INTERNATIONAL JOURNAL OF INNOVATIVE SCIENCE AND RESEARCH TECHNOLOGY

IJISRT A DIGITAL LIBRARY

ISSN N0 :- 2456-2165



THOMSON REUTERS

HAS BEEN PUBLISHED IN Volume 3 | Issue 12 | December - 2018

> ARTICLE DIGITAL NO. IJISRT18DC108



EDITOR IN CHIEF IJISRT

This document certifies that the manuscript listed above was submitted by above said respected author To verify the submitted manuscript please visit our official website: www.ijisrt.com Or Email us: editor@ijisrt.com

A DIGITAL LIBRARY

EDITORIAL BOARD

Manish Gupta (IJISRTREW100) | Assistant professor | ECE Dept.| VIT jaipur | Rajasthan | India HemantPurohit (IJISRTREW77) | Professor & HOD ECE dept.| JIET | Jodhpur | Rajasthan | India Jai Prakash Mishra (IJISRTREW13) | Assistant Professor| ECE Dept.| VIT Jaipur | Rajasthan |India Harsh Gupta (IJISRTREW02) | Micro Electronics Dept. | Manipal University | Jaipur | Rajasthan | India **DiwakarGautam** (IJISRTREW05) | Assistant professor | ECE Dept. | Sharda University TarunBadiwal (IJISRTREW09) | Assistant Professor | Electrical Dept. | Jaggannath University | Jaipur | Rajasthan | India Virendra Swami (IJISRTREW105) | Assistant Professor | ECE Dept. | MaharshiArvind college| Jaipur | Rajasthan | India Nishant Chauhan (IJISRTREW79) | Assistant Professor | Electrical Dept. | MahershiArvind College| Jaipur | Rajasthan | India Prince Ja.cob (IJISRTREW91) | Assistant Professor | Electrical Dept. | MahershiArvind College| Jaipur | Rajasthan | India Dr.S.SairaBanu (IJISRTREW10) | Associate Professor | ECE Dept. | Karpagam University | Coimbatore | Tamil Nadu | India **BalajiVelusamy** (IJISRTREW500) | Associate Professor | Info Institute of Engineering | Coimbatore | Tamil Nadu | India Lalit Mohan Nainwal (IJISRTREW501) |School of Pharmaceutical Sciences and Research| JamiaHamdard| Delhi | India **BaisNiravKishorkumar** (IJISRTREW502) |Assistant Professor|Ganpat University-Institute of Technology| Ahmedabad| Gujarat | India **Raj Kumar Gupta** (IJISRTREW503) |Assistant Professor|Amity University| Jaipur| Rajasthan | India **Dr. Neeta Saxena** (IJISRTREW504) |Assistant Professor|Amity University| Gwalior| Madhya Pradesh | India Dr.Nageswara Rao Moparthi(IJISRTREW505) Associate Professor Velgapudi Ramakrishna Siddhartha Engineering College Vijayawada | Andhra Pradesh | India **R. Narendran**(IJISRTREW506) |Faculty of Marine Sciences| Annamalai University| Parangipettai | Tamil Nadu | India Mahadeva.M (IJISRTREW507) Assistant Professor Shri Pillappa College of Engineering Bangalore Karnataka India

Indexing

SJIF Impact Factor : 5.15





CERTIFICATE OF INDEXING (SJIF 2017)

This certificate is awarded to

International Journal of Innovative Science and Research Technology (ISSN: 2456-2165)

The Journal has been positively evaluated in the SJIF Journals Master List evaluation process SJIF 2017 = 5.15 SJIF (A division of InnoSpace)

TIONAL

SJIFactor Pro

SJIFactor Project

Volume 3, Issue 12 – Desember 2018

Self-Medication Practices in Rural Bangalore, Karnataka, India

Author Name: Sangamesh Nidagundi, G Balamurugan, M Vijayarani | Volume 3, Issue 12, December- 2018

Influence of Physical Education on Academic Performance of High School Students Author Name: Harsha Sisodia, Akhilesh Sharma | Volume 3, Issue 12, December- 2018

Comparative Study of Network Protocol Analyzer and Existing Tools Author Name: Suvarna Chavan, Sachin Patel | Volume 3, Issue 12, December- 2018

<u>An Empirical Study on the Implementation of Digital Financial Service in Gorontalo</u> <u>Utara Regency, Province of Gorontalo</u>

Author Name: Dr Hais Dama, SE, M. Si, Dr Rio Monoarfa, SE, Ak, M. Si | Volume 3, Issue 12, December- 2018 Investigation of Structural Behaviour of I-Beam Honeycomb Structure

Author Name: S. Sathish, Dr R. Sathiya Moorthy | Volume 3, Issue 12, December- 2018

Comparative Study of Transformer Core Material Author Name: Kunal Chakraborty | Volume 3, Issue 12, December- 2018

The Influence of the Structure of Ownership and Dividend Policy of the Company (The Quality of the Earnings and Debt Policies are Intervening Variable): Empirical Study on Manufacturing Companies Listed on the Indonesia Stock Exchange Author Name: Rustan, Dr H. Abdul RahmanMus, SE., M.Si, Dr LukmanChalid, Dr Hj. AndiNirwanaNur, MM | Volume 3, Issue 12, December- 2018

The Analysis of Trust on the Purchase Intentions of Ramayana Application Users Author Name: Peylika, Nurlaela | Volume 3, Issue 12, December- 2018

Mobile Signal Jammer

Author Name: Md. Huzaifa Ansari, Lokendra Tiwari | Volume 3, Issue 12, December-2018

<u>Social Media Research Publications in Asian Countries – A Scientometric Study</u> Author Name: Dr L. N. Uma Devi, K. Thirumal | Volume 3, Issue 12, December- 2018

<u>Recruitment, Selection and Employee Commitment of Academic Staff in the Context</u> of a Private University in Uganda

Author Name: Wilson Mugizi, Benard Nuwatuhaire | Volume 3, Issue 12, December-2018

Improvement of Quality Control of Herbicide Products using the DMAIC Method Case Study in Chemical Companies in Merak- Banten

Author Name: Erry Rimawan, Angga Pratama | Volume 3, Issue 12, December- 2018

<u>Effect of Electronic Word of Mouth (E-WOM) and Instagram Account on Purchase</u> <u>Intention</u>

Author Name: Priyo Triatmanto, Raden Rachmat Nugra Adi, Reka Harjuna Pratama, Rizki Chandra | Volume 3, Issue 12, December- 2018

Teacher Reclassification: De Jure or De Facto, Ex Post Facto Author Name: Edilmar P. Masuhay | Volume 3, Issue 12, December- 2018

Analysis of Statistical Parsing in Natural Language Processing Author Name: Krishna Karoo, Dr Girish Katkar | Volume 3, Issue 12, December- 2018

The Self-Esteem and Self Stigma in Men Likes Men of Padang City in 2018 Author Name: Weni Mailita | Volume 3, Issue 12, December- 2018

Benchmarking of Problems and Solvers: A Ranking Theory Approach Author Name: Joseph Gogodze | Volume 3, Issue 12, December- 2018

Professional Educator Character of Pedagogical Student in Medan State University Author Name: Asih Menanti, Abdul Munir, Abdul Murad, Nurmaniah, Nuraini | Volume 3, Issue 12, December- 2018

PCOS and Cowpea Isoflavones Author Name: Syed Aamer Nawaz | Volume 3, Issue 12, December- 2018

Development of Steam Cooked Porridge cake Author Name: Ruchi Sharma, Mandeep Sharma, Shefali Dhiman, Ankita Nigam | Volume 3, Issue 12, December- 2018

Insider Attack Detection Implementation Using Behavior Analysis Author Name: Harshata Bhargava, Radhe Shyam Panda | Volume 3, Issue 12, December-2018

Simulation Comparison of In-Let and Out-Let Vents Towards Room Temperature Using CFD

Author Name: Muhammad Arief Yusuf | Volume 3, Issue 12, December- 2018

The Association between Mother's Knowledge Regarding Oral Health and Caries Experience of Pre School Children

Author Name: Murniwati, Susi, Nurul Khairiyah, Dina Wardiningsih | Volume 3, Issue 12, December- 2018

<u>C, C++ and JAVA: The Magic of Computer Programming Language</u> Author Name: Prajakta Pahade, Shweta Agrawal, Priyanka Patil | Volume 3, Issue 12, December- 2018

The British USA Colonialism Internalized by the Native American Elias Boudinot in the Narrative "An Address to the Whites" Author Name: Tania Gonzalez Marrufo | Volume 3, Issue 12, December- 2018

Study the Thermal Properties of some Plastic Materials by TMA Q400 Machine Author Name: H.S. Bui | Volume 3, Issue 12, December- 2018 **Coping Strategy of High Care Unit Nurses of Government Hospital**

Author Name: Indri Ramadini, Budi Anna Keliat, Vetty Priscilla | Volume 3, Issue 12, December- 2018

Relationship between Cigarette Consumption with Farmer Gingiva Health Level Using Regresi at Highland

Author Name: Minarni, Susi, Murniwati | Volume 3, Issue 12, December- 2018

Effect of Sugar Concentration on Gelling Properties of Pectin from Malaysian Banana Peels (Musa Acuminata × Balbisiana)

Author Name: Chek Z. Hassan, Siti. S. Ahmad, Agbaje Rafiu, S. Radhiah Omar | Volume 3, Issue 12, December- 2018

Implementation of Ijarah Multijasa Products in BPR Syariah Author Name: Syahid Suhandi Aziz, Yuhelson | Volume 3, Issue 12, December- 2018

Effect of Leadership Village Head on Empowerment of Village Potential based on Environmental Management

Author Name: Syamsu Qamar BADU, Novianty DJAFRI | Volume 3, Issue 12, December- 2018

Experimental Study on Strength and Durability Characteristics of Concrete with Partial Replacement of Nano-Silica, Nano-Vanadium Mixture Author Name: Srivathsa H U, Manu Vijay | Volume 3, Issue 12, December- 2018

Conceptions of Infinity An APOS Analysis Author Name: Layla H. Nasr, Dr. Nina Haifa | Volume 3, Issue 12, December- 2018

Adherence and Treatment Outcomes among Patients of Depression with Co-Morbidity from Kandahar, Afghanistan Author Name: Dr. Masood Ahmad Noushad | Volume 3, Issue 12, December- 2018

<u>Vegetation Structure, Diversity and Value of Carbon in the Tutuwoto Mangrove</u> <u>Area in Orchid District North Gorontalo Regency</u>

Author Name: Dewi Wahyuni K. Baderan, Sukirman Rahim, Syam S. Kumadji | Volume 3, Issue 12, December- 2018

<u>Cooperative Type Model Learning Planning Teams Achievement Division in</u> <u>Leadership Training IV</u>

Author Name: Dr. Suyana, S. Pd., MM | Volume 3, Issue 12, December- 2018

Ranking the Most Important Competencies of the Project Managers Using Relative Importance Index Analysis

Author Name: Dr. Elmahdee Hashim, Dr. Khawla M Alamen | Volume 3, Issue 12, December- 2018

Development of Ghour Fifa village to an Eco-Village Author Name: Ibrahim Al-mahasneh | Volume 3, Issue 12, December- 2018 Effectiveness of Self-Instructional Module on Knowledge and Attitude Regarding E-Waste Management among Workers of selected Electronic Repair Shops at Vijayapur

Author Name: Ravikumar M, Suchitra Rati, Sankappa Gulaganji, Manjunath Patil, Shreekant Savakar, Amitkumar B, Reshma Koloor | Volume 3, Issue 12, December- 2018

Antiretroviral Therapy Adherence and its Determinants among Adolescents in Kajiado County, Kenya

Author Name: Kimemia, C.W., Too, R, Kiptoo, J. P. | Volume 3, Issue 12, December-2018

Analysis of Service Quality on Electronic Word of Mouth (E-WOM) through Customer Satisfaction

Author Name: Alfianor, Bagus Teja Harmoko, Roberto T Sanjaya| Volume 3, Issue 12, December- 2018

<u>The Analysis on the Influence of the Quality of Service, Reliability and Security of E-</u> <u>Channel BNI Syariah towards Islamic Bank</u> Customer's Satisfaction

Author Name: Shinta Kamal, Ardi Pratiwi, Desyana, Ayu Respati Rachmadani Volume 3, Issue 12, December- 2018

Incidence of Weed Flora Composition in Maize (Zea mays L.) Intercropped with Cover Crops under Three Weed Control Methods at Alabata, Southwest, Nigeria Author Name: Williams O.A, Lagoke S.T.O.| Volume 3, Issue 12, December- 2018

A Survey of Hybrid Wireless Localization Techniques in Non-Line-of-Sight Author Name: Ghulam Bhatti| Volume 3, Issue 12, December- 2018

Integration of Robotic Process Automation with E-Governance Author Name: Prashanta Kumar Bhuyan, Sarvottam Dixit, Susmi Routray| Volume 3, Issue 12, December- 2018

Teacher's Perception of a Blended Thermodynamics Course Author Name: K V Muralidhar Sharma, Dr. S G Gopala Krishna, Dr. N. Kapilan Volume 3, Issue 12, December- 2018

Effect of KIA Service Quality on Satisfaction of Women Giving Birth Normally at the Regional General Hospital of Aceh Tamiang Regency in 2016 Author Name: Novi Aklima, Juanita, Taufik Ashar| Volume 3, Issue 12, December- 2018

Motivation and Meaning of Life on Hemodialisa Patients with Low Self Esteem in the Padang City in 2018 Author Name: Rizka Ausrianti| Volume 3, Issue 12, December- 2018

An Integrated Model of Project Managers' Competencies through Factor Analysis Author Name: Dr. Elmahdee Hashim, Dr. Aminah Binti Md Yusof, Dr. Khawla M Alamen| Volume 3, Issue 12, December- 2018 Impact of Different Dielectric Fluids on Surface Roughness During EDM Machining of AISI 4140 Steel

Author Name: Naveen Porwal, Love Kishore Sharma, Anil Kumar Sharma| Volume 3, Issue 12, December- 2018

The Role of Yoga in Education

Author Name: Siddappa Naragatti| Volume 3, Issue 12, December- 2018

Socio Economic Status of Tribal People Mukundapur Village, West Bengal Author Name: Jayashree Mondal Volume 3, Issue 12, December- 2018v Centella asiatica Extract Increased Expression of bFGF but not Sox-2 in Peptic Ulcer Model in Rats Induced by Indomethacin

Author Name: Umi Kalsum, Karyono Mintaroem, Iffa Aulia Hakim, Husnul Khotimah, Hidayat Sujuti, Wibi Riawan Volume 3, Issue 12, December- 2018

Mass Communication in the Modern World: It's Impact and Spirituality Author Name: A. Jasmine Volume 3, Issue 12, December- 2018

<u>The Analysis of Perceived Risk on Purchase Intentions on the Tokopedia Application</u> <u>Users</u>

Author Name: Rinaldi Alexander, Maman Permana Sidik| Volume 3, Issue 12, December- 2018

Vegetation Structure, Diversity and Value of Carbon in the Tutuwoto Mangrove Area in Orchid District North Gorontalo Regency

Dewi Wahyuni K. Baderan, Sukirman Rahim, Syam S. Kumadji University Gorontalo State Gorontalo, Indonesia

Abstract:- The method to be used is the stripped method and the combination method and exploration method. To measure the structure of mangrove vegetation by calculating the Relative Density (KR), Relative Frequency (FR), and Relative Dominance (DR), then the data obtained is tabulated to obtain INP. The diversity index (diversity) were analyzed using the Shannon Wien formula *n* er every strata of mangrove growth. The estimation of carbon stock on the surface (stem) uses a non-destructive sampling method. The results of this study found that for the vegetation structure 10 species of mangrove were obtained, namely Rhizophora mucronata Lamk., Rhizophora apiculata Bl., Rhizophora stylosa Griff., Ceriops decandra (Griff.) Ding Hou, Ceriops tagal (Perr.) CBRob, Brugueira gymnorrhiza (L.) Lamk, Sonneratia alba JE Smith, Xylocarpus granatum Koen, Avi cennia alba Bl., Avi cennia marina (Forsk) Vierh. The diversity index value at the study site showed a high level of diversity. This is evidenced by the value obtained at 2,287 ie on the H¹ value criteria > 1,5 -3.0. The total biomass of all mangrove species was 297,765.93 Kg. The total value of carbon k in the Tutuwoto mangrove forest was 247,845.54 Kg, and carbon dioxide uptake reached 909,557. The findings of this study are used as data in the management of mangrove forests Anggrek District, North Gorontalo Regency and can be used as data in the development of **REDD** (Reduced Emissions from Deforestation and Degradation) programs so that efforts to conserve mangrove can be increased.

Keywords :- INP, Mangrove, Diversity, Carbon.

I. INTRODUCTION

Mangrove ecosystems are a system in nature where life takes place that reflects the reciprocal relationship between living things and their environment and among living things themselves found in coastal areas, are affected by tides, and are dominated by distinctive and capable species of trees or shrubs growing in salty / brackish waters (Sahoo *et al.*, 2008)."Mangrove forests are generally tropical coastal vegetation communities, which are dominated by several types of trees that are able to grow and develop in muddy coastal tidal areas. The difference with other forests is the existence of specific flora and fauna, with high species diversity "(Gi sen, *et al* 2007).

Mangrove ecosystems have the most important ecological and socio- economic values, especially humans, among them can be used as food ingredients and raw materials for medicines. Besides that, mangrove forests have a function that is very important for the survival of humans, as other forests are as carbon sinks and storers. Mangrove plants can absorb some carbon in the form of CO 2 which is used for photosynthesis, while others remain in the form of gases in the atmosphere. According to Ilmiliyana (2012) over the past decade CO 2 emissions doubled from 1400 million tons per year to 2900 million tons per year. With increasing CO 2 which is one of the greenhouse gases in this atmosphere, it will trigger climate change globally. By being aware of these problems, the international world is rich in reducing greenhouse gas emissions in the atmosphere. According to Siregar et al (2010), one of the efforts made was through the Kyoto Protocol agreement in which it offered a joint effort to reduce greenhouse gas emissions between developed countries and developing countries through the Clean Development Mechanism (CDM) whose implementation in period I would be carried out for 4 year (2008-2012). The other agreement is the result of COP 13 (Bali Action Plan) in which it mandates the implementation of REDD⁺(Reducing Emission from Deforestation and Degradation) in 2012. With this REED + mechanism, Indonesia has a great opportunity in the carbon trading mechanism because it has a vast tropical forest area.

Pro v insi Gorontalo has extensive mangrove areas one mangrove areas are located in the District Orchid, Regency of North Gorontalo, Gorontalo province. The mangrove forest area in the Anggrek Subdistrict is a mangrove area with potential for carbon uptake which is important for the surrounding ecosystem. This is because the condition of mangroves in this region is still in good condition. Mangrove forests are the main ecosystems that support important life in the Anggrek District, because of the various functions and benefits they can produce, one of which is the ability of mangroves to absorb and store carbon. The ability of mangroves as carbon sinks and storing them in biomass can reduce the increase in carbon dioxide in the atmosphere. Based on the description of the background above, information about the structure of vegetation, diversity, and carbon values in mangrove forests in Anggrek District is very necessary, so that it can be used as preliminary data in carbon trading. Efforts to preserve

mangrove forests both in Anggrek District and in other regions in Indonesia can be further improved. Because if the number of mangroves continues to decrease, it certainly has an impact on the ability of mangroves to absorb and store carbon. The decomposition of carbon stored in mangrove forests into the atmosphere will change the role of mangrove ecosystems that were initially absorbent and storage carbon is a contributor to carbon emissions that has an impact on climate change in the world.

II. MATERIALS AND METHODS

A. Study Area

Areas of study in the mangrove areas Tutuwoto Village, District Orchid, Regency of North Gorontalo, Gorontalo province. Geographically the research area is located between coordinates $0\ 0^{0}$.4 8 \cdot .03.0 " N and 122 0 .50 \cdot .35.9 "E. Administratively the research area is bordered by: The North is bordered by the Sulawesi Sea , the East is bordered by Tolongio Village , the South is bordered by Molinggapoto Village , the West is bordered by Pontolo Village .

B. Method

The method used in this research is to use m etode the terraced path method (combination of plots and transects) and methods of exploration. This method is used to calculate the vegetation structure, diversity index and carbon at the study site.

Vegetation Sampling Techniques

The vegetation sampling technique includes the structure of vegetation by making rectangular transects marked with ropes. Each transect path is made perpendicular to the mainland from the coast, cutting the frontline mangrove community formation (the waterfront) to the backmost formation (bordering the mainland).Transect lines are placed *purposively* based on area utilization. Inventory of tree growth strata is recorded on each path divided into 20 mx 20 m plots. Meanwhile, the stratum is carried out in smaller sub-plots measuring 10 mx 10 m and seedling strata in the 5 mx 5 m sub-plot (Dombois and Ellenberg , 1974). The mangrove species at the study site were identified by identifying species directly in the field on each transect .Number of individuals s achthe mangrove species found on the transect were recorded.

> Species diversity

To find out the variety of species, the Shannon-Wienner variety index is calculated for each strata of mangrove growth.

Stem Carbon Biomass Value

The aboveground biomass (stem) value is measured by diameter at breast height (DBH), which is 1, 3 m above ground level from the buttress limit. Data from tree diameter measurements are used to calculate surface biomass (stem) using the allometric formula (Komiyama, 2008).

C. Data analysis

Mangrove Vegetation Structure

The structure of the mangrove vegetation that was analyzed was the structure of tree level, mangrove vegetation, saplings and seedlings. The vegetation data collected at the study sites were analyzed to determine dominance, relative dominance, density (density), relative density, frequency, relative frequency and Important Value Index (INP) using the Dombois and Ellenberg (1974) formulas, as follows:

	_	Total individuals of a species	3
Density (K)	_	Area of observation	
Relative density (Kr)		Density of a species	x 100 %
	-	Density of all species	X 100 /0
		The total area of the basal a	rea
Dominance (D)	=	Area of observation transect	
		Dominance of a species	x 100 %
Relative Dominance (Dr)	=	Dominance of all species	100 /0
		The number of transects found i	n a species
Frequency (F)		Total number of all trans	sects
Polotivo fraguonov (Fr)	_	Frequency of a species	- x 100 %
Kelauve nequelicy (FI)		Total frequency of all species	

ni N ISSN No:-2456-2165

> Diversity

Diversity index is calculated using the *Shannon and Wienner* formulas (Fachrul 2007) as follows:

$$H' = -\sum_{i=1}^{5} pi \ln pi$$

where:pi =

K attack

H'	= Diversity index Shannon-Wien ner
S	= Number of species
Pi	= proportion of species i
Ln	= Natural logarithms
Pi	= ni / N (comparison of the number of
individuals	of a type with the whole type)

Stem Biomass Measurement

To calculate the stem biomass using the equation compiled by Komiyama *et al.*, (2008). The geometric all equation used is as follows:

 $BK = 0.251 \text{ x } \rho \text{ x } D^{2,46}$

Information :

 ρ = Wood Specific Gravity (g cm ⁻³)

BK = Dry Weight

D = Tree Diameter (1, 3 m above ground level or above buttress)

Carbon Value and Absorption of Carbon dioxide (CO₂)

Carbon values use the formula:

Content of Carbon Trees = Biomass x 50% (Brown, 1997). Measurement of carbon dioxide absorption uses the following equation (Heriyanto *et al.*, 2012):

 $(CO_2) = \frac{Mr. CO_2}{Ar.C} \quad (or 3, 67 \text{ xcarbon content})$ Information :

- CO₂= carbon dioxide uptake

- Mr = relative molecule
 - Ar = Atom relative.

III. RESULTS

Mangrove Vegetation Structure

Based on the results of the identification of mangrove plants in the study location found 10 mangrove species at the level of trees, saplings and seedlings namely Rhizophora mucronata Lamk., Rhizophora apiculata Bl., Rhizophora stylosa Griff., Ceriops decandra (Griff.) Ding Hou, Ceriops tagal (Perr.) CBRob, Brugueira gymnorrhiza (L.) Lamk, Sonneratia alba JE Smith, Xylocarpus granatum Koen, Avicennia alba Bl., Avicennia marina (Forsk) Vierh. Emukan dit 10 species are included in D ivisi m agnoliophyta, one K elas namely Magnoliopsida, four O rdo namely Scrophulariales, Myrtales, Rhizophorales, and Sapindales . Included in the four families namely Acanthaceae, Rhizophoraceae, Sonneratiaceae, Meliaceae and six genera namely Avicennia, Sonneratia, Ceriops, Rhizophora, Bruguiera and Xylocarpus. The detailed classification of mangrove found on penelit ian locations are presented in Table 1.

Regnum	Division	Class	Order	Family	Genus	Species
						Avicennia alba
			Scrophulariales	Acanthaceae	Avicennia	Avicennia marina
			Myrtales	Sonneratiaceae	Sonneratia	Sonneratia alba
						Ceriops decandra
					Ceriops	Ceriops tagal
Plantae	Magnoliophyta	Magnoliopsida				Rhizophora apiculata
			Rhizophorales	Rhizophoraceae	Rhizophora	Rhizophora mucronata
					×	Rhizophora stylosa
					Bruguiera	Bruguiera gymnorrhiza
			Sapindales	Meliaceae	Xylocarpus	Xylocarpus granatum

Table 1:- Classification of Mangrove Species Found in Research Sites

> Mangrove Vegetation Structure and Tree Level Important Values

Index This calculation results I enting P values obtained with the number three criteria namely the relative density, relative dominance and relative frequency. The existence of this important value can describe the dominance, density and frequency of each species. The structure of mangrove vegetation and the distribution of dominant species are presented in Table 2.

Species Name	K	Kr	D	Dr.	F	Fr	INP
Rhizophora mucronata	0.02	19.4	0.162	18.5	1	10	47.96
Rhizophora apiculata	0.02	12.4	0.099	11.3	1	10	33.68
Ceriops decandra	0.01	12	0.099	11.3	1	10	33.31
Bruguiera gymnorrhiza	0.01	10.3	0.083	9.45	1	10	29.78
Sonneratia alba	0.01	9.5	0.079	9.06	1	10	28,56
Avicennia alba	0.01	9.5	0.079	9.06	1	10	28,56
Rhizophora stylosa	0.01	8.68	0.076	8.66	1	10	27,34
Avicennia marina	0.01	8.68	0.075	8.57	1	10	27.25
Ceriops tagal	0.01	7.85	0.068	7.75	1	10	25.6
Xylocarpus granatum	0.01	4.96	0.077	8.78	1	10	23.74

Table 2:- Mangrove Vegetation Structure and Tree Level Important Values

Mangrove Vegetation Structure and Important Stake Rate

Based on the analysis of vegetation for saplings, there are certain species that have high vegetation parameter values and this can characterize the dominant species in a community. The mangrove species, namely *Rhizophora mucronata* were the most dominating species in the study location at 13 % with an important value of 35.27 %, dominance of 0.163cm², frequency of 1 %, and density of 0, 07m², whereas *Rhizophoraapiculata* Memi Liki critical value of 11%, the dominance of 146cm², frequency of 1 %,

and density of $0.06m^2$. This can mean that the spread of Rhizophora mangrove can be said to be evenly distributed in the study location and because it has a large dominance compared to other species in the same location it can mean that the shape of the *Rhizophora mucronata* tree is larger and has a wider canopy closure than other species.

The structure of mangrove vegetation and the distribution of dominant species for the sapling level are presented in Table 3.

Species name	K	Kr	D	Dr.	F	Fr	INP
Rhizophora mucronata	0.07	12.6	0.163	12.7	1	10	35.27
Rhizophora apiculata	0.06	10.77	0.146	11.4	1	10	32,18
Rhizophora stylosa	0.05	10.48	0.13	10.1	1	10	30,61
Avicennia alba	0.05	10	0.128	10	1	10	30
Ceriops decandra	0.05	9,808	0.13	10.2	1	10	29.98
Sonneratia alba	0.05	9,327	0.134	10.5	1	10	29.78
Ceriops tagal	0.05	9,712	0.121	9.43	1	10	29.14
Bruguiera gymnorrhiza	0.05	8.75	0.117	9.13	1	10	27,88
Avicennia marina	0.05	9,327	0.106	8.3	1	10	27,63
Xylocarpus granatum	0.04	8,365	0.107	8.3	1	10	26.67
	0.0.	0,202	0.1201	0.0	-	- 0	

Table 3:- Mangrove Vegetation Structure and Important Value of Stake Levels

Mangrove Vegetation Structure and Important Value of Seedling Levels

The results of the calculation of important values for seedling mangroves at the location of the study showed that there were two seeded mangrove species which had a large dominant value of 16 % for *Rhizophoramucronata* species with an important value of 25.2 %, a density of 0.09m², a frequency of 1 % and the species *Rhizophoraapiculata* with an important value of 12 %, a large density of 0.07 m², frequency of 1 %.

Both of these species appear dominant compared to other species for seedlings and are widely distributed in the study sites. Taxonomically these two species belong to the genus Rhizophora so that it has an ecophysiological similarity in adapting to the environment, thus it can be indicated that at the location of the study of the Rhizophora seedling genus mangrove spread widely and grow well. This also proves that these two species are the main vegetation compilers of mangrove forests in the study area. The structure of mangrove vegetation and the distribution of dominant species for seedling levels are presented in Table 4.

Species name					
	K	KR	F	FR	INP
Rhizophora mucronata	0.09	15,19	1	10	25.2
Rhizophora apiculata	0.07	12.52	1	10	22.5
Rhizophora stylosa	0.06	10.04	1	10	20
Ceriops decandra	0.05	9,591	1	10	19.6
Ceriops tagal	0.05	9,503	1	10	19,5
Bruguiera gymnorrhiza	0.05	9,147	1	10	19,1
Avicennia marina	0.05	9,147	1	10	19,1
Avicennia alba	0.05	8,703	1	10	18.7
Sonneratia alba	0.05	8.526	1	10	18.5
Xylocarpus granatum	0.04	7,638	1	10	17.6

Table 4:- Mangrove Vegetation Structure and Important Value of Seedling Levels

> Diversity

Diversity index based on research results obtained by using the formula Shannon - Wiennerpresented in Table 5.

NO SPECIES Pi In Pi Pi In Pi H' 1 Rhizophora mucronata 0.14 -1.93 -0.28 2 Rhizophora apiculata 0.12 -2.14 -0.25 3 Rhizophora stylosa 0.1 -2.29 -0.23 4 Bruguiera gymnorrhiza 0.09 -2.4 -0.22 5 Ceriops decandra 0.1 -2.31 -0.23 6 Sonneratia alba 0.09 -2.37 -0.22 7 Avicennia marina 0.09 -2.37 -0.22 8 Avicennia alba 0.09 -2.37 -0.22 9 Ceriops tagal 0.09 -2.36 -0.22 10 Xylocarpus granatum 0.09 -2.36 -0.22 10 Xylocarpus granatum 0.08 -2.57 -0.2 $TOTAL$ $\Sigma =$ -2.29 -2.29						
1 Rhizophora mucronata 0.14 -1.93 -0.28 2 Rhizophora apiculata 0.12 -2.14 -0.25 3 Rhizophora stylosa 0.1 -2.29 -0.23 4 Bruguiera gymnorrhiza 0.09 -2.4 -0.22 5 Ceriops decandra 0.1 -2.31 -0.23 6 Sonneratia alba 0.09 -2.37 -0.22 7 Avicennia marina 0.09 -2.39 -0.22 8 Avicennia alba 0.09 -2.39 -0.22 9 Ceriops tagal 0.09 -2.36 -0.22 10 Xylocarpus granatum 0.08 -2.57 -0.2 TOTAL $\Sigma =$ -2.29	NO	SPECIES	Pi	ln Pi	Pi ln Pi	Η'
2 Rhizophora apiculata 0.12 -2.14 -0.25 3 Rhizophora stylosa 0.1 -2.29 -0.23 4 Bruguiera gymnorrhiza 0.09 -2.4 -0.22 5 Ceriops decandra 0.1 -2.31 -0.23 6 Sonneratia alba 0.09 -2.37 -0.22 7 Avicennia marina 0.09 -2.39 -0.22 8 Avicennia alba 0.09 -2.39 -0.22 9 Ceriops tagal 0.09 -2.36 -0.22 10 Xylocarpus granatum 0.08 -2.57 -0.2 TOTAL $\Sigma =$ -2.29	1	Rhizophora mucronata	0.14	-1.93	-0.28	
3 Rhizophora stylosa 0.1 -2.29 -0.23 4 Bruguiera gymnorrhiza 0.09 -2.4 -0.22 5 Ceriops decandra 0.1 -2.31 -0.23 6 Sonneratia alba 0.09 -2.37 -0.22 7 Avicennia marina 0.09 -2.39 -0.22 8 Avicennia alba 0.09 -2.39 -0.22 9 Ceriops tagal 0.09 -2.36 -0.22 10 Xylocarpus granatum 0.08 -2.57 -0.2 TOTAL	2	Rhizophora apiculata	0.12	-2.14	-0.25	
4 Bruguiera gymnorrhiza 0.09 -2.4 -0.22 5 Ceriops decandra 0.1 -2.31 -0.23 $2,287$ 6 Sonneratia alba 0.09 -2.37 -0.22 $2,287$ 7 Avicennia marina 0.09 -2.39 -0.22 8 Avicennia alba 0.09 -2.41 -0.22 9 Ceriops tagal 0.09 -2.41 -0.22 10 Xylocarpus granatum 0.08 -2.57 -0.2 TOTAL $\Sigma =$ -2.29	3	Rhizophora stylosa	0.1	-2.29	-0.23	
5 Ceriops decandra 0.1 -2.31 -0.23 $2,287$ 6 Sonneratia alba 0.09 -2.37 -0.22 7 Avicennia marina 0.09 -2.39 -0.22 8 Avicennia alba 0.09 -2.41 -0.22 9 Ceriops tagal 0.09 -2.36 -0.22 10 Xylocarpus granatum 0.08 -2.57 -0.2 TOTAL	4	Bruguiera gymnorrhiza	0.09	-2.4	-0.22	
6 Sonneratia alba 0.09 -2.37 -0.22 7 Avicennia marina 0.09 -2.39 -0.22 8 Avicennia alba 0.09 -2.41 -0.22 9 Ceriops tagal 0.09 -2.36 -0.22 10 Xylocarpus granatum 0.08 -2.57 -0.2 TOTAL	5	Ceriops decandra	0.1	-2.31	-0.23	2 287
7 Avicennia marina 0.09 -2.39 -0.22 8 Avicennia alba 0.09 -2.41 -0.22 9 Ceriops tagal 0.09 -2.36 -0.22 10 Xylocarpus granatum 0.08 -2.57 -0.2 TOTAL	6	Sonneratia alba	0.09	-2.37	-0.22	2,207
8 Avicennia alba 0.09 -2.41 -0.22 9 Ceriops tagal 0.09 -2.36 -0.22 10 Xylocarpus granatum 0.08 -2.57 -0.2 TOTAL $\Sigma =$ -2.29	7	Avicennia marina	0.09	-2.39	-0.22	
9 Ceriops tagal 0.09 -2.36 -0.22 10 Xylocarpus granatum 0.08 -2.57 -0.2 TOTAL $\Sigma =$ -2.29	8	Avicennia alba	0.09	-2.41	-0.22	
10Xylocarpus granatum 0.08 -2.57 -0.2 TOTAL $\Sigma =$ -2.29	9	Ceriops tagal	0.09	-2.36	-0.22	
TOTAL $\Sigma =$ -2.29	10	Xylocarpus granatum	0.08	-2.57	-0.2	
	TOTAL $\Sigma = -2.29$					

Table 5:- Tutuwoto Mangrove Forest Diversity Index

Based on the results of research conducted in the mangrove areas Tutuwoto village Orchid District presented in Table 5, shows the mangrove forest diversity index of 2.287. If the results are based on the diversity index criteria, then the Tutuwoto village mangrove forest has a high diversity index that is on the criteria of $H^1 > 1$, 5- 3.0.

Carbon Level Tree Mangrove Vegetation

The results of calculation of stem biomass, carbon content and carbon dioxide uptake at the tree level are presented in Table 6.

	Value			
Species Name	BB	КК	Uptake	
	(Kg)	(Kg)	CO_2	
Rhizhophora mucronata	40966.95	20483.48	75174.36	
Rhizhophora apiculata	22449,18	11224,59	41194,24	
Rhizophora stylosa	19595.43	9797.71	35957,61	
Bruguiera gymnorrhiza	18757.84	9378,92	34420,64	
Ceriops decandra	25775.21	12887,6	47297,5	
Sonneratia alba	15166,3	7583.15	27830,15	
Avicennia marina	16311,59	8155.79	29931,8	
Avicennia alba	13649.23	6824,62	25046.3	
Ceriops tagal	18711.73	9355.87	34336	
Xylocarpus granatum	21989.41	10,9947.2	403506,3	
total	213372.87	205638,9	754694,9	

Table 6:- Stem biomass, carbon content, and carbon dioxide uptake at the tree level

StakeLevel Mangrove Carbon Vegetation

The results of calculation of stem biomass, carbon content and carbon dioxide uptake at the stake level are presented in Table 7.

	Value				
Species Name	BB	KK	Uptake		
	(Kg)	(Kg)	CO2		
Rhizhophora mucronata	11271.31	5635,7	20682.86		
Rhizhophora apiculata	11020,7	5510.35	20223		
Rhizophora stylosa	8673.15	4336,58	15915.23		
Bruguiera gymnorrhiza	8619,52	4309.8	15817		
Ceriops decandra	9940.68	4970.34	18241		
Sonneratia alba	7465.18	3732,6	13699		
Avicennia marina	5112.66	2556.33	9382		
Avicennia alba	6914.4	3457,19	12688		
Ceriops tagal	8234.06	4117.03	15109		
Xylocarpus granatum	7141.4	3570,72	13105		
total	84393.06	42196.64	154862,1		

Table 7:- Stem biomass, carbon content and carbon dioxide uptake at the tree level

Total Biomass, Carbon Content and Absorption of Carbondiosides at the Research Site The total biomass, carbon content, and carbon dioxide uptake in the Tutuwoto village mangrove area are presented in Figure 1.



Fig 1:- The total biomass, carbon content, and carbon dioxide uptake in the Tutuwoto village mangrove area

IV. DISCUSSION

Based on research findings in the Tutuwoto mangrove ecosystem, 10 mangrove species were found at the observation site. The mangrove species found was Rhizophora mucronata Lamk., Rhizophora apiculata Bl., Rhizophora stylosa Griff., Ceriops decandra (Griff.) Ding Hou, Ceriops tagal (Perr.) CBRob, Brugueira gymnorrhiza (L.) Lamk, Sonneratia alba JE Smith, Xylocarpus granatum Koen, Avicennia alba Bl., Avicennia marina (Forsk) Vierh . The results of data analysis of the structure of mangrove vegetation in Tutuwoto village showed that the mangrove genus Rhizophora was the most dominant mangrove in the region. G Enus Rhizophora dominate Tutuwoto village and the substrate due to environmental conditions at the study site to the supported n g the growth of this species, but it is largely made up of muddy so easy to mangrove Rhizophora spp can adapt well and support the growth of mangrove Rhizophora spp. This choco a i with advanced by Noor et al (2012) that in Indonesia muddy substrate is very good for Rhizophora mucronata and Rhizophora apiculata stands, this condition is in accordance with the environmental conditions that exist in the location of the research, namely sand-mixed mud.

The second, third and fourth paragraphs presented above, there are certain species that have a high index of vegetation value and indicate that the species is dominant in a community. At the tree, sapling and seedling levels, *Rhizophora mucronata* has a high density and dominance, meaning that this species has the highest number of individuals and has a larger diameter than the other species. Based on the sum of the value of ape ents/dominance and species *Rhizophora mucronata* mem IVI IVI iliki highest rank of the tree at 47.86, the dominance of 0.162 cm². a frequency of 1%, and a density of 0.02 m². for saplings and seedlings of species *Rhizophora mucronata* is also a species that has the highest INP value of 35.27%, dominance of 0.163 cm², frequency of 1% and density of 0.07%, and seedling level of INP value of 25.5%, frequency of 15%, and density 0.09%.

Rhizophora mucronata has a high dominance compared to other species because this species has a large physical shape, extensive canopy closure area and wider distribution than other species. Furthermore *Rhizophora apiculata classically* belongs to the family Rhizophoraceae, and its habitat on muddy soil. P enyebaran *Rhizophora apiculata* tends to have the ability to adapt well in the mangrove community in Tutuwoto village. Furthermore, Irwanto (2007) states that a community is said to have high species diversity if the community is composed by many species with an abundance of the same or almost the same species. Conversely, if the community is composed of very few species and if only a few species are dominant, the species diversity is low.

Mangrove vegetation in the village of Tutuwoto, has a diversity index of vegetation types that are included in the high criteria are found in trees, saplings, and seedlings. The high species diversity index at this location is because the mangrove area in this location is still in good condition. Diversity index (H')Tutuwoto mangrove forest is 2, 287. This shows that the mangrove vegeta community is in high condition. The greater the H 'of a community, the more stable the community will be. According to Irwanto (2007), the greater the H 'of a community, the more stable the community will be. The value of H ' = 0 can occur if only one species in one sample and H' is maximal if all species have the same number of individuals and this shows abundance is perfectly distributed. Furthermore Asmaruf (2013), argues that the species diversity index value describes the level of species diversity in a stand. A community is said to have a high species diversity if there are many species with individual numbers relatively evenly. A large diversity index value implies the presence of a large carrying capacity of the environment for life.

The density of mangroves is closely related to stand biomass, where the amount of biomass in an area is obtained from the production and density of biomass through measurements of diameter, height, specific gravity and density of each type of tree. Biomass is a form of organic material produced by plants through photosynthesis. In the process of photosynthesis CO 2 and water are converted into simple carbohydrates produced through plant metabolic processes to be subsequently converted into lipids, nucleic acids, proteins, and organic molecules for example CO2.Organic molecules are then stored in the biomass of leaves, stems, roots, tubers, seeds, tissues, and other organ systems.CO 2absorbed by plants with the help of sunlight then stored in the body's biomass, namely the leaves, stems, roots, branches, fruits, and flowers of the substrate and roots. This process is called the *sequestration* process. The amount of carbon stored in biomass on a land can describe the amount of CO ₂in the atmosphere absorbed by plants (Hairiah and Rahayu, 2007).

Ilmiliyana (2012) states that the greater the potential of stand biomass is caused by the older age of the stand. This is because the diameter of the tree experiences growth through cell division which continues so that new cells are formed which will increase the stem diameter. This growth is called secondary growth which causes greater stem diameter in plants due to cambium division activity. So that the larger the stem diameter, the value of stem biomass increases. Rhizophoramucronata mangrove stems have a hard and rough texture. The stem has a composition of cellulose, hemicellulose, and lingnin. The larger the diameter of the tree the greater the potential for cellulose. Stems are part of plants that can store more carbon than other plants. This is because wood constituents are better than other parts of the tree. The constituent of wood causes many cell cavities in the stem to be composed of wood constituent components rather than water, so the weight of the stem biomass will be greater (Purnobasuki, 2012).

The results showed that the carbon content of the mangrove stem *Rhizophora mucronata* which is a mangrove species that promotes the Tutuwoto mangrove area capable of absorbing the largest carbon in biomass compared to other species, with a value of 40.966.95 Kg for tree level and 11.271.31 Kg for the stake level. This fact proves that there is a correlation with stem diameter, where the greater the stem diameter of *Rhizophoramucronata*, the higher the

value of biomass. Furthermore, the total value of carbon biomass in the stem of all mangrove species in Tutuwoto village is 297,765.93 Kg, the total value of carbon content is 247,845.54 Kg, and the total ability of carbon dioxide absorption of all species reaches 909,557 Kg / ha. With the ability of mangroves to store carbon, the increase in carbon emissions in nature can be reduced.

V. CONCLUSION

Based on the results and discussion in the study it can be concluded:

- 10 species of mangrove trees in Tutuwoto village at tree, sapling and seedling level were found, namely *Rhizophora mucronata* Lamk. , *Rhizophora apiculata* Bl., *Rhizophora stylosa* Griff. , *Ceriops decandra* (Griff.) Ding Hou, *Ceriops tagal* (Perr.) CBRob, *Brugueira gymnorrhiza* (L.) Lamk, *Sonneratia alba* JE Smith, *Xylocarpus granatum* Koen, *Avicennia alba* Bl., *Avicennia marina* (Forsk) Vierh . At the tree, sapling and seedling levels that dominate are *Rhizophora mucronata* Lamk.
- The index of mangrove forest diversity is 2,287. If the results are based on the diversity index criteria, the Tutuwo to village mangrove forest has a diversity index.
- The total value of carbon biomass in the stems of all mangrove species in Tutuwoto village is 297,765.93 Kg, the total value of carbon content is 247,845.54 Kg, and the total ability of carbon dioxide absorption of all species reaches 909,557 Kg / ha. With the ability of mangroves to store carbon, the increase in carbon emissions in nature can be reduced.

REFERENCES

- [1]. Asmaruf, MA, 2013. Structure and Composition of Mangrove Vegetation in the Tahiti Park Area in Bintuni City. Thesis of the Faculty of Forestry, Papua State University, Manokwari.
- [2]. Brown, S., 1997 .Estimating Biomass and Change of Tropical Forest.A. Primary, FAO.Forestry paper No.134.FAO, USA [Online].Available at http://www.fao.org/docrep/w4095e/w4095e00.htm .D iakses Date 20 September 2017.
- [3]. Dombois Dieter Muller and Ellenberg Heinz., 1974. *Aims and Method of Vegetation Ecology* .John Eiley & Sons.Toronto.
- [4]. Gi sen, W. Wulffraat, S. Zieren, M. Scholten, L. 2007. Mangrove Guidebook for Southeast Asia .Thailand: Phra Atit Road, Bangkok.10200.
- [5]. Hairiah, K, and S. Rahayu, 2007 .*Practical Guidelines* for Carbon Measurements Stored in Parts of Land Use.World Agroforestry Center ICRAF Southeast Asia.Bogor.
- [6]. Heriyanto, NM, and Subiandono E. 2012. Composition and Structure of Stands, Biomass, and Potential Carbon Content of Mangrove Forests in Alas Purwo National Park (Composition and Structure, Biomass, and Potential of Carbon Content In Mangroves)Forest At National Park Alas Purwo).Conservation and Rehabilitation Research and Development

Center.Bogor.http://forda-

mof.org/files/03.Heriyanto_klm_.pdf .

[7]. Ilmiliyana, A., Muryono, M. and Purnobasuki, H. 2012. Estimation of Carbon Stocks inRhizophora stylosaTree Standson Camplong Beach, Sampang-Madura Journal.Department of Biology, Faculty of Mathematics and Natural Sciences Ten November Institute of Technology.http://digilib.its.ac.id/public/ITS-

Undergraduate-22852-1508100020 id.pdf.

- [8]. Irwanto, 2007 .Vegetation Analysis for Management of Marsegu Island Protected Forest Areas, West Seram District, Maluku Province. Thesis.Postgraduate School of Gadjah Mada University, Yogyakarta.
- [9]. Komiyama, Akira., Sasitorn, Poungparn ., Shogo, Kato.2005. Common allometric equations for estimating the tree weight of mangroves .Journal of Tropical Ecology (2005) 21 : 471–477.Copyright © 2005 Cambridge University Press.
- [10]. Noor, YR, M. Khazali and INN Suryadiputra.2012. Guide to Introduction to Mangroves in Indonesia .PHKA / WI-IP. Bogor.
- [11]. Purnobasuki, H. 2012. Utilization of Mangrove Forests as Carbon Storage. Article. University of Surabaya PSL.28 (2012). Page 3-5.
- [12]. Sahoo, K and NK Dhal , 2008 .Potential Microbial Diversity in Mangrove Ecosystema : A review.Indian Journal of Marine Science.Vol.38 (2), pp.249-256.
- [13]. Siregar, C. Wibowo, A. Ginoga, K. Fitri, Nurfatriani, I. Dwiprabowo, H. Ekawati,S. Dan Krisnawati, H. 2010. *REED⁺And Forest Gofernance* .Center for Research on Socio-Economic and Forestry PolicyForestry Research and Development Campus.