NVEO
Natural Volatiles &
Essential Oils

Salinity distribution in the mangrove area of the Sungai Gemuruh, Koto XI Tarusan District, Pesisir Selatan Regency

M Dafikri[1], E Kamal[1*]

[1]*Postgraduate Program, Aquatic, Coastal and Marine Resources, Bung Hatta University*
Jl. Sumatera Ulak Karang Padang, West Sumatera, Indonesia
Corresponding author's e-mail: ekamal898@bunghatta.ac.id

ABSTRACT: Mangroves have a very important role for the ecosystem, because mangroves can prevent sea water intrusion, erosion and coastal abrasion, retain or trap sediment and play a very important role in the lives of coastal communities in managing and utilizing mangroves. The Gemuruh River Mangrove Area is in direct contact with community activities such as fishermen, merchant activities, boat crossing activities and river baths. It is feared that this can affect the quality of the environment and reduce the ecological function of mangroves, so that it is necessary to study the distribution of salinity in the mangrove areas of the roaring river around the community's activities, because salinity is one of the supporting factors for mangrove life. The sampling technique for mangrove species and salinity was carried out by using a purposive random sampling method, where there were 8 sampling points with a distance between points of about 3-5 meters. The results showed 5 types of mangroves, namely *Rhizophora apiculata*, *Rhizophora stylosa*, *Bruguiera cylindrica*, *Nypa fruticans*, *Acrostichum aureum* and a salinity distribution ranging from 13 ppm to 19 ppm. based on these data illustrates the salinity value that still supports mangrove development.

Keyword: Mangrove, Salinity, Spread

1. Introduction

Mangrove is a term for a vegetation community in a coastal area, where the community is composed of plant species that can live in tidal ranges and are in an intermediate area between land and sea [1]. Mangroves are also one of the natural resources in coastal areas that can be recovered (renewable), namely a tropical coastal vegetation community which is dominated by several mangrove species, where mangroves can grow and develop in muddy areas [2]. Mangroves have a very important role for the ecosystem, because mangroves can prevent sea water intrusion, erosion and abrasion of the coast, hold or trap sediment, as a place to find food, spawning and enlarging for various types of organisms that live in coastal areas and play a very important role for life. coastal communities in managing and utilizing mangroves.

Mangroves are one of the most unique ecosystems that have great natural resource potential with high productivity and biodiversity that are able to adapt to harsh areas, namely the area where the sea and the coast meet. Mangrove ecosystems provide essential nutrients or food sources for organisms and emitters of organic carbon for tropical beaches [3] and play an important role in balancing ecosystems, sources of life and the economy for communities as well as providing the diverse needs of humans and other living creatures [4].

Characteristics of mangrove habitats generally grow in intertidal areas where soil types are muddy, loamy and sandy [5], differences in substrate types and tidal conditions in mangrove ecosystems can typically form distinctive zoning patterns [6] This zoning pattern can be seen based on the types of mangroves that can grow on certain substrates and with certain salinity levels.

Salinity is the level of salt contained in water, the salinity in the mangrove area is different, this depends on the sediment trapping power of each mangrove plant and the high and low tides. The tides are influenced by the high and low levels of the substrate in a mangrove area, so this forms a different pattern of salinity distribution in the area and the distribution of salinity is a supporting factor for the growth of mangrove plants, therefore a study is needed regarding the distribution of salinity in the mangrove area of Sungai Gemuruh, District Koto XI Tarusan, Pesisir Selatan Regency, West Sumatra Province.

2. Methods

This research was conducted in October 2020, located in the mangrove area of Sungai Gemuruh, Koto XI Tarusan District, Pesisir Selatan Regency, West Sumatra Province (Figure 1.). The sampling technique for mangrove species and salinity was carried out by using the purposive random sampling method, where there were 8 sampling points with a distance of about 3-5 meters where the location is close to the fall of fresh water from the upstream of the river and tourism activities.

The salinity measurement at each station is measured by using a refractometer, beforehand performed the calibration using aquades. Measurements are made by: 1. The day light plate is opened using the thumb. 2. The refractometer is dripped with distilled water on the prism and day light plate. 3. The sample liquid is dripped on the prism 1-3 drops. 4. The scale is then viewed in a lighted place and read the scale. 5. After use, the prism and day light plate are cleaned with distilled water then wiped in one direction and freely. 6. The refractometer is stored back in the box or container.

Figure 1. Research Location Map

Complementary data in this study is photo documentation used to describe the actual situation, literature study is a technique used to obtain secondary data, in the form of mangrove area data, research location, area and other data needed in the study. The data were obtained from the Balai or related agencies accessed through the internet to complement the results of this study. Data processing uses the ArcGIS 10.5 software program with the output of the salinity distribution map in the mangrove area of Sungai Gemuruh. This flow chart is needed to simplify the analysis process. The flow diagram can be seen in Figure 2.
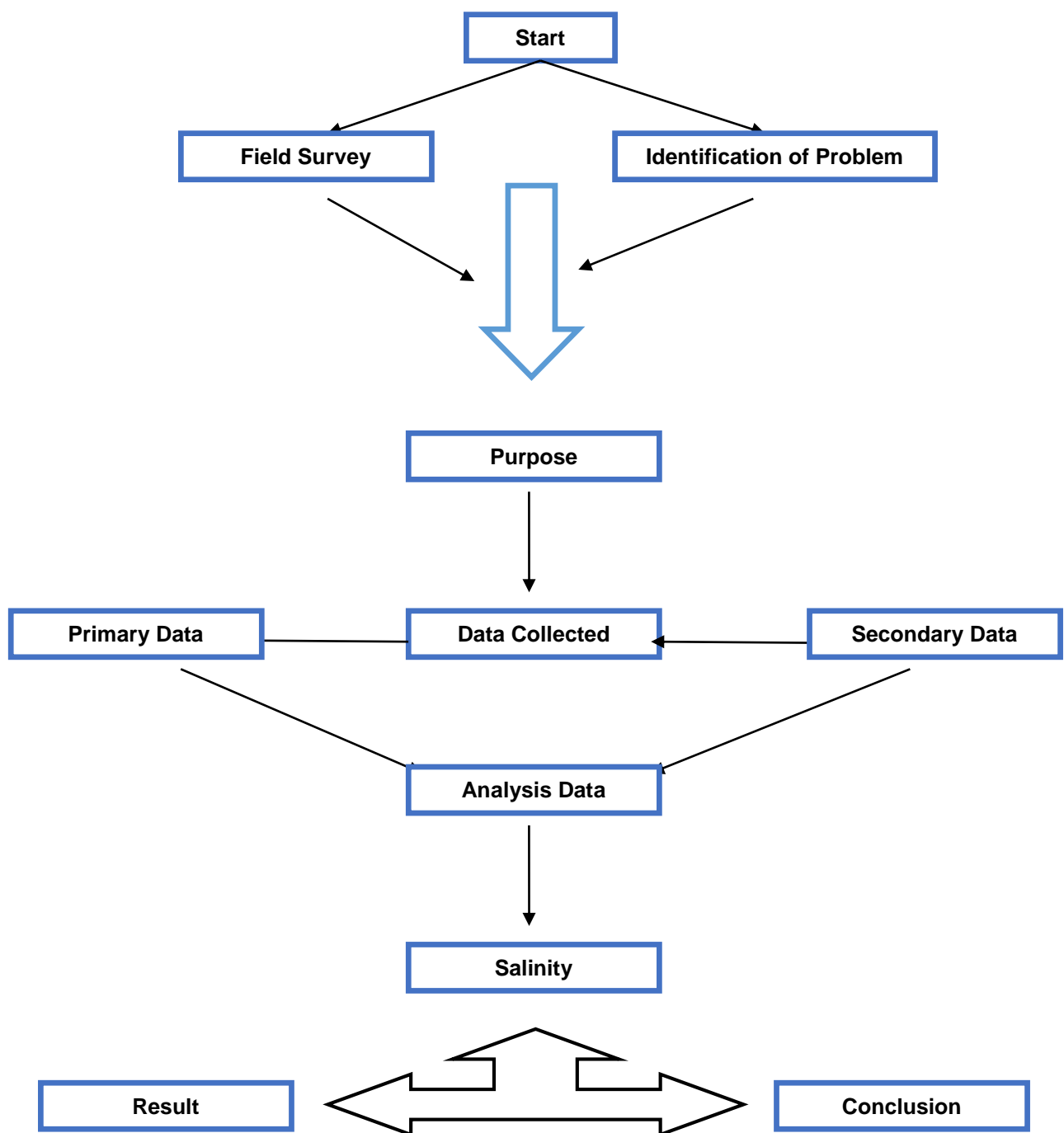
Figure 2. Flow Diagram Research

3. Result and Discussion

3.1. Composition and Structure of Mangrove Species

The results of observations on the types of mangroves found at each sampling point in the mangrove area of Sungai Gemuruh, Koto XI Tarusan District, Pesisir Selatan District were randomly sampled and direct species observations were made and with the help of mangrove identification books is Guide to Introduction to Mangroves in Indonesia [7], at 8 sampling points, there were 5 types of mangroves that were scattered in each observation point. So that from these data, the composition and structure of mangrove species at each station can be obtained which can describe the diversity of mangrove species in that location (Table 1.).

Table 1. Composition and Structure of Mangrove Species

No.	Mangrove Species	Sampling Points							
		1	2	3	4	5	6	7	8
1	*Acrostichum aureum*	-	-	+	-	-	+	+	-
2	*Bruguiera cylindrica*	-	+	+	-	-	+	-	-
3	*Rhizophora apiculata*	+	-	-	+	-	+	-	+
4	*Rhizophora stylosa*	+	+	+	+	+	-	+	+
5	*Nypa fruticans*	-	+	+	+	+	-	-	+

Information: + = Found   Primary Data, 2020
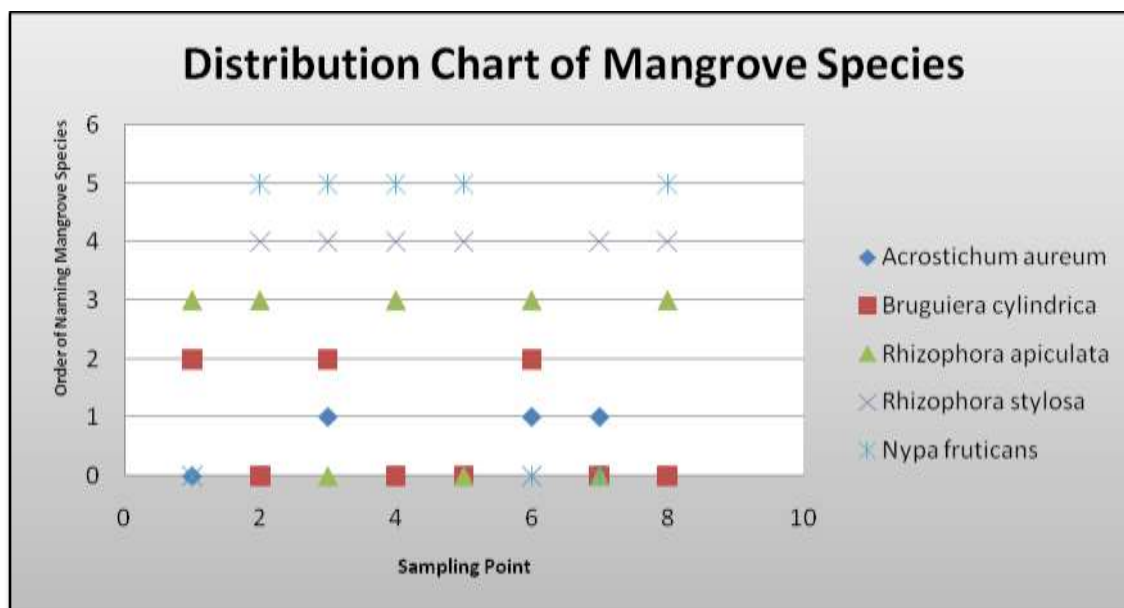
      - = Not Found

Figure 3. Distribution Chart of Mangrove Species

Based on Table 1. and Figure 3. Explaining the distribution of mangrove species found at each sampling point, such as: point 1 found mangrove species *Rhizophora apiculata* and *Rhizophora stylosa*; point 2 found mangrove species *Bruguiera cylindrica, R. stylosa* and *Nypa fruticans*; point 3 found mangrove species *Acrostichum aureum, B. cylindrica*, *R. stylosa* and *N. fruticans*; point 4 found mangrove species *R. apiculata, R. stylosa* and *N. fruticans*; point 5 is found mangrove species *R. stylosa* and *N. fruticans*; point 6 found mangrove species *A. aureum, B. cylindrica* and *R. apiculata*; point 7 found mangrove species *A. aureum* and *R. stylosa*; point 8 found mangrove species *R. apiculata, R. stylosa* and *N. fruticans*

3.2. Salinity Measurement Data

The results of salinity measurements at each sampling point in the mangrove area of Sungai Gemuruh, Koto XI Tarusan District, Pesisir Selatan Regency were randomly sampled at each of these points using a refractometer. Salinity measurements were carried out at 8 points at the observation location with a distance of about 3-5 meters each. Measurements were made during the daytime around 12.00 to 14.00 with the results of the salinity measurement as follows (Table 2).

Table 2. Salinity Measurement Data

Sampling Points	Coordinate	Salinity Measurement Results (‰)
Point 1	1° 13' 39,3" S dan 100° 26' 01,8" E	13 ‰
Point 2	1° 13' 39,5" S dan 100° 26' 01,8" E	14 ‰

Point 3	1° 13' 39,7" S dan 100° 26' 02,0" E	15 ‰
Point 4	1° 13' 39,9" S dan 100° 26' 02,3" E	19 ‰
Point 5	1° 13' 39,9" S dan 100° 26' 02,7" E	18 ‰
Point 6	1° 13' 39,5" S dan 100° 26' 03,1" E	15 ‰
Point 7	1° 13' 39,1" S dan 100° 26' 03,0" E	15 ‰
Point 8	1° 13' 39,1" S dan 100° 26' 02,4" E	15 ‰

Source : Primary Data, 2020

Figure 3. Map of Salinity Distribution in the Sungai Gemuruh Mangrove Area

Based on Table 2 and Figure 3, it explains the distribution of salinity measurement data obtained at each sampling point, such as: point 1 obtained a salinity of 13 ‰; point 2 obtained a salinity of 14 ‰; point 3 obtained a salinity of 15 ‰; point 4 obtained a salinity of 19 ‰; point 5 obtained a salinity of 18 ‰; point 6 obtained a salinity of 15 ‰; point 7 obtained a salinity of 15 ‰; point 8 obtained a salinity of 15 ‰. Points 1, 2, 3, 6, 7 and 8 have a salinity range of 13-15 ‰, this is because these six points are still relatively close to the estuary of the fall of fresh water (meeting of fresh water and sea water) so that the salinity is classified as smaller while in points 4 and 5 have a salinity range of 18-19 ‰, this is because the location of the sampling point is in a position away from the mouth of the mouth of the mouth of the meeting of fresh water and is in a position towards the sea, so the salinity is classified as greater.

4. Conclusion

The research conducted in the mangrove area of Sungai Gemuruh, Koto XI Tarusan District, Pesisir Selatan Regency, 5 types of mangroves were found, namely *Acrostichum aureum, Bruguiera cylindrica, Rhizophora apiculata, Rhizophora stylosa, and Nypa fruticans* and the distribution of salinity obtained at each sample point was 13 ‰ up to 19 ‰. Based on these data, it can describe the ecological conditions of the mangrove environment that are still well preserved and the salinity value that still supports mangrove development. Until now, community activities and tourism have not had a bad influence on the Sungai Gemuruh mangrove ecosystem, but it will still have to be closely monitored and supervised by related parties, stakeholders, academics, researchers and the surrounding community, so that the Sungai Gemuruh mangrove area remains preserved sustainability.

Acknowledgement

Reference

1. M. Dafikri, Yunasfi, and Z. A. Harahap, 2016. "*Analisis Vegetasi Dan Pola Sebaran Salinitas Di Ekosistem Mangrove Percut Sei Tuan Kabupaten Deli Serdang Sumatera Utara*,".

2. S. M. Lasibani and E. Kamal, 2010. "*Pola Penyebaran Pertumbuhan 'Propagul' Mangrove Rhozophoraceae di Kawasan Pesisir Sumatra Barat*," *J. Mangrove dan Pesisir*, vol. **10**, no. 1, pp. 33–38.

3. D. M. Alongi, 1996. "*The dynamics of benthic nutrient pools and fluxes in tropical mangrove forests*," *J. Mar. Res.*, vol. **54**, no. 1, pp. 123–148, doi: 10.1357/0022240963213475.

4. Z. Siregar, S. Syamsuardi, A. Rasyidin, and E. Kamal, 2019. "*Analysis of the Community's Willingness to Pay (WTP) for the Protection of Mangroves in Kuala Langsa, Aceh*," *Int. J. Agric. Sci.*, vol. **3**, no. 1, p. 12, doi: 10.25077/ijasc.3.1.12-16.2019.

5. S. Saputra, Sugianto, and Djufri, 2016. "JESBIO Vol . **5** No . 1 , Mei 2016 *Sebaran*

6. *Mangrove Sebelum Tsunami dan Sesudah Tsunami di Kecamatan Kuta Raja Kota Banda Aceh* Fakultas Keguruan dan Ilmu Pendidikan , Universitas Almuslim Email : syifa.mpbiounsyiah@gmail.com Program Pascasarjana , Universit," *J. Edukasi dan Sains Biol.*, vol. **5**, no. 1, pp. 23–29.

7. Y. A. Lewerissa and M. S. M. B. Latumahina, 2018. "*Pengelolaan Mangrove Berdasarkan Tipe Substrat di Perairan Negeri Ihamahu Pulau Saparua (Mangrove Management Based On Type Of The Substrate At Ihamahu Waters Saparua Island)*," vol. **14**, no. April, pp. 1–9.

8. I. N. N. S. Rusila Noor, Y., M. Khazali, 2006. *Pengenalan Mangrove di Indonesia*.