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ACE Paper 4/2024

For information on 5 February 2024

Report on the 38th Nature Conservation Subcommittee Meeting

INTRODUCTION

At the meeting on 4 December 2023, the Nature Conservation Subcommittee (NCSC) discussed two agenda items on “Strategic Feasibility Study on the Development of Wetland Conservation Parks (WCPs) System” and “Updates on the Monkey Contraceptive/Sterilisation Programme: Findings from the Population Viability Analysis”. For details of the subject, please refer to ACE-NC Papers 2/2023 and 3/2023 at *Annex 1* and *Annex 2* respectively.

KEY DISCUSSIONS

Strategic Feasibility Study on the Development of WCPs System

2. While Members generally welcomed the proposal to establish the WCPs System, questions were raised about the engagement with and potential impacts on the relevant stakeholders, implementation details of the proposal such as the potential management options to be adopted, in particular regarding the public-private partnership (PPP) option, and the zoning plans to serve the various functions of the WCPs. Members suggested that the Government should explore incentives to attract private landowners’ participations for the PPP option. AFCD was suggested to create diverse mosaic of habitats in the WCPs, including planting mangroves in suitable locations in view of their additional carbon sequestration function, and quantify the expected benefits such as enhancement of ecological value and biodiversity for public information.

3. Members also held the view that the overall development timeframe for the WCPs System should be expedited and promulgated for public information in one-go. It would be desirable to advance the construction works on the Government land in Sam Po Shue WCP as far as possible, and commence the preparation work for the remaining WCPs as early as possible.

Updates on the Monkey Contraceptive/Sterilisation Programme: Findings from the Population Viability Analysis

4. Members were supportive of AFCD's work on the management of wild monkeys. AFCD was suggested to devise and promulgate clear guidelines regarding the enforcement criteria or threshold for issuing summons in relation to feeding ban under the Wild Animals Protection Ordinance (Cap. 170) ("Ordinance"), with a view to avoiding conflicts between the front-line staff and members of the public. As feeding domestic animals such as stray cats and dogs is not an offence under the Ordinance, Members worried that some people may use this as a pretext to defend their behavior of feeding wild animals. In conclusion, Members appreciated that the key was to educate the public of the habits of the wild animals and the right way to co-exist with the wild animals.

5. The above key discussions are reported to the ACE for information.

NCSC Secretariat
January 2024



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ACE-NC Paper 2/2023
For discussion on 4 December 2023

**Strategic Feasibility Study on the Development of
Wetland Conservation Parks System**

BACKGROUND

The Northern Metropolis Development Strategy (NMDS) released in 2021 proposed to establish a multi-functional Wetland Conservation Parks (WCPs) System covering wetlands and fishponds with conservation value in areas around Tsim Bei Tsui, Nam Sang Wai, Fung Lok Wai, Tai Sang Wai, Sam Po Shue, Hoo Hok Wai and Sha Ling/Nam Hang, with a view to enhancing wetland conservation as well as increasing the environmental capacity for the development of the Northern Metropolis to achieve “Co-existence of Development and Conservation”. Five Parks are proposed to be established under the WCPs System to serve four major functions:

- (i) conserving the ecological value of the wetlands and safeguarding the integrity of the wetlands system;
- (ii) developing modernised aquaculture industry;
- (iii) promoting scientific research on aquaculture to facilitate the upgrading and transformation of the agriculture and fisheries industries; and
- (iv) providing ecological education and recreational facilities for the public.

2. The Chief Executive’s 2022 Policy Address proposed to implement a New Proactive Conservation Policy to establish a WCPs System, with a view to increasing the environmental capacity for the development of the Northern Metropolis. The 2023 Policy Address further recommended to first establish the Sam Po Shue Wetland Conservation Park (SPS WCP) to enhance the ecological quality and biodiversity of the Northern Metropolis, provide quality outdoor eco-education and recreation facilities for public enjoyment, as well as introduce modernised aquaculture in the park.

THE STUDY

3. Given that the NMDS is a strategic report outlining general directions for the establishment of the WCPs System, the Government needs to carry out further studies to confirm feasibility of and formulate detailed implementation plans for this initiative. In this light, the Agriculture, Fisheries and Conservation Department (AFCD) commenced the Strategic Feasibility Study on the Development of Wetland Conservation Parks System under the Northern Metropolis Development Strategy (the Study) in August 2022, with a view to establishing a comprehensive profile of the existing conditions at the fishponds and wetlands in the potential areas that may be included in the proposed Parks; determining the locations/areas and management model etc. of the proposed Parks; formulating positioning and functions of the proposed Parks; and evaluating the environmental capacity achieved through the WCPs System, etc.

PUBLIC ENGAGEMENT

4. As part of the Study, Part 1 of the Public Engagement (PE) exercise was conducted from January to February 2023, under which key stakeholders including green groups, eco-tourism sector, local associations on agriculture and fisheries, local communities and private developers, etc., were engaged. Part 1 PE aimed to solicit key stakeholders' initial general views and suggestions on the development of the WCPs System, which would be taken into consideration in the formulation of the preliminary recommendations.

5. Part 2 of the PE exercise will be conducted from November 2023 to January 2024 to seek views and suggestions on the preliminary recommendations from the aforementioned stakeholders, advisory and statutory bodies as well as the general public. Feedbacks collected during Part 2 PE will be considered and incorporated in the Study's final recommendations to the Government, which will serve as the basis for the subsequent further detailed studies. The preliminary recommendations under the Study are set out at the enclosed powerpoint slides at **Annex**.

ADVICE SOUGHT

6. Members are invited to note and comment on the preliminary recommendations of the Study.

Environment and Ecology Bureau
Agriculture, Fisheries and Conservation Department
November 2023



Strategic Feasibility Study on the Development of Wetland Conservation Parks System under the Northern Metropolis Development Strategy

AFCD/CON/01/22

Part 2 Public Engagement Meeting with ACE-NCSC

4 December 2023

Agenda

- 1 Introduction
- 2 Baseline Review of the Study Area & Major Views under Part 1 Public Engagement Exercise
- 3 Proposed Positioning and Functions
- 4 Potential Management Options to be Considered
- 5 Factors for Consideration in the Development of the Wetland Conservation Parks System
- 6 Proposed Development Plan of Sam Po Shue WCP
- 7 Discussion
- 8 Way Forward



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Introduction

Background

Wetlands and Fishponds in Deep Bay Area

- There are large areas of diverse wetland habitats in the northern and northwestern New Territories of Hong Kong, comprising **freshwater/brackish wetlands** such as **fishponds, marshes, reedbeds** and **mangroves**.
- The wetlands in Mai Po and Inner Deep Bay area, in particular, are **designated as a Wetland of International Importance under the Ramsar Convention**.



Background

Wetlands and Fishponds in Deep Bay Area

- These wetlands are recognised for their **high ecological value**, since they serve as an important over-wintering site for migratory waterbirds along the East Asian-Australasian Flyway, with **over 100,000 birds** using the area each year, of which some are globally threatened species.
- The wetlands also have **recreational and amenity values, as well as other important functions**, such as water storage and flood control, supporting aquaculture activities and providing recreation opportunities.



Proposal under the Northern Metropolis Development Strategy Published in 2021

Establishment of a Wetland Conservation Parks (WCPs) System in the Northern Metropolis

- The Northern Metropolis Development Strategy published in 2021 proposed to establish a multi-functional **WCPs System** covering wetlands and fishponds with conservation value in areas around **Tsim Bei Tsui, Nam Sang Wai, Fung Lok Wai, Tai Sang Wai, Sam Po Shue, Hoo Hok Wai** and **Sha Ling/Nam Hang**.

The proposed WCPs System aims to:

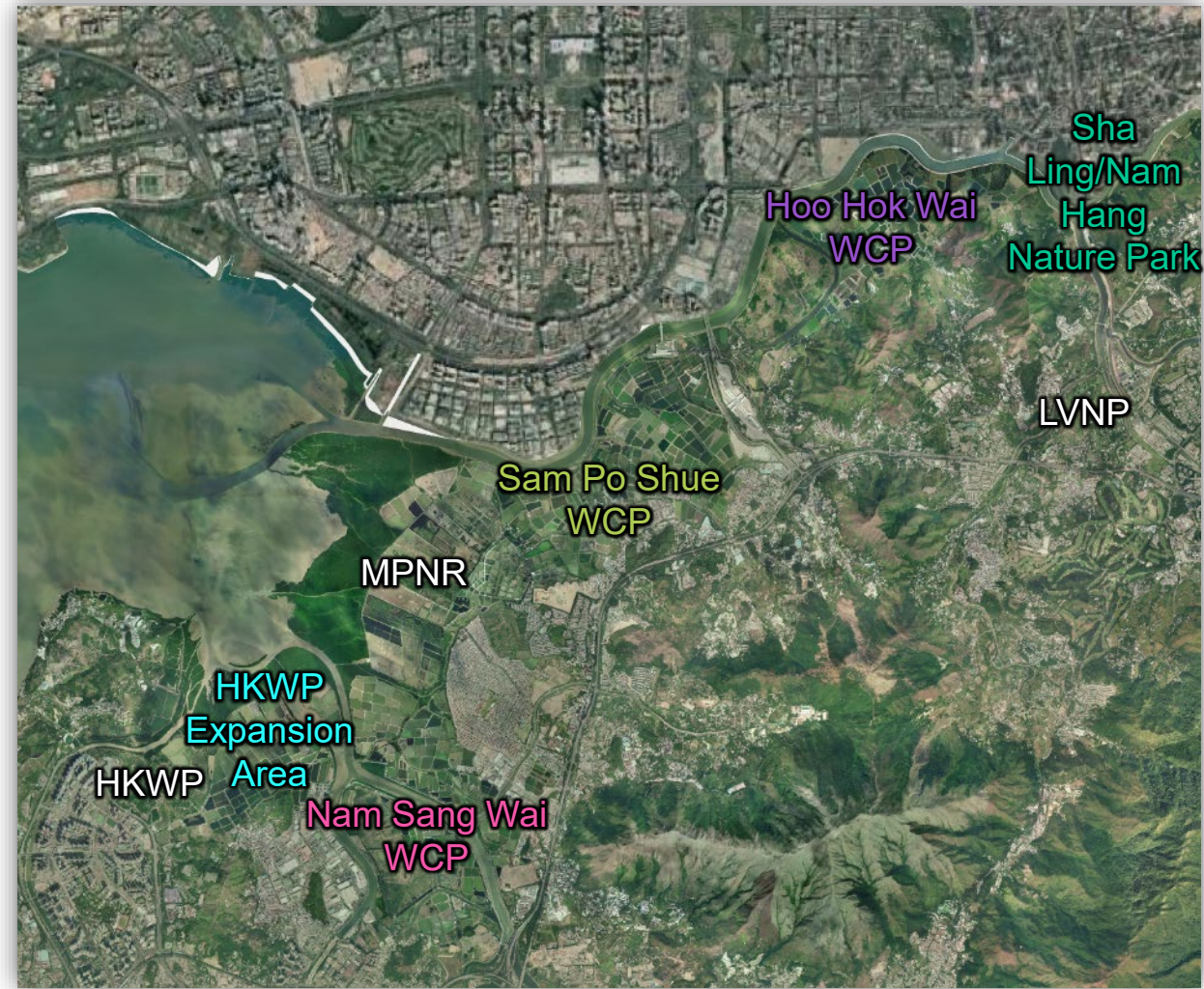
1. Create environmental capacity
2. Achieve “Co-existence of Development and Conservation”

Proposal under the Northern Metropolis Development Strategy Published in 2021

Five Parks Proposed to be Established under the multi-functional WCPs System:

1. Nam Sang Wai Wetland Conservation Park
2. Sam Po Shue Wetland Conservation Park
3. Hoo Hok Wai Wetland Conservation Park
4. Hong Kong Wetland Park Expansion Area
5. Sha Ling/Nam Hang Nature Park

These five Parks, together with **Hong Kong Wetland Park (HKWP)**, **Mai Po Nature Reserve (MPNR)** and **Long Valley Nature Park (LVNP)** to be established, shall form the proposed multi-functional **WCPs System**.



Proposal under the Northern Metropolis Development Strategy Published in 2021

The WCPs System shall serve four major functions

1. Conserving the ecological value of the wetlands and safeguarding the integrity of the wetlands system
2. Developing modernised aquaculture industry
3. Promoting scientific research on aquaculture to facilitate the upgrading and transformation of the agriculture and fisheries industries
4. Providing ecological education and recreational facilities for the public





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Baseline Review of the Study Area & Major Views under Part 1 Public Engagement Exercise

Baseline Review on Current Uses, Planning and Land Administration Matters

- The Study Area mainly falls within conservation-related zones on statutory town plans.
- Major land uses in the Study Area of the five proposed Parks are as follows:

Land Use	Proportion (Approximate)
Mangroves, ponds and waterbodies	74%
Others (including roads, drainage channels, etc.)	13%
Terrestrial habitats (including woodland, shrubland and grassland)	9%
Brownfield and industrial land	2%
Villages/rural settlement and residential development	1%

- Under the land use of mangroves, ponds and waterbodies, around 57% are fishponds.



Baseline Review on Ecological Conditions

- Habitats across the Study Area are dominated by actively managed, commercial fishponds. Other common habitats include seasonally wet grasslands, marshes/reedbeds and mangroves, etc.
- Several sites of conservation importance interface with the Study Area, including Mai Po Inner Deep Bay Ramsar Site, Priority Sites for Enhanced Conservation, SSSIs, “CA” zones, etc.
- The wetlands and fishponds in the Study Area are interconnected as a huge wetlands system with very high connectivity.
- Ecological value of the Study Area of the five proposed Parks are detailed as follows:

Study Area	Ecological Value
Proposed Sam Po Shue WCP	High – Physically linked to Mai Po Nature Reserve, fall partially within the Ramsar Site, with egrettries and cormorant roosts recorded
Proposed Nam Sang Wai WCP	High – Sizable reedbeds, partially within the Ramsar Site, adjacent to the Mai Po Nature Reserve, with egrettries and cormorant roosts recorded
Proposed HKWP Expansion Area	High – Within Ramsar Site and adjacent to HKWP
Proposed Hoo Hok Wai WCP	High – Eurasian Otters, ardeid and cormorant night roosts recorded
Proposed Sha Ling/Nam Hang Nature Park	Moderate – Existing compensatory wetland



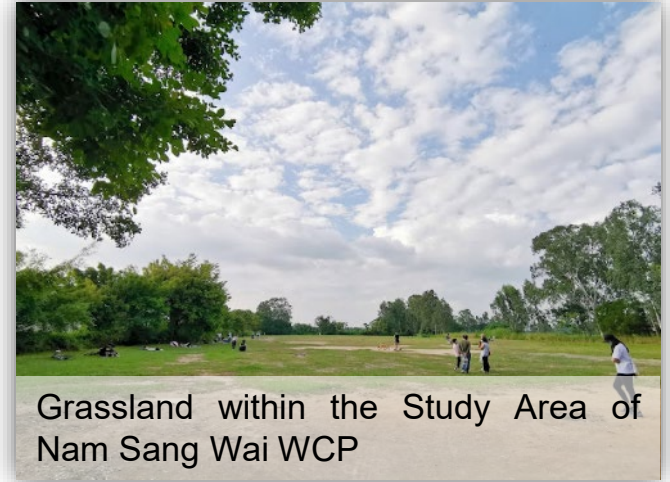
Baseline Review on Aquaculture Activities

- Hong Kong's inland fishponds are mainly located within the WCPs System and various degrees of aquaculture activities are recorded in the Study Area of the five proposed parks.
- Overall, around 80% of fishponds are active.
- Polyculture is a common practice. Commonly cultivated aquaculture species include bighead carp, tilapia and grass carp, etc.
- Some pond fish farmers also cultivate other aquaculture species such as shrimp, crayfish and giant grouper, etc.



Baseline Review on Eco-Education and Recreation Facilities

- Various eco-education and recreation facilities, as well as cultural heritage resources are identified within the Study Area and its vicinity
- Eco-education facilities include Mai Po Nature Reserve, Hong Kong Wetland Park and the Nam Sang Wai River Education Trail, etc.
- Recreation facilities include lookouts, cycling and hiking routes, and public spaces, etc.
- Cultural heritage resources include MacIntosh Forts, temples and ancestral halls, etc.



Grassland within the Study Area of Nam Sang Wai WCP



MacIntosh Fort at Pak Hok Chau (AMO, 2020) within the Study Area of Sam Po Shue WCP



Hong Kong Wetland Park



Nam Sang Wai River Education Trail within the Study Area of Nam Sang Wai WCP



Lookout Pavilion in the vicinity of the Study Area of Hong Kong Wetland Park Expansion Area

Major Views under Part 1 Public Engagement Exercise

- Overall positive comments have been collected from stakeholders under Part 1 Public Engagement Exercise. Stakeholders supported the development of the WCPs system, to achieve “Co-existence of Development and Conservation”. Some stakeholders also pointed out the necessity to balance the needs of different stakeholders such as aquaculture operators and villagers, as well as to develop outdoor eco-education and recreation facilities for public under the WCPs System. There were also queries over the implementation details of the WCPs System, such as future management arrangements.



Conclusion of the Baseline Review and Part 1 Public Engagement Exercise

- The Study Area is of high ecological value and connectivity, and it also has important aquaculture resources.
- The Study established that the development of the WCPs System could achieve ecological conservation, sustainable development of aquaculture, eco-education and recreation objectives.





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Proposed Positioning and Functions

Boundary Delineation Criteria

- A set of boundary delineation criteria has been formulated under the Strategic Feasibility Study.
- This set of criteria balances the considerations under different categories, which include:
 - Area of wetland habitat
 - Ecological value
 - Level of aquaculture activities
 - Existing, committed and planned developments
 - Current land use
 - Land status and lot boundaries



Proposed Positioning and Functions of the Parks

- Each park shall achieve dual functions of ecological conservation and sustainable development of aquaculture at various degrees.
- Based on their respective conditions, specific positioning and functions are also recommended for each park, so that the parks could complement each other to form a comprehensive WCPs System.

Sam Po Shue WCP

Biodiversity and Aquaculture in Harmony

- Enhancement of biodiversity and introduction of modernised aquaculture



Black-faced Spoonbill

HKWP Expansion Area

Wetlands For Learning

- Synergy with adjacent existing ecological education facilities in HKWP to provide eco-education experience



Eurasian Otter

Nam Sang Wai WCP

An Eco-tourism Paradise

- Capitalise on existing popular local leisure facilities / activities to further promote eco-tourism resources



Pied Avocet

Hoo Hok Wai WCP (including Sha Ling/Nam Hang area)

A Rural Retreat

- Utilise the habitat resources to provide rural experiences/ activities



Crimson Darter



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Potential Management Options to be Considered

Potential Management Options to be Considered under the WCPs System



Direct Management by Government Department(s)

- Government Department(s) could manage the parks directly.
- Employ contractor(s) to carry out management and/or maintenance works.
- Existing management practices adopted in the HKWP.



Collaboration with NGOs, Local Communities, and Agriculture and Fisheries Associations

- The Government could formulate relevant park regulatory framework and collaborate with NGOs, local communities, and agriculture and fisheries associations under the framework for the management of the parks.
- Existing management practices adopted in the Mai Po Nature Reserve.



Public-Private Partnership

- The Government could explore the public-private partnership option for collaboration with land owners in managing the parks.
- Private landowners can propose land use recommendations to the Government, on conditions that the land use recommendations must support the functions of the WCPs System and can bring positive impacts to the long-term operation and management of the parks.
- Wetland conservation easement adopted overseas (such as the USA and Canada).



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Factors for Consideration in the Development of the Wetland Conservation Parks System

Factors for Consideration in the Development of the WCPs System

- The scale of the WCPs System is unprecedented, the associated implications and necessary requirements must be assessed in detail and considered thoroughly.
- As such, it is recommended to develop the WCPs System in phases.
- **Sam Po Shue WCP** is recommended to be the first park to be developed. On top of enhancing ecological conservation, the park also compensates for ecological and fisheries impacts arising from development of San Tin Technopole.
- Experiences drawn from the development of Sam Po Shue WCP can be used as reference for the planning of the other parks.





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Proposed Development Plan of Sam Po Shue WCP

Proposed Development Plan of Sam Po Shue WCP

- **2023 Policy Address:** Establish the Sam Po Shue Wetland Conservation Park – enhance the ecological quality and biodiversity of the Northern Metropolis; provide quality outdoor eco-education and recreation facilities for public enjoyment; as well as introduce modernised aquaculture in the park.



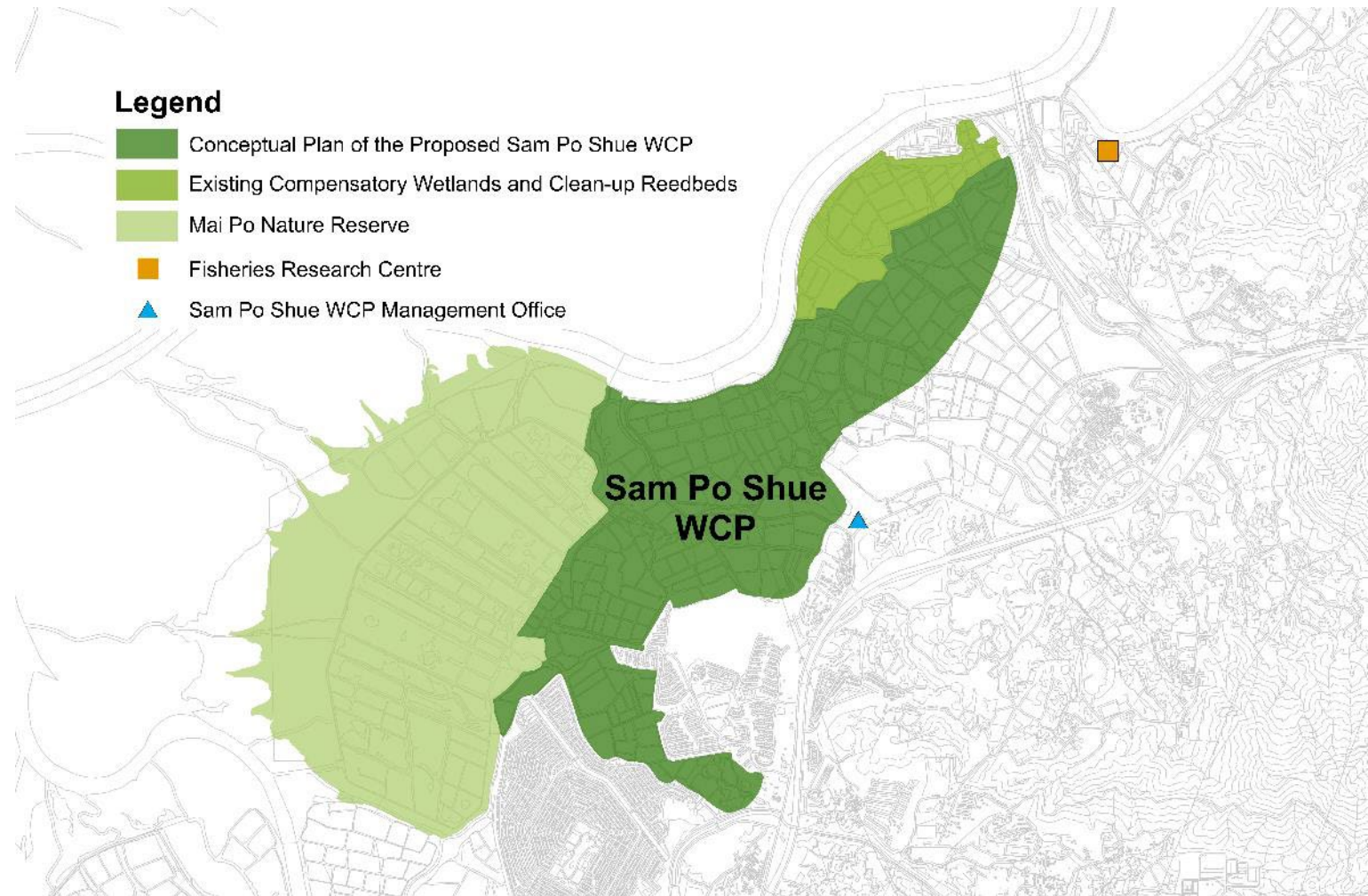
Sam Po Shue WCP

Proposed Area

- Approximately 338 ha

Functions

- Enhance the ecological quality and biodiversity of the Northern Metropolis
- Compensate for ecological and fisheries impacts arising from development of San Tin Technopole, to achieve no-net-loss in ecological function
- Provide quality outdoor eco-education and recreation facilities for public enjoyment
- Introduce ecologically friendly and modernised aquaculture in the park



Sam Po Shue WCP

Ecological Enhancement Measures to be Implemented

- Promote the establishment of ecologically friendly fishponds that serve dual ecological conservation and pond fish culture functions
- Increase the number and diversity of wildlife fishponds are able to support by incorporating various ecological features
- Establish enhanced freshwater wetland habitats to provide a mosaic of microhabitats for wildlife



Fisheries Enhancement Measures to be Implemented

- Promote the establishment of ecologically friendly fishponds that serve dual ecological conservation and pond fish culture functions
- Develop modernised and high production aquaculture techniques
- Other supporting measures:
 - Establish a fisheries research centre in San Tin Technopole to promote aquaculture research
 - Brand-building for aquaculture products



Proposed Ecological Enhancement Measures



Increase in pond area



Modification of pond habitats
to increase environmental
carrying capacity



Managing and
sequencing pond drain
down in the dry season



Enhance habitat
connectivity

Proposed Modernised and High Production Aquaculture Techniques



In-pond raceway system



Use of renewable energy



Remote farming monitoring system



Real-time water monitoring system

Proposed Outdoor Eco-education and Recreation Facilities

- **Visitor/Recreation Facilities**

- Visitor Centre
- Footpaths and bird hides
- Outdoor classrooms
- Open space with grasslands, pavilions, picnic tables, benches, etc. for public use
- Parking facilities, public toilets, etc.



Implementation Timeline and Strategy of Sam Po Shue WCP

- After the completion of the Strategic Feasibility Study, the Government shall use the findings of the Study as the basis to commence the next phase of detailed study of Sam Po Shue WCP in 2024.
- It is preliminarily recommended to develop Sam Po Shue WCP in phases, starting with the fishponds and wetland in the northern part of the park, to conserve the core bird flight path as early as possible.
- The commencement of development of the Sam Po Shue WCP is tentatively scheduled in 2026/2027, and strives to complete the first phase works by 2031.
- Sam Po Shue WCP is expected to be fully completed by 2039 or earlier.



Way Forward

- We will analyse comments received under the Public Engagement exercise and submit the final recommendations on the approximate locations, positioning, functions and management options of each proposed park to the Government. This study is expected to be completed in the first half of next year.
- Our preliminary recommendation to the Government is to first take forward the development of Sam Po Shue WCP.
- For the other potential parks, the Government could take into account the experience in developing Sam Po Shue WCP, as well as other relevant factors, and further consider and study the development of the other potential parks in a pragmatic and sustainable manner in due course.





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Thank you.



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ACE-NC Paper 3/2023

For discussion on 4 December 2023

Updates on the Monkey Contraceptive/Sterilisation Programme: Findings from the Population Viability Analysis

PURPOSE

This paper briefs Members on the latest progress of the monkey contraceptive/sterilisation programme conducted by the Agriculture, Fisheries and Conservation Department (AFCD) since 1999, and the latest findings arising from the Population Viability Analysis (PVA) commenced in 2022.

BACKGROUND

2. The Rhesus Macaque (*Macaca mulatta*) is native to Hong Kong. However, it is believed that the indigenous populations have been extirpated due to urban development. The current wild monkey populations in the territory are descendants of Rhesus Macaques and Long-tailed Macaques (*M. fascicularis*) which were intentionally released in the Kowloon Hills area during the 1910s and 1950s respectively. As a result, hybridisation arising from these two species has occurred.

3. In the early 1990, local studies estimated that the monkey population in the Kowloon Hills area consisted of about 600 to 700 individuals while the annual population growth ranged from 6.8% to 13%, indicating that the population would double every 7 to 12 years. The primary cause of the significant population surge was largely intentional feeding by humans. Consequently, monkeys lost their natural fear of humans due to human feeding, and became habituated to venturing into residential and urban areas in search of human food. Some of these monkeys showed aggressive behaviours, causing nuisance to the public.

4. Currently, monkeys have a fairly restricted distribution in Hong Kong. About 90% of them are found in Kam Shan, Lion Rock, and Shing Mun Country Parks. Peripheral populations have also been found in other areas like Tai Po Kau Nature Reserve, Sai Kung, as well as Tai Mo Shan and Tai Lam Country Parks. The latest monkey population in Hong Kong is estimated at about 2,000 individuals, belonging to 31 identified troops¹.

MONITORING AND MEASURES TO ADDRESS GROWTH OF MONKEY POPULATIONS

5. Since 1999, the AFCD had been conducting trials of contraceptive/sterilisation treatments on monkeys in captivity and in country parks². In 2007, the AFCD conducted a large-scale monkey contraceptive/sterilisation programme in country parks. During each operation, approximately 20-130 monkeys were captured using large trapping cages, which were then sedated, with suitable individuals treated with contraceptive/sterilisation treatments.

6. In 2009, the AFCD commissioned the Ocean Park Conservation Foundation, Hong Kong (OPCFHK) to undertake the monkey contraceptive/sterilisation programme by commencing comprehensive monkey population surveys³, and adopting a two-step endoscopic surgical treatments for the permanent sterilisation of female monkeys. The permanent sterilisation operations were further extended to male monkeys in 2014⁴. To intensify the efforts, the OPCFHK further extended the permanent sterilisation operations to monkeys found in urban fringe areas next to the districts with more monkey nuisance cases, such as Shatin, Tai Po, Wong Tai Sin and Sham Shui Po. As at end-2022, an accumulative total of 1,560 females and 377 males had been sterilised in Hong Kong.

¹ Monkeys form troops of varying sizes dominated by an alpha male.

² Initially, females were injected with an immuno-contraceptive vaccine, while males underwent chemical vasectomy.

³ The population surveys are carried out by direct counting or census walks along the roads and trails of all known monkey sites throughout the year. Direct head count is used to estimate the population sizes of all troops encountered. Troops are identified based on their alpha males or any recognisable individuals. During the surveys, monkeys are counted and categorized into four age groups – adults (males & females), sub-adults (males & females), juveniles (unisex) and infants (unisex).

⁴ These procedures involve using a pediatric endoscopic instrument with a diameter of 3 mm to cauterise, cut, and ligate the middle part of the oviducts or vas deferens of monkeys.

THE PVA STUDY

7. As non-human primates, including Rhesus Macaque and its hybrid with Long-tailed Macaque which are monkey species found in Hong Kong, are protected wild animals under the Wild Animals Protection Ordinance (Cap. 170)⁵, the AFCD's policy is always a balance between controlling population of monkeys thereby containing its nuisance caused to the public, while conserving the species without leading to its extirpation.

8. In light of the decade-long operation of the contraceptive/sterilisation programme implemented since 2007, the AFCD commissioned the PVA study in 2022 with the OPCFHK and Lingnan University, with a view to evaluating the effectiveness of the programme, determining the annual target number of monkey for sterilisation, and establishing suitable indicators for the contraceptive/sterilisation programme. The methodology of the PVA study is set out at [Annex](#).

MAJOR FINDINGS OF THE PVA STUDY

9. The results of the PVA study completed in June 2023 indicated that the monkey population in Hong Kong **would increase** if 20, 40, 60, and 80 individuals were sterilised annually, whereas the population **would decline** if 100, 120 and 140 individuals were sterilised annually (see [Figure 1](#) at the end of this paper).

10. The study also reveals that monitoring the population size and the birth rate is crucial for assessing monkey population trends in Hong Kong⁶. It showed that the birth rate of monkeys **at or below 35%** would **maintain the sustainability** of the monkey population, while **birth rate at 21.4% or below** in 2028 would **affect the sustainability**.

11. According to population surveys, the monkey population in Hong Kong has experienced a decline in both birth rate and overall population size. The birth rate over the past five years has been consistently reduced to about 32%. Meanwhile, the number of monkey nuisance cases received by the AFCD has

⁵ All non-human primates including Rhesus Macaque and its hybrid with Long-tailed Macaque are scheduled as protected wild animals under the Wild Animals Protection Ordinance (Cap. 170), meaning that it is an offence to hunt, wilfully disturb, possess or control, buy, sell, export or offer for sale or export them without special permit.

⁶ The PVA emphasises the importance of regularly evaluating the birth rate using population data to ensure a sustainable population.

significantly decreased from the range of about 800 to 1,400 cases in the 2000s, to about 200 cases in recent years (see **Figure 2** at the end of this paper). These findings indicate that the monkey contraceptive/sterilisation programme implemented by the AFCD so far has proven generally effective, while preserving sustainability of the monkey population.

RECOMMENDATIONS

12. To further restrain the monkey population growth in the wild, it is recommended to implement the contraceptive/sterilisation programme, with a target of **100 to 120 monkeys being sterilised between 2024 and 2028 every year**, and the projected monkey population expected to decrease to about 1,600 to 1,700 individuals by 2028. This range aims to achieve **a controlled and gradual decline in the monkey population**, thereby curbing any further increase in the long run. As regards the birth rate, it is recommended to adopt the target **birth rate at or below 35%, but not below 21.4% in 2028**. If the birth rate reaches 35% above or drops below 21.4% in 2028, the AFCD should adjust the sterilisation efforts accordingly to avoid overpopulation and catastrophic drop of the population. Regular conduct of monkey population surveys is essential to promptly detect any changes in the monkey populations, and provide valuable information for adjusting the sterilisation efforts accordingly, bearing any unforeseen factors such as disease outbreak or discovery of previously undetected populations and ensuring sterilisation target not to extirpate the monkey population. AFCD will continue to conduct regular monkey population survey in 2023 onwards following similar survey effort as in 2022⁷ to ensure consistent data collection.

13. Meanwhile, to further curb illegal feeding of monkeys leading to its overpopulation and aggressive behaviour towards the public, the AFCD will explore the feasibility of installing CCTV cameras at blackspots of illegal feeding activities. Furthermore, the Government will introduce a bill to the Legislative Council later this year to amend the Wild Animals Protection Ordinance (Cap. 170) to increase the penalty on illegal feeding of wild animals and introduce a fixed penalty system to enhance deterrent effect. Based on regular patrol and complaints received, the AFCD will also step up efforts in capturing monkeys causing nuisance to the public for sterilisation treatments or other appropriate measures.

⁷ In 2022, AFCD's contractor (OPCFHK) conducted about 200 survey days under the monkey sterilisation programme in the monkey living areas. Such survey effort is required to ensure the accuracy and to monitor the change of monkey population since monkey groups may not be encountered during every survey.

ADVICE SOUGHT

14. Members are invited to take note of the updates of the monkey contraceptive/sterilisation programme and provide comments.

Agriculture, Fisheries and Conservation Department
November 2023

Applied Methodology of the PVA Study Commenced in 2022

The study applied methodology (i.e. age-structured based matrix demographic model⁸ was constructed using the popbio⁹ package in R software) commonly used in studying population variability, which offers flexibility in modelling procedures, allowing for the incorporation of the number of contraceptive treatments to be performed annually. In the matrix population model, female monkeys instead of males were considered because of their promiscuous nature which was the key factor of reproductive success. Though demographic data from the comprehensive population surveys were utilised, certain parameters (e.g. survival rates) unavailable in Hong Kong were obtained through literature review.

2. Population analyses were carried out to assess the population trajectories¹⁰ of monkeys in Hong Kong by using the demographic data obtained from 2010 to 2021, in addition to various survival rates obtained from the literature review. Based on the observed trajectory, the survival rates of two literatures^{11,12} which closely matched the observed trajectory of monkey populations in Hong Kong were selected for the PVA. The survival rates adopted in the PVA were modified according to the literatures to align with the observed trend in Hong Kong.

3. The PVA aimed to utilise the age-structured matrix model constructed to forecast the monkey population trajectory under different number of sterilisation treatments performed annually (i.e. 20, 40, 60, 80, 100, 120 and 140 individuals sterilised every year), ultimately providing recommendations on whether to increase, maintain, or decrease the intensity of the sterilisation treatments.

⁸ Anderson, C. J., M. Van De Kerk, W. E. Pine, M. E. Hostetler, D. J. Heard, and S. A. Johnson. 2018. Population estimate and management options for introduced rhesus macaques. *The Journal of Wildlife Management* 83:295-303.

⁹ Stubben, C., and B. Milligan. 2007. Estimating and analyzing demographic models using the popbio package in R. *Journal of Statistical Software* 22:1–23.

¹⁰ Population trajectory describes the course of population trend over time.

¹¹ Hernandez-Pacheco, R., R.G. Rawlins, M.J. Kessler, L.E. Williams, T.M. Ruiz-Maldonado, J. Gonzalez-Martinez, A. V. Ruiz-Lambides, and A.M. Sabat. 2013. Demographic variability and density-dependent dynamics of a free-ranging rhesus macaque population. *American Journal of Primatology* 75: 1152-1164.

¹² Jiang, H., J. Lian, Feng, M., J. Wang, and Y. Li. 1998. Studies on population growth of *Macaca mulatta* at Nanwan, Hainan. *Arcta Theriologica Sinica* 18(2):100-106.

Figure 1: Forecasting monkey population trajectory using an age-structured matrix model with 20 to 140 number of monkeys sterilised per year.

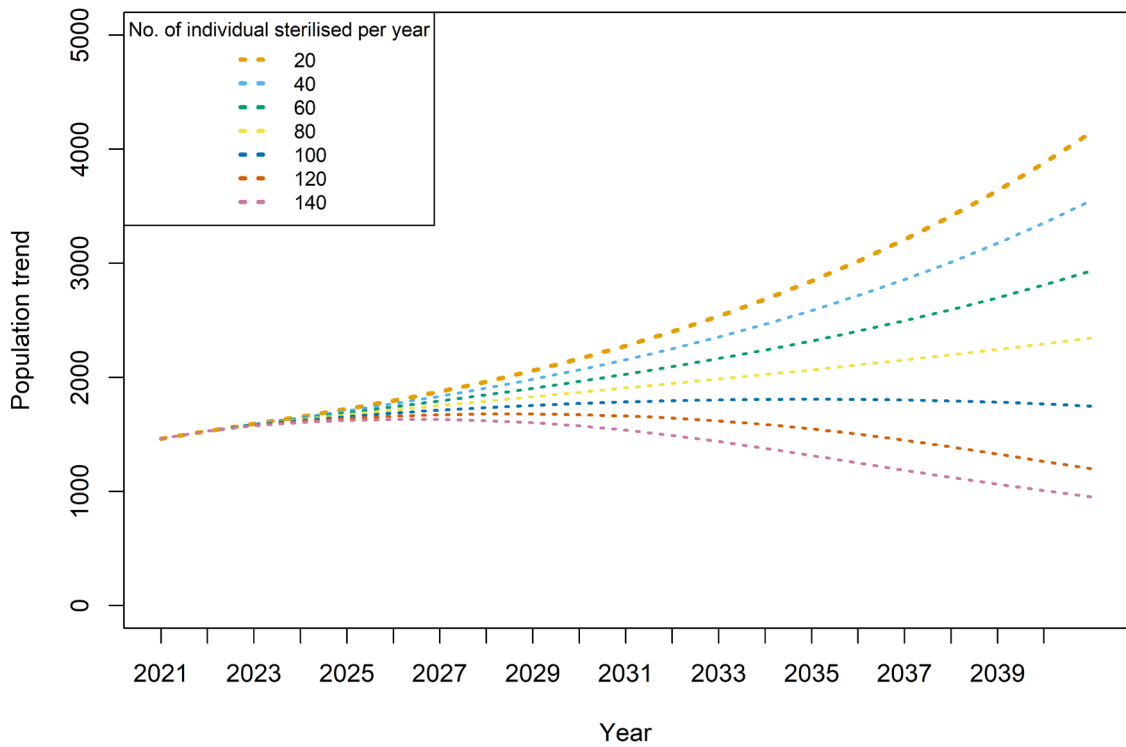


Figure 2: Number of monkey nuisance cases received by AFCD from 2001 to 2022.

