

## Species composition of fish in rice fields of That Phanom District, Nakhon Phanom Province, Northeast Thailand

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### Abstract:

Species composition of fish in rice fields of That Phanom District, Nakhon Phanom Province, Northeast Thailand were studied during May - September 2016. From 1,018 collected specimens in total 7 orders, 18 families, 31 genera and 38 species of fishes were recognized. The most dominant order was Cypriniformes (18 species, 47.37% of all species) and the next was Perciformes (10 species, 26.32% of all species) followed by Siluriformes (4 species, 10.53% of all species). The nine species of air-breathing fish (*Notopterus notopterus*, *Clarias batrachus*, *Monopterus albus*, *Anabas testudineus*, *Betta smaragdina*, *Trichopodus trichopterus*, *Trichopsis pumila*, *T. vittata*, and *Channa striata*) were found and accounted for 23.68% of all species. Only one species of alien species *Oreochromis niloticus* has been collected from the area. This study indicated that the rice fields play an important role in maintenance of biodiversity of a local area.

**Keywords:** Rice fields, Species, Fish, That Phanom District, Nakhon Phanom Province

### Introduction

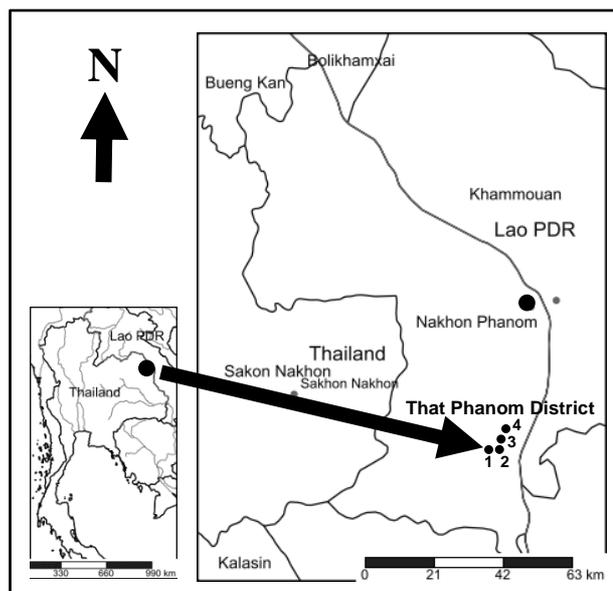
Northeast Thailand is the largest region of the country, representing approximately one-third of the total 16.8 million ha with 22 million people. Most agricultural lands (53%) are used for rice production [1]. Rice production takes many forms, but most rice is grown under flooded conditions [2]. The rice field can be described as a “temporary aquatic environment” or “a special type of wetland” that can be considered “a successor of shallow marshes or swamps”, which is influenced and maintained by farmers activities [3]. The rice field ecosystem consists of two physically and morphologically distinct habitats namely, the rectangular or similar

shaped flooded fields comprising mainly of the rice plants, and the surrounding bunds (levees), which harbour weeds or cultivated plants. Under the irrigated conditions, this mosaic system is connected with irrigation canals and ditches, while sump ponds, marshes and tanks serve as contiguous aquatic habitats [4]. Although being a monoculture agro-ecosystem, a rice field undergoes three major ecological phases; aquatic, semi-aquatic and a terrestrial dry phase, during a single paddy cultivation cycle [5]. Physically, the aquatic phase has a shallow fluctuating water depth of 5–30 cm depending on the availability of water and the type of water management followed, which are used as necessary temporary habitats for spawning and nursery grounds by many fish species [6,7]. In addition, rice fields provide habitats for wildlife species that include plants, amphibians, reptiles, molluscs, crustaceans and insects, many of which can be captured, collected or farmed as sources of food and medicine [8].

The important role of rice field environment for local aquatic organisms has been recognized, however only little information is known and most of documented information is that of rice fields in temperate countries such as Japan [6,7,9]. As we know, only few reports in literature exist on this subject in Southeast Asian countries so far and none of them deal with freshwater fishes in detail [5]. The purpose of this study was to accumulate knowledge about species diversity of fish in rice field environment of That Phanom District, Nakhon Phanom Province, Northeast Thailand.

### **Materials and methods**

The specimens were collected by a fine-mesh drug nets (3 m x 1 m, mesh size 1 mm x 1 mm) and scoop nets (mesh size 1 mm x 1 mm) in the rice field area (4 stations, 48,000 m<sup>2</sup>) at Tambon Na Thon, That Phanom District, Nakhon Phanom Province, Northeast Thailand (Figure 1) during May - September 2016. All specimens were preserved in 10 % of formalin solution. Thereafter the specimens were sent for examination in a laboratory. The specimens were sorted and identified using the taxonomical documents [10-12]. In this study the authors held the morphological character for identifying the specimens. Standard length (SL) was measured between a tip of snout to the end of the hypural plate. Taxonomic arrangements follow Nelson [13]. All specimens of freshwater fishes in this study are deposited at Research Laboratory of Ichthyology, Division of Fisheries, Nakhon Phanom University (RLINPU), Nakhon Phanom, Thailand.



**Figure 1.** Study area for collect fish in rice fields in That Phanom District, Nakhon Phanom Province, Northeast Thailand.

## Results and discussion

Totally, 7 orders, 18 families, 31 genera and 38 species of fishes have been recognized from 1,018 specimens collected from rice fields of That Phanom District, Nakhon Phanom Province, Northeast Thailand (Table 1). The most dominant order is Cypriniformes (18 species, 47.37% of all species) and the next is Perciformes (10 species, 26.32% of all species) and then Siluriformes (4 species, 10.53% of all species). Dominant families are Cyprinidae (9 genera, 15 species [39.47% of all species]), Osphronemidae (3 genera, 4 species [10.53% of all species]) and Cobitidae (2 genera, 3 species [7.89% of all species]). In all recognized fish species, 47.37% belonged to the order Cypriniformes which is usually known to be diverse in Southeast Asia [11, 13-15]. Members of fish in the suborder Anabantoidei occupied 60.00% of the order Perciformes which was the next dominant group and also known to be diverse in tropical Asia especially in stagnant water habitats [16]. According to the rice field area is stagnant water which is not directly connected with rivers or their tributaries. It is noteworthy that species diversity of fish in the order Siluriformes or catfish was relatively low (4 species, 10.53%) in the study area although this group has usually been ranked as the next dominant fish group to order Cypriniformes in many fish surveys [11,17]. This probably was because many catfish species inhabit in rivers and the study area of the present study was not directly

connected with surrounding canals or rivers. *Esomus metallicus* has been known as species found widely in temporal waters including floodplains and rice fields in Indochina [11,18]. In this study, *E. metallicus* was the most dominant species in quantity (14.15% of all specimens). The nine species of air-breathing fish (*Notopterus notopterus*, *Clarias batrachus*, *Monopterus albus*, *Anabas testudineus*, *Betta smaragdina*, *Trichopodus trichopterus*, *Trichopsis pumila*, *T. vittata*, and *Channa striata*) were found and accounted for 23.68% of all species (Figure 2). Only one species of alien species *Oreochromis niloticus* has been collected from the area. The result of this study showed the importance of rice fields in That Phanom District, Nakhon Phanom Province as artificial flood plains for freshwater fishes which helps in the maintenance of biodiversity of a local area.

### **Conclusions**

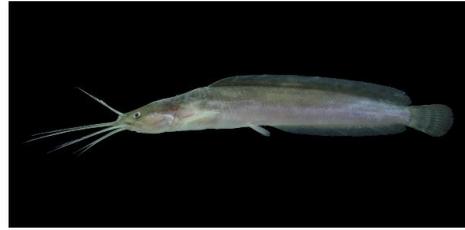
Totally, 7 orders, 18 families, 31 genera and 38 species of fishes have been recognized from 1,018 specimens collected from rice fields of That Phanom District, Nakhon Phanom Province, Northeast Thailand. Members of fish in the suborder Anabantoidei were found as the next dominant fish group to order Cypriniformes. The nine species of air-breathing fish have been recognized. Only one species of alien species or introduced species, *Oreochromis niloticus*, has been collected from the area. This study indicated that the rice fields in That Phanom District, Nakhon Phanom Province act as artificial flood plains for many fish species and play an important role in the maintenance of biodiversity of a local area.

### **Acknowledgements**

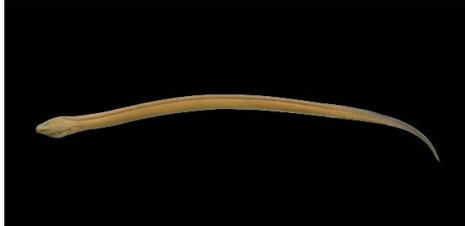
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*Notopterus notopterus* 37.50 mm SL



*Clarias batrachus* 92.70 mm SL



*Monopterus albus* 126.75 mm SL



*Anabas testudineus* 31.90 mm SL



*Betta smaragdina* 30.15 mm SL



*Trichopodus trichopterus* 53.20 mm SL



*Trichopsis pumila* 30.50 mm SL



*Trichopsis vittata* 31.35 mm SL



*Channa striata* 45.70 mm SL

**Figure 2.** Air-breathing fish found on this exploration.

**Table 1** Checklist of fish found from sampling stations in rice fields in That Phanom District, Nakhon Phanom Province, Northeast Thailand.

Order/Family/Scientific name	Number of fish species in each stations				Total
	1	2	3	4	
Osteoglossiformes					
Notopteridae					
1. <i>Notopterus notopterus</i> (Pallas, 1780)	2	1		4	7
Clupeiformes					
Clupeidae					
2. <i>Clupeichthys aesarnensis</i> Wongratana, 1983	6	5	7	8	26
Cypriniformes					
Cyprinidae					
3. <i>Parachela siamensis</i> (Günther, 1868)	4	3		5	12
4. <i>Parachela williaminae</i> Fowler, 1934	5	1		7	13
. <i>Amblypharyngodon chulabhornae</i> Vidthayanon & Kottelat, 1990	51	31	16	44	142
6. <i>Esomus metallicus</i> Ahl, 1924	45	32	18	49	144
7. <i>Rasbora aurotaenia</i> Tirant, 1885	14	1	3	10	28
8. <i>Rasbora borapetensis</i> Smith, 1934	15	34	12	35	96
9. <i>Rasbora rubrodorsalis</i> Donoso-Büchner & Schmidt, 1997	25	27	8	29	89
10. <i>Rasbora spilocerca</i> (Rainboth & Kottelat, 1987)	14	8	2	6	30
11. <i>Anematichthys armatus</i> (Valenciennes, 1842)	4	1		3	8
12. <i>Anematichthys repasson</i> (Bleeker, 1853)	1			2	3
13. <i>Hampala dispar</i> Smith, 1934	5	1		6	12
14. <i>Barbodes aurotaeniatus</i> (Tirant, 1885)	2	1			3
15. <i>Puntigrus partipentazona</i> (Fowler, 1934)	3	3		2	8
16. <i>Henicorhynchus siamensis</i> (Sauvage, 1881)	2			3	5
17. <i>Labiobarbus leptocheilus</i> (Valenciennes, 1842)	2	4		2	8
Cobitidae					
18. <i>Acanthopsoides gracilentus</i> (Smith, 1945)	2	1		3	6
19. <i>Acanthopsoides hapalias</i> Siebert, 1991	5	1		2	8
20. <i>Lepidocephalichthys hasselti</i> (Valenciennes, 1846)	3	2	4	4	13
Siluriformes					
Bagridae					
21. <i>Hemibagrus nemurus</i> (Valenciennes, 1840)	11	2		9	22
Siluridae					
22. <i>Kryptopterus cheveyi</i> Durand, 1940	1			1	2
23. <i>Ompok bimaculatus</i> (Bloch, 1794)	1				1
Clariidae					
24. <i>Clarias batrachus</i> (Linnaeus, 1758)	3	2	1	3	9
Beloniformes					
Adrianichthyidae					
25. <i>Oryzias mekongensis</i> Uwa & Magtoon, 1986	35	28	21	47	131
Belonidae					
26. <i>Xenentodon cancila</i> (Hamilton, 1822)	3			1	4
Synbranchiformes					
Synbranchidae					
27. <i>Monopterus albus</i> (Zuiew, 1793)	2	2	1	2	7
Mastacembelidae					
28. <i>Macrognathus siamensis</i> (Günther, 1861)				2	2
Perciformes					

**Table 1** Checklist of fish found from sampling stations in rice fields in That Phanom District, Nakhon Phanom Province, Northeast Thailand (cont.).

Order/Family/Scientific name	Number of fish species in each stations				Total
	1	2	3	4	
Ambassidae					
29. <i>Parambassis siamensis</i> (Fowler, 1937)	4	1		5	10
Cichlidae					
30. <i>Oreochromis niloticus</i> (Linnaeus, 1758)	3	5		8	16
Eleotridae					
31. <i>Oxyeleotris marmorata</i> (Bleeker, 1852)	5		2	2	9
Gobiidae					
32. <i>Brachygobius mekongensis</i> Larson & Vidthayanon, 2000	3	2		5	10
Anabantidae					
33. <i>Anabas testudineus</i> (Bloch, 1792)	4	4	6	12	26
Osphronemidae					
34. <i>Betta smaragdina</i> Ladiges, 1972	1	1	3	3	8
35. <i>Trichopodus trichopterus</i> (Pallas, 1770)	5	2	3	4	14
36. <i>Trichopsis pumila</i> (Arnold, 1936)	4	2	12	10	28
37. <i>Trichopsis vittata</i> (Cuvier, 1831)	6	5	8	11	30
Channidae					
38. <i>Channa striata</i> (Bloch, 1793)	10	3	5	10	28
Total	311	216	132	359	1018

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