ISSN: 2714-7045

Dominance of Mangroves on The Coast of Samatiga West Aceh Regency

[1]Suryanita, [2]Edwarsyah, [3]Wintah, [4]Munandar, [5]Dewi Fithria

[1]Students of the Master of Fisheries Science Study Program Universitas Teuku Umar, Indonesia
[2,4,5]Master of Fisheries Science Study Program Universitas Teuku Umar, Indonesia
[3]Faculty of Health Sciences, Universitas Teuku Umar, Indonesia
Corresponding author: Wintah, e-mail: wintah@utu.ac.id

Abstract

Mangroves are very important for life on the coast. This vegetation plays a role as biodiversity by protecting the coast and maintaining the habitat of association biota. Coastal waters have various ecosystems that produce a lot of organic substances, one of which is mangroves. The purpose of this study is to determine the level of dominance of mangrove vegetation on the coast of Samatiga, West Aceh. The method of the research is a survey by sampling mangroves by purposive sampling using the square linear transect method. Sampling was carried out at low tide at three stations, each station was divided into three plots with a size of 10 x 10 m2 for the tree level, a plot of 5 x 5 m2 for the sapling level, and a plot of 1x1 m2 for the seedling level. The dominant research results from the tree, sapling, and seedling levels were dominated by Rhizophora apiculata. The highest dominant tree rate was 0.18%, the highest dominant sapling rate was 0.88%, and the highest dominant seedling rate was 0.02%.

Keywords: Dominance; Mangrove; Sapling; Seedling; Tree

Introduction

Mangroves are hardy woody plants, thrive at the dynamic meeting of land and sea, survive extreme conditions such as high salinity, intense tidal fluctuations in sea water, strong winds, high temperatures, and anaerobic soils (Wintah and Kiswanto, 2024). Mangroves are one of the plant communities that grow along the coast, estuaries or estuaries of rivers in the tropics (Mullet et al., 2014).

Mangrove ecosystems provide ecological and economic benefits for coastal communities because they feed fish, crabs, shrimps, birds, and mammals (Wintah et al., 2021). The use of mangroves is divided into two categories: first, based on their overall function: mangroves are used as pond land, agriculture, salt ponds, and tourism; Second, based on its function as the main biotic component for foodstuffs, firewood, medicines, and building materials.

Mangroves play an important role in maintaining the biological integrity and resources of marine ecosystems (Wintah, Kiswanto and Duana, 2022). The use of mangrove ecosystems must consider the sustainability of mangroves and their carrying capacity. Overuse will have a bad impact on mangrove sustainability. The conversion of 430,000 to 980,000 hectares of land around the world has caused damage to mangrove ecosystems. Conservation activities must be carried out to optimize the functions and benefits of

the ecosystem so that exploitation does not occur (Pendleton et al., 2012).

The restoration of mangrove ecosystems is one of the objectives of conservation activities; However, this restoration must be carried out in the right way, such as planting must be carried out taking into account the suitability of the vegetation to the substrate. Good substrate characteristics can determine where mangrove vegetation will grow and develop. Mangrove substrates are sediments originating from rivers or marine carbonate deposits with low levels of salinity and oxygen, with a lot of organic matter, and are always wet (Soerianegara, 1971). Mangrove vegetation can generally grow both in mud substrates, but can also grow in sand and coral substrates (Basyuni, 2014).

One of the coastal areas that is the habitat of the mangrove ecosystem is the coast of Samatiga, West Aceh. According to (Wintah et al., 2023) mangroves in Kuala Bubon, West Aceh there are 6 species, namely: Rhizophora apiculata, Rhizophora mucronata, Rhizophora stylosa, Sonneratia caseolaris, Sonnertatia albaand Avicennia marina. The restoration of coastal areas, especially mangrove ecosystems, needs to be carried out after the tsunami in West Aceh. Before restoring the mangrove ecosystem, it is necessary to carry out an inventory of the most dominant mangroves on the coast of Samatiga, West Aceh.

Methods

The materials used in this study are all trees, stakes, and seedlings contained in the observation path. The tools used in this study include: GPS, compass, measuring tape, mining rope, plastic samples, leaf scissors, digital cameras, a set of stationery.

The method of the research is a survey by sampling mangroves by purposive sampling using the square linear transect method. The vegetation analysis technique is applied to observation paths (stations) with a width of 10 x 10 m2 and a length between stations of 100 m or adjusted to field conditions, which are divided into several sub-plots for the analysis of tree-level vegetation and its youth (seedlings and sapling), as well as other plant life forms (undergrowth, epiphytes, lianas, and palms). The criteria for trees and their youth as well as other plant life forms can be seen in Table 1.

Table 1. Criteria for trees and their youth and other observed plant life forms

Rejuvenation rate and other forms of plants	Criterion
Tree	Tree with a diameter of ≥ 10 cm in height
Sapling	Saplings with a height of ≥ 1.5 m and a diameter of up to < 10 cm
Seedling	Tree saplings from 2 leaves to < 1.5 cm tall
Palm tree	Palm plants with a length/height of > 1.5 m if mature
Bottom plants	Non-woody ground cover plants ranging from 2 leaves to < 1 m in height

The sub-plot sizes for each observed vegetation growth rate are as follows:

1. Sub-plots measuring 1 m × 1 m for the measurement of seedling level rejuvenation and undergrowth (grasses, herbs, terna, shrubs);

2. Sub-plots measuring 5 m × 5 m for measuring the rejuvenation of the stake sapling level;

3. Sub-plots measuring 10 m × 10 m for measuring trees and palms.

Data Analysis

The Type Dominance Index aims to determine the concentration or mastery of a type in an area using the formula (odum, 1971) as follows:

$$C = \sum \left(\frac{ni}{N}\right)_2$$

Information:

C = Dominance index

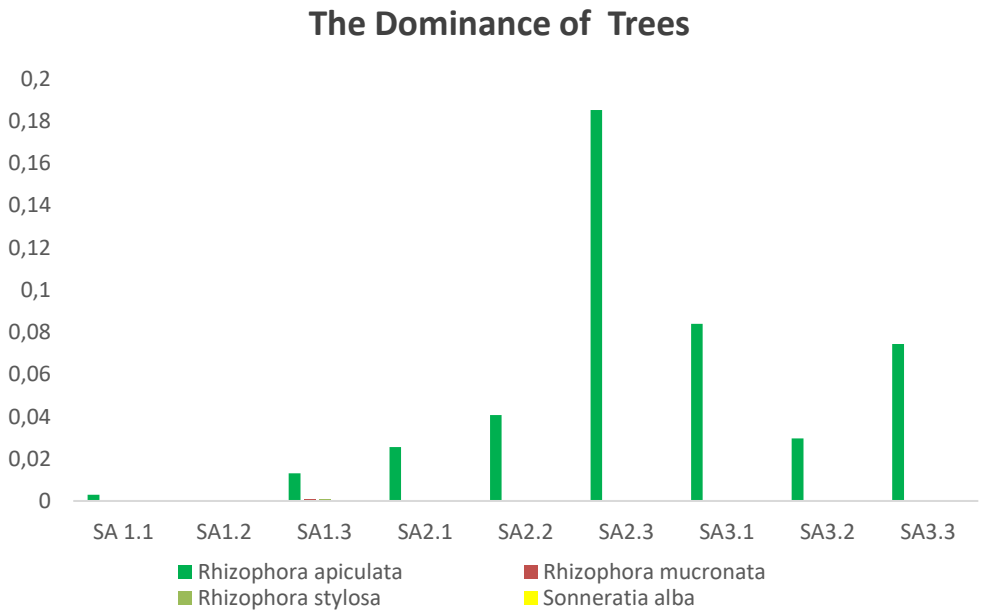
ni = Number of individuals of each type

N = Total number of individuals of all types

If the value of the dominance index is close to 1, then the community is dominated by a certain species or phylum, and if the index is close to 0, then the dominant species or phylum in the community does not exist (Odum, 1971).

Results

The type dominance index aims to determine the concentration or mastery of a species in a location. At the tree level, the concentration of a mangrove species is at Station 2 (SA2.3) (Figure 1).



Firuge 1. Tree-level dominance at each station

The dominance index at the level of concentration of a mangrove species is at Station 1 (SA1.3) (Figure 2).

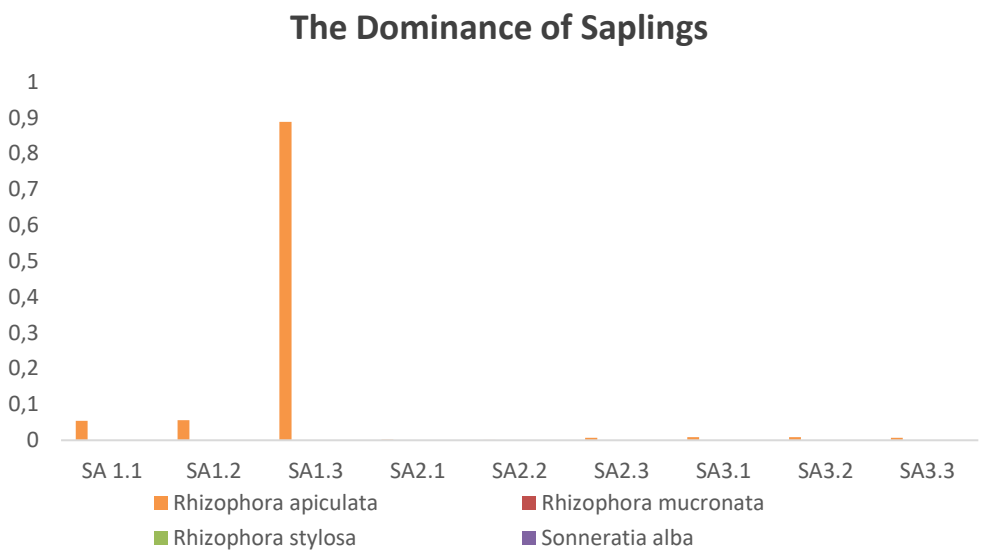


Figure 2. Sapling level dominance at each station

The dominance index at the seedling level of concentration of a mangrove species is at Station 1 (SA1.3) (Figure 3).

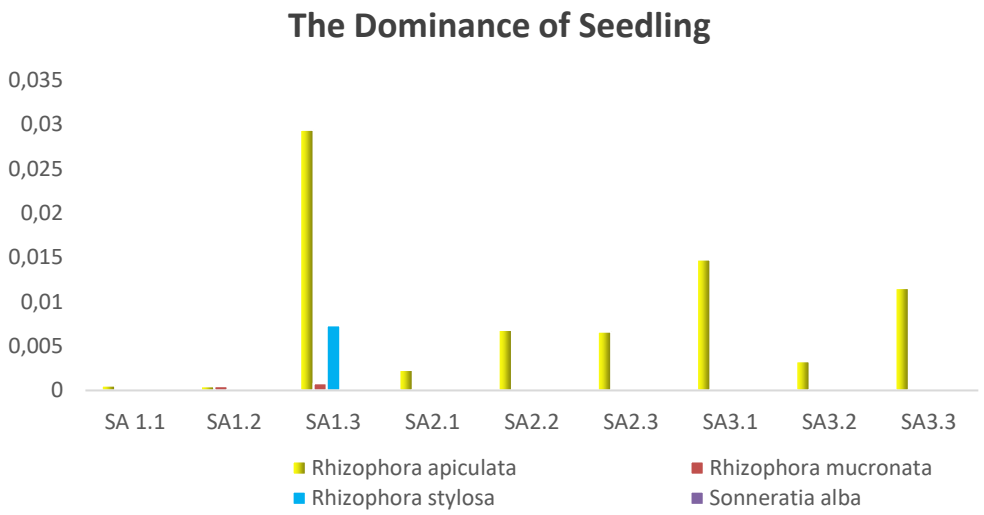


Figure 3. Seedling level dominance at each station

Discussion

Based on the observation results at the research location, the dominant species composition at the highest tree level was dominated at Station 2 (SA2.3) by 0.18% and dominated by species *Rhizophora apiculata*. The mangrove tree stands on the Samatiga Coast have reached the peak of their development. The type of old mangrove community is often dominated by species Rhizophora and Bruguiera whose trees are large and tall (Kusmana, 2000).

Based on the observation results at the research location, the dominant species composition at the highest sapling level is dominated at Station 1 (SA1.3) by 0.88% and dominated by species *Rhizophora apiculata*. The location with the type of community is located in the part of the Samatiga mangrove forest that

is protected from strong waves. At that location, *Rhizophora* The spp can also play a pioneering role (Kusmana 2000).

Based on the observation results at the research site, the dominant species composition at the highest seedling level was dominated at Station 1 (SA1.3) by 0.02% and dominated by species *Rhizophora apiculata*. According to Kusmana (2000), the type of shrub community was formed by pioneer types (*Avicennia* spp. and *Sonneratia* spp.) and on the seashores and the new soft muddy delta. The species that dominate the seedling level are usually no different from the tree and sapling level dominance that are in the same location. At the research site, *Rhizophora apiculata* dominates the seedling level because the vegetation that dominates the tree and sapling level is *Rhizophora apiculata.*

Conclusion

The Samatiga Coastal mangrove forest has low species diversity. A total of 4 species of mangrove trees and their youth, as well as other habitus in the location, were identified, consisting of; *Rhizophora apiculata, Rhizophora mucronata, Rhizophora stylosa, and Sonneratia alba.* The species *Rhizophora apiculata* is a species that dominates tree tops, sapling, and seedlings and is found in almost all observation locations.

Acknowledgment

The author would like to thank all parties who have assisted in the research and the Fisheries Service and Teuku Umar University for the opportunity and time given so that they can carry out research.

References

Basyuni, M. 2014. Guide to the Restoration of Degraded Mangrove Forests. USU Digital Library.

Kusmana, C. 2000. *Mangrove Ecology.* Ecology Laboratory. Faculty of Forestry IPB, Bogor.

Mullet EKC. 2014. Assesment of Mangrove Species and its Relation toSoil Substrate in Malapatan, Sarangani Province, Philippines. Journal of Biodiversity and Environmental Sciences (JBES). Vol. 5(4): 100-107.

Odum, E.P. 1971. *Fundamental of Ecology*. Third Edition, W.B. Saunders Company, Philadelphia.

Pendleton L. 2012. Estimating Global "Blue Carbon" Emissions fromConversion and Degradation of Vegetated Coastal Ecosistems. PLoSONE. Vol. 7(9): 1-7.

Soerianegara I. 1971. Characteristic of mangrove soil of Java. RimbaIndonesia. Vol.15: 141-150.

Wintah *et al.* (2021) 'Distribution pattern of gastropods and physical chemical factors in the Kebumen mangrove forest, Indonesia', *AACL Bioflux*, 14(4), pp. 1855–1864.

Wintah *et al.* (2023) 'Mangrove diversity and its relationships with environmental conditions in Kuala Bubon Village, West Aceh, Indonesia', *Biodiversity*, 24(8), pp. 4599–4605. Available at: https://doi.org/10.13057/biodiv/d240864.

Wintah and Kiswanto (2024) 'Assessing the Structure and Environmental Impact of Mangrove Forests in Segara Anakan, Cilacap, Central Java', *Akta Agrosia*, 27(1), pp. 27–31. Available at: https://doi.org/10.31186/aa.27.1.27-31.

Wintah, Kiswanto and Duana, M. (2022) 'Community Structure of Gastropods in Segara Anakan Cilacap, Central Java', *Journal of Aceh Aquatic Science*, 6(2), pp. 75–83.