



GEOECO

S2 PKLH UNS

TERAKREDITASI SINTA 5

SK Dirjen Penguatan Riset dan Pengembangan
KEMENRISTEK DIKTI No. 21/E/KPT/2018

[Home](https://jurnal.uns.ac.id/GeoEco/index) (<https://jurnal.uns.ac.id/GeoEco/index>) / [About the Journal](https://jurnal.uns.ac.id/GeoEco/about) (<https://jurnal.uns.ac.id/GeoEco/about>) / [Editorial Policies](https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies) (<https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies>)

ISSN

2460-0768 (Print)

2597-6044 (Online)

Editorial Policies

[Focus and Scope](https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#focusAndScope) (<https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#focusAndScope>)

[Section Policies](https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#SectionPolicies) (<https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#SectionPolicies>)

[Peer Review Process](https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#peerReviewProcess) (<https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#peerReviewProcess>)

[Publication Frequency](https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#publicationFrequency) (<https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#publicationFrequency>)

[Open Access Policy](https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#openAccessPolicy) (<https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#openAccessPolicy>)

[Archiving](https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#archiving) (<https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#archiving>)

[About The Journal](https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#custom-0) (<https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#custom-0>)

[Publication Ethics](https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#custom-1) (<https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#custom-1>)

[Copy Right and Permissions](https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#custom-2) (<https://jurnal.uns.ac.id/GeoEco/about/editorialPolicies#custom-2>)

Focus and Scope

The GeoEco Journal is a multidisciplinary journal covering all fields of education and science related to geography, demography and the environment. The purpose of writing this journal are to reveal facts, problems and problem solving that can be used as input for Government, institutions, society and individual.

The subject matter of the journal includes the following and related issues:

1. Geography Education, including classroom action research results, experimental research, development research and survey research related to geography education in elementary, junior high, high school and university
2. Population education, including classroom action research results, experimental research, research development and survey research related to population education in elementary, junior high, high school and university
3. Environmental education, including classroom action research results, experimental research, development research and survey research related to environmental education in elementary, junior high, high school and university
4. The phenomenon of the lithosphere and its interaction with the population
5. The phenomenon of hydrosphere and its interaction with the population
6. The phenomenon of the atmosphere and its interaction with the population
7. The phenomenon of anthroposphere and its interaction with environmental elements

Open Journal Systems
(<http://pkp.sfu.ca/ojs>)

- [Editorial Team](#)
([/GeoEco/about/editori](#))
- [Focus and Scoupe](#)
([/GeoEco/about/editori](#))
- [Section Policies](#)
([/GeoEco/about/editori](#))
- [Peer Review Process](#)
([/GeoEco/about/editori](#))
- [Publication Frequency](#)
([/GeoEco/about/editori](#))
- [Publication Ethics](#)
([/GeoEco/about/editori](#))
- [Online Submissions](#)
([/GeoEco/about/submi](#))
- [Author Guidelines](#)
([/GeoEco/about/submi](#))
- [Reference Tool](#)
(<https://www.mendeley>)
- [Google Scholar](#)
(<https://scholar.google>
[hl=id&user=8tMTa8cA/F7GAgpDpnjDJ0ccSQfy8tcgLsuoLGLIDLfoZ](https://scholar.google.hi=id&user=8tMTa8cA/F7GAgpDpnjDJ0ccSQfy8tcgLsuoLGLIDLfoZ))

00019020

(<http://www.statcounter.co>)

Visitor

Journal Help
([javascript:openHelp\(](#)

Flagcounter

8. Interaction between society, development and implication for sustainable development
9. Sustainable use of land, water, energy and biological resources in development
0. Social and cultural contexts of sustainable development
1. Role of education and public awareness in sustainable development
2. Impacts of population growth and human activity on food and other essential resources for development
3. Sustainable land use, water, energy and biological resources in development
4. Distribution, growth, population composition and demographic-related issues
5. Development and application of sustainability indicators

GeoEco journal welcomes scientific research papers, review papers and discussion papers dealing with environmental sustainability issues from such fields as the biological sciences, agriculture, geology, meteorology, energy, food sciences, soil and water sciences, geography, education.

Section Policies

Articles

- Open Submissions
 Indexed
 Peer Reviewed

Peer Review Process

Section Policies

Research article is written based on scientific research. The article should present the novelty, originality and contribution in developing knowledge. The length of these articles are typically from 5000 to 7000 words including the reference list. This should contain:

- Abstract,
- Introduction,
- Research Methods,
- Results and Discussion, and
- Conclusions.

[Peer Review Process \(jjpte/about/editorialPolicies#peerReviewProcess\)](#)

1. Double blind review, authors do not know reviewers and vice versa.
2. Articles will be reviewed by reviewer(s) who have relevant expertise. Reviewer provide written assessment of the **strengths** and **weaknesses** of written research, with the aim of improving the reporting of research and identifying the most appropriate and highest quality material for the journal.

Publication Frequency

This journal is published one year twice in July and January.

Open Access Policy

This journal provides immediate open access to its content on the principle that making research freely available to the public supports a greater global exchange of knowledge.



User

Username

Password

Remember me

Login

Notifications

- [View](#)
(<https://jurnal.uns.ac.ir>)
- [Subscribe](#)
(<https://jurnal.uns.ac.ir>)

Language

Select Language

English ▼

Submit

Journal Content

Search

Search Scope

All ▼

Search

Browse

- [By Issue](#)
(<https://jurnal.uns.ac.ir>)
- [By Author](#)
(<https://jurnal.uns.ac.ir>)
- [By Title](#)
(<https://jurnal.uns.ac.ir>)
- [Other Journals](#)
(<https://jurnal.uns.ac.ir>)
- [Categories](#)
(<https://jurnal.uns.ac.ir>)

Information

Archiving

This journal utilizes the LOCKSS system to create a distributed archiving system among participating libraries and permits those libraries to create permanent archives of the journal for purposes of preservation and restoration. [More...](http://www.lockss.org/) (<http://www.lockss.org/>).

About The Journal

The GeoEco Journal is a multidisciplinary journal covering all fields of education and science related to geography, demography and the environment. The purpose of writing this journal are to reveal facts, problems and problem solving that can be used as input for Government, institutions, society and individual. GeoEco published one year twice in July and January.

Publication Ethics

Plagiarism Checker

The article that can be reviewed by editor board after completing the attachment of plagiarism checker and stated that article at least 80% is origin. The following are the tools of checker:

1. [Plagiarisma](http://www.plagiarisma.net/) (<http://www.plagiarisma.net/>)
2. Duplicity-Checker
3. [Turnitin](http://turnitin.com/) (<http://turnitin.com/>)
4. [Plagiarism Checker](http://www.plagiarismchecker.com/) (<http://www.plagiarismchecker.com/>)
5. Other tools of plagiarism

Ethical Guideline for Journal Publication

The publication of an article in a peer-reviewed is an essential building block in the development of a coherent and respected network of knowledge. It is a direct reflection of the quality of the work of the authors and the institutions that support them. Peer-reviewed articles support and embody the scientific method. It is therefore important to agree upon standards of expected ethical behaviour for all parties involved in the act of publishing: the author, the journal editor, the peer reviewer, the publisher and the society.

Master of population education and environment Faculty of Teacher Training and Education Sebelas Maret University as publisher of GeoEco takes its duties of guardianship over all stages of publishing seriously and we recognize our ethical and other responsibilities. We are committed to ensuring that advertising, reprint or other commercial revenue has no impact or influence on editorial decisions.

Publication decisions

The editor of the GeoEco is responsible for deciding which of the articles submitted to the journal should be published. The validation of the work in question and its importance to researchers and readers must always drive such decisions. The editors may be guided by the policies of the journal's editorial board and constrained by such legal requirements as shall then be in force regarding libel, copyright infringement and plagiarism. The editors may confer with other editors or reviewers in making this decision.

Fair play

An editor at any time evaluate manuscripts for their intellectual content without regard to race, gender, sexual orientation, religious belief, ethnic origin, citizenship, or political philosophy of the authors.

Confidentiality

The editor and any editorial staff must not disclose any information about a submitted manuscript to anyone other than the corresponding author, reviewers, potential reviewers, other editorial advisers, and the publisher, as appropriate.

Disclosure and conflicts of interest

- [For Readers](https://jurnal.uns.ac.id) (<https://jurnal.uns.ac.id>)
- [For Authors](https://jurnal.uns.ac.id) (<https://jurnal.uns.ac.id>)
- [For Librarians](https://jurnal.uns.ac.id) (<https://jurnal.uns.ac.id>)

Unpublished materials disclosed in a submitted manuscript must not be used in an editor's own research without the express written consent of the author.

Duties of Reviewers

Contribution to Editorial Decisions

Peer review assists the editor in making editorial decisions and through the editorial communications with the author may also assist the author in improving the paper.

Promptness

Any selected referee who feels unqualified to review the research reported in a manuscript or knows that its prompt review will be impossible should notify the editor and excuse himself from the review process.

Confidentiality

Any manuscripts received for review must be treated as confidential documents. They must not be shown to or discussed with others except as authorized by the editor.

Standards of Objectivity

Reviews should be conducted objectively. Personal criticism of the author is inappropriate. Referees should express their views clearly with supporting arguments.

Acknowledgement of Sources

Reviewers should identify relevant published work that has not been cited by the authors. Any statement that an observation, derivation, or argument had been previously reported should be accompanied by the relevant citation. A reviewer should also call to the editor's attention any substantial similarity or overlap between the manuscript under consideration and any other published paper of which they have personal knowledge.

Disclosure and Conflict of Interest

Privileged information or ideas obtained through peer review must be kept confidential and not used for personal advantage. Reviewers should not consider manuscripts in which they have conflicts of interest resulting from competitive, collaborative, or other relationships or connections with any of the authors, companies, or institutions connected to the papers.

Duties of Authors

Reporting standards

Authors of reports of original research should present an accurate account of the work performed as well as an objective discussion of its significance. Underlying data should be represented accurately in the paper. A paper should contain sufficient detail and references to permit others to replicate the work. Fraudulent or knowingly inaccurate statements constitute unethical behaviour and are unacceptable.

Originality and Plagiarism

The authors should ensure that they have written entirely original works, and if the authors have used the work and/or words of others that this has been appropriately cited or quoted.

Multiple, Redundant or Concurrent Publication

An author should not in general publish manuscripts describing essentially the same research in more than one journal or primary publication. Submitting the same manuscript to more than one journal concurrently constitutes unethical publishing behaviour and is unacceptable.

Acknowledgement of Sources

Proper acknowledgment of the work of others must always be given. Authors should cite publications that have been influential in determining the nature of the reported work.

Authorship of the Paper

Authorship should be limited to those who have made a significant contribution to the conception, design, execution, or interpretation of the reported study. All those who have made significant

contributions should be listed as co-authors. Where there are others who have participated in certain substantive aspects of the research project, they should be acknowledged or listed as contributors. The corresponding author should ensure that all appropriate co-authors and no inappropriate co-authors are included on the paper, and that all co-authors have seen and approved the final version of the paper and have agreed to its submission for publication.

Disclosure and Conflicts of Interest

All authors should disclose in their manuscript any financial or other substantive conflict of interest that might be construed to influence the results or interpretation of their manuscript. All sources of financial support for the project should be disclosed.

Fundamental errors in published works

When an author discovers a significant error or inaccuracy in his/her own published work, it is the author's obligation to promptly notify the journal editor or publisher and cooperate with the editor to retract or correct the paper.

Copy Right and Permissions

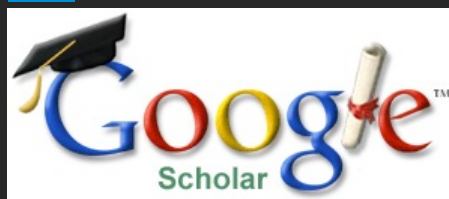
GeoEco suggests that the authors retain the copyright of their works. It also encourages the publication of the work in any other format by the author or other interested parties.

GeoEco, however, requests that the latest version of the publication cites the initial published version in GeoEco



Copyright © 2017 [Universitas Sebelas](#) [Maret](#) [Alamat](#)

Jalan Ir. Sutami 36 A, Surakarta, 57126
(0271) 638959



This work is licensed under a [Creative Commons Attribution 4.0 International License](#).



GEOECO

S2 PKLH UNS

TERAKREDITASI SINTA 5

SK Dirjen Penguatan Riset dan Pengembangan
KEMENRISTEK DIKTI No. 21/E/KPT/2018

[Home \(https://jurnal.uns.ac.id/GeoEco/index\)/](https://jurnal.uns.ac.id/GeoEco/index/) [About the Journal \(https://jurnal.uns.ac.id/GeoEco/about\)/](https://jurnal.uns.ac.id/GeoEco/about/)
[Editorial Team \(https://jurnal.uns.ac.id/GeoEco/about/editorialTeam\)](https://jurnal.uns.ac.id/GeoEco/about/editorialTeam)

ISSN

2460-0768 (Print)

2597-6044 (Online)

[Open Journal Systems \(http://pkp.sfu.ca/ojs/\)](http://pkp.sfu.ca/ojs/)

- [Editorial Team \(/GeoEco/about/edito](#)
- [Focus and Scoupe \(/GeoEco/about/edito](#)
- [Section Policies \(/GeoEco/about/edito](#)
- [Peer Review Process \(/GeoEco/about/edito](#)
- [Publication Frequency \(/GeoEco/about/edito](#)
- [Publication Ethics \(/GeoEco/about/edito](#)
- [Online Submissions \(/GeoEco/about/subr](#)
- [Author Guidelines \(/GeoEco/about/subr](#)
- [Reference Tool \(https://www.mendel](https://www.mendel)
- [Google Scholar \(https://scholar.goog](https://scholar.goog)

00019018
(<http://www.statcounter.c>

Visitor

[Journal Help \(javascript:openHel](#)

Editorial Team

Editorial In Chief

» [Chatarina Muryani](#)
([javascript:openRTWindow\('https://jurnal.uns.ac.id/GeoEco/about/editorialTeamBio/1980/'\)](https://jurnal.uns.ac.id/GeoEco/about/editorialTeamBio/1980/)), S2
PKLH FKIP Universitas Sebelas Maret, Indonesia

Member of Editor

» [Sarwono Sarwono](#)
([javascript:openRTWindow\('https://jurnal.uns.ac.id/GeoEco/about/editorialTeamBio/5562/'\)](https://jurnal.uns.ac.id/GeoEco/about/editorialTeamBio/5562/)),
Universitas Sebelas Maret, Surakarta, Indonesia, Indonesia

» [Yasin Yusup](#)
([javascript:openRTWindow\('https://jurnal.uns.ac.id/GeoEco/about/editorialTeamBio/5564/'\)](https://jurnal.uns.ac.id/GeoEco/about/editorialTeamBio/5564/)),
Universitas Sebelas Maret, Indonesia

» [Enok Maryani](#)
([javascript:openRTWindow\('https://jurnal.uns.ac.id/GeoEco/about/editorialTeamBio/7976/'\)](https://jurnal.uns.ac.id/GeoEco/about/editorialTeamBio/7976/)),
Departement of Geography Education UPI Bandung, Indonesia

Editorial Board

» [Ahmad Ahmad](#)
([javascript:openRTWindow\('https://jurnal.uns.ac.id/GeoEco/about/editorialTeamBio/6640/'\)](https://jurnal.uns.ac.id/GeoEco/about/editorialTeamBio/6640/)),
Universitas Sebelas Maret (UNS), Indonesia



GEOECO

S2 PKLH UNS

TERAKREDITASI SINTA 5

SK Dirjen Penguatan Riset dan Pengembangan
KEMENRISTEK DIKTI No. 21/E/KPT/2018

[Home](https://jurnal.uns.ac.id/GeoEco/index/) / [About the Journal](https://jurnal.uns.ac.id/GeoEco/about/) / [People](https://jurnal.uns.ac.id/GeoEco/about/displayMembership/628)

ISSN

2460-0768 (Print)

2597-6044 (Online)

People

Reviewer

Sugeng Utaya ([javascript:openRTWindow\('https://jurnal.uns.ac.id/GeoEco/about/editorialTeamBio/7970'\)](https://jurnal.uns.ac.id/GeoEco/about/editorialTeamBio/7970)),
Departement of Geography Universitas Negeri Malang, Indonesia

Dewi Liesnoor Setyowati ([javascript:openRTWindow\('https://jurnal.uns.ac.id/GeoEco/about/editorialTeamBio/7974'\)](https://jurnal.uns.ac.id/GeoEco/about/editorialTeamBio/7974)), FIS-P.IPS UNNES,
Indonesia

Open Journal Systems
(<http://pkp.sfu.ca/ojs/>)

- **Editorial Team** ([/GeoEco/about/editorial](https://jurnal.uns.ac.id/GeoEco/about/editorial))
- **Focus and Scoupe** ([/GeoEco/about/editorial](https://jurnal.uns.ac.id/GeoEco/about/editorial))
- **Section Policies** ([/GeoEco/about/editorial](https://jurnal.uns.ac.id/GeoEco/about/editorial))
- **Peer Review Process** ([/GeoEco/about/editorial](https://jurnal.uns.ac.id/GeoEco/about/editorial))
- **Publication Frequency** ([/GeoEco/about/editorial](https://jurnal.uns.ac.id/GeoEco/about/editorial))
- **Publication Ethics** ([/GeoEco/about/editorial](https://jurnal.uns.ac.id/GeoEco/about/editorial) 1)
- **Online Submissions** ([/GeoEco/about/submiss](https://jurnal.uns.ac.id/GeoEco/about/submiss))
- **Author Guidelines** ([/GeoEco/about/submiss](https://jurnal.uns.ac.id/GeoEco/about/submiss))
- **Reference Tool** (<https://www.mendeley.c>)
- **Google Scholar** (<https://scholar.google.c>
[hl=id&user=8tMTa8cAAf](https://scholar.google.c)
[F7GAgpDpnjDJ0ccSQyf](https://scholar.google.c)
[fy8tcgLsuoLGLIDLfoZBI](https://scholar.google.c))

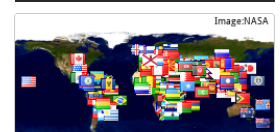
00019019

(<http://www.statcounter.com>)

Visitor

Journal Help
([javascript:openHelp\('h](https://jurnal.uns.ac.id/GeoEco/help))

Flagcounter



2,092,499 views

<https://s09.flagcounter.com/>

User



GEOECO

S2 PKLH UNS

TERAKREDITASI SINTA 5

SK Dirjen Penguatan Riset dan Pengembangan
KEMENRISTEK DIKTI No. 21/E/KPT/2018

[Home](https://jurnal.uns.ac.id/GeoEco/index/) / [About the Journal](https://jurnal.uns.ac.id/GeoEco/about/) / [Journal Contact](#) (<https://jurnal.uns.ac.id/GeoEco/about/contact>)

Journal Contact

Mailing Address

Prodi S2 PKLH
Ged.G Pascasarjana FKIP
Universitas Sebelas Maret
Jalan Ir. Sutami Nomor 36A
Kentingan, Surakarta 57126

Site

<https://www.google.co.id/maps/place/Pasca+Sarjana+UNS/@-7.5571631,110.8562097,19z/data=!4m2!1m1!1s0x2e7a1702bf2da7f3:0x40a3656cf0f9cf618m2!3d-7.557082!4d110.856671?hl=id>

Map:

Principal Contact

Chatarina Muryani

Editor In Chief
Universitas Sebelas Maret
Prodi S2 PKLH
Ged.G FKIP
Universitas Sebelas Maret
Jalan Ir. Sutami Nomor 36A
Kentingan, Surakarta 57126

Phone: 081548537609

Email: chatarinamuryani@staff.uns.ac.id

<mailto:%63%68%61%74%61%72%69%6e%61%6d%75%72%79%61%6e%69%73%74%61%66%66%75%6e%73%61%63%69%64>

Support Contact

GeoEco

Phone: 08122857297

Email: geoeco@fkip.uns.ac.id

<mailto:%67%65%6f%65%63%6f%66%6b%69%70%75%6e%73%61%63%69%64>

ISSN

2460-0768 (Print)

2597-6044 (Online)

Open Journal Systems

[\(http://pkp.sfu.ca/ojs/\)](http://pkp.sfu.ca/ojs/)

Editorial Team

<http://GeoEco/about/editorial>

Focus and Scope

<http://GeoEco/about/editorial>

Section Policies

<http://GeoEco/about/editorial>

Peer Review Process

<http://GeoEco/about/editorial>

Publication Frequency

<http://GeoEco/about/editorial>

Publication Ethics

<http://GeoEco/about/editorial>

<http://GeoEco/about/editorial>

<http://GeoEco/about/editorial>

<http://GeoEco/about/editorial>

Online Submissions

<http://GeoEco/about/submiss>

Author Guidelines

<http://GeoEco/about/submiss>

Reference Tool

<https://www.mendeley.com>

Google Scholar

<https://scholar.google.com>

<https://scholar.google.com/hl=id&user=8tMTa8cAAJF7GAgpDpnjDJ0ccSQyfFy8tcgl.suoLGLIDLfoZBI>

<https://scholar.google.com/hl=id&user=8tMTa8cAAJF7GAgpDpnjDJ0ccSQyfFy8tcgl.suoLGLIDLfoZBI>

00019017

<http://www.statcounter.com>

Visitor

<http://www.statcounter.com>

Journal Help

[\(javascript:openHelp\('h](#)

Flagcounter



2,092,499 views

<https://s09.flagcounter.com>

User



GEOECO

S2 PKLH UNS

TERAKREDITASI SINTA 5

SK Dirjen Penguatan Riset dan Pengembangan
KEMENRISTEK DIKTI No. 21/E/KPT/2018

[Home](https://jurnal.uns.ac.id/GeoEco/index/) / [Archives](https://jurnal.uns.ac.id/GeoEco/issue/archive/) / [Vol 5, No 1 \(2019\)](#)

ISSN

2460-0768 (Print)

2597-6044 (Online)

Vol 5, No 1 (2019)

GeoEco Journal January 2019

This GeoEco Journal Volume 5 No 1 January 2019 contains 10 Scientific Articles themed geography, earth, disaster, population, environment both in the fields of education and pure science.

Table of Contents

Articles

Open Journal Systems
(<http://pkp.sfu.ca/ojs>)

- [Editorial Team](#) ([/GeoEco/about/editori](#))
- [Focus and Scoupe](#) ([/GeoEco/about/editori](#))
- [Section Policies](#) ([/GeoEco/about/editori](#))
- [Peer Review](#)

MODEL OF TOURISM DEVELOPMENT OF TUGU KHATULISTIWA BASED ON WATERFRONT CITY WITH LEADING AND CO-ORDINATING APPROACH IN PONTIANAK CITY
(<https://jurnal.uns.ac.id/GeoEco/article/view/25150>)

Dony Andrasgoro

[PDF](#) (<https://jurnal.uns.ac.id/GeoEco/article/view/25150/pdf>)
1-15
[Ethics](#)
[/editori](#)

DISPARITY OF IMPLEMENTATION OF REGIONAL CULTURE AS CHARACTER EDUCATION IMPLEMENTATION IN CITY WORTH CHILDREN
(<https://jurnal.uns.ac.id/GeoEco/article/view/23926>)

Siti Supeni, Dian Esti Nurati, Faula Sufa Ferry

[Submissions](#) ([/GeoEco/about/submi](#))
• [Author Guidelines](#) ([/GeoEco/about/submi](#))
• [Reference Tool](#) (<https://www.mendeley>)
• [Google Scholar](#)

ANALYSIS OF INTER-REGENCY DEVELOPMENT INEQUALITY IN D.I YOGYAKARTA PROVINCE
(<https://jurnal.uns.ac.id/GeoEco/article/view/27296>)

seno budhi ajar

[PDF](#) (<https://jurnal.uns.ac.id/GeoEco/article/view/27296/pdf>)
23-34
[google](#)
[Ta8cA](#)
[0ccSQ](#)
[IDLfoZ](#)
[nter.co](#)

THE RELATIONSHIP BETWEEN GIVING MOTIVATION BY TEACHERS TOWARD STUDENT LEARNING OUTCOME IN GEOGRAPHIC LESSONS
(<https://jurnal.uns.ac.id/GeoEco/article/view/27270>)

[PDF](#) (<https://jurnal.uns.ac.id/GeoEco/article/view/27270/pdf>)
35-42
[Journal Help](#)
([javascript:openHelp\(](#)

Flagcounter

IN CLASS XI IPS SANGGAU REGENCY

[\(https://jurnal.uns.ac.id/GeoEco/article/view/27270\)](https://jurnal.uns.ac.id/GeoEco/article/view/27270)

Wiwik Cahyaningrum, Novita Sariyani, Sri Rahayu



THE ABUNDANCE, DIVERSITY, AND THE DENSITY OF MOLLUSKS IN TUTUWOTO MANGROVE AREA OF ANGGREK DISTRICT, NORTH GORONTALO REGENCY, GORONTALO, INDONESIA

[\(https://jurnal.uns.ac.id/GeoEco/article/view/28652/pdf\)](https://jurnal.uns.ac.id/GeoEco/article/view/28652/pdf)

43-54

[\(https://jurnal.uns.ac.id/GeoEco/article/view/28652\)](https://jurnal.uns.ac.id/GeoEco/article/view/28652)

dewi wahyuni baderan, Marini Susanti Hamidun, Farid S M

ANALYSIS OF THE POTENTIAL AND SUITABILITY TOURISM AREAS AS A DIRECTION FOR TOURISM DEVELOPMENT IN WANA WISATA CURUG CIPENDOK BANYUMAS REGENCY 2018

[\(https://jurnal.uns.ac.id/GeoEco/article/view/27986/pdf\)](https://jurnal.uns.ac.id/GeoEco/article/view/27986/pdf)

55-65

[\(https://jurnal.uns.ac.id/GeoEco/article/view/27986\)](https://jurnal.uns.ac.id/GeoEco/article/view/27986)

Gati Parameswari, Chatarina Muryani, Djoko Subandriyo

LOCATIONAL STUDY OF JUNIOR HIGH SCHOOL AND MADRASAH TSANAWIYAH USING GEOGRAPHY INFORMATION SYSTEM (GIS) AT CEPOGO SUBDISTRICT BOYOLALI DISTRICT IN 2016

[\(https://jurnal.uns.ac.id/GeoEco/article/view/28914/pdf\)](https://jurnal.uns.ac.id/GeoEco/article/view/28914/pdf)

66-72

[\(https://jurnal.uns.ac.id/GeoEco/article/view/28914\)](https://jurnal.uns.ac.id/GeoEco/article/view/28914)

MS Khabibur Rahman, Jumadi Jumadi

ANALYSIS THE DISTRIBUTION AND POTENTIAL OF TOURISM OBJECT IN NGARGOYOSO DISTRICT, KARANGANYAR REGENCY

[\(https://jurnal.uns.ac.id/GeoEco/article/view/26662/pdf\)](https://jurnal.uns.ac.id/GeoEco/article/view/26662/pdf)

73-81

[\(https://jurnal.uns.ac.id/GeoEco/article/view/26662\)](https://jurnal.uns.ac.id/GeoEco/article/view/26662)

Chatarina Muryani, Sigit Santoso, Singgih Prihadi

Login

Notifications

- [Subscribe](#)

Language

Search Scope PDF

All

Search

Browse

- [By Issue](#) [\(https://jurnal.uns.ac.id\)](https://jurnal.uns.ac.id)
- [By Author](#) [\(https://jurnal.uns.ac.id\)](https://jurnal.uns.ac.id)
- [By Title](#) [\(https://jurnal.uns.ac.id\)](https://jurnal.uns.ac.id)
- [Other Journals](#) [\(https://jurnal.uns.ac.id\)](https://jurnal.uns.ac.id)
- [Categories](#) [\(https://jurnal.uns.ac.id\)](https://jurnal.uns.ac.id)

Information

- [For Readers](https://jurnal.uns.ac.id)
(<https://jurnal.uns.ac.id>)
- [For Authors](https://jurnal.uns.ac.id)
(<https://jurnal.uns.ac.id>)
- [For Librarians](https://jurnal.uns.ac.id)
(<https://jurnal.uns.ac.id>)



Copyright © 2017 [Universitas Sebelas](#) [Maret](#)

Alamat
Jalan Ir. Sutami 36 A, Surakarta, 57126
(0271) 638959



This work is licensed under a [Creative Commons Attribution 4.0 International License](#).



[Home \(https://jurnal.uns.ac.id/GeoEco/index\)](https://jurnal.uns.ac.id/GeoEco/index) > [Vol 5, No 1 \(2019\) \(https://jurnal.uns.ac.id/GeoEco/issue/view/2148\)](https://jurnal.uns.ac.id/GeoEco/issue/view/2148)
> [baderan \(https://jurnal.uns.ac.id/GeoEco/article/view/28652/0\)](https://jurnal.uns.ac.id/GeoEco/article/view/28652/0)

ISSN

2460-0768 (Print)

2597-6044 (Online)

THE ABUNDANCE, DIVERSITY, AND THE DENSITY OF MOLLUSKS IN TUTUWOTO MANGROVE AREA OF ANGGREK DISTRICT, NORTH GORONTALO REGENCY, GORONTALO, INDONESIA

dewi wahyuni baderan, Marini Susanti Hamidun, Farid S M

Abstract

The aim of the current study is to calculate the value of the abundance, diversity, and the density of phyla mollusks in the Tutuwoto mangrove area of Anggrek District. The survey method is used in this study as a method, which means that it collects the data directly at the research area. The observations were carried out under mangrove stands. The area of the observation plot is 5m x 5m. Phylum mollusks collected at the study site were counted by the number of individuals, abundance, diversity, and density of the types of each species. Sanon-Wiener formula is used to calculate the species diversity, Brower formula is used to calculate the density, and Odum formula is used to calculate the abundance of the species. The findings show that it is found that the reasearch about phylum mollusks in Tutuwoto mangrove area consisted of 6 (six) types namely *Terebralia sulcata*, *Terebralia palustris*, *Nerita articulate*, *Hexaplex trunculus*, *Anadara granosa*, and *Mactra grandis*. Based on the calculation of the abundance, diversity, and density of the mollusks phylum at the research site, there are several types that have the highest value. In the gastropod class, *Nerita articulata* has the highest score with an abundance of 30.41%, diversity of 0.36, and density of 0.17 ind / m², followed by *Terebralia sulcata* with an abundance of 28.07%, diversity 0.36, and density of 0.16 ind / m². However, the lowest is owned by *Terebralia palustris* with an abundance value of 17.54%, diversity of 0.31, and density of 0.10 ind / m². The values of abundance, diversity, and density in the bivalve class have different values. The type of *Anadara granosa* has an abundance value of 53.06%, diversity of 0.34, and density of 0.08 ind / m² while *Mactra grandis* has an abundance value of 46.94%, diversity of 0.36, and density of 0.07 ind / m². Based on the predetermined criteria of the Gastropod class, it has the abundance in many categories, exceptional of *Terebralia palustris* which has sufficient criteria.

Keywords

Mangrove, Mollusks, Tutuwoto

Full Text:

[PDF \(https://jurnal.uns.ac.id/GeoEco/article/view/28652/pdf\)](https://jurnal.uns.ac.id/GeoEco/article/view/28652/pdf)

References

Arbi, U.Y. (2008). The Mollusk in the Mangrove Ecosystem in Tambak Wedi, Madura Strait, Surabaya, East Java. *Oseanologi and Limnologi in Indonesia* 34(3): 411-425.

Open Journal Systems
(<http://pkp.sfu.ca/ojs>)

- [Editorial Team](#)
([/GeoEco/about/ editori](#))
- [Focus and Scoupe](#)
([/GeoEco/about/ editori](#))
- [Section Policies](#)
([/GeoEco/about/ editori](#))
- [Peer Review Process](#)
([/GeoEco/about/ editori](#))
- [Publication Frequency](#)
([/GeoEco/about/ editori](#))
- [Publication Ethics](#)
([/GeoEco/about/ editori](#))
- [Online Submissions](#)
([/GeoEco/about/ submi](#))
- [Author Guidelines](#)
([/GeoEco/about/ submi](#))
- [Reference Tool](#)
(<https://www.mendeley>)
- [Google Scholar](#)
(<https://scholar.google>
[hl=id&user=8tMTa8cA](https://scholar.google)
[F7GAgpDpnjDJ0ccSQ](https://scholar.google)
[fy8tcgLsuoLGLIDLfoZ](https://scholar.google))

00019015

<http://www.statcounter.co>

Visitor

Journal Help
([javascript:openHelp\(](#)

Flagcounter

Bengen DG. (2001). The Introduction to Technical Guidelines and Mangrove Ecosystem Management. Bogor. The Center of Coastal and Ocean Resources Studies, Bogor Agricultural Institute, Bogor.

Brower, J.E., Jerrold H.Z., Car I.N.V.E. (1990). Field and laboratory methods for general ecology. third edition. Wm.C.Brown Publisher, USA, New York.

Dali, Rifal, (2018). The litter productivity and food chain models in Tutuwoto Mangrove Area of Anggrek District, North Gorontalo Regency. Thesis. Postgraduate Program of Population and Living Environment, Universitas Negeri Gorontalo.

Fitriyani, F., Yunasfi, & Desrita. (2016). The Production and Decomposition of Mangrove Leaves of *Rhizophora stylosa* in Pulau Sembilan Village of Pangkalan Susu District, Langkat Regency of North Sumatera. North Sumatera. Retrieved: <http://Users/Notebook/Downloads/15186-36364-1-SM.pdf>.

Intan, Afrijal., T. Irvina, N. (2012). The Abundance of *Anadara granosa* in the Coastal water of Tanjung Balai, Asahan North Sumatra. *Journal of Fisheries and Marine Sciences Faculty*, Vo.1. No.1.Hal. 1-10.

KPH North Gorontalo. (2010). Mangrove Forest of North Gorontalo. Gorontalo

Latifah. A. 2011. The Morphology Characteristic of *Anadara granosa*. IPB. Bogor

Lisna, Malik Adam, Toknok Bau. 2017. The Potential Vegetation of Mangrove Forests in the Coastal Areas in Khatulistiwa Village of South Tinombo District, Parigi Moutong Regency. *Forestry Faculty, Tadulako University*. Central Sulawesi

Macintosh, DJ., Ashton, E.C. dan Havanon, S. (2002). Mangrove rehabilitation and intertidal biodiversity: A study in the Ranong Mangrove Ecosystem, Thailand. *Estuarine, Coastal and Shelf Science*

Michael, P. (1995). *Ecology method for the Field Investigation and Laboratory*. Indonesia University Press. Jakarta.

Nontji. A. (2006). *No Life on Earth without the Presence of the Plankton*. LIPI. Jakarta

Odum, Eugene P. (1996). *Basic Ecology*. 3rd Edition. Yogyakarta. Gajah Mada University Press. Interpreter: Samingan. Tjahjono.

Sari, K.W., Yunasfi dan Suryanti, A. (2017). The Litter Decomposition of Mangrove Leaf *Rhizophora apiculata* in Bagan Asahan Village, Tanjungbalai District, Asahan Regency, North Sumatera Province. *Acta Aquatica*, 4(2): 88-94.

Wahyuni, Indria., Sari, Indah Juwita., Ekanara, Bambang. (2017). Biodiversitas Mollusca (Gastropoda Dan Bivalvia) as a Bio-Indicator of water quality in the coastal area of Tuna Island, Banten. *Biology Education Program, FKIP, Untirta*. *Biodidaktika*, Volume 12 No 2.

DOI: <http://dx.doi.org/10.20961/ge.v5i1.28652> (<http://dx.doi.org/10.20961/ge.v5i1.28652>)

Article Metrics

Abstract view : 0 times

PDF - 0 times

Tweet

Refbacs

- There are currently no refbacs.



2,092,499 views 177 FLAG counter
(<https://s09.flagcounter.com>)

User

Username

Password

Remember me

Login

Notifications

- [View](#)
(<https://jurnal.uns.ac.id>)
- [Subscribe](#)
(<https://jurnal.uns.ac.id>)

Language

Select Language

English ▼

Submit

Journal Content

Search

Search Scope

All ▼

Search

Browse

- [By Issue](#)
(<https://jurnal.uns.ac.id>)
- [By Author](#)
(<https://jurnal.uns.ac.id>)
- [By Title](#)
(<https://jurnal.uns.ac.id>)
- [Other Journals](#)
(<https://jurnal.uns.ac.id>)
- [Categories](#)
(<https://jurnal.uns.ac.id>)

Information

**THE ABUNDANCE, DIVERSITY, AND THE DENSITY OF MOLLUSKS IN
TUTUWOTO MANGROVE AREA OF ANGGREK DISTRICT, NORTH
GORONTALO REGENCY, GORONTALO, INDONESIA**

Dewi Wahyuni K. Baderan¹, Marini Susanti Hamidun², Farid S M³

^{1,2,3} Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Negeri
Gorontalo, Jl. Jendral Sudirman No. 6 Gorontalo City 96128, Gorontalo Province, Indonesia.
Tel./Fax. +0435-821752
e-mail: dewi.baderan@ung.ac.id

ABSTRACT

The aim of the current study is to calculate the value of the abundance, diversity, and the density of phyla mollusks in the Tutuwoto mangrove area of Anggrek District. The survey method is used in this study as a method, which means that it collects the data directly at the research area. The observations were carried out under mangrove stands. The area of the observation plot is 5m x 5m. Phylum mollusks collected at the study site were counted by the number of individuals, abundance, diversity, and density of the types of each species. Sanon-Wiener formula is used to calculate the species diversity, Brower formula is used to calculate the density, and Odum formula is used to calculate the abundance of the species. The findings show that it is found that the reasearch about phylum mollusks in Tutuwoto mangrove area consisted of 6 (six) types namely *Terebralia sulcata*, *Terebralia palustris*, *Nerita articulate*, *Hexaplex trunculus*, *Anadara granosa*, and *Mactra grandis*. Based on the calculation of the abundance, diversity, and density of the mollusks phylum at the research site, there are several types that have the highest value. In the gastropod class, *Nerita articulata* has the highest score with an abundance of 30.41%, diversity of 0.36, and density of 0.17 ind / m², followed by *Terebralia sulcata* with an abundance of 28.07%, diversity 0.36, and density of 0.16 ind / m². However, the lowest is owned by *Terebralia palustris* with an abundance value of 17.54%, diversity of 0.31, and density of 0.10 ind / m². The values of abundance, diversity, and density in the bivalve class have different values. The type of *Anadara granosa* has an abundance value of 53.06%, diversity of 0.34, and density of 0.08 ind / m² while *Mactra grandis* has an abundance value of 46.94%, diversity of 0.36, and density of 0.07 ind / m². Based on the predetermined criteria of the Gastropod class, it has the abundance in many categories, exceptional of *Terebralia palustris* which has sufficient criteria.

Keywords: *Mangrove, Mollusks, Tutuwoto*

A. INTRODUCTION

Mangroves are categorized as the types of plants that are often found on muddy coasts and river estuaries. The mangrove ecosystem is a tropical coastal vegetation community consisting of several species that develop and are able to grow in

muddy coastal tidal areas (Bengen, 2001). Lisna et al., (2017) states that mangrove ecosystems are the main ecosystems supporting life that are important in coastal and marine areas. Therefore, it can be concluded that the mangrove ecosystem is a coastal ecosystem that consists of a group

of endemic coastal species that function as supporters of coastal life.

Moreover, mangrove forests are one of the natural ecosystems that have high ecological value. The ecological functions of mangrove ecosystems include protecting the coast from wind attacks, currents, and waves from the sea, habitats (living quarters), feeding ground, nursery, and enlargement, and spawning ground for aquatic biota including, shrimp, crabs, fish and shellfish (mollusks). The animals belonging to the phylum of mollusks are one of the non-fish biological resources that have high diversity. Some mollusks animals can live on land, fresh waters, and marine waters. Mollusks associate with the mangrove ecosystem as a habitat for the living, sheltering, spawning and also as a food supply area that supports the growth of these mollusks. According to Odum (1996), mollusks play a role as a food chain detritus feeder in the nutrient cycle because mollusks are located as early decomposers that work by chopping mangrove leaves into small parts and then being followed by smaller organisms namely microorganisms so that its presence is very influential in the food chain. The existence and abundance of mollusks in the mangrove ecosystem is largely determined by mangrove vegetation. The composition and diversity of mollusks are influenced by the local

environment such as food availability, predation, and competition. In addition, the pressure and changes in the environment can affect the number of types and differences in structure (Sari *et al*, 2012).

Mangrove forests often get stress due to irresponsible management that will cause the pressure that can lead to changes in the ecosystem, both affecting the physical, chemical, and biological conditions of the mangrove forest itself. The damage to the mangrove ecosystem occurs because of the influence of two factors, namely natural and human factors. The natural factors that cause mangrove damage are the occurrence of storms, global warming and the rise of sea level. Moreover, the damage caused by human factors includes the existence of irresponsible logging, uncontrolled land conversion and the use of unsynchronized coastal areas between one region and etc.

The forests of mangrove in Tutuwoto Village of Anggrek District, North Gorontalo Regency are located along the coast with an area of 11 hectares (KPH North Gorontalo, 2010). The mangrove area of Tutuwoto has experienced a reduction in area, the local community uses mangrove areas as residential and agricultural areas, and uses mangrove wood as a material for making houses and livestock pens.

The lower understanding of the community about mangrove forests that are used to fulfill their needs by themselves, enable interdependence to overuse the actions that have a detrimental effect resulting in habitat degradation without regard to sustainability and considerable benefits for ecosystem productivity. These activities will affect the decreasing density of mangroves which results in less leaf litter production and reduced decomposition process as the supply of energy sources for living resources inside, especially mangrove crabs, mollusks, shrimp and fish that feed in the mangrove ecosystem. The changes caused by human activities such as increased logging of mangrove forests can cause a decrease in the quantitative value of

mangrove forests. A study that aims to determine the value of diversity, abundance and density of mollusks needs to be done. So that the role of mangrove forests as a supporter and provider of services for the survival of the fauna inside is maintained.

B. MATERIALS AND METHODS

The current research was carried out in the Tutuwoto mangrove area of Angrek District, North Gorontalo Regency, Gorontalo Province. It was also conducted for 3 (three) months, starting from April-June 2018. The timeline of the current research included the preparation of the research proposal, data collection, data analysis of the research to the report of research results.

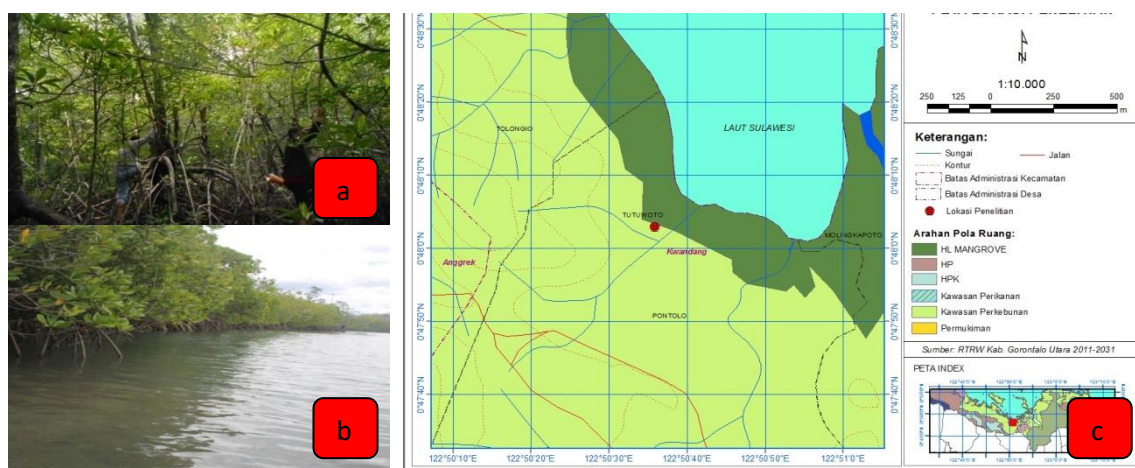


Figure 1. The research site, (fig. a) The condition of the mangrove, (fig. b) the outermost condition of mangrove, (fig. c) the administrative map of the research site.

A survey is used as a method in this study, which is a method of collecting data directly at the research site. The aquatic

fauna belonging to the phyla of mollusks is done by direct observation. The observation is carried out under mangrove stands. The

area of the observation is 5m x 5m. The fauna found in the next observation plot is counted the number of individuals and is recorded in the observation book. Furthermore, the aquatic fauna collected at the research site is calculated by the number of individuals, abundance, diversity, and density of each species.

The calculation of the species diversity uses a Sannon-wiener formula:

$$H' = -\sum Pi \ln Pi \quad \text{where } pi = (ni/N)$$

Where:

- H' = The Diversity Index
- ni = Σ The individual of each species
- N = Σ the total individual of all species

Criteria : Odum, 1996

- H' < 1 = Low diversity
- 1 < H' < 3 = Medium diversity
- H' > 3 = High diversity

The calculation of the density uses Brower et al., 1990 formula:

$$D = \frac{Ni}{A} \times 100\%$$

Where:

- D = Biota density (ind/m²)
- Ni = The number of individuals
- A = the plot of the observation area (m²)

By obtaining the D value, it can be made the classification of each species by referring to the following dominance criteria (Jorgensen):

Criteria:

- D > 5%, Dominant category
- D = 2-5%, sub-dominant

D < 5%, non-dominant category

The abundance of each species is calculated using Odum formula (1996), as follows:

K

$$= \frac{\text{the number of the individual species } i}{\text{the number of all individuals of the species}} \times 100\%$$

By taking the criteria of the abundance by Michael, (1995) as follows:

- 0 = none
- 1-10 = less
- 11-20 = enough
- >20 = many

C. RESULTS AND DISCUSSION

Results

Macintosh et al (2002) stated that mollusks are the organism that has an important role in ecological functions in the mangrove ecosystems, namely as bio-indicators in aquatic ecosystems. The group mollusks mangrove as part of the mangrove forest ecosystem has an important role which directly or indirectly supports the ecological functions of the mangrove forests.

Based on the research results about mollusks, it is found that there are six (6) types of mollusks found in the Tutuwoto mangrove area namely *Terebralia sulcata*, *Terebralia palustris*, *Nerita articulate*, *Hexaplex trunculus*, *Anadara granosa*, and *Mactra grandis*. The classification of each species can be seen in the table 1 below, moreover, the morfology form is presented in the Figure 2.

Table 1. The Classification of Mollusks Phylum Found in Tutuwoto Mangrove Area

PHYLUM	CLASS	ORDO	FAMILY	GENUS	SPECIES
Mollusks	Gastropods	Caenogastropoda	Potamididae	Terebralia	<i>Terebralia sulcata</i>
					<i>Terebralia palustris</i>
		Neritimorpha	Neritidae	Nerita	<i>Nerita articulata</i>
		Hypsogastropoda	Huricidae	Hexaplex	<i>Hexaplex trunculus</i>
	Bivalves	Arcoida	Arcidae	Anadara	<i>Anadara granosa</i>
		Veneroidae	Mactridae	Mactra	<i>Mactra grandis</i>



Figure 2. The Morphology Form of Mollusk Phylum Found in the Research site (a)*Anadara granosa*, (b)*Mactra grandis*, (c)*Terebralia sulcata*, (d)*Hexaplex trunculus*, (e)*Nerita articulate* (f)*Terebralia palustris*

The Abundance (K) Mollusk Phylum

The abundance is the number of the individuals in the particular site in a

community. The index value of the abundance at the research site is presented in Figure 3.

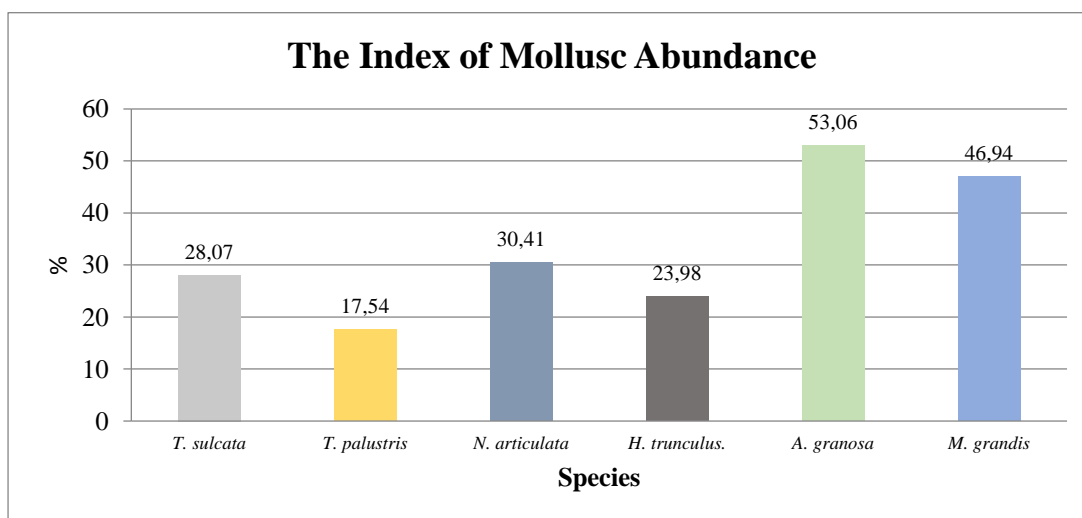


Figure 3. The Abundance Index of Mollusk at the Research Site

The highest index of abundance is owned by *Anadara granosa* with a value of 53.06%. The type of *Anadara granosa* (blood clams) is found in the study sites because it is associated with muddy substrate conditions. Latifah (2011) emphasizes that blood clams are non-fauna, which is alive by immersing themselves under the surface of the mud. The blood clams are more commonly found in areas farther away from river estuaries because river estuaries are the sites most affected by pollutants and fisheries that can exploit shellfish excessively (Intan *et al*, 2012). This condition is in line with the conditions at the research site whose substrate has characteristics that are muddy and far from

the river mouth. Therefore, this type dominates the area.

The Diversit (H') Mollusk Phylum

The diversity is the total number of species in a particular area or it is also interpreted as the number of species contained in an area between the total number of individuals of the species present in a community. Wahyuni *et all*, (2017) states that a community has high diversity if all species have relatively the same or almost the same abundance, besides, there is no large dominance so that the diversity value in the study location reflects each species that spread relatively in equal numbers. The diversity index at the research site is presented in Figure 4

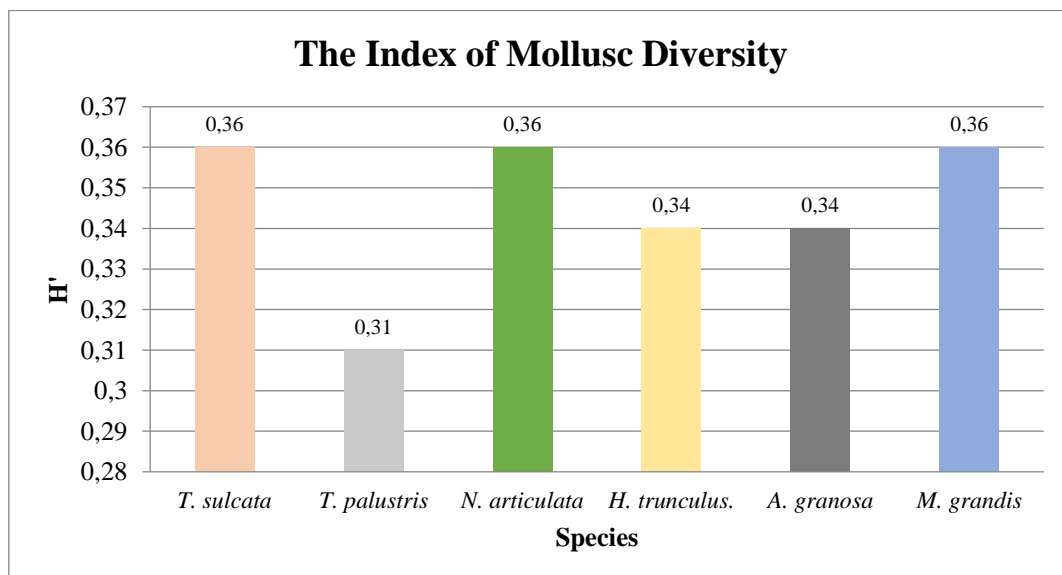


Figure 4. The index of Mollusk Diversity at the Research Site

The results of the calculation of Shannon winner diversity about the total index of mollusk diversity in the study

location are 2.07. This shows that the spread of individual numbers per species and community instability is classified as

moderate. The diversity in research locations in dominance by species *Terebralia sulcata*, *Nerita articulate* and *Anadara granosa* with the diversity value (H') 0.36. These three types dominate the area because they are related to habitat, and the way of life of each type. *Nerita articulate* and *Terebralia sulcata* types generally live in groups and are often found attached to the roots, stems, leaves, rocks and wood weathering. This is in line with the statement by Nontji A. (2006), he explains that *Nerita articulate* species is generally found in the groups with diverse populations. This community can be found in the *supralitoral* area with the characteristic of sticking, both in the roots, stems and leaves of the vegetation that

grows in the area as a form of migration due to the high sea level. The foraging activities in this species are active at night and when the condition of the water is not in tidal wave conditions because of its nature as a scavenger. On the other hand, *Mactra grandis* breeds and lives in areas that have muddy sand substrates.

The Density (D) Mollusk Phylum

The density results of the Mollusk phylum calculation at the location of the study show that there are several types that have the highest value. *Anadara granosa* type has the highest value of 53.1% and followed by *Mactra grandis* of 46.0%. The density index of mollusk at the research site is presented in Figure 5.

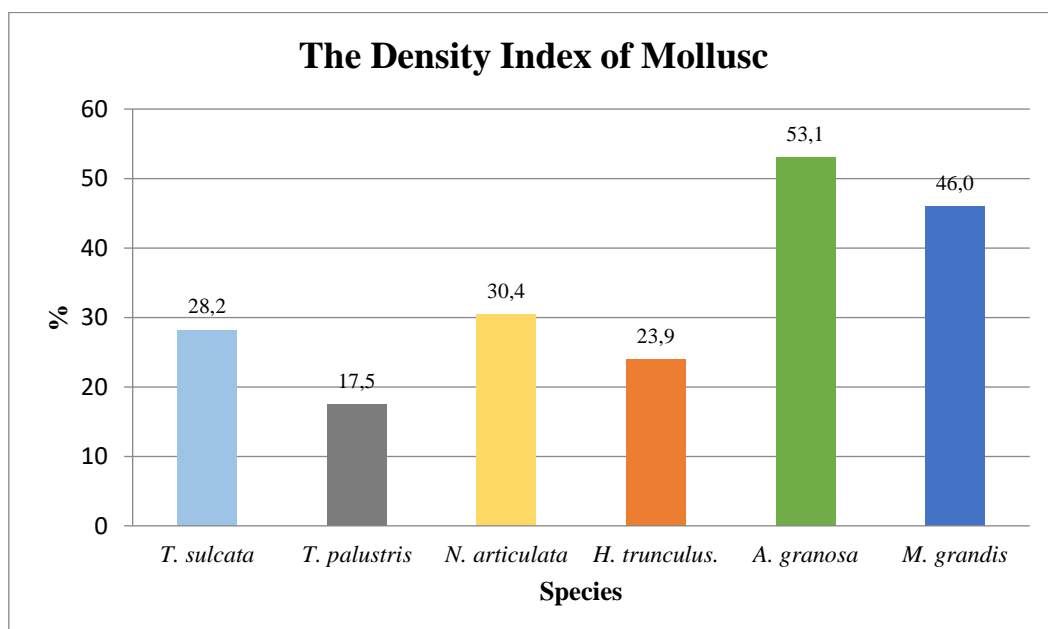


Figure 5. The Density Index of Mollusk at the Research Site

Both types are included in the bivalve class. The height of these two types is

related to the place and way of life. The blood clams of *Anadara granosa* and

mactra grandis grow well in calm waters, especially in muddy bays that are 46-76 cm or thicker. The high value is thought to be related to the substrate where they live and look for food and also their tolerance to the extreme environment. This can be seen in Bivalve life preferences in sandy mud or mud habitat in the form of gathering and spreading (Intan, et al., 2014).

The Environmental Parameters at the Research Site

The environmental factors have a very important role in supporting the mollusks life. Based on the measurement of environmental factors at the research location, the environmental temperature results are ranged from 27-28°C, generally mollusks are able to adapt to varying temperatures, that is from 0 °C to 48.6 °C and is active at a temperature range of 5 °C - 38 °C (Wahyuni et al, 2017). For the details, the results of measuring environmental parameters are presented in Table 2.

Table 2. The results of measuring environmental parameters at the research site

Week	Environmental factor					
	Temperature (°C)	Humidity (%)	Soil ph	Dissolved oxygen (mg/l)	Water temperature (°C)	Salinity (ppt)
I	27	75	6,6	2,24	28,32	23,76
II	28	68	6,6	2,22	28,42	24,17
III	27	74	6,6	2,23	28,23	23,54
IV	28	73	6,6	2,24	28,33	23,42

The observations of salinity at the study site are still quite normal in supporting the life of Mollusks, which ranged from 23.42 - 24.17 ‰ because of the range of normal salinity values for mollusk life, which is ranged from 5 ‰ - 75 ‰. Most Mollusk like the pH value around 7.0 - 8.5 and the pH at the research location is at 6.6. Dissolved oxygen ranges from 2.22-2.24, water temperature 28.23-28.42°C. Humidity ranges from 68-75%,

Discussion

The animals that live on the bottom of the water are *macrozoobenthos*. *Macrozoobenthos* is one of the most important groups in aquatic ecosystems due to its role as a key organism in the food web. Furthermore, the level of diversity found in the aquatic environment can be used as an indicator of pollution. Fitriyani et al., (2016) emphasizes that *macrozoobenthos* is included in the initial decomposer which plays a role in chopping

the remnants of leaves that are reissued into feces then followed by bacteria or fungi that convert organic matter into protein and carbohydrates. The organic material is the most important contribution of mangrove forests to the ecosystem through litter avalanches that fall into the forest floor. The litter will be utilized by *macrozoobenthos* as an energy source and will be broken down again by micro-fauna into nutrients that help mangrove growth.

Mollusks are categorized as one organism that has an important role in the ecological function of the mangrove ecosystem. As for those belonging to the Mollusk group is phylum *makrozoobenthos* namely gastropod and bivalve which can be used as bio-indicators in aquatic ecosystems (Macintosh et al, 2002). Mollusks found at the research site are *Terebralia sulcata*, *Terebralia palustris*, *Nerita articulate*, *Hexaplex trunculus*, *Anadara granosa*, and *Macra grandis*. The group of mangrove mollusk as part of the mangrove forest ecosystem has an important role that directly or indirectly supports the ecological functions of mangrove forests. Some mollusk species such as members of the Potamididae, Neritidae, and Carithidae are species that make mangroves their habitat (Arbi, 2008).

Moreover, mollusks have the ability to adapt well to the mangrove environment,

survived by crawling and attaching the body to the substrate. Mollusks also have good body resistance and shell adaptation, so they are able to survive compared to other classes (Dali, 2018). Based on the calculation of the value of abundance, diversity, and density of aquatic fauna in the mollusk class in the study location are in the dominance of the species *Nerita articulate* (gastropod) and *Anadara granosa* (Pelecypoda). Both of these types dominate the area because they are related to habitat and the way of life of each type. *Nerita articulate* types generally live in groups and are often found sticking to the roots, stems, leaves, rocks and wood weathering. This is in line with the statement of Nontji A. (2006) who explains that *Nerita articulate* species are generally found in groups with diverse populations. In the *supralitoral* area, this community can be found with the characteristic of sticking, both in the roots, stems, and leaves of the vegetation that grows in the area as a form of migration due to the high sea level. The foraging activities in this species are active at night and the condition of the water is not in tidal conditions because of its nature as a scavenger.

In relation to maintain its survival, living things interact with the environment and tend to choose the best environmental conditions and habitat types to continue to

grow and reproduce. The factors that influence the growth of shellfish are the season, temperature, salinity, substrate, food, and other water chemical factors that vary in each region. Measurement of physical-chemical parameters can describe the quality of the environment at a certain time. Besides, biological indicator measurements can monitor continuously and are easy instructions to monitor the occurrence of pollution. The physical-chemical factors of the waters in the study location are still below the threshold and are still within tolerance for the conditions of life and development of mollusks. Therefore, the diversity of mollusks in the research location can also be influenced by the physical-chemical factors of the waters.

D. CONCLUSION

As a conclusion related to the study conducted in Tutuwoto mangrove area of Anggrek district, North Gorontalo, it can be concluded that:

1. The abundance index of mollusks in Tutuwoto mangrove area in Anggrek Subdistrict, North Gorontalo District, shows different values for each species. The highest abundance index value is owned by *Anadara granosa* species with a value of 53.06%, *Mactra grandis* species with a value of 46.94%,

Nerita articulata species with a value of 30.41%, *Terebralia sulcata* species with a value of 28.07%, *Hexaplex trunculus* species with a value of 23.98% and the lowest owned by *Terebralia palustris* species with a value of 17.54%.

2. The value of diversity index of mollusks in the Tutuwoto mangrove area of Anggrek District, North Gorontalo Regency shows that the spread of individual numbers per species and community instability is classified as in the moderate level. The diversity value index of *Terebralia sulcata*, *Nerita articulata* and *Mactra grandis* species has the same value namely $H' = 0.36$, *Hexaplex trunculus* and *Anadara granosa* species have $H' = 0.34$, and *Terebralia palustris* species has a value of $H' = 0.31$.
3. The index of the density value of mollusks in the Tutuwoto mangrove area of Anggrek District, North Gorontalo Regency, shows different values for each species. The highest density index is owned by *Anadara granosa* species with a value of 53.1%, *Mactra grandis* species with a value of 46.0%, *Nerita articulate* species with a value of 30.4%, *Terebralia sulcata* species with a

value of 28.2%, *Hexaplex trunculus* species with a value of 23.9% and the lowest owned by *Terebralia palustris* species with a value of 17.5%.

E. REFERENCES

- Arbi, U.Y. (2008). The Mollusk in the Mangrove Ecosystem in Tambak Wedi, Madura Strait, Surabaya, East Java. *Oceanologi and Limnologi in Indonesia* 34(3): 411-425.
- Bengen DG. (2001). The Introduction to Technical Guidelines and Mangrove Ecosystem Management. Bogor. The Center of Coastal and Ocean Resources Studies, Bogor Agricultural Institute, Bogor.
- Brower, J.E., Jerrold H.Z., Car I.N.V.E. (1990). Field and laboratory methods for general ecology. third edition. Wm.C.Brown Publisher, USA, New York.
- Dali, Rifal, (2018). The litter productivity and food chain models in Tutuwoto Mangrove Area of Anggrek District, North Gorontalo Regency. Thesis. Postgraduate Program of Population and Living Environment, Universitas Negeri Gorontalo.
- Fitriyani, F., Yunasfi, & Desrita. (2016). The Production and Decomposition of Mangrove Leaves of *Rhizophora stylosa* in Pulau Sembilan Village of Pangkalan Susu District, Langkat Regency of North Sumatera. North Sumatera. Retrieved: <http://Users/Notebook/Downloads/15186-36364-1-SM.pdf>.
- Intan, Afrijal., T. Irvina, N. (2012). The Abundance of *Anadara granosa* in the Coastal water of Tanjung Balai, Asahan North Sumatra. *Journal of Fisheries and Marine Sciences Faculty*, Vo.1. No.1.Hal. 1-10.
- KPH North Gorontalo. (2010). Mangrove Forest of North Gorontalo. Gorontalo
- Latifah. A. 2011. The Morphology Characteristic of *Anadara granosa*. IPB. Bogor
- Lisna, Malik Adam, Toknok Bau. 2017. The Potential Vegetation of Mangrove Forests in the Coastal Areas in Khatulistiwa Village of South Tinombo District, Parigi Moutong Regency. Forestry Faculty, Tadulako University. Central Sulawesi
- Macintosh, DJ., Ashton, E.C. dan Havanon, S. (2002). Mangrove rehabilitation and intertidal biodiversity: A study in the Ranong Mangrove Ecosystem, Thailand. *Estuarine, Coastal and Shelf Science*
- Michael, P. (1995). Ecology method for the Field Investigation and Laboratory. Indonesia University Press. Jakarta.
- Nontji. A. (2006). No Life on Earth without the Presence of the Plankton. LIPI. Jakarta
- Odum, Eugene P. (1996). Basic Ecology. 3rd Edition. Yogyakarta. Gadjah Mada University Press. Interpreter: Samingan. Tjahjono.
- Sari, K.W., Yunasfi dan Suryanti, A. (2017). The Litter Decomposition of Mangrove Leaf *Rhizophora*

apiculata in Bagan Asahan Village, Tanjungbalai District, Asahan Regency, North Sumatera Province. *Acta Aquatica*, 4(2): 88-94.

Wahyuni, Indria., Sari, Indah Juwita., Ekanara, Bambang. (2017). Biodiversitas Mollusca (Gastropoda Dan Bivalvia) as a Bio-Indicator of

water quality in the coastal area of Tuna Island, Banten. Biology Education Program, FKIP, Untirta. *Biodidaktika*, Volume 12 No 2.