การสำรวจปลาและทรัพยากรประมงของหนองกอมเกาะ จังหวัดหนองคาย

A Survey on Fish and Fishery Resources of Nong Kom Khor, Nong Khai Province

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บทคัดย่อ

การสำรวจทรัพยากรประมงของหนองกอมเกาะ 3 ครั้ง ระหว่าง เดือนเมษายน พ.ศ. 2541 ถึง เดือนตุลาคม พ.ศ. 2541 แต่ละครั้งมีระยะห่างกัน 3 เดือน พบปลาทั้งหมดจำนวน 14 ครอบครัว 26 สกุล และ 34 ชนิด มีสัดส่วนมวลชีวภาพ ของปลาเหยื่อต่อปลาล่าเนื้อมีค่าประมาณ 1.19 พบพันธุ์ไม้น้ำ 31 ชนิด คุณภาพของน้ำอยู่ในเกณฑ์ดีไม่มีสภาพเน่าเสีย โดยความเป็นกรดเป็นด่างมีค่าเฉลี่ย 9.46 ความนำไฟฟ้ามีค่าเฉลี่ย 87.1±Scm-1 อุณหภูมิมีค่าเฉลี่ย 33.3 ± C ความเป็นด่างมีค่าเฉลี่ย 21.0 mgCaCO3/l ความกระด้างมีค่าเฉลี่ย 37.1 mgCaCO3/l ปริมาณออกซิเจนที่ละลายน้ำมีค่าเฉลี่ย 8.53 mg/l และการส่องผ่านของแสงลงไปในน้ำมีค่า 81 cm. องค์ประกอบของตะกอนก้นแหล่งน้ำแตกต่างกันตามตำแหน่งที่เก็บตัวอย่าง โดยความเป็นกรดเป็นด่างมีค่าเฉลี่ย 6.38 ปริมาณสารอินทรีย์มีค่าเฉลี่ย 1.57% ปริมาณไนโตรเจนมีค่าเฉลี่ย 0.07% และปริมาณฟอสฟอรัสมีค่าเฉลี่ย 4.82 ppm.

Abstract

A survey on fishery resources of Nong Kom Khor three times during April 1998 to October 1998 at 3 months period. There were 14 families with 26 genera and 34 fish species. The ratio of available prey to predator fish biomass was approximately 1.19. There were 31 species of aquatic macrophytes. Water quality of Nong Kom Khor was not polluted. The averages of pH, conductivity, temperature, total alkalinity, total hardness, dissolved oxygen and Secchi disk visibility of water were 9.46, 87.1 ± Scm-1, 33.3 ± C, 21.0 mgCaCO3/l, 37.1 mgCaCO3/l, 8.53 mg/l and 81 cm., respectively. The constituents of bottom sediment were varied according to sampling sites. The average pH of bottom sediment was 6.38. The average contents of organic matter, nitrogen and available phosphorus were 1.57%, 0.07% and 4.82 ppm., respectively. Almost of surface area covered with aquatic macrophytes.

คำสำคัญ : ปลา ทรัพยากรประมง หนองกอมเกาะ
Keywords : fish, fishery resources, Nong Kom Khor

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Introduction

Nong Kom Khor is a large water resource located at south-west four kilometers from district Nong Khai Province with the area of around 5,000 rai. This water resource is particularly affected by Mae Khong river in rainy season. From physical characteristic point of view, this water resource is interested in term of fishery resources. Additionally, this water resource tends to be a spawning ground of some economic fishes from Mae Khong river. Fresh water resources play very important role in most countries in Asia. De Silva (1987) reported that freshwater fish production in Asia represent 57% of world production. This indicates the important of freshwater resources in fisheries, particularly in Asia. However, water resource management requires some basic information. In case of Thailand, there is a lack of water resource data that affect on analysis of fishery resource status (Pawaputanon, 1986).

So, a survey on fishery resources of Nong Kom Khor will support some important basic information to apply for fishery resources management. Furthermore, some basic such as biology of breeding and spawning that are useful for fisheries management to improve or conservation of this water resource. Those information will be used as basic data for aquaculture development in future. Besides fish resource, the other resources related to fishery resource such as aquatic macrophytes and also water and bottom sediment are very important in fisheries management. Ploskey and Jenkins (1982) stated that fish production produced from various types of food namely (1) plants and organic materials (2) benthos (3) zooplankton (4) fish and (5) terrestrial invertebrates. Furthermore, a success of breeding, growth and production of fish in reservoir closely related to environmental factors and relationship between prey and predator (Summerfelt, 1986)

This survey had projected to study on fish species and factors concerning fish production; aquatic macrophytes, water quality and sediment compositions in order to verify the present status that necessary for management and development of Nong Kom Khor.

Materials and Methods

The study was performed by determination four sampling sites in Nong Kom Khor to collect the fish samples of fish, aquatic macrophyte, water and bottom sediment. The surveys were conducted three times at a period of three months during April 1998 to October 1998. Fish sampling was done using 25 meter length nylon net with mesh size of 1 cm. Fish samples were taken a picture and preserved in 10% formalin. The classification was performed in laboratory followed a review of Roberts (1989) and Rainboth (1996). The study on aquatic macrophytes by collecting samples and taking pictures. The classification followed an article of Stodola (1967) and Muhlberg (1980). Surface water samples were collected at 14.00

pm. pH, conductivity and temperature were measured directly using SOLOMAT 520 C. Water samples for total alkalinity, total hardness analyses were preserved and analyzed by titritatic method according to APHA (1989). Water samples for dissolved oxygen measurement were preserved and analyzed by Winkler method according to APHA (1989). The transparency was measured directly using Secchi disk (Boyd, 1979). The study on compositions of bottom sediment was performed by collecting the samples from four sites in Nong Kom Khor. All samples were air-dried and analyzed for pH, organic matter using Walkley and Black method, total nitrogen using Kjeldahl method and available phosphorus using Bray N0. 2 extraction, Spectrophotometer. The analyses of bottom sediment were followed the methods of Black et al. (1965).

Results

There are 14 families, 26 genera and 34 species of fish. Most of fishes found in the survey are in family Cyprinidae (Table 1). The ratio of available prey to predator biomass is approximately 1.19 (Table 2). However, this ratio tends to vary according to seasons. Herbivorous fishes found in this water resource were not major macrophyte feeder. Almost of surface area covered with aquatic macrophytes. Threre are 31 species of aquatic macrophytes found in Nong Kom Khor in this survey (Table 3). There are comprises of submerged macrophytes, emerged macrophytes, floating macrophytes and marginal macrophytes. The plenty of aquatic macrophytes play an important role in water quality and composition of sediment of this water resource. Water quality of Nong Kom Khor is showed in Table 4. The average of pH, conductivity, temperature, total alkalinity, total hardness, dissolved oxygen and Secchi disk visibility are 9.46, 87.1 μScm^{-1}, 33.3°C, 21.0 $mgCaCO_3/l$, 37.1 $mgCaCO_3/l$, 81 cm., respectively. The compositions of bottom sediments are varied with sampling sites (Table 5). The averages of pH, organic matter, total nitrogen and available phosphorus are 6.38, 1.57%, 0.07% and 4.82 ppm., respectively.

Conclusion and Discussion

From the survey of Nong Kom Khor has found fish 14 families, 26 genera and 34 species. Most of fishes are Cyprinids, 8 genera and 13 fish species. The second group are Anabantids, 4 genera and 6 fish species. There are no any exotic species. There are diversity of species as compared to Pawaputanon (1986) reported that species of fish found in 17 Thai reservoir range from 17 species in Bang Phra reservoir to 94 species in Ubolratana dam. There are 4 species usually found in Thai reservoir that included *Channa striata, Osteochilus hasselti, Notopterus notopterus* and *Mystus nemerus*. The ratio of available prey and predator biomass is low approximately 1.19. The low value indicates that fish population in term of trophic niche is imbalance. Because of FC ratio in food web is average of 5.0-8.6 (Mann et al., 1972). The improvement

in this condition is a stocking of herbivorous fish. Because Summerfelt (1986) reported that the relationship between predator fish and prey fish was predominantly affected by fisheries and re-stocking. Further more, from a study of Pawaputanon (1986), the success species for stocking in reservoir were *Oreochromis niloticus, Labeo rohita, Pangasius sutchi* and Chinese carps. The optimum size should be over 13 cm. in length due to high survival rate. However, in this survey of Nong Kom Khor has not found this group of fish that means there are no stocking or the stocking may be not success. So, in this case the stocking of herbivorous fishes such as Nile tilapia and Chinese carps can improve the ratio of available prey to predator fishes and total fish production. Besides this, the herbivorous fish can utilize tremendous vegetation, especially submerged macrophytes in this water resource. Primary productivity in term of phytoplankton density in this water resource is rather low that indicated by 81 cm. of Secchi disk visibility. Generally, phytoplakton always show very important role in process of fish production in natural water resources. The low production of phytoplankton in this water resource may cause by the competition of nutrient between aquatic macrophytes and phytoplankton. The reduction of submerged macrophytes can enhance the primary productivity due to adequate available key limiting nutrients namely N and P (Boyd, 1979; Jiwyam, 1990). Water quality of this water resource is in accepted criteria for fisheries (Train, 1979). The nutrient accumulation in sediment, especially N and P is quiet low as compared to sediment from artificial fish ponds (Jiwyam, 1990).

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Table 1 Fishes of Nong Kom Khor

No.	Scientific name	No.	Scientific name
	Family Anabantidae		
1	*Anabas testudineus*	18	*Hampala dispar*
2	*Betta splendens*	19	*Osteocheilus hasselti*
3	*Trichogaster trichopterus*	20	*Osteocheilus lini.*
4	*Trichogaster pectoralis*	21	*Oxygaster spp.*
5	*Trichopsis pumila*	22	*Puntius gonionotus*
6	*Trichopsis vittatus*	23	*Puntius brevis*
	Family Bagridae	24	*Puntius orphoides*
7	*Mystus mysticetus*	25	*Rasbora borapetensis*
	Family Belonidae	26	*Rasbora trilineata*
8	*Xenentodon cancila*		**Family Eleotridae**
	Family Centropomidae	27	*Oxyeleotris marmoratus*
9	*Ambassis siamensis*		**Family Mastocembelidae**
	Family Channidae	28	*Macrognathus siamensis*
10	*Channa striata*		**Family Nandidae**
	Family Clariidae	29	*Nandus nebulosus*
11	*Clarias batrachus*	30	*Pristolepis fasciatus*
12	*Clarias. macrocephalus*		**Family Notopteridae**
	Family Cobitidae	31	*Notopterus notopterus*
13	*Lepidocephalichthys hasselti*		**Family Siluridae**
	Family Cyprinidae	32	*Ompok bimaculatus*
14	*Cirrhinus jullieni*		**Family Synbranchidae**
15	*Cirrhinus microlepis*	33	*Monopterus albus*
16	*Cyclocheilichthys repasson*		**Family Tetraodontidae**
17	*Esomus metalicus*	34	*Tetraodon lenatus*

Table 2 A ratio of available prey to predator fish biomass of Nong Kom Khor

No.	Genus	Weight (g.)			Total
		1st	2nd	3rd	
	Hertbivores/Detritivores				
1	*Ambassis*	810	105	718	1,633
2	*Cyclocheilichthys*	830	10	190	1,030
3	*Macrognathus*	55	8	-	63
4	*Osteocheilus*	7	18	81	106
5	*Pristolepis*	-	-	59	59
6	*Puntius*	55	50	55	160
7	*Oxygaster*	460	119	185	764
8	*Rasbora*	567	124	6	697
9	*Trichogaster*	240	12	26	278
10	*Trichopsis*	7	38	33	78
11	Other	48	19	19	86
	Carnivores				
1	*Channa*	-	33	52	85
2	*Hampala*	1,080	27	534	1,641
3	*Notopterus*	1,715	22	2	1,739
4	*Oxyeleotris*	90	-	-	90
5	*Tetraodon*	215	-	20	235
6	*Xenentodon*	80	14	233	327
7	Other	0	3.84	9	44
	Available Prey fish/Predator fish	0.97	5.53	1.61	1.19

Table 3 Aquatic macrophytes in Nong Kom Khor

No.	Scientific name	No.	Scientific name
1	*Azolla pinnata* R. BR.	17	*Jussiaea repens* L.
2	*Blyxa japonica* (MIG.) MAXIM	18	*Leersia hexandra* SW
3	*Brachiaria mutica* STAPF.	19	*Limnocharis flava* (L.) BUCH.
4	*Ceratophyllum demersum* (L.)	20	*Limnophila heterophylla* BENTH.
5	*Chara zeylanica* KL.EX WILLD	21	*Najas graminea* DEL
6	*Cyperus iria* L.	22	*Nelumbo nucifera* GAERTN
7	*Cyperus pulcherrimus* WILLD.ex KUNTH	23	*Neptunia oleracea* LOUR
8	*Eclipta prostata* L.	24	*Nymphaea lotus* L.
9	*Eichornia crassipes* (MART.) SOLMS.	25	*Nymphoides parvifolia* (GRISEB) O. KUNTZE
10	*Eleocharis dulcis* (BURM. F.) HENSCHEL.	26	*Marsilea crenata* PRCSL
11	*Enydra fluctuans* LOUR.	27	*Salvenia cucullata* BOXB
12	*Floscopa scandens* LOUR.	28	*Scirpus grossus* L.F.
13	*Hydrilla verticillata* (L.F.) ROYLE	29	*Trapa quadrispinosa* ROXB.
14	*Hygroryza aristata* (RETZ.) NEES	30	*Typha angustifolia* L.
15	*Hymenachne pseudointerrupta* C.MUELL	31	*Utricularia aurea* LOUR
16	*Ipomoea aquatica* FORSK.		

Table 4 Water quality of Nong Kom Khor (Mean ± SE)

Month	Water quality parameters						
	PH (unit)	Conductivity (μScm^{-1})	Temperature (^{o}C)	Total Alkalinity ($mgCaCO_3/l$)	Total Hardness ($mgCaCO_3/l$)	DO (mg/l)	Secchi disk visibility (cm.)
April	10.7 ± 0.03	89.3 ± 1.26	35.6 ± 0.31	20.3 ± 0.88	38.0 ± 3.06	8.6 ± 0.12	80
July	9.12 ± 0.06	135.0 ± 1.73	30.8 ± 0.22	22.3 ± 0.88	37.3 ± 2.40	8.4 ± 0.16	78
October	8.56 ± 0.03	76.4 ± 5.66	33.5 ± 0.17	22.3 ± 1.20	36.0 ± 1.15	8.6 ± 0.12	85
Mean ± SE	9.46 ± 0.03	87.1 ± 5.74	33.3 ± 1.23	21.0 ± 1.04	37.1 ± 2.09	8.5 ± 0.12	81 ± 2.94
Range	8.56 - 10.73	76.4 - 135.0	30.8 - 35.6	20.3 - 22.3	36.0 - 38.0	8.4 - 8.6	78 - 85

Table 5 Compositions of sediment of Nong Kom Khor (Mean ± SE)

Sampling site	Composition			
	pH	Organic Matter (%)	Total Nitrogen (%)	Available P (ppm)
1	6.13	3.08	0.13	5.47
2	7.05	0.73	0.05	1.91
3	6.21	1.34	0.07	7.08
4	6.13	1.12	0.04	46.4
Mean ± SE	6.38 ± 0.40	1.57 ± 0.90	0.07 ± 0.04	4.82 ± 2.16 *
Range	6.13 - 7.05	1.12 - 3.08	0.04 - 0.13	1.91 - 46.40

Note * Mean obtained from sampling sites 1, 2 and 3 only, because 4 are affected by wastewater from pig farm