UNIVERSITI PUTRA MALAYSIA

SOME ASPECTS OF THE BIOLOGY OF IKAN BAUNG, MYSTUS NEMURUS C. &. V. WITH REFERENCE TO CHENDEROH RESERVOIR

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FPSS 1987 1

SOME ASPECTS OF THE BIOLOGY OF IKAN BAUNG, *MYSTUS NEMURUS* C. & V. WITH REFERENCE TO CHENDEROH RESERVOIR

by

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A thesis submitted in partial fulfilment of the requirements for the degree of Master of Science (Fisheries) in the Faculty of Fisheries and Marine Science, Universiti Pertanian Malaysia.

1987

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DEDICATION

This work has been dedicated to
my parent, brothers and sisters.

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude, honour and sincere appreciation to my supervisor, Dr. Haji Mohammad Azmi bin Ambak, Associate Professor and Dean, Faculty of Fisheries and Marine Science, Universiti Pertanian Malaysia, Serdang, for his invaluable suggestions, guidance and encouragement throughout the study period. It is indeed not an exaggeration that this dissertation would never have been written unless I got support morally and materially from him. I also wish to express my indebtedness to Dr. Ang Kok Jee, Associate Professor, Faculty of Fisheries and Marine Science who as Co-supervisor always gave his suggestion and advice to the solution of problems that arose in the course of research work. From the deepest core of my heart, I acknowledge the assistance offered to me by the Universiti Pertanian Malaysia through a research grant no. 1813-1-147.

Acknowledgements are also due to the following persons who have been instrumental in the presentation of this dissertation:-

*Associate Professor Dr. A.K. Mohammad Mohsin, who showed profound sympathy and love and helped me in many ways.

*Tuan Haji Mohd. Zaki Mohd. Said, Encik Aizam Zainal Abidin, Puan Siti Shapor, Siti Khalijah Daud, Dr. Patimah and Fatimah Md. Yusof, Lecturers Faculty of Fisheries and Marine Science for their excellent cooperation.

*Encik Ghani, and faculty staff for helping in the field work.

*Encik Aziz bin Kader (Bac. Mech. Eng.), Zul Jasmi (Bac. Econ.), Abdul Lani (Bac. Econ.), and Azulita Salim (Bac. Accountancy) and many others to whom I owe a great deal for their sincere cooperation, irredeemable fellow-feelings and inspiration towards achievements of noble cause of education.

TABLE OF CONTENTS

		Page
ACKNOWLEDGEMENT		iii
TABLE OF CONTENTS		iv
LIST OF TABLES		viii
LIST OF FIGURES		x
LIST OF ABBREVIATIONS		xii
ABSTRACT		xiii
ABSTRAK		xvi
CHAPTER 1	INTRODUCTION	1
CHAPTER 2	REVIEW OF LITERATURE	7
	Reservoir and its ecology	7
	Taxonomy of Malaysian fishes with reference to cat fishes	12
	Food and feeding biology of the Genus *Mystus*	12
	Reproductive biology of the Genus *Mystus*	14
	Length-weight relationship and growth	15
CHAPTER 3	DESCRIPTION OF THE STUDY AREA	18
	Description of the sampling stations and fishing gears	22
CHAPTER 4	MATERIALS AND METHODS	25
	PHYSICO-CHEMICAL AND BIOLOGICAL PARAMETERS IN CHENDEROH RESERVOIR	25
	Transparency	25
	Temperature	25
	Dissolved oxygen	25
	pH	25
	Conductivity	26
	Water level	26
	Total alkalinity	26
	Phosphate Phosphorus	26
	Nitrate nitrogen	26
	Zooplankton	27
	Phytoplankton	27

Page

MERISTIC AND MORPHOMETRIC CHARACTERS OF MYSTUS NEMURUS C. & V. 27

FOOD AND FEEDING HABIT OF MYSTUS NEMURUS C. & V. 30

REPRODUCTIVE BIOLOGY OF MYSTUS NEMURUS C. & V. 31

Sex ratio 31
Macroscopic classification of gonads 31
Size at first maturity 32
Cyclical changes in the gonadosomatic index (GSI) 33
Fecundity 34
Spawning Periodicity 34
Cyclical changes in the fat somatic index (FSI) 34

LENGTH-WEIGHT RELATIONSHIP, CONDITION FACTOR AND GROWTH OF MYSTUS NEMURUS C. & V. 35

Length-weight relationship 35
Condition factor 36
Growth 36

CHAPTER 5 RESULTS AND DISCUSSION 38

PHYSICO-CHEMICAL AND BIOLOGICAL PARAMETERS IN CHENDEROH RESERVOIR 38

Transparency 38
Temperature 39
Dissolved oxygen 39
pH 41
Conductivity 41
Total alkalinity 42
Rainfall 42
Water level 44
Phosphate phosphorus 45
Nitrate Nitrogen 45
Comparison of various physico-chemical variables in different reservoir and swamp systems in Malaysia 47
Plankton abundance and their seasonal variation in Tasek Chenderoh 49
Fish communities of Tasek Chenderoh 52

Page

MERISTIC AND MORPHOMETRIC CHARACTERS OF THE SPECIMEN, MYSTUS NEMURUS C. & V. 58

Valid name 58
Synonyms 58
Vernacular name 59
Suprageneric classification 59
External anatomy of Mystus nemurus C. & V. 62
Head 62
Barbels 62
Body 62
Fins 62
Coloration 63
Mouth 64
Sexual dimorphism 64
Size and distribution of the specimen 64
Regressions of various body measurements 66
Fin formula 68
Proportional body measurement and some variation in the count 68

FOOD AND FEEDING HABIT OF MYSTUS NEMURUS C. & V. 71

Functional morphology of various body structure in Mystus nemurus C. & V. 71
Feeding intensity in relation to maturity stage ... 76
Seasonal variation in the percentage of fish with empty and full stomach 76
Seasonal variation in the gastrosomatic index (GSI) 79
Selectivity of foods by Mystus nemurus C. & V. of various size groups in Tasek Chenderoh 81
Food and feeding habit analysis by count method, frequency of occurrence method and gravimetric method 83

REPRODUCTIVE BIOLOGY OF MYSTUS NEMURUS C. & V. 86

Sex ratio 86
Macroscopic classification of gonads of male and female Mystus nemurus C. & V. 86
Size at first maturity 88
Cyclical changes in gonado-somatic index (GSI) .. 91
Fecundity 97
Spawning periodicity 101
Seasonal changes in the fat somatic index (FSI) .. 101

Page

LENGTH-WEIGHT RELATIONSHIP CONDITION FACTOR AND GROWTH OF *MYSTUS NEMURUS* C. & V. 107

Length-weight relationship of mature and and immature male and female 107
Condition factor 110
Growth 112

CHAPTER 6 SUMMARY AND CONCLUSION 118

REFERENCES..... 124

APPENDIX 137

LIST OF TABLES

Table		Page
I	Supply and demand of fisheries products, Peninsular Malaysia	2
II	Major reservoirs in Peninsular Malaysia (Malaysia, Department of Fisheries)	8
III	Comparative study of water chemistry of different reservoir and swamp systems in Malaysia	48
IV	List of ichthyofauna with their local name found in Tasek Chenderoh during sampling period	55
V	Proportional body measurements in Mystus nemurus C. & V.	69
VI	Meristic count and variations in some species of Mystus nemurus C. & V.	70
VII	Relationship between length of fish and number of gill rakers	75
VIII	Relative gut index (RGI) of Mystus nemurus C. & V. of four size groups caught off Tasek Chenderoh	75
IX	Feeding intensity in relation to sexual maturity of female fish	77
X	Feeding intensity in relation to sexual maturity of male fish	77
XI	Percentage of fish with empty and full stomach	78
XII	Food and feeding analysis of Mystus nemurus C. & V.	84
XIII	The number and ratio of male Mystus nemurus C. & V. to female over 12 month study period	87
XIV	Mean GSI, mean length and mean weight of female sex organ of the specimen, Mystus nemurus C. & V. of different stages of maturity	89
XV	Frequency distribution of maturity stage in relation to size in Mystus nemurus C. & V.	90

Table		Page
XVI	Mean total length, weight and gonado-somatic index (GSI) of mature Mystus nemurus C. & V. sampled during the 12 month study period	94
XVII	Breeding seasons of different Mystus species along with other cat fishes	96
XVIII	Total length, weight, fecundity, relative fecundity and average ova-diameter of 21 specimens of Mystus nemurus C. & V. sampled during 12 month study period ..	99
XIX	Average ova-diameter and their range over 12 month study period	100
XX	Mean total length, weight and Fat-Somatic Index (FSI) of Mystus nemurus C. & V. sampled during the 12 months study period	105
XXI	Condition factor, its range and variation over 12 months study period	113
XXII	Comparative values of growth parameter in some of the Malaysian freshwater species	117

LIST OF FIGURES

Figure		Page
1.	Map of Peninsular Malaysia showing location of Tasek Chenderoh	19
2.	Map showing Tasek Chenderoh	20
3.	Map of Tasek Chenderoh showing the sampling stations A, B, and C	23
4.	Schematic diagram of Mystus nemurus C. & V. showing various body measurements	29
5.	Monthly variations of temperature, transparency, dissolved oxygen, pH, conductivity, total alkalinity in stations A, B, & C in Tasek Chenderoh	43
6.	Monthly variations of mean rainfall, water depth, phosphate-phosphorus and nitrate-nitrogen in Tasek Chenderoh	46
7.	Monthly changes in a) rotifera, copepoda and cladocera; b) phyto and zooplankton; and c) catch statistics of Mystus nemurus C. & V. in Tasek Chenderoh	53
8.	Mystus nemurus C. & V. in Tasek Chenderoh in natural condition	60
9.	Male and female Mystus nemurus C. & V. showing secondary sexual characters	65
10.	Regression lines of various body measurements of Mystus nemurus C.& V.	67
11.	A. Gill shape of Mystus nemurus C. & V.	72
	B. Inner view of stomach of Mystus nemurus C. & V.	72
	C. Mouth gap of Mystus nemurus C. & V.	72
12.	Figure showing linear correlation between gut and total length of Mystus nemurus C. & V.	74
13.	Monthly variation of the gastro-somatic index (GSI) of Mystus nemurus C. & V.	80

Page

14. Percentage composition of the food items present in the Mystus nemurus, C. & V. of sizes a) longer than 35 cm.; b) between 25-35 cm.; & c) less than 25 cm..... 82

15. Cyclical changes in mean gonado-somatic index (GSI) of male and female of Mystus nemurus C. & V. 92

16. Relationship between fecundity and length of Mystus nemurus C. & V. 98

17. Frequency distribution of ova-diameters in the ovaries of Mystus nemurus C. & V. 102

18. Mean seasonal changes of fat-somatic index (FSI) of male and females of Mystus nemurus, C. & V. 104

19. Relationship between total length (cm) and weight (g) of male Mystus nemurus C. & V. in a) logarithmic and b) non-logarithmic forms 108

20. Relationship between total length (cm) and weight (g) of female Mystus nemurus C. & V. in a) logarithmic and b) non-logarithmic forms 109

21. a. Seasonal variation of relative condition factor in male and female Mystus nemurus C. & V. 111

b. Change of relative condition factor with respect to increase in length of Mystus nemurus C. & V..... 111

22. Length frequency and mean length at age of Mystus nemurus C. & V. 114

23. Graph showing the length growth curve of Mystus nemurus C. & V. 116

LIST OF ABBREVIATIONS

C.V.	Cuvier and Valenciennes
cm	Centimetre
conc	Concentration
Fig.	Figure
F.S.I.	Fat-Somatic Index
g.	Gram
G.S.I.	Gonado-Somatic Index
G.S.I.	Gastro-Somatic Index
mg.	Miligram
mgl^{-1}	Miligram per litre
mm.	Milimeter
kg.	Kilogram
km.	Kilometer
R.G.I.	Relative Gut Index
µmhos/cm	Micromhos/centimeter

ABSTRACT

An abstract of the thesis presented to the Senate of Universiti Pertanian Malaysia in partial fulfilment of the requirements for the Degree of Master of Science.

SOME ASPECTS OF THE BIOLOGY OF MYSTUS NEMURUS C. & V. WITH REFERENCE TO CHENDEROH RESERVOIR

by

Mohammad Salim Khan

1987

Supervisor: Associate Professor Dr. Haji Mohammad Azmi bin Ambak

Co-supervisor: Associate Professor Dr. Ang Kok Jee

Faculty: Fisheries and Marine Science

Some aspects of the biology of Ikan Baung, Mystus nemurus C. & V. including taxonomy, food and feeding habits, reproduction, growth and its ecology were studied.

The fish is a bottom feeder and fed extensively on a wide range of food items that include teleosts, crustaceans, benthic invertebrates and detrital materials. The relative gut index has been found to vary from the lowest 0.783 to the highest 1.07 in a size range of 8.2 to 67.0 cm.

External fertilization and heterosexuality are exhibited. Sexual differentiation can be made depending on visual observation of secondary

sex characters. Five maturing stages have been identified. Size at first sexual maturity has been found within the length range of 32.5 to 35.5 cm in case of female and 35.5 to 38.5 cm in male.

Fecundity has been found to vary from 6,900 to 93,510 in specimens having a length range of 34.8 to 45 cm. The relationship between Fecundity, F, and Length, L can be expressed as

$$F = 0.0011L^{4.758}$$

The fish is a partial spawner and spawning period has been found long and indefinite. The ripe oocytes are therefore shed off within an interval of time. No major spawning season can be detected as is evidenced from the seasonal fluctuation of gonadosomatic index, ovadiameter measurements and different maturity stages. Fat contents in the abdominal mesentaries are associated mainly with maintenance and also for reproduction.

Growth parameters of the Von Bertalanffy equation were computed and is of the form

$$L_t = 87.0\ (1-\exp.^{0.579(t + 0.870)})$$

The calculated maximum size attainable is 87.00 cm. The length-weight relationship for male and female respectively are of the form:

$$\text{LogW} = 3.027\ \text{LogL} - 2.066$$

$$\text{LogW} = 3.201\ \text{Log L} - 2.307$$

Monthly variations of condition factor are very little.

Physico-chemical and biological regimes of Tasek Chenderoh were also studied to determine the species ecological requirements. Tasek Chenderoh is an oligotrophic, lowland, and shallow tropical reservoir. The water is slightly acidic, soft and has temporary thermocline and permanent chemocline of dissolved oxygen in open and deep water. Average pH, dissolved oxygen, temperature, conductivity, and total alkalinity were 6.35, 4.25 mg/l, 27.64°C, 47.72 µmhos/cm, and 26.73 mg/1 respectively. Nitrate-nitrogen and phosphate-phosphorus have been found limiting nutrient of primary production and the average of them were 0.085 and 0.015 mg/l respectively. Among plankton, there were 25 euplanktonic algae and 23 zooplankton heterotrophs. The mean density of phytoplankton and zooplankton were 33.25 cells/ml and 57 organisms/l respectively. Fish composition of Tasek Chenderoh consists of 50 heterogenous species of different families which can be arranged in terms of decreasing order: Cyprinidae(22), Anabantidae(6), Bagridae(3), Ophicephalidae(3), Siluridae(3), Claridae(2), Palaemonidae(2), Mastacembelidae(2), Cichlidae(2), Notopteridae(2), Eleotridae(1), Synbranchidae(1), & Gobidae(1).

ABSTRAK

Abstrak tesis dikemukakan kepada Senat Universiti Pertanian Malaysia sebagai memenuhi sebahagian daripada syarat-syarat untuk mendapatkan Ijazah Master Sains.

BEBERAPA ASPEK BIOLOGI MYSTUS NEMURUS C. & V. MERUJUK KEPADA EMPANGAN CHENDEROH

oleh

Mohammad Salim Khan

1987

Penyelia: Profesor Madya Dr. Haji Mohammad Azmi bin Ambak

Penyelia Bersama: Profesor Madya Dr. Ang Kok Jee

Fakulti Perikanan dan Sains Samudera

Beberapa aspek biologi Ikan Baung, Mystus nemurus C. & V. termasuk taxonomi, jenis makanan dan tabiat-tabiat makan, pembiakan, tumbesar dan ekologi telah dikaji.

Ikan ini adalah pemakan dasar yang memakan segala jenis makanan termasuk teleosts, krustasia, invertebrata bentik dan bahan-bahan detrital. Indexs relatif perut didapati berubah dari yang paling rendah 0.783 kepada yang paling tinggi 1.07 dalam satu julat saiz 8.2 hingga 67.0 sm.

Persenyawaan luar dan sifat heteroseks dipamerkan. Perbezaan seks boleh dibuat berdasarkan permerhatian sifat-sifat seks sekundar. Lima tahap kematangan telah dikenali. Saiz ketika kematangan seksual yang pertama didapati dalam julat panjang di antara 32.5 hingga 35.5 sm bagi betina dan 35.5 hingga 38.5 sm bagi yang jantan.

Fekunditi didapati berbeza daripada 6,900 hingga 93,510 dalam spesies yang mempunyai julat panjang di antara 34.8 hingga 45 sm. Perhubungan di antara fekunditi, F, dan panjang, L boleh dinyatakan seperti berikut:

$$F = 0.0011L^{4.758}$$

Ia bersifat penelur berperingkat dan jangkamasa ini adalah panjang dan tidak menentu. Oosit yang matang dilepaskan dalam jangkamasa yang tertentu. Tidak dapat dikesan satu musim bertelur yang nyata terbukti dengan turun naiknya bermusim indek gonadosmatik, ukuran 'ova-diameter' dan tahap kematangan yang berlainan. Kandungan lemak di dalam messentari abdominal mempunyai perhubung rapat dengan pemulihan dan pengeluaran.

Parameter tumbesar persamaan Von Bentalanffy dikira dan adalah dalam bentuk

$$Lt = 87.00\ (1-\exp.^{0.579(t + 0.870)})$$

Saiz maksima dikira yang didapati adalah 87.00 sm. Hubungan panjang-berat untuk jantan dan betina masing-masing adalah dalam bentuk:

$$\text{LogW} = 3.027\ \text{LogL} - 2.066$$

$$\text{LogW} = 3.201\ \text{LogL} - 2.307$$

Perubahan bulanan faktor keadaan adalah sangat kecil.

Sifat-sifat fizikal, kimia dan biologi Tasek Chenderoh juga dikaji untuk menentukan keperluan ekologi spesies. Tasek Chenderoh adalah oligotrofik, tanah rendah dan empangan tropikal yang cetek. Airnya berasid sedikit, lembut dan temoklin yang sementara dan kemoklin kekal oksigen terlarut pada permukaan dan kedalaman air. Purata pH, oksigen terlarut, suhu, konduktiviti dan alkaliniti adalah 6.35, 4.25 mg/l, 27.64°C, 47.72 µmhos/cm, dan 26.73 mg/l. Nitrate-nitrogen dan phosphate-phosphorus telah didapati menghadkan nutrien produksi primer dan puratanya adalah 0.085 dan 0.015 mg/l. Planktonnya adalah 25 euplanktonik algae dan 23 zooplankton heterotrof. Purata kepadatan fitoplankton dan zooplankton adalah 33.25 sel/ml dan 57 organism/l. Komposisi spesies Tasek Chenderoh mengandungi 50 heterogenus spesies dengan berbagai-bagai famili dimana boleh disusun mengikut order: Cyprinidae(22), Anabantidae(6), Bagridae(3), Ophicephlidae(3), Siluridae(3), Claridae(2), Palaemonidae(2), Mastacembelidae(2), Cichlidae(2), Notopteridae(2), Eleotridae(1), Synbranchidae(1), & Gobidae(1).

CHAPTER 1

INTRODUCTION

Atz and Pickford (1959) mentioned the following "In a world, where the human population is increasing at a rate of 25 million each year and where half the people are already undernourished, no opportunity to improve the productivity of any important source of animal protein food can be neglected, if such food can be produced in the regions where the greatest shortage of this vital component of man's diet occur."

Consumption of fish in Malaysia is widespread amongst its multiracial population. Fish constitutes about two-thirds of the total protein intake of the population in Malaysia, because it is the cheapest source of animal protein food and acceptable by all ethnic groups in the country (Tan, 1980).

The bulk of the fish landings come from marine source. Overexploitation of fish stocks from sea, as indicated by the decline in catch per unit of effort, has compelled the country to turn more towards aquaculture for its fish supply. A study made by the Fisheries Development Authority of Malaysia (LKIM) (1981) revealed that the shortage of fish will be intensified from year to year (Table I). By 1990, it is envisaged that Peninsular Malaysia will experience a drastic shortage of fish supply of between 46% - 48% of the total demand for home consumption, if nothing is done to remedy the situation.

TABLE I

SUPPLY AND DEMAND OF FISHERIES PRODUCT

PENINSULAR MALAYSIA

Year	Supply (tons) 1	Import (tons) 2	Export (tons) 3	Demand (tons) 4	Surplus/Shortage (tons) 5
1974	432652	76368	108891	400129	32523
1975	375235	94871	94514	375592	-357
1976	410968	115895	109049	417814	-6846
1977	497952	118636	109032	507556	-9604
1981	649315	141848	123430	667733	-18418
1982	567323	169291	131291	604795	-37472

Source: Annual Fisheries Statistics, Various Issues (1965-1982)

In addition to this, industrial effluents that are released to the water system cause serious pollution problem to fisheries. In Southeast Asia this is a serious problem arising out of indiscriminate deforestation, urbanization and industrialization (Baluyut, 1985). There has been declining harvest as indicated by the catch statistics (Anon, 1972-1981) of some of the endemic ichthyofauna that were in abundance a decade ago. Many workers (Van Oosten, 1945; Bishop, 1973; Baluyut, 1985) mentioned siltation of most of the river basins due to deforestation as one of the major causes of pollution. Johnson (1976) reported the disappearence of the herring species of Hilsa macrura from the straits of Malacca, and Mohsin and Ambak (1983) listed 118 species of fishes which are very rare or are already extinct and 59 fish species which are endangered. Aizam (1984) reported that effluents from palm oil mill can cause massive fish mortality because of high biochemical oxygen demand.

Under this context, the growing demand of fish protein in Malaysia, has motivated an active development of aquaculture recently (Pathansali and Zainol, 1976). LKIM has taken steps to spearhead the rapid growth of aquaculture since 1971-1985, as evidenced in the Third and Fourth Malaysia plan. The total aquaculture production has been steadily increasing in recent years (Ong, 1983). 2,290 hectares of land were developed for aquaculture during 1981-85 and 10,340 ha. will be developed by LKIM in the Fifth Malaysia Plan.

With the Government of Malaysia planning for an accelerated development in aquaculture (Pathansali & Zainol, 1976), and both the private and public sectors actively engaged in aquaculture industry (Ong, 1983), there is a need to identify popular table fishes.

Catfish culture in fresh water ecosystem is not a new concept in aquaculture. Bardach et al. (1972) reported catfish culture in the Indian sub-continent, Laos, Vietnam, Cambodia, Taiwan, Thailand, Near East and some countries of eastern Europe. The catfish farming dates back to 1931 in the United States (Lucus, 1931, cited in Am. Fish. Soc. by Riggs, C.D. 1957). Catfish farming is a rapidly growing industry in the United States (Sundararaj and Goswami, 1969). Chen (1967) mentioned commerical farming of walking catfish Clarias fuscus in Taiwan and Hongkong. Clarias lazera and Tilapia nilotica are reared in central African Empire as part of a successful mixed farming system (FAO Aquaculture Bull., 1977). Catfish has been an important source of revenue for the south central states, U.S.A. and by 1969, production was 30 million kg. from only 11 million kg. in 1966 (Bardach et al. 1972). Although production of rainbow trout, tilapia, carp, salmon and other species is increasing,