

Chapter 70

Ornamental Fishes: A Looming Danger for Inland Fish Diversity of Iraq



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Abstract The aquarium trade has been renowned as a significant passageway for the introduction of offensive species everywhere in the world. Ornamental fishes are nice-looking colourful fishes of nonviolent nature, which are retained as pets in aquarium for recreation purposes. The process of keeping these fishes is the second most popular hobby next to photography. And the ornamental fish industry is one of the most booming ones among the World.

Invasions of an exotic species in the freshwater habitats can be ecologically destructing and economically expensive. Identifying ‘hot-spots’ of the exotic species and their origin of introduction is important to decide the utmost of the usefulness of invasion isolation plans.

Management efforts for the eradication of the invasive fish species must emphasis on (a) enhancing cataloguing and recognition of fish species in pet shops, (b) teaching buyers of pet fish and store staffs about the hazards caused by pet discharge, and (c) offering improved choices for accountable discarding of surplus fish.

In conclusion, the aquarium fish sector in Iraq is practically uncontrolled given the presence of threatened species, species potentially harmful to humans and species capable of establishing non-indigenous populations, if released into the wild. Therefore, a set of recommendations is given at the end of this chapter for the policyholders in Iraq to adopt and curb the invasiveness of the ornamental and fish food species in the freshwater system of this country.

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© Springer Nature Switzerland AG 2021

L. A. Jawad (ed.), *Tigris and Euphrates Rivers: Their Environment from Headwaters to Mouth*, Aquatic Ecology Series 11,

https://doi.org/10.1007/978-3-030-57570-0_70

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70.1 Introduction

Non-native fishes that found external to their natural home zones and have dispersion capability. These fish species are frequently introduced to any area either deliberately or else for the devotions of aquaculture, aquarium business, healing value, research, and biological regulator (Singh and Lakra 2011).

Normally, invasion attainment might be motivated by the features of the trespasser, such as inherent developmental rates, food-related grade, and reproductive life history (Fausch et al. 2001). However, investigational and comparative indications show that all being identical, the likelihood of achievement increases with growing impact of the stages of life history of the organism (Kolar and Lodge 2001).

This chapter a short review is given about the potential influences of the exotic fish species in general and the ornamental species in particular in regard to both welfares and hazards. This data will convey a scientific foundation for assessments of the introduction of a certain exotic species into Iraq, limiting the extent of possibly intrusive species and constructing controlling devices to deal with safe aquaculture events. The chapter is also dealt with the issues of conservation and continuous efforts to improve any assessments and interventions.

70.2 Invasive Fish Species of Iraq

Over the last few decades, the process of introduction of an alien fish species has been increased and it continues to be increased (Coad and Hussain 2007; Mutlak and Al-Faisal 2009; Coad 2010; Al-Sa'adi et al. 2012; Jawad et al. 2012; Al-Faisal et al. 2014; Khamees et al. 2013, Mutlak et al. 2017), with the appearance of species that have never thought to be accommodated in the Aquatic environment of Iraq such as freshwater species of neotropical origin (Jawad and Qasim 2019).

In this section, a short review of the invasive fish species has been recorded is given. Those species can be divided into groups depending on their nature and use for the society.

70.2.1 Food Fish Species

70.2.1.1 Family Cyprinidae

Carasobarbus sublimus (Coad and Najafpour, 1997)

This species was initially designated from Iran by Coad and Najafpour (1997). The distribution of *C. sublimus* is confined to the A'la River in Khuzestan Province in Iran (Coad and Najafpour 1997). Recently, Mohamed et al. (2017) reported on

specimens of cyprinid fish have been obtained from the higher reaches of the Shatt al-Arab River, and later appeared to be *C. sublimus*. This is the first record of this species from the freshwater system of Iraq.

Gibel Carp, *Carassius gibelio* (Bloch 1782)

The natural distributional range of the gibel carp, *C. gibelio* is from northern Europe to Asia (Tarkan et al. 2012). Jawad et al. (2012) recorded *C. gibelio* from Basrah City, Iraq, differentiating it from *C. auratus* and *C. carassius*. This species found in the Basrah fish market when an upsurge in the Tigris River release, which decreases the salinity of the Shatt al-Arab River level enabling for *C. gibelio* to survive (Coad 1996). The carp farming events in Iran contain many species of carp that are well sustained and fruitful (Salehi 2007; Yousefian, 2011). Such actions could be the reason for the carp species entering freshwater systems in Iran (Nash 1997), which may also be the supply for the adjoining freshwater systems of Iraq. *Carassius gibelio* is now ascertained in Iraq, subsequently being misrecognized with the other two *Carassius* species brought into Iraq: goldfish, *C. auratus* and crucian carp, *C. carassius*, but their influences on the local species have not been known and established yet.

Common Carp, *Cyprinus carpio*

Cyprinus carpio was brought into Iraqi waters over the period 1960–1972. By the mid-1980s the common carp had reached full setting up in the habitats of Iraq and accomplished in eliminating several fish species that had previously controlled the area.

Hemiculter leucisculus (Basilewsky, 1855)

The natural distribution of this fish is from Maritime Russia south through China to Korea and Vietnam. It is brought into Iran, perhaps by coincidence together with commercial consignments of Chinese major carps from central Asia in the former U.S.S.R. and/or Romania in 1967 (Al-Faisal et al. 2014). It was reported from the Hawizah marsh Coad and Hussain (2007) that recorded this species for the first time from the Hawizah marsh and latter from southern marshes of Iraq by Al-Faisal (2008). This species can be taken as a food fish, but it expresses high feeding competition with the native species in Iraq (Coad 2010).

70.2.1.2 Family Cichlidae

Coptodon zillii (Gervais, 1848)

In Iraq, the Redbelly tilapia is recorded from Al Musayyib on the Euphrates River in Iraq (Al-Sa'adi et al. 2012), and recorded at the chief outfall drain in Basrah city (Mutlak and Al-Faisal 2009). It is also reported from the Euphrates River in Syria. The populations of this species inhabiting Shatt al-Arab River have shown segregation so there are two groups, one positioned at the north and middle parts of the river, while the second group is located in the south (Jawad et al. 2018).

Oreochromis aureus (Steindacher, 1864)

This species has been recorded from the main outfall drain in Basrah city (Mutlak and Al-Faisal 2009). It is also recorded from the Euphrates River and other rivers in Syria (Coad 1996). The morphometric and meristic characters of the populations of *O. aureus* inhabiting Shatt al-Arab River showed significant variation indicating the separation of the stock of this species into two groups, the northern group located at the middle and north part of the river and a second group situated at the southern part of River Shatt al-Arab (Jawad et al. 2018).

The Nile Tilapia, *Oreochromis niloticus* (Linnaeus, 1758)

The Nile tilapia is native to Africa, but it has been brought into several countries for aquaculture business (Vreven et al. 1998). Conferring to Herzog (1969), the Nile tilapia was brought into fish ponds on the Tigris River near Baghdad but did not endure during winter (Coad 1996). Another report of this species from southern part of Iraq, Basrah was by Al-Faisal and Mutlak (2015).

70.2.1.3 Family: Xenocyrididae

Ctenopharyngodon idella (Valenciennes in Cuvier and Valenciennes, 1844)

Grass carp was introduced to the freshwater system of Iraq in 1968 from Japan for use in pond culture (Coad 2010). It has a wide distribution range within Iraq. In addition, this species is found in the ponds and marshes of neighbouring Iran (Shireman and Smith 1983). In Iraq, this species is favoured due to its large size and can grow faster, which could be preferred by farmers. In Iran, grass carp used to control weeds in the ponds and marshes as they can get rid of huge amounts of vegetation or destroy them in a short time. In doing so, human diseases that such as

schistosomiasis can be kerb down since the snail carried their early stages of these worms live on water plantation (Coad 2010).

Silver Carp, *Hypophthalmichthys molitrix*

This species was brought into the Middle East area such as the marshes and reservoirs in Iran. The record of the silver carp in Iraq goes back to 1992, when Al-Hassan (1994) recorded this species for the first time from the lower part of the Shatt al-Arab River near Abu al-Khaseeb (Al-Hassan 1994). This record was a result of an escape from aquaculture facilities in the Middle part of Iraq. An additional option for its record is that it has come from the Iranian freshwater system via the Karoon River. This species was reported as being brought into Iran in 1974 and formed a sustained population there (Kamaly 1991; Coad 1992).

Hypophthalmichthys nobilis (Richardson, 1844)

This species is recorded from fish farms and basins in Khuzestan, Iran, it has been also brought into Syrian reservoirs (Coad 1996). It is used in fish farms in Iraq. It is a significant profitable species for farm ponds, feeding on phytoplankton when adult. The record of this species in Iraq could go back to 2005, when a foreign soldier caught one specimen from one of Saddam Palaces in Baghdad. Its effect on the aquatic ecosystem can be seen through the specialized feed of this species on plankton and remove them drastically from the environment. In addition, individuals of this species can turn the water of the habitats living in turbid and not suitable for living of eggs and larvae of other native fish species of Iraq.

70.2.2 Medical Purposes Fish Species

70.2.2.1 Family: Poeciliidae

Mosquito Fish, *Gambusia holbrooki* Girard, 1859

Individuals of this species have been disseminated dynamically through Iraq through a programme to combat malarial disease. This species is native to North and Central America. No specific date is known for the bringing of *Gambusia* to Iraq has been reported (Jawad 2003). *Gambusia* must not be introduced to newly created basins because it contests for food with various cyprinids of commercial status.

The Indian Catfish, *Heteropneustes fossilis* (Bloch, 1794)

The precise date for bringing in this species to Iraq is not known, but it exhibited in large numbers in the inland waters towards the end of the 1950s. This species was introduced intentionally to get rid of the gastropod mollusc, *Bulinus truncatus*, which plays as an intermediate host for the Bilharzia parasite (*Schistosoma haematobium*). Unluckily, this aim was incorrect and as a substitute, this fish displayed an ability to feed frequently on the aquatic plants and organic detritus in addition to crustaceans, aquatic insects and mollusks (Menon 1965). The feeding habit is alike to that of the cyprinid *M. sharpeyi*, but the struggle between the two species is less than that between *M. sharpeyi* and the common carp, probably since of the great variance in their ecological niches. This species is well ascertained in the freshwater system in Iraq and it would be very hard at this stage to get rid of it. Coad (2010) reported that R. Beckman has reported this species from localities at the Euphrates River in Syria and Ali et al. (2016) have recorded this species from the Syrian Inland waters recently.

70.2.3 Ornamental Fish Species

70.2.3.1 Family: Poeciliidae

Sailfin Mollie, *Poecilia latipinna* (Lesueur, 1821)

The distribution of the sailfin molly is confined to the coastal waters of the Gulf of Mexico and the Atlantic Ocean, from southeast North Carolina to the Yucatan. No particular date has been allocated for the first introduction to Iraq, but Coad (2010) thinks and based on personal communication that the date 2006 marks the first introduction of this species into Iraq. Individuals of this species have been reported from shallow marsh areas, and large groups inhabit areas where water flow has been changed. The presence of the sailfin mollie in the freshwater scheme of Iraq is through the deliberate introduction of the ornamental fish trade.

70.2.3.2 Family: Pangassidae

The Striped Catfish, *Pangasianodon hypophthalmus* (Sauvage, 1878)

The original locality of this species is the Mekong River and Maeklong basins. Individuals of the striped catfish usually inhabit large rivers (Rainboth 1996). They are omnivorous (Ukkatawewat 2005), feeding on fish and crustaceans as well as on vegetable debris (Rainboth 1996). The formal date of introduction of this species is 2013, when Khamees et al. (2013) have recorded this species from the Shatt

Al-Basrah canal south of Iraq and concluded that their record of the striped catfish is due to aquarium trade introduction.

70.2.3.3 Family: Lepisosteidae

The Alligator Gar, *Atractosteus spatula* (Lacepède, 1803)

The native locality of this species is North America as it is distributed from the Mississippi River basin from southwestern Ohio and southern Illinois in the USA south to the Gulf of Mexico; Gulf of Mexico Coastal Plain from Enconfina River in Florida, USA to Veracruz, Mexico (Etnier and Starnes 1993). This species feeds mostly on fishes and it is an effective predator in its natural habitat. The eggs of alligator gar are toxic, but their consumption by people is unlikely (Goddard 2009). Furthermore, this fish could damage fishing nets owing to the form of its head and the piercing teeth.

Mutlak et al. (2017) recorded on the capture of a single specimen of alligator gar, from the inland waters of Iraq. The specimen was obtained from the lower reaches of the Shatt al-Arab River, Iraq. This report symbols the first sighting a member of the family Lepisosteidae in the freshwater system of Iraq. Aquarium profession path is the as an alleged agent for the occurrence of this species in the Iraqi freshwater area.

70.2.3.4 Family: Serrasalminidae

The Speckled Piranha, *Serrasalmus maculatus* Kner, 1858

The distribution of this species is confined to the Amazon and Paraguay-Paraná River basins in South America (Jégu 2003). Jawad and Qasim (2019) reported on the presence of this species in the open waters of the Tigris River near the capital city of Baghdad in Iraq. This appearance suggests an introduction of a potentially dangerous species into the inland waters of Iraq. Furthermore, it looks to be well sustained in its new habitat, so that it can be considered an invasive species. Moreover, a new maximum size was also measured with the specimens.

The only Neotropical fish species that has been recorded from the natural waters in the Middle East is the red-bellied pacu, *Piaractus brachypomus*. One specimen of this species has been collected from the freshwater system in Iran (Esmaeili et al. 2017). No other records of piranha have been reported from neighbouring areas. Therefore, the possibility of the speckled piranha to invade the inland waters of Iraq in a natural way is nil.

The speckled piranha may be injurious in several ways to both the humans and the freshwater environment of Iraq, particularly because it is now established in this new habitat.

70.3 Negative Side of the Aquarium Trade

70.3.1 *The Disease Risks*

Matched to the land animals greater numbers of individual aquatic animals of a greater number of species are transacted. These animals will form a source of diseases if each species and each country of origin is hypothetically linked with disease causative agent abundance. Linked possibilities contain the formation of species which may develop pests that contend with the exotic species. On the other hand, the launch of aquarium plants and the setting up of invertebrates, some of which could play as a middle hosts for pathogens of further animals. Also, the introduction of farmed ornamental fish does not fundamentally diminish the hazard of disease attack.

70.3.2 *Ecological Impact*

Often, non-native species inclusion to an area is related to other reasons of habitat alteration (McDowall 2006) and administration measures (Lewin et al. 2006). It appears generally that the modest action of bringing an exotic species into an area is a source of ecological influence (Simberloff 2006).

There are many significant aspects frequently deliberated in relation with the non-native fish bring to any area like predation, niche dilapidation, struggle for foods, hybridization, and disease spread. Conferring to a current study to the European Commission in 2008, and support the work of Gozlan (2009), negotiation of these matters in departure is insufficient to define the ecological impact of bringing into an area a fish species. As a substitute, there is a responsibility for the above significant aspects to be linked with a calculable and vital miscarriage of biological or genetic diversity threatening long-term reliability of local species. Consequently, in this instance fish species introduction can be deliberated destructive.

A difference in the ecosystem, and mostly macrophytes or phytoplankton community or biomass, could usually give an outcome such as a widespread alteration of ecosystem utility, with long-term implications for several species and the general integrity of the habitat. This is well shown by the worldwide introduction of *C. carpio* (Pinto et al. 2005), a species that alters aquatic ecosystems via its feeding habitat, causing in displaced plants and the re-suspension of sediments.

70.3.3 *Economic Impacts*

Economic drive, chiefly globalization via line of work, is the essential human reason for non-native organism forwarding's (Pimentel et al. 2005). The overall aspect is

that the non-native species has an unwanted economic impact. It is often demanded that banning, regulation and abolition of non-native species must be a worldwide action that all the countries should join in (Perrings et al. 2002). Consequently, a necessity for best strategies concerning non-native species is desirable that lessen the likelihood of their entrance, bearing in mind the costs of avoidance, and policies that decreasing the harm they therefore perform, in addition to the costs of control or abolition.

70.4 Recommendations

The followings are recommendations selected from research from the literature and summarized and altered to suit the status of aquarium trade in Iraq. These recommendations are set for policy makers to adopt and put in action in order to curb the process of invasion of freshwater fish species through the aquarium trade.

1. Obtainability of scientific values for taking hazard of bringing ornamental fish species.
2. Treatment is the procedure by which the non-native species is completely eradicated from the receiver habitat.
3. Distinguishing resolution for the problem of intrusiveness and justification responses (as summarized in Britton et al. 2008).
4. The physical removal of the non-native species from infested waters by means of procedures such as seining, electrofishing and gillnetting decreases their richness in the site and permits all non-target species to be reverted (Britton et al. 2009).
5. Producing regulations to forbid the discharge of surplus ornamental pet fish into natural waters.
6. Announcing a plan whereby undesirable pets could be reverted to stores or local zoos and make it possible with operative policy.
7. Public awareness plans for aquarists and sellers are essential and perhaps have the success (Strecker et al. 2011).
8. Hazard valuations should be performed to recognize species that indicate the most hazards of conquering natural waters and creating damaging effects.

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