the renaming would not affect the land use/development control mechanisms and these ponds/<i>gei wais</i> are zoned either as SSSI zone or CA zone. As for the rest of the WUZs, they are within CA zones which are subjected to very stringent control for developments.
		<ul style="list-style-type: none"> ➤ AFCD should consider regular reviews (at least annual), not just reporting, on the Plan's objectives and activities. Such reviews are necessary not only to ensure the Plan delivers on its objectives, but is in keeping with the Plan's proposed adaptive approach to managing the Ramsar site. 	<ul style="list-style-type: none"> ➤ The implementation of the RSMP is a continuous process and it is subjected to regular reviews through different ecological monitoring programmes. The management programmes are also updated regularly through an adaptive management regime.
		<ul style="list-style-type: none"> ➤ There is concern about the continued loss of inter-tidal mudflat within the Ramsar site boundary. Although new mudflat may indeed be forming in Deep Bay, those areas are not under conservation protection. 	<ul style="list-style-type: none"> ➤ AFCD has a plan to conduct study on the ecological values of the adjacent wetland areas, in particular the mudflat. It is hoped that the results would provide scientific basis for the reviews of the carrying capacity and the boundary of the Ramsar Site.
		<ul style="list-style-type: none"> ➤ It is considered that illegal fishing activities on the inter-tidal mudflat (Core Zone), and the trend of intensification of aquaculture practices within the Wise Use Zone are 'issues of concern' affecting the Ramsar site's biodiversity. As such, these should be addressed in the new Plan. 	<ul style="list-style-type: none"> ➤ AFCD wardens regularly patrol the Ramsar Site and take enforcement actions against illegal activities. Considering the site constraints on the mudflat and potential danger associated with the enforcement operation, AFCD is working closely with the Border and Marine Police to deter the illegal fishermen. ➤ AFCD keeps close contact with the relevant authority in the mainland China with a view to formulating a

Date	Party	Comments	AFCD' Response
			<p>solution which could manage the problem.</p> <ul style="list-style-type: none"> ➤ Intensive fish farming is only conducted in a limited number of fish ponds in the Inner Deep Bay. AFCD is exploring the opportunity of reaching management agreement (MA) under the New Nature Conservation Policy with NGOs and fish pond operators for conservation management of fish ponds. It is hoped that the MA could improve the ecological values and wise-use of the fish ponds. ➤ AFCD is also studying the feasibility of organic pond fish farming practices, fish farmers would be encouraged to carry out environmentally-friendly practices under such scheme.
		<ul style="list-style-type: none"> ➤ Systematic population/distribution monitoring and focal studies on important wildlife, such as Eurasian Otter, Saunders's Gull and <i>Parasesarma maipoensis</i> should be considered. 	<ul style="list-style-type: none"> ➤ The territory-wide biodiversity surveys of all important and rare species have been completed and that survey included the Ramsar Site.
		<ul style="list-style-type: none"> ➤ AFCD should consider establishing regular events to facilitate communication between stakeholders in and around the Ramsar site such as stakeholder workshops. 	<ul style="list-style-type: none"> ➤ AFCD has frequent and regular communications/meetings with fish pond operators and also NGOs on matters related to conservation of the Ramsar Site.
		<ul style="list-style-type: none"> ➤ What are the actions by AFCD to address various threats, such as development, invasive species, habitat degradation and disturbance to wildlife, surrounding the Ramsar site in Deep Bay? ➤ How does the Government prevent the Ramsar site from 	<ul style="list-style-type: none"> ➤ The Baseline Ecological Monitoring Programme and Waterbird Monitoring programme serve as very important long-term monitoring tools to monitor the changes in the ecological values of the Ramsar Site. ➤ The work to ensure sustainable use of wetlands for

Date	Party	Comments	AFCD' Response
		<p>being affected by the developments, such as reclamation, dredging and building constructions, in the Shenzhen side?</p>	<p>protecting and conserving the ecological integrity of the Deep Bay area wetland ecosystem will be continued. Reviewing development proposals and land use planning for WBA and WCA which require ecological impact assessment under TPO and EIAO, checking of the wetland management plans of development proposals against the relevant statutory guidelines including the Technical Memorandum and Guidance Notes of EIAO, TPB PG 12B had been part of AFCD's routine work to safeguard the ecological values of the Ramsar Site and wise use of wetlands. These works would be continued and have been included in the management plan.</p> <ul style="list-style-type: none"> ➤ Communications with Futian Nature Reserve in Shenzhen, which share the same Inner Deep Bay wetland system, will be enhanced with a view to maintaining and improving the ecological values of the area.
		<ul style="list-style-type: none"> ➤ It is considered that a more proactive advisory board or committee is needed to oversee the implementation of the Ramsar Site Management Plan. Reference can be made to the Mai Po Management Committee or the Environmental Committee of the Lok Ma Chau Spur Line. 	<ul style="list-style-type: none"> ➤ The Nature Conservation Sub-Committee of the Advisory Council on the Environment is a statutory body with a formal framework that monitors the management works of the Ramsar Site. AFCD would report issues of concern related to the Ramsar Site regularly to this Committee for advice.
		<ul style="list-style-type: none"> ➤ WWF welcome more collaboration with the HK Wetland Park on wetland education activities. ➤ Using Mai Po and Inner Deep Bay Ramsar site as one of the case studies, WWF Hong Kong and AFCD 	<ul style="list-style-type: none"> ➤ The roles of HKWP and MPMNR in conservation education are complementary. ➤ CEPA programmes organized by the Hong Kong Wetland Park and the education and training

Date	Party	Comments	AFCD' Response
		(including Wetland Park) have cooperated for many years to provide wetland management training to other wetland site managers in Mainland China and other countries/region in Asia. The training is well-recognized by China's National Ramsar Implementation Office (SFA), other organizations and wetland sites, and may need to be mentioned in the new plan	programmes organized by WWFHK have been included in the RSMPII.
		➤ The current government subsidy provided to WWF to manage the Mai Po Nature Reserve should be increased to help WWF meet rising management costs.	➤ The Government has been providing funding support to WWFHK in meeting part of the operation costs for management of the MPNR. Over the past few years, the funding support from AFCD to WWFHK for the MPNR management works has been maintained at around 1.4 to 1.7 million per year. In addition, Education Bureau also provides steady funding support to meet partially the operation costs of the MPNR. ➤ AFCD reviews the funding provided to WWFHK for supporting habitat management works inside the MPMNR annually.
17 November 2010	Advisory Council on the Environment-Nature Conservation Subcommittee	➤ The definition of 'Wise Use' under the Ramsar Convention is rather vague, would AFCD adopt a more stringent definition of Wise use for better conservation of wetlands in Hong Kong? ➤ Would the renaming of two existing BMZ and PAZs to WUZ facilitate development of these areas? ➤ Would development be allowed within the PL?	➤ According to the Ramsar definition, livelihood of local indigenous people should be maintained but at the same time the ecological values of the Ramsar Site should be protected. AFCD adopts a 'balanced' approach in considering/commenting proposals for sustainable use of wetlands so that ecological values of the Ramsar Site would be maintained and conserved. ➤ AFCD is studying the feasibility of carrying out MA scheme under the New Nature Conservation Policy for

Date	Party	Comments	AFCD' Response
			<p>more conservation-oriented management of fish ponds in the Inner Deep Bay.</p> <ul style="list-style-type: none"> ➤ Development and land use controls of different management compartments within the Ramsar Site rested on the statutory outline zoning plans and Town Planning Ordinance. The existing BMZ, PAZ and PL are zoned either SSSI and CA zones and therefore they are protected by very stringent development zones. ➤ As for the PL in Fung Lok Wai, it is zoned OU(CDWEA) which is for comprehensive development but with a conservation objectives.
		<ul style="list-style-type: none"> ➤ It is noted that there are some dumping activities occurring inside the Ramsar Site, how would that affect the ecological character of the Ramsar Site? ➤ How would AFCD monitor such activities in the Ramsar Site? 	<ul style="list-style-type: none"> ➤ The fish ponds in Ramsar Site are mainly used for aquacultural uses and most of the dumping cases are found within the WBA but not inside Ramsar Site. ➤ AFCD wardens patrol regularly in the Ramsar Site to check out for illegal activities and take enforcement actions as appropriate. E.g. enforcement actions are taken to remove any bird trapping nets that are found in the fish pond areas.
		<ul style="list-style-type: none"> ➤ What is AFCD's view on mangrove colonization in the Inner Deep Bay. 	<ul style="list-style-type: none"> ➤ There are different views regarding the mangrove colonization in the mudflat. AFCD is planning to conduct a study on the estimated area of mudflat required for supporting the waterbirds. ➤ Management of mangrove, if required, should only be conducted if it is supported by scientific information. Nevertheless, AFCD carry out removal of exotic mangrove in the Inner Deep Bay regularly.
		<ul style="list-style-type: none"> ➤ What is the impact of climate change on the growth of mangrove in the Inner Deep Bay. 	<ul style="list-style-type: none"> ➤ AFCD did not study the impact on climate change on the growth of mangrove in the Inner Deep Bay but based on

Date	Party	Comments	AFCD' Response
			<p>information gathered from the Baseline ecological monitoring programme, the effect of climate change is not obvious as the ecological characters have been remained stable over the years.</p>
		<p>➤ What is the impact of opening up of FCA on the Ramsar Site.</p>	<p>➤ The impact of the opening up of FCA on the Ramsar Site would depend on the land use zoning of the areas to be opened. It is noted that the Planning Department is currently conducting a land use study on these areas. AFCD would support conservation-oriented zonings for areas that are close to the Ramsar Site.</p>
		<p>➤ AFCD has any idea on the carrying capacity of the mudflat in supporting waterbirds? What is the upper capacity on number of waterbirds to be supported by the mudflat?</p>	<p>➤ As noted from the wintering bird monitoring programme, the number of waterbirds that winter in Hong Kong is increased from some 40,000 to 80,000 which shows that the mudflat has not reached its maximum capacity.</p> <p>➤ AFCD is planning to conduct a study with a view to find out the carrying capacity of the mudflat.</p>

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