

Checklists, production trends, and potential ecological and socioeconomic impacts of non-native freshwater fishes in Malaysia: a review

ABSTRACT

The importation of non-native fish species into Malaysia began as early as the 19th century, when a substantial number of non-native fishes were introduced from southern China, heralding the beginning of aquaculture in Malaysia. In this review, we analyzed the available literature on the history, checklists, current status, production trends, and potential ecological and socioeconomic impacts of non-native freshwater fishes in Malaysia. We identified a total of 30 non-native food fishes belonging to 12 families, with Cichlidae occurring the most frequently. Moreover, 173 species from 40 families of non-native freshwater ornamental, recreational and biological control fishes were also listed. The aquaculture production and wholesale value were significantly higher ($p < 0.05$) for non-native species, as compared to native species. Approximately 93% (1,317,990 metric tonnes (MT)) of aquaculture production and 85.6% (RM 7.4 billion) of wholesale value are from non-native species. However, for inland freshwater captured fisheries, the landing and wholesale values were significantly higher ($p < 0.05$) for native species than the non-native species. Non-native species only occupied approximately 28.6% (18,227 MT) of the landing, and 14.2% (RM 110 million) of wholesale value, respectively. For the ornamental fish production, the highest value was recorded in the year 2012 (RM 629 million), but dipped to its lowest value in 2017 (RM 327 million). The cyprinids that are mostly represented by non-native species recorded the highest value (RM 112 million) in the year 2018, followed by osteoglossids that are mainly represented by the native Asian arowana (RM 108 million). Despite the massive economic contribution from these non-native fishes, some of these fish present important ecological and socioeconomic threats to Malaysia. Several recommendations are proposed for a win-win situation between the economic gains and environmental threats caused by these non-native fishes.

Keyword: Aquaculture; Aquarium fish; Inland fisheries; Introduced fish; Native biodiversity; Invasive fish