



Comparison of biodiversity and ecological management between Jilin Xianghai National Nature Reserve and Mai Po Nature Reserve

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Objectives:

- 1. Identify the ecosystem biodiversity, species biodiversity and ecological management of Xianghai National Nature Reserve and Mai Po Nature Reserve.
- 2. Compare the differences in ecosystem biodiversity and species diversity between the two sites.
- 3. Compare the differences in ecological management and public education practices between the two sites.

Biodiversity -----

Mai Po Nature Reserve (MPNR):

Area (WWF-HK, 2019):	1500 hectares (Mai Po Inner Deep Bay Ramsar Site) 380 hectares (Mai Po Nature Reserve [MPNR])	
Major types of ecosystems (WWF-HK, 2019):	1. Intertidal shrimp ponds (<i>Gei wai</i> [基圍]) 2. Freshwater ponds 3. Inter-tidal mudflats 4. Mangroves 5. Reedbeds	
Number of Species (WWF-HK, 2019):	417 birds 322 plants 25 indigenous mammals 8 indigenous amphibians 21 indigenous reptiles 54 fishes 105 Butterflies 316 moths 54 odonates >15 ants	155 bees and wasps >400 beetles and weevils >100 spiders 12 shrimps 41 crabs

Jilin Xianghai National Nature Reserve (JXNNR):

Area (RSIS, 1997):	105467 hectares (Jilin Xianghai National Nature Reserve) 12441 hectares (Total water ares) 23654 hectares (swamp area)
Major types of ecosystems (RSIS, 1997):	1. Mongolian yellow elm forest 2. Sand dunes 3. Grasslands 4. Marshes 5. Rivers 6. Cultivated lands 7. Reservoirs
Number of Species (吉林向海濕地宣教中心, 2023):	613 plants 316 birds (李洪濤, 2023) 37 mammals 29 fishes 8 reptiles 5 amphibians

Ecological Management -----

MPNR

Background: MPNR is now managed by World Wide Fund For Nature Hong Kong (WWF-HK) under an annually renewable conditional license granted by the HK Government. Management plan is developed every 5 years. (WWF-HK, 2019)

Biodiversity Conservation Programs (WWF-HK, 2019):

- Regular **habitat management work** are done. These mainly include 1) the management of water levels in the gei wai; 2) desilting of gei wai channel, ponds and reedbeds; 3) restoring islands to provide habitats; and 4) removal of invasive species (e.g., Mikania, apple snails, fire ants).
- **Conservation targets** for MPNR were identified. These mainly include **1) threatened species**, like Black-faced spoonbill (EN), Collared Crow (VU), breeding Black-winged stilt (NT); **2) Endemic species**, like Hong Kong bent-winged firefly
- **Regular ecological surveys** and a **threat analysis** were conducted for the conservation targets.
- **Research programs** were conducted with external parties (e.g., academics, conservation partners) to assist recovery of locally threatened species (e.g., *Lutra lutra*), to identify effective control methods of invasive species and to monitor shorebird movement by bird ringing and leg-flagging.



Figure 1. Photo of the Mai Po Nature Reserve (taken by WWK-Hong Kong)

JXNNR

Background: From 1983 to 1998, the state and provincial counties invested a total of 10 million yuan to improve the infrastructures.

Habitat management (吉林向海濕地宣教中心, 2023):

- Core area are zoned for the **conservation targets** (i.e., great bustard, cranes, Mongolian yellow elm and Oriental stork)
- **Buffer area and experimental area** are zoned for bird resure center and research projects
- **Infrastructure** are established for habitat management such as offices, guest houses, specimen rooms, and education center



Figure 2. Photo of the Jilin Xianghai National Nature Reserve



Figure 3. Map of the four conservation core areas in Jilin Xianghai National Nature Reserve

Comparison of the ecosystem diversity

- **Area:** To compare the areas between two Ramsar sites, JXNNR is **70 times** larger than MPNR, so JXNNR has **larger expanse of habitats** which is more capable of preventing **habitat fragmentation** (RSIS, 1997; WWF-HK, 2019)

Ecosystems:

- There are **five** main ecosystems in MPNR while there are **seven** main ecosystems in JXNNR. In terms of the huge difference of the area of both sites, ecosystems in the MPNR are more densely packed
- Although both sites share similar freshwater ecosystems (e.g., mudflats, marshes), the soil conditions are different:
 - 1) **MPNR** (WWF-HK, 2013): The soils are mainly **clay** and **silt** with poor drainage and are often anaerobic. **High acidity** is found in soil and water due to the high iron sulphide concentration .
 - 2) **JXNNR** (RSIS, 1997): The soil are mainly castenozem, saline-alkali soil and wind alluvial sand soil with little humus soil which contain silt, sand, clay, and gravel and often high amount of organic matterand. Therefore, **High alkalinity** is found in soil and water.
- Both MPNR and JXNNR consist of man-made ecosystems:

- 1) **MPNR:** traditional *Gei wai* and rain-fed ponds are separated by earth bunds which was constructed by immigrants from Mainland China after World War 2 (WWF-HK, 2019).
- 2) **JXNNR:** In 1971, a dam was built to establish Xianghai and Xinglong large reservoirs while the source of reservoirs is mainly Tao'er River, and the depth is 1.5 - 10 m (RSIS, 1997)

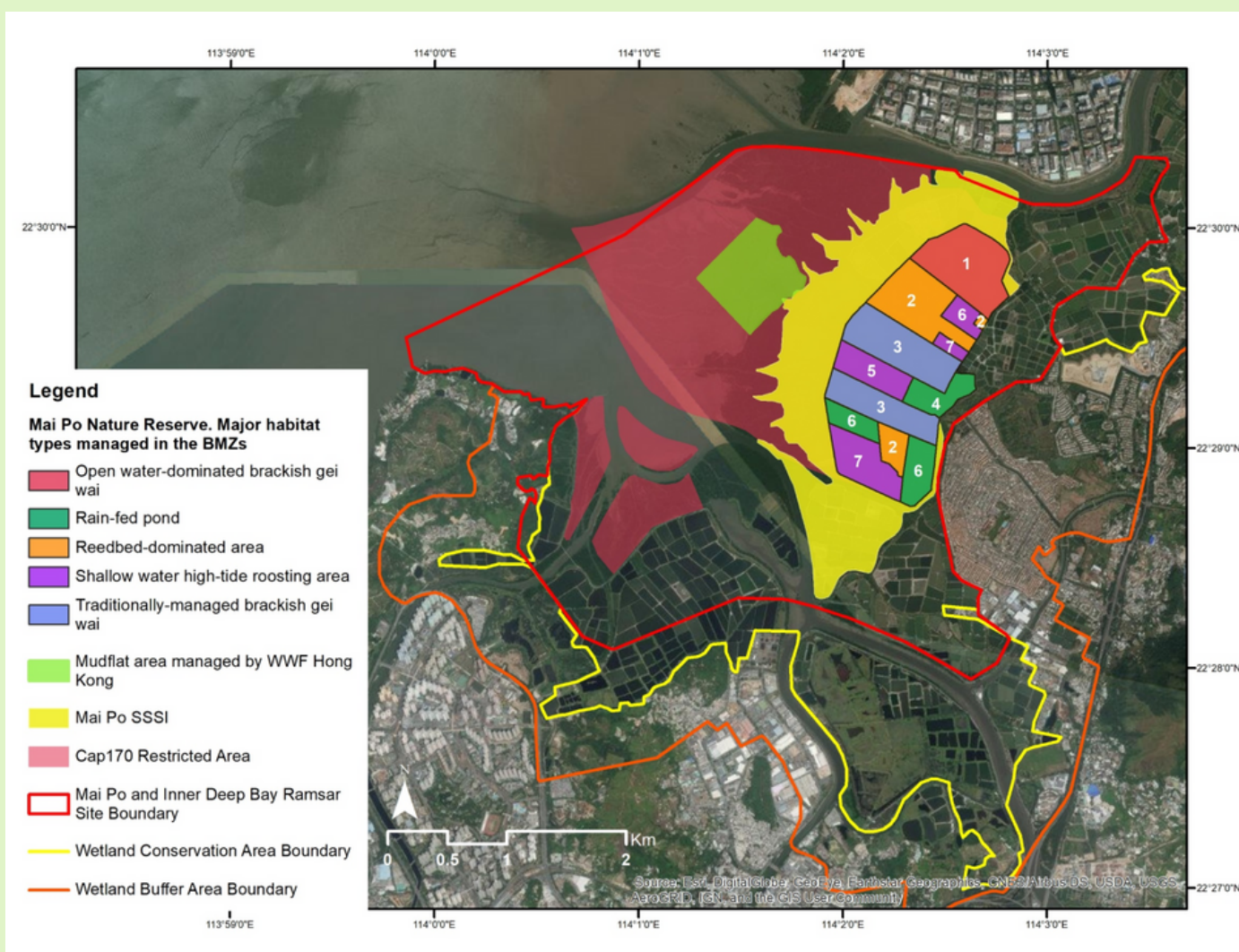


Figure 4. The major habitat types managed within and around the MPNR (WWF-HK, 2019)

Comparison of the species diversity

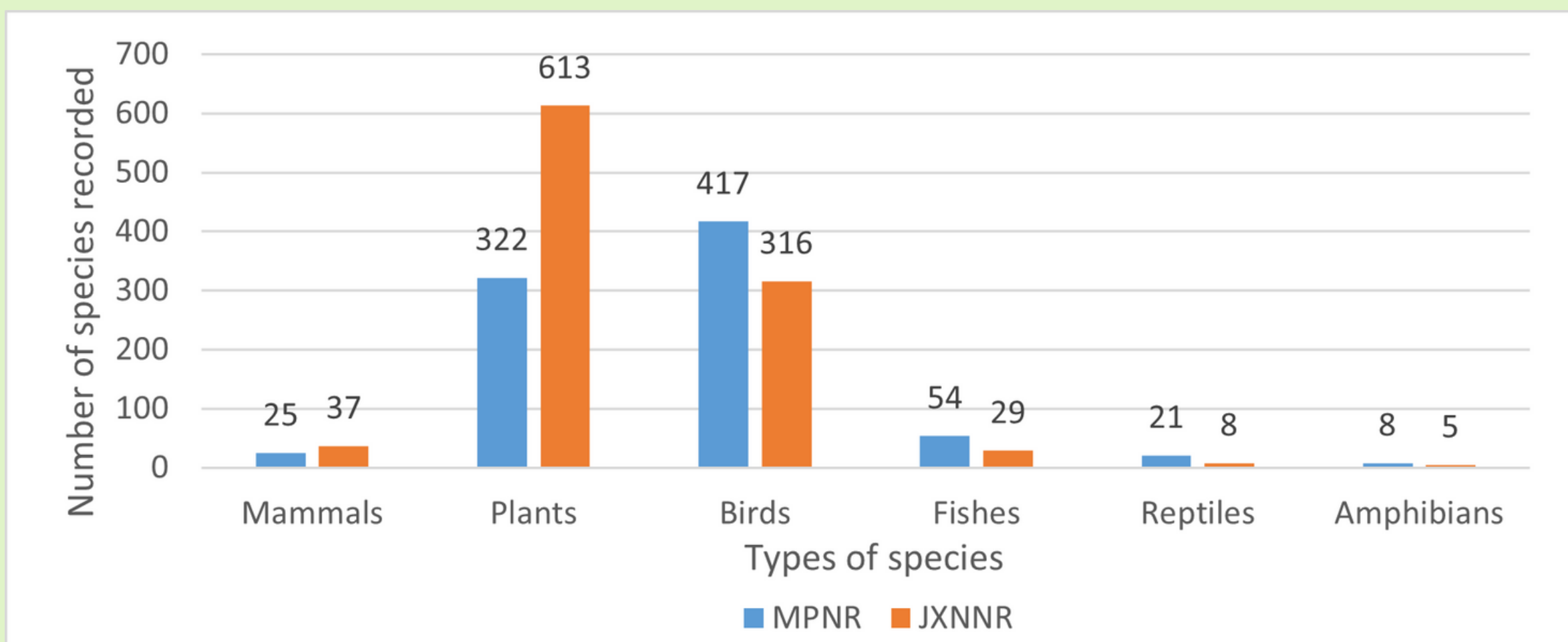


Figure 6. Comparison of species diversity between MPNR and JXNNR

- **Plants:** In the MPNR, only 322 plants are found, whereas in the JXNNR, there are 613 plants, which is 52% more than in the MPNR.
 - 1) **MPNR:** of the 322 plants, 65% are indigenous while 35% are exotic. **Four species** are noteworthy for their conservation value (e.g., *Diospyros vaccinioides*) (WWF-HK, 2019)
 - 2) **JXNNR:** It is noteworthy that the world's best-preserved and largest **Mongolian yellow elm forest** (i.e., *Ulmus macrocarpa var. mongolica*) exists here (Zhang, 2022).
- **Mammals:** 37 mammals are recorded in the JXNNR which is 48% more than the 25 mammals in the MPNR.
- **Birds:** In the MPNR, 417 birds are recorded, which is around **30% more** than the 316 birds in the JXNNR.
- **Other vertebrates:** In the MPNR, the number of species of reptiles, fishes, and amphibians is around **163%, 86%, and 60% higher**, respectively, than the number of species in the JXNNR due to the sub-tropical and humid weather HK has.

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Comparison of the ecological management

1) MPNR:

Mainly focusing on the **conservation and investigation** of natural reserves, as well as the prevention and control of biological diseases and pests, with a focus on the sustainable development of protected areas.

2) JXNNR:

The main focus is on investing funds in the **infrastructure and public education** of nature reserves, and achieving the sustainable development of the reserves through the construction of more modern facilities and comprehensive education and training for the public (Chen, 2023).



Figure 5. Explanation activities of JXNNR publicity and education center

Comparison of the public education

Education and Reginal Training Programs for MPNR:

- **One Planet Education Program** is established to motivate local students and youth by collaborating with schools and launching youth action projects
- To secure the integrity of wetland habitats within East Asian-Australasian Flyway (EAAF), WWF-HK has trained **over 5,200 wetland managers** from China and elsewhere in Asia about principles and techniques of wetland conservation (WWF-HK, 2019)

Public Education of JXNNR:

- Through organizing **visits** to education centers, printing picture albums, and bird resure center, extensive publicity was carried out to the people within the community and people from other countries, raising their **awareness of caring for wildlife**, and understanding the significance of environmental protection and citizens' responsibilities and obligations for ecological protection.



Figure 7. Group photo taken in front of the education center in JXNNR