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THE 2nd INTERNATIONAL SYMPOSIUM MARINE AND FISHERIES

🕒 June 22, 2019 👤 Arham Rahim 📁 Uncategorized @en 💬 0



The 2nd International Symposium Marine and Fisheries, Faculty of Marine Science and Fisheries Universitas Hasanuddin were held on June 22, 2019, at Makassar City, Indonesia. The theme of this symposium is Managing Aquatic Resources for sustainable development. Furthermore, the topics of symposium were consist of 13 parts namely Aquatic Biodiversity, Aquatic Ecology and Conservation, Marine and Fisheries Biotechnologi, Sustainable Aquatic, Sustainable Fisheries, Fisheries Processing Technology and food Culture, Marine Tourism, Marine and Fisheries Low and Development Policy, Marine and Fisheries Geographical Information Systems, Marine Technology, Nature Disaster Mitigation and Adaptation, and Marine and Fisheries Outreach and Community Service.

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[🇬🇧 English](#)[🇮🇩 Indonesia](#)

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Marine Gespatial and Fisheries Information System Lab.

The international speakers who come from several countries such as Dr. Marea Beger (University of Leeds, UK), Prof. Tamiji Yamamoto (Hiroshima University Japan), Mr. Ichiro Namura (JICA, Japan), Prof. Ikhwanuddin (Universitas Malaysia Terengganu, Malaysia) and Dr. Dewi Yanuarita (Universitas Hasanuddin). On the other hand, the participant takes part in this symposium from many universities in Indonesia.



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Conservation Lab.

Nutrition and Feed
Management Technology Lab.

Fish Product Technology Lab.

Fishing Technology Lab.

Fish Parasites and Diseases
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Fishing Gear Construction
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M	T	W	T
4	5	6	7
11	12	13	14
18	19	20	21
25	26	27	28

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Foreword

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FOREWORD

Their great diversity and potential makes the development of marine and fisheries resources a priority for Indonesia, and a key orientation of long-term development planning. The development of valuable maritime and fishery resources has been encouraged by the government as a means to achieve food security and economic independence.

These abundant marine and fisheries resources are the mainstay of Indonesia's efforts to achieve Sustainable Development Goal (SDG) number 14: "Conserve and sustainably use the oceans, seas and marine resources for sustainable development".

As a contribution towards achieving SDG 14, each year the Faculty of Marine Science and Fisheries at Universitas Hasanuddin holds a national and international marine and fisheries symposium. The theme of the 2019 Symposium is "**Managing Aquatic Resources for Sustainable Development**". This symposium will provide opportunities for participants to exchange information, knowledge and experience, as well as to initiate partnerships for research and outreach activities in the field of marine science and fisheries. These exchanges and partnerships will contribute towards enhancing the potential, development and utilization of marine and fishery resources in sustainable ways.

A warm welcome to the researchers and participants from a wide cross-section of the marine and fisheries sector and thank you for coming to taking part in this Universitas Hasanuddin Marine Science and Fisheries Symposium. A heartfelt thank you is also due to the many people and organisations that have provided support or contributed in any way towards the successful realisation of this Symposium. May all the contributions made during this event provide valuable input to support marine and fisheries development in Indonesia.

Makassar, 5 September 2019
Dean,

Dr.Ir.St Aisjah Farhum, MSi



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Table of contents

Volume 370

November 2019

[◀ Previous issue](#) [Next issue ▶](#)

The 2nd International Symposium on Marine Science and Fisheries (ISMF2) - 2019 22 June 2019, Makassar, Indonesia

Accepted papers received: 08 October 2019

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[View all abstracts](#)

Preface

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Foreword

[+ View abstract](#) [View article](#) [PDF](#)

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[+ View abstract](#) [View article](#) [PDF](#)

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Statement of Peer Review

[+ View abstract](#) [View article](#) [PDF](#)

Papers

OPEN ACCESS 012001

Meristic characters and length-weight relation of climbing perch (*Anabas testudineus*) from wetlands in Sigi District, Central Sulawesi, Indonesia

S Ndobe, Rusaini, A Masyahoro, N Serdiati, Madinawati and A M Moore

[+ View abstract](#) [View article](#) [PDF](#)

-
- OPEN ACCESS** 012002
Environmental Geochemistry of Heavy Metals and Plagioclase Background Enrichment Factor in Coastal Sediments at Lumpue - Parepare, South Sulawesi, Indonesia
A Tongggiroh, A M Imran and S Haerany
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012003
Participatory mapping and unmanned aerial vehicle (UAV) images for developing village level coastal geoinformation
N Nurdin, D F Inaku, A R Rasyid, A R Jalil, A Alimuddin, Agus, M Akbar As and S Q Al Azizi
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012004
Mapping distribution patterns of skipjack tuna during January-May in the Makassar Strait
M Zainuddin, M I Amir, A Bone, S A Farhum, R Hidayat, A R S Putri, A Mallawa, Safruddin and M Ridwan
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012005
Production of Pacific whiteleg shrimp, *Litopenaeus vannamei* through implementation of rapid biofloc technology
N A Kasan, A S Kamaruzzan, A I A Rahim, A N Ishak, I Jauhari and M Ikhwanuddin
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012006
Physico-chemical characteristics and amino acid profile of fermented sauce made from tuna loin by-product
M R Wenno and C R M Loppies
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012007
Preliminary note on the morphological characters of *penja* (amphidromous goby postlarvae) in West Sulawesi and Gorontalo Bay
Nurjirana, A Haris, F M Sahami, P Keith and A I Burhanuddin
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012008
Effect of oceanographic conditions on skipjack tuna catches from FAD versus free-swimming school fishing in the Makassar Strait
A R S Putri, M Zainuddin, M Musbir, M A Mustapha and R Hidayat
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS**

- Quality of giant clam (*Tridacna derasa*) juveniles as non–target organisms after exposure to clove oil in concentrations suitable for anaesthetising ornamental fish 012009
S W Rahim, K Yaqin, L Fachruddin and H Kudsiah
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012010
Biological condition and carapace width frequency distribution of blue swimming crabs (*Portunus pelagicus*) in Gresik and Lamongan, East Java
M A Rahman, F Iranawati, A B Sambah and D G R Wiadnya
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012011
The effect of commercial feed enrichment with *Piper betle* leaf extract on the growth and survival rate of tilapia (*Oreochromis niloticus*)
S S Agustina
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012012
A Microcosm Multitrophic Aquaculture System
A Tuwo, I Yasir, J Tresnati, Mutmainnah, R Aprianto, A Yanti, A D Bestari and M Nakajima
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012013
The stability of mangrove ecosystems for edu-tourism based on macrozoobenthos ecological indicators in the educational fish ponds of Hasanuddin University
A Saru, M Lanuru, S Mashoreng, Y Jubhari and M Ilham
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012014
Species diversity of wrasses caught by fishermen in the Spermonde Islands, South Sulawesi, Indonesia
I Yasir, J Tresnati, A Yanti, P Y Rahmani, R Aprianto and A Tuwo
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012015
Long-Term Monitoring of Parrotfish Species Composition in the Catch of Fishermen from the Spermonde Islands, South Sulawesi, Indonesia
J Tresnati, I Yasir, R Aprianto, A Yanti, P Y Rahmani and A Tuwo
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012016
Maturity stages of the redbreasted wrasse *Cheilinus fasciatus*

[+ View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012017

Cultivated seaweed carbon sequestration capacity

S Mashoreng, Y A La Nafie and R Isyrini

[+ View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012018

Morphological and genetic analysis of *Gracilaria* sp. cultured in ponds and coastal waters

N I S Arbit, S B A Omar, E Soekendarsi, I Yasir, J Tresnati, Mutmainnah and A Tuwo

[+ View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012019

Comparative study on the growth, carotenoid, fibre and mineral content of the seaweed *Caulerpa lentillifera* cultivated indoors and in the sea

R Syamsuddin, H Y Azis, Badraeni and Rustam

[+ View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012020

Enrichment of commercial feed for striped snakehead fry (*Channa striata*) with golden snail (*Pomacea* sp.) flour

S Ndohe, S F Mangitung, R Bardi, Madinawati, D T Tobigo and A M Moore

[+ View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012021

Analysis of coral reef benthic cover changes around Kapoposang Island, Pangkep Regency, South Sulawesi using multi-temporal remote sensing imagery

A Faizal, A F Raazy and A Rasyid

[+ View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012022

Perspectives on seagrass ecosystem services from a coastal community

R Ambo-Rappe, Y A. La Nafie, A A Marimba, L C. Cullen-Unsworth and R K. Unsworth

[+ View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012023

Design Viability of Purse Seiners Operating in Bone Regency, South Sulawesi, Indonesia

S A Farhum, M Zainuddin, A F P Nelwan, A A Pangera and R D Risa

[+ View abstract](#) [View article](#) [PDF](#)

-
- OPEN ACCESS** 012024
Nursery Performance of Sandfish *Holothuria scabra* Juveniles in Tidal Earthen Pond Using Different Types of Cage
M Firdaus and L F Indriana
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012025
Livelihood Features of Seaweed Farming Households: A Case study from Bungin Permai Village, South Konawe, South East (SE) Sulawesi, Indonesia
M Rahim, L O M Aslan, Ruslaini, S A A Taridala, N I Wianti, A Nikoyan, Budiyanto and H Hafid
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012026
Use of Common Lantana (*Lantana camara* Linn) Extract to Prevent Ice-ice Disease and Trigger Growth Rate of the Seaweed *Kappaphycus alvarezii*
R S Patadjai, I Nur and S Kamri
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012027
Structural relationship among steroids from Sulawesi Tenggara's sponge *Clathria* sp. and their radical scavenger activity
I Sahidin, Baru Sadarun, La Ode M. Aslan, Wahyuni, M. Hajrul Malaka and Adryan Fristiohady
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012028
Coral Disease Prevalence on Scleractinian Corals at Prigi Bay, Trenggalek, East Java
Rosdianto and O M Luthfi
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012029
The effect of *Melastoma malabathricum* leaf extract on growth and spawning of blue swimming crab (*Portunus pelagicus*)
N Alam, Y Fujaya, Haryati, D K Sari, M Achmad, M Rusdi and N Farizah
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012030
Chemical composition and antibacterial activity of honey collected from East Nusa Tenggara, Indonesia on pathogenic bacteria in aquaculture
Y Salosso
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012031

Habitat characteristics and distribution of flyingfish in Fak-Fak and surrounding waters

P Boli, I Luhulima, F Simatauw, S Leatemia, S Tabay, D Parenden and A S Ananta

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012032

Antioxidant, antibacterial and antifungal activity of edible coating chitosan-galactose complex

Rieny Sulistijowati, Rahim Husain, Muhammad Cakra Datau and Kusbidinandri

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012033

The Effect of Dosage Combination and Feeding Frequency on Growth and Survival Rate of Vannamei Shrimp Juveniles in Ponds

Z Zainuddin, S Aslamyah, K Nur and Hadijah

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012034

Diversity of attached marine life in different types of artificial timber reefs

J F Alam, T Yamamoto, T Umino, S Nakahara and K Hiraoka

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012035

Osteological study of Titan Trigger fish, *Balistoides viridescens* (Bloch and Schneider, 1801) (Balistidae: Tetraodontiformes) from the Spermonde Archipelago Waters

M Afrisal, Nurjirana, Irmawati and A I Burhanuddin

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012036

Analysis of biological aspects of Scottish seine net catches in Mamuju waters, West Sulawesi

Najamuddin, M Palo, A Assir, A Asni and Busman

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012037

The effect of initial weight of seedlings grafted from tissue-cultured and local strain seedlings on growth and carrageenan content of the Red Seaweed (*Kappaphycus alvarezii*) using a grafting method

A L Embi, L O M Aslan, W Iba, A B Patadjai and E Sulistiani

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012038

Comparing skipjack tuna catch and oceanographic conditions at FAD locations in the Gulf of Bone and Makassar Strait

[+](#) [View abstract](#) [View article](#) [PDF](#)

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012039

Evisceration rate of sandfish *Holothuria scabra* during transportation

A Tuwo, I Yasir, J Tresnati, R Aprianto, A Yanti, A D Bestari, Syafiuddin and M Nakajima

[+](#) [View abstract](#) [View article](#) [PDF](#)

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012040

Biological aspects of Indian scad (*Decapterus russelli* Ruppell, 1830) in south site of Madura Strait Waters, East Java

G Bintoro, T D Lelono, Rudianto and N D Utami

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012041

The introduced Banggai cardinal fish (*Pterapogon kauderni*) population in Ambon Island, Indonesia

K Wibowo, U Y Arbi and I B Vimono

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012042

Water bird habitat suitability analysis in an urban coastal wetland (case study: Lantebung mangrove ecotourism area)

A Purify, N Nurdin, R I Maulani and M Lanuru

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012043

Grafting of *Kappaphycus alvarezii* seedlings using different seedling sources in Sasara Coastal Waters, Buton Utara, Southeast (SE) Sulawesi, Indonesia

Armin, L O M Aslan, A B Patadjai, W Iba, Yusnaeni and W H. Muskita

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012044

The Effect of Different Oblique Incision Length in Slide-Slipped Grafting using Tissue Cultured and Local Seedlings on the Growth of Seaweed (*Kappaphycus alvarezii*) in Sasara Coastal Waters, Kulisusu Bay, Buton Utara, SE Sulawesi, Indonesia

R Hasriah, L O M. Aslan, W Iba, A B Patadjai, Ruslaini, M Balubi and E Sulistiani

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012045

The Fishing Ground of Large Pelagic Fish during the Southeast Monsoon in Indonesian Fisheries Management Area-713

Safuruddin, B Aswar, M Rijal Ashar, R Hidayat, Y K Dewi, M. T Umar, S. A Farhum, A Mallawa and M Zainuddin

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS 012046

Biodiversity of lobster larvae (*Panulirus* spp.) from the Indonesian Eastern Indian Ocean

A Setyanto, Soemarno, D G R Wiadnya and C Prayogo

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS 012047

The effect of differences in feed protein raw materials on the glycogen content, metamorphosis rate of mangrove crab larvae (*Scylla olivacea*) and feed price

Haryati, Y Fujaya and E Saade

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS 012048

The association of economically important fish with mangroves in Maumere Bay, Indonesia

A Vincentius, M N Nessa, J Jompa, A Saru, M Hatta and N Rukminasari

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS 012049

Evaluating Ecotourism Development in Bontang: Water Quality, Compatibility, and Carrying Capacity

Aspiany, Sutrisno Anggoro, Frida Purwanti and Bambang Indratno Gunawan

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS 012050

Preliminary study: human trampling effects on seagrass density

N Nurdin, Y La Nafie, M T Umar, M Jamal and A Moore

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS 012051

Macroscopic characteristics of the gonad maturity stages of dusky parrotfish *Scarus niger*

A Yanti, I Yasir, P Y Rahmani, R Aprianto, A Tuwo and J Tresnati

[+](#) [View abstract](#) [View article](#) [PDF](#)

OPEN ACCESS 012052

Exploring Biodiversity and Monitoring Genetic Resources of Aquatic Plants in Manado, North Sulawesi, Indonesia

M F I Nugraha, R Koneri, A Julzarika, Reflinur, W Enggarini, R Yunita, M A Radjamuddin and H Novita

[+](#) [View abstract](#) [View article](#) [PDF](#)

-
- OPEN ACCESS** 012053
Model of investment reconstruction post moratorium of *Cantrang* fishing gear (case study: Makassar Strait Waters and Bone Bay in Indonesia)
Sri Suro Adhawati and Achmar Mallawa
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012054
Population dynamics and feeding habits of *Euthynnus affinis*, *Auxis thazard*, and *Auxis rochei* in South Coast of East Java waters
Tri Djoko Lelono and Gatut Bintoro
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012055
Histopathological changes in the intestine of *Channa micropeltes* infected with the cestode *Senga rostellariae*
Marina Hassan, Muhammad Syafiq Izzuddin Abdul Hadi, Mohd Fazrul Hisam Abd Aziz, Wahidah Wahab, Farizan Abdullah, Shuhaimi Deraman, Kismiyati and Mohd Ihwan Zakariah
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012056
Bridging a new concept of fisheries subsidies policy to support sustainable fisheries in Indonesia
Muhammad Nur
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012057
The productivity and the pattern of yellowfin tuna (*Thunnus albacares*) fishing season in Morotai Island waters
Titien sofiati and Djainudin Alwi
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012058
Development strategy and increased production of seaweed in Takalar District
Hamzah Tahang, Gunarto Latama and Kasri
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012059
Effects of increasing temperature and nitrate concentration on cell abundance, growth rate, biomass and free fatty acid of *Tetraselmis* sp
Nita Rukminasari, Sharifuddin Bin Andy Omar and Muhammad Lukman
[+](#) [View abstract](#) [View article](#) [PDF](#)

-
- OPEN ACCESS** 012060
Seasonal variation in growth and carrageenan yield of *Kappaphycus alvarezii* (Doty) Doty farmed using mass selection in Bungin Permai Coastal Waters, South Konawe District, Southeast (SE) Sulawesi, Indonesia
La Ode M. Aslan, Rahmad S. Patadjai, Ruslaini, Irwan J. Effendy, Abdul H. Sarita, Siti Amina, Nuraeni and Armin
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012061
Inhibitory activity of *Sargassum hystrix* extract and its chloroform fractions on inhibiting the α -glucosidase activity
Rosiana Nafilatul Azizah, Amir Husni and Siti Ari Budhiyanti
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012062
Sungkur rolling ship with pushing operation method for fish and shrimp catching in the coastal waters
Rusmilyansari, Erwin Rosadi, Iriansyah and Aulia Azhar Wahab
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012063
Distribution patterns of gregarine parasitism of wild marine bivalve, *Anadara cornea* (reeve, 1844) concerning seasonality and water quality
Mohd Ihwan Zakariah, Hassan Mohd Daud, Reuben Sunil Kumar Sharma, Mhd. Ikhwanuddin and Marina Hassan
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012064
Blue-forest in mangrove area at Kuri Caddi hamlet, Nisombalia Village, Maros Regency, South Sulawesi, Indonesia
Andi Hurul Auni Usman, Meta Dilianti Palimbunga, Basran Nur Basir, Aswar, Ma'rifa Baharuddin and Ira Taskirawati
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
- OPEN ACCESS** 012065
Impact of tsunami Sunda Strait to coastal tourism in Tanjung Lesung Special Economic Zone Pandeglang Regency Banten Province
LS Mulyawati, L Adrianto, K Soewandi and HA Susanto
[+](#) [View abstract](#) [View article](#) [PDF](#)
-
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Exploitation level of shortfin scads fish (*Decapterus macrosoma*) caught with purse seine in Bulukumba waters, South Sulawesi
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Preliminary note on the morphological characters of *penja* (amphidromous goby postlarvae) in West Sulawesi and Gorontalo Bay

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Penja is the local name for the postlarvae of fish belonging to the Gobioidaei, whose appearance at certain times is an amphidromous migration process from the sea to rivers. This group of fish is generally referred to as amphidromous gobies. This study aimed to reveal some facts related to the species diversity of *penja* based on morphological characteristics. The study was conducted from

October 2017 to March 2019 in West Sulawesi and Gorontalo Bay, Indonesia. Amphidromous goby samples at the *penja* (postlarval) stage were obtained from fishermen's catches and from traditional markets in each location. The samples obtained were measured and described based on morphological differences. The total length of the sampled *penja* ranged from 18 mm to 58 mm. All *penja* were identified as belonging to one of two families, the Gobiidae and Eleotridae. Although the species obtained from the waters of West Sulawesi and Gorontalo Bay were similar, there were variations in species composition (relative abundance) based on observed morphology of *penja* postlarvae from these two locations.

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Preliminary note on the morphological characters of *penja* (amphidromous goby postlarvae) in West Sulawesi and Gorontalo Bay

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Abstract. *Penja* is the local name for the postlarvae of fish belonging to the Gobioidae, whose appearance at certain times is an amphidromous migration process from the sea to rivers. This group of fish is generally referred to as amphidromous gobies. This study aimed to reveal some facts related to the species diversity of *penja* based on morphological characteristics. The study was conducted from October 2017 to March 2019 in West Sulawesi and Gorontalo Bay, Indonesia. Amphidromous goby samples at the *penja* (postlarval) stage were obtained from fishermen's catches and from traditional markets in each location. The samples obtained were measured and described based on morphological differences. The total length of the sampled *penja* ranged from 18 mm to 58 mm. All *penja* were identified as belonging to one of two families, the Gobiidae and Eleotridae. Although the species obtained from the waters of West Sulawesi and Gorontalo Bay were similar, there were variations in species composition (relative abundance) based on observed morphology of *penja* postlarvae from these two locations.

1. Introduction

Penja is one local name used for amphidromous gobies in Sulawesi, Indonesia. These *penja* are one of the most popular fishes for local consumption, because their emergence from the sea to the river mouth in large numbers occurs at predictable intervals, and *penja* fishing has long been a routine activity for communities in the coastal area and from the river estuary to the upper reaches of many rivers. The appearance of dense schools of *penja* is a process of migration from the sea to the river. These gobies have an amphidromous migration pattern associated with both reproduction and foraging [1–3]. Amphidromous gobies such as the *penja* of Sulawesi have a life-cycle which begins with adults spawning in the river. The eggs and embryos are then carried by river currents, generally hatching before arriving at the sea, and spend their larval and postlarval phases in the sea for 3-5 months, before returning to the river to grow and eventually reproduce.

Penja fishing in Sulawesi is generally carried out monthly around the full moon, which seems to serve as a time indicator, triggering mass migrations of amphidromous gobies returning to their natal



riverine habitat. *Penja* can be found in many places, with many different local names. For example, in West Sulawesi, people generally refer to them as *penja* or *ikan penja* [4], while in Gorontalo and much of Central Sulawesi they are called *nike* or *duwo* [5,6]. All these local names have one thing in common, which is that they refer collectively to all species of amphidromous gobies. The local communities and the general public believe that *penja* (or *nike*) are a single species. However, the results of a study in 2016 [6] which used DNA Barcodes to compared the *penja* from West Sulawesi with *nike* from Gorontalo concluded that *penja* differed from *nike*. The *nike* from Gorontalo were identified as *Awaous melanocephalus*, while the sequences obtained from *penja* specimens did not align with data in the various genetic databanks. These *penja* sequences were sufficiently different from those of other known species to justify new species status. However, as the specimens were all still in the postlarval phase the species could not be described morphologically.

Based on the situation outlined above, it is considered necessary to carry out an assessment of the amphidromous gobies known as *penja* and *nike* based on morphological differences. This study aimed to contribute to the identification and classification of *penja* postlarvae from West Sulawesi and Gorontalo Bay based on morphological characteristics.

2. Materials and methods

This study was conducted from October 2017 to March 2019 in West Sulawesi and Gorontalo Bay. Samples of *penja* (amphidromous goby postlarvae) were collected from the catches of fishermen who were catching *penja* in the river using nets, and *penja* fishing methods were observed. Several samples were also obtained from traditional markets in each location. The *penja* samples were documented using a camera, then preserved in 70% alcohol. The preserved samples were taken to the Hasanuddin University Laboratory of Marine Biology. Morphological analysis of the samples was based on [7]. The total length of each specimen was measured using callipers and the specimens were described based on differences in morphology.

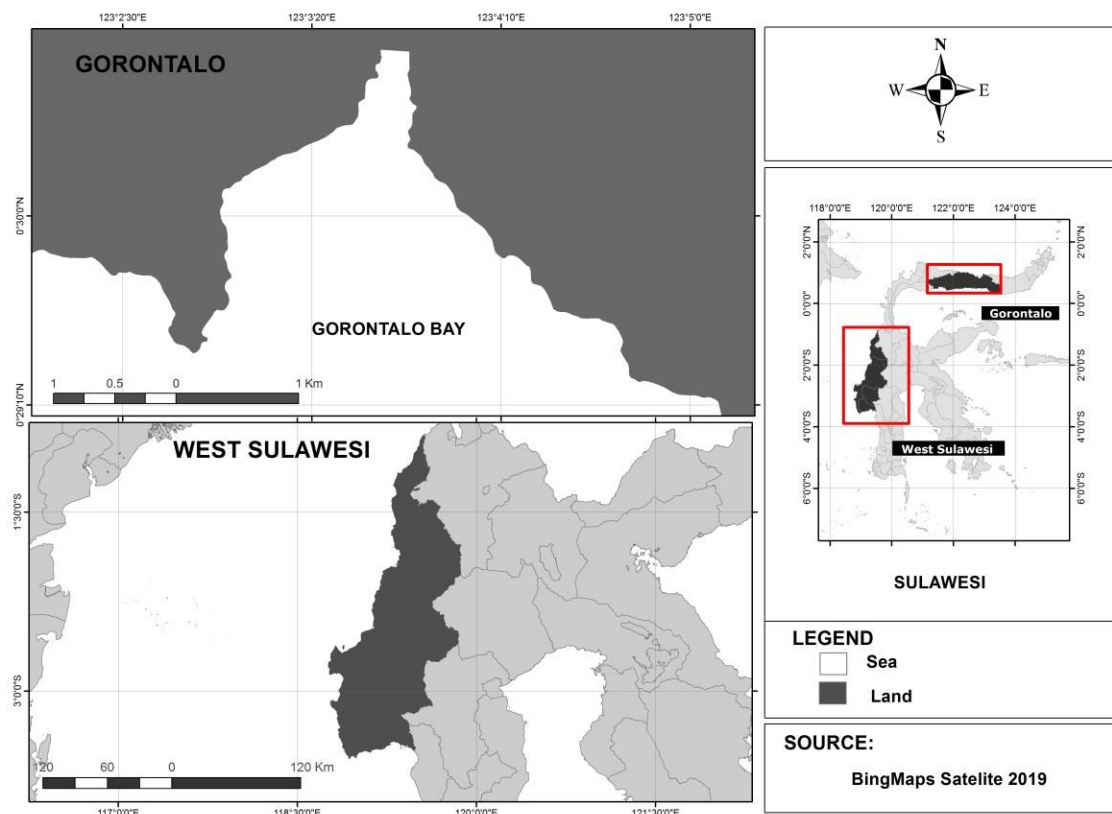


Figure 1. Study Locations: West Sulawesi and Gorontalo Bay

3. Results

Penja fishing activities are routinely carried out on both West Sulawesi and Gorontalo Bay, especially in coastal areas that have rivers which serve as migration routes for a variety of migratory fishes including glass eels (*Anguilla* sp.) and *penja*. The fishermen from both regions carrying out fishing activities when *penja* migrate using similar fishing gear. The most commonly used fishing gear in both locations was a type of mini purse seine which is spread out in the river estuary, while some fishermen use small nets including scoop nets and push nets. Some of the specimens collected are shown in Figure 2 (West Sulawesi) and Figure 3 (Gorontalo).

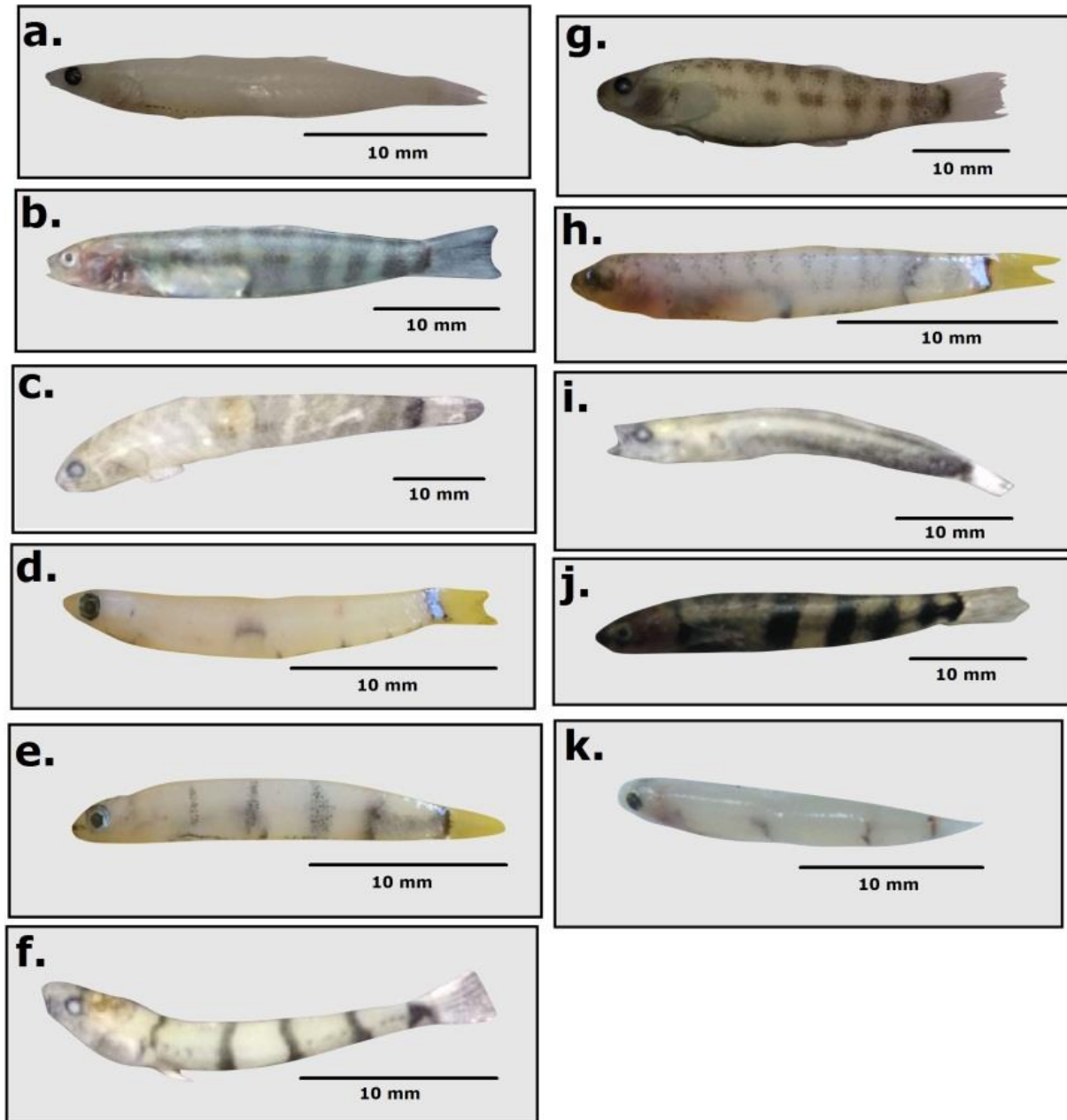


Figure 2. Penja postlarvae specimens collected in West Sulawesi: Gobiidae (b,c,d,e,f,h,j,k), Eleotridae (a,g,i)

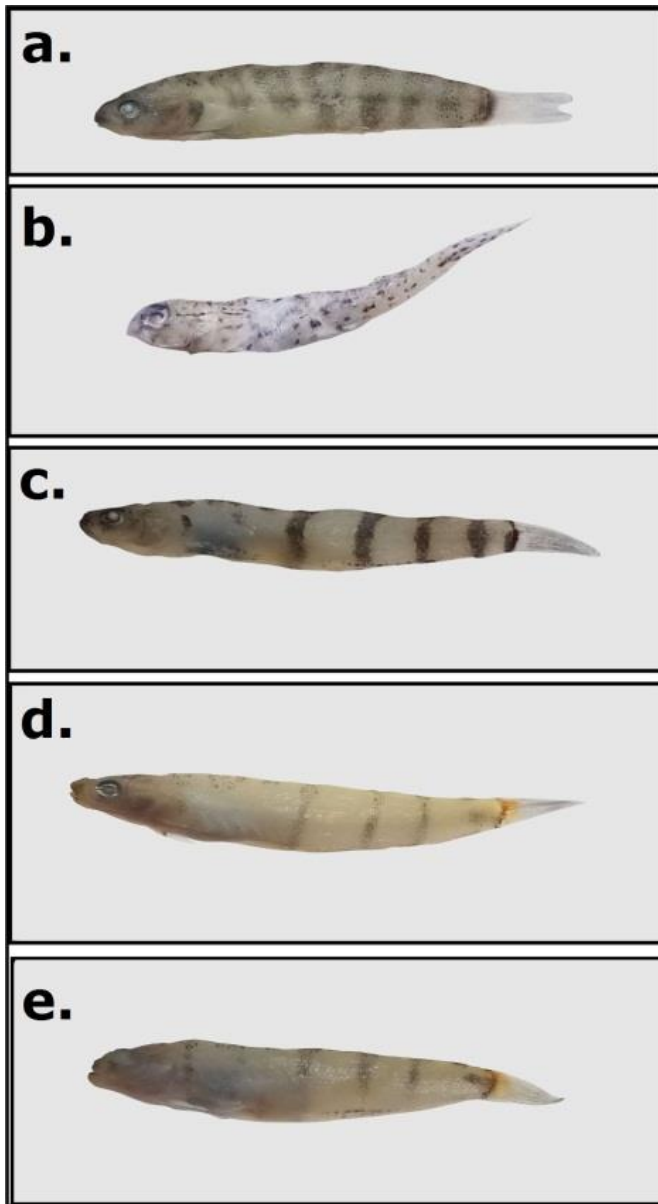


Figure 3. Penja postlarvae in Gorontalo Bay: Gobiidae (a,b,c), Eleotridae (d,e)

The migration period of *penja* in the study location could not always be predicted with certainty because, even when the moon has entered the full moon phase, schools of *penja* are not always found, especially at the Gorontalo site. However, in the waters of West Sulawesi, *penja* migration occurs every month in areas with wider rivers where there is a strong discharge into the sea, even though in some months there are only a few *penja* that migrate. The numbers and size of the *penja* specimens collected are shown in Table 1.

Table 1. Penja postlarvae specimens collected

Study Location	n	Total Length Range
West Sulawesi	362	18 - 58 mm
Gorontalo	184	15 - 46 mm

The morphological analysis of *penja* amphidromous goby postlarvae obtained from West Sulawesi (Figure 2) and Gorontalo Bay (Figure 3) gave broadly similar results, with collected specimens identified as belonging to two families within the Gobioidaei, the Gobiidae and Eleotridae. The size range was also similar, despite slightly higher minimum and maximum total length (TL) values in West Sulawesi compared to Gorontalo Bay. There appeared to be several species within each family present in each region. In terms of relative abundance, sample composition differed between the two regions, both at the family level and for morphological phenotypes likely to be different species.

4. Discussion

When *penja* migrate from the sea, they initially approach coastal areas close to the river estuary, and schools of postlarvae will gather along the coast before entering the river mouth. The *penja* postlarvae gather in seagrass areas and beneath rocks in coastal areas, which are the habitat types in which the fishermen in the study areas often caught *penja*. Certain species such as the genus *Sicyopterus* and *Stiphodon* from the Gobiidae and the family Eleotridae [8,9] can be found from the downstream area to the upstream areas, so that when they migrate, some groups will stay in areas close to the mouth of the river, while other groups will continue to migrate until they find suitable habitat in the upper reaches of the river system.

The *penja* migrating to the rivers in the study area were identified as amphidromous gobies from the families Gobiidae and Eleotridae, both of which belong to the Suborder Gobioidaei. Two fundamental differences in the morphology of Gobiidae and Eleotridae are the shape of the pelvic fins and the relative length of the base of the dorsal fin (Figure 4). The pelvic fins of fishes in the Gobiidae family are fused together and modified to a sucker-like form which enables the fish to attach themselves to rocks. These suckers are used when climbing waterfalls and rapids during their upstream migration to the upper reaches of the river systems. In addition, in the Gobiidae the base of the second dorsal fin is generally longer than the distance from the end of this fin to the base of the caudal fin [7]. Distinguishing features of the Eleotridae include separate pelvic fins similar to most fishes, while the length of the base of the dorsal fin is generally similar to the length of the caudal peduncle [7].

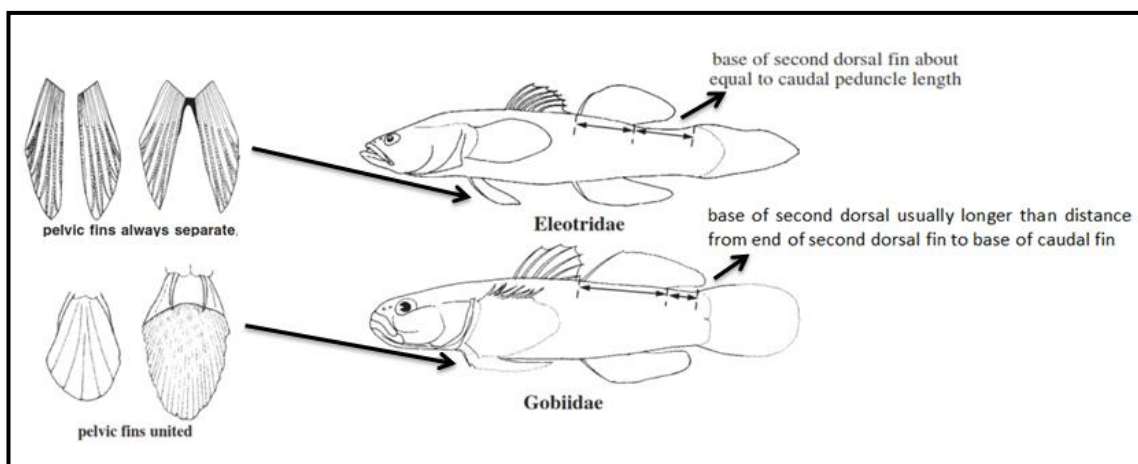


Figure 4. Distinguishing features of the gobioid families Gobiidae and Eleotridae [7]

Identification to species level based on morphology at the postlarval *penja* stage is problematic, considering that amphidromous gobies will change shape as they undergo metamorphosis from the postlarval phase to the juvenile phase [1,2,8]. A study in French Polynesia and New Caledonia [9] observed postlarvae of amphidromous gobies *in vivo* and then succeeded in raising them to adulthood. These adults were identified to species level and included *Awaous ocellaris*, *Awaous guamensis*, *Lentipes rubrofasciatus*, *Sicyopterus marquesensis*, *Sicyopterus lagocephalus*, *Stenogobius yateiensis*,

Stenogobius genivittatus, and *Eleotris fusca*. However, most references (e.g. [10–12]) only provide details sufficient for species identification for adult fish, making it difficult to perform identification to the species level based on the morphology of specimens still in the postlarval phase.

Based on specimens in the juvenile/adult phases, 9 amphidromous goby species have been identified in one river in West Sulawesi: seven species of Gobiidae (5 genera: Sicyopterus, Stiphodon, Sicyopus Smilosicyopus, Schismatogobius) and two species of Eleotridae (genus Eleotris) [4]. These are the same two families identified in this study, and it is likely that several of the 11 morphotypes identified in West Sulawesi penja postlarvae correspond to these species. One way to identify the penja postlarvae would be to adopt a similar approach to [9], capturing and rearing live specimens of penja. Another approach would be the use of molecular biology tools, in particular so-called "DNA barcodes" [13]. Such methods have the potential to be very helpful in the identification to species level of larval and postlarval stages [14]. The limitation on this method is that it can only identify the species for which reference sequences for reliably identified adult specimens have been deposited in appropriate data repositories such as GenBank. Although a number of Gobiidae and Eleotridae have been barcoded [11], further barcoding of amphidromous gobies is recommended in order to build a comprehensive database for this group of fishes.

5. Conclusion

The apparent diversity of postlarval penja collected from West Sulawesi and Gorontalo Bay was similar, and included an as yet undetermined number of species belonging to two families, the Gobiidae and Eleotridae. Composition (relative abundance of each morphological phenotype) differed between the two regions. Further research including molecular (DNA) analysis is needed to determine the number and identity of the species of amphidromous goby postlarvae present in each region.

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