

This paper looks at one mangrove restoration project on Pulau Ubin.

Mangrove restoration at Chek Jawa Wetlands

The project at Chek Jawa Wetlands centred on an abandoned prawn farming pond covering about 2 hectares, within a 6-hectare mangrove forest area (Fig. 2). Based on aerial photographs from the Ministry of Defence, the pond was in operation from at least 1969 to 1999. The prawn farming utilised local traditional farming methods, comprising a pond surrounded by mud bunds, with a sluice gate to control tidal inundation. The bunds were likely formed from mud excavated to create the pond and consisted of fine clay with remnants of mangrove mollusc shells.

With the cessation of prawn farming operations, mangroves started to colonise naturally in shallower areas of the pond by 2001 (Fig. 3). A project to expedite the natural colonisation of mangroves commenced in 2005. Alien invasive plant species (e.g., *Acacia auriculiformis* and *Falcataria falcata*) which had established around the abandoned pond were removed, and the bunds were levelled down (Fig. 4 & 5) to allow inundation during high tides and exposure as the tides recede. The excavated materials were used to fill in the sides of the pond to raise the bottom of the pond in those areas. The restoration efforts facilitated the natural dispersal and establishment of mangrove seedlings in the relevelled areas – along the former bunds and the sides of the pond.



Fig. 2. Aerial photograph showing mangrove area at Chek Jawa Wetlands in 2001.



Fig. 3. Aerial photograph showing close-up of abandoned pond in 2001.



Fig. 4. Bunds around the pond were levelled down. Part of the bund yet to be cleared then can be seen on the right.



Fig. 5. The relevelled bunds facilitated natural mangrove colonisation.

By 2017, mangrove vegetation had covered about 90% of the subject site (Fig. 6). Only the deepest areas of the pond where the elevations are lowest were not colonised by mangrove vegetation. Species that colonised the relevelled areas included *Acrostichum speciosum*, *Avicennia alba*, *A. officinalis*, *A. rumphiana*, *Brugueira cylindrica*, *B. gymnorhiza*, *Ceriops zippelliana*, *Excoecaria agallocha*, *Heritiera littoralis*, *Nypa fruitcans*, *Rhizophora apiculata*, *R. mucronata*, *Sonneratia alba*, *S. ovata*, *Scyphiphora hydrophyllacea*, *Hibiscus tiliaceus*, *Thespesia polpunea*, *Xylocarpus granatum*, and *X. moluccensis*.



Fig. 6. Mangrove coverage of pond. (Image credit: Google Earth, 2017)

Conclusion

The success of the project highlighted the effectiveness of modifying site conditions through removing alien species, modifying substrate levels, and ensuring inundation that facilitated the natural regeneration of mangroves, without the need to plant mangrove saplings. Lessons learnt from the project and a research collaboration with the Geography Department of the National University of Singapore from 2016–2017 are being applied to other mangrove restoration efforts on Pulau Ubin.