

PEER REVIEW

A2

**LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW
KARYA ILMIAH : JURNAL ILMIAH**

Judul Jurnal Ilmiah (Artikel) : Diversity and Longitudinal distribution of freshwater fish in Klawing River, Central Java, Indonesia.

Penulis Jurnal Ilmiah *) : 1 **Suhestri Suryaningsih** (*nama pengusul dicetak tebal)
2 Sri Sukmaningrum
3 Sorta Basar Ida Simanjuntak
4 Kusbiyanto

Jumlah Penulis : 4

Status Penulis : Penulias ke-1

Identitas Jurnal Ilmiah :

a. Nama Jurnal : BIODIVERSITAS/Journal of Biological Diversity.
b. Nomor ISSN : P-ISSN: 1412-033X, E-ISSN: 2085-4722.
c. Edisi/Volume, Nomor : Januari 2018/Vol. 19 No. 1
d. Penerbit : Universitas Sebelas Maret Surakarta
e. DOI artikel : <https://doi.org/10.13057/biodiv/d190114>
f. Alamat Web : <https://biodiversitas.mipa.uns.ac.id/D/D1901/D190114.pdf>
g. Terindeks di : SCOPUS, DOAJ, Q3, SJR 0,27

Kategori Publikasi Jurnal Ilmiah : Jurnal Ilmiah Internasional /Internasional Bereputasi
(beri v pada kategori yang tepat) Jurnal Ilmiah Nasional Terakreditasi
 Jurnal Nasional/Nasional terindeks di..... *

Hasil Penilaian Peer Review :

Komponen Yang Dinilai	Nilai Maksimal Jurnal Ilmiah			Nilai Akhir Yang Diperoleh
	Internasional/ Internasional bereputasi 40	Nasional Terakreditasi	Nasional *)	
a Kelengkapan unsur isi artikel (10%)	10 % x 40 = 4			3,8
b Ruang lingkup dan kedalaman pembahasan (30%)	30 % x 40 = 12			11,3
c Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	30 % x 40 = 12			11,3
d Kelengkapan unsur dan kualitas terbitan/jurnal (30%)	30 % x 40 = 12			11,4
Total	40			37,70
Nilai Pengusul (60 % x Total)	24			22,6

Catatan Penilaian artikel oleh Reviewer:

1. Tentang kelengkapan dan kesesuaian unsur : lengkap dan sesuai
2. Tentang ruang lingkup dan kedalaman pembahasan : dalam pembahasan perlu pendalaman kaitan antara keragaman dengan titik sampling sehingga preferensi habit suatu spesies cukup
3. Kecukupan dan kemutahiran data serta metodologi : cukup memadai cukup
4. Kelengkapan unsur kualitas penerbit : lengkap
5. Indikasi plagiasi : tidak ada indikasi plagiasi (Turnitin 10%)
6. Kesesuaian bidang ilmu : sesuai

Bogor, 19/4/2021

*) wajib diisi

Reviewer 2,



Prof. Dr. Ir. Sulistiono, M.Sc.
NIP. 196303121989031003
Jabatan/(Gol.) : Guru Besar/(Gol. IV/d)
Bidang Ilmu : Ekobiologi Ikan, Biologi Populasi/Biologi Perikanan
Unit Kerja : FPIK IPB

Reviewer 1,



Prof. Dr. Ir. Ridwan Afandi
NIP. 195411051980031002
Jabatan/(Gol.) : Guru Besar/(Gol. IV/e)
Bidang Ilmu : Ekof
Unit Kerja : FPIK IPB

A2

**LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW
KARYA ILMIAH : JURNAL ILMIAH**

Judul Jurnal Ilmiah (Artikel) : Diversity and Longitudinal distribution of freshwater fish in Klawing River, Central Java, Indonesia.

Penulis Jurnal Ilmiah *) : **1 Suhestri Suryaningsih** (*nama pengusul dicetak tebal)
2 Sri Sukmaningrum
3 Sorta Basar Ida Simanjuntak
4 Kusbiyanto

Jumlah Penulis : 4

Status Penulis : Penulias ke-1

Identitas Jurnal Ilmiah :

- a. Nama Jurnal : BIODIVERSITAS/Journal of Biological Diversity.
- b. Nomor ISSN : P-ISSN: 1412-033X, E-ISSN: 2085-4722.
- c. Edisi/Volume, Nomor : Januari 2018/Vol. 19 No. 1
- d. Penerbit : Universitas Sebelas Maret Surakarta
- e. DOI artikel : <https://doi.org/10.13057/biodiv/d190114>
- f. Alamat Web : <https://biodiversitas.mipa.uns.ac.id/D/D1901/D190114.pdf>
- g. Terindeks di : SCOPUS, DOAJ, Q3, SJR 0,27

Kategori Publikasi Jurnal Ilmiah : Jurnal Ilmiah Internasional /Internasional Bereputasi
(beri v pada kategori yang tepat) Jurnal Ilmiah Nasional Terakreditasi
 Jurnal Nasional/Nasional terindeks di..... *

Hasil Penilaian Peer Review :

Komponen Yang Dinilai	Nilai Maksimal Jurnal Ilmiah			Nilai Akhir Yang Diperoleh
	Internasional/ Internasional bereputasi 40	Nasional Terakreditasi	Nasional *)	
a Kelengkapan unsur isi artikel (10%)	10 % x 40 = 4	<input type="checkbox"/>	<input type="checkbox"/>	3,6
b Ruang lingkup dan kedalaman pembahasan (30%)	30 % x 40 = 12	<input type="checkbox"/>	<input type="checkbox"/>	10,8
c Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	30 % x 40 = 12	<input type="checkbox"/>	<input type="checkbox"/>	10,8
d Kelengkapan unsur dan kualitas terbitan/jurnal (30%)	30 % x 40 = 12	<input type="checkbox"/>	<input type="checkbox"/>	10,8
Total	40			36
Nilai Pengusul (60 % x Total)	24			21,6

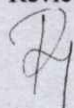
Catatan Penilaian artikel oleh Reviewer:

1. Tentang kelengkapan dan kesesuaian unsur : Lengkap dan sesuai
2. Tentang ruang lingkup dan kedalaman pembahasan : Dalam pembahasan, perlu pendalaman kaitan antara keragaman dengan titik sampling sehingga preferensi habit suatu spesies terlihat
3. Kecukupan dan kemutahiran data serta metodologi : Cukup memadai
4. Kelengkapan unsur kualitas penerbit : Lengkap
5. Indikasi plagiasi : Tidak ada
6. Kesesuaian bidang ilmu : Sesuai

Bogor, 16/4/2021

***) wajib diisi**

Reviewer 1,



Prof. Dr. Ir. Ridwan Afandi
NIP. 195411051980031002
Jabatan/(Gol.) : Guru Besar/(Gol. IV/e)
Bidang Ilmu : Ekofitologi Hewan Air
Unit Kerja : FPIK IPB

Mengetahui :

Dekan



Prof. Dr. Imam Widhiono M.Z, M.S.
NIP. 195904201985031002
Unit Kerja : Fakultas Biologi Unsoed

A2
LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW
KARYA ILMIAH : JURNAL ILMIAH

Judul Jurnal Ilmiah (Artikel) : Diversity and Longitudinal distribution of freshwater fish in Klawing River, Central Java, Indonesia.

Penulis Jurnal Ilmiah *) : 1 **Suhestri Suryaningsih** (*nama pengusul dicetak tebal)
 2 Sri Sukmaningrum
 3 Sorta Basar Ida Simanjuntak
 4 Kusbiyanto

Jumlah Penulis : 4

Status Penulis : Penulias ke-1

Identitas Jurnal Ilmiah :

a. Nama Jurnal : BIODIVERSITAS/Journal of Biological Diversity.
 b. Nomor ISSN : P-ISSN: 1412-033X, E-ISSN: 2085-4722.
 c. Edisi/Volume, Nomor : Januari 2018/Vol. 19 No. 1
 d. Penerbit : Universitas Sebelas Maret Surakarta
 e. DOI artikel : <https://doi.org/10.13057/biodiv/d190114>
 f. Alamat Web : <https://biodiversitas.mipa.uns.ac.id/D/D1901/D190114.pdf>
 g. Terindeks di : SCOPUS, DOAJ, Q3, SJR 0,27

Kategori Publikasi Jurnal Ilmiah : Jurnal Ilmiah Internasional /Internasional Bereputasi
 (beri v pada kategori yang tepat) Jurnal Ilmiah Nasional Terakreditasi
 Jurnal Nasional/Nasional terindeks di..... *

Hasil Penilaian Peer Review :

Komponen Yang Dinilai	Nilai Maksimal Jurnal Ilmiah			Nilai Akhir Yang Diperoleh
	Internasional/ Internasional bereputasi 40	Nasional Terakreditasi	Nasional *)	
a Kelengkapan unsur isi artikel (10%)	10 % x 40 = 4			3,9
b Ruang lingkup dan kedalaman pembahasan (30%)	30 % x 40 = 12			11,8
c Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	30 % x 40 = 12			11,8
d Kelengkapan unsur dan kualitas terbitan/jurnal (30%)	30 % x 40 = 12			11,9
Total	40			39,4
Nilai Pengusul (60 % x Total)	24			23,6

Catatan Penilaian artikel oleh Reviewer:

- Tentang kelengkapan dan kesesuaian unsur : lengkap, sesuai
- Tentang ruang lingkup dan kedalaman pembahasari : cukup
- Kecukupan dan kemutahiran data serta metodologi : cukup
- Kelengkapan unsur kualitas penerbit : lengkap
- Indikasi plagiasi : tidak ada indikasi plagiasi (Turnitin 10%)
- Kesesuaian bidang ilmu : sesuai

Bogor, 15/4/2021

*) wajib diisi

Reviewer 2,



Prof. Dr. Ir. Sulistiono, M.S.
 NIP. 196303121989031003
 Jabatan/(Gol.) : Guru Besar/(Gol. IV/d)
 Bidang Ilmu : Ekobiologi Ikan, Biologi Populasi/Biologi Perikanan
 Unit Kerja : FPIK IPB

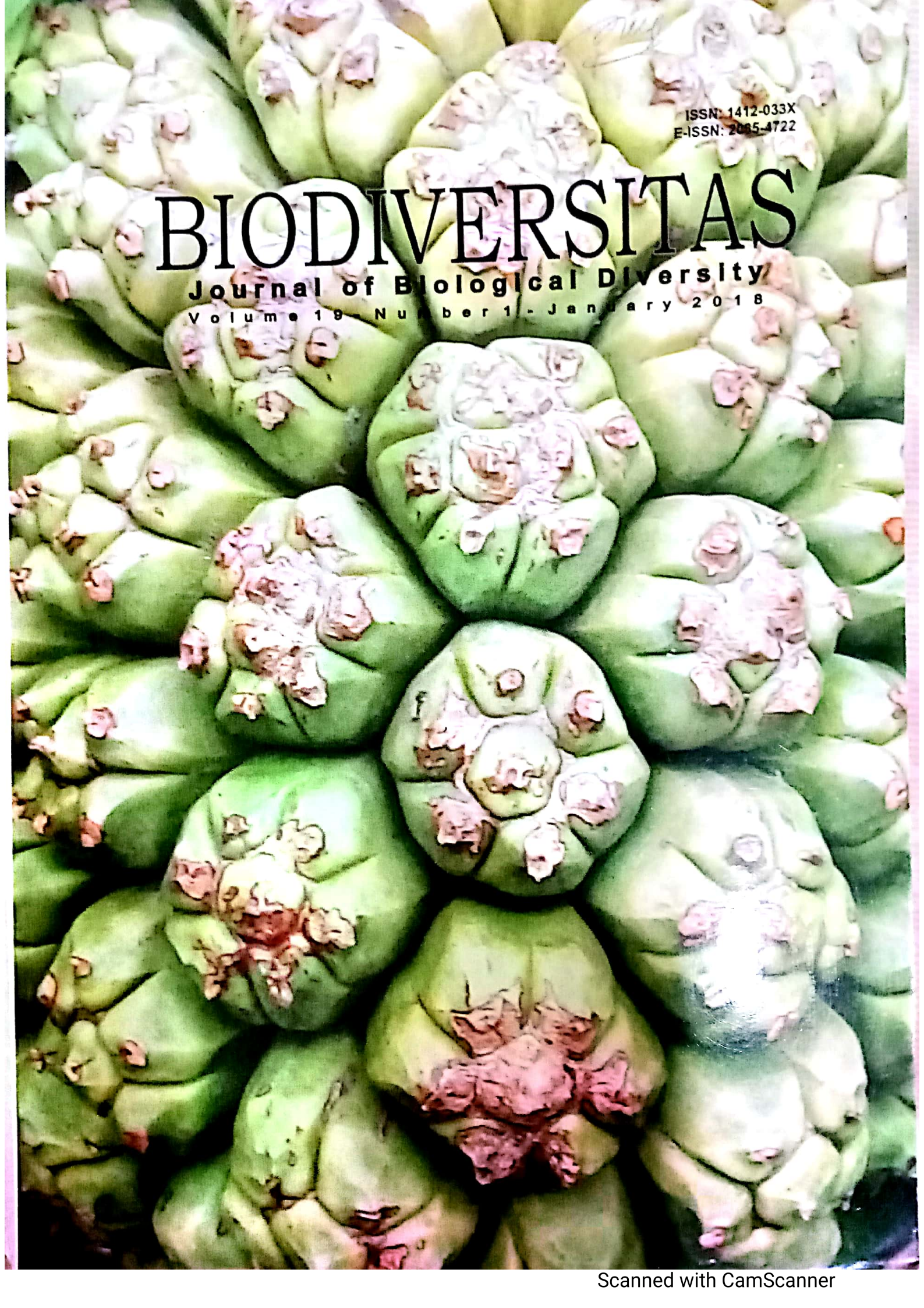
Mengetahui :

Dekan



Prof. Dr. rer. nat. Imam Widhiono M.Z, M.S.
 NIP. 195904201985031002
 Unit Kerja : Fakultas Biologi Unsoed

ARTIKEL



ISSN: 1412-033X
E-ISSN: 2085-4722

BIODIVERSITAS

Journal of Biological Diversity

Volume 19 Number 1 - January 2018

BIODIVERSITAS

Journal of Biological Diversity
Volume 19 - Number 1 - January 2018

ISSN/E-ISSN:

1412-033X (printed edition), 2085-4722 (electronic)

EDITORIAL BOARD (COMMUNICATING EDITORS):

Abdel Fattah N.A. Rabou (Palestine), Agnieszka B. Najda (Poland), Alan J. Lymbery (Australia), Alireza Ghanadi (Iran), Ankur Patwardhan (India), Bambang H. Saharjo (Indonesia), Daiane H. Nunes (Brazil), Darlina Md. Naim (Malaysia), Ghulam Hassan Dar (India), Faiza Abbasi (India), Hassan Pourbabaie (Iran), I Made Sudiana (Indonesia), Ivan Zambrana-Flores (United Kingdom), Joko R. Witono (Indonesia), Katsuhiko Kondo (Japan), Krishna Raj (India), Livia Wanntorp (Sweden), M. Jayakara Bhandary (India), Mahdi Reyahi-Khoram (Iran), Mahendra K. Rai (India), Mahesh K. Adhikari (Nepal), Maria Panitsa (Greece), Maryam Keshavarzi (Iran), Muhammad Akram (Pakistan), Mochamad A. Soendjoto (Indonesia), Mohib Shah (Pakistan), Mohamed M.M. Najim (Sri Lanka), Morteza Elghani (Iran), Pawan K. Bharti (India), Paul K. Mbugua (Kenya), Rasool B. Tareen (Pakistan), Seweta Srivastava (India), Seyed Aliakbar Hedayati (Iran), Shahabuddin (Indonesia), Shahir Shamsir (Malaysia), Shri Kant Tripathi (India), Stavros Lalas (Greece), Subhash Santra (India), Sugiyarto (Indonesia), T.N. Prakash Kammardi (India)

EDITOR-IN-CHIEF:

Sutarno

EDITORIAL MEMBERS:

English Editors: Graham Egleton (grahamegleton@gmail.com), Suranto (surantouns@gmail.com); Technical Editor: Solichatun (solichatun_sa@yahoo.com), Artini Pangastuti (pangastuti_tutut@yahoo.co.id); Distribution & Marketing: Rita Rakhmawati (oktia@yahoo.com); Webmaster: Ari Pitoyo (aripitoyo@yahoo.com)

MANAGING EDITORS:

Ahmad Dwi Setyawan (unsjournals@gmail.com)

PUBLISHER:

The Society for Indonesian Biodiversity

CO-PUBLISHER:

Department of Biology, Faculty of Mathematics and Natural Sciences, Sebelas Maret University, Surakarta

ADDRESS:

Jl. Ir. Sutami 36A Surakarta 57126. Tel. +62-271-7994097, Tel. & Fax.: +62-271-663375, Email: unsjournals@yahoo.com

ONLINE:

biodiversitas.mipa.uns.ac.id

EXPERTISE AND CORRESPONDING EMAIL OF THE COMMUNICATING EDITORS:

GENETIC DIVERSITY: Agnieszka B. Najda (agnieszka.najda@up.lublin.pl), Alan J. Lymbery (a.lymbery@murdoch.edu.au), Darlina Md. Naim (darlinamdna@usm.my), Mahendra K. Rai (pmkrai@hotmail.com), Maryam Keshavarzi (neshat112000@yahoo.com).
SPECIES DIVERSITY: Joko R. Witono (jrwitono@yahoo.com), Katsuhiko Kondo (k3kondo@nodai.ac.jp), Livia Wanntorp (livia.wanntorp@nm.se), Mahesh K. Adhikari (mkg_adh@wlink.com.np), Maria Panitsa (mpanitsa@upatras.gr), Mohib Shah (mohibshah@awkum.edu.pk), Paul K. Mbugua (paulkmbugua@gmail.com), Rasool B. Tareen (rbtareen@yahoo.com).
ECOSYSTEM DIVERSITY: Abdel Fattah N.A. Rabou (arabou@iugaza.edu), Alireza Ghanadi (aghannadi@yahoo.com), Ankur Patwardhan (ankurpatwardhan@gmail.com), Bambang H. Saharjo (bhsaharjo@gmail.com), Daiane H. Nunes (nunesdaiane@gmail.com), Faiza Abbasi (faezaabbasi@gmail.com), Ghulam Hassan Dar (profdar99@gmail.com), Hassan Pourbabaie (hassan_pourbabaie@yahoo.com), I Made Sudiana (sudiana@yahoo.com), Ivan Zambrana-Flores (izambrana@gmail.com), Krishna Raj (krishnarajsec@yahoo.co.uk), Mahdi Reyahi-Khoram (phdmrk@gmail.com), Mochamad A. Soendjoto (masoendjoto@gmail.com), Mohamed M.M. Najim (mnajim@kln.ac.lk), Morteza Elghani (morteza_elghani@yahoo.com), Pawan K. Bharti (gurupawanbharti@rediffmail.com), Seweta Srivastava (seweta.21896@lpu.co.in), Seyed Aliakbar Hedayati (Hedayati@gau.ac.ir), Shahabuddin (shahabsaleh@gmail.com), Shahir Shamsir (shahirshamsir@gmail.com), Shri Kant Tripathi (sk_tripathi@rediffmail.com), Stavros Lalas (slalas@teilar.gr), Subhash Santra (scsantra@yahoo.com), Sugiyarto (sugiyarto_ys@yahoo.com), T.N. Prakash Kammardi (prakashnk@yahoo.com).
ETHNOBIOLOGY: M. Jayakara Bhandary (mbjaikar@gmail.com), Muhammad Akram (makram_0451@hotmail.com).



Society for Indonesia
Biodiversity



Sebelas Maret University
Surakarta

Diversity and longitudinal distribution of freshwater fish in Klawing River, Central Java, Indonesia

SUHESTRI SURYANINGSIH[✉], SRI SUKMANINGRUM, SORTA BASAR IDA SIMANJUNTAK, KUSBIYANTO

Faculty of Biology, Universitas Jenderal Soedirman. Jl. Dr. Soeparno No. 63, Purwokerto-Banyumas 53122, Central Java, Indonesia. Tel.: +62-281-638794, Fax.: +62-281-631700, ✉email: hestri.bio@gmail.com

Manuscript received: 10 July 2017. Revision accepted: 2 December 2017.

Abstract. Suryaningsih S, Sukmaningrum S, Simanjuntak SBI, Kusbiyanto. 2018. Diversity and longitudinal distribution of freshwater fish in Klawing River, Central Java, Indonesia. *Biodiversitas* 19: 85-92. The aims of this study were to evaluate the diversity and longitudinal distribution of fish in Klawing River, Purbalingga (Central Java). The survey was performed using a clustered random-sampling technique. The river was divided into upstream, midstream and downstream regions. Species diversity was measured as the number of species, and the longitudinal distribution was assessed by determining the fish species present in each of the three regions. Eighteen fish species of eleven families were identified in the Klawing River: Cyprinidae, Bagridae, Mastacembelidae, Anabantidae, Cichlidae, Channidae, Eleotrididae, Beleontinidae, Osphronemidae, Poeciliidae, and Siluridae. Cyprinidae exhibited the highest number of species (six), followed by Bagridae and Cichlidae (two species each). The other families were represented by one species each. A single cluster analysis showed that the upstream population had a similarity of 78% and 50% with the midstream and downstream populations, respectively. Species and family diversities were higher in the midstream populations than in the upstream and downstream populations. This longitudinal distribution may be due to differences in environmental conditions and suggests that management of the land surrounding the Klawing River is a key factor in the conservation of freshwater fish.

Keywords: cluster analysis, freshwater fish, longitudinal distribution, Klawing

INTRODUCTION

The Klawing River is located in Purbalingga, Central Java and is one of the tributaries of the Serayu River. The Klawing River is an important freshwater fish habitat in Java. In total, Java has 213 species of freshwater fish, several of which are endemic (Hubert et al. 2015). However, Javanese ecosystems and biotas are currently threatened. Recent research on freshwater fish species diversity and distribution in Javanese rivers has yielded various results. In the Brantas River (East Java), Suharijanti et al. (2008) found nine species of fish, while Djumanto and Probosunu (2011) found 12 species in upstream Opak River, Yogyakarta. In the lakes of the Cisadane River basin (West Java), Hadiaty (2011) found a total of 32 fish species belonging to 19 families.

Land use differs along the Klawing River, with plantation forests and intensive agriculture systems in the headwaters area, settlements in the midstream area, and agriculture in the downstream area. Such differences in land use result in different fish macro- and microhabitats. According to Mercado-Silva et al. (2012), the vegetation, land use, and topographic conditions in a basin determine the hydrology and chemistry of receiving waters and exert direct effects on resident organisms. However, other factors such as water temperature, channel depth, and biological interactions determine the species present in a particular river region. As mentioned by Atkore et al. (2011), the distribution patterns of fishes are generally controlled by the dispersal mechanism, historical factors, and tolerance of environmental factors.

There is a significant drop in elevation along the Klawing River, from 247m asl upstream to 36m asl downstream, which is a major factor affecting water flow. Water flow represents the main force behind freshwater ecosystems determining the distribution, abundance, and diversity of fish. The movement of water across the landscape influences the ecology of rivers across a broad range of spatial and temporal scales. River flow strongly influences the ichthyofauna. By regulating the input of organic matter, it affects the phenology of reproduction and spawning behavior of local fish assemblages, and determines habitat diversification. Diversity and distribution of freshwater fish assemblages are generally influenced by water levels and flow variability (Bradford and Heinonen 2008), geo-hydrological features of the river (Angermeier and Davideanu 2004), and microhabitat heterogeneity (Shervette et al. 2007). To varying degrees, the diversity of freshwater assemblages is aggravated by urbanization, habitat alteration, anthropogenically-induced climate change (Vescovi et al. 2009; Paller et al. 2011) and the presence of invasive alien fish species (Guerrero 2002).

Determining the longitudinal profile of the fish assemblage along the Klawing River should provide information to detect relationships between coarse gradients in the assemblage structures and factors such as temperature and stream flow (Vannote et al. 1980). In general, fish assemblage structure is thought to change predictably from headwaters to downstream reaches, with biotic zones in which species are added or replaced in response to continuous gradients in temperature, channel morphology, and water velocity. It is important to describe

the fish species diversity and longitudinal distribution in the Klawing River, in order to develop conservation strategies. This study aimed to determine the fish diversity and longitudinal distribution along the Klawing River and to describe the effects of physicochemical parameters on these variables.

MATERIALS AND METHODS

Study site

In general, the study site was chosen to reflect the variety of land uses found along the Klawing River, such as

forest, secondary forest, agriculture, and human settlement. The Klawing River is 55.5 km long, 15.6-47.3 m wide and 0.65-2.16 m deep. The substrate composition changes gradually along the river. The survey employed a clustered random sampling technique: we divided the river into three regions, upstream, midstream and downstream, and then collected fish samples at three sampling sites per area. The three upstream sampling sites were at Tlahab Kidul (256 m asl.), Plumbungan and Banjarsari, the three midstream sites were at Onje (96 m asl.), Sindang, and Lamongan, and the three downstream sites were at Jetis, Bokol, and Kedungbenda (at 36.3 m asl.).

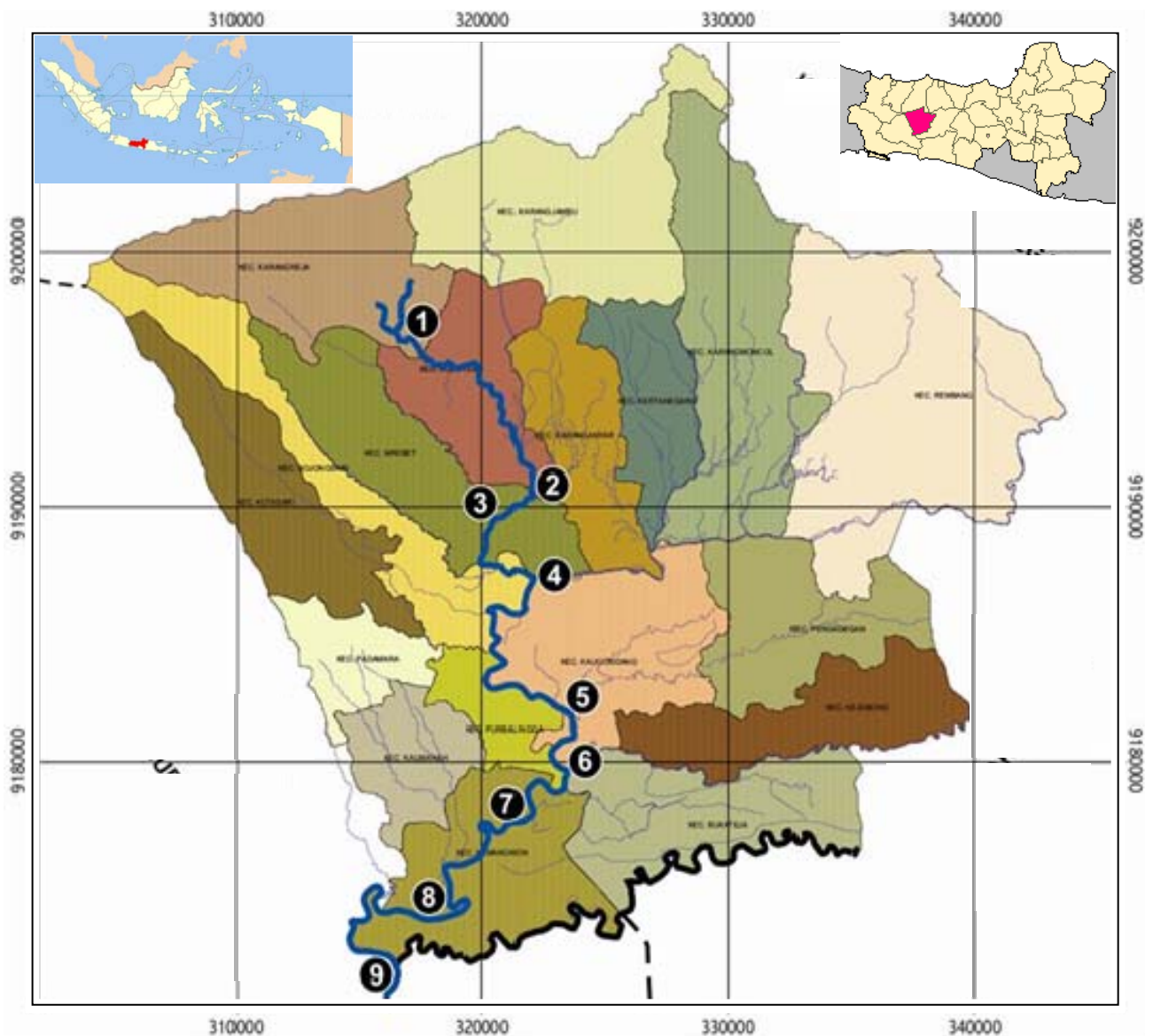


Figure 1. Sampling sites along the Klawing River, Purbalingga, Central Java, Indonesia ($07^{\circ}16'520''S$ and $109^{\circ}21'209''E$ to $07^{\circ}28'827''S$ and $109^{\circ}19'270''E$). Note: No. 1 to 9, see Table 1.

Table 1. Habitat description of study site, along Klawing River, Purbalingga, Central Java, Indonesia

Region category	Location	Coordinate	Habitat description	Water quality
Upstream	1. Tlahab Kidul	(07 ⁰ 16'520''S, 109 ⁰ 21'209''E)	Elevation: 256 m asl. Land use system : Secondary forest Depth (m): 0.45-0.6 Width (m): 16-22 Substrate: rock, big stones	Temperature (°C): 26-27 Depth of visibility (m): 0.55-0.70 Velocity (m/s) : 1.4-1.5 pH: 7-8 O ₂ : 9.2-14.5 CO ₂ : 1.9-3.1
	2. Plumbungan	(07 ⁰ 16'934''S) 108 ⁰ 22'340''E)	Elevation: 174 m asl. Land use system: Secondary forest Depth (m): 0.45-0.60 Width (m): 18-25 Substrate: rock, big stones	Temperature (°C): 27-28 Depth of visibility (m): 0.50-0.70 Velocity (m/s) : 1.2-1.36 pH : 6.9-7.5 O ₂ : 10.0-13.6 CO ₂ : 2.1-3.3
	3. Banjarsari	(07 ⁰ 18'247''S) 108 ⁰ 22'749''E)	Elevation: 134 m asl. Land use system: Agricultural areas Depth (m) : 0.55-0.75 Width (m): 27-30 Substrate: rock, big stones	Temperature (°C): 24-29 Depth of visibility (m): 0.51-0.70 Velocity (m/s) : 1.1-1.4 pH: 7-8 O ₂ : 12.6-15.2 CO ₂ : 1.4-3.3
Midstream	4. Onje	(07 ⁰ 20'050''S 109 ⁰ 22'291''E)	Elevation: 96 m asl. Land use system: Agricultural areas Depth (m) : 0.6-0.9 Width (m): 25-33 Substrate: small stones, gravel	Temperature (°C): 26-31 Depth of visibility (m): 0.42-0.54 Velocity (m/s): 0.78-0.92 pH: 7-7.5 O ₂ : 9-13.8 CO ₂ : 1.9-5
	5. Sindang	(07 ⁰ 21'940''S 109 ⁰ 23'070''E)	Elevation: 71 m asl. Land use system: Agricultural areas Depth (m): 0.65-1.0 Width (m): 33-45 Substrate : small stones, gravel	Temperature (°C): 26 -31 Depth of visibility (m): 0.56-0.54 Velocity (m/s): 0.80-0.92 pH: 7-7.5 O ₂ : 8.5-13.5 CO ₂ : 2.1-4.5
	6. Lamongan	(07 ⁰ 24'355''S 109 ⁰ 24'154''E)	Elevation: 43.2 m asl. Land use system: Agricultural areas and human settlements Depth (m): 0.7-1.1 Width (m): 40-58 Substrate: small stones, gravel	Temperature (°C): 26-31 Depth of visibility (m): 0.50-0.60 Velocity (m/s): 0.80-0.92 pH: 7-7.5 O ₂ : 8.0-13.8 CO ₂ : 2.0-4.6
Downstream	7. Jetis	(07 ⁰ 25'448''S 109 ⁰ 23'187''E)	Elevation: 40 m asl. Land use system: Agricultural areas, human settlements and sand mining Depth (m): 0.8-1.0 Width (m): 42-52 Substrate: sand, mud	Temperature (°C): 27-32 Depth of visibility (m): 0.37-0.50 Velocity (m/s) : 0.63-0.75 pH: 7-7.5 O ₂ : 8.3-12.5 CO ₂ : 2.4-6.9
	8. Bokol	(07 ⁰ 28'365''S 109 ⁰ 21'090''E)	Elevation: 38 m asl. Land use system: Agricultural areas and sand mining Depth (m): 1.1-1.3 Width (m): 42-55 Substrate: sand, mud	Temperature (°C): 27-32 Depth of visibility (m): 0.35-0.45 Velocity (m/s): 0.60-0.78 pH: 7-7.5 O ₂ : 7.9-12.5 CO ₂ : 2.1-7.1
	9. Kedungbenda	(07 ⁰ 28'370''S 109 ⁰ 19'625''E)	Elevation: 36 m asl. Land use system: Agricultural areas, and sand mining Depth (m): 42-60 Width (m): 1.3-1.9 Substrate: gravel, sand, mud	Temperature (°C): 24-29 Depth of visibility (m): 0.51-0.70 Velocity (m/s): 1.25-1.42 pH: 7-7.5 O ₂ : 8.0-12.0 CO ₂ : 2.3-8

Fish collection

Fish samples were collected using electric fishing (Gorman and Karr 1978; Lestari 2006) and seine nets with 0.5 and 1-inch mesh size. Fish samples were collected during the months of June to September 2016, once a month with four replications. Sampling efforts were performed for one hour at each site.

Fish identification

Fish samples were preserved using formalin 10 %, and then alcohol 70% for the permanent collection in bottles. The fresh fish samples from the sampling area were taken to the laboratory using an ice box; then the fish specimen was washed with running water before being preserved by formalin 10%. Next, the fish specimens were preserved in a 10% formalin solution for fixation, after that, they were moved into 70% ethyl alcohol storage. The fish specimens were identified based on Saanin (1984), Kottelat et al. (1993), Froese and Pauly (2012), and FishBase (2017a,b,c). Fresh fish samples were transported to the laboratory in an ice box, washed in running water, preserved in 10% formalin, and transferred to 70% alcohol (Haryono et al. 2012).

Environmental parameters measurement

Physicochemical parameters measured were water depth, river width, water temperature, depth of visibility, water velocity, acidity (pH), oxygen, carbon dioxide, and river substrate. The physicochemical parameters for the different sampling sites are presented in Table 1.

In the upstream region, the riparian zone was vegetated with secondary forest while the bottom substrate comprised large and medium-sized stones. In the midstream, the land use in the riparian zone comprised open fields, rice fields, and human settlement, while the bottom substrate consisted of medium stones and gravel. In the downstream, the land use of the riparian zone comprised open fields, rice fields, sand mining and human settlement, while the substrate of the bottom was gravel, sand, and mud.

Data analysis

The mean number of individuals, species abundance, diversity, evenness, and dominance were compared

between regions and seasons by two-way analysis of variance and a *post-hoc* Fisher LSD test. Diversity was estimated using the Shannon index (Magurran 1988). Evenness was calculated as Shannon diversity divided by the logarithm of the number of species. The values for Dominance were expressed as the complement of the Simpson's index ($D = 1 - S$). These indices were analyzed using the statistical package PAST (Hammer et al. 2001).

RESULTS AND DISCUSSION

Species diversity and abundance

A total of 472 individuals belonging to 18 species and 11 families (Table 2) were collected from the Klawing River. Cyprinidae with 6 species had the highest number of individual fish caught (82.6% of the total catch), followed by Bagridae and Cichlidae each with two species (3.2% and 2.5% of the catch, respectively), and Anabantidae, Chanidae, Eleotridae, Belontiidae, Mastacembelidae, Poeciliidae, Osphronemidae, and Siluridae each represented by only one species (Figure 2a). The eighteen species are listed in Table 2. Our result showed quite a low species diversity when compared to the other rivers in Java.

The Logawa River, which is located in the same biogeographic region, reportedly harbors 33 fish species of 11 families (Lestari 2004). Nuryanto et al. (2012) detected 22 fish species belonging to 10 families in the Cileumeuh River (Cilacap, Central Java). Roesma et al. (2016) detected 24 fish species belonging to 10 families in the Batangtoru River, South Tapanuli, North Sumatra. Yustina (2001) detected 70 species of fish along the Rangau River, Riau, and Sumatra. In a different biogeographic region, Pathak et al. (2013) detected 33 fish species belonging to 14 families in the Gangga River basin, India. Thus, differences are observed not only in species richness but also in composition. This may result, in part, from differences in the land use systems around the rivers (Humpl et al. 2006).

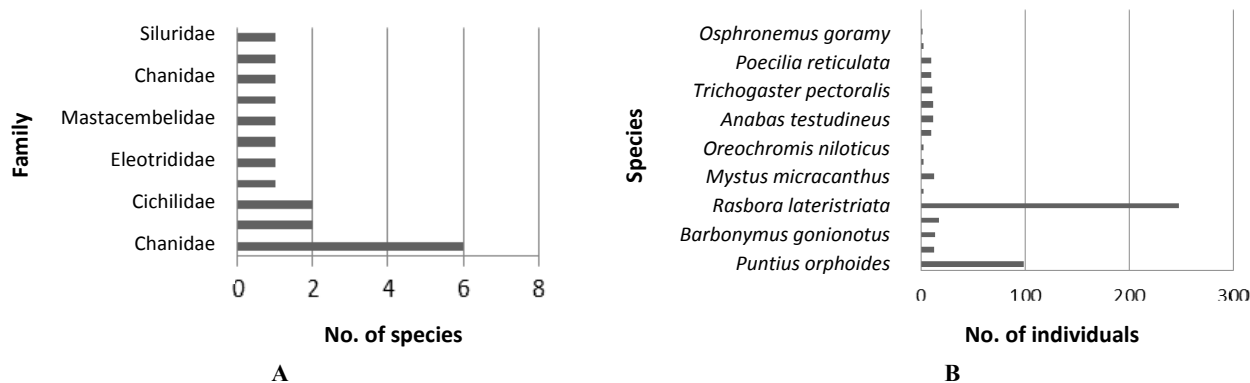


Figure 2. A. The number of families and species of fish in the Klawing River. B. Abundance of each species

Table 2. Fish abundance and species diversity according to their longitudinal distribution in the Klawing River, Purbalingga, Central Java, Indonesia

Families	Species	Number of individual fish			
		Upstream	Midstream	Downstream	Total
Cyprinidae	<i>Puntius orphoides</i>	31	45	22	98
	<i>Hampala macrolepidota</i>	5	7	0	12
	<i>Barbonymus gonionotus</i>	6	4	3	13
	<i>Osteochilus vittatus</i>	0	8	9	17
	<i>Rasbora lateristriata</i>	87	124	36	247
	<i>Cyprinus carpio</i>	0	3	0	3
Bagridae	<i>Mystus micracanthus</i>	0	5	7	12
	<i>Hemibagrus nemurus</i>	0	2	0	3
Cichlidae	<i>Oreochromis niloticus</i>	0	3	0	3
	<i>O. mossambicus</i>	0	4	5	9
Anabantidae	<i>Anabas testudineus</i>	0	2	9	11
Eleotrididae	<i>Oxyeleotris marmorata</i>	0	4	7	11
Belontiidae	<i>Trichogaster pectoralis</i>	0	4	6	10
Mastacembelidae	<i>Macrogathus aculeatus</i>	3	6	0	9
Poeciliidae	<i>Poecilia reticulata</i>	3	6	0	9
Chanidae	<i>Chana striata</i>	0	0	3	3
Osphronemidae	<i>Osphronemus goramy</i>	0	2	0	2
Siluridae	<i>Ompok hypothalamus</i>	0	1	0	1
	Number of individuals	135	230	107	472
	Number of species	6	17	10	18
	Dominance_D	0.4724	0.3347	0.1851	
	Shannon_H	1.051	1.691	1.97	
	Simpson_1-D	0.5276	0.6653	0.8149	
	Evenness_e^H/S	0.4766	0.3192	0.7171	

Within the body of the river our results showed that the diversity of fish was significantly different between upstream, midstream and downstream ($F_{2,9} = 13,73$, $p = 0,002$). Species abundance was highest in the midstream (17 species and 230 individuals) followed by downstream with (10 species and 107 individuals) and the lowest was in the upstream (46 species and 135 individuals). Species composition of the fish between sampling sites was different, with upstream having the lowest diversity index ($H = 1.051$; $E = 0.476$), then midstream ($H = 1.691$; $E = 0.319$), and with downstream having the highest ($H = 1.97$; $E = 0.717$). The distribution of freshwater fish assemblages showed low dominance (0.18 - 0.47) and relatively high evenness (0.312 - 0.71), which means that the allocation of niche space is distributed fairly equitably for most dominant and non-dominant fish species thriving in the river. Our results were consistent with those of Torgesen et al. (2006), Rahim et al. (2009), Nautiyal et al. (2013), Paller et al. (2013), and Pathak et al. (2013). Their studies, like ours, found that fish diversity of the rivers gradually increased from upstream to downstream with the lowest diversity occurring upstream. But our findings differed from the other studies in the geohydrological and physicochemical factors that affected the diversity and distributions of the fish. In previous research, differences in diversity and distribution of fish were found to be affected especially by differences in temperature and flow between sections of the rivers, but in our research the important variation in environmental factors was in velocity ($F_{2,9} = 86,841$, $p = 0,001$) and light of the river waters, ($F_{2,9} = 8,487$, $p = 0,008$),

while other environmental factors analyzed did not show any significant differences (Table 1). Water temperature and rainfall were found as major influential factors for species distribution. Fish communities respond significantly and predictably to almost all kinds of anthropogenic disturbances, including eutrophication, acidification, chemical pollution, flow regulation, physical habitat alteration and fragmentation, human exploitation and introduced species (Li et al. 2010).

There were temporal variations in the fish assemblage we observed in the Klawing River; H differed significantly between months ($F_{2,9} = 13.73$, $p = 0.002$), as did abundance ($F_{2,9} = 13.03$, $p = 0.002$). The highest abundance was in June and then it gradually decreased until September. In contrast, diversity increased from June through to September (Figure 3 a, b). This difference was likely caused by water flow. Paller et al. (2013) found that water level fluctuation and dissolved oxygen concentrations exert marked effects on fish assemblage structure. In Central Java, the water level is significantly lower during the dry season (April to October). The lower diversity and equitability during the dry season serve as indicators of water and habitat qualities. Increase in fish diversity in the rainy season is attributed to the diverse riverine habitats formed by rising water levels. During rainy months, the volume of aerated water (Dissolved Oxygen) is sufficient to replenish the watersheds, which increases the nutrient-carrying capacity of the river water, leading to greater diversity in the aquatic biota (Vescovi et al. 2009).

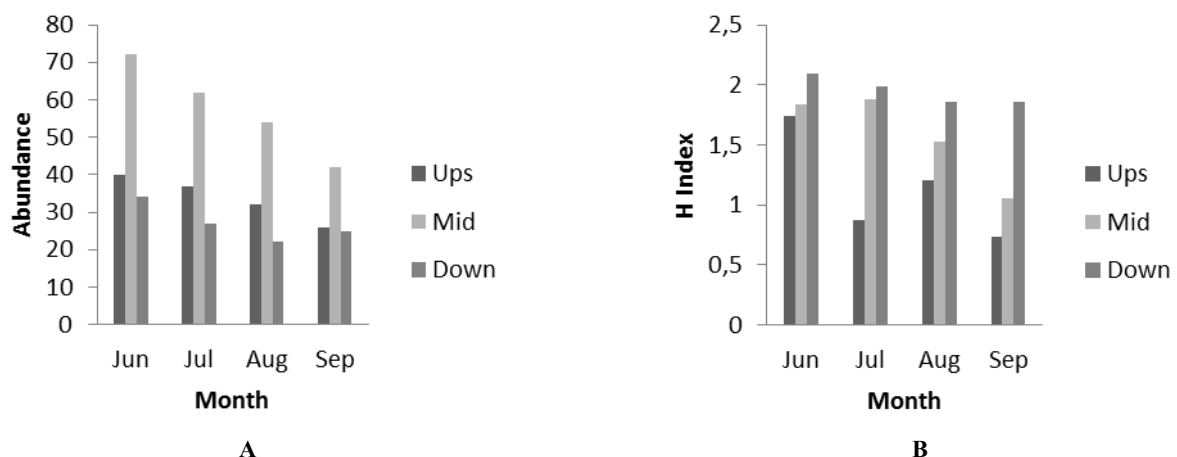


Figure 3. A. Abundance, and B. H-index of fish in the Upper, Middle, and Lower reaches of the Klawing River, Purbalingga, Central Java, Indonesia from June to September 2016

Fish distribution

Six species were found upstream (Table 1), but none were unique. The species found upstream and midstream included *Hampala macrolepidota*, *Poecilia reticulata*, and *Macrognathus aculeatus*.

Hampala macrolepidota was also found in the Batang Toru River (Roesma et al. 2016), which differs from the Klawing River only in its flow velocity. The Batang Toru River reportedly had clear water, a flow velocity of 0.85-0.88 m/s, and a substrate of rocks, sand, and gravel; however, the altitudes of the sampling sites were not stated. *H. macrolepidota* is considered an ecological indicator species. *P. reticulata* was found in the upstream and midstream areas. Similarly, Rachmatika et al. (2002) found this species in the upstream areas of the Cibareno River of Mount Halimun National Park, which has a similar water temperature 20-29°C, pH (6.0-7.5) and dissolved oxygen content (8-10 ppm); however, the altitude of the sampling sites in that study was not mentioned. In contrast to Nuryanto et al. (2012), this species was found upstream, but whether the conditions were similar to those in our study is unclear. Roesma et al. (2016) identified *M. aculeatus* at the Simajambu sampling site upstream in the Batangtoru River, South Tapanuli, North Sumatra. This site is characterized by clear water, a flow velocity of 0.85-0.88 m/s, and a substrate comprising rocks, sand, and gravel.

In our study, seventeen species were identified in the midstream, some of which - *Cyprinus carpio*, *Oreochromis niloticus*, *Osphronemus gourami*, and *Ompok hypothalamus*, - were unique to the midstream region.

In general, these four species are considered to occur midstream in rivers. In our study, *C. carpio* was found only in the midstream at an altitude of 43.2-96 m asl. This is in accordance with the findings of Lestari (2004) in the Logawa River, Banyumas, Central Java. Nuryanto et al. (2012) reported that *O. niloticus* was present only in upstream, in the Cilemeuh River, Majenang, Cilacap. Similarly, this species was found at the Simajambu sampling site upstream in the Batangtoru River, South

Tapanuli, North Sumatra (Roesma et al. 2016). There are potential differences in the physicochemical parameters between the two rivers. In this study, *O. gourami* was found midstream but was not detected in other studies. The area around the Klawing River is fundamental for the cultivation of gourami. In this study, *O. hypothalamus* was found only in midstream, but it has also been found on the Sei Jaya River (a tributary of the Barito River) and downstream on the Sebangau River, East Kalimantan, which has a water temperature of 29.6-31.4°C, a light intensity of 0.34-0.53m depth, pH of 4.31-5.20 and dissolved oxygen content of 3.76-6.74ppm. However, the altitude of the sampling sites was not mentioned (Haryono 2012). The pH and oxygen levels differ significantly from those of our study, probably because the research site was a river located in peat soil. According to FishBase (2017b), *O. hypothalamus* lives in medium to large-sized, slow-flowing, lowland rivers, streams, and lakes with peat soil. It feeds on fish, prawns, and crustaceans. It moves to seasonally flooded habitats during high tide periods and is generally found around submerged woody vegetation.

In this study, *Osteochilus vittatus* was found only in midstream and downstream. Djumanto et al. (2011) reported this species at stations 2-5 located downstream on the Opak River, which is near the midstream region of the river and is characterized by a water temperature of 28.8-29.2°C, light intensity of 0.20-0.90 m depth, flow velocity of 0.49-1.13 m/s, and pH of 7.0-7.3. Again, the altitude of the sampling sites was not provided. Nuryanto et al. (2012) detected this species in all areas; however, the physicochemical parameters and the altitudes of the sampling sites were not provided. This species was found only in the midstream and downstream in our study, but upstream in the Cileumeuh River.

Trichogaster pectoralis, found midstream and downstream in our study, was detected in the Batang Kerang floodplain, Balai Ringin, Sarawak, by Rahim et al. (2009), at sampling sites characterized by brown or black water, a water temperature of 25.6-26.6°C, a light intensity

of 0.63-1.26 m, pH of 4.55-5.45, and a dissolved oxygen content of 1.55-1.66 ppm; however, the altitude of the sampling sites was not specified. According to FishBase (2017c), this species is found in shallow, sluggish or standing-water habitats with abundant aquatic vegetation. *T. pectoralis* can breathe air directly and absorb oxygen from water and thus is well adapted to poor-quality habitats. This species originates from the Mekong basin in Laos, Thailand, Cambodia, and Vietnam and from the Chao Phraya basin. At least one country has reported that the introduction of this species has had an adverse ecological impact.

In our study, the downstream area harbored 10 fish species. *Channa striata* was found at an altitude of 36-40 m asl., compared with 51 m (site 13) and 81 m (site 6) in the study of Ohee et al. (2016); the differences are possibly due to the different biogeographies of Papua and Java. Our results are consistent with the findings of Lestari (2004) in the Logawa River, Banyumas, Central Java, in that *C. striata* was found at similar altitudes (*i.e.*, 25-40 m asl.).

Cyprinus carpio was found in midstream regions at 36-40 m asl. Rachmatika et al. (2002) found this species in the midstream and downstream regions, which had water temperatures of 22-29°C, pH of 6.5-7.5, and dissolved oxygen content of 8-10 ppm; however, the altitude of these sampling sites was not mentioned. According to FishBase (2017a), adult *C. carpio* inhabits warm, deep, slow-flowing, and still waters such as lowland rivers and large, well-vegetated lakes. The species is hardy and tolerant of a wide variety of conditions, but generally favors large bodies of water with stagnant or slow-flowing water and soft-bottom sediments. *C. carpio* thrives in large turbid rivers and is more active at dusk and dawn. Adults and juveniles feed on a variety of benthic organisms and plant material. The species develops along shores or in backwaters. Adults often engage in considerable spawning migration to suitable backwaters and flooded meadows. In this study, *Mystus micracanthus* was found midstream and downstream, while *Hemibagrus nemurus* was found only in midstream, which is in agreement with the findings of Nuryanto et al. (2012) in the Cileumeuh River, Majenang, Cilacap Regency. Rahim et al. (2009) detected *M. micracanthus* only at sampling sites with brown water, while *H. nemurus* was found at sites with brown or black water; both have poor physicochemical parameters. These two species can survive under such conditions because of their ability to take in oxygen directly from the air.

In general, our results show that certain species of fish are distributed in particular river regions. Oberdroff et al. (1993) reported a similar longitudinal zoning of fish species, such zoning may be associated with differences in the relative ease of laying eggs on appropriate spawning substrates, usually gravel or submerged plants. Such a pattern was evident in the Klawing River.

A Bray-Curtis dendrogram of the fish species distribution in the upstream, midstream, and downstream regions of Klawing River is shown in Figure 5. The highest species richness was observed midstream, and the fish assemblage shifted from tolerant to thermally inclined groups in the upstream and downstream reaches. The

altitude gradient (driving water velocity and river substrate variations) exerts a major influence on fish assemblage pattern. Our findings, therefore, support the pattern of an ecological guild structure inferred from predictions of the river continuum concept (Bhat et al. 2012). According to Alabaster and Lloyd (1982), variations in water chemistry can influence fish diversity and distribution.

The distribution of fish families differs between this and prior studies. The number of families detected in this study (11) was lower than those reported by Azmir et al. (2010) (14 families) at Gunung Machinchang, Pulau Langkawi, Malaysia; by Sjafei et al. (2001) (20 families) in the Cimanuk River; by Hadiaty (2011) (19 families) in the Cisadane River basin, Jabodetabek. The number we detected is smaller than that reported by Lestari (2004) (11 families) in the Logawa River, Banyumas, but higher than that reported by Roesma et al. (2016) (10 families) in the Batangtoru River.

Cyprinidae was the largest family seen in the Klawing River (82.6%) and was detected in all regions of the river. This is in agreement with the findings of Rahim et al. (2009) (79.8-63.8%), Lestari (2004) (65%), Atkore et al. (2011) (53.48%), Nuryanto et al. (2012) (45.45%), Roesma et al. (2016) (45.83%), Ibarra et al. (2005) (42.5%), and Azmir et al. (2010) (29.36%).

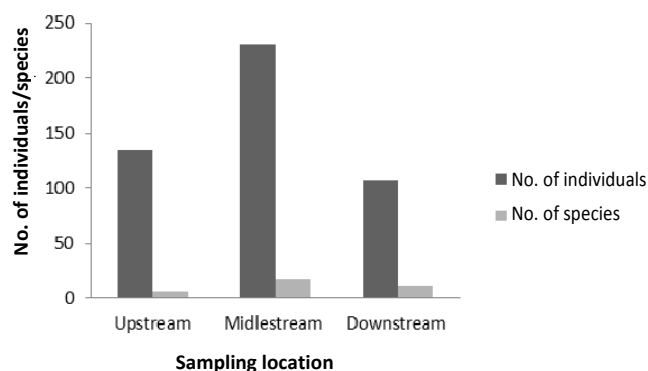


Figure 4. Fish species distribution along a longitudinal gradient in Klawing River, Purbalingga, Central Java, Indonesia

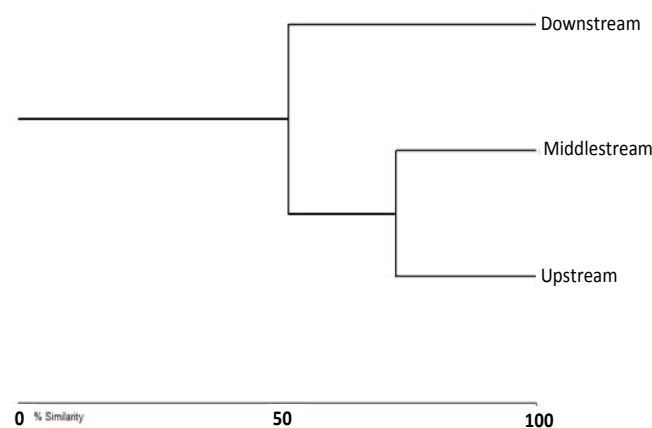


Figure 5. Bray-Curtis Cluster Analysis Dendrogram shows the distribution pattern of the species in the Klawing River, Purbalingga, Klawing River, Central Java, Indonesia

In conclusion, 18 fish species belonging to 11 families were found in the Klawing River, which indicates that the river has low fish species diversity. The family Cyprinidae had the largest number of species (six). Some species were distributed along the length of the river, while others were limited to certain areas. The fish species distribution was linked to variations in physicochemical parameters along the river, especially light, water velocity, and substrate.

ACKNOWLEDGEMENTS

We are grateful to Akhmad Iqbal, Soewarto, and Yulia Sistina for their support in securing funding for this research and to all of the students who assisted in collecting field data. This research was supported by a Directorate General of Higher Education Research Fellowship and funding from the Universitas Jenderal Soedirman, Purwokerto, Central Java, Indonesia (contract number: 1918/UN23.14/PN.01.00/2016).

REFERENCES

- Alabaster JS, Lloyd R. 1982. Water Quality Criteria for Fish. FAO, Butterworth Scientific, London.
- Angermeier PL, Davideanu G. 2004. Using fish community to assess streams in Romania: initial development of an index of biotic integrity. *Hydrobiologia* 511: 65-78.
- Atkore VM, Sivakumar K, Johnsingh AJT. 2011. Patterns of diversity and conservation status of freshwater fishes in the tributaries of River Ramganga in the Shiwaliks of the Western Himalaya. *Curr Sci* 100 (5): 731-736
- Azmir AI, Samat A. 2010. Diversity and distribution of stream fishes of Pulau Langkawi, Malaysia. (Kepelbagaian dan taburan ikan sungai di Pulau Langkawi, Malaysia). *Sains Malaysiana* 39 (6): 869-875.
- Bhatt JP, Manish K, Pandit MK. 2012. Elevational gradients in fish diversity in the Himalaya: Water discharges the key driver of distribution patterns. *PLoS ONE* 8 (4): 10.1371/annotation/c24aa49a-7eb5-4612-bde3-8285b21921a0. DOI: 10.1371/annotation/c24aa49a-7eb5-4612-bde3-8285b21921a0.
- Bradford MJ, Heinonen JS. 2008. Low flows, instream flow needs and fish ecology in small streams. *Canadian Water Resources Journal* 33: 165-180.
- Djumanto, Probosunu N. 2011. Biodiversitas ikan di hulu Sungai Opak. *Jurnal Iktiologi Indonesia* 11 (1): 1-10. [Indonesian]
- FishBase. 2017a. *Ompok hypothalamus* Bleeker, 1646. <http://www.fishbase.org/summary/23107>. [April 17, 2017].
- FishBase. 2017b. *Trichogaster pectoralis* Regan, 1910. <http://www.fishbase.org/summary/499#>. [April 17, 2017].
- FishBase. 2017c. *Cyprinus carpio* Linnaeus, 1758. <http://www.fishbase.org/summary/1450>. [April 17, 2017].
- Froese R, Pauly D. 2012. FishBase. World Wide Web Electronic Publication, Stockholom.
- Gorman OT, Karr JR. 1978. Habitat structure and stream fish communities. *Ecology* 59 (3): 507-515.
- Guerrero RD. 2002. Invasive aquatic animals in the Philippines. special report on their impacts and management. *ASEAN Biodiversity* (Oct-Dec 2002): 12-15.
- Hadiaty RK. 2011. Diversitas dan kehilangan jenis ikan di danau-danau aliran Sungai Cisdane. *Jurnal Iktiologi Indonesia*, 11 (2): 143-157.
- Hammer Ø, Harper, David AT, Ryan PD. 2001. Past: Paleontological Statistics Software Package for education and data analysis. *Palaeontologia Electronica* <http://palaeo-electronica.org>
- Haryono. 2012. Fish fauna of Central Kalimantan peatland waters in rainy season. *Iktiofauna perairan lahan gambut pada musim penghujan di Kalimantan Tengah. Jurnal Iktiologi Indonesia* 12 (2): 83-91.
- Huebert N. 2015. DNA Barcoding Indonesian freshwater fishes. *UMR BOREAS*. borea.mnhn.fr/sites/.../files/.../Hubert-et-al-dna-2015-0018.p
- Humpl M, Pivnic`ka K. 2006. Fish assemblages as influenced by environmental factors in streams in protected areas of the Czech Republic. *Ecology of Freshwater Fish* 15: 96-103.
- Ibarra AA, Park Y-S, Brosse S, Reyjol Y, Lim P, Lek S. 2005. Nested patterns of spatial diversity revealed for fish assemblages in a West European river. *Ecol Freshw Fish* 14: 233-242.
- Kottelat M, Whitten AJ, Kartikasari SN, Wirjoatmojo S. 1993. Freshwater fishes of Western Indonesia and Sulawesi. Periplus, Hongkong.
- Lestari W. 2004. The fish community of a tropical organically polluted river: a case study of the Loggawa River, Central Java, Indonesia. Dissertation. Cuvillier Verlag Göttingen.
- Lestari W. 2006. Detecting the efficiency of fish sampling technique on abundance and diversity of freshwater fish. *Jurnal Saintek Perikanan* 1 (2): 57-62.
- Li L, Zheng B, Liu L. 2010. Biomonitoring and bioindicators used for river ecosystems: Definitions, approaches, and trends. *Procedia Environ Sci* 2: 1510-1524.
- Magurran AE. 1988. Ecological diversity and its measurement. Chapman & Hall, London.
- Mercado-Silva N, Lyons J, Pardo ED. 2012. Environmental factor associated with fish assemblages pattern in a high gradient. *Revista Mexicana de Biodiversidad* 83: 117-128.
- Nautiyal P, Mishra AS, Singh KR, Singh U. 2013. Longitudinal distribution of the fish fauna in the river Ganga from Gangotri to Kanpur. *J Appl Nat Sci* 5 (1): 63-68.
- Nuryanto A, Bhagawati D, Abulias MN, Indarmawan. 2012. Diversitas ikan di Sungai Cileumeuh, Kecamatan Majenang, Kabupaten Cilacap, Jawa Tengah. *Jurnal Iktiologi Indonesia* 12 (2): 147-153. [Indonesian]
- Oberdroff T, Guilbert E, Lucchetta JC. 1993. Pattern of species richness in the Seine River basin, France. *Hydrobiologia* 259: 157-167.
- Ohee HL. 2016. Freshwater fish diversity in an oil palm concession area in Mimika, Papua. *Biodiversitas* 17 (2): 665-672.
- Paller VGC, Labatos Jr BV, Lontoc BM, Matalog OE, Ocampo PP. 2011. Freshwater fish fauna in watershed of Mt. Makiling Forest Reserve, Laguna, Philippines. *Philippine J Sci* 140 (2): 195-206.
- Paller VGC, Mark Nell C, Corpuz, and Pablo P. Ocampo. 2013. Diversity and distribution of freshwater fish assemblages in Tayabas River, Quezon (Philippines). *Philippine J Sci* 142 (1): 55-67.
- Pathak AK, Sakkar UK, Singh SP. 2013. Spatial Gradients in fresh water fish diversity, abundance and current pattern in the Himalayan region of upper Ganges Basin, India. *Biodiversitas* 15 (2): 186-194.
- Rachmatika I, Sjafei DS, Nurcahyadi W. 2002. Fish diversity in Cibareno River, Gunung Halimun National Park: its unique assemblage, management and conservation consideration. *Jurnal Iktiologi Indonesia* 2 (2): 1-14.
- Rahim KAA, Daud SK, Siraj SS, Arshad A, Ibrahim YEER. 2009. Freshwater fish diversity and composition in Batang Kerang Floodplain, Balai Ringin, Sarawak. *Pertanika J Trop Agric Sci* 32 (1): 7-16.
- Roesma DI, Chonelia A, Mursid A, Kamsi M. 2016. Fish diversity of the Batang Toru River System, South Tapanuli, North Sumatra. *Biodiversitas* 7 (2): 634-641.
- Saanin H. 1984. Kunci Identifikasi ikan I dan II. Bina Cipta, Bandung. [Indonesian]
- Shervette VR, Aguirre WE, Blacio E, Rodrigo Cevallo R, Gonzalez, Pozo F, Gelwick F. 2007. Marcelo fish communities of a disturbed mangrove wetland and an adjacent tidal river in Palmar, Ecuador. *Estuar Coast Shelf Sci* 72: 115-128.
- Sjafei DS, Wirjoatmojo S, Rahardjo MF, Susilo SB. 2001. Fauna ikan di Sungai Cimanuk, Jawa Barat. *Jurnal Iktiologi Indonesia* 1 (1): 1-6. [Indonesian]
- Suharijanti HU, Winarji, Arfianti D, Mulyanto, Widjanarko P, Kusriani. 2008. Inventarisasi jenis-jenis ikan air tawar dan laut di Perairan Jawa Timur. *Jurnal Perikanan* 2 (1): 7-12. [Indonesian]
- Torgersen CE, Baxter CV, Li HW, McIntosh BA. 2006. Landscape influences on longitudinal patterns of river fishes: Spatially continuous analysis of fish habitat relationships. *American Fisheries Society Symposium* 48: 473-492.
- Vannote RL, Minshall GWK, Cummins W, Sedell JR, Cushing CE. 1980. The river continuum concept. *Can J Fish Aquat Sci* 37: 130-137.
- Vescovi L, Berteaux D, Bird D, Sylvie DB. 2009. Freshwater biodiversity versus anthropogenic climate change. *UNESCO-WWAP*, France.
- Yustina. 2001. Keanekaragaman jenis ikan di sepanjang perairan Sungai Rangau, Riau Sumatra. *Jurnal Natur Indonesia* 4 (1): 1-14. [Indonesian]

TURNITIN

Diversity and longitudinal distribution of freshwater fish in Klawing River, Central Java, Indonesia

by Suhestri Suryaningsih

Submission date: 18-Mar-2018 07:30PM (UTC+0700)

Submission ID: 931961799

File name: and_longitudinal_distribution_of_freshwater_fish_in_Klawing.pdf (347.24K)

Word count: 5703

Character count: 30656

5

Diversity and longitudinal distribution of freshwater fish in Klawing River, Central Java, Indonesia

S⁶ HESTRI SURYANINGSIH^{*}, SRI SUKMANINGRUM, S⁶ RTA BASAR IDA SIMANJUNTAK, KUSBIYANTO

Faculty of Biology, Universitas Jenderal Soedirman. Jl. Dr. Soeparno No. 63, Purwokerto-Banyumas 53122, Central Java, Indonesia. Tel.: +62-281-638794, Fax.: +62-281-631700, *email: hestri.bio@gmail.com

Manuscript received: 10 July 2017. Revision accepted: 2 December 2017.

Abstract. Suryaningsih S, Sukmaningrum S, Simanjuntak SBI, Kusbiyanto. 2018. Diversity and longitudinal distribution of freshwater fish in Klawing River, Central Java, Indonesia. *Biodiversitas* 19: 85-92. The aims of this study were to evaluate the diversity and longitudinal distribution of fish in Klawing River, Purbalingga (Central Java). The survey was performed using a clustered random-sampling technique. The river was divided into upstream, midstream and downstream regions. Species diversity was measured as the number of species, and the longitudinal distribution was assessed by determining the fish species present in each of the three regions. Eighteen fish species of eleven families were identified in the Klawing River: Cyprinidae, Bagridae, Mastacembelidae, Anabantidae, Cichlidae, Channidae, Eleotrididae, Belontiidae, Osphronemidae, Poeciliidae, and Siluridae. Cyprinidae exhibited the highest number of species (six), followed by Bagridae and Cichlidae (two species each). The other families were represented by one species each. A single cluster analysis showed that the upstream population had a similarity of 78% and 50% with the midstream and downstream populations, respectively. Species and family diversities were higher in the midstream populations than in the upstream and downstream populations. This longitudinal distribution may be due to differences in environmental conditions and suggests that management of the land surrounding the Klawing River is a key factor in the conservation of freshwater fish.

Keywords: cluster analysis, freshwater fish, longitudinal distribution, Klawing

INTRODUCTION

The Klawing River is located in Purbalingga, Central Java and is one of the tributaries of the Serayu River. The Klawing River is an important freshwater fish habitat in Java. In total, Java has 213 species of freshwater fish, several of which are endemic (Hubert et al. 2015). However, Javanese ecosystems and biotas are currently threatened. Recent research on freshwater fish species diversity and distribution in Javanese rivers has yielded various results. In the Brantas River (East Java), Suharijanti et al. (2008) found nine species of fish, while Djumanto and Probosunu (2011) found 12 species in upstream Opak River, Yogyakarta. In the lakes of Cisadane River basin (West Java), Hadiaty (2011) found a total of 32 fish species belonging to 19 families.

Land use differs along the Klawing River, with plantation forests and intensive agriculture systems in the headwaters area, settlements in the midstream area, and agriculture in the downstream area. Such differences in land use result in different fish macro- and microhabitats. According to Mercado-Silva et al. (2012), the vegetation, land use, and topographic conditions in a basin determine the hydrology and chemistry of receiving waters and exert direct effects on resident organisms. However, other factors such as water temperature, channel depth, and biological interactions determine the species present in a particular region. As mentioned by Atkore et al. (2011), the distribution patterns of fishes are generally controlled by the dispersal mechanism, historical factors, and tolerance of environmental factors.

There is a significant drop in elevation along the Klawing River, from 247m asl upstream to 36m asl downstream, which is a major factor affecting water flow. Water flow represents the main force behind freshwater ecosystems determining the distribution, abundance, and diversity of fish. The movement of water across the landscape influences the ecology of rivers across a broad range of spatial and temporal scales. River flow strongly influences the ichthyofauna. By regulating the input of organic matter, it affects the phenology of reproduction and spawning behavior of local fish assemblages, and determines habitat diversification. Diversity and distribution of freshwater fish assemblages are generally influenced by water levels and flow variability (Bradford and Heinonen 2008), geo-hydrological features of the river (Angermeier and Davideanu 2004), and microhabitat heterogeneity (Shervette et al. 2007). To varying degrees, the diversity of freshwater assemblages is aggravated by urbanization, habitat alteration, anthropogenically-induced climate change (Vescovi et al. 2009; Paller et al. 2011) and the presence of invasive alien fish species (Guerrero 2003).

Determining the longitudinal profile of the fish assemblage along the Klawing River should provide information to detect relationships between coarse gradients in the assemblage structures and factors such as temperature and stream flow (Vannote et al. 1980). In general, fish assemblage structure is thought to change predictably from headwaters to downstream reaches, with biotic zones in which species are added or replaced in response to continuous gradients in temperature, channel morphology, and water velocity. It is important to describe

the fish species diversity and longitudinal distribution in the Klawing River, in order to develop conservation strategies. This study aimed to determine the fish diversity and longitudinal distribution along the Klawing River and to describe the effects of physicochemical parameters on these variables.

19
MATERIALS AND METHODS

Study site

In general, the study site was chosen to reflect the variety of land uses found along the Klawing River, such as

forest, secondary forest, agriculture, and human settlement. The Klawing River is 55.5 km long, 15.6-47.3 m wide and 0.65-2.16 m deep. The substrate composition changes gradually along the river. The survey employed a clustered random sampling technique: we divided the river into three regions, upstream, midstream and downstream, and then collected fish samples at three sampling sites per area. The three upstream sampling sites were at Tlahab Kidul (256 m asl.), Plumbungan and Banjarsari), the three midstream sites were at Onje (96 m asl.), Sindang, and Lamongan, and the three downstream sites were at Jetis, Bokol, and Kedungbenda (at 36.3 m asl.).

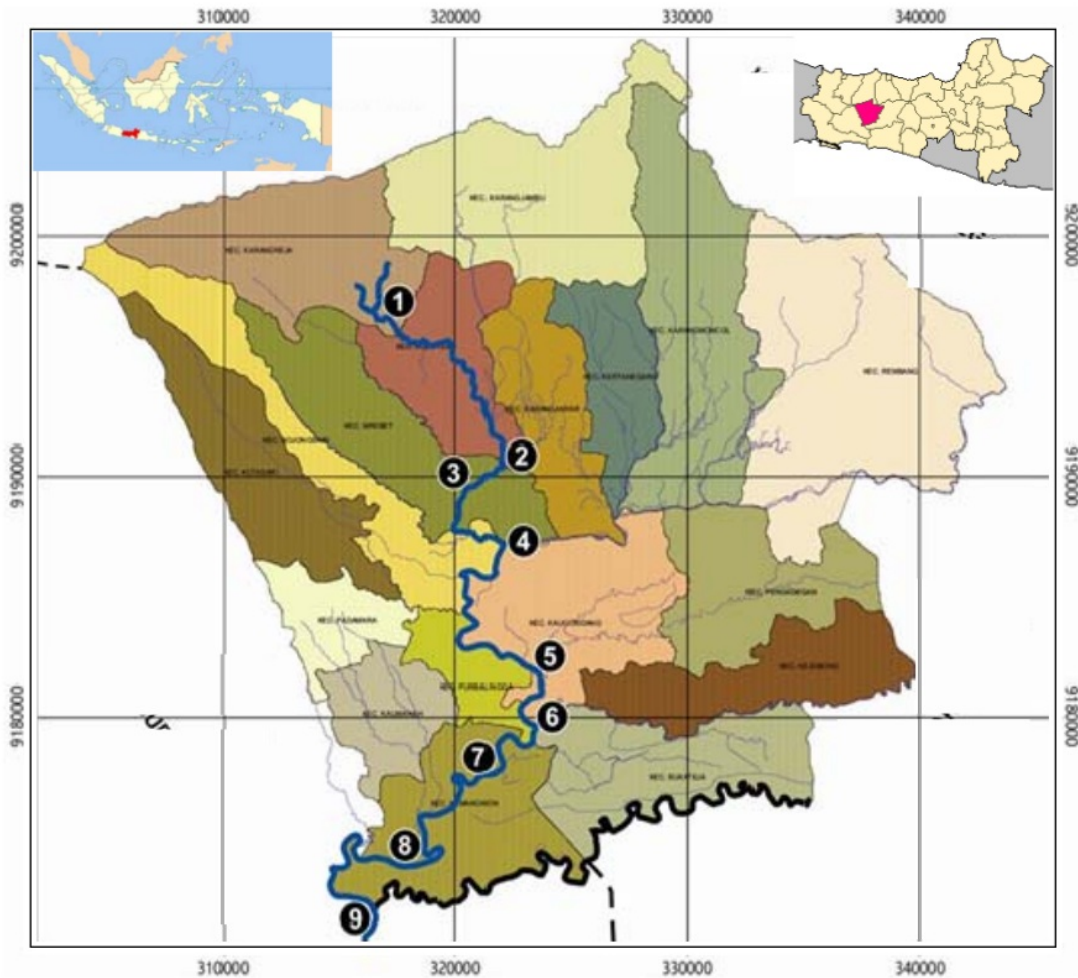


Figure 1. Sampling sites along the Klawing River, Purbalingga, Central Java, Indonesia (07°16'520"S and 109°21'209"E to 07°28'827" S and 109°19'270"E). Note: No. 1 to 9, see Table 1.

Table 1. Habitat description of study site, along Klawing River, Purbalingga, Central Java, Indonesia

Region category	Location	Coordinate	Habitat description	Water quality
Upstream	1. Tlahab Kidul	(07 ^o 16'520"S, 109 ^o 21'209"E)	Elevation: 256 m asl. Land use system : Secondary forest Depth (m): 0.45-0.6 Width (m): 16-22 Substrate: rock, big stones	Temperature (^o C): 26-27 Depth of visibility (m): 0.55-0.70 Velocity (m/s) : 1.4-1.5 pH: 7-8 O ₂ : 9.2-14.5 CO ₂ : 1.9-3.1
	2. Plumbungan	(07 ^o 16'934"S) 108 ^o 22'340"E)	Elevation: 174 m asl. Land use system: Secondary forest Depth (m): 0.45-0.60 Width (m): 18-25 Substrate: rock, big stones	Temperature (^o C): 27-28 Depth of visibility (m): 0.50-0.70 Velocity (m/s) : 1.2-1.36 pH : 6.9-7.5 O ₂ : 10.0-13.6 CO ₂ : 2.1-3.3
	3. Banjarsari	(07 ^o 18'247"S) 108 ^o 22'749"E)	Elevation: 134 m asl. Land use system: Agricultural areas Depth (m): 0.55-0.75 Width (m): 27-30 Substrate: rock, big stones	Temperature (^o C): 24-29 Depth of visibility (m): 0.51-0.70 Velocity (m/s) : 1.1-1.4 pH: 7-8 O ₂ : 12.6-15.2 CO ₂ : 1.4-3.3
Midstream	4. Onje	(07 ^o 20'050"S 109 ^o 22'291"E)	Elevation: 96 m asl. Landuse system: Agricultural areas Depth (m) : 0.6-0.9 Width (m): 25-33 Substrate: small stones, gravel	Temperature (^o C): 26-31 Depth of visibility (m): 0.42-0.54 Velocity (m/s): 0.78-0.92 pH: 7-7.5 O ₂ : 9-13.8 CO ₂ : 1.9-5
	5. Sindang	(07 ^o 21'940"S 109 ^o 23'070"E)	Elevation: 71 m asl. Landuse system: Agricultural areas Depth (m): 0.65-1.0 Width (m): 33-45 Substrate : small stones, gravel	Temperature (^o C): 26 -31 Depth of visibility (m): 0.56-0.54 Velocity (m/s): 0.80-0.92 pH: 7-7.5 O ₂ : 8.5-13.5 CO ₂ : 2.1-4.5
	6. Lamongan	(07 ^o 24'355"S 109 ^o 24'154"E)	Elevation: 43.2 m asl. Landuse system: Agricultural areas and human settlements Depth (m): 0.7-1.1 Width (m): 40-58 Substrate: small stones, gravel	Temperature (^o C): 26-31 Depth of visibility (m): 0.50-0.50 Velocity (m/s): 0.80-0.92 pH: 7-7.5 O ₂ : 8.0-13.8 CO ₂ : 2.0-4.6
Downstream	7. Jetis	(07 ^o 25'448"S 109 ^o 23'187"E)	Elevation: 40 m asl. Land use system: Agricultural areas, human settlements and sand mining Depth (m): 0.8-1.0 Width (m): 42-52 Substrate: sand, mud	Temperature (^o C): 27-32 Depth of visibility (m): 0.37-0.50 Velocity (m/s) : 0.63-0.75 pH: 7-7.5 O ₂ : 8.3-12.5 CO ₂ : 2.4-6.9
	8. Bokol	(07 ^o 28'365"S 109 ^o 21'090"E)	Elevation: 38 m asl. Land use system: Agricultural areas and sand mining Depth (m): 1.1-1.3 Width (m): 42-55 Substrate: sand, mud	Temperature (^o C): 27-32 Depth of visibility (m): 0.35-0.45 Velocity (m/s): 0.60-0.78 pH: 7-7.5 O ₂ : 7.9-12.5 CO ₂ : 2.1-7.1
	9. Kedungbenda	(07 ^o 28'370"S 109 ^o 19'625"E)	Elevation: 36 m asl. Land use system: Agricultural areas, and sand mining Depth (m): 42-60 Width (m): 1.3-1.9 Substrate: gravel, sand, mud	Temperature (^o C): 24-29 Depth of visibility (m): 0.51-0.70 Velocity (m/s): 1.25-1.42 pH: 27-31 O ₂ : 8.0-12.0 CO ₂ : 2.3-8

Fish collection

Fish samples were collected using electric fishing (Gorman and Karr 1978; Lestari 2006) and seine nets with 0.5 and 1-inch mesh size. Fish samples were collected during the months of June to September 2016, once a month with four replications. Sampling efforts were performed for one hour at each site.

Fish identification

Fish samples were preserved using formalin 10 %, and then alcohol 70% for the permanent collection in bottles. The fresh fish samples from the sampling area were taken to the laboratory using an ice box; then the fish specimen was washed with running water before being preserved by formalin 10%. Next, the fish specimens were preserved in a 10% formalin solution for fixation, after that, they were moved to 70% ethyl alcohol storage. The fish specimens were identified based on Saanin (1984), Kottelat et al. (1993), Froese and Pauly (2012), and FishBase (2017a,b,c). Fresh fish samples were transported to laboratory in an ice box, washed in running water, preserved in 10% formalin, and transferred to 70% alcohol (Haryono et al. 2012).

Environmental parameters measurement

Physicochemical parameters measured were water depth, river width, water temperature, depth of visibility, water velocity, acidity (pH), oxygen, carbon dioxide, and river substrate. The physicochemical parameters for the different sampling sites are presented in Table 1.

In the upstream region, the riparian zone was vegetated with secondary forest while the bottom substrate comprised large and medium-sized stones. In the midstream, the land use in the riparian zone comprised open fields, rice fields, and human settlement, while the bottom substrate consisted of medium stones and gravel. In the downstream, the land use of the riparian zone comprised open fields, rice fields, sand mining and human settlement, while the substrate of the bottom was gravel, sand, and mud.

Data analysis

The mean number of individuals, species abundance, diversity, evenness, and dominance were compared

between regions and seasons by two-way analysis of variance and a *post-hoc* Fisher LSD test. Diversity was estimated using the Shannon index (Magurran 1988). Evenness was calculated as Shannon diversity divided by the logarithm of the number of species. The values for Dominance were expressed as the complement of the Simpson's index ($D = 1 - S$). These indices were analyzed using the statistical package PAST (Hammer et al. 2001).

RESULTS AND DISCUSSION

Species diversity and abundance

A total of 472 individuals belonging to 18 species and 11 families (Table 2) were collected from the Klawing River. Cyprinidae with 6 species had the highest number of individual fish caught (82.6% of the total catch), followed by Bagridae and Cichlidae each with two species (3.2% and 2.5% of the catch, respectively), and Anabantidae, Chanidae, Eleotridae, Belontiidae, Mastacembelidae, Poeciliidae, Osphronemidae, and Siluridae each represented by only one species (Figure 2a). The eighteen species are listed in Table 2. Our result showed quite a low species diversity when compared to the other rivers in Java.

The Logawa River, which is located in the same biogeographic region, reportedly harbors 33 fish species of 11 families (Lestari 2004). Nuryanto et al. (2012) detected 22 fish species belonging to 10 families in the Cileumeuh River (Cilacap, Central Java). Roesma et al. (2016) detected 24 fish species belonging to 10 families in the Batangtoru River, South Tapanuli, North Sumatra. Yustina (2001) detected 70 species of fish along the Rangau River, Riau, and Sumatra. In a different biogeographic region, Pathak et al. (2013) detected 33 fish species belonging to 14 families in the Gangga River basin, India. Thus, differences are observed not only in species richness but also in composition. This may result, in part, from differences in the land use systems around the rivers (Humpl et al. 2006).

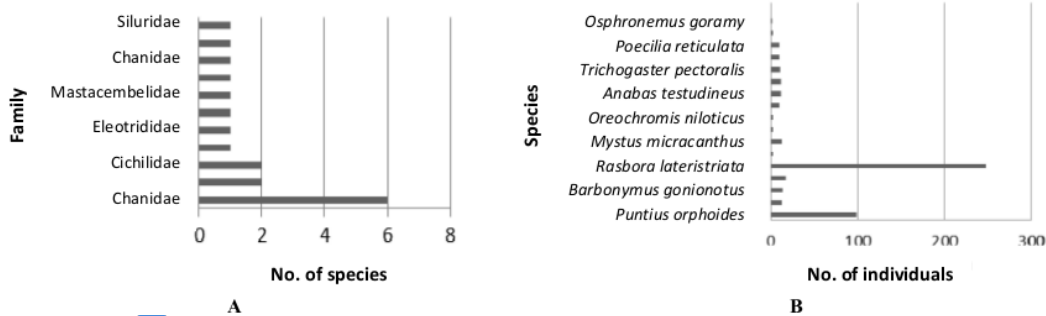


Figure 2. A. The number of families and species of fish in the Klawing River. B. Abundance of each species

Table 2. Fish abundance and species diversity according to their longitudinal distribution in the Klawing River, Purbalingga, Central Java, Indonesia

Families	Species	Number of individual fish			
		Upstream	Midstream	Downstream	Total
Cyprinidae	<i>Puntius orphoides</i>	31	45	22	98
	<i>Hampala macrolepidota</i>	5	7	0	12
	<i>Barbonymus gonionotus</i>	6	4	3	13
	<i>Osteochilus vittatus</i>	0	8	9	17
	<i>Rasbora lateristriata</i>	87	124	36	247
Bagridae	<i>Cyprinus carpio</i>	0	3	0	3
	<i>Mystus micracanthus</i>	0	5	7	12
	<i>Hemibagrus nemurus</i>	0	2	0	3
Cichlidae	<i>Oreochromis niloticus</i>	0	3	0	3
	<i>O. mossambicus</i>	0	4	5	9
Anabantidae	<i>Anabas testudineus</i>	0	2	9	11
Eleotrididae	<i>Oxyeleotris marmorata</i>	0	4	7	11
Belontiidae	<i>Trichogaster pectoralis</i>	0	4	6	10
Mastacembelidae	<i>Macrognathus aculeatus</i>	3	6	0	9
Poeciliidae	<i>Poecilia reticulata</i>	3	6	0	9
Chanidae	<i>Chana striata</i>	0	0	3	3
Osphronemidae	<i>Osphronemus goramy</i>	0	2	0	2
Siluridae	<i>Ompok hypenthalamus</i>	0	1	0	1
	Number of individuals	135	230	107	472
	Number of species	6	17	10	18
	Dominance <i>D</i>	0.4724	0.3347	0.1851	
	Shannon <i>H</i>	1.051	1.691	1.97	
	Simpson 1-D	0.5276	0.6653	0.8149	
	Evenness $e^{-H/S}$	0.4766	0.3192	0.7171	

Within the body of the river our results showed that the diversity of fish was significantly different between upstream, midstream and downstream ($F_{2,9} = 13.73$, $p = 0.002$). Species abundance was highest in the midstream (17 species and 230 individuals) followed by downstream with (10 species and 107 individuals) and the lowest was in the upstream (46 species and 135 individuals). Species composition of the fish between sampling sites was different, with upstream having the lowest diversity index ($H = 1.051$; $E = 0.476$), then midstream ($H = 1.691$; $E = 0.319$), and with downstream having the highest ($H = 1.97$; $E = 0.717$). The distribution of freshwater fish assemblages showed low dominance (0.18 - 0.47) and relatively high evenness (0.312 - 0.71), which means that the allocation of niche space is distributed fairly equitably for most dominant and non-dominant fish species thriving in the river. Our results were consistent with those of Torgesen et al. (2006), Rahim et al. (2009), Nautiyal et al. (2013), Paller et al. (2013), and Pathak et al. (2013). Their studies, like ours, found that fish diversity of the rivers gradually increased from upstream to downstream with the lowest diversity occurring upstream. But our findings differed from the other studies in the geohydrological and physicochemical factors that affected the diversity and distributions of the fish. In previous research, differences in diversity and distribution of fish were found to be affected especially by differences in temperature and flow between sections of the rivers, but in our research the important variation in environmental factors was in velocity ($F_{2,9} = 86.841$, $p = 0.001$) and light of the river waters, ($F_{2,9} = 8.487$, $p = 0.008$),

while other environmental factors analyzed did not show any significant differences (Table 1). Water temperature and rainfall were found 3 major influential factors for species distribution. Fish communities respond significantly and predictably to almost all kinds of anthropogenic disturbances, including eutrophication, acidification, chemical pollution, flow regulation, physical habitat alteration and fragmentation, human exploitation and introduced species (Li et al. 2010).

There were temporal variations in the fish assemblage we observed in the Klawing River; *H* differed significantly between months ($F_{2,9} = 13.73$, $p = 0.002$), as did abundance ($F_{2,9} = 13.03$, $p = 0.002$). The highest abundance was in June and then it gradually decreased until September. In contrast, diversity increased from June through to September (Figure 3 a, b). This difference was likely caused by water flow. Paller et al. (2013) found that water level fluctuation and dissolved oxygen concentrations exert marked effects on fish assemblage structure. In Central Java, the water level is significantly lower during the dry season (April to October). The lower diversity and equitability during the dry season serve as indicators of water and habitat qualities. Increase in fish diversity in the rainy season is attributed to the diverse riverine habitats formed by rising water levels. During rainy months, the volume of aerated water (Dissolved Oxygen) is sufficient to replenish the watersheds, which increases the nutrient-carrying capacity of the river water, leading to greater diversity in the aquatic biota (Vescovi et al. 2009).

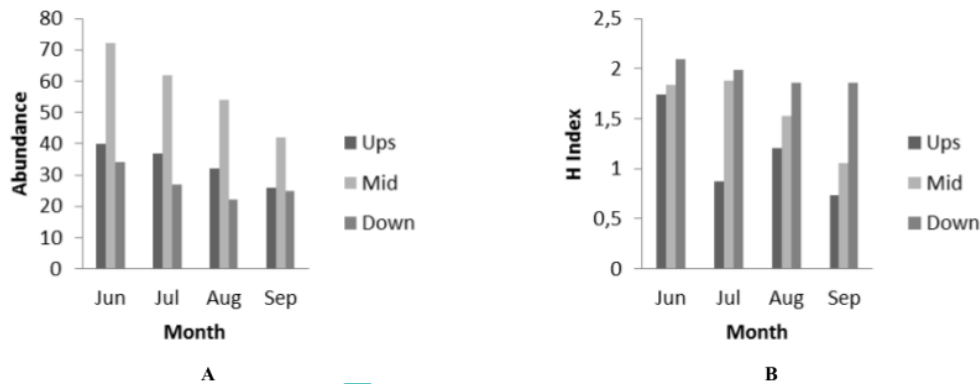


Figure 3. A. Abundance, and B. H-index of fish in the Upper, Middle, and Lower reaches of the Klawing River, Purbalingga, Central Java, Indonesia from June to September 2016

Fish distribution

Six species were found upstream (Table 1), but none were unique. The species found upstream and midstream included *Hampala macrolepidota*, *Poecilia reticulata*, and *Macrognathus aculeatus*.

Hampala macrolepidota was also found in the Batang Toru River (Roesma et al. 2016), which differs from the Klawing River only in its flow velocity. Batang Toru River reportedly had clear water, a flow velocity of 0.85-0.88 m/s, and a substrate of rocks, sand, and gravel; however, the altitudes of the sampling sites were not stated. *H. macrolepidota* is considered an ecological indicator species. *P. reticulata* was found in the upstream and midstream areas. Similarly, Rachmatika et al. (2002) found this species in the upstream areas of the Cibareno River of Mount Halimun National Park, which has a similar water temperature 20-29°C, pH (6.0-7.5) and dissolved oxygen content (8-10 ppm); however, the altitude of the sampling sites in that study was not mentioned. In contrast to Nuryanto et al. (2012), this species was found upstream, but whether the conditions were similar to those in our study is unclear. Roesma et al. (2016) identified *M. aculeatus* at the Simajambu sampling site upstream in the Batangtoru River, South Tapanuli, North Sumatra. This site is characterized by clear water, a flow velocity of 0.85-0.88 m/s, and a substrate comprising rocks, sand, and gravel.

In our study, seventeen species were identified in the midstream, some of which - *Cyprinus carpio*, *Oreochromis niloticus*, *Osphronemus gourami*, and *Ompok hypenthalamus*, - were unique to the midstream region.

In general, these four species are considered to occur midstream in rivers. In our study, *C. carpio* was found only in the midstream at an altitude of 43.2-96 m asl. This is in accordance with the findings of Lestari (2004) in the Logawa River, Banyumas, Central Java. Nuryanto et al. (2012) reported that *O. niloticus* was present only in upstream, in the Cilemeuh River, Majenang, Cilacap. Similarly, this species was found at the Simajambu sampling site upstream in the Batangtoru River, South

Tapanuli, North Sumatra (Roesma et al. 2016). There are potential differences in the physicochemical parameters between the two rivers. In this study, *O. gourami* was found midstream but was not detected in other studies. The area around the Klawing River is fundamental for the cultivation of gourami. In this study, *O. hypenthalamus* was found only in midstream, but it has also been found on the Sei Jaya River (a tributary of the Barito River) and downstream on the Sebangau River, East Kalimantan, which has a water temperature of 29.6-31.4°C, a light intensity of 0.34-0.53m depth, pH of 4.31-5.20 and dissolved oxygen content of 3.76-6.74ppm. However, the altitude of the sampling sites was not mentioned (Haryono 2012). The pH and oxygen levels differ significantly from those of our study, probably because the research site was a river located in peat soil. According to FishBase (2017b), *O. hypenthalamus* lives in medium to large-sized, slow-flowing, lowland rivers, streams, and lakes with peat soil. It feeds on fish, prawns, and crustaceans. It moves to seasonally flooded habitats during high tide periods and is generally found around submerged woody vegetation.

In this study, *Osteochilus vittatus* was found only in midstream and downstream. Djumanto et al. (2011) reported this species at stations 2-5 located downstream on the Opak River, which is near the midstream region of the river and is characterized by a water temperature of 28.8-29.2°C, light intensity of 0.20-0.90 m depth, flow velocity of 0.49-1.13 m/s, and pH of 7.0-7.3. Again, the altitude of the sampling sites was not provided. Nuryanto et al. (2012) detected this species in all areas; however, the physicochemical parameters and the altitudes of the sampling sites were not provided. This species was found only in the midstream and downstream in our study, but upstream in the Cileumeuh River.

Trichogaster pectoralis, found midstream and downstream in our study, was detected in the Batang Kerang floodplain, Balai Ringin, Sarawak, by Rahim et al. (2009), at sampling sites characterized by brown or black water, a water temperature of 25.6-26.6°C, a light intensity

of 0.63-1.26 m, pH of 4.55-5.45, and a dissolved oxygen content of 1.55-1.66 ppm; however, the altitude of the sampling sites was not specified. According to FishBase (2017c), this species is found in shallow, sluggish or standing-water habitats with abundant aquatic vegetation. *T. pectoralis* can breathe air directly and absorb oxygen from water and thus is well adapted to poor-quality habitats. This species originates from the Mekong basin in Laos, Thailand, Cambodia, and Vietnam and from the Chao Phraya basin. At least one country has reported that the introduction of this species has had an adverse ecological impact.

In our study, the downstream area harbored 10 fish species. *Channa striata* was found at an altitude of 36-40 m asl., compared with 51 m (site 13) and 81 m (site 6) in the study of Ohee et al. (2016); the differences are possibly due to the different biogeographies of Papua and Java. Our results are consistent with the findings of Lestari (2004) in the Logawa River, Banyumas, Central Java, in that *C. striata* was found at similar altitudes (*i.e.*, 25-40 m asl.).

Cyprinus carpio was found in midstream regions at 36-40 m asl. Rachmatika et al. (2002) found this species in the midstream and downstream regions, which had water temperatures of 22-29°C, pH of 6.5-7.5, and dissolved oxygen content of 8-10 ppm; however, the altitude of these sampling sites was not mentioned. According to FishBase (2017a), adult *C. carpio* inhabits warm, deep, slow-flowing, and still waters such as lowland rivers and large, well-vegetated lakes. The species is hardy and tolerant of a wide variety of conditions, but generally favors large bodies of water with stagnant or slow-flowing water and soft-bottom sediments. *C. carpio* thrives in large turbid rivers and is more active at dusk and dawn. Adults and juveniles feed on a variety of benthic organisms and plant material. The species develops along shores or in backwaters. Adults often engage in considerable spawning migration to suitable backwaters and flooded meadows. In this study, *Mystus micracanthus* was found midstream and downstream, while *Hemibagrus nemurus* was found only in midstream, which is in agreement with the findings of Nuryanto et al. (2012) in the Cileumeuh River, Majenang, Cilacap Regency. Rahim et al. (2009) detected *M. micracanthus* only at sampling sites with brown water, while *H. nemurus* was found at sites with brown or black water; both have poor physicochemical parameters. These two species can survive under such conditions because of their ability to take in oxygen directly from the air.

In general, our results show that certain species of fish are distributed in particular river regions. Oberdroff et al. (1993) reported a similar longitudinal zoning of fish species, such zoning may be associated with differences in the relative ease of laying eggs on appropriate spawning substrates, usually gravel or submerged plants. Such a pattern was evident in the Klawing River.

A Bray-Curtis dendrogram of the fish species distribution in the upstream, midstream, and downstream regions of Klawing River is shown in Figure 5. The highest species richness was observed midstream, and the fish assemblage shifted from tolerant to thermally inclined groups in the upstream and downstream reaches. The

altitude gradient (driving water velocity and river substrate variations) exerts a major influence on fish assemblage pattern. Our findings, therefore, support the pattern of an ecological guild structure inferred from predictions of the river continuum concept (Bhat et al. 2012). According to Alabaster and Lloyd (1982), variations in water chemistry can influence fish diversity and distribution.

The distribution of fish families differs between this and prior studies. The number of families detected in this study (11) was lower than those reported by Azmir et al. (2010) (14 families) at Gunung Machinchang, Pulau Langkawi, Malaysia; by Sjafeji et al. (2001) (20 families) in the Cimanuk River; by Hadiaty (2011) (19 families) in the Cisadane River basin, Jabodetabek. The number we detected is smaller than that reported by Lestari (2004) (11 families) in the Logawa River, Banyumas, but higher than that reported by Roesma et al. (2016) (10 families) in the Batangtoru River.

Cyprinidae was the largest family seen in the Klawing River (2.6%) and was detected in all regions of the river. This is in agreement with the findings of Rahim et al. (2009) (79.8-63.8%), Lestari (2004) (65%), Atkore et al. (2011) (53.48%), Nuryanto et al. (2012) (45.45%), Roesma et al. (2016) (45.83%), Ibarra et al. (2005) (42.5%), and Azmir et al. (2010) (29.36%).

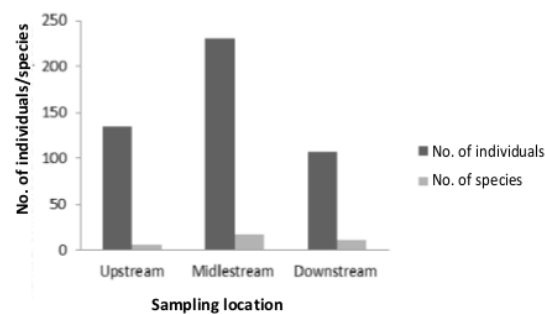


Figure 4. Fish species distribution along a longitudinal gradient in Klawing River, Purbalingga, Central Java, Indonesia

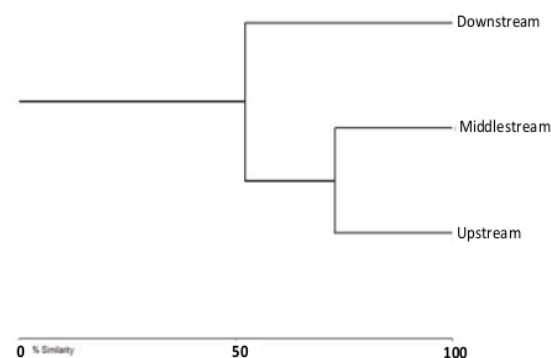


Figure 5. Bray-Curtis Cluster Analysis Dendrogram shows the distribution pattern of the species in the Klawing River, Purbalingga, Klawing River, Central Java, Indonesia

In conclusion, 18 fish species belonging to 11 families were found in the Klawing River, which indicates that the river has low fish species diversity. The family Cyprinidae had the largest number of species (six). Some species were distributed along the length of the river, while others were limited to certain areas. The fish species distribution was linked to variations in physicochemical parameters along the river, especially light, water velocity, and substrate.

ACKNOWLEDGEMENTS

We are grateful to Akhmad Iqbal, Soewarto, and Yulia Sistina for their support in securing funding for this research and to all of the students who assisted in collecting field data. This research was supported by a Directorate General of Higher Education Research Fellowship and funding from the Universitas Jenderal Soedirman, Purwokerto, Central Java, Indonesia (contract number: 1918/UN23.14/PN.01.00/2016).

REFERENCES

- Alabaster JS, Lloyd R. 1982. Water Quality Criteria for Fish. FAO, Butterworth Scientific, London.
- Angermeier PL, Davideanu G. 2004. Using fish community to assess streams in Romania: initial development of an index of biotic integrity. *Hydrobiologia* 511: 65-78.
- Atkore VM, Sivakumar K, Johnsingh AJT. 2011. Patterns of diversity and conservation status of freshwater fishes in the tributaries of River Ramganga in the Shiwaliks of the Western Himalaya. *Curr Sci* 100 (5): 731-736.
- Azmir AI, Samat A. 2010. Diversity and distribution of stream fishes of Pulau Langkawi, Malaysia. (Kepelbagaian dan taburan ikan sungai di Pulau Langkawi, Malaysia). *Sains Malaysiana* 39 (6): 869-875.
- Bhatt JP, Manish K, Pandit MK. 2012. Elevational gradients in fish diversity in the Himalaya: Water discharges the key driver of distribution patterns. *PLoS ONE* 8 (4): 10.1371/annotation/c24aa49a-7eb5-4612-bdc3-8285b21921a0. DOI: 10.1371/annotation/c24aa49a-7eb5-4612-bdc3-8285b21921a0.
- Bradford MJ, Heinonen JS. 2008. Low flows, instream flow needs and fish ecology in small streams. *Canadian Water Resources Journal* 33: 165-180.
- Djumanto, Probosunu N. 2011. Biodiversitas ikan di hulu Sungai Opak. *Jurnal Iktiologi Indonesia* 11 (1): 1-10. [Indonesian]
- FishBase. 2017a. *Ompok hypothalamus* Bleeker, 1646. <http://www.fishbase.org/summary/23107>. [April 17, 2017].
- FishBase. 2017b. *Trichogaster pectoralis* Regan, 1910. <http://www.fishbase.org/summary/499#>. [April 17, 2017].
- FishBase. 2017c. *Cyprinus carpio* Linnaeus, 1758. <http://www.fishbase.org/summary/1450>. [April 17, 2017].
- Froese R, Pauly D. 2012. FishBase. World Wide Web Electronic Publication, Stockholm.
- Gorman OT, Karr JR. 1978. Habitat structure and stream fish communities. *Ecology* 59 (3): 507-515.
- Guerrero RD. 2002. Invasive aquatic animals in the Philippines. special report on their impacts and management. *ASEAN Biodiversity* (Oct-Dec 2002): 12-15.
- Hadiaty RK. 2011. Diversitas dan kehilangan jenis ikan di danau-danau aliran Sungai Cisdane. *Jurnal Iktiologi Indonesia*, 11 (2): 143-157.
- Hammer Ø, Harper, David AT, Ryan PD. 2001. Past: Paleontological Statistics Software Package for education and data analysis. *Palaentologia Electronica* <http://palaeo-electronica.org>
- Haryono. 2012. Fish fauna of Central Kalimantan peatland waters in rainy season. *Iktiofauna perairan lahan gambut pada musim penghujan di Kalimantan Tengah. Jurnal Iktiologi Indonesia* 12 (2): 83-91.
- Huebert N. 2015. DNA Barcoding Indonesian freshwater fishes. *UMR BOREAS*. borea.mnhn.fr/sites/.../files/.../Hubert-et-al-dna-2015-0018.p
- Humpl M, Pivnic'ka K. 2006. Fish assemblages as influenced by environmental factors in streams in protected areas of the Czech Republic. *Ecology of Freshwater Fish* 15: 96-103.
- Ibarra AA, Park Y-S, Brosse S, Reyjol Y, Lim P, Lek S. 2005. Nested patterns of spatial diversity revealed for fish assemblages in a West European river. *Ecol Freshw Fish* 14: 233-242.
- Kottelat M, Whitten AJ, Kartikasari SN, Wirjoatmojo S. 1993. *Freshwater fishes of Western Indonesia and Sulawesi*. Periplus, Hongkong.
- Lestari W. 2004. The fish community of a tropical organically polluted river: a case study of the Loggawa River, Central Java, Indonesia. Dissertation. Cuvillier Verlag Göttingen.
- Lestari W. 2006. Detecting the efficiency of fish sampling technique on abundance and diversity of freshwater fish. *Jurnal Saintek Perikanan* 1 (2): 57-62.
- Li L, Zheng B, Liu L. 2010. Biomonitoring and bioindicators used for river ecosystems: Definitions, approaches, and trends. *Procedia Environ Sci* 2: 1510-1524.
- Magurran AE. 1988. *Ecological diversity and its measurement*. Chapman & Hall, London.
- Mercado-Silva N, Lyons J, Pardo ED. 2012. Environmental factor associated with fish assemblages pattern in a high gradient. *Revista Mexicana de Biodiversidad* 83: 117-128.
- Nautiyal P, Mishra AS, Singh KR, Singh U. 2013. Longitudinal distribution of the fish fauna in the river Ganga from Gangotri to Kanpur. *J Appl Nat Sci* 5 (1): 63-68.
- Nuryanto A, Bhagawati D, Abulias MN, Indarmawan. 2012. Diversitas ikan di Sungai Cileumeuh, Kecamatan Majenang, Kabupaten Cilacap, Jawa Tengah. *Jurnal Iktiologi Indonesia* 12 (2): 147-153. [Indonesian]
- Oberdorff T, Guilbert E, Lucchetta JC. 1993. Pattern of species richness in the Seine River basin, France. *Hydrobiologia* 259: 157-167.
- Ohee HL. 2016. Freshwater fish diversity in an oil palm concession area in Mimika, Papua. *Biodiversitas* 17 (2): 665-672.
- Paller VGC, Labatos Jr BV, Lontoc BM, Matalog OE, Ocampo PP. 2011. Freshwater fish fauna in watershed of Mt. Makiling Forest Reserve, Laguna, Philippines. *Philippine J Sci* 140 (2): 195-206.
- Paller VGC, Mark Nell C, Corpuz, and Pablo P. Ocampo. 2013. Diversity and distribution of freshwater fish assemblages in Tayabas River, Quezon (Philippines). *Philippine J Sci* 142 (1): 55-67.
- Pathak AK, Sakkar UK, Singh SP. 2013. Spatial Gradients in fresh water fish diversity, abundance and current pattern in the Himalayan region of upper Ganges Basin, India. *Biodiversitas* 15 (2): 186-194.
- Rachmatika I, Sjafei DS, Nurcahyadi W. 2002. Fish diversity in Cibareno River, Gunung Halimun National Park: its unique assemblage, management and conservation consideration. *Jurnal Iktiologi Indonesia* 2 (2): 1-14.
- Rahim KAA, Daud SK, Siraj SS, Arshad A, Ibrahim YEER. 2009. Freshwater fish diversity and composition in Batang Kerang Floodplain, Balai Ringin, Sarawak. *Pertanika J Trop Agric Sci*. 32 (1): 7-16.
- Roesma DI, Chonelia A, Mursid A, Kamsi M. 2016. Fish diversity of the Batang Toru River System, South Tapanuli, North Sumatra. *Biodiversitas* 7 (2): 634-641.
- Saanin H. 1984. *Kunci Identifikasi ikan I dan II*. Bina Cipta, Bandung. [Indonesian]
- Shervette VR, Aguirre WE, Blacio E, Rodrigo Cevallo R, Gonzalez, Pozo F, Gelwick F. 2007. Marcelo fish communities of a disturbed mangrove wetland and an adjacent tidal river in Palmar, Ecuador. *Estuar Coast Shelf Sci* 72: 115-128.
- Sjafei DS, Wirjoatmodjo S, Rahardjo MF, Susilo SB. 2001. Fauna ikan di Sungai Cimanuk, Jawa Barat. *Jurnal Iktiologi Indonesia* 1 (1): 1-6. [Indonesian]
- Suharijanti HU, Winarji, Arfianti D, Mulyanto, Widjanarko P, Kusriani. 2008. Inventarisasi jenis-jenis ikan air tawar dan laut di Perairan Jawa Timur. *Jurnal Perikanan* 2 (1): 7-12. [Indonesian]
- Torgersen CE, Baxter CV, Li HW, McIntosh BA. 2006. Landscape influences on longitudinal patterns of river fishes: Spatially continuous analysis of fish habitat relationships. *American Fisheries Society Symposium* 48: 473-492.
- Vannote RL, Minshall GWK, Cummins W, Sedell JR, Cushing CE. 1980. The river continuum concept. *Can J Fish Aquat Sci* 37: 130-137.
- Vescovi L, Berteaux D, Bird D, Sylvie DB. 2009. Freshwater biodiversity versus anthropogenic climate change. *UNESCO-WWAP*, France.
- Yustina. 2001. Keanekaragaman jenis ikan di sepanjang perairan Sungai Rangau, Riau Sumatra. *Jurnal Natur Indonesia* 4 (1): 1-14. [Indonesian]

Diversity and longitudinal distribution of freshwater fish in Klawing River, Central Java, Indonesia

ORIGINALITY REPORT

10%

SIMILARITY INDEX

10%

INTERNET SOURCES

5%

PUBLICATIONS

4%

STUDENT PAPERS

PRIMARY SOURCES

1	astrobulletin.amnh.org Internet Source	1%
2	Submitted to Universiti Kebangsaan Malaysia Student Paper	1%
3	Submitted to Eiffel Corporation Student Paper	1%
4	www.pertanika.upm.edu.my Internet Source	1%
5	asianscientificjournals.com Internet Source	1%
6	biosains.mipa.uns.ac.id Internet Source	1%
7	www.nonnativespecies.org Internet Source	<1%
8	www98.griffith.edu.au Internet Source	<1%
9	kups.ub.uni-koeln.de	

Internet Source

<1%

10

riunet.upv.es

Internet Source

<1%

11

id.scribd.com

Internet Source

<1%

12

eol.org

Internet Source

<1%

13

Submitted to Brunel University

Student Paper

<1%

14

www.omicsonline.org

Internet Source

<1%

15

amz.museucienciasjournals.cat

Internet Source

<1%

16

internationalwatercentre.org

Internet Source

<1%

17

media.neliti.com

Internet Source

<1%

18

scholar.lib.vt.edu

Internet Source

<1%

19

link.springer.com

Internet Source

<1%

20

Eugenia López-López. "Spatial and seasonal

<1%

distribution patterns of fish assemblages in the
Río Champotón, southeastern Mexico", Reviews
in Fish Biology and Fisheries, 06/2009

Publication

21

www.innspub.net

Internet Source

<1%

22

ethesis.inp-toulouse.fr

Internet Source

<1%

23

www.ukm.my

Internet Source

<1%

24

digitalcommons.usu.edu

Internet Source

<1%

25

biodiversitygenomics.net

Internet Source

<1%

26

elib.suub.uni-bremen.de

Internet Source

<1%

27

www.worldacademicunion.com

Internet Source

<1%

28

library.cemaonline.ca

Internet Source

<1%

29

www.redalyc.org

Internet Source

<1%

30

biotaxa.org

Internet Source

<1%

31

lipi.go.id
Internet Source

<1%

32

Francisco J. García-De León, Andrés I. Hernández Sandoval, Fernando Contreras-Catala, Laura Sánchez-Velasco et al.
"Distribution of fishes in the Río Guayalejo-Río Tamesí system and relationships with environmental factors in northeastern Mexico",
Environmental Biology of Fishes, 2017

Publication

<1%

Exclude quotes On

Exclude matches Off

Exclude bibliography On

KORESPONDENSI



Suhestri Suryaningsih <hestri.bio@gmail.com>

Resend manuscript entitled Diversity Taxonomy and Longitudinal Distribution of Freshwater Fish in Klawing River, Purbalingga. Suhestri S. et al.

2 pesan


10 Juli 2017 11.05

Suhestri Suryaningsih <hestri.bio@gmail.com>
Kepada: Managing Editor <unsjournals@gmail.com>

Dear editor, I hereby resend my manuscript entitled Taxonomic Diversity and Longitudinal Distribution of Freshwater Fish in Klawing River, Purbalingga, Central Java. I have changed the document format from docx to doc as requested editor. Actually this manuscript I sent back on May 19, 2017, but long time no answer for the revision, whereas my friends are participants International Seminar of Biodiversity in Yogyakarta who sent the manuscript has long been getting answers for revision. I was thinking, is it possible that my manuscript has not arrived yet, so I resend it.

Dear editor, I hope to get an answer for revision soon. thanks.

Regards, Suhestri Suryaningsih, Faculty of Biology Unsoed.

 **TaxonomicDivers FishSuhestri-ReSubmit-F.doc**
1235K

10 Juli 2017 11.54

Managing Editor <unsjournals@gmail.com>
Kepada: Suhestri Suryaningsih <hestri.bio@gmail.com>

Okay, it will be checked again.

Thank you,
Regards,

Ahmad Dwi Setyawan

Managing Editor,
- Biodiversitas, Journal of Biological Diversity (biodiversitas.mipa.uns.ac.id) (SCOPUS, DOAJ)
- Nusantara Bioscience (biosains.mipa.uns.ac.id/N/index.htm) (Web of Science (ESCI), DOAJ)

Chairman/Co-Chairman
- National Seminar & International Conference on Biodiversity, <http://biodiversitas.mipa.uns.ac.id/snmbi.html>

Department of Biology,
Faculty of Mathematics and Natural Sciences, Sebelas Maret University,
Jl. Ir. Sutami 36A Solo 57126, Central Java, Indonesia,
Tel. & Fax. +62-271-663375,
e-mail: unsjournals@gmail.com
[Kutipan teks disembunyikan]



Suestri Suryaningsih <hestri.bio@gmail.com>

Fwd: Fwd: Invitation to review.

3 pesan

2 Agustus 2017 10.34

Managing Editor <unsjournals@gmail.com>
Kepada: Suestri Suryaningsih <hestri.bio@gmail.com>

Kindly find attached file for reviewer's comment.

Thank you,
Regards,

Ahmad Dwi Setyawan

Managing Editor,
- Biodiversitas, Journal of Biological Diversity (biodiversitas.mipa.uns.ac.id) (SCOPUS, DOAJ)
- Nusantara Bioscience (biosains.mipa.uns.ac.id/N/index.htm) (Web of Science (ESCI), DOAJ)

Chairman/Co-Chairman
- National Seminar & International Conference on Biodiversity, <http://biodiversitas.mipa.uns.ac.id/snmbi.html>

Department of Biology,
Faculty of Mathematics and Natural Sciences, Sebelas Maret University,
Jl. Ir. Sutami 36A Solo 57126, Central Java, Indonesia,
Tel. & Fax. +62-271-663375,
e-mail: unsjournals@gmail.com

----- Forwarded message -----
From:@yahoo.com>
Date: 2017-08-02 9:28 GMT+07:00
Subject: Re: Fwd: Invitation to review.
To: Managing Editor <unsjournals@gmail.com>

Dear Managing Editor.


I'm sorry that I am late in returning the article I reviewed with the last two weeks of student examination for graduation by the end of this month.

I also apologize for not continuing to discuss the part of Results and Discussions as long as the Authors make the correlation without analysis while they have the data.
As long as I know, If we want to discuss the taxonomic diversity we have to measure the average taxonomic distinctness (AvTD) and the average phylogenetic diversity (AvPD) so we will get the value of the variation in taxonomic distinctness (VarTD) in order to reflect the taxonomic tree or taxonomic diversity. I think it will be better the title be "Diversity and longitudinal"

Perhaps it would be helpful if the author also attached an article in Indonesian, it was complicated in understanding its grammar (though I am also far from excellent hehehe).

Thank you and Best Regards

.....
Genetic & Cell Biology Laboratory.
Biology Department, Faculty of Mathematics and Natural Sciences.
Andalas University.
Kampus Unand Limau Manih, Padang,
West Sumatra, Indonesia 25163


.....
 **Tax div and longitudinal dist of freshwater fish.-from reviewer.docx**
1552K

6 September 2017 10.48

Managing Editor <unsjournals@gmail.com>
Kepada: Suhestri Suryaningsih <hestri.bio@gmail.com>

Kami menunggu revisi naskah terlampir.
Revisi mohon dilakukan langsung pada file terlampir. Bila penulis tidak setuju dengan masukan reviewer, mohon beritahukan alasannya. Naskah revisi akan dikirimkan kembali ke reviewer.

Catatan: kami mendapat kiriman file lain, namun menurut hemat kami tidak merujuk pada masukan reviewer.
[Kutipan teks disembunyikan]

 **Tax div and longitudinal dist of freshwater fish.-from reviewer.docx**
1552K

21 September 2017 21.36

Managing Editor <unsjournals@gmail.com>
Kepada: Suhestri Suryaningsih <hestri.bio@gmail.com>

Kami menunggu perbaikan naskah terlampir.

Thank you,
Regards,


Ahmad Dwi Setyawan

Managing Editor,
- Biodiversitas, Journal of Biological Diversity (biodiversitas.mipa.uns.ac.id) (SCOPUS, DOAJ)
- Nusantara Bioscience (biosains.mipa.uns.ac.id/N/index.htm) (Web of Science (ESCI), DOAJ)

Chairman/Co-Chairman
- National Seminar & International Conference on Biodiversity, <http://biodiversitas.mipa.uns.ac.id/snmbi.html>

Department of Biology,
Faculty of Mathematics and Natural Sciences, Sebelas Maret University,
Jl. Ir. Sutami 36A Solo 57126, Central Java, Indonesia,
Tel. & Fax. +62-271-663375,
e-mail: unsjournals@gmail.com

[Kutipan teks disembunyikan]

 **Tax div and longitudinal dist of freshwater fish.-from reviewer.docx**
1552K



Suhestri Suryaningsih <hestri.bio@gmail.com>

Correction of Diversity & longitudinal distribution of fish Klawing River-Suhestri S. et al


2 pesan

Suhestri Suryaningsih <hestri.bio@gmail.com>
Kepada: Managing Editor <unsjournals@gmail.com>

27 September 2017 21.38

Yth. Editor Biodiversitas,
Dengan ini saya kirimkan kembali hasil koreksi dari manuskrip saya dari Reviewer berjudul : Diversity & longitudinal distribution of freshwater fish in Klawing River, Central Java, Indonesia

Mohon diterima, terima kasih.
Salam hormat, Suhestri Suryaningsih

 **f-27Sept-Correction of. Diversity and longitudinal distribution Klawing-Suhestri S. et al..docx**
1599K

Managing Editor <unsjournals@gmail.com>
Kepada: Suhestri Suryaningsih <hestri.bio@gmail.com>

28 September 2017 11.20

Thank you,
Regards,

Ahmad Dwi Setyawan

Managing Editor,
- Biodiversitas, Journal of Biological Diversity (biodiversitas.mipa.uns.ac.id) (SCOPUS, DOAJ)
- Nusantara Bioscience (biosains.mipa.uns.ac.id/N/index.htm) (Web of Science (ESCI), DOAJ)

Chairman/Co-Chairman
- National Seminar & International Conference on Biodiversity, <http://biodiversitas.mipa.uns.ac.id/snmbi.html>

Department of Biology,
Faculty of Mathematics and Natural Sciences, Sebelas Maret University,
[Jl. Ir. Sutami 36A Solo 57126, Central Java, Indonesia](http://Jl.Ir.Sutami36ASolo57126CentralJavaIndonesia),
Tel. & Fax. +62-271-663375,
e-mail: unsjournals@gmail.com
[Kutipan teks disembunyikan]



Suhetri Suryaningsih <hestri.bio@gmail.com>

Fwd: Editing of the Klawing River paper

2 pesan

Managing Editor <unsjournals@gmail.com>
Kepada: Suhetri Suryaningsih <hestri.bio@gmail.com>

17 Oktober 2017 09.12

Find attached file for our editor/native speaker comment.

Thank you,
Regards,

Ahmad Dwi Setyawan

Managing Editor,
- Biodiversitas, Journal of Biological Diversity (biodiversitas.mipa.uns.ac.id) (SCOPUS, DOAJ)
- Nusantara Bioscience (biosains.mipa.uns.ac.id/N/index.htm) (Web of Science (ESCI), DOAJ)

Chairman/Co-Chairman

- National Seminar & International Conference on Biodiversity, <http://biodiversitas.mipa.uns.ac.id/snmbi.html>

Department of Biology,
Faculty of Mathematics and Natural Sciences, Sebelas Maret University,
Jl. Ir. Sutami 36A Solo 57126, Central Java, Indonesia,
Tel. & Fax. +62-271-663375,
e-mail: unsjournals@gmail.com

....

 15. Klawing TRACKCHANGES.doc
1581K

Suhetri Suryaningsih <hestri.bio@gmail.com>
Kepada: Managing Editor <unsjournals@gmail.com>

17 Oktober 2017 10.59

Yth Managing Editor Biodiversitas Journal

Hasil Review lanjutan manuskrip saya, akan saya perbaiki segera.
Terima kasih, Salam, Suhetri Suryaningsih

[Kutipan teks disembunyikan]



Suhestri Suryaningsih <hestri.bio@gmail.com>

Revisi manuskrip ikan Klawing-Suhestri Suryaningsih

3 pesan

Suhestri Suryaningsih <hestri.bio@gmail.com>
Kepada: Managing Editor <unsjournals@gmail.com>

18 Oktober 2017 13.34


Yth Managing Editor Biodiversitas,

Dengan ini saya kirimkan kembali manuskrip yang sudah saya revisi sebanyak dua file (yang satu yg ada instruksi dan komen dari reviewer, yang satu lagi file setelah saya revisi).

Mohon diterima.

Terima kasih, salam hormat Suhestri Suryaningsih

2 lampiran

 15. f-Klawing EDITOR Coment-Suhestri S..doc
1301K

 15.f- Klawing FINAL Revision-Suhestri S..doc
889K

Managing Editor <unsjournals@gmail.com>
Kepada: Suhestri Suryaningsih <hestri.bio@gmail.com>

18 Oktober 2017 15.48

Thanks

Thank you,
Regards,**Ahmad Dwi Setyawan**

Managing Editor,

- Biodiversitas, Journal of Biological Diversity (biodiversitas.mipa.uns.ac.id) (SCOPUS, DOAJ)
- Nusantara Bioscience (biosains.mipa.uns.ac.id/N/index.htm) (Web of Science (ESCI), DOAJ)

Chairman/Co-Chairman

- National Seminar & International Conference on Biodiversity, <http://biodiversitas.mipa.uns.ac.id/snmbi.html>

Department of Biology,
Faculty of Mathematics and Natural Sciences, Sebelas Maret University,
[Jl. Ir. Sutami 36A Solo 57126, Central Java, Indonesia](http://Jl.Ir.Sutami36A.Solo57126.CentralJava.Indonesia),
Tel. & Fax. +62-271-663375,
e-mail: unsjournals@gmail.com
[Kutipan teks disembunyikan]

Managing Editor <unsjournals@gmail.com>
Kepada: Suhestri Suryaningsih <hestri.bio@gmail.com>

23 Oktober 2017 12.19

Mohon kirimkan final file dalam bentuk CLEAN, tanpa track change dan siap direview kembali.



Suhestri Suryaningsih <hestri.bio@gmail.com>

Manuscript Klwing Suhestri S.-Clean File


2 pesan

Suhestri Suryaningsih <hestri.bio@gmail.com>
Kepada: Managing Editor <unsjournals@gmail.com>

23 Oktober 2017 19.42

Yth. Managing Editor Biodiversitas Journal

Dengan ini saya kirimkan Manuscript Klwing Suhestri S.-Clean File,
Mohon diterima. Terima kasih, Salam hormat Suhestri Suryaningsih

 **15.Klwing-FinalRev-Clean File-Suhestri-f1.doc**
820K

Managing Editor <unsjournals@gmail.com>
Kepada: Suhestri Suryaningsih <hestri.bio@gmail.com>

24 Oktober 2017 03.28

Okay

Thank you,
Regards,**Ahmad Dwi Setyawan**Managing Editor,
- Biodiversitas, Journal of Biological Diversity (biodiversitas.mipa.uns.ac.id) (SCOPUS, DOAJ)
- Nusantara Bioscience (biosains.mipa.uns.ac.id/N/index.htm) (Web of Science (ESCI), DOAJ)---
Chairman/Co-Chairman- National Seminar & International Conference on Biodiversity, <http://biodiversitas.mipa.uns.ac.id/snmbi.html>---
Department of Biology,
Faculty of Mathematics and Natural Sciences, Sebelas Maret University,
[Jl. Ir. Sutami 36A Solo 57126](http://Jl.Ir.Sutami.36A.Solo.57126), Central Java, Indonesia,
Tel. & Fax. +62-271-663375,
e-mail: unsjournals@gmail.com

[Kutipan teks disembunyikan]



Suhestri Suryaningsih <hestri.bio@gmail.com>

Klawing- Resubmit Manuskrip setelah Textcheck dan Proofreading

2 pesan

Suhestri Suryaningsih <hestri.bio@gmail.com>
Kepada: Managing Editor <unsjournals@gmail.com>

13 November 2017 21.05

Yth. Editor,

Dengan hormat saya resubmit manuskrip Klawing setelah saya Textcheck dan Proofreading

1. Textcheck : The English in this document has been checked by at least two professional editors, both native speakers of English. For a certificate, please see: <http://www.textcheck.com/certificate/fAQ3hP>

2. Proofreading :Prof Spencer C. Bowden

Editorial Board Chairman

Oak-fortress Proofreading International

<http://oakfortressproofreading.com>

Terima kasih,

Salam hormat, Suhestri Suryaningsih

**Klawing f-Corrected-Proofread Prof.Spencer C. Bowden.docx**
604K

Managing Editor <unsjournals@gmail.com>
Kepada: Suhestri Suryaningsih <hestri.bio@gmail.com>

13 November 2017 23.38

Thank you,
Regards,**Ahmad Dwi Setyawan**

Managing Editor,

- Biodiversitas, Journal of Biological Diversity (biodiversitas.mipa.uns.ac.id) (SCOPUS, DOAJ)
- Nusantara Bioscience (biosains.mipa.uns.ac.id/N/index.htm) (Web of Science (ESCI), DOAJ)

Chairman/Co-Chairman

- National Seminar & International Conference on Biodiversity, <http://biodiversitas.mipa.uns.ac.id/snmbi.html>

Department of Biology,



Suestri Suryaningsih <hestri.bio@gmail.com>

Fwd: Klawing River paper edited

1 pesan

Managing Editor <unsjournals@gmail.com>
Kepada: Suestri Suryaningsih <hestri.bio@gmail.com>

27 November 2017 11.54

Terlampir adalah komentar editor kami, masih terdapat pertanyaan yang perlu dijelaskan.
Mohon periksa lampiran.

Thank you,
Regards,

Ahmad Dwi Setyawan

Managing Editor,
- Biodiversitas, Journal of Biological Diversity (biodiversitas.mipa.uns.ac.id) (SCOPUS, DOAJ)
- Nusantara Bioscience (biosains.mipa.uns.ac.id/N/index.htm) (Web of Science (ESCI), DOAJ)

Chairman/Co-Chairman
- National Seminar & International Conference on Biodiversity, <http://biodiversitas.mipa.uns.ac.id/snmbi.html>

Department of Biology,
Faculty of Mathematics and Natural Sciences, Sebelas Maret University,
Jl. Ir. Sutami 36A Solo 57126, Central Java, Indonesia,
Tel. & Fax. +62-271-663375,
e-mail: unsjournals@gmail.com

----- Forwarded message -----
From:@gmail.com >
Date: 2017-11-27 10:15 GMT+07:00
Subject: Klawing River paper edited
To: Managing Editor <unsjournals@gmail.com>

Dear Pak Ahmad,

Please find attached the results of my editing of the resubmitted paper on the Klawing River. As usual there is a TRACKED CHANGES version with a few Comments for consideration (**one is important!**) and a TIDY VERSION with all changes incorporated and comments removed.

I will now proceed to editing the other three papers. I hope to finish them by the end of this week.

Thank you,

best wishes

.....

 **KlawingTRACK CHANGES.doc**
587K



Suhestri Suryaningsih <hestri.bio@gmail.com>

Revisi Manuskrip Klawing Suhestri S.

3 pesan

Suhestri Suryaningsih <hestri.bio@gmail.com>
Kepada: Managing Editor <unsjournals@gmail.com>

28 November 2017 17.41

Yth. Bapak Ahmad Dwi Setyawan, Managing Editor Biodiversitas Journal.
dengan hormat saya ganti resubmit Revisi Manuskrip Klawing dari DOCX menjadi DOC format. Mohon maaf atas kekeliruan ini.
Terima kasih, salam hormat Suhestri Suryaningsih

2 lampiran **KlawingTRACK CHANGES-27 Nov.2017-f.doc**
746K **Klawing clean file-Rev.27 Nov-2017-f.doc**
1228K**Managing Editor** <unsjournals@gmail.com>
Kepada: Suhestri Suryaningsih <hestri.bio@gmail.com>

28 November 2017 19.22

Thank you,
Regards,

Ahmad Dwi Setyawan

Managing Editor,
- Biodiversitas, Journal of Biological Diversity (biodiversitas.mipa.uns.ac.id) (SCOPUS, DOAJ)
- Nusantara Bioscience (biosains.mipa.uns.ac.id/N/index.htm) (Web of Science (ESCI), DOAJ)

Chairman/Co-Chairman
- National Seminar & International Conference on Biodiversity, <http://biodiversitas.mipa.uns.ac.id/snmbi.html>

Department of Biology,
Faculty of Mathematics and Natural Sciences, Sebelas Maret University,
Jl. Ir. Sutami 36A Solo 57126, Central Java, Indonesia,
Tel. & Fax. +62-271-663375,
e-mail: unsjournals@gmail.com
[Kutipan teks disembunyikan]

Suhestri Suryaningsih <hestri.bio@gmail.com>
Draf Untuk: Managing Editor <unsjournals@gmail.com>

28 November 2017 19.33

Well received with thanks.
[Kutipan teks disembunyikan]



Suhestri Suryaningsih <hestri.bio@gmail.com>

BILLING

1 pesan

29 November 2017 09.32

Managing Editor <unsjournals@gmail.com>
Kepada: Suhestri Suryaningsih <hestri.bio@gmail.com>

Dear Author(s),

Kindly find attached an invoice for the publication of your manuscript.

Thank you,
Best Regards,

Dewi Nur Pratiwi,

Treasurer,

- Biodiversitas, Journal of Biological Diversity (biodiversitas.mipa.uns.ac.id) (SCOPUS, DOAJ)
- Nusantara Bioscience (biosains.mipa.uns.ac.id/nusbioscience.htm) (Web of Science (ESCI), DOAJ)

**377.SUHESTRI SURYANINGSIH.pdf**
178K



Suhestri Suryaningsih <hestri.bio@gmail.com>

'D190194-Klawing.doc'

2 pesan

Suhestri Suryaningsih <hestri.bio@gmail.com>
Kepada: Managing Editor <unsjournals@gmail.com>

2 Desember 2017 18.50

Yth. Bapak Ahmad Dwi Setyawan,
Setelah saya cermati, manuskrip sdh tidak saya perbaiki lagi.
Terima kasih, salam hormat
Suhestri Suryaningsih

 **D190194-Klawing.doc**
1026K

Managing Editor <unsjournals@gmail.com>
Kepada: Suhestri Suryaningsih <hestri.bio@gmail.com>

2 Desember 2017 21.28

Thank you,
Regards,

Ahmad Dwi Setyawan

Managing Editor,
- Biodiversitas, Journal of Biological Diversity (biodiversitas.mipa.uns.ac.id) (SCOPUS, DOAJ)
- Nusantara Bioscience (biosains.mipa.uns.ac.id/N/index.htm) (Web of Science (ESCI), DOAJ)

Chairman/Co-Chairman
- National Seminar & International Conference on Biodiversity, <http://biodiversitas.mipa.uns.ac.id/snmbi.html>

Department of Biology,
Faculty of Mathematics and Natural Sciences, Sebelas Maret University,
[Jl. Ir. Sutami 36A Solo 57126](http://Jl.Ir.Sutami.36A.Solo.57126), Central Java, Indonesia,
Tel. & Fax. +62-271-663375,
e-mail: unsjournals@gmail.com
[Kutipan teks disembunyikan]