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Malabera trees, one of the 10 commercially important timber tree species successfully planted. — Photos: SIA HONG KIAU/The Star

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"JUST imagine that less than 20 years ago, you could see as far as 3km from where you are standing," said Dr Ang Lai Hoe, pointing ahead.

It was indeed something hard to picture, because we could hardly see beyond 100m due to the thick foliage around.

It was getting warm when we first arrived at the ex-tin mining area in Bidor, Perak, at about 10am.

Members of the media and ASEAN delegates of the seminar on "Reclamation, Rehabilitation and Restoration of Disturbed Sites" held in Kuala Lumpur last month were taken on a tour of the site recently, situated about 10km southwest of Bidor town.

The seminar, themed "Planting of National and IUCN Red List Species", was organised by the Forest Research Institute Malaysia (FRIM) with the support of the Korea Forest Service and Asia Pacific Association of Forestry Research Institutions (APAFRI).

(The IUCN Red List Species refers to the International Union for Conservation of Nature's list of threatened plant and animal species).

Part of the programme was a visit to FRIM's Tin Tailings Afforestation Centre (TTAC), which

Greening a barren land

FRIM has successfully transformed a former tin mining area into a lush man-made forest.

sits on a former tin mine in Bidor.

What was once barren land, unsuitable for vegetation to grow, has now been successfully rehabilitated with rainforest species.

Pathways there are not tarred so as not to affect the growth of plants, especially roots.

Various fauna has slowly returned to the lush green space spanning 121.4ha (300 acres) – more than 70 bird species, and 25 mammals and other wildlife have been observed including migratory birds, hornbills, squirrels, wild boars, civets, moonrat, monkeys and snakes.

"I like to come here at night and just stand still and there will be a wild boar nearby," shared Ang, TTAC coordinator, who has been with the project since the beginning.

It all started in 1996 when the

Perak State Government leased the ex-mining land to FRIM for the establishment of a research station, also known as the FRIM Bidor Research Station.

The degraded area consisted of tin tailings – or waste from the mining industry – like slime and sand tailings largely covered by grass and sparsely colonised by several pioneer species. Pioneer species are hardy plants which were the first to grow on previously disrupted or damaged ecosystems.

Today the research station, also just referred to as the TTAC, has been successfully rehabilitated by FRIM with over 90 indigenous and exotic timber species. Overall, the site features 150 plant species in all, populated by about 1,500 plants per hectare.

In recognition of its success,



Ang (right), sharing with delegates and the media about the various tree species that thrive at the ex-tin mine.

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Ang, coordinator of FRIM's Tin Tailings Afforestation Centre .

TTAC was listed by the Malaysia Book of Records in October last year as the Largest Man-made Forest Established on Ex-Tin Mine. TTAC is also the first tin-tailing area in Malaysia systematically and successfully greened with rain-forest species. It serves as a model forest, recognised as an international educational site for rehabilitation of ex-tin tailings and a research site for international and national research projects on afforestation, biodiversity, forest influences, phytoremediation and eco-toxicity.

Labour of love

The regeneration project first began in 1999 and was earmarked as a 16-year project. The cost of planting work in the area alone took RM295,000.

There are 10 commercially important timber tree species successfully planted at TTAC, namely *Acacia mangium*, *Intsia palembanica* (merbau), *Hopea odorata* (merawan siput jantan), *Fagraea crenulata* (malabera), *Palaquium spp.* (nyatoh), *Shorea roxburghii* (meranti temak nipis), *Dyera costulata* (jelutong), *Acacia hybrid*, *Acacia auriculiformis* dan *Dryobalanops oblongifolia* (keladan).

What is the main challenge in rehabilitating an ex-tin mine?

"Basically, such sites have adverse soil properties and bad microclimate, and are not suitable for rain-forest tree species to be planted directly. So we need to first improve the site before we can plant them, after which we need to give intensive care to the site," said Ang.

Among other measures, biomass waste in the form of empty fruit bunches contributed by an oil palm plantation nearby helped to regenerate the soil.

However, despite the effort and results seen so far, it will take a total of 200 years for the land to return to its former glory.

"Eventually, we hope to replant as many lowland species that were originally there as possible. But we are not at the full restoration level yet, which is when (all) the flora and fauna returns to the area.

"Right now, there are not many species here because we don't have enough food for them, but we have already completed the first stage of rehabilitation," explained Ang.

Out of the 90 timber species currently found there, 22 belong to the Endemic, Endangered and Threatened species (EETs) category.

Ang then posed a question to the group. "Why must we plant EETs in problematic sites?"

"The answer is, a tin tailing area is difficult to plant things because there is bad soil and bad microclimate. The temperature in a forested area is normally about 5°C lower compared to its surroundings.

"So, first we had to bring plants back to make the microclimate better in order to plant the rainforest species. That's why in the first five



The Tin Tailings Afforestation Centre was recognised last year by the Malaysia Book of Records as the Largest Man-made Forest Established on Ex-Tin Mine.



The 40ha lake is home to various freshwater fish species and also serves as a mitigation pond for the whole of Bidor.



Paths are not tarred in order not to hamper the plants' growth.

years, the average diameter of plants we achieved was 25cm. "Now, the biggest we have is 60cm in diameter, which is an acacia tree," said Ang with pride, adding that the tallest acacia recorded in the area is 28m, while the tallest tongkat all tree, which also grows there, is 22m high.

If anyone has any funny ideas about harvesting them illegally, think again, as Ang said heavy metal content is still found in the plant.

Regenerating a rainforest

There are two types of regeneration process at TTAC. Natural regeneration means seeds are brought in by mother trees that exist in the area, or propagated by birds or bats, and start to grow on site.

There is also artificial regeneration which requires human intervention to propagate, for example merbau seeds which are big in size and are usually distributed by elephants.

About halfway through our site visit, we saw a 17-year-old merbau tree reaching 20m high, while 15 red rosewoods, whose seeds were brought in from Bangalore by Ang,

were also thriving. "With enough water, nutrients, good climate and tender loving care, the plants will grow well. What's important is we must know the suitable species to plant in the area and the distribution of the species.

The relative humidity of the area when we arrived in the morning was 65%, but by mid-day it was 30%, explained Ang, so plants in the area are selected to adjust to this factor.

By the end of our tour, we had walked a total of 3.5km and it was refreshing that our last stop was a scenic spot by the lake.

Looking out into the waters, Ang told us to imagine a huge dredging

machine, sitting on barren white sand dune all around, a sight during the tin mining heydays.

Today, toman, grass carp and many types of freshwater species thrive in the lake, with some weighing up to 45kg.

"Otters can be seen swimming around here too," said Ang, adding that the 40ha pond also serves as a mitigation pond for the whole of Bidor and is 46m (150ft) at its deepest.



Both artificial and natural regeneration take place at the TTAC.



Flowers, plants and trees thrive at the TTAC but it will take 200 years for it to return to its original state.