The Biodiversity of Freshwater Fishes and Different Measures Applied for Its Conservation in Vietnam

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INTRODUCTION

During the last three decades, I have opportunities to carry out many surveys on the biodiversity of freshwater fishes of almost important ecosystems distributed all over the country of Vietnam (Fig.1). Many papers have been reported [1], [2], [3], [4].

METHODS

For surveys on the biodiversity of freshwater fishes, I used the book of T. Bagenal, 1978 [5]. For ichthyogeographical analysis, I applied the methods used in zoogeographical analysis. For identification of fish species, I used the books dealing on systematic of freshwater fishes at the Oriental Region (China, India, Thailand, Vietnam).

RESULTS AND DISCUSSION

1. Freshwater Fish Species Composition

There are 471 freshwater fish species living in different types of freshwater ecosystems including streams, rivers, lakes, ponds, ricefields, wetlands, ground water streams, dam reservoirs and brackish lagoons.

They belonging to 217 genera and 48 families. Some of largest fish families are: Cyprinidae - 204 species, Cobitidae - 26, Bagridae - 22, Homalopteridae - 18, Gobiidae - 16, Siluridae - 15, Schilbeidae - 13, Ariidae - 12, Eleotridae - 11, Cynoglossidae - 11. (Table 1).

Among them, there are more than 50 endemic species. Many are described as new species recently, I would like remember particularly here that there is one new specie described by The Japanese Prince (now is The King) Akihito: Glossogobius sparsipapillus [6].

Comparing with medium-sized countries as Vietnam with 33 x 106 ha surface area, Vietnam is considered as a country with high biodiversity in freshwater fishes

2. Freshwater Ichthyogeographical Zones

Vietnam could be divided into 10 ichthyogeographical units in the level of Ichthyogeographical district belonging to the two major subregions of the Oriental Region namely South China subregion and Indochinese subregion (Fig. 2).

The South China subregion has 203 fish species belonging to 114 genera and 27 families. The Indochinese subregion has 255 fish species belonging to 130 genera and 43 families.

The two subregions has only 11 species in common. The 6 districts have mountainous fish fauna and the 3 districts have deltaic fish fauna.

3. Inland fisheries and freshwater aquaculture

Inland fisheries and freshwater aquaculture are good developed in Vietnam. Vietnam's surface water resources are provided by 15 major rivers distributed all over in the country.

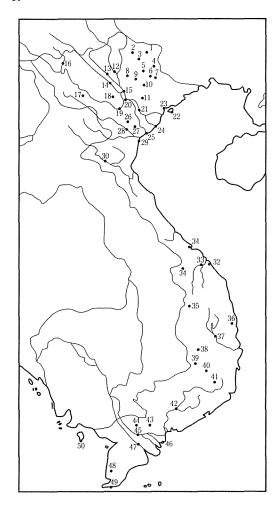
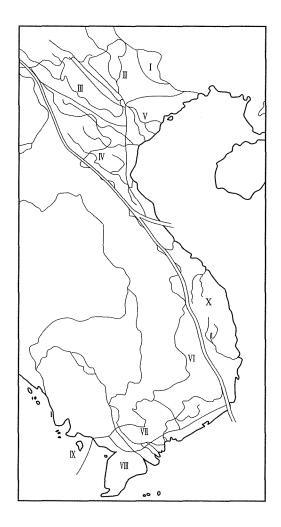


Fig. 2: (Right)
Map showing zoogeographical zones for the freshwater fishes of Vietnam:

I, II, III, IV, V: South China Subregion VI, VII, VIII, IX: Indochinese Subregion X: Overlapping district

Fig. 1: (Left)
Map showing 50 waterbodies
of Vietnam which have been
examined for their fish fauna.



Vietnam has two large deltas considered as two wetlands: The Hong (Red) River delta: 1,9 x 106 ha and The Cuu long (Mekong) River delta: 3,9 x 106 ha of surface area.

Vietnam is now using for aquaculture: Ponds and lakes - 60×103 ha, Dam reservoirs - 300×103 ha, Inundated ricefields - 400×103 ha, and brackish water lagoons and lakes - 300×103 ha.

There are some 50 economical freshwater fish species living in the natural waterbodies (Table 2) and some 24 cultured fish species (most of them are native) (Table 3). They have been highly appreciated by their growth rate, feeding patterns, and food values for human [7]

Annually, the average total fish culture yield is 200×103 tons, and total catching of natural fish species is 100×103 tons.

4. A great loss of biodiversity in freshwater fishes

The biodiversity of freshwater fishes in Vietnam is now seriously damaged by the 3 main factors:

- Overfishing and destructive fishing practices such as by using dynamite,
- Water pollution,
- Habitats deterioration by high rate of deforestation, herbicides used during the war, and reducing in surface areas by agricultural encroachment.

By overfishing and using destructive fishing methods, the catching per year of many waterbodies is decreasing quickly: In the Hong river 1.200 tons in 1964 and now 1990 - 500 tons, in the Chau-giang river 200 tons in 1978 and in 1982 - 50 tons, in the DongThapMuoi wetland in 1970 around 20.000 tons and now 5.000 tons, in the ThacBa dam reservoir 390 tons in 1980 and 1990 - 100 tons.

The rivers of Cau, Thuong, Thao, Cam are heavily polluted.

By deforestation, many streams and rivers in the mountain regions are heavily polluted by erosion and are lacking of water in the dry season.

The two large deltas now have a limited area as wildland: For the Hong delta around 50.000 ha, and the Cuulong delta 300.000 ha. Most of their surface area are engaged by intensive agriculture.

Now there many (40) freshwater fish species are rare and endangered (Table 4) [8].

5. Many measures have been applied for its conservation

There are many measures which have been applied for biodiversity conservation in Vietnam such as:

In-situ conservation: Protected areas,

Ecosystems conservation, Control of alien species,

Ex-situ conservation particularly for the local cultured fish species:

Water pollution control by Environmental laws and Environmental standards [9],

Public education and awareness,

Impact assessment and minimizing adverse impacts,

Regulations in fisheries management [10],

But all of the above efforts could not give the good expected results. The biodiversity continues to decrease.

It is necessary to overcheck these above measures for finding the key factors.

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Table 1: List of families with number of genera and species of freshwater fishes of Vietnam.

No	Name of family		Number	No	Name of family N		
	(of genera	of species		, OI)	genera of sp	pecies
1.	Elopidae	1	1	25.	Anguillidae	1	2
2.	Clupeidae	6	9	26.	Psettodidae	1	1
3.	Engraulidae	5	8	27.	Bothidae	1	1
4.	Notopteridae	1	2	28	Soleidae	2	8
5.	Mastacembelidae	1	4	29.	Cynoglossidae	2	11
6.	Salangidae	3	3	30.	Syngnathidae	1	1
7.	Cyprinidae	87	204	31.	Ophiocephalidae	2	7
8.	Ophichthyidae	1	1	32.	Polynemidae	2	3
9.	Flutidae	1	1	33.	Anabantidae	5	9
10	Symbranchidae	2	2	34.	Centropomidae	2	5
11.	Homalopteridae	4	18	35.	Toxotidae	1	1
12.	Gyrinocheilidae	1	2	36.	Sparidae	1	1
13.	Cobitidae	9	26	37.	Serranidae	2	3
14.	Siluridae	8	15	38.	Lobotidae	1	2
15.	Clariidae	1	3	39.	Scatophagidae	1	1
16.	Plotosidae	1	1	40.	Nandidae	2	2
17.	Bargridae	8	22	41.	Sciaenidae	1	1
18.	Sisoridae	4	8	42	Eleotridae	6	11
19.	Ariidae	3	12	43.	Gobiidae	11	16
20.	Schilbeidae	5	13	44.	Periopthalmidae	1	1
21.	Cyprinodontidae	2	3	45.	Apocrypteidae	3	3
22.	Poecilidae	1	1	46.	Gobioididae	2	3
23.	Belonidae	4	6	47.	Lagocephalidae	2	2
24.	Hemirhamphidae	: 2	4	48.	Tetrodontidae	3	7

Total of 48 families with 217 genera and 471 species.

Table 2: List of 50 economical freshwater fish species living in natural waterbodies of Vietnam.

Clupanodon thrissa
 Coilia grayi

5. Cyprinus centralus

7. Puntius altus

9. Altigena lemassoni

11. Spinibarbichthys denticulatus

13. Cirrhinus microlepis

15. Hampala macrolepidota

17. Cyclocheilichthys enoplo s

19. Thynnichthys thynnoides

21. Rasbora lateristriata

23. Squaliobarbus curriculus

25. Misgurnus fossilis

27. Clarias macrocephalus

29. Wallago attu

31. Cranoglanis sinensis

33. Anguilla bicolor pacifica

35. Ophiocephalus striatus

37. Mastacembelus armatus

39. Anguilla marmorata

41. Cyprinus carpio

43. Cirrhina molitorella

45. Mylopharyngodon piceus

47. Puntius gonionotus

49. Trichogaster pectoralis

2. Hilsa reevesii

4. Notopterus notopterus

6. Catlocarpio siamensis

8. Lissochilus krempfi

10. Megalobrama terminalis

12. Semilabeo notabilis

14. Puntioplites proctozysron

16. Morulius chrysophekadion

18. Hemiculter leucisculus

20. Elopichthys bambusa

22. Onychostoma gerlarchi

24. Leptobarbus Hoeveni

26. Clarias fuscus

28. Hemibagrus elongatus

30. Bagarius bagarius

32. Fluta alba

34. Anabas testudineus

36. Ophiocephalus micropeltes

38. Oxyeleotris marmorata

40. Mugil cephalus

42. Carassius auratus

44. Hypophthalmichthys molitrix

46. Osteochilus hasselti

48. Pangasius micronemus

50. Osphronemus gorami

Table 3: List of freshwater cultured fish species in Vietnam.

1. Chanos chanos

3. Carassius auratus

5. Puntius javanicus

7. Mypharyngodon piceus

9. Hypophthalmichthys molitrix Harmandi

11. Clarias lazera

13. Mugil cephalus

15. Trichogaster pectoralis

17. Oreochromis mossambicus

19. Labeo rohita

21. Catla catla

23. Clarias macrocephalus

2. Cyprinus carpio

4. Osteochilus hasselti

6. Cirrhina molitorella

8. Ctenopharyngodon idellus

10. Aristichthys nobilis

12. Pangasius micronemus

14. Helostoma Temmincki

16. Osphronemus gorami

10. Copinonomiao goraam

18. Oreochromis niloticus

20. Cirrhinus mrigala

22. Clarias fuscus

24. Spinibarbichthys denticulatus

Table 4: List of freshwater fish species rare and endangered in Vietnam (enregistered in the Red Data Book of Vietnam)

1. Chanos chanos

3. Hilsa toli

5. Clupanodon punctatus

7. Anguilla japonica

9. Procypris merus

11. Catlocarpio siamensis

13. Semilabeo notabilis

15. Labeo tonkinensis

17. Spinibarbus caldwelli

19. Cyclocheilichthys enoplos

21. Morulius chrysophekadion

23. Tor tambroides

25. Luciocyprinus langsoni

27. Gyrinocheilus Aymoneri

29. Clarias macrocephalus

31. Pangasius Larnaudi

33. Hemibagrus elongatus

35. Bagarius bagarius

37. Nandus nandus

39. Ophiocephalus micropeltes

2. Hilsa reevesii

4. Clupanodon thrissa

6. Notopterus chitala

8. Anguilla macrorata

10. Cyprinus multitaenniata

12. Onychostoma laticeps

14. Altigena Lemassoni

16. Labeo Graffeuilli

18. Spinibarbichthys denticulatus

20. Cirrhinus macrolepis

22. Tor brevifilis

24. Mylopharyngodon piceus

26. Megalobrama terminalis

28. Sinogastromyzon tonkinensis

30. Clarias batrachus

32. Pangasianodon gigas

34. Cranoglanis sinensis

36. Datnioides quadrifasciatus

38. Toxotes chatareus

40. Trichogaster pectoralis

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