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COMPOSITION OF VALUABLE FISH, INVASIVE SPECIES AND DANGEROUS FISH FOR HUMAN IN GIANH RIVER BASIN

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Over time of analysis, we have identified 93 fish species belong to 81 genera, 43 families of 13 orders of valuable fishes, invasive fishes and dangerous fish for human in Gianh river basin in Quang Binh - North Central of Vietnam. Therein there were 5 species in this region being considered in the Red Book to be protected. Have 36 species is level Not Evaluated; 15 species is level Data Deficient; 37 species is level Least Concern; 3 species is level Near Threatened; 1 species is level Vulnerable; 1 species is level Endangered in this region being considered in The rare fish species in the IUCN Red List of Threatened Species. There are 84 species of fish having economic value, 4 invasive species and 26 dangerous fish for human.

Keywords: *ichthyofauna, valuable economic fish, invasive species, rare fish species, dangerous fish.*

SPECII DE PEŞTI VALOROŞI, SPECII INVAZIVE DE PEŞTI ŞI SPECII DE PEŞTI POTENŢIAL PERICULOŞI PENTRU OM ÎN BAZINUL RÂULUI GIANG

Pe parcusul analizei, în bazinul fluviului Gianh din Quang Binh (Centrul de Nord al Vietnamului) noi am identificat 93 specii de peşti din cadrul a 81 genuri, 43 familii cuprinse în 13 ordine de peşti valoroşi, peşti invazivi şi peşti potenţial periculoşi pentru om. În această regiune sunt 5 specii care se consideră ca fiind înregistrate în Cartea Roşie a Vietnamului pentru a fi protejate. Tot aici sunt 26 specii încă neevaluate (NE), 15 specii despre care există date insuficiente (DD), 37 specii nepericlitate (LC), 3 specii aproape ameninţate cu dispariţia (NT), 1 specie vulnerabilă, 1 specie pereclitată care în Lista Roşie Internaţională (IUCN) sunt considerate specii rare de peşti. Sunt 84 specii de peşti care au valoare economică, 4 specii invazive şi 26 specii potenţial periculoase pentru om.

Cuvinte-cheie: *ihtiofaună, peşte economic valoros, specii invazive, specii de peşti rare, peşte periculos.*

Introduction

Quang Binh province is a province along Vietnam's north-central coast. The province has an area of 51500 km^2 and population about 857.818 inhabitants. The province is bordered by the Laotian Khammouane province to the west, the North Pacific Ocean to the east, Ha Tinh province to the north and Quang Tri province to the south. Gianh river basin of Quang Binh province. The Gianh river is 158 km long and the basin area approximately 4680 km^2. It is derived from the coastal area of the Co Pi mountain which is 2.017 m height and belongs to Truong Son range. It flows through the territory of Minh Hoa, Tuyen Hoa, Quang Trach districts. In addition to the main line, there is a tributary river called the Con river (Son river) in the south with many underground rivers and caves originate in Thuong Trach commune, Bo Trach district and flows through the Phong Nha - Ke Bang National Park then confluence with the main stream in Quang Thuan commune, Quang Trach district and reach into the East Sea at Gianh River Estuary. Local inhabitants living in both sides of the basin are almost ethnic minority. They have low education, poverty and misery. Their daily food was supported from surrounding natural resources and self-service. In natural resources, fish sources play an important role for local people's lives. By that view, we study this project "Composition of valuable fishes, invasive fishes and dangerous fish for human in Gianh river basin."

Material and methods

Fish specimens were collected mainly from fishing men in these survey regions. Fishing tools are fishnets, rackets, casting – net, multi size fishing – rods and also professional tools of fish men such as: fishing basket, fishing traps, etc. Some other specimens was bought from local people. All samples were given full information in field trip diary, sampling notes, taking pictures and fixed with formaline 8 - 10% and reserving with formaline 5% in Animal Laboratory of Department of Biology, Vinh University.

We use the following materials to identification species: Chen Yiyu et al. (1998); Chu Xinluo et al. (1999); Do Thi Nhu Nhung (2007); Freyhof J., F. Herder (2002); Hartel K. E., T. Nakabo (2003); Knapp L. W (1999); Kottelat M (1990); Kottelat M., Freyhof J. (2007); Mai Dinh Yen (1978); Mai Dinh Yen et al. (1992);

Menon A. (1977); Nakabo T (1982, 1983); Nguyen Huu Phung (2001); Nguyen Khac Huong (1991, 2001; 2007); Nguyen Nhat Thi (1991, 2001); Nguyen Van Hao, Ngo Si Van (2001); Nguyen Van Hao (2005); Nguyen Van Luc et al. (2007); Ochiai A. et al. (1955); Prokofiev A. M. (2010); Rainboth J. (1996); Tetsji Nakabo (2002); William P. (1966); Yokogawa K. et al. (2008); Yue Peiqi et al (2000) served as methodological and theoretical scientific basis.

List of Orders and Families is sorted by William N. Eschmeyer and Jon David Fong 2015. Genera of subfamilies and species of genera is sorted by a to z [33, 35].

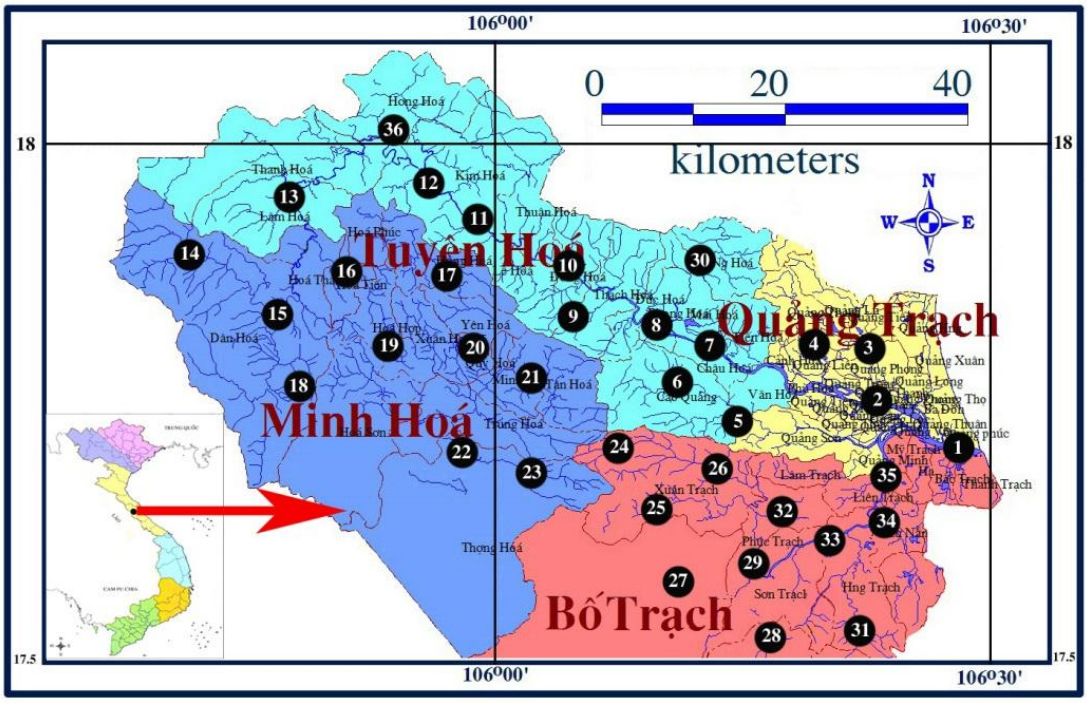

Fig.1. Map of fish sampling in Gianh river basin.

Results and discussion

We conducted 12 field surveys in 2003 - 2011 at 36 study sites, collected 5699 specimens and analyzed 1882 specimens. Over time of analysis, we have identified 93 fish species belong to 81 genera, 43 families of 13 orders of valuable fishes, invasive fishes and dangerous fish for human in Gianh river basin in Quang Binh - North Central of Vietnam (Table 1).

Table 1

Composition of fish species having economic value, invasive and species created a danger to humans in Gianh river basin

N^0	Science name	RB	IUCN	EV	DH
I.	**ORDER RAJIFORMES**				
(1).	**FAMILY RAJIDAE**				
1.	*Dasyatis sinensis* (Steindachner, 1892)		**DD**		*
II.	**ORDER OSTEOGLOSSIFORMES**				
(2).	**FAMILY NOTOPTERIDAE**				
2.	*Notopterus notopterus* (Pallas, 1769)		**LC**	*	
III.	**ORDER ANGUILLIFORMES**				
(3).	**FAMILY ANGUILLIDAE**				
3.	*Anguilla marmorata* Quoy & Gaimard, 1824	**VU**	**LC**	*	
IV.	**ORDER CLUPEIFORMES**				
(4).	**FAMILY CLUPEIDAE**				
4.	*Clupanodon thrissa* (Linnaeus, 1758)	**EN**	**NE**	*	
5.	*Konosirus punctatus* (Tem. & Sch., 1846)	**VU**	**NE**	*	
6.	*Sardinella albella* (Valenciennes, 1847)		**LC**	*	

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N⁰	Science name	RB	IUCN	EV	DH
V.	**ORDER CYPRINIFORMES**				
(5).	**FAMILY CYPRINIDAE**				
7.	*Hemiculter leucisculus* (Basilewsky, 1855)		**LC**	*	
8.	*Carassioides acuminatus* (Richardson, 1846)		**LC**	*	
9.	*Carassius auratus* (Linnaeus, 1785)		**LC**	*	
10.	*Cyprinus carpio* Linnaeus, 1758		**VU**	*	+
11.	*Cirrhinus molitorella* (Valenciennes, 1844)		**NT**	*	
12.	*Garra imberba* Garman, 1912		**DD**	*	
13.	*Osteochilus salsburyi* Nichols & Pope, 1927		**LC**	*	
14.	*Ctenopharyngodon idella* (Val., 1844)		**NE**	*	+
15.	*Squaliobarbus curriculus* (Richardson, 1846)		**DD**	*	
16.	*Hypophthalmichthys molitrix* (Valenciennes, 1844)		**NT**	*	+
17.	*Hemibarbus umbrifer* (Lin, 1931)		**LC**	*	
18.	*Microphysogobio kachekensis* (Oshima, 1926)		**LC**	*	
19.	*Hypsibarbus annamensis* (Pel. & Che., 1936)	**VU**	**DD**	*	
20.	*Hypsibarbus macrosquamatus* (Mai, 1978)		**DD**	*	
21.	*Nicholsicypris dorsohorizontalis* Ng. & Do., 1969		**NE**	*	
22.	*Neolissochilus benasi* (Pellegrin & Chevey, 1936)		**DD**	*	
23.	*Onychostoma gerlachi* (Peters, 1881)		**NT**	*	
24.	*Opsariichthys bidens* Günther, 1873		**LC**	*	
25.	*Paraspinibarbus macracanthus* (Pel. & Che., 1936)		**DD**	*	
26.	*Poropuntius solitus* Kottelat, 2000		**EN**	*	
27.	*Spinibarbus denticulatus* (Oshima, 1926)		**LC**	*	
28.	*Spinibarbus hollandi* Oshima, 1919		**DD**	*	
(6).	**FAMILY COBITIDAE**				
29.	*Cobitis laoensis* (Sauvage, 1878)		**LC**	*	
30.	*Misgurnus anguillicaulatus* (Cantor, 1842)		**NE**	*	
31.	*Misgurnus mizolepis* Günther, 1888		**NE**	*	
(7).	**FAMILY NEMACHEILIDAE**				
32.	*Schistura hingi* (Herre, 1934)		**LC**	*	
33.	*Schistura pervagata* Kottelat, 1998		**LC**	*	
34.	*Traccatichthys taeniatus* (Pel. & Che., 1936)		**NE**	*	
VI.	**ORDER SILURIFORMES**				
(8).	**FAMILY BAGRIDAE**				
35.	*Mystus gulio* (Hamilton, 1822)		**LC**		*
36.	*Hemibagrus centralus* Mai, 1978		**DD**	*	*
37.	*Tachysurus virgatus* (Oshima, 1926)		**DD**	*	*
(9).	**FAMILY SILURIDAE**				
38.	*Silurus asotus* Linnaeus, 1758		**LC**	*	*
39.	*Pterocryptis cochinchinensis* (Val., 1840)		**LC**	*	*
(10).	**FAMILY CLARIIDAE**				
40.	*Clarias fuscus* (Linnaeus, 1758)		**LC**	*	*
(11).	**FAMILY PLOTOSIDAE**				
41.	*Plotosus lineatus* (Thunberg năm 1787)		**NE**	*	*
VII.	**ORDER AULOPIFORMES**				
(12).	**FAMILY SYNODONTIDAE**				
42.	*Saurida elongata* (Tem. & Sch., 1846)		**NE**	*	
VIII.	**ORDER BELONIFORMES**				
(13).	**FAMILY BELONIDAE**				
43.	*Strongylura strongylura* (van Hasselt, 1823)		**NE**	*	*
IX.	**ORDER SYNBRANCHIFORMES**				
(14).	**FAMILY SYNBRANCHIDAE**				
44.	*Monopterus albus* (Zuiew, 1793)		**LC**	*	
(15).	**FAMILY MASTACEMBELIDAE**				

N^0	Science name	RB	IUCN	EV	DH
45.	*Mastacembelus armatus* (Lacepède, 1800)		**LC**	*	*
46.	*Sinobdella sinensis* (Bleeker, 1870)		**LC**	*	*
X.	**ORDER SCORPAENIFORMES**				
(16).	**FAMILY TETRAROGIDAE**				
47.	*Paracentropogon rubripinnis* (Tem. & Sch., 1843)		**NE**		*
(17).	**FAMILY SYNANCEIIDAE**				
48.	*Minous pusillus* (Tem. & Sch., 1843)		**NE**		*
(18).	**FAMILY PLATYCEPHALIDAE**				
49.	*Platycephalus indicus* (Linnaeus, 1758)		**DD**	*	*
50.	*Rogadius serratus* (Cuvier, 1829)		**NE**	*	*
51.	*Sorsogona tuberculata* (Cuvier, 1829)		**NE**	*	*
XI.	**ORDER PERCIFORMES**				
(19).	**FAMILY PERCICHTHYIDAE**				
52.	*Coreoperca whiteheadi* Boulenger, 1900		**LC**	*	
(20).	**FAMILY LATIDAE**				
53.	*Lates calcarifer* (Bloch, 1790)		**NE**	*	
(21).	**FAMILY SERRANIDAE**				
54.	*Epinephelus awoara* (Tem. & Sch., 1842)		**DD**	*	
55.	*Epinephelus longispinis* (Kner, 1864)		**LC**	*	
(22).	**FAMILY TERAPONTIDAE**				
56.	*Terapon jarbua* (Forsskål, 1775)		**LC**	*	*
57.	*Pelates sexlineatus* (Quoy & Gaimard, 1825)		**LC**	*	*
(23).	**FAMILY SILLAGINIDAE**				
58.	*Sillago maculata* Quoy & Gaimard, 1824		**NE**	*	
59.	*Sillago sihama* (Forsskål, 1775)		**NE**	*	
(24).	**FAMILY CARANGIDAE**				
60.	*Carangoides praeustus* (Bennett, 1830)		**NE**	*	
61.	*Selaroides leptolepis* (Cuvier, 1833)		**NE**	*	
62.	*Scomberoides lysan* (Forsskål, 1775)		**NE**		*
(25).	**FAMILY LUTJANIDAE**				
63.	*Lutjanus fulviflamma* (Forsskål, 1775)		**NE**	*	
64.	*Lutjanus russellii* (Bleeker, 1849)		**NE**	*	
(26).	**FAMILY GERREIDAE**				
65.	*Gerres limbatus* Cuvier, 1830		**LC**	*	
66.	*Gerres filamentosus* Cuvier, 1829		**LC**	*	
(27).	**FAMILY HAEMULIDAE**				
67.	*Pomadasys maculatus* (Bloch, 1793)		**LC**	*	
(28).	**FAMILY SCIAENIDAE**				
68.	*Argyrosomus pawak* Lin, 1940		**NE**	*	
(29).	**FAMILY DREPANEIDAE**				
69.	*Drepane punctata* (Linnaeus, 1758)		**NE**	*	
(30).	**FAMILY MUGILIDAE**				
70.	*Liza affinis* (Günther, 1861)		**NE**	*	
(31).	**FAMILY CICHLIDAE**				
71.	*Oreochromis niloticus* (Linnaeus, 1758)		**NE**	*	+
(32).	**FAMILY CALLIONYMIDAE**				
72.	*Callionymus curvicornis* Valenciennes, 1837		**NE**	*	*
73.	*Callionymus pleurostictus* Fricke, 1982		**NE**		*
(33).	**FAMILY ODONTOBUTIDAE**				
74.	*Sineleotris chalmersi* Nichols & Pope, 1927		**LC**	*	
75.	*Sineleotris namxamensis* Chen & Kottelat, 2004		**DD**	*	
(34).	**FAMILY ELEOTRIDAE**				
76.	*Bostrychus sinensis* Lacepède, 1801	**CR**	**LC**	*	
(35).	**FAMILY GOBIIDAE**				

N^0	Science name	RB	IUCN	EV	DH
77.	*Oxyurichthys tentacularis* (Valenciennes, 1837)		**NE**	*	
78.	*Rhinogobius leavelli* (Herre, 1935)		**LC**	*	
79.	*Tridentiger trigonocephalus* (Gill, 1859)		**NE**	*	
80.	*Papuligobius uniporus* Chen & Kottelat, 2003		**DD**	*	
81.	*Pseudapocryptes elongatus* (Cuvier, 1816)		**LC**	*	
82.	*Glossogobius giuris* (Hamilton, 1822)		**LC**	*	
(36).	**FAMILY SCATOPHAGIDAE**				
83.	*Scatophagus argus* (Linnaeus, 1766)		**LC**	*	*
(37).	**FAMILY SIGANIDAE**				
84.	*Siganus canaliculatus* (Park, 1797)		**NE**	*	
85.	*Siganus punctatissimus* Fowler & Bean, 1929		**NE**		*
(38).	**FAMILY SPHYRAENIDAE**				
86.	*Sphyraena pinguis* Günther, 1874		**NE**	*	
(39).	**FAMILY ANABANTIDAE**				
87.	*Anabas testudineus* (Bloch, 1792)		**DD**	*	*
(40).	**FAMILY CHANNIDAE**				
88.	*Channa striata* (Bloch, 1793)		**LC**	*	
89.	*Channa gachua* (Hamilton, 1822)		**LC**	*	
XII.	**ORDER PLEURONECTIFORMES**				
(41).	**FAMILY SOLEIDAE**				
90.	*Aseraggodes xenicus* (Matsubara & Ochiai, 1963)		**NE**	*	
91.	*Solea ovata* Richardson, 1846		**NE**	*	
XIII.	**ORDER TETRAODONTIFORMES**				
(42).	**FAMILY TRIACANTHIDAE**				
92.	*Triacanthus biaculeatus* (Bloch, 1786)		**NE**		*
(43).	**FAMILY TETRAODONTIDAE**				
93.	*Lagocephalus sceleratus* (Gmelin, 1789)		**LC**		*
Total			**93**	**84**	**26**

Notes of table 1.: (**N^0**) Number the order; (**RB**) Species in the Vietnam Red Book 2007; (**IUCN**) Species in the IUCN Red List of Threatened Species; (**EV**) Species with precious economic values; (**IS**) Invasive species; (**DH**) Dangerous fish for human; (**NE**) Not Evaluated; (**DD**) Data Deficient; (**LC**) Least Concern; (**NT**) Near Threatened; (**VU**) Vulnerable; (**EN**) Endangered; (**CR**) Critically Endangered.

According to Vietnam Red Animals [14] and base of composition of valuable fishes, invasive fishes and dangerous fish for human in Gianh river basin (Table 1). There were 5 species in this region being considered in the Red Book to be protected: *Anguilla marmorata* Quoy & Gaimard, 1824, *Konosirus punctatus* (Tem. & Sch., 1846), *Hypsibarbus annamensis* (Pel. & Che., 1936) is level Vulnerable; *Clupanodon thrissa* (Linnaeus, 1758) is level Endangered; *Bostrychus sinensis* Lacepède, 1801 is level Critically Endangered. In five species in the Gianh river basin recorded in the Vietnam Red Book (2007), there are two species: *Anguilla marmorata, Clupanodon thrissa* that were caught in our field studies with large output. Moreover these 2 species are frequently used by people and have high price, so we put them into the list of species having economic value in Gianh River Basin. 3 species: *Hypsibarbus annamensis*, *Konosirus punctatus*, *Bostrychus sinensis* we only caught 1 to 2 times during our field study with low output. Therefore, the managers of natural resources should build more closely regulations to protect these species.

According to the rare fish species in the IUCN Red List of Threatened Species [34] and base of composition of valuable fishes, invasive fishes and dangerous fish for human in Gianh river basin (Table 1). There are 36 species is level Not Evaluated; 15 species is level Data Deficient; 37 species is level Least Concern; 3 species is level Near Threatened; 1 species is level Vulnerable; 1 species is level Endangered in this region being considered in The rare fish species in the IUCN Red List of Threatened Species

According to the method of determining fish species with economic value of the Mai Dinh Yen [10]. Fish species of economic value are fish having large output, with high prices and frequently used by people. We identified in the Gianh river basin there are 84 species of economic value. List of economic species are shown in column 5 Table 1. These species we encountered at all times of fieldwork with large output, and are

frequently used, sold, exchanged, served food to tourists in Phong Nha - Ke Bang National Park. Thus we consider these 84 species of fish having economic value in Gianh River Basin. Currently, people living on both sides of the basin of Gianh river have successfully raised some fish species, which have high economic value such as *Cyprinus carpio* Linnaeus, 1758; *Cirrhinus molitorella* (Valenciennes, 1844); *Ctenopharyngodon idella* (Val., 1844); *Hypophthalmichthys molitrix* (Valenciennes, 1844); *Clarias fuscus* (Linnaeus, 1758); *Monopterus albus* (Zuiew, 1793); *Oreochromis niloticus* (Linnaeus, 1758).

According to Nguyen Van Hao [23]. Ichthyofauna of the Gianh river basin from Vietnam have 4 invasive species: *Cyprinus carpio* Linnaeus, 1758; *Ctenopharyngodon idella* (Val., 1844); *Hypophthalmichthys molitrix* (Valenciennes, 1844); *Oreochromis niloticus* (Linnaeus, 1758). But in this 4 species Kottelat said that *Hypophthalmichthys molitrix* (Valenciennes, 1844) is indigenous.

According to the Chu Xinluo [2]; Hartel [6]; Knapp [7]; Nguyen Van Hao [23]; Rainboth J. Walter [28]; Tetsji Nakabo [29]; William P. D. [30] and our research shows that. In Gianh river basin have only 1 species *Lagocephalus sceleratus* secrete toxins endanger to humans. Similar to other puffer fishes, the silver-cheeked toadfish is extremely poisonous if eaten because it contains tetrodotoxin in its ovaries and to a lesser extent its skin, muscles and liver, which protects it from voracious predators. It becomes toxic as it eats bacteria that contain the toxin. This deadly substance causes paralysis of voluntary muscles, which may cause its victims to stop breathing or induce heart failure.

Some parts of fish (e.g. Spines of dorsal; spines of pectoral; spines of anal; preopercular spines; preocular spines; lacrimal spines; preorbital spines …) can hurt effectively such as bleeding, inflaming, frostbiting, smarting, etc. or attack terribly to human including 25 species below: *Dasyatis sinensis Mystus gulio, Hemibagrus centralus, Tachysurus virgatus, Silurus asotus, Pterocryptis cochinchinensis, Clarias fuscus, Plotosus lineatus, Strongylura strongylura, Mastacembelus armatus, Sinobdella sinensis, Paracentropogon rubripinnis, Minous pusillus, Platycephalus indicus, Rogadius serratus, Sorsogona tuberculata, Terapon jarbua, Pelates sexlineatus, Scomberoides lysan, Callionymus curvicornis, Callionymus pleurostictus, Scatophagus argus, Siganus punctatissimus, Anabas testudineus, Triacanthus biaculeatus.*

Conclusion

Over time of analysis, we have identified 93 fish species belong to 81 genera, 43 families of 13 orders of valuable fishes, invasive fishes and dangerous fish for human in Gianh river basin in Quang Binh - North Central of Vietnam. Therein there were 5 species in this region being considered in the Red Book to be protected. Have 36 species is level Not Evaluated; 15 species is level Data Deficient; 37 species is level Least Concern; 3 species is level Near Threatened; 1 species is level Vulnerable; 1 species is level Endangered in this region being considered in The rare fish species in the IUCN Red List of Threatened Species. There are 84 species of fish having economic value, 4 invasive species and 26 dangerous fish for human.

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