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# Migratory birds may skip marsh as pollutants put native fish at risk

Tejonmayam.U@timesgroup.com

*Native Fish Species Die, Non-Native Exotic Ones Thrive - That's The Double Whammy From Dumping And Burning Municipal Waste At Pallikaranai Marshland, Say Experts. Studies Show That Non-Native Species Better Tolerate Hydrocarbons Released By Burning Garbage At Perungudi Landfill. This Increases The Risk To Native Fish, On Which Migratory Birds Feed. If This Ecological Cycle Snaps, Birds Won't Migrate To Pallikaranai Every Year To Breed, Which Will Critically Endanger Several More Species*

The fragile wetland ecosystem in Pallikaranai may be at the risk of losing its native fish species - a food source for migratory birds - as a study has found that non-native or introduced fish species may be more tolerant to pollutants in the water body, including from the adjacent Perungudi dumpyard.

The presence of non-native fish species in great numbers and their relative resilience to the environmental stressors can be a factor contributing to these fishes turning into invasive ones predating on the endemic fishes.

The study by Salim Ali Centre for Ornithology and Natural History, Coimbatore, involved analysing 745 tissue samples of liver, kidney, gills, reproductive organs and gut content of five native and five non-native species and measuring the levels of polycyclic aromatic hydrocarbons (PAH) in them. Levels of PAH compounds such as naphthalene, fluorene, phenanthrene and pyrene were found to be higher in non-native species such as African catfish, nile tilapia and swamp barb than in native species such as spotted snakehead, walking catfish, olive barb and three spot gourami. PAH are toxic chemicals released due to incomplete combustion such as burning of garbage, vehicle emissions and industrial waste floating in water bodies and influx of seawater polluted due to oil spill during monsoon.

Mythreyi Devarajan, of division of ecotoxicology at the centre and the corresponding author of the study, said PAH affects not just the fishes but also birds that dwell in the environment and feed on them. "Though we could not accurately determine how PAH affects these fishes, we found that non-native species are more tolerant to these pollutants, which is a characteristic of introduced or non-native species turning invasive. So, based on our study, there is a possibility the non-native species can become invasive," she said. "This ecosystem is fragile, it is best we try to make remedies right now rather than wait out a little longer," she added.

Besides surviving among the pollutants, the researchers' visual observation and feedback from local fishermen revealed that introduced species were more abundant despite the perennial influx of contaminants. Introduced species may have found their way into the marsh through migratory birds and run off during monsoon.

However, the study showed more prevalence of high molecular weight PAH (26%) and carcinogenic PAH4, a combination of four compounds, (23.2%) in native species compared to non-native ones (13.2% and 11.2%).

The team collected the 745 samples from 190 specimens belonging to five native and five non-native species from Perungudi, the lowest point of the Pallikaranai marsh, where the corporation routinely dumps waste. The site was chosen as the wetland has slowly been converted into the official corporation garbage disposal site to handle municipal wastes, industrial effluents, among others. The fishes were collected season-wise between January and April, May and August and September and December to assess if covariates such as season, sex, organs and species-wise variation were observed in the accumulation pattern of PAH in the introduced species.

It was found that organs and year contributed significantly while the role played by the species considered in the study did not significantly affect the levels of PAH in both endemic and introduced species.

"We saw a seasonal variation pattern. We found that when the PAH levels in the fish were high, levels in the water and sediment were low, and the opposite happened the next season. So, there was an exchange happening some where, but we were not able to establish where," she said. "Even if we stop the dumping, what remedy do we have for all damage caused over the years? People need to be educated that we cannot treat wetland as waste land. They need to know why they cannot purchase property there even if it is cheap. Government too should take a stand and stop construction of government complexes," she said.

## YEARS OF HARM

AT RISK AT HOME: A study by the Salim Ali Centre for Ornithology showed that non-native fish species in the marshland thrived despite having higher levels of hydrocarbons in them. Native fish that migratory birds feed on struggle to cope

**Fish species studied**

Native | Climbing Perch, spotted snakehead, walking catfish, olive bard, three spot Gourami

Non-native | African catfish, blue Tilapia, Mozambique Tilapia, Nile Tilapia, Swamp Bard

**What is PAH** | Polycyclic Aromatic Hydrocarbons (PAHs) are a class of chemicals that **occur naturally in coal, crude oil and gasoline.** They are also produced when **coal, oil, gas, wood, garbage and tobacco** are **burned**

**Source of PAH** | PAH is formed due to incomplete combustion of organic material during activities such as processing of coal and crude oil, combustion of natural gas, indiscriminate dumping or burning of waste, uncontrolled vehicle emissions and tobacco smoking as well as in natural processes such as carbonisation

Figures below show average PAH levels in non-native species is higher than in native ones, indicating that the former is more tolerant (measured as nanograms/gram wet weight (ng/g ww))

| Native species | | Non-native species | |
|---|---|---|---|
| Naphthalene ng/g ww | 52.1 | Naphthalene ng/g ww | 65.04 |
| Fluorene | 1.73 | Fluorene | 1.58 |
| Phenanthrene | 8.83 | Phenanthrene | 10.34 |
| Anthracene | 1.81 | Anthracene | 2.31 |
| Pyrene | 14.53 | Pyrene | 31.3 |
| Total PAH - average | 79.73 | Total PAH compounds | 110.8 |

**How non-native species can turn invasive**

When non-native species better adapt to the new ecosystem and reproduce quickly, it is more likely to thrive in the new ecosystem. It may then predate or outcompete native species as it becomes more in abundance, making them invasive. At Pallikaranai, researchers say invasive species will harm both the native fish species in the marshland and the migratory birds that arrive for breeding every year

SAVE PALLIKARANAI

**News Item in The Times of India newspaper, Chennai Edition dated 30th July 2021**

**CHENNAI:** The fragile wetland ecosystem in Pallikaranai may be at the risk of losing its native fish species - a food source for migratory birds - as a study has found that non-native or introduced fish species may be more tolerant to pollutants in the water body, including from the adjacent Perungudi dumpyard.The presence of non-native fish species in great numbers and their relative resilience to the environmental stressors can be a factor contributing to these fishes turning into invasive ones predating on the endemic fishes.

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