

The Influence of Alien Fish Species on Native Fish Community Structure in Malaysian Waters

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Abstract

Introduction of alien fish species has resulted in major global change, harming native species and communities throughout the world. The main objectives of this review were to examine the species composition, ecology, and distribution of alien fish species in natural water bodies and evaluate the role and contribution of alien fish species through aquaculture to socio-economic development in Malaysia. The rate of introduction and the number of alien fish species introduced into local habitats have greatly increased since the early twentieth century. A statistical analysis of habitat differences among native fish species in Malaysia indicated that differences in fish assemblage structure in various sites was associated with differences in physical habitat. However, the occurrence of alien species has not only changed the structure of native ichthyo-fauna groups but has also caused ecological damage and economic harm to local fishermen. At present, alien fish species inhabit diverse environments including highland and isolated streams, rivers, rice fields, swamps, drainage areas, dams and reservoirs, lakes created from former mining areas, and estuaries in Malaysia. The examination of species composition, distribution and movement of alien fish in natural habitats revealed that these species have seriously spread and are now distributed in diverse aquatic habitats of Malaysia. This in turn provided evidence that there are no restrictions or limitations to the spreading of alien fish species in the natural habitats of Malaysia.

Key words: alien fish species, Malaysia, native fish fauna

Introduction

Human facilitation of the movement of living organisms across continents has caused profound alteration in the ecology of relocated species and the communities to which they have been introduced (Callaway *et al.*, 2006). In addition, the rate of increase and the scale of these movements is rapidly becoming a major focus of ecologists, conservation biologists and resource managers around the world (Williamson, 1996) in part due to the fact that the introduction of alien fish or exotic species are causing and may cause further threats to native biodiversity (Fernando, 1991; Dudgeon, 2003). The globalization and growth in the volume of trade and tourism, coupled with the emphasis on free trade, provide more opportunities for fish species to be spread both deliberately and accidentally (Welcomme, 1984; Jenkins, 1996; Cohen and Carlton, 1998; Casal, 2006; Sampson *et al.*, 2009). These factors may exert tremendous pressure on

the population and diversity of aquatic organisms, particularly on native fish fauna.

Experiences throughout the world have shown that a number of problems may arise following the introduction of a new species. These include the following: disruption of the receiving environment; predation and interspecific competition; overcrowding and stunting; genetic degradation; introduction of parasites and disease; and extinction of many native species (Zaret and Paine, 1973; Taylor *et al.*, 1984; Welcomme, 1988; Jianqing *et al.*, 1996; Bedarf *et al.*, 2001; Johnson *et al.*, 2006; Gaygusuz *et al.*, 2007; Amundsen *et al.*, 2009).

However, the issues of alien fish species in the freshwater environment in Malaysia were greatly undervalued and have not received much attention (Othman and Hashim, 2003). Indeed, a comprehensive study on species composition, ecology, habitat preference and distribution of alien species in Malaysia is still scarce (Khairul Adha, 2012). Although there are no detailed studies

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