

Ecological impact of three invasive cichlid species in lower Chao Phraya River, Bangkok, Thailand

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In recent years, many invasive fishes have been introduced to Southeast Asia as food resource, aquarium fish, or for sport fishing. Many of these fishes are already established in the natural environment and mostly have a negative impact on the native ecosystems, representing one of the largest threats to biodiversity. However, only few studies are available about invasive fish species in Southeast Asia, a region that is considered a biodiversity hotspot, harboring many types of organisms. Therefore, it is necessary to elucidate the influence of invasive fish species that have been introduced to Southeast Asia. This study focuses on Thailand and assesses the ecological and sociological impacts of invasive species on its aquatic ecosystems. The target species are three invasive Cichlidae: *Oreochromis niloticus* and *O. mossambicus* introduced as food resources and *Cichlasoma urophthalmus* used as aquarium fish (Fig. 1, 2, 3).



Figure 1. *Oreochromis niloticus*



Figure 2. *Cichlasoma urophthalmus*



Figure 3. *Oreochromis mossambicus*

The purpose of this study is to assess the impact of the invasive Cichlidae species on the native ecosystem and human activities related to food habits, aquaculture, etc. The biological part of the research studied the feeding habits of Cichlidae in order to elucidate the ecological niche they occupy by using two methods, the stomach contents analysis and stable isotope analysis. The sociological research addresses the impact on human activities by conducting surveys and interviews.

There was a significant difference in the opinions about the values of alien species. For example, in Japan, introduced species are generally considered to have negative impact on the native ecosystems and therefore should be eliminated. In Thailand, however most of the people consider introduced fish species to have economic value and, apart from few biologists, they are not aware of their impact on the ecosystem. Moreover, Thai people usually release organisms, most of which are introduced species, for belief. There are even street stalls selling different types of introduced species (Fig. 4). This finding was unexpected and entailed correct evaluation of

introduced fish.

This study will provide valuable knowledge that can be used for conservation study and sustainable management of aquaculture resources in the future.



Figure 4. Stall selling alien species for release



Figure 5. Alien species sold for release