Faculty of Resource Science and Technology

Fish Composition and Physicochemical Parameters at the Upper Stretch of Baram River, Sarawak

Juliana Sambai anak Sibat

Master of Science
2018

UNIVERSITI MALAYSIA SARAWAK

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Fish Composition and Physicochemical Parameters at the Upper Stretch of Baram River, Sarawak

Juliana Sambai anak Sibat

A thesis submitted

In fulfillment of the requirements for the degree of Master of Science

(Aquatic Science)

Faculty of Resource Science and Technology
UNIVERSITI MALAYSIA SARAWAK

DECLARATION

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(JULIANA SAMBAI ANAK SIBAT)

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ABSTRACT

This present study aimed to investigate the diversity and distribution of freshwater fish from four areas (Lio Mato, Long Apu, Long San and Long Kesseh) in the upper stretch of Baram River, which has not been studied before. Studies were undertaken from August 2015 to July 2016. Sampling was done along 60 to 100 m reach of each tributary using an electro-shocker. The fish were also caught using 3 layered net, cast net and gill nets of various mesh sizes (2.54 cm, 5.08 cm, 7.06 cm, 10.16 cm, and 12.7 cm). Triplicates of selected water parameters were obtained *in situ* at each sampling site using Sonde Multiparameters YSI 6920 V2.2 while the standard method of APHA (2005) was used to measure the *ex situ* water quality parameters. A total of 1,376 fishes belonging to 13 families and 58 species were caught. Cyprinidae is the most abundant freshwater family in Baram River with 63.37% of the total number of individuals caught. *Kryptopterus macrocephalus* is the most dominant species constituting 12.06% of the total individuals caught (166 individuals). Biological Indices such as Shannon-Weiner, Margalef's Index and Pielou's Index were used to determine the diversity and distribution of fish species. Long Apu (LA) recorded the highest Shannon Diversity Index H = 1.17 and the lowest was at Long San (LS) with H = 0.93. The highest richness Index was recorded at Lio Mato (LM) with D = 12.28 and the lowest was at Long Kesseh (LK) with D = 9.69. This showed that the total number of species at Lio Mato area is higher compared to the other sampling areas. The highest Pielou's evenness index was recorded at Long Apu (LA) with J = 0.36 and the lowest was at Long San (LS) with J = 0.28. This shows that fish species in Long Apu area are equally diverse and comparable to the other three areas in Baram River. Pooled water quality readings recorded throughout the study period showed that conductivity, DO, pH, temperature and BOD_5 were classified as Class I, while TSS and

turbidity were categorized as Class III based on NWQS, Malaysia. This showed that the water can be used for irrigation with precaution but extensive treatment is needed before it could be used for domestic purposes. The exponent b value of LWR ranged from 2.316 (*Kryptopterus apogon*) to 3.487 (*Rasbora caudimaculata*). Length-weight relationship (LWR) and condition factor (K) of selected fish species show that only one species (*Barbonymus schwanenfeldii*) exhibited isometric growth, two species (*Pseudolais micronemus* and *Rasbora caudimaculata*) showed positive allometric growth and the remaining two species (*Krytopterus apogon* and *Osteochillus enneaporos*) have negative allometric growth. The highest mean condition factor (K), was recorded in *B. schwanenfeldii* (1.21±0.23) while the lowest value was observed in *K. apogon* (0.35±0.03). Higher K value showed that Baram River provided a much better habitat for this species. HSI values varied from 0.106 for *B. collingwodii* to 0.648 for *R. caudimaculata*. GSI of male varied from 0.39 for *H. planiceps* to 1.17 for *B. collingwodii*. GSI of female varied from 0.80 for *P. waandersii* to 13.04 for *R. caudimaculata*. Study on the feeding habits of fishes in Baram showed that *Barbonymus schwanenfeldii*, *Luciosoma setigerum*, *Pseudolais micronemus* and *Rasbora caudimaculata* are omnivorous while *Krytopterus apogon* is carnivorous. *C. apogon* could be classified as a euryphagous omnivore, feeding on a wide range of food of benthic organisms. *Hemibagrus planiceps* is suggested as euryphagous as they feed on wide ranges of food. The findings of this study are expected to benefit the planning and management towards conservation programs in Baram River.

Keywords: Fish distribution, diversity index, length-weight relationship, Pielou's index.

Komposisi Ikan dan Parameter-parameter Fiziko-kimia di Ulu Batang Baram, Sarawak

ABSTRAK

Kajian ini bertujuan untuk mengkaji kepelbagaian dan taburan ikan air tawar dari empat kawasan (Lio Mato, Long Apu, Long San dan Long Kesseh) di Ulu Batang Baram, yang belum pernah dikaji sebelum ini. Kajian telah dijalankan dari Ogos 2015 hingga Julai 2016. Persampelan dijalankan pada jarak 60 hingga 100 m pada setiap anak sungai menggunakan teknik kejutan elektrik. Ikan juga ditangkap menggunakan pukat tiga lapis, jala dan pukat insang dari pelbagai saiz (2.54 cm, 5.08 cm, 7.06 cm, 10.16 cm, dan 12.7 cm). Tiga replikat sampel parameter air terpilih diperolehi in situ *di setiap kawasan persampelan menggunakan Sonde Multiparameters YSI 6920 V2.2 manakala kaedah piawai APHA (2005) digunakan untuk mengukur parameter-parameter kualiti air* ex situ. *Sebanyak 1,376 ekor ikan daripada 13 famili dan 58 spesies telah direkodkan.* Cyprinidae *adalah famili ikan air tawar paling banyak di Batang Baram mewakili 63.37% daripada jumlah individu yang ditangkap.* Kryptopterus macrocephalus *adalah spesis paling dominan yang mewakili 12.06% daripada jumlah tangkapan (166 individu). Indeks kepelbagaian seperti Shannon-Weiner, Indeks Margalef dan Indeks Pielou digunakan untuk menganalisis kepelbagaian dan taburan spesis ikan. Long Apu (LA) mencatat nilai indeks kepelbagaian Shannon yang tertinggi, H = 1.17 dan yang paling rendah direkodkan di Long San (LS) dengan H = 0.93. Nilai indeks kekayaan spesis tertinggi dicatatkan di Lio Mato (LM) dengan D = 12.28 dan paling rendah direkodkan di Long Kesseh (LK) dengan D = 9.69. Ini menunjukkan bahawa bilangan spesis di kawasan Lio Mato lebih tinggi berbanding dengan kawasan yang lain. Nilai indeks kesamaan tertinggi dicatatkan di Long Apu (LA) dengan J = 0.36 dan terendah di Long San (LS) dengan J = 0.28. Ini menunjukkan bahawa spesis ikan di kawasan Long Apu adalah sama rata dan setara*

dengan tiga lagi kawasan lain di Baram. Nilai semua kualiti air yang didapati sepanjang kajian menunjukkan bahawa kekonduksian, DO, pH, suhu dan BOD_5 *diklasifikasikan sebagai Kelas I, manakala TSS dan kekeruhan sebagai Kelas III berdasarkan NWQS, Malaysia. Ini menunjukkan bahawa air sungai boleh digunakan untuk pengairan dengan terkawal tetapi rawatan yang ekstensif diperlukan sebelum ianya dapat digunakan untuk tujuan domestik. Nilai eksponen b bagi LWR adalah dari 2.316* (Kryptopterus apogon*) hingga 3.487 (*Rasbora caudimaculata). *Hubungan panjang berat (LWR) merekodkan hanya satu spesis yang menunjukkan pertumbuhan isometrik (Barbonymus schwanenfeldii), dua spesis menunjukkan pertumbuhan alometrik positif* (Pseudolais micronemus *dan* Rasbora caudimaculata) *dan dua spesis* (Kryptopterus apogon *dan* Osteochillus enneaporos) *mengalami pertumbuhan alometrik negatif. Purata faktor keadaan (K) yang paling tinggi dicatatkan pada* B. schwanenfeldii *(1.21 ± 0.23) manakala nilai terendah direkodkan pada* K. apogon *(0.35 ± 0.03). Nilai HSI berjulat dari 0.106 untuk* B. collingwodii *kepada 0.648 untuk* R. caudimaculata. *GSI jantan berjulat dari 0.39 untuk* H. planiceps *kepada 1.17 untuk* B. collingwodii. *GSI betina berjulat dari 0.80 untuk* P. waandersii *kepada 13.04 untuk* R. caudimaculata. *Kajian pemakanan ikan di Batang Baram menunjukkan bahawa* B. schwanenfeldii, L. setigerum, P. micronemus *dan* R. caudimaculata *di Batang Baram adalah omnivora, manakala* K. apogon *adalah karnivora. C. apogon boleh diklasifikasikan sebagai omnivora yang memakan makanan organisma bentik.* H. planiceps *dikategorikan sebagai euryphagous kerana memakan pelbagai jenis makanan. Penemuan kajian ini diharapkan dapat memberi manfaat kepada perancangan dan pengurusan ke arah program pemuliharaan Sungai Baram.*

Kata kunci: *Taburan ikan, indeks kepelbagaian, hubungan panjang-berat, indeks Pielou.*

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