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Study identifies 55 fish species in S'pore reservoirs

Researchers also looked at how their water quality, ecological state could be improved

Cheryl Tan

A recently concluded biodiversity study of Singapore's reservoirs has revealed much about the distinct aquatic communities living in them, along with their respective food webs.

The seven-year-long study was carried out by national water agency PUB in collaboration with researchers from the National University of Singapore's (NUS) Freshwater and Invasion Biology Laboratory at the Department of Biological Sciences.

It also looked at how the water quality and ecological state of the reservoirs could be improved.

A total of 55 fish species were identified across the 17 reservoirs, each one recording a range of between nine and 21 species, said Ms Tricia Poh, a biologist at PUB's water quality department.

"The reservoirs were dominated by non-native species, where a significant number had originated from the aquarium trade, and likely stemmed from the release of unwanted animals into the reservoirs," she said.

The largest family found in the reservoirs are the cichlids with 14 species – the most common being the eartheater cichlid and the green chromide, she noted.

Cichlids are typically omnivores that feed on both aquatic plants and invertebrates such as prawns and snails.

Ms Poh noted that the only two native species found in all 17 reservoirs were the marbled gudgeon, an invertivorous fish that inhabits rocky areas at the bottom of the reservoir bed, and the common snakehead, an apex predator that feeds on other fish.

"Overall, the findings indicated that each reservoir houses distinct aquatic communities with unique combinations of food web interactions among the fish, macroinvertebrates and plankton there," said Dr Jeffrey Kwik, a senior research fellow at NUS' Department of Biological Sciences.

IMPACT OF HUMAN ACTIVITY

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For instance, the food web at Upper Peirce Reservoir was simpler and more robust compared with that at Serangoon Reservoir, making it more resilient to changes and disturbances, said Dr Kwik, who is also the co-principal investigator of the study.

"This may be attributed to the fact that Upper Peirce is an older and protected inland catchment reservoir with fewer anthropogenic disturbances, whereas Serangoon Reservoir is a younger, unprotected coastal reservoir that is easily accessible to the public."

To improve the water quality of the reservoirs, the research team also conducted small-scale and short-term biomanipulation experiments that significantly impacted the population of macroinvertebrates, such as midges, in certain reservoirs, said Dr Kwik.

Biomanipulation is a way of altering the ecosystem by adding or removing certain species.

"However, as each reservoir's ecosystem is unique, our studies suggest a need for biomanipulation strategies to be catered specifically to each individual reservoir," he added.

Therefore, a follow-up study of the reservoirs – that started in June and is set to last three years – will first address some knowledge gaps, such as whether the aquatic communities and their food webs remain stable over time, and the role of pelagic fish (that reside in deeper, open waters) in these food webs, before testing the feasibility of biomanipulation, said Dr Kwik.

This study's focus is on the Serangoon, Lower Seletar, Upper Peirce, Tengeh and Pandan reservoirs.

"These reservoirs were selected as representatives across the 17 reservoirs to determine if there are temporal changes to their food webs," said Ms Poh.

"The results would inform PUB of the relative efforts required to biomanipulate the different systems and help us to prioritise the reservoirs with higher chances of improvement in their water quality or environmental state."

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