

Chapter 7

Threatened Cyprinid Species In Asia¹

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7.1 Introduction

Asia is home to about 40 per cent of the world's species of flora and fauna. The region's aquatic environment is among the most diverse in the world (ADB 2000). It has rich native carp species diversity with a total of 1 333 cyprinid species (Froese and Pauly 2001). Of these, 15 are of major aquaculture importance and contributed 49 per cent of total aquaculture production in the region in 2001. The Chinese carps: silver carp (*Hypophthalmichthys molitrix*), grass carp (*Ctenopharyngodon idella*), bighead carp (*Aristichthys nobilis*), common carp (*Cyprinus carpio*), and crucian carp (*Carassius carassius*) and Indian major carps: rohu (*Labeo rohita*), catla (*Catla catla*) and mrigal (*Cirrhinus cirrhosus*) have continuously dominated global carp production and accounted 71.3 per cent of the total freshwater aquaculture worldwide (FAO 2003). This indicates the important role of carp resources as a major provider of fish protein not only to growing populations in Asia but also to the entire world.

Despite the considerable potential for continued growth in cyprinid aquaculture production in Asia, there are increasing concerns about the status of native cyprinids especially those that are important to aquaculture in the region. During the last 25 years, Asia has seen remarkable economic and social transformation that consequently has resulted in increases in developmental activities and enormous pressure on the region's natural resources. Degradation of the aquatic environment and water pollution have taken their toll on its biological resources and threatened its rich natural diversity (ADB 2000).

In view of the importance of cyprinids to the present and future status of Asian aquaculture

(small-scale and industrial scale), it is necessary to have information on endangered/threatened species to assist with the region's conservation programs. This chapter reports on the status of such cyprinids in Asia and the factors that are threatening them.

7.2 Threatened species

Globally, 179 cyprinid species have been recorded as threatened (Froese and Torres 1999). The World's Conservation Union's (IUCN) Red Book and country reports list 56 cyprinid species as "threatened" in 14 countries in Asia (Annex 7.1). However, it is likely that the figure is an underestimate. This does not appear to be a very comprehensive assessment of freshwater fish fauna and hence there is the possibility of more species than those reported being either extinct or threatened (Bruton 1995; Gupta 1999; Froese and Torres 1999).

Of the 56 threatened cyprinid species listed in Annex 7.1, 40 are from the IUCN Red list and the other 16 species are from country reports. The genera with the most threatened endemic species in the region are *Puntius* (20 species) and *Labeo* (8 species). This list of threatened cyprinid species also indicates that the natural range of distribution of five of these cyprinids extends to more than one country in the region. These species are *Amblypharyngodon microlepis*, *Balantiocheilos melanopterus*, *Chela caeruleostigmata*, *Labeo porcellus* and *Probarbus jullieni* (Annex 7.1, Table 7.1).

Based on Annex 7.1, 14 species are categorized as vulnerable, 19 as endangered, 22 as critically endangered and one as extinct (Fig. 7.1). The vulnerable, endangered and critically endangered categories³ in this paper are from the IUCN Red list and follow the criteria for classifying

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³ Definitions by the IUCN (Groombridge 1993): **endangered** – taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included are taxa whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction. Also included are taxa that may be extinct but have been definitely been seen in the wild in the past 50 years; **vulnerable** – taxa that are likely to move into the "endangered" category in the near future if the causal factors continue operating. Included are the taxa of which most or all of the population(s) are decreasing because of over-exploitation, extensive destruction of habitat or other environmental disturbances, whose ultimate security has not been assured; and taxa with population(s) that are still abundant but are under threat from severe adverse factors throughout their range.

Table 7.1. Threatened cyprinid species that are endemic to more than one country in Asia (based on IUCN records of threatened species in FishBase)

Name of species	Countries	Conservation status
<i>Amblypharyngodon microlepis</i>	Bangladesh, India	Vulnerable
<i>Balantiocheilos melanopterus</i>	Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Thailand and Vietnam	Endangered
<i>Chela caeruleostigmata</i>	Cambodia, Lao PDR, Thailand	Critically endangered
<i>Labeo porcellus</i>	India, Sri Lanka	Critically endangered
<i>Probarbus jullieni</i>	Cambodia, Lao PDR, Thailand, Vietnam	Endangered

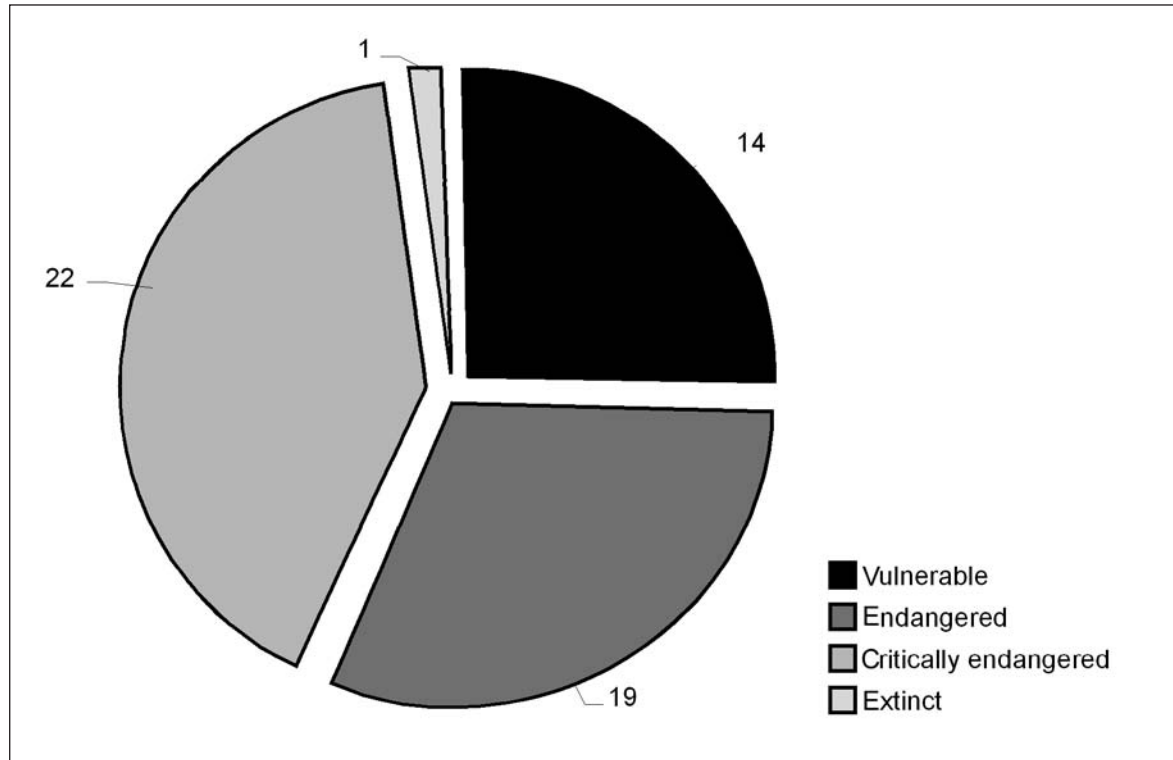


Fig. 7.1. Number of threatened cyprinid species per category in Asia (based on IUCN records of threatened species in FishBase and country reports).

threatened species. These criteria are based on biological factors related to rate of decline, population size, geographic distribution, and degree of population and distribution fragmentation (IUCN 2001). However, some of the endangered and extinct categories reported in this paper are from country reports (Bangladesh and China) and information is lacking as to the basis on which these countries have made these classifications.

In terms of global importance, 12 of the 56 threatened cyprinid species in the region are classified in FishBase as being of commercial importance or of potential interest to aquaculture. These species belong to the genera *Labeo* (5 species), *Puntius* (2 species), *Tor* (2 species), *Balantiocheilos*, *Chela* and *Probarbus* (1 species each) (Annex 7.1).

Based on the IUCN records of threatened species in FishBase, Bangladesh, China and the Philippines are the countries in Asia with the highest number of threatened cyprinid species. Among the Asian countries, only China (Yunnan Province) has an endemic cyprinid species (*Cyprinus yilongensis*) that has been listed as “extinct” (Xie and Chen 2001). This confirms reports that China’s aquatic biodiversity is under stress: it has been estimated that some 98 fish species are either extinct, endangered or threatened in China (Li 1997). In the Philippines, many species of the genus *Puntius* that are endemic in streams and lakes have been driven near to the brink of extinction (WWF 2004a). IUCN (Harrison and Stiassny 1999) considers 12 of the 18 cyprinid species listed in Annex 7.1 from the Philippines to be “possibly extinct”.

7.3 Threats to native diversity of cyprinids

One of the factors that can threaten native species is the adverse impact of introduced species, including predation, disruption of ecological processes, competition for food and space, infestation with alien parasites and diseases, habitat degradation and hybridization (Bruton 1995). Indiscriminate introductions of aquatic organisms from one habitat into another, where they have never been before, have serious risks and represent a significant threat to aquatic biodiversity (Welcomme 1988).

In freshwater and estuarine environments, species extinctions, and threatened and endangered aquatic species are most common and mainly result from habitat loss and degradation (Smith 1999; Froese and Torres 1999). This holds true for cyprinids in Asia, where the greatest threat to endemic populations stems from degradation of aquatic ecosystems more than the effects of species introductions.

For instance in India, there is depletion in the populations of almost all economically important fish species including major carps in all the rivers. This appears to be mainly due to man-made stresses through over-fishing and alteration of the environment through the construction of dams, hydro-power plants, etc., which prevents the fish from migrating to their natural breeding and feeding grounds (Reddy 1999). Sarkar and Ponniah (2000) reported that in northeast India alone, 22 endemic cyprinid species are categorised as threatened. Another 22 cyprinid species have also been reported to be threatened in the Western Ghats, India (Shaji et al. 2000).

IUCN (2002) confirmed that the major native cyprinid species in South Asian countries that breed naturally in flowing river waters are at great long-term risk due to destruction of the region's ecosystem of rivers. These include pollution, inadequate water flow during lean season due to draw-off for irrigation, lack of bypass facilities in weirs, barrages and dams, use of explosives and fine mesh nets, bank-to-bank net laying and other destructive practices, lack of controls and/or enforcement, etc. Asian Development Bank (2000) reported that Asian rivers have 4 times more than the world average of suspended solids and 1.4 times the biological oxygen demand.

In Bangladesh, the natural cyprinid stocks have declined due to degradation of aquatic

environments and reduction of many wetlands and water areas due to natural causes and man-made changes resulting in the loss of many habitats of riverine and floodplain endemic species (Hussain and Mazid 1997). More recently, concerns have been raised about the threat to wild endemic fish populations from large-scale induced breeding operations, inappropriate artificial reproduction practices and the large-scale stocking of domesticated, genetically degraded fingerlings in floodplains, and large-scale escapes of cultured stocks due to flooding (Rajts et al. 2002).

WWF (2004b) reported that in China, the strong pressure of the rapidly increasing human population and, with most of it concentrated around river courses, the large-scale infrastructures such as dams and aquatic pollution have brought severe damage to the Yangtze River's remaining biodiversity.

In the Philippines, the near extinction of some native cyprinid species (*Puntius lindog*, *P. baoulan* and *P. tumba*) in Lake Lanao has been attributed to soil erosion due to mining and agricultural development that has degraded water quality and to introduction of alien aquatic species such as common carp (*Cyprinus carpio*) and goby (*Glossogobius giurus*) (WWF 2004a).

7.4 Conclusion

The threat to cyprinids and other genetic resources in Asia and elsewhere is likely to worsen if pressures imposed on their populations due to environmental degradation, over-exploitation, disturbance by the introduction of alien species, etc., continue.

If the contribution of carp aquaculture to total fish production is to be sustained, there has to be an emphasis on the conservation of carp genetic resources in the region. IUCN (1996), however, cautioned that the category of threat is not necessarily sufficient to determine priorities for conservation action. It should also include numerous other factors concerning conservation action such as costs, logistics, chances of success and taxonomic distinctiveness of the species.

Reddy (1999) stressed that in view of the deteriorating aquatic environment, the first necessary step should be *in situ* conservation of germplasm resources of at least all the economically important species. IUCN's Global Biodiversity Strategy calls for the establishment of

national strategies in all countries and a comprehensive world *in situ* and *ex situ* genetic conservation system to be operational by 2010 (Bruton 1995). While governments in Asia have now realized the importance of living aquatic resources, only in recent years have some governments initiated the process for developing national policies and plans for conservation and utilization of biodiversity. In addition to enactment of national laws/regulations for conservation, there is a need for regional collaboration in the implementation of regulations especially for countries in the regions with common watersheds/borders and endemic species (Gupta 1999). An example is mahseer (*Tor putitora*), a species that is native to Pakistan, Northern India, Nepal and Bangladesh. The present plight of the species, which is critically endangered in Bangladesh, has become a matter of serious concern to South Asian countries. To address this problem, the IUCN South Asia Sustainable Use Specialist Group will develop a Mahseer Conservation and Management Plan and will play a leading role in river conservation projects (IUCN 2002).

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Annex 7.1

Threatened cyprinid species in different countries in Asia

Country	Species	Status	Global importance	Reference	
Bangladesh	<i>Amblypharyngodon microlepis</i>	Vulnerable*	Low importance in fisheries; commercial importance as aquarium fish	Talwar and Jhingran 1992; Hilton – Taylor 2000	
	<i>Cirrhinus reba</i>	Endangered	-	Hussain and Mazid (this volume)	
	<i>Labeo bata</i>	Endangered	Interest to aquaculture	Hussain and Mazid (this volume)	
	<i>L. boga</i>	Critically endangered	Interest to aquaculture	Hussain and Mazid (this volume)	
	<i>L. calbasu</i>	Endangered	Interest to aquaculture	Hussain and Mazid (this volume)	
	<i>L. goniuis</i>	Endangered	Interest to aquaculture	Hussain and Mazid (this volume)	
	<i>L. nandina</i>	Critically endangered	Interest to aquaculture	Hussain and Mazid (this volume)	
	<i>L. pangusia</i>	Endangered	-	Hussain and Mazid (this volume)	
	<i>Puntius sarana</i>	Critically endangered	Interest to aquaculture	Hussain and Mazid (this volume)	
	<i>P. ticto</i>	Endangered	-	Hussain and Mazid (this volume)	
	<i>Tor tor</i>	Critically endangered	Interest to aquaculture	Hussain and Mazid (this volume)	
	<i>T. putitora</i>	Critically endangered	Interest to aquaculture	Hussain and Mazid (this volume)	
	Brunei Darussalam	<i>Balantiocheilus melanopterus</i>	Endangered*	Commercial importance in aquaculture and as aquarium fish	Kottelat 2001; Hilton – Taylor 2000
		<i>B. melanopterus</i>	Endangered*	Commercial importance in aquaculture and as aquarium fish	Rainboth 1996
Cambodia	<i>Chela caeruleostigmata</i>	Critically endangered*	Commercial importance as aquarium fish	Rainboth 1996	
	<i>Probarbus jullieni</i>	Endangered*	Commercial importance in fisheries; aquaculture - experimental	Rainboth 1996	
China	<i>Acheilognathus elongatus</i>	Endangered*	-	IUCN 1994	
	<i>Barbodes exiguus</i>	Endangered	-	Li 1997	
	<i>B. cogginii</i>	Endangered	-	Li 1997	
	<i>Cyprinus crassilabris</i>	Endangered	-	Li 1997	
	<i>C. longipectoralis</i>	Endangered	-	Li 1997	
	<i>C. megalopthalmus</i>	Endangered	-	Li 1997	
	<i>C. micristius</i>	Endangered*	-	IUCN 1994	
	<i>C. yilongensis</i>	Extinct	-	Li 1997	

	<i>Sinocyclocheilus anatirostris</i> <i>S. angularis</i> <i>S. anopthalmus</i> <i>S. cyphotergous</i> <i>S. microphthalmus</i> <i>Tor yunnanensis</i>	Vulnerable* Vulnerable* Vulnerable* Vulnerable* Vulnerable* Endangered*	- - - - - -	Proudlove 1997; Hilton – Taylor 2000 Proudlove 1997; Hilton – Taylor 2000 IUCN 1990 Proudlove 1997; Hilton – Taylor 2000 Proudlove 1997; Hilton – Taylor 2000 Baillie and Groombridge 1996
India	<i>A. microlepis</i> <i>L. porcellus</i>	Vulnerable* Critically endangered*	Low importance in fisheries; commercial importance as aquarium fish Fisheries: minor commercial importance	Taiwar and Jhingran 1992; Hilton – Taylor 2000 Taiwar and Jhingran 1992; Hilton – Taylor 2000
Indonesia	<i>B. melanopterus</i> <i>Rasbora baliensis</i> <i>R. tawarensis</i>	Endangered* Vulnerable* Vulnerable*	Commercial importance in aquaculture and as aquarium fish - -	Kottelat 2001; Hilton – Taylor 2000 Kottelat et al. 1993; Hilton – Taylor 2000 Kottelat, et al. 1993; Hilton – Taylor 2000
Iran	<i>Iranocypris typhlops</i>	Vulnerable*	-	Proudlove 1997; Hilton-Taylor 2000
Japan	<i>Rhodeus ocellatus smithii</i>	Critically endangered*	-	Kimura and Nagata 1992; Hilton-Taylor 2000
Lao PDR	<i>B. melanopterus</i> <i>C. caeruleostigmata</i>	Endangered* Critically endangered*	Commercial importance in aquaculture and as aquarium fish Commercial importance in aquaculture and as aquarium fish	Kottelat 2001; Hilton-Taylor 2000 Rainboth 1996; Hilton-Taylor 2000
Malaysia	<i>P. jullieni</i> <i>B. melanopterus</i>	Endangered* Endangered*	Commercial importance in aquaculture	Roberts 1992; Hilton-Taylor 2000 Kottelat 2001; Hilton – Taylor 2000
Philippines	<i>Cephalakompsus pachycheilus</i> <i>Mandibularca resinus</i> <i>P. amarus</i> <i>P. baoulan</i> <i>P. clemensi</i> <i>P. disa</i> <i>P. flavifuscus</i> <i>P. hemictenus</i> <i>P. herrei</i>	Critically endangered* Critically endangered* Critically endangered* Critically endangered* Critically endangered* Critically endangered* Vulnerable* Critically endangered*	- Minor interest to fisheries - - - - - Commercial importance in fisheries	Herre 1924; Hilton-Taylor 2000 Herre 1924; Hilton-Taylor 2000 Herre 1924; Hilton-Taylor 2000 Hilton-Taylor 2000 Hilton-Taylor 2000 Herre 1953; Hilton-Taylor 2000 Herre 1924; Hilton-Taylor 2000 Herre 1924; Hilton-Taylor 2000 Herre 1953; Hilton-Taylor 2000

	<i>P. katolo</i>	Critically endangered*	-	Herre 1953; Hilton-Taylor 2000
	<i>P. lanaoensis</i>	Critically endangered*	-	Herre 1924; Hilton-Taylor 2000
	<i>P. lindog</i>	Vulnerable*	-	Herre 1924; Hilton-Taylor 2000
	<i>P. manalak</i>	Critically endangered*	Subsistence fisheries	Herre 1924; Hilton-Taylor 2000
	<i>P. manguaensis</i>	Vulnerable*	-	Herre 1924; Hilton-Taylor 2000
	<i>P. sirang</i>	Vulnerable*	-	Herre 1953; Hilton-Taylor 2000
	<i>P. tras</i>	Critically endangered*	-	Hilton-Taylor 2000
	<i>P. tumba</i>	Vulnerable*	Low importance in fisheries	Herre 1924; Hilton-Taylor 2000
	<i>Spratellacypris palata</i>	Critically endangered*	Commercial importance in fisheries	Herre 1953; Hilton-Taylor 2000
Sri Lanka	<i>L. fisheri</i>	Endangered*	-	Talwar and Jhingran 1992; Hilton – Taylor 2000
	<i>L. porcellus</i>	Critically endangered*	Low importance in fisheries	Talwar and Jhingran 1992; Hilton – Taylor 2000
	<i>P. asoka</i>	Endangered*	Commercial importance as aquarium fish	Pethiyagoda 1991; Hilton-Taylor 2000
	<i>P. bandula</i>	Critically endangered*	For likely future use in aquaculture	Pethiyagoda 1991; Hilton-Taylor 2000
	<i>P. martenstyni</i>	Endangered*	Commercial importance in fisheries	Pethiyagoda 1991; Hilton-Taylor 2000
Thailand	<i>B. melanopterus</i>	Endangered*	Commercial importance in aquaculture and as aquarium fish	Kottelat 2001; Hilton – Taylor 2000
	<i>C. caeruleostigmata</i>	Critically endangered*	Commercial importance as aquarium fish	Rainboth 1996; Hilton-Taylor 2000
	<i>P. jullieni</i>	Endangered*	Commercial importance in fisheries; aquaculture – experimental; gamefish	Roberts 1992; Hilton-Taylor 2000
Vietnam	<i>B. melanopterus</i>	Endangered*	Commercial importance in aquaculture and as aquarium fish	Kottelat 2001; Hilton – Taylor 2000
	<i>P. jullieni</i>	Endangered*	Commercial importance in fisheries and in aquaculture	Roberts 1992; Hilton-Taylor 2000
	<i>C. caeruleostigmata</i>	Critically endangered*	Commercial importance as aquarium fish	Rainboth 1996

* Data obtained from the FishBase record of threatened species (www.fishbase.org); based on IUCN categories of threatened species.