Special Report

The Impact of Back Mangrove Loss on Bird Diversity

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A collaboration between Malaysian Bird Report and *Macaranga*

In the past few months, the Malaysian Bird Report has been working with *Macaranga* to produce an in-depth article on the value of back mangroves to birds. *Macaranga* is a journalism portal covering the environment and sustainability in Malaysia. The full report was produced by Ashley Yeong, Amar-Singh HSS and S.L. Wong and is available from this link: https://www.macaranga.org/listen-to-the-birds-to-save-mangroves/. BFM Radio Podcast on the article: https://www.bfm.my/podcast/bigger-picture/earth-matters/birds-for-mangroves
The write-up here is a condensation of that report.

'Listen to the Birds to Save Mangroves' emphasises the critical role of birds as indicators of mangrove forest health, particularly in Malaysia. The article highlights the interconnectedness of birdlife and mangrove conservation. It draws attention to the alarming loss of mangroves, specifically back mangroves, its implications for both avian diversity and the ecosystem as a whole and advocates for conservation strategies that prioritise both. Mangroves, often underestimated in their ecological importance, serve as vital coastal forests that protect shorelines and hinterlands, support diverse species, and mitigate the impacts of climate change.

However, these ecosystems face significant threats, primarily due to human activities such as development, pollution, and deforestation. The threats are especially big to back mangroves which link mangroves to inland forest, and is home to at least half of Malaysia's resident birds that primarily depend on mangroves.

The Importance of Mangroves to Birds

Mangroves provide essential habitats for at least 144 bird species in Malaysia. These coastal forests offer nesting sites, shelter, and abundant food sources, including fish, crabs, insects, and mangrove-produced fruit and nectar. In turn, birds contribute to mangrove ecosystems through pollination, seed dispersal, pest control, and nutrient deposition. According to avian ecologist Richard Noske, in Peninsular Malaysia, sunbirds are a major pollinator of the *Bruguiera* mangrove species.

Coastal mangrove regions are 'important staging and wintering sites for waterbirds', says MNS. The north-central Selangor coast is recognised as an Important Bird and Biodiversity Area and is located along the East-Asian-Australasian Flyway. This bird migratory route stretches from Russia all the way down to New Zealand.

The absence of bird species like the Velvet-fronted Nuthatch in Malaysian mangrove forests signals a decline in ecosystem health. Ornithologist Dr. David Wells identifies the loss of 'back mangroves', the transitional zone between mangroves and dryland forests, as a primary driver of this decline. Back mangroves support a disproportionately high number of bird species, making their conservation vital.

Mangrove Zones and Bird Diversity

Plate 1 shows the zonation of mangrove forests, from the seaward edge to the landward zone. Mangrove ecologist Dr Ahmad Aldrie Amir describes this change. Facing the ocean and awash in 100% salty seawater are hardy species like *Avicennia* and *Sonneratia*. These trees are distinguished by their 'pencil roots', sticking vertically out of the sand and mud to breathe oxygen. They are called pioneer species because they 'grow' land by colonising new deposits of sediment. Behind the seaward zone is the central zone, dominated by *Rhizophora* species. Inundated daily by seawater, their tangled web of aerial roots elevates the plants above the saltwater and allow them to 'breathe' even while their lower roots are submerged. Moving landward, *Brugueira* species with their buttresses and knee-shaped roots tend to dominate. This zone melds into the back mangroves or landward zone, which is influenced by freshwater and is inundated only by the highest tides. This is where the most diverse communities live, comprising mangrove and mangrove-associates plants. Among them are the *Acrostichum*, *Acanthus*, *Excoecaria*, and river-fringing *Nypa fruticans*. This zone is also richest in bird numbers and diversity, says ornithologist Wells.

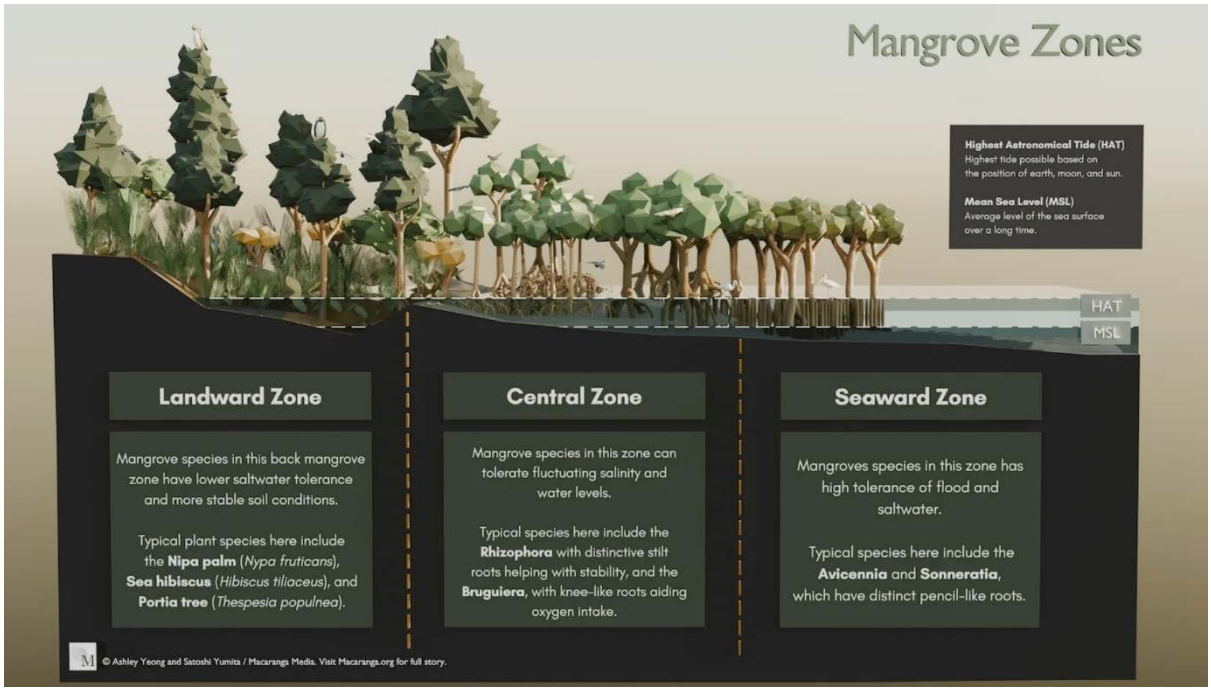

Plate 1: Mangrove zones from the seaward edge to the land

Ideally, back mangroves would merge into dryland forest. However, in reality, their ecological succession is blocked by a slew of man-made impediments. These include roads and plantations, aquaculture farms and landfills, and factories and ports. These disrupt this ecological succession and fragment mangrove habitats. The consequences grow ever more severe as Malaysia's sea levels are set to rise with climate change.

Mangrove Loss and Conservation Efforts

Many of Malaysia's mangroves are actually legally protected: of its 586,548 ha, 93.74% are inside permanent reserved forests, and state and national parks. But Malaysia has been losing its mangroves steadily since 1990, according to the Forest Research Institute of Malaysia

(FRIM) in its upcoming 2024 report on the status of mangroves shared with *Macaranga* (see Plate 2). While loss can also result naturally, FRIM states that the most loss is caused by development outside protected areas, on state lands.

The biggest loss of mangroves is recent, in the last 6 years since 2017. Mangrove areas decreased by 46,853 ha, almost twice the size of Kuala Lumpur. Of this, a massive 73% (34,379 ha) happened in Sabah, and the rest in Sarawak (12,474 ha). Measured in terms of loss per year, Sabah lost about 19 times more mangroves than in the previous 27 years, and Sarawak, at least 8 times more. Both these regions are home to the most mangroves in the country – Sabah around 22% and Sarawak 59%.

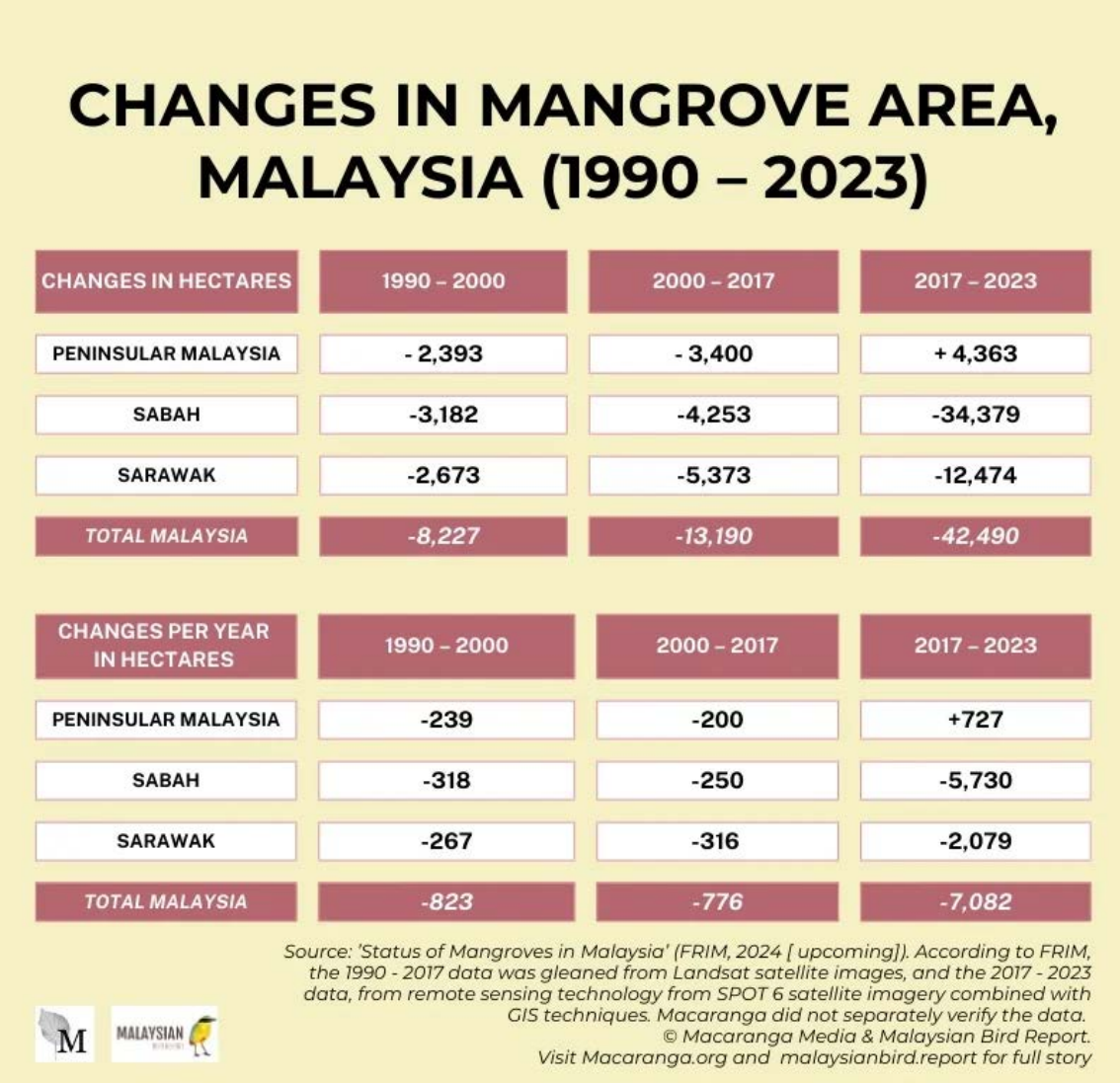

Plate 2: Changes in mangrove area for Malaysia from 1990 to 2023

Interestingly, Peninsular Malaysia actually gained 4,364 ha of mangroves, more than making up for the mangroves it lost between 2000 - 2017. The losses and gains differed across states, but most states saw mangrove areas grow (see Plate 3). Still, the earlier mangrove loss is evident. Driving from Penang to Selangor, outside of the protected areas, *Macaranga* found

most mangrove forests little more than strips fenced by infrastructure and agriculture. When agriculture is developed behind mangroves, bunds are typically built to shield plots from tidal flooding. To protect the bunds from eroding, the Department of Irrigation and Drainage has a policy to maintain a strip of mangroves between the bunds and the sea. But the bunds cause the mangroves themselves to erode.

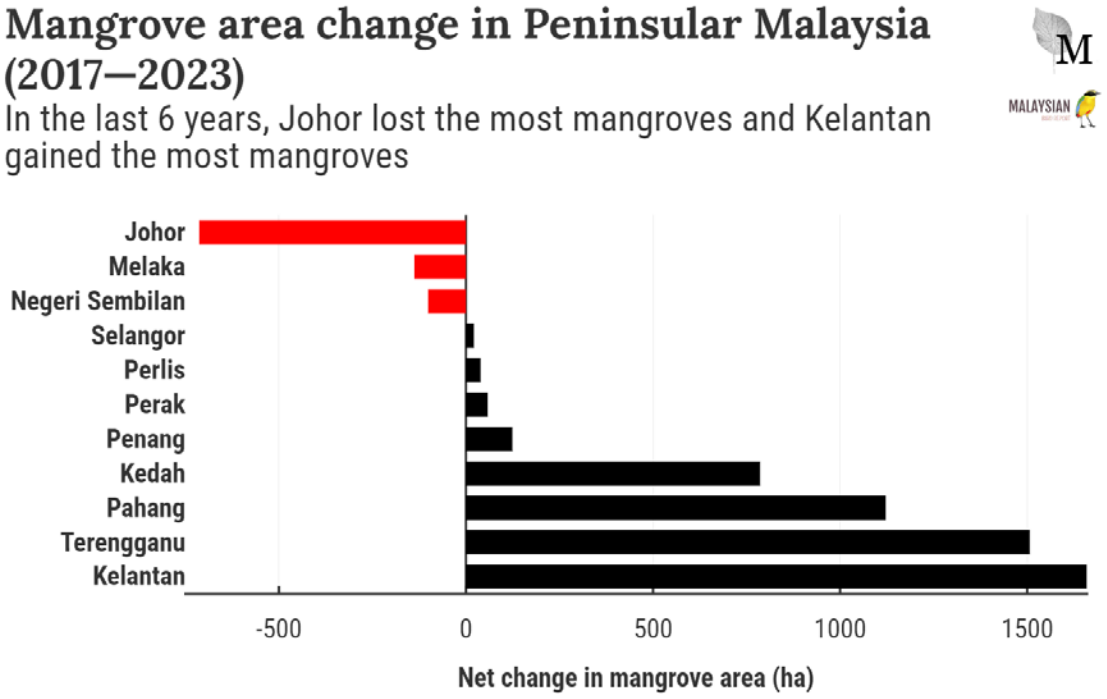

Plate 3: Mangrove change in Peninsular Malaysia from 2017 to 2023

Birds as Red Flags

Without space for back mangrove expansion and the forest's ability to host all its various zones, birds are at risk. *Macaranga* and Malaysian Bird Report compared bird diversity and numbers at two sites in Perak 100 km apart, using the citizen birdwatching global database, eBird at Cornell University (see Plate 4). The Matang Mangrove Forest with its healthy forest complete with back mangroves has considerably more different bird species than Bagan Datuk, which only has a sea-front mangrove fringe. In terms of resident bird species spotted, Matang has 96, more than double the 45 species in Bagan Datuk.

Table 1 provides a comparison of selected mangrove dependent resident land birds for the two regions. The data from eBird compares the mean frequency of the bird species seen and their range for 2022 to 2023. The majority of the resident mangrove bird species are more commonly seen and in larger numbers at the Matang Mangrove Forest Reserve which has good back mangrove. Unfortunately, in the thinner mangroves of Bagan Datuk, species such as the Mangrove Pitta, Mangrove Whistler have not been recorded in recent years; the birds were absent in both the 2024 eBird database and the 2018 MNS surveys. Avian ecologist Noske, in his study of mangrove forest birds in Peninsular Malaysia, noted that birds like the Mangrove Blue Flycatcher have a "*preference for dense forests with low light levels*". Hence its absence where the forest has 'gaps' or is sparse.

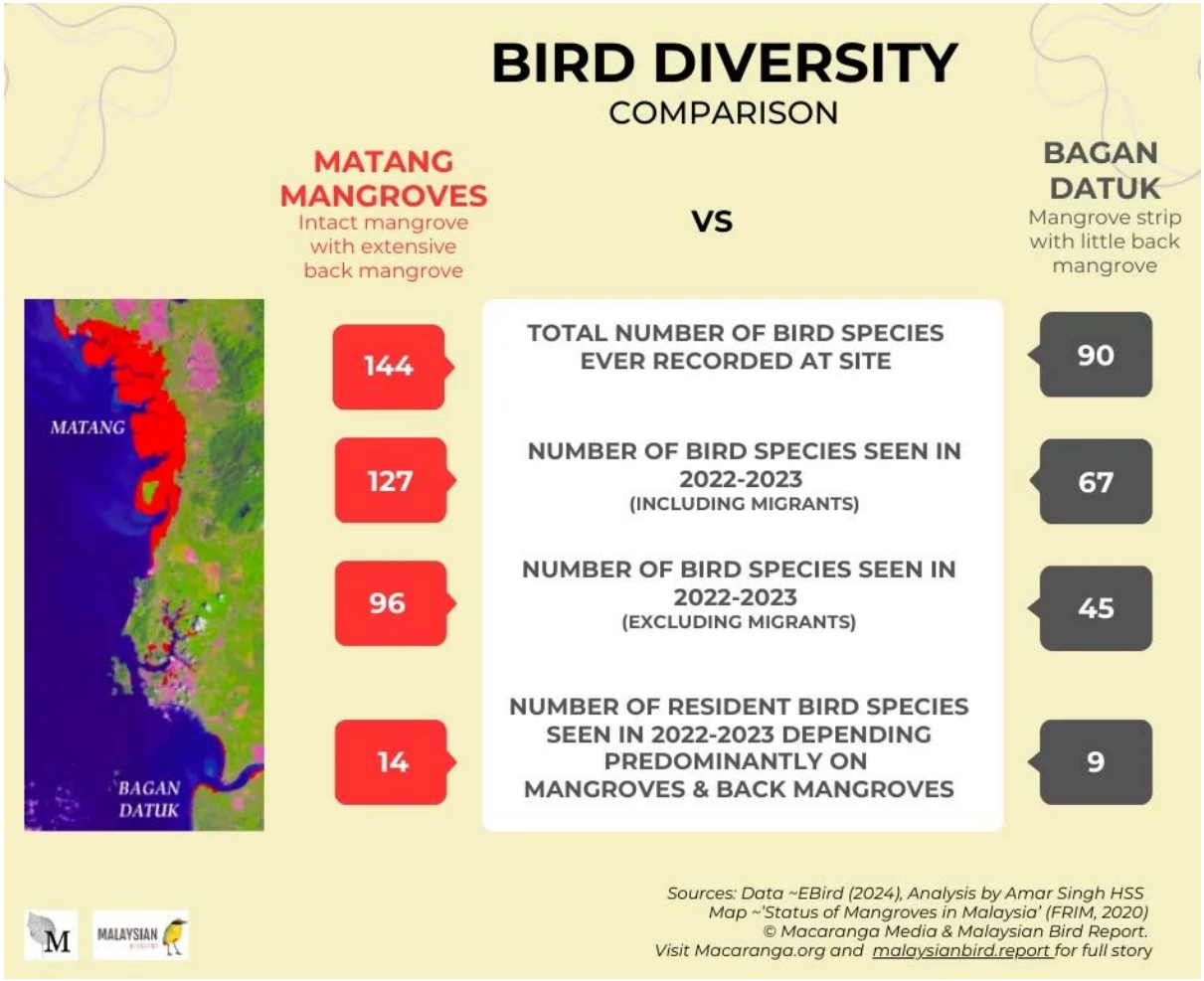

Plate 4: Comparison of bird diversity at Matang Mangrove Forest Reserve & Bagan Dato, Perak

Table 1: Average number of birds seen in 2022-2023 for key mangrove dependent resident land birds using eBird Data

Selected Resident Mangrove Dependent Land Bird Species	**Matang Mangrove Forest Reserve, Perak** (mean number seen & range)[@]	**Bagan Dato, Perak** (mean number seen & range) @
Mangrove Pitta *Pitta megarhyncha*	0.1 (0-1)	0[#]
Collared Kingfisher *Todiramphus chloris*	2.6 (0-10)	3.8 (0-6)
Greater Flameback *Chrysocolaptes guttacristatus*	1.2 (0-5)	0.4 (0-1)
Sunda Pygmy Woodpecker *Yungipicus moluccensis*	0.5 (0-5)	0.5 (0-1)
Laced Woodpecker *Picus vittatus*	0.6 (0-3)	0.8 (0-2)
Mangrove Blue Flycatcher *Cyornis rufigastra*	0.5 (0-4)	0*
Mangrove Whistler *Pachycephala cinerea*	0.8 (0-8)	0[#]
Velvet-fronted Nuthatch *Sitta frontalis*	0.9 (0-4)	0[#]
Ashy Tailorbird *Orthotomus ruficeps*	2.4 (0-10)	2.5 (2-4)
Cinereous Tit *Parus cinereus*	0.8 (0-4)	0*
Copper-throated Sunbird *Leptocoma calcostetha*	2.5 (0-6)	1.0 (0-6)

[@]The mean refers to the number of birds seen divided by the total number of visits (checklists); the range is the minimum and maximum number of birds seen during visits to the sites. [#]Was **not** observed at Bagan Dato during the MNS & FRIM survey in 2018; *Was observed at Bagan Dato during the MNS & FRIM survey in 2018

Conserving Mangroves and Birds

Mangroves need room to perform their ecological functions effectively, says Dr Chee Su Yin who researches coastal ecosystem conservation. "*If the sea level rises, they can move backwards. And if they have enough soil they can also move (forwards) towards the sea.*" By this logic, mangrove areas should be protected to allow them to grow both seaward and landward. This has big implications as Malaysia's sea levels are set to rise with climate change. "*But mangroves can only grow backwards if there is space*," points out Chee. How much space exactly? Ideally, as much space as possible. In reality though, she notes that the buffer zone is usually a mere 100 m. "*This area (back mangroves) is always a tussle between developers and profit-makers and conservationists. One hundred meters is actually not enough. For me, I would advocate for at least 200 m to half a kilometer.*"

Efforts to restore mangroves through replanting initiatives have seen mixed results. The article stresses the importance of engaging scientific and local communities in these efforts to ensure the selection of appropriate species and planting sites. Natural regeneration offers a promising approach to mangrove restoration.

The article also highlights the potential of bird watching and ecotourism to support mangrove conservation. Drawing birdwatchers and photographers to these areas can generate economic value and raise awareness about the importance of preserving these ecosystems.

References (full refences in article link)

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