



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

Mohammad Salim Khan

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



It is hereby certified that we have read this thesis entitled 'Some Aspects of the Biology of Ikan Baung, Mystus Nemurus C.&V. with Reference to Chenderoh Reservoir' by Mohammad Salim Khan, and in our opinion it is satisfactory in terms of scope, quality, and presentation as partial fulfilment of the requirements for the degree of Master of Science



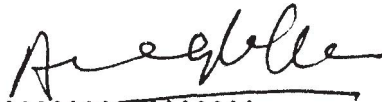
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DEDICATION

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



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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
mg ^l ⁻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, ovidiameter measurements and different maturity stages. Fat contents in the abdominal mesenteries 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 $\mu\text{mhos/cm}$, and 26.73 mg/l 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-tabiati makan, pembiakan, tumbesaran dan ekologi telah dikaji.

Ikan ini adalah pemakan dasar yang memakan segala jenis makanan termasuk teleosts, krustasia, invertebrata bentik dan bahan-bahan detrital. Indeks 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 pemerhatian sifat-sifat seks sekunder. 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 mesentari abdominal mempunyai perhubung rapat dengan pemulihan dan pengeluaran.

Parameter tumbesaran persamaan Von Bertalanffy dikira dan adalah dalam bentuk

$$L_t = 87.00 (1 - \exp(-0.579(t + 0.870)))$$



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 $\mu\text{mhos/cm}$, 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 disappearance 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 commercial 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,