

# Species Composition of Freshwater Fishes in Nong Han Wetland, Sakon Nakhon Province, Thailand

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**Abstract**— This study was conducted in Nong Han Wetland (NHW), Sakon Nakhon Province, Thailand aims to investigate current species composition of freshwater fishes in littoral and limnetic zones of NHW. Gill nets (about 2,000 m length and 2 m depth) in different mesh sizes were used for collecting freshwater fishes during March to April 2011. There were at least 23 species (12 families) presented in the aforementioned areas. Littoral zone revealed higher species richness than limnetic zone which implied that the biodiversity conservation of freshwater fishes should be started at this area. Cyprinidae was the major family in NHW and *Puntius brevis* and *Cyclocheilichthys apogon* were the most common species. Moreover, the study found the prevalence of *Hampala dispar*, *Oxyeleotus marmoratus*, *Tetraodon leirus*, *Henicorhynchus siamensis*, *Osteochilus hasselti* and *Notopterus notopterus*. Such species adapted to environmental conditions. They contribute to local livelihood from catching and culture fisheries activities. However, local fishermen should be informed and followed fisheries conservation and responsibility practice. The results from this study implied various policies on aquatic biodiversity particularly on the public awareness, education and business of fisheries biodiversity in NHW.

**Keywords**— biodiversity, fishery, aquatic ecosystem, Nong Han Wetland, Sakon Nakhon Province

## I. INTRODUCTION

Nong Han Wetland (NHW) is the biggest lake in Northeast of Thailand which is located in Sakon Nakhon Province. Their area is about 7,456 ha with about 0.75 m in average depth and 158 m elev [1; 4 and 9]. This wetland has linked to the Mekong River (International River) [10].

This wetland is freshwater reservoir dominated by several species of aquatic flora and fauna [3]. Aquatic vegetation in this wetland contributes to habitat complexity and diversity of freshwater fishes [5 and 7]. This ecosystem is very important in terms of local business and biodiversity conservation. It serves as a source of water supply for anthropogenic. Likewise, freshwater fishes in NHW provide a source of food and income for local people. Thus, they play significant roles in terms of food security and community business.

The rich of freshwater fishes implied to high biodiversity of freshwater ecosystem. Fishes supports human well being in NHW due to they provide a various ecosystem services for example they can control the algae bloom and assist in balancing ecosystem food web.

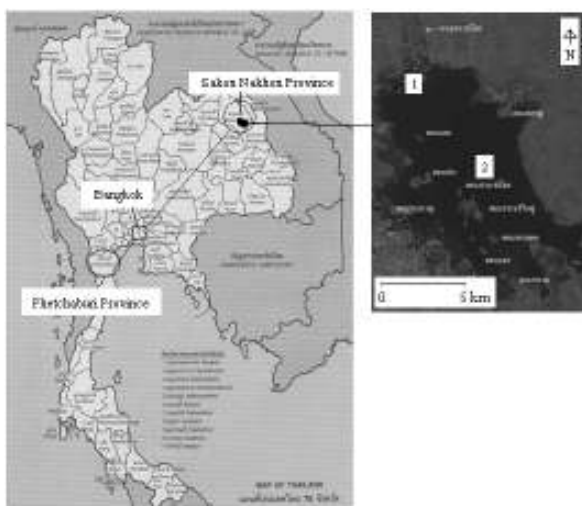
An important undertaking in biodiversity conservation of freshwater fishes is defining its species composition and related issues hence, the objectives of this study were to investigate the species composition of freshwater fishes in NHW, to determine the dominance and rare species of freshwater fishes and to study the index of similarity to understand their structure and to know the

available fisheries resources that people can utilize and need to conserve and rehabilitate.

## II. MATERIALS AND METHODS

### A. Study Area

The research was performed in Nong Han Wetland (NHW), Sakon Nakhon Province, Thailand (Fig. 1) which composed of littoral and limnetic zones where high and low density of aquatic plants are occurred, respectively. It is located in the Northeast of Thailand and subjected to the Great Mekong Sub-region (GMS) [10], 614 km far from Bangkok. NHW encompasses an area of 7,456 ha. The study area was suited around 17°11'56" N latitude and 104°11'9" E longitude. There are 18 islands presented in NHW which serves as natural habitat for various species of birds, reptiles and amphibians. Two sites were selected based on characteristics of water depth and aquatic plants density. Two difference sites were Don Chaing Ban and Don Sawan (Fig. 1). Site selection was based on layout of satellite image (THEOS: Thailand Earth Observation System) and actual field survey using Global Position System (GPS) [6].



**Fig. 1** A study area in NHW, Sakon Nakhon Province, Thailand: Don Chaing Ban, littoral zone (1) and Don Sawan, limnetic zone (2)

### B. Data Collection

The coordinates of two sampling sites (Don Chaing Ban and Don Sawan) (Fig. 1) were recorded using GPS receiver with estimated accuracy of 10 m or better [6]. To validate the coordinates, geo-referencing method was employed to display the collecting localities on the map. Fig. 2 presents the general overview of the two sampling sites. Gill nets (about 2,000 m length and 2 m depth) in different mesh sizes were used for collecting freshwater fishes [8 and 9] during March to April 2011.



**Fig. 2** Overview of aquatic plants and water bodies in the two study sites in NHW, Sakon Nakhon Province, Thailand: Don Chaing Ban (1) and Don Sawan (2)

## III. RESULTS AND DISCUSSION

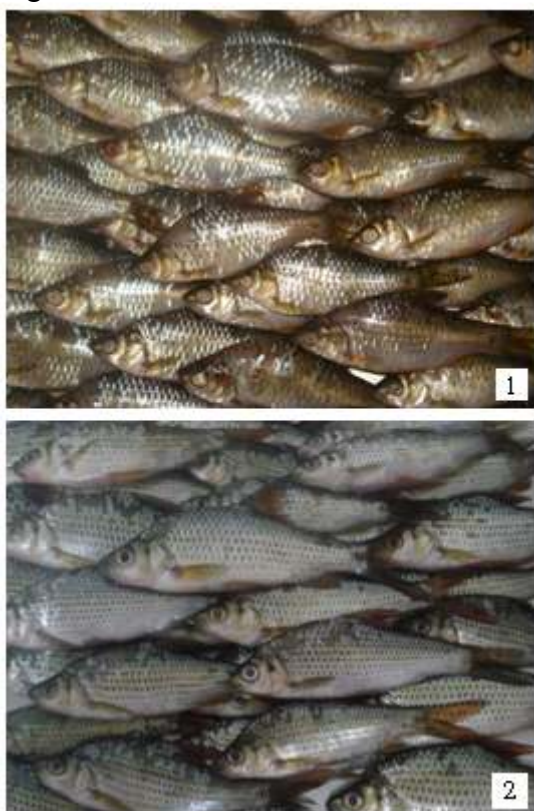
There were at least 23 species of freshwater fishes were collected and identified (Table 1). Littoral zone had higher species richness than limnetic zone. Seven species of freshwater fishes were collected for every times namely: *Puntius brevis*, *Hampala dispar*, *Oxyeleotus marmoratus*, *Tetraodon leiurus*, *Henicorhynchus siamensis*, *Osteochilus hasselti* and *Notopterus notopterus*. There were 4 species of fishes subjected to native rare species (*Mystus nemurus*, *Trichogaster trichopterus*, *Channa striata* and *Macrognathus siamensis*) (Table 1).

**TABLE I**  
LIST OF FRESHWATER FISHES IN THE TWO STUDY SITES IN NHW, SAKON NAKHON PROVINCE, THAILAND:  
DON CHAING BAN (1) AND DON SAWAN (2) DURING MARCH – APRIL, 2011

No.	Vernacular name	Common name	Scientific name (Families)	Sites of Collection			
				March		April	
				1	2	1	2
1	Pla kod lueng	Yellow mystus	<i>Mystus nemurus</i> (Bagridae)	+	-	-	-
2	Pla kradi mor	Three - spot gourami	<i>Trichogaster trichopterus</i> (Anabantidae)	+	-	-	-
3	Pla krasub jud	Eye - spot barb	<i>Hampala dispar</i> (Cyprinidae)	+	+	+	+
4	Pla kam cham	Red - cheek barb	<i>Puntius orphoides</i> (Cyprinidae)	+	-	+	+
5	Pla kayang kang lay	Iridescent mystus	<i>Mystus multiradiatus</i> (Bagridae)	-	+	-	+
6	Pla chon	Striped snake - head fish	<i>Channa striata</i> (Channidae)	+	-	-	-
7	Pla Cha on	Butter catfish	<i>Ompok bimaculatus</i> (Siluridae)	+	+	-	+
8	Pla sa	Barb	<i>Labiobarbus siamensis</i> (Cyprinidae)	+	-	+	-
9	Pla ta pien khao	Common silver barb	<i>Barbodes gonionotus</i> (Cyprinidae)	+	-	+	-
10	Pla ta pien say	Golden little barb	<i>Puntius brevis</i> (Cyprinidae)	+	+	+	+
11	Pla bu say	Marbled sleepy goby	<i>Oxyeleotris marmoratus</i> (Eleotridae)	+	+	+	+
12	Pla pak pao	Puffer fish	<i>Tetraodon leiurus</i> (Tetraodontidae)	+	+	+	+
13	Pla pan kra jok	Siamese glassfish	<i>Parambassis notatus</i> (Centropomidae)	+	+	-	-
14	Pla soy khao	Jullien's mud carp	<i>Henicorhynchus siamensis</i> (Cyprinidae)	+	+	+	+
15	Pla soy nok kao	Bonylip barb	<i>Osteochilus hasseltii</i> (Cyprinidae)	+	+	+	+
16	Pla salad	Grey feather back	<i>Notopterus notopterus</i> (Notopteridae)	+	+	+	+
17	Pla seao dam	Bornean leaffish	<i>Nandus nebulosus</i> (Nandidae)	+	+	+	-
18	Pla sai tan ta dang	Beardless barb	<i>Cyclocheilichthys apogon</i> (Cyprinidae)	+	-	+	+
19	Pla na mong	Lini barb	<i>Osteochilus lini</i> (Cyprinidae)	+	-	+	-
20	Pla mo chang yeap	Striped tiger nandid	<i>Pristolepis fasciatus</i> (Nandidae)	+	-	+	-
21	Pla mo tes kang lay	Striped tilapia	<i>Oreochromis melanopleura</i> (Cichlidae)	-	+	-	+
22	Pla mo thai	Common climbing perch	<i>Anabus testudineus</i> (Anabantidae)	+	-	+	-
23	Pla load	Spotted spiny eel	<i>Macrognathus siamensis</i> (Matacembelidae)	+	-	-	-
Total species in each site				21	12	15	12

Among all species, the golden little barb (*Puntius brevis*) and the beardless barb (*Cyclocheilichthys apogon*) (Fig. 3) were the most common species in NHW aquatic ecosystem. The beardless barb fishes were collected in all sites except at Don Sawan during March 2011 (Table 1). They are the economic freshwater fishes, the Thai people use this kind of fish for making salted and fermented fishes and use as ornamental fishes, thus, generating income for them especially, local people who dwelling on small-scale fisheries business in NHW aquatic ecosystem.

NHW is a complex ecosystem with rich of both aquatic flora and fauna. They have an important role in freshwater stocking for human utilization and simultaneously serving as habitat for many organisms. However, it seems likely to face environmental problem such as habitat degradation and environmental quality from anthropogenic disturbances and natural effects for example flood and drought.



**Fig. 3** The dominants of freshwater fishes in NHW, Sakon Nakhon Province, Thailand: *Puntius brevis* (1) and *Cyclocheilichthys apogon* (2)

The study revealed that the highest species richness of freshwater fishes was in Don Chaing Ban (littoral zone) (Fig. 1 and 2) with 21 species (Table 1). Due to the various species of aquatic plants in this zone serve as habitat and niche for many freshwater fishes particularly small and young fishes, indeed helped in species biodiversity conservation. The lowest species richness of freshwater fish was in Don Sawan (Fig. 1 and 2) with only 12 species (Table 1). This implied that this site has less aquatic plants and niche for fishes thriving. However, as this zone is the open water where abundance of planktons are occurred thus, freshwater fishes in this site are likely bigger in size (length and weight) than Don Chaing Ban do.

Index of similarity (IS) of freshwater fishes in NHW also was studied in order to examine the percentage of IS between two different sampling sites. The study found that the IS has higher value (66.67) during collecting fishes in April, 2011 (Table 2). The implication behind this result was the even distribution of fishes species and has low rate of movement for seeking food due to normally on the mid of May every year the fishes will be laying eggs, therefore, the Department of Fisheries (DOF), Thailand declared the closing season for catching fisheries in freshwater bodies in Thailand during 16 May-15 September each year [3].

NHW aquatic ecosystem showed a diverse freshwater fishes composition. Dominants among these were *Puntius brevis* and *Cyclocheilichthys apogon* (Fig. 3). The presence of these fishes implied that their food sources were readily available. It also meant that they were adapted to the environmental conditions. The abundance of such species served as source of livelihood for local people therefore bringing about socio-economic uplift and improves quality of life in the area.

**TABLE 2**  
THE INDEX OF SIMILARITY (IS) OF  
FRESHWATER FISHES IN TWO STUDY SITES  
IN NHW, SAKON NAKHON PROVINCE,  
THAILAND: DON CHAING BAN (S1) AND  
DON SAWAN (S2) DURING MARCH-APRIL,  
2011

Variables	March	April
No. of species in site 1 (S1)	21	15
No. of species in site 2 (S2)	12	12
No. of same species (C)	10	9
S1+S2 = (A)	33	27
2C = (B)	20	18
(B)/(A) = (D)	0.61	0.67
Index of Similarity (IS) = [(D) x 100]	60.61	66.67

The species richness in this study was lesser compared with the studied of researchers from [4; 8 and 9] where they listed more than 40 species of freshwater fishes observed in NHW. This implied that fisheries resources are declining probably because of the overexploitation and habitat degradation.

#### IV. CONCLUSIONS

Nong Han Wetland (NHW) was selected to examine species composition of freshwater fishes in shallow and open waters during March to April 2011. The fishing gear for collecting the fishes was gill nets. The study revealed prevalence and rare of native fishes species. The biodiversity conservation of fishes should be started at littoral zone by using dominant species. The habitat of fishes must be protected associated with the awareness and cooperation from local people. Moreover, the business sections should be taken into account on fisheries biodiversity to achieve their Corporate Social Responsibility (CSR).

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