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Status of the endemic loaches of Iran

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Abstract. A study was conducted from 2007 to 2010 to determine the status of the endemic loach species of Iran. So far 27 loach species belonging to two families (Nemacheilidae and Cobitidae) and eight genera have been recorded from 19 water basins of Iran. Eleven loach species are endemic to Iran. *Oxynoemacheilus farsicus* is considered as junior synonym of *Oxynoemacheilus persus*. The species *Ilamnemacheilus longipinnis* is known from a single specimen collected in the Tigris basin in 1978 and has to be considered as endemic but extinct in Iran. While some species like *Paracobitis smithi* are vulnerable due to their restricted and isolated habitat but drought, habitat alteration, extensive water extraction for irrigation and water pollution seems to be the major threatening factors to the loach survival in Iran. The Iran Department of Environment with the cooperation of Iranian Fisheries Research Organization must implement conservation programs to safeguard survival of Iran endemic loaches.

Key word: endemic, loach, conservation, Iran

Introduction

Few reviews of freshwater fish conservation have been conducted in the countries of the Middle East. Conservation strategies in Iran seem to be almost non-existent and most of the conservation measures for Iranian catchments have been carried out by neighboring countries in their part of the catchments in the South Caspian Sea basin. Some hatchery experiments have been conducted to improve the stock of commercially important species, but non-commercial and recreational species remain largely ignored (Coad 1980). A major problem with the conservation of freshwater fishes of Iran is the lack of scientific knowledge. The taxonomy of these fish is poorly understood, and besides the fishes of the Caspian Sea, an identification key for Iranian fishes has yet to be devised. The status of endemic fishes in Iran was recently reviewed by Coad (2005), but the conservation status of all Iranian loach species except *Paracobitis smithi* has not been evaluated by

the International Union for Conservation of Nature (IUCN red list 2010).

The loaches of Iran belong to two families, Nemacheilidae and Cobitidae. The nemacheilid loaches of Iran were recently classified in six genera by Prokofiev (2009): *Oxynoemacheilus*, *Seminemacheilus*, *Paracobitis*, *Paraschistura*, *Turcinemacheilus* and *Metashistura*. An additional genus, *Ilamnemacheilus* was described by Coad & Nalbant (2005). During a review of the loaches of Iran, Nalbant & Bianco (1998) mentioned 19 nemacheilid species for this country. Among these, nine species are suspected to occur in Iran but have not yet been found there while eleven species are endemic to Iran. Among those species which occurrence has been considered as likely by Nalbant & Bianco (1998), *Turcinemacheilus kosswigi* was recently added to the nemacheilid loach fauna of Iran (Golzarianpour et al. 2009).

The cobitid loaches consist of two genera in the Iranian freshwater networks: *Cobitis* is distinguished

by the erectable spine below the eyes and by males having scales of Canestrini on their pectoral fin rays. Two species (*Cobitis* sp. and *Cobitis linea*), are generally considered to occur, while the presence of *Cobitis turcica* in Iran is questionable. Nalbant & Bianco (1998) reported its presence in Iran based a single specimen from Kor basin. Also Erkakan et al. (1999) doubted that the taxon is present in Iran and Coad (2010) believes that *C. turcica* in Nalbant & Bianco (1998) is actually *C. linea*. Second genus is *Sabanejewia* that is characterised by a stronger suborbital spine and lacks the lamina circularise in males. In the present study, the status of the endemic loach species of Iran is determined.

Material and Methods

Most of the main endorheic and exorheic basins of Iran have been sampled from 2007 to 2010. Fish sampling were done at 112 localities (Fig. 1) using electrofishing gear and dip net. The loach specimens were identified according to Bănărescu & Nalbant (1964, 1995) and Nalbant & Bianco (1998). Comments on the distribution, habitat and conservation status of endemic species follow Coad (1998), Kiabi et al. (1999), Kiabi & Abdoli (2000), Esmaeili et al. (2007), Coad et al. (2009) and present data.

Abbreviations were: D, dorsal fin ray; A, anal fin ray; P, pectoral fin ray; DD, data deficient; LC, least concern; NT, near threatened; VU, vulnerable; L, limited; M, moderate; W, wide.

Results and Discussion

More than 161 freshwater fish species so far have been described from Iran. About 27 species of them are loaches (16.7 % of freshwater fish fauna of Iran), which are found in all basins of Iran (Table 1). About 40 % of all identified loach species of Iran are endemic. Among the basins mentioned, Tigris and Kor catchments (with four and three endemic species respectively) are most diverse. Four endemic loaches (*Paraschistura sargadensis*, *Oxynoemacheilus kermanshahensis*, *Paraschistura nielsenii* and *Seminemacheilus tongiorgii*) are found in more than one basin (multi-basin) and seven species are known only from a single basin (*Paracobitis smithi*, *P. iranica*, *P. vignai*, *Ilamnemacheilus longipinnis*, *Oxynoemacheilus bergianus*, *O. persus* and *C. linea*). In the current study, *Paraschistura bampurensis* occurs in Pakistanian waters close to the border with Iran (Mirza 2003), but has never been found in Iran, therefore we do not consider this species further in the present study. Among the spined loaches, *C. linea*

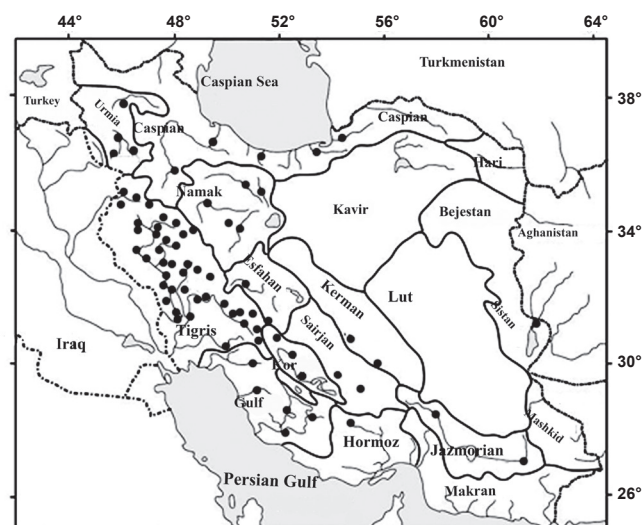


Fig. 1. The map of nineteen freshwater basins of Iran; solid circle, sampling site. Maharlou basin is located between Kor and Persian Gulf basins. Based on Coad 1998.

is the only endemic cobitid species to Iran. Nalbant & Bianco (1998) reported *C. turcica* based only one specimen from Kor basin. However, we agree with Coad (2010) that this specimen most likely was a misidentified *C. linea*. The species of *Cobitis* occurring in the southern Caspian basin has often been referred to as *Cobitis taenia*. Since the real *C. taenia* is a rather northern species (Kottelat & Freyhof 2007), it is unlikely to occur in Iran and we list the *Cobitis* in the southern Caspian basin as *Cobitis* sp. If this species is endemic to Iran is unclear, but most species in the southern Caspian basin are shared between neighbouring countries.

Untreated sewage, various pollutions, sand extraction in river, construction of dams, drought and extensive extraction of water for irrigation are the major threats in the studied areas. The distribution, frequency and influence of the threat causing factors mentioned above and the conservation status of each species were evaluated (Table 2). Status of eleven endemic loach species is shortly discussed below:

Ilamnemacheilus longipinnis

(Coad & Nalbant 2005)

Common name: long-fin loach

Body moderately elongated with highest depth before dorsal-fin origin; paired fins very long; D III 10; A II 5; P I 9. The species *I. longipinnis* is known from a single specimen collected in the Tigris river basin in 1978 (Coad & Nalbant 2005), but all later attempts to recollect this species failed. It is possible that the species will be found again in other parts of the Tigris

Table 1. Distribution of the loaches within the nineteen freshwater basins of Iran (based on present as well as previous studies).

Species \ Basin	River Tigris	South of Caspian sea	Lake Namak	River Kor	Persian Gulf	Urmia	Sistan	Estahan	Maharlou	Hormoz	Kerman-Na'im	Hamon Jazmorian	Sirjan	Makran	Mashkid	Lut	Bejestan	Kavir	Hari River
<i>Oxynoemacheilus brandtii</i>			?			●													
<i>Oxynoemacheilus bergianus</i>	●	?																	
<i>Oxynoemacheilus cf. angorae</i> #	?	?	●			?												?	
<i>Oxynoemacheilus farsicus</i> ¹			?	?	?				?										
<i>Oxynoemacheilus frenatus</i> #	?																		
<i>Oxynoemacheilus persus</i>	?			●		?													
<i>Oxynoemacheilus kermanshahensis</i>	●																		
<i>Paracobitis iranica</i>			●																
<i>Paracobitis rhadinaea</i>	?						●					?			?	?	?		
<i>Paracobitis malapterura</i>	?	?	●	?															
<i>Paracobitis vignai</i>							●												
<i>Paracobitis longicauda</i> #		?																	
<i>Paracobitis smithi</i>	●																		
<i>Paraschistura bampurensis</i> #					?							?		?	?	?			
<i>Paraschistura sargadensis</i>										●	●	●	●	●	●				
<i>Paraschistura nielsenii</i>	●				●														
<i>Paraschistura Kessleri</i> #							?								?		?		●
<i>Seminemacheilus tongiorgii</i>	●			●					?	?									
<i>Ilamnemacheilus longipinnis</i> ²	●																		
<i>Turcinoemacheilus kosswigi</i>	●							●											
<i>Metaschistura cristatus</i> #		?																	●
<i>Triplophysa stoliczkai</i> #							?												
<i>Cobitis linea</i>				●						●									
<i>Cobitis turcica</i> ³ #		?																	
<i>Cobitis sp.</i> ⁴	?	?	?																
<i>Sabanejewia caspia</i>		●																	
<i>Sabanejewia aurata</i>		●																	

Note: bold letters: endemic to Iran, ● confirmed presence in the basin, # probably found in the basin due to its presence in the shared water catchments with adjacent countries, ? the presence of species is doubtful and need to be confirmed by fresh specimens. ¹ *O. farsicus* was treated as junior synonym of *O. persus* until new data demonstrate the validity of *O. farsicus* (see the text), ² after 1978, all attempts to recollect this species failed (see the text), ³ this taxon was not captured at the present collection and in addition its presence in Iran is doubtful (see the text), ⁴ it would be better to call the *Cobitis* in the southern Caspian basin *Cobitis sp.* rather than *C. taenia* (see the text).

Table 2. Conservation status of the endemic loaches of Iran (based on present as well as previous studies).

Endemic Species	Distribution	Frequency	Habitat destruction	Agricultural pollution	Industrial pollution	Aquaculture pollution	Drought	Scientific sampling	Conservation status
<i>O. bergianus</i>	L	1	*	*	*	*			NT
<i>O. persus</i>	M	3	*	*		*	*		LC
<i>O. kermanshahensis</i>	W	2	*	*	*	*	*		NT
<i>P. iranica</i>	L	?	*		*		*	*	DD
<i>P. vignai</i>	L	?					*	*	DD
<i>P. smithi</i>	L	1	*				*	*	VU
<i>P. nielsenii</i>	L	1		*	*				DD
<i>P. sargadensis</i>	W	2		*		*	*		LC
<i>S. tongiorgii</i>	L	1	*	*			*	*	VU
<i>I. longipinnis</i> #	L	?					*		DD
<i>C. linea</i>	L	?	*	*		*	*	*	DD

1 = low; 2 = moderate; 3 = frequent, L; limited, M; medium, W; wide, * presence of threatening factors, ? their abundance are poorly known, # after 1978, all later attempts to recollect this species failed (see the text).

basin, but until then we have to consider the species as endemic, but extinct for Iran.

Oxynoemacheilus persus (Heckel, 1843)

Common name: Persian loach

Body elongated with equal depth; D III, IV 7-8 (82 %); A III, IV 5; P I 8-9-10 (64 %); lateral line complete; the back has 7-8 rounded dark-brown blotches with 10-11 distinct blotches on the flank; caudal fin forked. Its distribution range is limited to the endorheic Kor River basin where the Persian loach exists in most rivers of the basin. Habitat destruction, water diversion, drought, agricultural and aquaculture pollutions are the main threats in the basin. Because of its high frequency in the basin, its conservation status is categorized as least concern.

Two species have been described from the Kor basin: *O. persus* and *O. farsicus*. Since no morphologic characters to distinguish the two species are known, we here use the older name and treat *O. farsicus* as junior synonym of *O. persus* until new data demonstrate the validity of *O. farsicus*.

Oxynoemacheilus kermanshahensis

(Bănărescu & Nalbant, 1967)

Common name: Kermanshah loach

Body elongated with equal depth; D III, IV 7-8; A III, IV 5; P I 8-9-10; lateral line incomplete; the colour is distinct with three stripes along the flank. Samplings showed that the Kermanshah loach is restricted to upper Karkheh and Dez drainages. It is found in all tributaries of Gamasiab and Kashkan rivers with moderate frequency (Abdoli 2000). Habitat destruction, drought, extensive extraction of water for irrigation as well as industrial, agricultural and aquaculture pollutions severely threat its survival. Its conservation status is categorized as near threatened.

Oxynoemacheilus bergianus (Derzhavin, 1934)

Common name: Sefidrud loach

Body elongated with equal depth; D III 8; A III 5; P I 9; lateral line incomplete; the flank has several irregular dark blotches; caudal fin forked. Distribution range of Sefidrud loach is limited to western part of the Caspian Sea basin in Iran (the River Sefidrud and its tributaries) with low frequency (Abdoli & Naderi 2009). This area is threatened by the extraction of gravel from the river, extensive extraction of water and untreated sewage. Based on the available data (Abdoli & Naderi 2009) this species is categorized as near threatened.

Paracobitis smithi (Greenwood, 1976)

Common name: blind loach

Eyeless loach; D III 7; A III 5; P I 10; lateral line is irregularly interrupted; colourless; caudal fin almost forked. It is a fabulous and unique member of the family Nemacheilidae and found in a subterranean water cave in the Zagros Mountains. During the study, the blind loach was not caught which demonstrates its low frequency. Our inquiry showed that this mysterious loach has not been seen for more than ten years. Drought, landslide and scientific sampling could be affective on its perpetuity. Its conservation status is vulnerable (Coad et al. 2009).

Paracobitis iranica (Nalbant & Bianco 1998)

Common name: Iranian crested loach

The body is scaled; D III 7-8; A III 5; P I 9; lateral line complete; caudal fin emarginated. Facts on its systematic and nomenclature is doubtful (Coad 2010). The Iranian loach has only been known from the River Qom in the Namak Lake basin. Because of inadequate sampling, there is no sufficient information about its frequency. Among the threatened factors, drought has the most negative effect on its existence in the basin. Its conservation status is categorized as data deficient due to the lack of knowledge of its distribution range, frequency and deleterious factors.

Paracobitis vignai (Nalbant & Bianco 1998)

Common name: vigna loach

Scaleless; D III 6-8; A II 5-6; P I 8-10; lateral line complete; caudal fin deeply forked. To date it is only recorded from the Helmand lake system of Seistan region. Biology, distribution range and numbers are poorly known so an assessment of conservation status cannot be made. Drought is the main threat in the region.

Paraschistura nielsenii

(Nalbant & Bianco 1998)

Common name: Nielsen loach

Short body with a short head and blunt snout; D III, IV 7; A III 5; P I 8; lateral line incomplete; the body with 7-16 dusky brown bars; caudal fin emarginated. There is no well documented information on its distribution range and frequency. During the sampling this species was caught from the River Dez (Sabz-a'b area) for the first time which makes it likely that it is much more widespread and has been overlooked in other parts of Tigris basin. The main threats are untreated sewage and introduction of non-native fish species in the sampled areas.

Paraschistura sargadensis (Nikol'skii, 1899)

Common name: Sarhad loach

Body elongated with equal depth; D III, IV 7; A III 5; P I 8; lateral line incomplete; a black spot at the base of dorsal fin; caudal fin emarginated. It is the multi-basin loach that has been recorded in six basins from the eastern parts of Iran. Sampling results showed that Sarhad loach has wide distribution with frequent populations. Water pollution from domestic sewage, decrease in the water level especially during the dry seasons make habitat alterations can influence on the frequency of this species.

Seminemacheilus tongiorgii

(Nalbant & Bianco 1998)

Common name: Tongiorgi loach

Body short and compressed laterally; D IV 7-8; A III, IV 5; P I 10-11; lateral line incomplete; four pores on supratemporal canal; caudal fin truncate. The holotype was collected from a big spring near Darab city in the Kul River basin which may be an alphabetic mistake. During the study *S. tongiorgii* was only found in the Ghadamgah spring, a regional biodiversity hotspot or micro hotspot (Esmaeili et al. 2007), in the Kor River basin; hence, any threat such as water diversion, drainage rehabilitation, water pollution, drought, development of intensive aquaculture and introduction of non-native fish species are the main factors affecting the biological diversity of this loach. Samplings revealed that the frequency of Hormoz loach is much more rare than *O. persus* in Kor River basin. For these reasons it should be considered as threatened or vulnerable species (Esmaeili et al. 2007).

Cobitis linea (Heckel, 1849)

Common name: southern spined loach

Lateral line incomplete; D II 6-7; A II, III 5; P 7-9; males have two Canestrini's scales at the unbranched and first branched pectoral fin rays; dark brown lateral spots being reduced or absent. *C. linea* has restricted distribution in the River Kor and probably Hormoz

basin. Unlike the nemacheilid loaches, it prefers muddy bottom with the quiet flow water. There is no well documented data on its distribution and frequency. Thus, future works should be undertaken to evaluate its dispersal range and population size.

Conclusions

There is an urgent need to determine the status of the abundance of loach fishes in Iran. The biology of most loach species is unknown (Coad 2010). To ensure survival of many rare and endangered species, long-term research will be needed. Detailed survey, exploration and documentation of kind, occurrence and distribution of loaches in the streams of main rivers are much needed in Iran.

Drought, as a main problem in Iran, has dried up many natural springs, marshes, ponds and streams reducing river flows especially in the most main rivers and tributaries of Karkheh drainage threatening specifically the habitat of *O. kermanshahensis*. Industrial, agricultural and aquaculture pollutants, as the main sources of water pollution, have significantly increased in the recent two decades in Iran severely endangering all freshwater environments and their biodiversity.

There is no doubt that many ecosystems need conservation actions to lighten the ecologically harmful consequences that habitat modifications are causing (Simila et al. 2006). Most of the endemic loach species are currently suffering from the habitat alterations, so assessments and habitat protection in order to facilitate the future survival of these species is necessary. Since 46 % of the loach species in Iran are considered endemic, which is the highest rate among all other fresh water families there, specific attention should be paid to their conservation.

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