
The world's first International Mangrove Botanical Garden

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Overview

Uniquely in world history, at a dignified event on 22 October 2018, the Kingdom of Thailand officially opened the world's first International Mangrove Botanical Garden. Graciously presided over by Her Royal Highness (HRH) Princess Maha Chakri Sirindhorn and witnessed by top Thai Government Leaders and Officials, and by Ambassadors from 51 countries. An area covering 0.83 km² of Chanthaburi Province in S.E. Thailand, became an outstanding affirmation of and contribution to the conservation of global mangrove biodiversity.

Background: Concept, site and construction

In commemoration of the beloved and respected late King Bhumibol Adulyadej and in honour of Her Majesty Queen Sirikit, the Queen Consort of the late King Rama IX, the concept of constructing the International Mangrove Botanical Garden Rama IX (IMBGR9) was conceived. The Committee comprising the National Resources and Environment, the National Legislative Assembly, together with the Department of Marine and Coastal Resources and the Ministry of National Resources and Environment have the intention to make full use of the natural features of the IMBGR9 site and its associated buffer mangrove forest ecosystem.

Key attributes of the Botanical Garden

- Location: The Garden is located at Ban Samet Ngam, Moo 10, Nong Bua Sub-District of Mueang Chanthaburi District, Chanthaburi Province, Southeast Thailand.
- Size: 83 ha
- Size of the hinterland (or buffer zone) of the Garden: 232 ha.
- The Garden has a Green House Building to accommodate species or ecotypes which come from subtropical locations e.g. southern Japan and northern New Zealand.
- Both Royal Thai Governmental agencies and the International Society for Mangrove Ecosystems (ISME) will contribute to the management and scientific activities of the Garden.
- Core function: IMBGR9 facilitates the conservation of mangrove species with an emphasis on rare or endangered species.

Scientific potentialities

The planting of three mangrove seedlings by HRH Princess Maha Chakri Siridhorn: *Aegialitis rotundifolia*, *Heritiera fomes* and *Kandelia candel* on the occasion of the Garden's official opening, was a world first. Never before has an esteemed member of any Royal Family carried out such a powerful symbolic yet pragmatic action in the globally meaningful cause of mangrove conservation.

With debate, uncertainty and inconclusive discourse evident in ecological literature about the place of biodiversity in ecosystem stability and resilience, the need for action on biodiversity banking grows. We do not want to lose biodiversity before we have done the science of its potential and likely importance. This general trend also spills over into mangrove ecology. In recent years, the rate of mangrove forest loss has been slight but, nevertheless, continuous. With on-going loss, the threat of extinction of what are already rare species grows. Thus this new and timely International Mangrove Botanical Garden represents a powerful statement based on practical action.

There is a paucity of literature on rare species and ecosystem functioning. Lyons *et al.* (2005) is one of the few that have argued a case for rare species contributing to ecosystem processes under changing conditions. Maxwell (2016) raised this issue in the context of mangrove survival in the face of climate change: a rare embrace of this question in mangrove ecosystem studies.

There is clear evidence that our existing knowledge of mangrove biodiversity is incomplete. Likewise, its co-lateral potentials for resistance to the consequences of climate change remain to be described. Isolated and remote atolls like the Bangaram atoll of the Lakshadweep islands in the Arabian Sea has but one mangrove species, *Pemphis acidula*. Only two mangroves, *Lumnitzera racemosa* and *P. acidula*, occur in the seven atolls of the Chagos islands in the Indian Ocean (Sivakumar *et al.*, 2018). This two only situation is again exhibited in the Keeling Islands, located 2,750 km northwest of Perth, Western Australia. Here we find *Rhizophora apiculata* and, again, *P. acidula* (Williams, 1994).

An International Mangrove Botanical Garden can become a source of both replacement and new species to help enhance the very restricted existing biodiversity of remote mangrove habitats like the atolls of the Arabian Sea, Indian and Pacific Oceans. On a border front, the existence of a mangrove botanic garden can provide a living reference point for selecting the most suitable species for use in mangrove restoration schemes, a need brought into strong focus after the Indian Ocean tsunami of 2004 (Paphavasit *et al.*, 2009; Havanond, 2008).

Conclusion

Currently three rare mangrove species have been planted at the IMBGR9. They are *Aegialitis rotundifolia*, *Heritiera fomes* and *Kandelia candel*. As a survey of the mangrove science literature will show, the biology of these three species alone contains important gaps which invite attention. Examples here include the comparative eco-physiology of sodium ion extrusion (see Saenger, 2002), the essentiality of *H. fomes* to the ecological function of the Sundarbans mangrove ecosystem (could other species do the same job should climate change challenge *H. fomes*?) and the importance of *K. candel* to the ecological integrity of mangroves near their present biogeographic limits (Maxwell, 2002, 2015). The sensitivity of *H. fomes* to even minor increases in salinity above 10–15 ppt is noted (Blasco & Auda, 2008) as were the challenges of other environmental shocks like oil spills in the Sundarbans where *H. fomes* is an eco-dominant mangrove (Bhuiyan, 2015). The planting of these three mangroves at IMBGR9 brings the positive potential role of this Garden strongly into focus.

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