

Conservation threats of *Pemphis acidula* in the Tomini Bay area, Gorontalo, Indonesia

by Dewi W.k. Baderan

Submission date: 25-Mar-2023 12:34AM (UTC-0400)

Submission ID: 2046038780

File name: eran_2022_IOP_Conf._Ser._Earth_Environ._Sci._976_012058-2-7.pdf (384.83K)

Word count: 3261

Character count: 17140

Conservation threats of *Pemphis acidula* in the Tomini Bay area, Gorontalo, Indonesia

D W K Baderan¹, Y Retnowati and R Utina²

¹ Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Negeri Gorontalo. Jl. Prof.B.J. Habibie, Tilongkabila, Bone Bolango 96583, Gorontalo, Indonesia. Tel./fax.: +62-435-821752

² Coastal Ecology Based Local Wisdom Research Center, Department of Biology, Universitas Negeri Gorontalo Gorontalo, Indonesia.

*Corresponding author e-mail: dewi.baderan@ung.ac.id

Abstract. *Pemphis acidula* is a wild plant in coastal and mangrove ecosystems. This plant is in great demand by ornamental plant collectors because of its unique wood texture. Massive exploitation causes more of these species reduction. The coastal areas of Olele, Dulanga, and Biluhu in the Tomini Bay of Gorontalo are the habitat of *Pemphis acidula*. The purpose of this study is to reveal the form of threat to *Pemphis acidula* in Tomini Bay. The results showed two forms of threats, namely (1) theft by residents from outside the area to be traded as ornamental plants, and (2) the use of herbal medicines, traditional ceremonies, and building materials by residents. The study also revealed that some residents believe the stems of *Pemphis acidula* have magical powers. The use of this plant is not comparable to its slow growth, other than being included in the category of least concern. However, this plant has a very high selling value of up to hundreds of millions of rupiah. Therefore, it is important to do conservation for the management of the Tomini Bay ecosystem to prevent the decline in the biodiversity of *Pemphis acidula*.

Keywords: Conservation threats, exploitation, *Pemphis acidula*.

1 Introduction

Gorontalo province, geographically, bordered by Tomini Bay. Along the southern coastal of Gorontalo is the beach area with geographical condition. Beaches like Olele, Dulanga, and Biluhu shows various geographical condition with diverse plant species. Biluhu Beach has a soil structure which is dominantly sandy and 117 plant species are found well distributed as its response towards the environment [1]. The soil structure in the coastal area of Olele beach comprises the sandy-corals as well as coral hills with 82 kinds of plants. On the other hand, Dulanga Beach has a rocky structure, steep rocky-cliffs, and 56 types of plant are found there [2]. This shows that the distribution of diversity numbers and the diversity types of plants in each location is determined by their interaction with the geographical condition and physicochemical factors of the environment. In other words, the biodiversity is affected by the adaptation of the species towards the geographical characters of the environment.

The environment characteristics of Olele, Dulanga, and Biluhu beaches show the diversity in the level of ecosystem, species, and, also presumably, in the level of genetics. This assumption is strengthened by the findings on a plant type which is similar in those three beach ecosystem. *Pemphis acidula* is known by the people of Gorontalo as Wolihedu plant which was found in three location of Tomini Bay's area.



Content from this work may be used under the terms of the Creative Commons Attribution 3.0 licence. Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.

Published under licence by IOP Publishing Ltd

Pemphis acidula is a herbaceous plant, with 4-10 meters height and irregular branching and tortuous stems. The color of the peel of the branch is dark brown to grey and the surface is scaly. *P. acidula* has been used by many people such as sold as decorative plant in the form of bonsai with highly expensive price, and as traditional medical plant. Although there is a thorough decrease in its population. In several places, this species is considered as the least concern category instead of threatened. According to Ellison *et al.* [3], *P. acidula* is listed as the less-overseen species. This condition is assumed to affect the thorough decrease of *P. acidula* in several places including Gorontalo. Thus, this study aims to probe whether the use of *P. acidula* plant in the coastal area of Tomini Bay becomes a threat towards the conservational attempt of *P. acidula*.

2 Study Sites and Methods

2.1 Research Location

This research was conducted in three locations of Tomini Bay of Gorontalo, i.e. Biluhu, Dulanga, and Olele Beach. The research location is delivered in Figure 1.

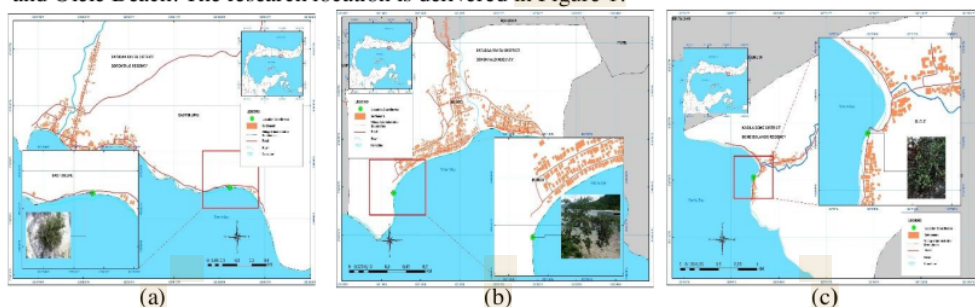


Figure 1. Location mapping of the growth habitat of *Pemphis acidula* (a) Biluhu Beach; (b) Dulanga Beach; (c) Olele Beach.

2.2 Data Types and Resource

The primary data is from the people living in the area of Biluhu, Dulanga, and Olele Beaches. The referred data contains information about the potentials of use, theft, local community knowledge, and threats to sustainability of *P. acidula*. The secondary data is from the review and research results in the form of potentials and the use of *P. acidula* plant.

2.3 Data Collection Technique

The data were collected by employing several techniques, i.e. observation, interview, and documentation. The total sample of the informants was obtained by using *non probability* sampling technique that is snowball sampling. The informants were the community living around the area of Biluhu, Dulanga, and Olele Beaches. The initial identification towards the people who were qualified for giving information in this research is including some of them in the Tourism Awareness Group (POKDARWIS) in each research location thus perceived as the key informants. Further, the key informants identified the other ones who were perceived as another expert informant including several public figures such as traditional and religious figures. After that, the expert informants identified other people who can give information. Data collection was finished after several interviewed informants had given sufficient information, consisting of 10 informants in each location so that the total of the informants is 30.

2.4 Data Analysis Technique

The data of interview result were analyzed by using descriptive method. The data analyzed were obtained from the summary of informants' answers related to the issues asked. The data were recapitulated in a table to simplify the data analysis. The referred data analysis result is in the form of

description on the symptoms which occurred and are relevant to the facts in the field, as well as its relevance to the problems and aims of this research. The researcher also attempts to analyze and interpret the meaning behind the data.

3 Results and Discussion

3.1 General Description of the Research Location

3.1.1 Biluhu Beach

Biluhu beach is located in Batuda Sub-District, Beach of Gorontalo District, Gorontalo Province. It is precisely located on the coordinate of 0°29'34.08 North Latitude and 122°57'80 East Longitude. Administratively, the northern part of East Biluhu Beach is bordered by Barakati Village. While the eastern side of the beach is bordered by Kayu Bulan Village, the southern part is bordered by Tomini Bay, and the western part is bordered by Tontayuo Village. The area of Biluhu beach is 52.074 Km² [4].

Biluhu Beach is a beach with wonderful natural beauty so that it attracts many visitors for the sake of tourism purpose. Biluhu Beach with its natural beauty has gradually conducted some improvements such as providing comfortable shelters and also good access to the best road to reach this tourism place [3]. Biluhu Beach provides various ecological functions as well as environmental services. Besides the tourism destination, it is also a farming area, tidal, the coconut and fruit plantation which become the main professions of local community.

3.1.2 Dulanga Beach

Dulanga Beach is located in Bongo Village, Batudaa Sub-District, Beach of Gorontalo District. Geographically, Bongo Village is located between 00°30'37.00" North Latitude and 123°01'31,24" East Longitude. Bongo Village is bordered by Tenilo Village in its northern part, Tomini Bay in its southern part, Pohe and Tanjung Pangatiboni villages in its western part [6]. Dulanga Beach is a type of sandy and rocky beach [7].

3.1.3 Olele Beach

The coastal area of Olele beach is located in Olele Village, Kabila Sub-District, Bone Bolango District, Gorontalo Province. This area has been legally appointed as the Regional Marine Conservation Area (KKLD) as the area with community-based protected sea. The potentials of coral reefs in Olele Beach becomes one of appealing tourism aspect for the tourists to visit this place and having a snorkeling or other kinds of marine activities (Mahale et al., 2018). Based on the topographic data, the conservation area of Olele beach is located at an altitude of 1-3 meters ASL. There is only small parts of it which has an altitude which is more-less 50-70 meters ASL. KKLD of Olele Beach is located in a position 0°24'51"-0°24'23" North Latitude and 123°09'11 East Longitude and the area is 24,910 hectare. Administratively, Olele Village is bordered by Suwawa Village in its north, Tolotio in its east, Tomini bay in its south, and Olohuta Village in its west. Olele Beach is mostly a big sea marine area and only its small parts are used as settlement.

Olele Sea Park is known to have a well-preserved-authentic natural marine biota. Located in the area of Tomini Bay makes Olele Beach granted with sloping beach with underwater beauty. Olele Sea Park has immense potentials if seen from its marine biota richness. The coastal area is up on the discussions only by seeing its urgency towards human life. It is undeniable that the sustainability of a coastal area which have considerable economic value will always be threatened [8].

3.2 Types of Threats towards the Sustainability of *Pemphis acidula*

Pemphis acidula is a plant which is associated with mangrove, with high endurance towards the extreme environment, thin soil layers, poor in nutrients, and unique drought. Human activities in using *P. acidula* and theft is such potential threats towards its sustainability and diversity. The theft of *P. acidula* was caused by the community coming from beyond this area and ironically was helped by the local community to be sent to market as decorative plant and bonsai. The local community use this plant as the alternative herbal medicine, traditional ceremony, home construction, and the source of magic as a

group of people believe that the stem of *P. acidula* has magical appeal. This activity impacts to the destruction of beach ecosystem.

The role of community is needed to maintain the sustainability of the ecosystem around the coastal area of Tomini Bay. The lack of community's knowledge about the importance of beach ecosystem is one of factors causing the destruction of beach ecosystem particularly the treats on the diversity extinction of *P. acidula*. Until today, the community around the coastal area of Tomini Bay has not been engaged in keeping *P. acidula* from theft activities. This protection activity was only conducted by several people included in a Tourism Awareness Group or also known as POKDARWIS. Several types of threats towards the sustainability of *P. acidula* in the area of Tomini Bay is resumed in Picture 2.

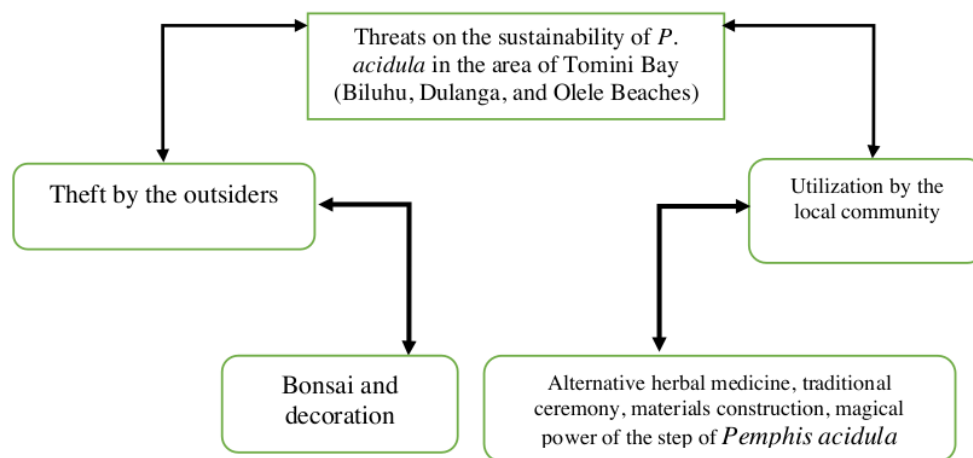


Figure 2. Threats towards the sustainability of *P. acidula*.

3.3 Community's Knowledge about *Pemphis acidula*

According to the interview result in three locations, people who recognized the existence of *P. acidula* which are growing in other location are those who are considered as particular group of people with high education (academician) and the visitors. *Pemphis acidula* is known by the people in Biluhu and Dulanga Beaches as "Wolihedu" and "Ayu Wolihedu" by the people living around Olele Beach. *Pemphis acidula* in the coastal area of East Biluhu is threatened to be extinct due to the innumerable theft by the outsiders which was ironically helped by the locals. Biluhu community has not realized that *Pemphis acidula* has high commercial value, except using it as materials construction or being cultivated as the decorative plants by the local community.

People in Dulanga beach use the roots, stem, and leaves of *Pemphis acidula* for various aims. From generation to generation, this plant is used to cure skin disease such as itching medicine. Historically, there is a traditional annual event known as "modoyango" which was conducted by the former community. This traditional ceremony was not carried out anymore since people are well aware that this kind of activity is violating their religion. It was lastly carried out in 1993. To protect *Pemphis acidula*, a regulation by Bongo village No. 40 Year 2021 was issued concerning the protection of tourism area and become an example for various tourism destinations all over Gorontalo District.

Community around Olele Village believe that *Pemphis acidula* gives many benefits such as mighty drugs, skin medicine, and medicine for stomachache. This plant is kept by the local community as they believe that this plant has magical power. The community among the three locations have not recognized that *Pemphis acidula* or the so-called Wolihedu can be used to make bonsai with high commerciality reaching hundreds million. The information related to *Pemphis acidula* reforming to bonsai and

decoration was acquired from the Tourism Awareness Group in those three location, village head, and local traditional holders.

3.4 Community's Participation in Managing the Area of Tomini Bay

The existence and the sustainability progression of the area of Tomini Beach cannot be separated from the intervention of the Provincial, District, and Village Government. The area is managed by POKDARWIS and the community around the area. The community must take part in keeping and maintaining the area of Tomini Bay. Meanwhile, until this far, there are only few and particular people who really keep *Pemphis acidula* from the threats of theft. Local community perceived that the provincial government has not firmly take action to the theft issues which had happened. The theft issued happened before the regulation from the provincial regulation issued in written form to seriously protect *Pemphis acidula*. Information and socialization received by the people were still considered insufficient as they were not totally understand about the function and advantages of *Pemphis acidula* as the keeper of coastal line from various natural disasters such as tsunami, typhoon, and the tidal wave. As consequence, many people are not totally aware of the existence of *Pemphis acidula*.

3.5 The Potentials of *Pemphis acidula* and the Threats towards its Sustainability in Tomini Bay Area

For the admirers of dwarf plants, *Pemphis acidula* becomes one of plants which can be used as bonsai. Plants characteristics starting from its roots, stem, branches, leaves, unique flowers, and the endurance of the plant and its slow growth makes this plant as the favorite plant among bonsai admirers. Having a high commerciality, *Pemphis acidula* has a strong body, absorbing any poison and toxic of animals. Wood skin of *Pemphis acidula* can be used as skin medicine (itching) and various alternative herbal medicine.

The theft issues of *Pemphis acidula* has been vividly conducted on land (by using car) and sea (by using boat). The interview result revealed that the theft of *Pemphis acidula* in the area of Tomini Bay massively happened in 2000s because at that time, an information is spread that the price of *Pemphis acidula* is high in the plant market as it can be used as bonsai. The theft was committed by the outsiders who were also the visitors of this tourism place. Furthermore, the massive theft which happened in the coastal area of East Biluhu, Dulanga Beach Area, and Olele Beach were not as severe as those happened in East Biluhu.

Although this plant has a potential to grow and quickly produce new roots and shoots—but not for a match—*Pemphis acidula* needs a long time that is 2 years. This is relevant to a research by Manek and Yofris (2020) who stated that Stigi needs a quite long time to grow that is 2 years. It can be stated that *Pemphis acidula* is a plant which is not productive. With its slow growth and its small availability in nature while the high theft rate of *Pemphis acidula* in a year caused the availability of *Pemphis acidula* in the seedling, sapling, and trees level is not comparable with its regeneration speed. This condition makes the availability of *Pemphis acidula* in the area of Tomini Bay area is terribly threatened due to theft activities and the use of *Pemphis acidula* by the community around the Bilulu, Dulanga, and Olele Beach.

4 Conclusion

According to the result of the study and analysis which had been conducted concerning the sustainability threats of *Pemphis acidula* in Tomini Bay Area, it can be concluded in the following that:

1. The types of threats towards the sustainability of *Pemphis acidula* is a kind of theft committed by the outsiders for selling interest as bonsai and decoration, as well as its use by the local community as the alternative herbal medicine, traditional ceremony, house construction, and the belief o a group of people that the step of *Pemphis acidula* has magical power.
2. The sustainability of *Pemphis acidula* is threatened to extinct as the theft and the use of this plant by the community is not comparable with its growth which is slow.

References

- [1] Utina, R, Baderan DWK and Hamudin, MS. 2020. *Biodiversity from the Potential Geosite of Biluhu Beach as the Pioneer of Global and Sustainable Development of Geopark of Gorontalo Province*. Final Report of Professorship's Scientific Development. State University of Gorontalo
- [2] Baderan DWK, and Melisnawati A. 2019. *Index Measurement of Biodiversity from a Geosite of Gorontalo Province (A Pioneer of Gorontalo Geopark)*. A Final Report of the Provincial Bappeda of Gorontalo.
- [3] Ellison, J., Koedam, N.E., Wang, Y., Primavera, J., Jin Eong, O., Wan-Hong Yong, J. and Ngoc Nam, V. 2010. *Phempis acidula*. The IUCN Red List of Threatened Species. Version 2014.
- [4] Statistics of Gorontalo District 2019 Gorontalo Province in Numbers (Indonesia Statistics)
- [5] Baderan DWK and Ramli U. 2021. *Flora and Fauna Biodiversity of East Biluhu Beach (An Ecological-Environmental Review of Beach)* (Deepublish Publication Group CV. Budi Utomo)
- [6] Rahayu, Titin U, Rijal AS, and Ivan T 2020 *J Sci. Info. Geography* **3**(1) 1-9
- [7] Yapanto, Lis M and Hendra A 2019 *Community Participation towards the Development of Dulanga Beach Tourism of Bongo Village, Batudaa Sub-District Beach of Gorontalo District, Gorontalo Province*. A collaborative research among the lecturers and students (Gorontalo: UNG)
- [8] Mahale, Moch. Machtino A. Mandagi, Stephanus V and Lasut Markus T 2018 *J Aquatic Sci. Manag.* **6**(2) 39-44

Conservation threats of Pemphis acidula in the Tomini Bay area, Gorontalo, Indonesia

ORIGINALITY REPORT

8%

SIMILARITY INDEX

5%

INTERNET SOURCES

6%

PUBLICATIONS

2%

STUDENT PAPERS

PRIMARY SOURCES

1	Yaoguo Wu, Mengying Yi, Bo Zhou, Zhiyuan Liang, Ran Sun, Sihai Hu, Qian Guo, zhaohui Meng, Erfan ye. "Batch and column tests study on coexistence of TNT and aniline enhancing their Transports in Chinese loess", Research Square Platform LLC, 2022 Publication	2%
2	purehost.bath.ac.uk Internet Source	2%
3	jppipa.unram.ac.id Internet Source	1%
4	repository.lppm.unila.ac.id Internet Source	1%
5	ejurnal.ung.ac.id Internet Source	1%
6	www.hindawi.com Internet Source	<1%
7	repository.upnjatim.ac.id Internet Source	<1%

8

Indra Dewi Sery Yusuf, Tita Rostitawati, Muhammad Obie. "CULTURAL AND NATURAL RESOURCES AS A TOURISM DESTINATION IN GORONTALO REGENCY - INDONESIA: ITS POTENTIALS, PROBLEMS, AND DEVELOPMENT", International Journal of Tourism & Hospitality Reviews, 2020

Publication

<1 %

9

Sitti Suhada, Edi Setiawan, Talib Alamri. "Adobe Flash-Based Multimedia Learning System in Basic Analog and Digital Electronics Subject", Journal of Physics: Conference Series, 2019

Publication

<1 %

Exclude quotes On

Exclude matches Off

Exclude bibliography On

Conservation threats of Pemphis acidula in the Tomini Bay area, Gorontalo, Indonesia

GRADEMARK REPORT

FINAL GRADE

/0

GENERAL COMMENTS

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6