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No safety in numbers for pin-striped tit babbler

Despite healthy population levels in S'pore, species has low genetic diversity, study finds

Audrey Tan
Environment Correspondent

A pin-striped tit babbler at Kent Ridge Park. By analysing genetic material in samples taken from 46 babblers here, scientists traced the trail of genetic decline to about 50 years ago, when large parts of Singapore were urbanised. PHOTO: DAVID TAN

An old adage claims that there is safety in numbers.

But for the pin-striped tit babbler (*Mixornis gularis*), a small brown bird that can often be seen flitting on the lower branches of trees in parks and forest edges in Singapore, this may not be the case.

Despite their large numbers, this species has a startlingly low genetic diversity, a new study led by a National University of Singapore (NUS) scientist has found.

A low genetic diversity in a population could have many repercussions, including the possibility of the animals developing harmful mutations due to inbreeding, and a higher susceptibility to disease or environmental change.

This could eventually result in an elevated risk of extinction in an area, said Mr David Tan, a research assistant at NUS' Lee Kong Chian Natural History Museum and the lead author of the study.

Mr Tan estimates the number of pin-striped tit babblers in Singapore at 9,000, making them one of the few woodland-dependent songbird species to have maintained healthy population levels in Singapore, despite the urbanisation and forest clearance over the years.

On the surface, this paints a rosy picture of the species' resilience and ability to adapt.

But a different perspective emerges when the layers are peeled away – as the scientists did, when they delved into the genetic make-up of the insectivorous birds through the analysis of blood and tissue samples taken from 46 babblers across different forest patches in Singapore.

By analysing the genetic material in the samples, scientists were able to follow the breadcrumbs and trace the trail of genetic decline to about 50 years ago, when large parts of Singapore were developed and urbanised, with many plantations and wooded areas being replaced by concrete structures and buildings.

"A key finding was that even though the babblers are very abundant, that is no indication of their population health, and that even animals adapted to disturbed and degraded habitats can be affected by fragmentation," said Mr Tan, who worked on the study with six other scientists in Singapore and Sweden. The study was recently published in the scientific journal Nature Scientific Reports.

One possible reason for the babblers' low genetic diversity is that they are unable to travel far in search of mates, due to their short wings and sedentary habits. When vegetated areas are broken up into fragments, the babblers have greater difficulty moving beyond the isolated plots to meet other breeding partners, said Mr Tan.

He added: "The babblers behave very much like mammals. Even though they have wings, they don't disperse far and they live largely in the mid-to-lower part of the forest."

The 46 babblers were captured, tagged and subsequently released in forest patches across Singapore's north-south axis.

Based on the data, the study also found that babblers from Admiralty Park were significantly more inbred than those caught in other areas, such as the Southern Ridges and the Central Catchment Nature Reserve.

This suggests Admiralty Park is starting to be isolated from the rest of the forest patches – even though the park is only 2km away from the Central Catchment Nature Reserve, as the crow flies, said Mr Tan.

"This shows that spatial layout of wooded areas plays a significant role in affecting the flow of genetic material between Singapore's forests," he said, adding that assessments of the impacts of fragmentation for various species could be useful in informing long-term conservation strategies, since different species may respond differently to such stressors.

The National Parks Board (NParks), custodian of Singapore's biodiversity, said it was aware of Mr Tan's study, and will take the findings into consideration in planning and developing long-term biodiversity conservation strategies.

Mr Lim Liang Jim, group director of NParks' National Biodiversity Centre, said species targeted for conservation are identified based on their conservation status and distribution, with priority given to threatened, endemic species and rediscovered species, or those previously thought to be extinct.

Species recovery efforts are just part of Singapore's broader nature conservation masterplan, which includes the conservation of key habitats and improving connectivity, Mr Lim said.

NParks has a suite of measures to improve connectivity, including the planting of nature ways – roadside greenery that can function as corridors for animals – and the "rewilding" of the Rail Corridor.

IMPACT OF FRAGMENTATION

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audreyt@sph.com.sg