



Safeguarding Our Natural Heritage

Habitat Enhancement and Species Recovery in Pulau Ubin

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Images as credited

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Pulau Ubin is a 1,000-hectare boomerang-shaped island situated northeast of mainland Singapore. Once alive with quarrying, plantation, and aquaculture activity, the island has since been left for wildlife to thrive. Ubin comprises different habitat types: mangroves, rocky and sandy shores, coastal and secondary forests, abandoned fruit plantations, scrubland, and freshwater ponds. These habitats support a rich diversity of wildlife.

In March 2014, the government launched a plan to sensitively enhance and conserve Ubin, giving rise to The Ubin Project. The Friends of Ubin (FUN) network consisting of representatives from nature groups, academia, history, heritage, sports, recreation, and education was established. The mission of The Ubin Project was formed with a vision for:

Ubin to remain as a familiar and rustic getaway, where we can reminisce the past and celebrate the present, where our children can learn about and enjoy thriving biodiversity, where we can come together to protect and enhance its idyllic charm through sustainable means and practices, for future generations of Singaporeans.

The public contributed thousands of ideas through various methods that were reviewed by FUN members. Among these ideas were a number of habitat enhancement and species recovery projects.

Habitat Enhancement

In the past, the landscape of Pulau Ubin was used for agriculture and granite quarrying. This has affected the quality of its habitats as well as created new ones such as granite quarries. Habitat enhancement can be employed to modify sites to increase the quality of the site or produce conditions that did not use to exist so that biodiversity can thrive.

Shoreline restoration

The shoreline around Pulau Ubin has been eroding for the past few years. The northern coastline of Ubin has suffered severe erosion and the cliff sides and sandy beaches have been heavily impacted (See Fig. 2). At Noordin Beach, erosion is so severe that the beach campsite has been washed away (See Fig. 3 and 4). A shoreline restoration feasibility study is currently being conducted to find out the causes of erosion. It is due to be completed by early 2016. Based on the results of the study, shoreline mitigation measures will be employed accordingly.

Reforestation

Reforestation efforts at Ubin have been ongoing for several years. Certain sites have also been identified for future reforestation. They were selected to extend key habitats such as forest and mangrove habitats as well as to increase the connectivity between biodiversity cores. In addition to these sites, those areas damaged by unforeseen occurrences such as fires have also been swiftly reforested.

Floating wetlands

Floating wetlands have been installed in water bodies such as reservoirs, lakes, and even rivers in Singapore. These were designed with aesthetics and wastewater treatment as their primary function. However, as an additional plus, these floating wetlands have managed to attract biodiversity such as water birds, dragonflies, and other reptile and amphibian fauna.

Under The Ubin Project, floating wetlands will be designed with the priority of creating habitats to attract biodiversity. The design of the floating wetlands would appeal to birds such as ducks and grebes. These wetlands will have substantial areas with short vegetation for waterbirds to climb and walk on as well as taller plants to provide them with safety and privacy. Two sites, Pekan Quarry and the ponds at Sensory Trail, have been selected for the deployment of floating wetlands.

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Located in the south of Pulau Ubin, Pekan Quarry has good numbers of Grey Herons that roost along the dead trees, branches, and floating debris around the quarry. However, the Grey Herons do not nest there. The deployment of floating wetlands may provide additional habitats for herons and encourage them to nest. These wetlands can also increase the biodiversity value of the quarry by attracting other waterbirds (See Fig. 5).

The deployment of floating wetlands in the quarry poses an interesting challenge as anchoring is usually to the bottom of the water body and some portions of the quarry are as deep as 50 metres. A trial test will be carried out where floating wetlands will be anchored via long lead ropes and bag of rocks.

The ponds at Sensory Trail are also located in the southern part of Ubin. They comprise a series of four ponds formerly used for aquaculture. The ponds were angular in shape with steep banks and had been left unused since aquaculture activities had stopped. In 2010, National Parks Board restored the ponds by grading their banks to be less steep, weeding the overgrown aquatic plants, and planting aquatic plants such as lotus and lilies (See Fig. 6). Since then, the ponds have attracted biodiversity such as moorhens, herons, and bitterns. Smooth-coated otters have been seen swimming in the water coming from the nearby mangrove inlets.

Being one of the few freshwater habitats in Ubin, the ponds are of high importance and thus have been selected for habitat enhancement as part of The Ubin Project. This includes breaking the bunds and combining the four ponds into one large freshwater pond. The broken bunds will be turned into islets and together with the floating wetlands will provide additional habitat for wildlife. Public access will be restricted to hides placed at specific viewpoints to allow for the observation of birds with minimal disruption.

As part of the engagement efforts of The Ubin Project, Republic Polytechnic will help to design floating wetlands for this new pond. This is a suitable site for students to work on as the water is shallow, between one to two metres deep. Students will survey the area and test the water quality, before selecting suitable species to plant and designing a floating wetland system. The floating wetland system designed by the students will be the first to be deployed in the newly combined ponds.

Species Recovery

With increasing urbanisation, natural habitats are disappearing. The lack of habitats has translated into a decrease in species that used to be commonly sighted. Species recovery programmes aim to stop the decline of targeted species and support their recovery to maximise their chances of long-term survival.

Bats

Pulau Ubin is home to several sensitive bat species, one of which is the Ashy Roundleaf Bat (*Hipposideros cineraceus*) recently discovered in April 2014 (See Fig. 7). Within Singapore, this species is only known to reside in Pulau Ubin and nowhere else. Also residing in Ubin is the critically endangered Lesser False Vampire Bat (*Megaderma spasma*) (See Fig. 8).

Bat houses and boxes have been used in many countries to provide alternative roost sites for bat colonies. This can be employed in Ubin to increase the population of existing bats as well as the species diversity of bats.

Bat houses are usually designed as tower-like structures with a rough interior so that bats can grip onto their surfaces. Bat houses will be placed in several spots in Ubin based on differing habitats (See Fig. 9). Bat boxes can also provide alternative housing for bats. They are smaller structures, usually made of wood, and can be single- or multi-chambered depending on the target species and species make-up. Depending on the design as well as location of a bat box, different species of bats will be attracted to roost.

A prototype bat box made of wood was featured as an exhibit in annual community event Ubin Day 2015 and will be the first bat box to be deployed (See Fig. 10). Republic Polytechnic students will further research on the habitat requirements of bats at Ubin as well as bat box designs and deployment methods before coming up with bat box designs as part of a student project. These boxes will be deployed on poles at various points across the island.

Otters

The Oriental Small-clawed Otter (*Aonyx cinereus*) lives in small family groups and can be found in small river and mangrove streams. It has a diet consisting mostly of crustaceans and molluscs. Unlike the frequently encountered Smooth-coated Otter (*Lutrogale perspicillata*), the Oriental Small-clawed Otter is rarely seen in Singapore.



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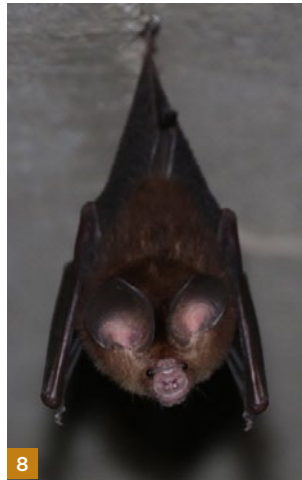


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1. Male Baya Weaver sitting on a partially constructed nest (Photo: Noel Thomas).
2. The cliff side behind the National Police Cadet Corps campsite showing heavy slope erosion and fallen trees (Photo: Noel Thomas).
3. Noordin Beach and Chamar Hut in the late 1990s (Photo: National Parks Board).
4. Chamar Hut at present. The beach and all the trees in the foreground of Fig. 3 are gone (Photo: Noel Thomas).
5. An artist's impression of the floating wetlands on Pekan Quarry (Image: National Parks Board Design).
6. The first stage of enhancement of the ponds at Sensory Trail showed graded banks and lotus planting (Photo: Noel Thomas).



Otter recovery programmes have proven successful in several cases, most notably in the United Kingdom, where low populations of otters are now increasing in numbers. Methods for otter recovery include planting riparian vegetation to provide more covered areas for otters as well as installing artificial otter holts. Similar methods can be tested out in Pulau Ubin.

To aid the recovery of the Oriental Small-clawed Otter, artificial otter holts modelled after the design of natural ones will be placed in the small mangrove rivers where Oriental Small-clawed Otters are usually found (See Fig. 12). These artificial holts will be installed near the high tideline so that they remain dry. As otters need to ascend banks to access the holts, the bank slopes where holts will be placed should not be too steep. Additionally, the artificial holts have been designed to include more than one exit point leading to the water. This will allow otters to escape to the water where they are most comfortable when they feel threatened.

Birds

Three bird species have been selected for recovery in Pulau Ubin: Baya Weaver (*Ploceus philippinus*), Blue-throated Bee-eater (*Merops viridis*), and Red-wattled Lapwing (*Vanellus indicus*). The three species require different nesting habitats. They have been decreasing in numbers presumably due to a loss of habitat. Safeguarding nesting as well as roosting sites is thus important to maximise their chances of long-term survival.

A site along Ketam Quarry will be converted into a bird recovery area and cater to all three targeted species. A boardwalk with hides on one side will allow for the public to get a good view of the birds with minimal disturbance (See Fig. 11).


Male Baya Weavers build distinct hanging nests with a central bulbous chamber on drooping branches as this makes it

difficult for predators such as snakes to raid their nests for eggs or young (See Fig. 1). Planting plants with similar characteristics such as bamboo or weeping willows will be coupled with the preservation of trees that are being used currently to benefit this species.

Blue-throated Bee-eaters build their nests on the ground or on slope faces. They do so by burrowing a tunnel and creating a chamber at the end where they lay their eggs and raise their young. To create more nesting sites for Bee-eaters, mounds of sand will be built. Additionally, a few artificial Bee-eater nest boxes will be inserted into the sand mounds to encourage them to nest. These nest boxes will be built into the mound and follow the same characteristics such as the size and tilt of the natural Bee-eater's nest. A study model was built for display at the Ubin Day 2015.

Red-wattled Lapwings have a characteristic alarm call that is used repeatedly while the birds take to the air when an intruder approaches their nests. Their nests are built on well-watered gravel, forest clearings, or sand. In the past, Lapwings used to nest on open gravel areas near Ketam Quarry. This habitat has since become overgrown with tall grass. A section of this tall grass will be cleared and laid with gravel to attract these birds back.

Conclusion

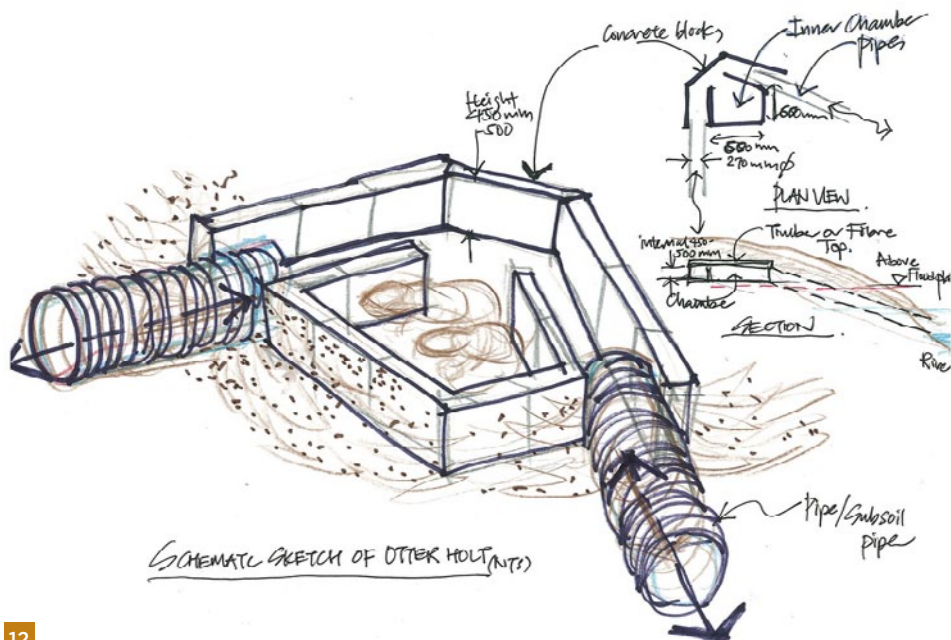
Compared to the highly urbanised mainland Singapore, Pulau Ubin still has large nature areas with a lot of potential to become a better place for biodiversity. Besides the habitat enhancement and species recovery projects mentioned, there are also other ongoing projects such as for restoring mangroves, orchid recovery, and seagrass recovery. It is hoped that the biodiversity of Ubin will improve and thrive with these projects. 



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7. Lesser False Vampire Bat (*Megaderma spasma*)
(Photo: Noel Thomas).

8. Ashy Roundleaf Bat (*Hipposideros cineraceus*)
(Photo: Noel Thomas).

9. Artist's impression of bat houses to be constructed in Ubin
(Image: National Parks Board Design).

10. A triple-chamber bat box prototype
(Photo: Noel Thomas).

11. Boardwalk passing through bird nest sites
(Image: National Parks Board Design).

12. Sketch of artificial otter holt design
(Image: National Parks Board Design).