CONFERENCE PROGRAM

THE
INTERNATIONAL CONFERENCE ON MANGROVES AND ITS RELATED ECOSYSTEMS 2019

ORGANIZED BY
UNSOED
SUPPORTED BY
RISTEKDIKTI, KEMENKOMAR, AND KLHK

Content

Welcome Remarks

by the Chairman of Organizing Committee

On behalf of the Organizing Committee, it is our great pleasure and honor to welcome you all at the International Conference on Mangrove and Its Related Ecosystems (ICoMIRE) 2019 in Purwokerto, Indonesia.

ICoMIRE-2019 organized by the Faculty of Biology, Jenderal Soedirman University, co-hosted by Coordinating Ministry of Maritime Affairs and supported by the Ministry of Research, Technology, and Higher Education and the Ministry of Environment and Forestry of the Republic of Indonesia. This forum facilitates scientists who are interested in mangrove and its related ecosystems to discuss their findings on biological resources, including biotechnology for multiple purposes, i.e., to preserve biodiversity while utilizing it for human welfare. It is also a forum to create or strengthen the networks among the scientists, build up partnerships and exchange ideas with both government and a variety of experienced researchers, practitioners, research institutions, and academia. We accommodate four symposia covering 1) mangrove ecosystem health, 2) mangrove ecosystem management, 3) recent approach to mangrove monitoring, and 4) mangrove interrelated systems. The conference program will be preceeded by workshops and field trip to the mangrove ecosystem, and also the first congress of establishment of Indonesian Mangrove Society.

The ICoMIRE-2019 is attended by speakers and participants from several countries, including Japan, Philippines, Vietnam, Bangladesh, Malaysia, Sudan, and Indonesia. Total articles will be presented are 66, consisting of 56 oral presentations and 10 poster presentations.

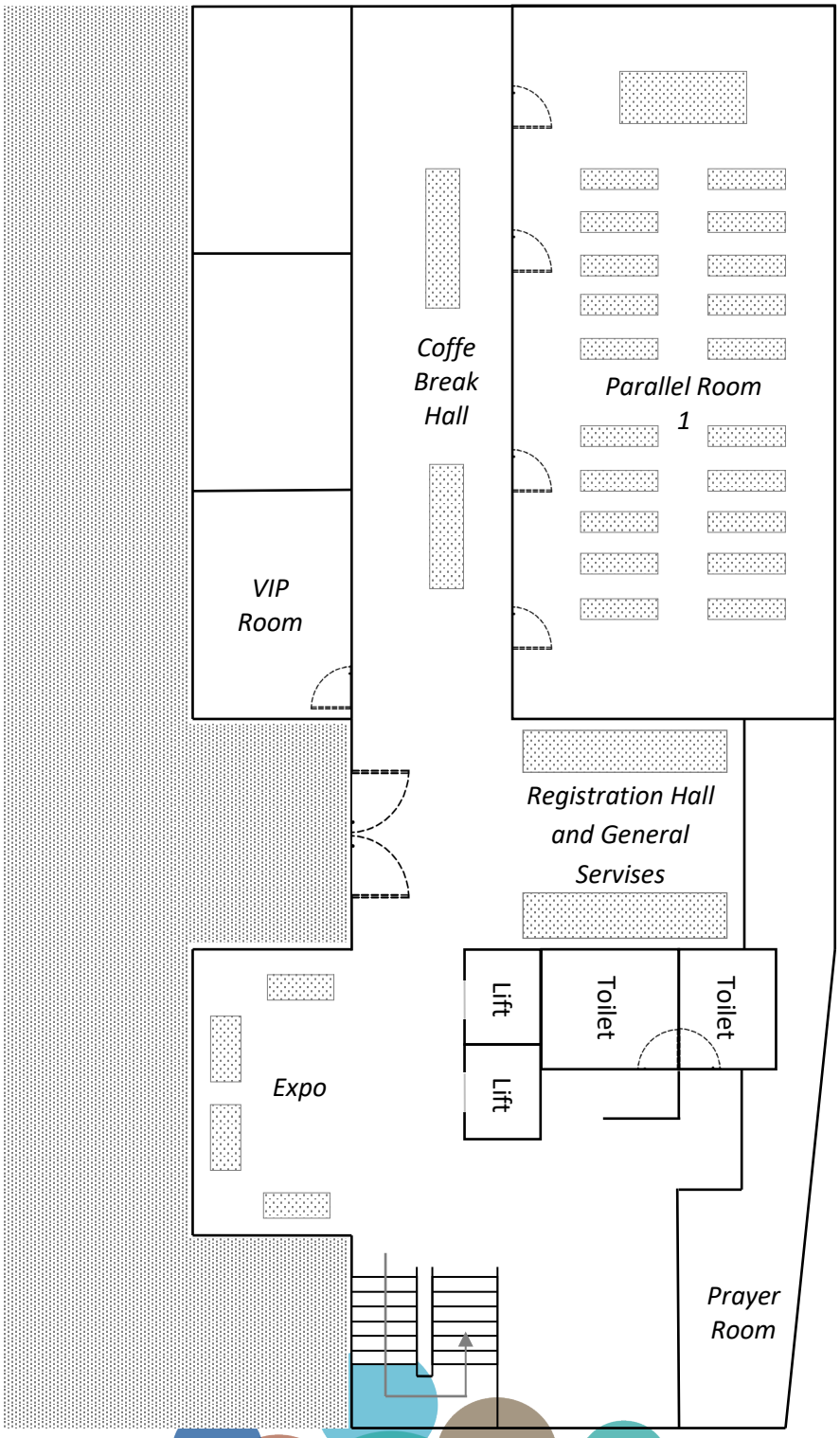
We would like to thanks to the parties that give great support to the conference. We would like to deliver the highest appreciation to keynote speakers: Jenderal TNI (Purn.) Luhut Binsar Panjaitan, M.P.A. (Coordinating Minister of Maritime Affairs), Dr. Ir. Siti Nurbaya Bakar, M.Sc. (Minister of Environment and Forestry), Dr. Jurgenne H. Primavera (Zoological Society of London – Philippines), Dr. Koji Takayama (Kyoto University, Japan); other invited speakers from Vietnam and Indonesia; and all participants, as well as steering and organizing committee.

Finally, we wish you to have a fruitful conference, and I hope you will find your experience in Purwokerto, to be unique, satisfying, and enjoyable.

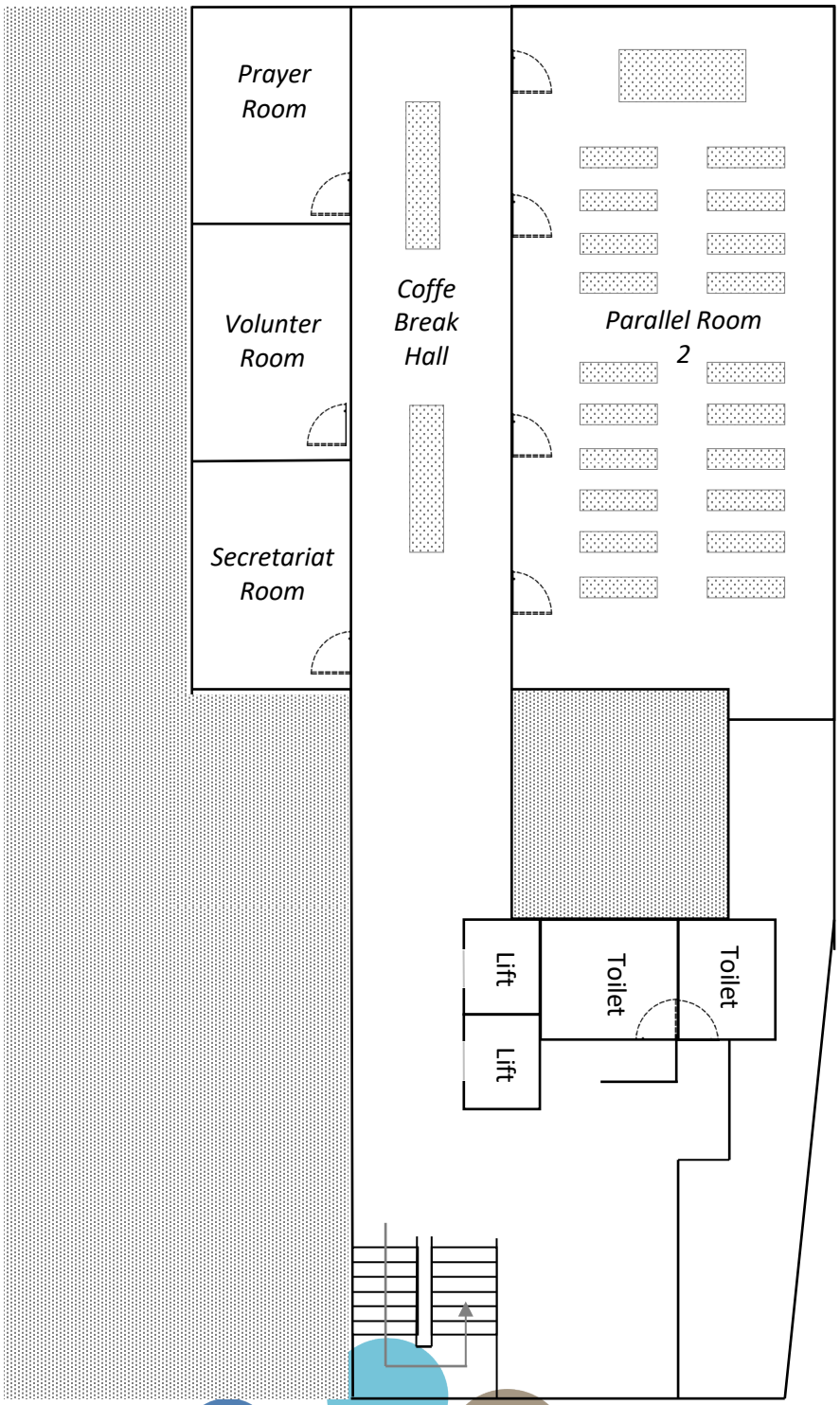
With the warmest welcome,

Dr.rer.nat. Erwin Riyanto Ardli, M.Sc.
Chair
Organizing Committee

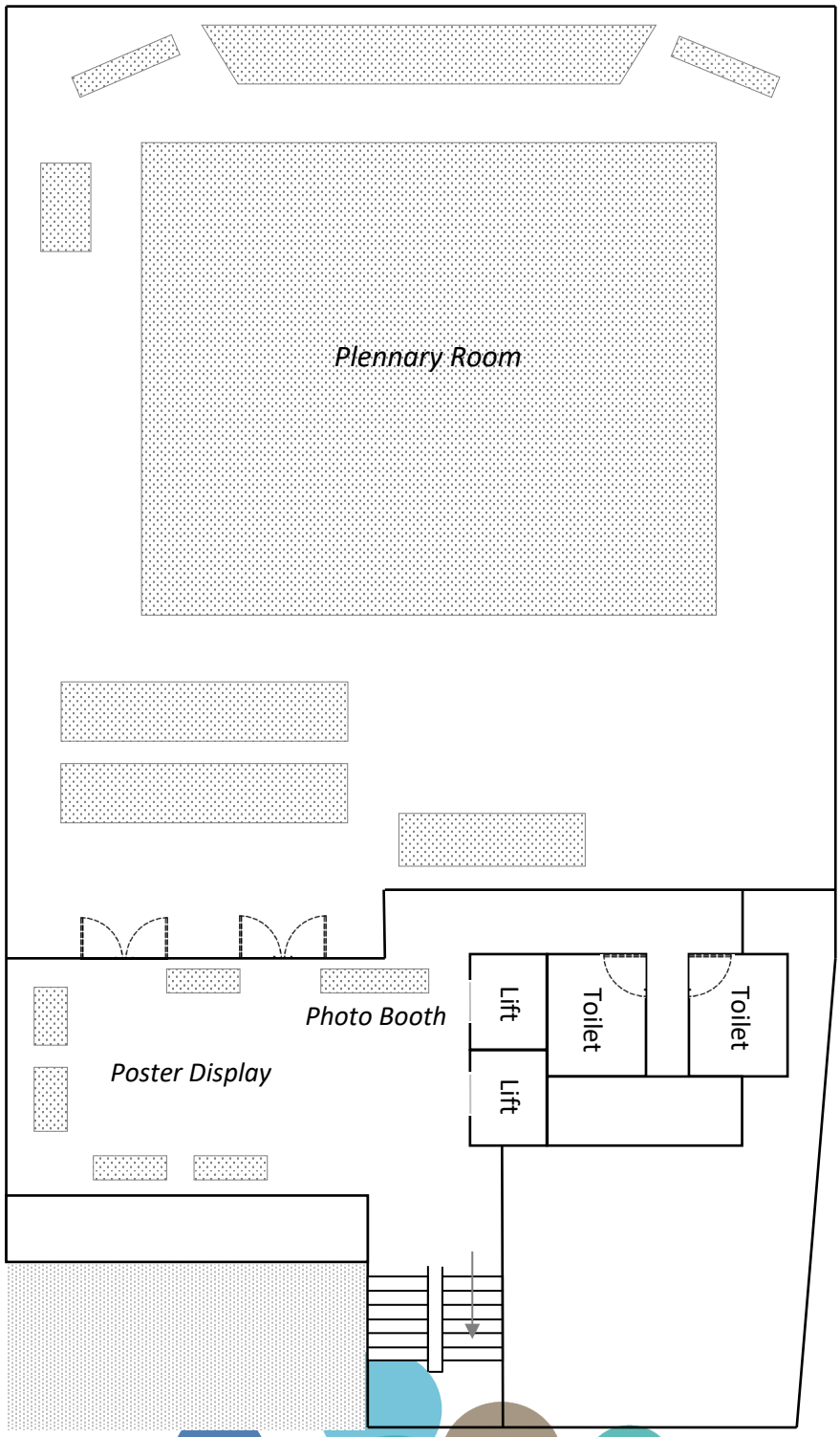
Java Heritage Venue Directory 1st Floor



Java Heritage Venue Directory 2nd Floor



Java Heritage Venue Directory 3rd Floor



Schedule of International Conference of Mangroves and Its Related Ecosystems 2019

Workshop Day-1. Monday, 19 August 2019	
Time	**Event**
08.30 - 09.00	Registration
09.00 - 09.15	Opening by Dean of Faculty of Biology Universitas Jenderal Soedirman
09.15 - 12.00	**Workshop Session 1. Direction of Mangrove Ecosystem Management Policy**
	Material 1. The Policy of Mangrove Ecosystem Rahabilitations by Direktur Konservasi Tanah dan Air, Ditjen PDASHL, KLHK
	Material 2. Acceleration of Mangrove Ecosystem Recovery by Asisten Deputi Lingkungan dan Kebencanaan Maritim, Kementerian Koordinator Bidang kemaritiman
	Material 3. Research and Analyses to Support Mangrove Management Policy by Dean of faculty of Biology Universitas Jenderal Soedirman
	Material 4. Mangrove Conservation Policy in Essential Ecosystem Platform by Direktur Bina pengelolaan Ekosistem esensial, Ditjen KSDAE, KLHK
	Material 5. Best Practices of Sustainable Mangrove Management by Direktur wetland International-IP
	Panel Discussion
12.00 - 13.00	**Lunch Break**
13.00 - 15.30	**Workshop Session 2. Data Analyses**
	Primer v7 Software: Theory and Practices
15.30 - 16.00	**Coffee Break**
16.00 - 17.30	Primer v7 Software: Theory and Practices
19.00 - 21.00	Discussion [optional]

Workshop Day-2, Tuesday, 20 August 2019	
08.30 - 12.00	Primer v7 Software: Theory and Practices
12.00 - 13.00	**Lunch Break**
13.00 - 16.00	Primer v7 Software: Theory and Practices
16.00 - 16.15	**Coffee Break**
16.15 - 16.30	**Closing**

Field Trip Day, Tuesday, 20 August 2019	
Time	**Event**
06.30 - 17.00	Segara Anakan Mangrove, the Tropical Mangrove of the South Java, and mangrove planting

Conference Day-0. Tuesday, 20 August 2019		
Time	**Event**	**Place**
16.00 - 17.30	Registration for the Conference	**1st Floor**
17.30 - 18.00	Prayer Break	**1st Floor & 2nd Floor**
18.00 - 19.30	Welcoming Dinner	**Plennary Room (3rd Floor)**
19.30 - 20.00	Pre-Opening Ceremony	
20.00 - 20.20	Opening Remarks [Dean of Faculty of Biology, Rector of Universitas Jenderal Soedirman, and Coordinating Ministry for Maritime Affairs] | Official Opening	
20.20 - 21.00	**Keynote 1.** Coordinating Ministry for Maritime Affairs	

Conference Day-1. Wednesday, 21 August 2019				
Time		**Event**		**Place**
08.30 - 09.30		**Parallel Session 1**	**Symposium**	
	08.30 - 08.50	[Paper 1] The Condition of Mangrove Ecosystem at Coastal Area of Pangkalpinang City, Bangka Belitung Province **[Irma Akhrianti, Ahmad Gustomi]**	**MEH**	**Parallel Room 1 (1st Floor)**
	08.50 - 09.10	[Paper 2] Study of Mangrove Forest Change Towards the Diversity and Carbon Stock of Mangroves in Segara Anakan, Cilacap **[Nurmalahayati, Erwin Riyanto Ardli, Ani Widyastuti, Edi Yani, Agatha Sih Piranti]**	**MEH**	
	09.10 - 09.30	[Paper 3] Distribution and Characteristics of Nypa Palm (*Nypa fruticans* Wurmb.) in Southern Part of Cilacap Regency **[Pudji Widodo, Sukarsa Sukarsa, Wiwik Herawati, Hexa Apriliana Hidayah, Titi Chasanah, Dian Palupi, Elly Proklamasiningsih]**	**MEH**	
	08.30 - 08.50	[Paper 29] Leaf Morphological Variation of Acanthus in Some Estuarin Areas of Cilacap [**Wiwik Herawati, Pudji Widodo, Sukarsa Sukarsa, Dian Palupi**]	**MEH**	**Parallel Room 2 (2nd Floor)**
	08.50 - 09.10	[Paper 30] Translocation Factor of Zinc (Zn) in Water and Sediment by Root and Stem of Rhizophora sp. at Blanakan Riparian, West Java [**Ananda Rizky Purwaningdyah, Noverita Dian Takarina**]	**MEH**	
	09.10 - 09.30	[Paper 31] Composition and Zoning Pattern of Mangrove Plants in Cilacap Donan Sedimented Land **[Ani Widyastuti, Edy Yani, Erie Kolya Nasution]**	**MEH**	
09.30 - 09.50		**Coffee Break**		**Plenary Room (3rd Floor)**
09.50 - 11.00		**Keynote 2.** Global Phylogeography of Mangrove Plants and Evolutionary Consequences of Extreme Long-distance Sea-drift Seed Dispersal **| Koji Takayama, Kyoto University, Japan**		
11.00 - 12.00		**Keynote 3.** Science-based Mangrove Rehabilitation and Conservation: the Philippine Experience **| Jurgenne H Primavera, Zoological Society of London, Philippine**		
12.00 - 13.00		**Lunch Break**		

13.00 - 16.30		Parallel Session 2	Symposium	
	13.00 - 13.30	**[Invited Speaker]** Evaluation of Mangrove Restoration in the Southern Coastal of Java, Indonesia **[Erwin R Ardli, Universitas Jenderal Soedirman, Indonesia]**	**MEH**	**Parallel Room 1 (1st Floor)**
	13.30 - 13.50	[Paper 4] Relationship between Mangrove Vegetation Parameters and the Abundance of Forest Floor Fauna (Case Study in Pondok Bali Beach, Subang and Pulau Dua Nature Reserve, Serang) **[Silvia Ferdayanti Laoli, Devi Nandita Choesin,Ichsan Suwandhi]**	**MEH**	
	13.50 - 14.10	[Paper 5] Relationship between Vegetation Parameters and Substrate Characteristics in Mangroves of Pondok Bali Beach and Pulau Dua Nature Reserve **[Agnes Rumenta Setianty Samosir]**	**MEH**	
	14.10 – 14.30	[Paper 6] Composition and Characters of Actinomycetes Isolated from Nipah Mangrove Mud, Gastrointestinal, and Feces of Nipah Worm (*Namalycastis rhodhocord*) **[Rikhsan Kurniatuhadi, Ari Hepi Yanti, Tri Rima Setyawati]**	**MEH**	
	14.30 – 14.50	[Paper 7] Bioaccumulation of Heavy Metal in *Avicennia* sp. from Blanakan Riparian, Subang, West Java **[Selsa Artika Ayujawi, Noverita Dian Takarina]**	**MEH**	
	14.50 – 15.10	[Paper 8] The Pathway of Methane Production in Overwash Mangroves **[Yaya Ihya Ulumuddin]**	**MEH**	
	15.10 - 15.30	**Coffee Break**		
	15.30 - 15.50	[Paper 25] Health Assessment of Mangrove Ecosystem in Ayau Islands, Raja Ampat West Papua **[Rudhi Pribadi]**	**MEH**	
	15.50 - 16.10	[Paper 27] Kandelia candel (L.) Reproductive Organs Phenology, at Berbak and Sembilang National Park, South Sumatra **[Hanifa Marisa, Sarno, Mohd. Rasyid Ridho, Dwi Puspa Indriani, Puspita Wulansari]**	**MEH**	
	16.10 – 16.30	[Paper 24] Mangrove root diversity and structure (cone, pencil, prop) effectiveness in accumulating Cu and Zn in sediments and water in Blanakan River **[Noverita Dian Takarina]**	**MEH**	
	13.00 - 13.20	[Paper 32] Microplastic Monitoring Using Combination of FTIR with Multispectral and Sentinel SAR Remote Sensing **[Andri Adi]**	**MEH**	**Parallel Room 2 (2nd Floor)**
	13.20 - 13.40	[Paper 33] Preliminary Detection of Coliform Bacteria and Heavy Metal Pollution in Blanakan River Estuary, Subang, West Java **[Enggit Glory, Noverita Dian Takarina]**	**MIS**	
	13.40 - 14.00	[Paper 34] Evaluation of Coliform Bacteria and Heavy Metal (Cu) in Upstream of Blanakan River, Subang, West Java **[Ghina Nabila, Noverita Dian Takarina]**	**MIS**	
	14.00 – 14.20	[Paper 35] Assesment of Heavy Metals Zn and Coliform in Midstream of Blanakan River, Subang, West Java **[Tika Damayanti, Noverita Dian Takarina]**	**MIS**	
	14.20 – 14.40	[Paper 36] The Potencies of *Streptomyces* spp. Origin of the Mangrove Ecosystem of Segara Anakan **[Dini Ryandini et al.]**	**MIS**	
	14.40 – 15.00	[Paper 37] Exploration of Rhizospheric Soil Fungi From Several Food Crops in Purwokerto **[Endang Sri Purwati, Uki Dwiputranto, Nuraeni Ekowati, Nuniek Ina Ratnaningtyas]**	**MIS**	

15.00 - 15.30	**Coffee Break**		
15.30 - 15.50	[Paper 45] The plankton composition from lagoon to sea water entrance in the west part of Segara Anakan Cilacap **[Moh. H Sastranegara, Dwi S Widyartini, Isna Fitriana, Klausa M Rani]**	**MIS**	
15.50 - 16.10	[Paper 56] Traceability Studies of *Kappaphycus alvarezii* Carrageenan Industries in Indonesia **[Bayu Mangkurat, Maya Puspita, Ratih Pangestuti, A. B. Susanto]**	**MIS**	
16.10 - 16.30	[Paper 46] Marine environment and biodiversity in Sudanese Red Sea **[Hanan Hasan Alsheikh Mahmoud]**	**MIS**	

Time	Event	Place
13.00 – 15.10	**Internal Meeting**	**Plenary Room (3rd Floor)**
13.00 – 13.20	Internal Meeting of the Coordinating Ministry for Maritime Affairs	
13.20 – 13.40	Internal Meeting of the Coordinating Ministry for Maritime Affairs	
13.40 – 14.00	Internal Meeting of the Coordinating Ministry for Maritime Affairs	
14.00 – 14.20	Internal Meeting of the Coordinating Ministry for Maritime Affairs	
14.20 – 14.40	Internal Meeting of the Coordinating Ministry for Maritime Affairs	
14.40 – 15.00	Internal Meeting of the Coordinating Ministry for Maritime Affairs	

Time	Event	Place
18.00 – 19.15	**Dinner**	**Plenary Room (3rd Floor)**
19.15 – 21.45	**Indonesian Mangrove Society (IMS) Congress**	
19.15 – 19.25	Congress Opening	
19.25 – 19.40	Delivery of the Congress Regulations	
19.40 – 21.20	Discussion of the IMS Charter	
21.20 – 21.30	Reading of the Congress Results	
21.30 – 21.45	Congress Closing	

Conference Day-2. Thursday, 22 August 2019				
Time		**Event**		**Place**
08.00 - 09.40		**Parallel Session 3**	**Symposium**	
	08.00 - 08.20	[Paper 9] A Quantitative Relationship between Environmental Setting and Mangrove Community in Bintan Island, Indonesia **[I Wayan Eka Dharmawan, Dede Falahudin]**	**MEH**	**Parallel Room 1 (1st Floor)**
	08.20 - 08.40	[Paper 10] Mangrove Community Structure in Papuan Small Islands **[I Wayan Eka Dharmawan]**	**MEH**	
	08.40 - 09.00	[Paper 11] Conditions and Status of Mangrove Resources in The Coastal Area of Lombok Island, West Nusa Tenggara **[Hilman Ahyadi, Lalu Ahmad Tantilar]**	**MEH**	
	09.00 - 09.20	[Paper 23] The Recent Status of Development of Mangrove Health Index based on Remote Sensing Data **[Gathot Winarso]**	**MEH**	
	09.20 - 09.40	[Paper 13] Bird Prefence in using Mangrove Vegetation at Pulau Dua Nature Reserve, Banten **[Dinda Safira Fauziah]**	**MEM**	
	08.00 - 08.20	[Paper 38] Effect of Temperature and Zinc (Zn) Temporal Variation in Water on Size Distribution of River Catfish (*Mystus* sp.) at Blanakan River, West Java **[Dewi Ayu Sekarini, Noverita Dian Takarina]**	**MIS**	**Parallel Room 2 (2nd Floor)**
	08.20 - 08.40	[Paper 42] Size Variation of River Catfish (*Mystus* sp.) and It's Relationship to Cadmium (Cd) Heavy Metal and pH in Blanakan River, Subang **[Intan Claudya Anjani, Noverita Dian Takarina]**	**MIS**	
	08.40 - 09.00	[Paper 43] Sexual Dimorphism Characterization of Kurau Fish (*Philimanus perplexa* Feltes, 1991) **[Sri Sukmaningrum, Suhestri Suryaningsih, Ayu Nurhaeni]**	**MIS**	
	09.00 - 09.20	[Paper 39] Macrozoobenthos Diversity as Bioindicator of Metal Pollution in Segara Anakan **[Sri Lestari, Teguh Arief Rahmanto]**	**MIS**	

Time		Event		Place
09.40 - 10.00		**Coffee Break**		**Plenary Room (3rd Floor)**
10.00 - 11.00		**Keynote 4. Ministry of Environment and Forestry**		
11.00 - 12.30		**Invited Pleno** **Topic:** - World Mangrove Center - Institution strategic planning, Programs related to mangrove and marine resources 1. **Dr. Syaiful Anwar** Ministry of Environment and Forestry 2. **Dr. Sahat** - Coordinating Ministry for Maritime Affairs 3. **Prof. Rifda Naufalin,** Institute of Research and Community Services Universitas Jenderal Soedirman		
12.30 - 12.40		**Quickfire Poster Promotion**		
12.40 - 13.30		**Lunch Break and Poster Session**		
	[Monitor 1]	[Poster 1] The Composition of Mangrove Association Mollusks in Natural and Rehabilitation Mangrove Ecosystem at South Lombok Seashore **[Laily Hunawatun Sani, Dining Aidil Candri, Hilman Ahyadi, Baiq Farista]**	**MEH**	
	[Monitor 1]	[Poster 2] The Preliminary Assessment of Mangrove Status at Payung Island in Musi Estuary, Indonesia **[Tengku Zia Ulqodry, Andi Agussalim, Indah Widiastuti, Riris Aryawati, Andreas Eko Aprianto]**	**RAM**	
	[Monitor 2]	[Poster 3] Mangrove Ecosystem as A Blue Carbon Asset **[Lady Hafidaty Rahma Kautsar]**	**RAM**	
	[Monitor 2]	[Poster 4] An Analysis Model of The Change Mangrove Ecosystem in Cendi Manik village, Sekotong, West Lombok **[Kholish Supiyani]**	**RAM**	
	[Monitor 3]	[Poster 5] Estimation of Carbon Deposits in Mangrove Stands Biomass at Bagek Kembar Mangrove Ecotourism Sekotong West Lombok **[Dining Aidil Candri, Athiefah Ifah, Baiq Farista, Arben Virgota, Hilman Ahyadi]**	**RAM**	
	[Monitor 3]	[Poster 6] Enzymatic activity profile of *Streptomyces* spp. isolated from the mud of the nipah mangrove area in Sungai Kakap sub-district, West Kalimantan **[Ari Hepi Yanti, Tri Rima Setyawati, Rikhsan Kurniatuhadi]**	**MIS**	
	[Monitor 4]	[Poster 7] The Diversity of Fish in Cikaniki River, Bogor Regency **[Mia Azizah]**	**MIS**	
	[Monitor 4]	[Poster 8] Pathogenicity profile of indigenous bacteria isolated from gut and feces of nipah worm (*Namalycastis rhodochorde*) **[Rikhsan Kurniatuhadi, Tri Rima Setyawati, Ari Hepi Yanti]**	**MIS**	
	[Monitor 5]	[Poster 9] The Induction of Asexual Reproduction on Holothuria scabra and Bohadschia marmorata: The Conservation Effort in Tanimbar Archipelago, Maluku **[A. Dimas Cahyaning Furqon, Firdaus Maulana, Endang Triyani Prihantari, Romanus Edy Prabowo]**	**MIS**	
	[Monitor 5]	[Poster 10] Community structure of Trepang at Namtabung, Selaru Island, Maluku, Indonesia **[Firdaus Maulana, Romanus Edy Prabowo, Erwin Riyanto Ardli]**	**MIS**	

Time		Event		Place
13.30 - 15.00		**Parallel Session 4**		
	13.30 - 14.00	**[Invited Speaker]** Forty Years Mangrove Rehabilitation and Management of Can Gio Mangrove Biosphere Reserve, Ho Chi Minh City, Viet Nam (1978 – 2018) **[Vien Ngoc Nam, Long Nam University Vietnam]**	**MEM**	**Parallel Room 1 (1st Floor)**
	14.00 - 14.20	[Paper 14] The Dynamics of Coastline and Mangrove Ecosytems in Coastal Area of Mangkang Kulon Subdistrict, Semarang **[Nana Kariada Tri Martuti]**	**MEM**	
	14.20 - 14.40	[Paper 15] The Mangrove Conditions Post Restoration by Planting and Enrichment Pattern in ex-Fish Ponds at Berbak and Sembilang National Park, South Sumatera **[Tengku Zia Ulqodry]**	**MEM**	
	14.40 - 15.00	[Paper 16] Design of a Mangrove Greenbelt at a Permanently Waterlogged Area in the North Coast of Subang District, West Java **[Devi Nandita Choesin, Dinda S Fauziah, Syntia Ayu Kartika, Silvia F Laoli, Agnes RS Samosir, Ichsan Suwandhi]**	**MEM**	
	13.30 - 14.00	**[Invited Speakers]** Topic: Ecophysiology pof Coral Reefs **[Suharsono, LIPI]**	**MIS**	**Parallel Room 2 (2nd Floor)**
	14.00 – 14.20	[Paper 44] Effect of Salinity and Zinc (Zn) Heavy Metal on Water towards Size Distribution of River Catfish (*Mystus* sp.) at Blanakan River, Subang, West Java **[Agatha Oktavina, Noverita Dian Takarina]**	**MIS**	
	14.20 - 14.40	[Paper 40] Polychaete Nereis sp. in the Coastal Farming of Jeruklegi, Cilacap as Potential Prawn Feed **[Eko Setyo Wibowo, IGA Ayu Ratna Puspitasari, Endah Sri Palupi, Atang]**	**MIS**	
	14.40 - 15.00	[Paper 41] A New Mangrove Intertidal Barnacle of Segara Anakan Cilacap **[Romanus Edy Prabowo]**	**MIS**	
15.00 - 15.20		**Coffee Break**		
15.20 - 16.40		**Parallel Session 5**		
	15.20 - 15.40	[Paper 17] Mangrove Governance: Establish a new paradigm of mangrove management " from village to the world" **[Yonvitner]**	**MEM**	**Parallel Room 1 (1st Floor)**
	15.40 - 16.00	[Paper 18] Carbon Dynamic of Restored Mangrove at ex-Brackish Pond in Northern Sumatra: Implication for Mitigation Climate Change **[Onrizal, Alfan Gunawan Ahmad, Achmad Siddik Thoha]**	**MEM**	
	16.00 - 16.20	[Paper 19] Analysis of Visitor Perceptions of Additional Cost of Admission Ticket for Conservation Program at Brebes Mangrove Ecotourism **[Cahyadi Adhe Kurniawan]**	**MEM**	
	16.20 - 16.40	[Paper 26] Preliminary assessment of mangrove ecosystem health using multitemporal high resolution satellite images: Case of mangrove rehabilitation areas in Indonesia **[Rinny Rahmania, Terry Louis Kepel, Luh Putu Ayu Savitri Chitra Kusuma, Taslim Arifin]**	**MEM**	
	15.20 - 15.40	[Paper 47] Molecular Profile of *Synedrella nodiflora* (L.) Gaertn from Three Different Altitudes Based on IGS atpB- rbcL **[Agus Hery Susanto, Murni Dwiati]**	**MIS**	**Parallel Room 2 (2nd Floor)**
	15.40 - 16.00	[Paper 48] Morphological and Physiological Adaptation of *Synedrella nodiflora* (L.) Gaertn in Various Altitudes **[Murni Dwiati, Agus Hery Susanto]**	**MIS**	
	16.00 - 16.20	[Paper 49] Ability of Road Shade Plants As Pb Absorbent in Jalan Jenderal Soedirman Purwokerto **[Siti Samiyarsih, Slamet Santoso, Sri Lestari, Dayu Ardiyuda, Nur Fitrianto]**	**MIS**	

	16.20 - 16.40	[Paper 50] Chlorophyl contain of *Ipomoea pes-caprae* (L.) in Cilacap Coastal Areas in Relation to Habitat **[Elly Proklamasiningsih, Pudji Widodo**]	**MIS**	

Conference Day-3. Friday, 23 August 2019				
Time		**Event**		**Place**
08.30 - 10.10		**Parallel Session 6**		
	08.30 - 08.50	[Paper 20] Ba(NO3)2 Acetone Method Adapted for Nitrateisolation from Fresh and Saline Water in Nitrogen Isotope Analysis **[Ferdouse Zaman Tanu, Yasuhiro Nakanishi]**	**RAM**	**Parallel Room 1 (1st Floor)**
	08.50 - 09.10	[Paper 21] Identification of Changes in Shoreline and Mangrove Area in the Coast of Legon Kulon Sub-District, Subang District, West Java **[Syntia Ayu Kartika]**	**RAM**	
	09.10 - 09.30	[Paper 22] Crowdsourcing Data Collection as an Optimatization Method for Mangrove Rehabilitation **[Ardha Yosef Retmana, Bayu Mangkurat]**	**RAM**	
	09.30 - 09.50	[Paper 28] Early study on the mangrove coverage condition in the West Coast of North Sumatera Province, Indonesia **[Joko Samiaji]**	**MEH**	
	09.50 -10.10	[Paper 12] Nursery Evaluation of Avicennia marina (Forssk.) Vierh. and Bruguiera cylindrica (L.) Blume in Different Substrates [**Frank Paolo Jay Babate Albarico, Rogelio Q. Gacutan**]	**MEH**	
	08.30 - 08.50	[Paper 51] Ornamental Marine Fish from the South Coast of Cilacap Central Java **[Agus Nuryanto, Dian Bhagawati, Kusbiyanto]**	**MIS**	**Parallel Room 2 (2nd Floor)**
	08.50 - 09.10	[Paper 52] Phytoremidiation of Liquid Waste Electroplating using *Salvinia* sp. **[Hernayanti, Sri Lestari]**	**MIS**	
	09.10 - 09.30	[Paper 53] Batik Dye Decolorization by Immobilized Biomass of *Aspergillus* sp. **[Ratna Stia Dewi, Aris Mumpuni**]	**MIS**	
	09.30 - 09.50	[Paper 54] Self-Feeding Selection Behavior in German Cockroaches, *Blattella germanica* L. (Dictyoptera:Blattellidae) **[Trisnowati Budi Ambarningrum, Edi Basuki, Rokhmani]**	**MIS**	
	09.50 - 10.10	[Paper 55] Preference of Termites to Habitat under The Trees along Altitudinal Gradient in Western Slope of Mount Slamet Central Java **[Hery Pratiknyo, Trisnowati Budi Ambarningrum, Endang Ariyani Setyowati, Titik Indrawati]**	**MIS**	
10.10 - 10.30		**Coffee Break**		
10.30 - 11.00		**Closing**		

Keynote Paper:

Global phylogeography of mangrove plants and evolutionary consequences of extreme long-distance sea-drifted seed dispersal

Koji Takayama

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The global distribution of mangroves is attributed to interactions between geographical barriers and long-distance seed dispersal via ocean currents, which are manifest in species distribution, genetic structuring, and evolutionary history. Extreme long-distance dispersal (ELDD), especially, is an important process in mangrove biogeography, because such events can lead to changes in distribution ranges of mangrove species, to rapid diversification due to founder effects, and to secondary contact with sibling species. Revealing the evolutionary consequences of ELDD in mangrove species, we conducted phylogeographic chloroplast and nuclear DNA sequencing and microsatellites analyses in genus *Rhizophora* and *Hibiscus* species collected worldwide. Both genera have pantropical distribution in the coastal area. According to the current distribution patterns of each species in *Rhizophora*, the East Pacific and African continent are the biggest geographical barriers for dispersal. On the other hand, in *Hibiscus*, the East Pacific as well and Atlantic are the ones. The global phylogeographic analyses indicated the presence of ELDD in each genus and the difference of these consequences. In the case of *Rhizophora*, the genetic disjunction between Indo-West Pacific (IWP) and Atlantic-East Pacific (AEP) was strongly supported by all molecular markers. Molecular data also supported that both IWP and AEP lineages met in South Pacific Islands by EDLL after long-term isolation (11 million years), and then produced the sterile hybrid, *R.* × *selala*, in these areas. In the case of *Hibiscus*, the genetic disjunction between Old World and New World species was strongly supported by nuclear DNA markers but not by chloroplast ones. Significant introgression between the two species can be suggested in Atlantic populations of the New World, which might be caused by past EDLL from the African continent. These results suggested that EDLL can bring different evolutionary processes dynamics depending on the development of reproductive isolation.

Invited Paper:

Forty years Mangrove Rehabilitation and Management of Can Gio Mangrove Biosphere Reserve, Ho Chi Minh City, Viet Nam (1978 – 2018)

Vien Ngoc Nam

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Can Gio, a suburban district of Ho Chi Minh City (HCMC), covers an area of ~72,000 ha. It is the poorest district of the city with a population of ~80,000. Can Gio (formerly Rung Sat) began to be widely chemicals spraying, especially on waterways along the river. As a result, 57% of mangrove forests in the district were destroyed. The mangrove rehabilitation program started in 1978 with the vast track of monospecific *Rhizophora apiculata* plantations, main species. Application of Landsat remote sensing image to evaluate the change of mangrove forest from 1973 to 2018 in Can Gio District shows 20,280 ha to 36,651 ha of mangrove respectively. There are 179 forestry households signed the contract to protect mangrove and get monthly salary. The reforestation effort brought vast ecological improvement to the mangrove environment and its associated biodiversity. The planted mangrove forests are now teeming with fauna such as pythons, wild boars, crocodiles, and various birds. The reforestation program in Can Gio (1978-1991) was aimed at establishing mangrove plantations for sustained production of fuelwood, charcoal, and poles. Protected Forest Management (from 1991-2000) combined the protective roles of mangrove forests with organized production activities to improve the living standards of the local people. With the designation of Can Gio into a Mangrove Biosphere Reserve (MBR) in 2000, the management was transferred to Protection Forest Management Board (PFMB). Since then, growing forests flourished with richer biodiversity, and there was better environmental protection for HCMC and its suburbs. Can Gio is best management of mangrove in Viet Nam.

Key words:

Mangrove Rehabilitation and Management**;** Can Gio Biosphere Reserve.

Paper 1: Mangrove Ecosystem Health

The Condition of Mangrove Ecosystem at Coastal Area of Pangkalpinang City, Bangka Belitung Province

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Pangkalpinang is the provincial center of Bangka Belitung Islands which has an area of 89.4 km^2 with a coastline of 36 km^2 and overgrown by mangrove ecosystems which tend to be varied. As provincial capitals, development activities and equitable development in Pangkalpinang City especially the development of industrial estates and warehouses also increasing. Besides the high anthropogenic activity in coastal areas, the proliferation of port activities, and the existence of mangrove land conversion activities are thought to affect the existence / survival of mangroves in the coastal areas of Pangkalpinang City. Therefore there is a need for research related to the assessment of mangrove ecosystem conditions in the Pangkalpinang Coastal Area. This study aims to assess the status of mangrove conditions in the research area. This study uses a purposive sampling method. Data was collected using the line and plot transect method (LTP) and hemisphere photography agreed upon for mangrove monitoring in the COREMAP-CTI. The results showed that in general the condition of mangroves in the Coastal Area of Pangkalpinang City was still relatively good based on the Decree of the Minister of Environment No. 201 of 2004.

Keywords:

Pangkalpinang; Mangrove Condition; Hemispherical Fotography

Paper 2: Mangrove Ecosystem Health

Study of Mangrove Forest Change Towards the Diversity and Carbon Stock of Mangroves in Segara Anakan, Cilacap

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Segara Anakan Cilacap, being the largest mangrove area in Java Island, is one example of a degraded area which is mostly caused by land conversion to farming lands, ponds, housing, and industrial properties affecting the mangrove community in various ways. The objective of this research is to know the diversity and carbon stock of mangroves in different types of environmental change in Segara Anakan, Cilacap as well as to know the correlation between environmental factors in different types of environmental change with diversity and carbon stock of mangroves in Segara Anakan, Cilacap. This research was conducted using clustered sampling from 8 stations located at the ex rice field, ex shrimp pond, illegal cutting area, and forest. Highest carbon stock and diversity index (H) occurred at forest habitats with a total values of 34 tons.ha^{-1} and 1.80, respectively. Correlation values between diversity and environmental factors ranged from 0.172 to 0.449 whereas those between carbon stock and environmental factors range from 0.065 to 0.724.

Keywords:

Segara Anakan Cilacap; Mangrove diversity; Carbon stock; Land conversion

Paper 3: Mangrove Ecosystem Health

Distribution and Characteristics of Nypa Palm (*Nypa fruticans* Wurmb.) in Southern Part of Cilacap Regency

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Nypa palm (*Nypa fruticans* Wurmb.) is a kind of palm growing very well in the brackish water forest or along the river near its mouth. In some countries, it is considered to be invasive plant, so that its development shound be controlled. The aim of this study is to find out the morphological distribution of the nypa along Cilacap and Kebumen coastal areas of Central Java. The method used in this study is survey. The sampling was taken by stratifying the river based on distance from the sea namely: 0-<50 m, 50-<100 m, 150-<200 m, 200-<250 m, >250 m from the sea water. The other enviromental factors meassured included water salinity, water pH, soil pH, and soil type. The nypa characteristics meassured included leaf morphology and size, and plant individual density. The results of this study based on the distance from the coastline showed that: 1) The nypa is mainly distributed a long the river with Grey regosol and Aluvial Hydromorph soils; 2) erect leafed nypa are present close to the water while the curved leafed nypa were presence in the inner part of the areas; 3) Based on the midrib color, the young, medium, and old nypa leaves tend to have green, greenish yellow, and orange midrib respectively. 4) Based on survivability, the nypa seeds tend survive in water further inland.

Keywords:

estuarine; brackish water; mangrove; morphology; nypa; distrbution

Paper 4: Mangrove Ecosystem Health

Relationship between Mangrove Vegetation Parameters and the Abundance of Forest Floor Fauna (Case Study in Pondok Bali Beach, Subang and Pulau Dua Nature Reserve, Serang)

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Mangrove forests are very complex coastal ecosystems containing various plant and animal communities, including forest floor fauna. The parameters of mangrove vegetation are thought to have a close relationship with the abundance of forest floor fauna. Therefore, the degradation of ecosystems and the reduction in mangrove vegetation, as is the case in the coastal areas of Java, can disrupt the balance of mangrove ecosystems and the presence of forest floor fauna. This study aimed to determine the composition of mangrove vegetation in two mangrove locations on the north coast of Java Island, i.e., Pondok Bali beach in Subang, West Java and Pulau Dua Nature Reserve in Serang, Banten; and determine the relationship of various vegetation parameters and the abundance of forest floor fauna. Vegetation and floor fauna data were obtained by using sampling plots of size 10 m x 10 m determined by purposive sampling. The vegetation parameters measured were tree density, root density, and canopy cover. The forest floor fauna in this study was limited to Molluscs and Crustaceans. The relationship between vegetation parameters and abundance of floor fauna was analyzed by Pearson correlation test and multiple linear regression using SPSS software. Results indicate that the two locations differ in vegetation and floor fauna community structure. Pondok Bali beach has a homogeneous plant composition, consisting of only two species, i.e., *Avicennia marina* and *Rhizophora mucronata*. *Avicennia marina* dominated at tree level (Importance Value Index 172%), while *Rhizophora mucronata* was dominant at the sapling and seedling levels (IVI 154% and 189%). Pulau Dua Nature Reserve in general has a more diverse species composition, characterized by five plant species, i.e., *Avicennia marina*, *Rhizophora apiculata, Bruguiera cylindrica, Excoecaria agallocha,* and *Lumnitzera racemosa*, however *Avicennia marina* dominates at all levels (IVI 180%, 88% and 103%). Pondok Bali Beach has higher abundance of floor fauna than Pulau Dua Nature Reserve, i.e., 16.7 ind/m^2. The floor fauna found at Pondok Bali beach consists of five species of Crustaceans and five species of Molluscs with abundance of 6.6 ind/m^2 and 10.1 ind/m^2 respectively. The abundance of floor fauna in Pulau Dua Nature Reserve is 8.6 ind/m^2. The floor fauna found in Pulau Dua Nature Reserve consists of two species of Crustaceans and six species of Molluscs with abundance of 0.35 ind/m^2 and 8.3 ind/m^2 respectively. Results of Pearson correlation tests suggest a very strong relationship between two vegetation parameters and abundance of floor fauna (i.e., tree density, R = 0.703 and root density, R = 0.737), while the canopy cover was not related to abundance of floor fauna (R = –0.029). Results of multiple linear regression analysis indicated that tree density and root density affected the abundance of floor fauna (R = 0.829 and R^2 = 0.687). The regression equation for this relationship is Y = –7.79 + 0.015 + 0.07 (with X_1 tree density; X_2 root density) which indicates that higher density of trees and roots will increase the abundance of fauna in the forest floor.

Keywords:

vegetation; tree density; root density; canopy cover; mangrove; molluscs; crustaceans

Paper 5: Mangrove Ecosystem Health

Relationship Between Vegetation Parameters and Substrate Characteristics in Mangroves of Pondok Bali Beach and Pulau Dua Nature Reserve

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Mangrove substrate is the growing media for mangrove vegetation, and is characterized by water saturation, high salinity, presence of coarse particles, and high organic matter content. Mangrove vegetation can grow in a variety of substrate textures (sand, silt, and clay) which affect the organic matter contained within them. Therefore, mangrove substrate is a determining factor in reforestation efforts. The objectives of this study was to identify substrate characteristics, measure vegetation parameters, and then determine the relationship between vegetation parameters with characteristics of mangrove substrate. The study was conducted in two locations, i.e., Pondok Bali Beach in Subang, West Java as example of a degraded mangrove ecosystem and Pulau Dua Nature Reserve in Serang, Banten as representation of a natural mangrove ecosystem that is still in relatively good condition. The method used in collecting data was by making vegetation analysis plots using purposive sampling with plot size of 10x10 m^2. Vegetation data were measured directly in the field, while substrate samples were taken to the laboratory for analysis. The relationship between vegetation parameters and characteristics of mangrove substrate was tested by correlation analysis using SPSS software. Results showed that the two locations differed in term of vegetation parameters and substrate characteristics. From the vegetation aspect, Pondok Bali Beach has a higher root density compared to Pulau Dua Nature Reserve, respectively valued at 148.6 roots/m^2 and 83.6 roots/m^2. Pondok Bali Beach also has a larger canopy volume compared to Pulau Dua Nature Reserve, with a value of 8274.6 m^3/ha and 4,990.3 m^3/ha respectively. In terms of substrate, Pondok Bali Beach tends to have substrate texture in the form of sand and loam, while Pulau Dua Nature Reserve tends to be clay and silt; and both locations have low salinity. Results of statistical analysis show that substrate organic matter and salinity are positively correlated with root density, respectively with R values of 0.657 and 0.416; and positively correlated with crown volume, respectively with R values of 0.650 and 0.634. In addition, pH is negatively correlated with root density and crown volume, with R values of –0.605 and –0.759 respectively. Judging from the characteristics of the substrate and vegetation parameters, it can be concluded that the characteristics of substrate (texture, organic content, pH and salinity) are related to vegetation parameters, so that changes in the characteristics of substrate will have an impact on vegetation parameters.

Keywords:

substrate characteristics, organic matter, pH, salinity, root density, crown volume

Paper 6: Mangrove Ecosystem Health

Composition and Characters of Actinomycetes Isolated from Nipah Mangrove Mud, Gastrointestinal, and Feces of Nipah Worm (*Namalycastis rhodhocorde*)

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The nipah worm (*Namalycastis rhodochorde*) is one of the *polychaeta* species lived in the *Nypha fruticans* mangrove mud of West Kalimantan that has potentialy to be cultivated. Feed aspect is an important part of cultivation, through improving the quality of feed by giving probiotics that are able to produce secondary and primary metabolites derived from the microflora of nipah worms. These metabolites are expected to increase their immunity and biomass. The purpose of this study was to determine the composition and characteristics of actinomycetes derived from mangrove substrate, gastrointestinal and feces of nipah worm. Isolation of actinomycetes was carried out by pour plate method on Starch Casein and Glycerol Asparagine Agar. Characterization process was carried out by growing isolates on ISP2, ISP3, ISP4 and ISP5 agar with the addition of starch, cellulose, and milk casein based on Bergey's Determinative Bacteriology protocol for actinomycetes. The results showed that the highest actinomycetes density was found in mangrove mud (3.3×10^4 CFU/10 g). Twelve actinomycetes had been characterized. Seven isolates from mangrove substrate, four isolates from feces and one isolate from the gastrointestinal tracts. All isolates were closely related to *Streptomyces* genera.

Paper 7: Mangrove Ecosystem Health

Bioaccumulation of Heavy Metal in *Avicennia* sp. from Blanakan Riparian, Subang, West Java

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The heavy metals from aquatic environment can be transported, absorbed, and stored in mangrove tissues. This study aims to assess accumulations of Cu and Zn in the sediment, root and stem of *Avicennia* sp. as affected by human activity in Blanakan riparian, West Java. *Avicennia* sp. root, stem, water, and sediment samples were collected from 2 stations located in Blanakan riparian. The concentrations of Cu and Zn in samples were measured using an atomic absorption spectrophotometer (AAS). Bioconcentration factor (BCF) and translocation factor (TF) equations were used to analyse the Cu and Zn accumulations in *Avicennia* sp. Based on the sediment quality guidelines, the sediment samples were not polluted for Cu (2.23–2.26 mg/kg) and moderately polluted for Zn (92.83–95.86 mg/kg). Moreover, the Cu and Zn in the water have BCF values of root ranging from 257.5–295 and 97.07–390.29, while BCF values of stem ranging between 590–990 and 90.23–330.21, respectively. Furthermore, the Cu and Zn in the sediment have BCF values of root ranging from 0.23–0.26 and 0.30–0.57, while BCF values of stem ranging between 0.53–0.88 and 0.30–0.48, respectively. In addition, the TF values ranged from 2.29–3.36 for Cu and 0.85–0.93 for Zn. To summarize, the root and stem of *Avicennia* sp. have the ability to translocate Cu from water and sediment in Blanakan riparian.

Keywords:

Bioconcentration factor; *Avicennia* sp.; Zinc; Copper; Translocation factor

Paper 8: Mangrove Ecosystem Health

The Pathway of Methane Production in Overwash Mangroves

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Methane (CH_4) production or methanogenesis in wetland ecosystems is a key process in the CH_4 emission, one of the strongest greenhouse gases. Methanogens the microorganism involved in methanogenesis in mangrove wetlands are commonly thought to be out-competed by sulphate-reducing bacteria (SRB) in saline environments, which are rich in sulphate (SO_4^{2-}) content. This is due to the common group of methanogen (i.e. acetotrophic and hydrogenotrophic methanogens) use similar substrates with SRB. However, there are methylotrophic methanogens that may co-exist with SRB because these microorganisms use different substrates. Our study aims to investigate methanogenic pathways in overwash mangrove forests, which have much less freshwater inputs. We combined analysis of sediment geochemistry, microbial functional groups and potential CH_4 production to elucidate which pathways of methanogenesis were occurring in the mangrove sediment or dominant. The result of sediment geochemistry showed that SO_4^{2-} wasabundance in the sediment pore-water but it apparently has not affected to CH_4 production in that sediment. According to qPCR analysis, the abundance of methanogens and SRB in the sediment samples ranged within the similar order (i.e. 72 - 6 × 10^5 CFU g^{-1} sediment and 2 × 10^2 - 2 × 10^5 CFU g^{-1} sediment, respectively). Further analysis indicated that methylotrophic methanogen is the most abundance among the methanogen groups. Moreover, the analysis of potential CH_4 production showed that methanogenesis through methylotrophic pathway was more favourable than the others. Therefore, this study confirmed the importance of the methylotrophic pathway for CH_4 production in overwash mangrove environments. Furthermore, our study may change the view on mangrove ecosystems as a minor source of CH_4 emission.

Keywords:

methane production; methanogenesis; methanogens; methylotrophic

Paper 9: Mangrove Ecosystem Health

A Quantitive Relationship between Environmental Setting and Mangrove Community in Bintan Island, Indonesia

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Mangrove is the most productive ecosystem in the coastal area and found vastly in Indonesia. The ecosystem condition has considered being related to environmental settings. Riverine and estuarine mangrove are unique since they have lower salinity and higher carbon and nutrient content than the oceanic sites. A correlative study was conducted along Bintan island aimed to analyze the relationship between mangrove community structure and environmental parameters. As many as 27 10m-x-10m-quadratic plots were scattered in three mangrove forests, such as Kawal, Pengudang, and Lagoi. Hemispherical photography and vegetation data were applied for collecting mangrove community size. On the other hand, soil samples were collected in for organic concentration and soil particle composition analysis. Moreover, we also conducted real-time in-site analysis for pH and salinity of pore-water. The results found that organic matter content had a strong correlation (Pearson: Sig. <0.01) to mangrove canopy coverage, tree density, and diameter size. The silkier substrate tended to have lower mangrove canopy coverage, fewer tree numbers, and larger trunk size. Tree diameter also was influenced by clay and sand concentration. Multidimensional scaling, based on soil particles composition and species distribution, represented that Pengudang and Lagoi were more similar than Kawal due to the geographical position. The Redundancy analysis (RDA) showed that the species composition on each site was highly influenced by soil content, especially soil particle proportion. The study quantitatively revealed that mangrove size, distribution, and coverage were strongly depended on the environmental proxies.

Keywords:

Mangrove; soil organic matter; soil particle composition; canopy coverage; community structure; species distribution.

Paper 10: Mangrove Ecosystem Health

Mangrove Community Structure in Papuan Small Islands

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Mangrove plays the importance of roles for the small island sustainability both physically and ecologically. In the high-risk Pacific Ocean's islands, Papuan small islands face typhoon, earthquake, high wave, and tsunami effect. Mangrove could be optimized as the natural structure to reduce the risks. Various explorations on North Part of Papua were compiled to figure out mangrove structure and potential. The study was conducted at 200 10mx10m-quadratic-plots scattered on 14 small islands in six regencies in the northern archipelago. Research objectives were to investigate mangrove community structure on each island i.e. canopy coverage, density, and morphological size; and to analyze the correlation among those parameters. The general result found that mangrove condition in all island was in pristine condition, high individual size with low anthropogenic threats. In detail, they were covered by a medium and dense canopy from 61.32±3.04% in Pasi island to 93.88±0.14% in Meos Mangguandi. Substrate composition significantly influenced the level of canopy coverage and controlled the MDS ordination of species composition. *Sonneratia alba*tended to be dominant in rocky sand in Pasi, Owi, Padaidori, and Wundi, while *Ceriops* and *Rhizophora* were mostly occupied the muddy sand, or *Bruguiera gymnorrhiza* has the highest domination in sandy mud substrate in Auki, Pai and Meos. The canopy coverage had a significant correlation only with total density but none with the others. Height of tree (up to 21.2 m) was found highly related to the diameter size (max: 124 cm).

Keywords:

Papuan small islands; mangrove; community structure; pristine; substrate

Paper 11: Mangrove Ecosystem Health

Conditions and Status of Mangrove Resources in The Coastal Area of Lombok Island, West Nusa Tenggara

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The existence of mangrove ecosystems on the island of Lombok is very important ecologically and disaster mitigation as well as economic potential. However, the existence and function of these ecosystems has decreased due to utilization that tends to be destructive. The purpose of this study is to inform the potential and problems of mangrove resources in the coastal area of Lombok Island. Data collection was carried out using the quadratic transect method in several locations in five regencies/cities in Lombok Island. Whereas the utilization and its problems were carried out by interview method and focus group discussion (FGD) with stakeholders around the location. Determination of the status of mangrove damage was using Kep.Men.LH No. 201 of 2004. The results of the study found 27 species of mangroves scattered in coastal areas in five regencies/cities on the island of Lombok. Dominant species were *Rhizopora stylosa* and *Rhizopora mucronata*, and the least was *Sonneratia ovata*. The city of Mataram has the least mangrove cover with damaged status, while the coast of East Lombok Regency has the widest mangrove cover with moderate to good status. Utilization of mangrove resources on the island of Lombok, among others: fishponds, fishing, tourism and conservation. Damage to mangrove resources on the coast of Lombok Island is mostly caused by land conversion to ponds, buildings and landfills.

Paper 12: Mangrove Ecosystem Health

Nursery Evaluation of *Avicennia marina* (Forssk.) Vierh. and *Bruguiera cylindrica* (L.) Blume in Different Substrates

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This research was undertaken to assess the nursery performance of *Avicennia marina* and *Bruguiera cylindrica* in the difference substrates such as sand, mangrove soil (clay), and the combination of two (sandy clay loam). The study was conducted at NONESCOST Mangrove Civil Reservation Area for 18 weeks. The experiment was arranged in a randomized factorial design (2 x 3) x 5, with two mangrove species, three substrates and five replicates; sand for Treatment I (sand), mangrove soil (clay) for Treatment II, and combinations of the two (sandy clay loam) for Treatment III. There were 10 plants every replicate having a total of 50 plants per treatment. Analysis of variance showed significant difference in survival between Treatments I (82±18) and Treatment III (48±7) in *A. marina* ($P<0.05$), but none in *B. cylindrica* ($P>0.05$). Survival patterns of *A. marina* and *B. cylindrica* showed strong negative correlations with time ($P<0.001$). Different types of substrates tested had no significant effect ($P>0.05$) on the growth of *A. marina* in terms of total height, number of axils, and number of internodes developed. Likewise, length of the first internode, second internode, and the third internode were not significantly different ($P>0.05$). For *B. cylindrica*, the height and number of axils produced was not affected by the different substrates. Analysis of variance showed no significant differences on the total height, number of axils, and lengths of internodes among treatments at $p>0.05$. However, there were significantly different results in the number of leaves ($P<0.05$) and internodes ($P<0.01$) produced in *B. cylindrica* in Treatment II. This study showed the feasibility of using all types of substrates in the nursery of both mangrove species. However, the best substrate to use for *A. marina* is sand and *mangrove soil* for *B. cylindrica*.

Keywords:

Growth; Survival; Internode; Axil

Paper 13: Mangrove Ecosystem Management

Bird Preference in Using Mangrove Vegetation at Pulau Dua Nature Reserve, Banten

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The northern coast of Java is a very potential area for mangrove and also a place for migratory birds from the Asian mainland. As a habitat for birds, mangroves act as a place to find food (feeding ground), nursery (nursery ground), breed, or just rest. Pulau Dua Nature Reserve is a protected mangrove ecosystem on the northern coast of Java which has become a center for bird activity, so is also known as Bird Island. As a nature reserve, the mangrove ecosystem in Pulau Dua Nature Reserve is considered to be a pristine ecosystem, so this study is important to find out the relationship between mangrove vegetation and the presence of birds. This study aimed to determine the preference of birds in making use of mangrove vegetation, especially in terms of tree canopy parameters which include canopy volume, percent canopy cover, and number of branches. This study was approached by conducting bird abundance and species inventory using a point count method within a 50 m radius. The inventory was restricted to birds that perch and nest in vegetation, and did not record the birds that were flying over vegetation. Inventory of bird data was classified into three categories based on body size: (1) small birds (<20cm); (2) medium birds (20–40 cm); and (3) large birds (> 40 cm). Canopy volume data and number of branchings were taken from trees in two 10x10m vegetation plots located inside the bird observation plot. Data on percentage canopy cover were taken at four points in four directions inside the bird observation plots. Results showed that there were different correlations between bird size types and tree canopy parameters. The abundance of small-sized birds is positively correlated with canopy cover percentage(R = 0.868), but negatively correlated with the number of branches (R = –0.706). The abundance of medium-sized birds is only positively correlated with the canopy cover percentage (R = 0.850). The abundance of large-sized birds is positively correlated with the number of branching (R = 0.785), but negatively correlated with canopy cover percentage (R = –0,812). The results of this study can be taken into consideration in rehabilitating degraded mangroves so that they may be conducive to attract birds.

Paper 14: Mangrove Ecosystem Management

The Dynamics of Coastline and Mangrove Ecosystems in Coastal Area of Mangkang Kulon Subdistrict, Semarang

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Mangkang Kulon Subdistrict is one of the coastal area in Semarang which has relatively dynamic conditions. This could be seen from the coastline and mangrove ecosystem changes within several periods of time. This study aims to observe coastline changes and the spatial distribution of mangrove ecosystems on the coast of Mangkang Kulon Subdistrict between 2005, 2012 and 2019. Land use maps were obtained from visual interpretation of high-resolution digital globe satellite images from 2005, 2012 and 2019 which then tested the accuracy of land use interpretation through field observation. Then, it was overlayed one another through vector analysis to find out the changes that have occurred. Based on the results of the study, it could be seen that the coastline changes were increasingly jutting towards the land in these ranges of time. This condition is affected by the port construction on the east coast of Kendal Regency which is directly adjacent to the Mangkang Kulon Subdistrict. Meanwhile, the mangrove ecosystem has increased widely with relatively elongated and grouped spatial patterns. The increase that occurred as a manifestation of various coastal care activities in the form of mangrove planting activities which carried out by several government agencies and private parties with a model of coastal communities empowerment.

Paper 15: Mangrove Ecosystem Management

The Mangrove Conditions Post Restoration by Planting and Enrichment Pattern in ex-Fish Ponds at Berbak and Sembilang National Park, South Sumatera

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One of the large mangrove area in Western Indonesia is in Berbak-Sembilang National Park (BSNP) South Sumatera. The cause of mangrove damage in this area was fish ponds activity, particularly in Barong area. The initial restoration has been applied in Barong area by using planting and enrichment pattern. This research investigated mangrove density and the growth of mangrove post restoration used planting and enrichment pattern. This research was held on July 2017 on restoration area at ex-fish ponds of BSNP South Sumatera. Data was analyzed descriptively in graphic and table form. The result showed that there was ten mangrove species on two restoration patterns; *Aegiceras corniculatum, Bruguiera cylindrica*, *Bruguiera gymnorrhyza, Bruguiera sexangula*, *Ceriops decandra*, *Ceriops tagal*, *Kandelia candel*, *Rhizophora apiculata, Rhizophora mucronata*, and *Xylocarpus granatum*. The mangroves species that found on both restoration pattern were *C. decandra*, *C. tagal*, *R. apiculata* dan *R. mucronata*. The planting pattern was better in growth, while enrichment pattern had more variative species of mangroves.

Keywords:

Berbak-Sembilang National Park; Enrichment Pattern; Mangrove; Planting Pattern; Restoration

Paper 16: Mangrove Ecosystem Management

Design of a Mangrove Greenbelt at a Permanently Waterlogged Area in the North Coast of Subang District, West Java

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Mangrove ecosystems provide important ecological services. However, the sustainability of their ecosystem function is limited by coastal dynamics which in turn are affected by natural and anthropogenic factors. The northern coast of Subang District in West Java has suffered severe abrasion and mangrove degradation. Mitigation efforts so far have not been successful, as the limiting factors of mangrove growth have not been properly considered and most of the area is now permanently flooded. In this study we present a model design of a mangrove greenbelt suggested for the rehabilitation of the northern coast of Subang District, specifically at Legonkulon Subdistrict as case study. The main strategy is to determine the optimal thickness and total area of the greenbelt; and the appropriate zoning and plant composition in order to reduce wave strength and enhance other ecological services. *Avicennia marina* and *Rhizophora mucronata* are selected as plant species because of their suitability to high salinity levels and the recommended substrate. Both species also support the physical function of reducing wave strength as well as ecological function as habitat for forest floor fauna and birds. Planting mangrove seedlings in "guludans" with 1x1 m spacing will generate the highest tree diameter increment compared to other spacing recommendations. Taking into account survival rate, tree stand density in the target year (year 5) is projected at 5900 individuals per hectare. Greenbelt thickness is determined based on the ability of vegetation to reduce ocean wave strength. Wave data in the coastal area of ??Legonkulon Subdistrict, vegetation density, and diameter increment in the fifth year were used in a wave reducing model simulated using Stella software. The simulation suggests that to reduce wave height from 1.7 meters to 0.5 meters, a greenbelt composition of 52 guludans measuring 10 x 10 $m^2$are needed, consisting of 30 guludans of *Avicennia marina* and 22 guludans of *Rhizophora mucronata*, with a total greenbelt thickness of 622 meters. The design also includes hybrid engineering of a water break with permeable structure that can break waves and accumulate sediment. Based on specifications for zonation, thickness, and hybrid engineering, a total area of ??409,79 hectares consisting of waterlogged area, open area, and vegetated area is designated as priority area for the design. Further optimization of greenbelt function can be achieved by several design recommendations, including stand density enhancement in the vegetated areas within the greenbelt zone and allowing silvofishery involving the local community until the fourth year. In addition, species enrichment with *Avicennia* spp., *Rhizophora* spp., or *Sonneratia* spp. can later be conducted to increase the diversity of mangroves.

Keywords:

Greenbelt; mangrove; rehabilitation; Subang

Paper 17: Mangrove Ecosystem Management

Mangrove Governance: Establish a New Paradigm of Mangrove Management " from Village to the World"

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Mangrove ecosystems are one of the main ecosystems in coastal areas that have high productivity that serves and support the productivity of fisheries resources. This is due to mangrove ecological functions of mangroves as a nursery ground, feeding ground and spawning ground. In an effort to mitigate global warming the mangrove ecosystem has a function as a sink and storage carbon (Rachmawati et al., 2014; Sondak, 2015). Mangroves also play a process of disaster mitigation, especially to current and waves, erosion and coastal abrasion. Mangrove in a good status will be able to protect the wave movement from sea to land. The research was conducted in Jakarta Bay shows that the root's ability to protect waves from the sea. And then, the village autonomy according to Law No. 6 of 2014 concerning villages to conserve the ecosystem and environment as the village's new responsibility. Thus, the village is no longer just managing the administration but also saving the environment and the world one of them through mangroves

Keywords:

Mangrove; Governance; Fisheries; Disaster; Village

Paper 18: Mangrove Ecosystem Management

Carbon Dynamic of Restored Mangrove at ex-Brackish Pond in Northern Sumatra: Implication for Mitigating Climate Change

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Well known mangroves are recorded as carbon-rich ecosystem in tropical areas. However, mangroves are declining overtime, mainly due to anthropogenic activities that it can release carbon to atmosphere. Rate of mangrove loss and degradation is too higher than mangrove rehabilitation and restoration, including in Indonesia that has largest mangrove areas in the world. Subsequently, the information of the capacity of restored mangrove on storing carbon in biomass is unavailable or very limited. This research aim to calculate the carbon stock at restored mangrove from 5 to 9 years-old, and to create the allometry model for estimating carbon stock based on the age of mangroves. The restored mangrove situated at ex-brackish pond in Northern Sumatra. Square method with 10 m x 10 m was used and 30 sampling plot was established at each age of restored mangrove and also at secondary mangrove surrounding the restored mangrove. Non destructive sampling was applied to calculate the above and below stand biomass and then converted to carbon stock of mangrove stand. The carbon stock of restored mangroves increased following stand aged. The carbon stock at 9 years-old of restored mangrove reached 96.6% of secondary mangroves. Power equation (Wtot = 0.406X2.105) was selected as suitable equation for predicting the carbon stock of restored mangrove. Based on selected model, the carbon stock of restored mangrove is higher than secondary mangrove at surrounding areas after 10 years old. Subsequently, the carbon stock of restored mangrove will reach primary mangrove condition after 22 years-old. Therefore, the restored mangrove should be prioritized in managing blue carbon and mitigating climate change as well as conserving biodiversity due to their high capacity as carbon pool and harbors of biodiversity.

Keywords:

mangrove; climate change mitigation; restoration; forest carbon; Sumatra

Paper 19: Mangrove Ecosystem Management

Analysis of Visitor Perceptions of Additional Cost of Admission Ticket for Conservation Program at Brebes Mangrove Ecotourism

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Determination of the area of mangrove forests as ecotourism is one way to protect and conserve the mangrove forests. The mangrove ecotourism area in Kaliwlingi Village was set in 2015 in the mangrove rehabilitation area which has been carried out since 2005 to overcome the rate of abrasion that occurred since 1985 due to the opening of shrimp ponds. As the development of mangrove ecotourism advances, facilities and infrastructure continue to be built to meet the needs of tourists who can have an impact on the condition of the mangrove ecosystem. Mangrove rehabilitation activities are the responsibility of all ecotourism stakeholders, including the visitors themselves. This study aims to determine visitor perceptions of the additional cost of admission as a mangrove conservation program in the form of mangrove rehabilitation in ecotourism areas. Sampling was done by purposive sampling method based on consideration of the age of the visitors over 17 years. The results showed that 60% of visitors agreed to the additional costs for the mangrove conservation program, while 40% of visitors said they did not agree. The additional costs agreed by visitors are Rp. 2000 by 56%, Rp. 3000 by 27%, Rp. 4% by 4% and Rp. 5000 by 13%.

Keywords:

Mangrove; Ecotourism; Conservation

Paper 20: Recent Approach to Mangrove Monitoring

Ba(NO3)2 Acetone Method Adapted for Nitrate Isolation from Fresh and Saline Water in Nitrogen Isotope Analysis

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From the beginning of the establishment of stable isotopic analysis, various methods and the modifications have been effectively practised in nitrate-nitrogen isotope (?^{15}N-NO_3^-) analysis as a powerful tool for exploring origin and cycling mechanisms of nitrates (NO_3^-) in the ecosystems[1]. For example, analyses of ?^{15}N-NO_3^- in mangrove watershed are expected to clarify the possible sources of NO_3^-, furthermore, impact of human activities on mangrove ecosystems. As analytical ways to measure ?^{15}N-NO_3^- in saline matrices like seawater and soil extracts which were practically impossible by ion-exchange method[2,3] bacterial denitrifying[4,5], ammonium diffusion[6], and azide method[7] have shown high precision and accuracy. Additionally, $Ba(NO_3)_2$ acetone method[3] has been successfully used to analyse ?^{15}N-NO_3^-in fresh water. However, bacterial method requires special bacterial culture, specialized and costly instrument set up and trained personnel, and the other methods are labour-intensive, time consuming, and need toxic substances to use[3,7,8]. Therefore, as NO_3^- isolation techniques from aqueous solutions are still challenging, ?^{15}N-NO_3^-analysis has not been performed frequently due to lack of suitability of existing methods in consideration to sample types and available instrument set up in the laboratory. Thus, adaptation of $Ba(NO_3)_2$ acetone method has been planned for its nontoxic reagents requirement, easy handling procedures and compatibility with current isotopic ratio mass spectrometer (IRMS) set up in the laboratory. Next, the adapted method was applied to analyse ?^{15}N-NO_3^-insaline water samples taken from mangrove communities, requiring a large volume due to the excess salts with low concentration of NO_3^- and high content of DOC. A volume of 500 mL of each test solution (a fresh water test solution: Milli Q + KNO_3; a saline water test solution: Milli Q + KNO_3 + NaCl + KHP) was reduced by evaporation followed by freeze-drying to dry all the salts. Dried salts were added with pure acetone (two step addition), NaI and n-hexane and the mixture were stored in the refrigerator at 3?C for at least 12 hrs to allow the insoluble salts to be precipitated. The centrifuged and separated liquid was added with $BaI_2$and preserved in the refrigerator at 3?C for at least 12 hrs to have a precipitation of $Ba(NO_3)_2$. The separated $Ba(NO_3)_2$by centrifugation was dried in an oven and dissolved in water. Then, the dissolved NO_3^- solution was poured into the capsules and dried capsules were introduced to IRMS coupled to an elemental analyser (TC/EA-IRMS) to analyse ?^{15}N-NO_3^-. Both the previous and the adapted protocols were applied to test solutions to compare their performances. The results of ?^{15}N-NO_3^- (‰) and recovery rate of NO_3^- (%) from fresh water obtained by both the previous and the adapted acetone method were almost same (the previous method: -0.21 ‰ and 69 %; the adapted method: -0.19 ‰ and 70 %). It suggested that changes in sample reduction, preparation and analysing processes in the adapted method caused no or very negligible isotopic fractionation. Furthermore, it was possible to measure ?^{15}N-NO_3^- by the adapted acetone method even with lower amount of NO_3^- (1-2 µmol) taken into sample capsules compared to those (4-5 µmol) in the previous method. While, both methods were applied to saline water test solution with same concentration of NO_3^- to investigate the NO_3^- recovery rate under the influence of excess salts and DOC. Then, the recovery rate of NO_3^- was lower from saline water than that from fresh water. Nevertheless, better NO_3^- recovery was found by the adapted method (13 %) compared to that by the previous one (6 %). Finally, to examine and compare the

performances of both methods, surface water samples collected from mangrove communities along Urauchi creek on Iriomote Is. and Miyara creek on Ishigaki Is. characterized by a low (2.8 mS/cm) and a high (53 mS/cm) electric conductivity (EC), respectively, were used. The results of NO_3^- recovery rates by both the previous and the adapted method were almost similar in the former sample with low EC (42 and 45 %, respectively), whereas, the rate by the adapted method was larger in the later sample with high EC (35 %) compared to that obtained by the previous method (18 %). It meant that large amount of salts in the Miyara creek water sample was the reason for poor NO_3^- recovery by the previous method. However, the adapted acetone method could successfully recover even very low amount of NO_3^- from the saline water sample for ?^{15}N-NO_3^-analysis. In conclusion, the adapted acetone method showed applicability with similar precision and accuracy to the previous acetone method even with saline water in ?^{15}N-NO_3^- analysis. Additionally, it stated the minimum requirement of NO_3^-(μmol) in sample for successful application of this method.

Paper 21: Recent Approach to Mangrove Monitoring

Identification of Changes in Shoreline and Mangrove Area in The Coast of Legon Kulon Sub-District, Subang District, West Java

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Mangrove ecosystems are important resources in the coastal region that provide physical, biological, social and economic functions. However, these ecosystems are highly affected by coastal dynamics, including the processes of abrasion and accretion that can be caused by ocean waves, wind, or human activity. Among the areas that has suffered damage due to abrasion over the past 20 years is the coastal area of Subang district in West Java. The objectives of this study was to describe the changes in coastline and mangrove forest area from year 2000 to 2018 in that area. This study is important as it provides an overview of the dynamics of the coastline as well as the decline in mangrove area that has occurred over the past 18 years; thus becoming a reference in the formulation of policies on mangrove rehabilitation. The study area encompasses 2,830.24 hectares of coastal area in Legon Kulon sub-district in Subang district. Identification of shoreline changes and mangrove vegetation was carried out using the on screen digitating technique in ArcGIS software 10.5.1. Shoreline change was calculated by overlaying Landsat 7 ETM + imagery in 2000, 2003, 2006, 2009, 2012 and Landsat 8 OLI images in 2015 and 2018 along 8,837.6 m coastline using the DSAS (Digital Shoreline Analysis System) program version 5. Mangrove parameters were measured in the form of area and level of greenness through calculation of the NDVI value (Normalized Difference Vegetation Index). The results of this study indicate that since 2000 to 2018, the coast of Subang district has experienced a change in coastline by the process of accretion and abrasion. Mangrove ecosystems are important resources in the coastal region that provide physical, biological, social and economic functions. However, these ecosystems are highly affected by coastal dynamics, including the processes of abrasion and accretion that can be caused by ocean waves, wind, or human activity. Among the areas that has suffered damage due to abrasion over the past 20 years is the coastal area of Subang district in West Java. The objectives of this study was to describe the changes in coastline and mangrove forest area from year 2000 to 2018 in that area. This study is important as it provides an overview of the dynamics of the coastline as well as the decline in mangrove area that has occurred over the past 18 years; thus becoming a reference in the formulation of policies on mangrove rehabilitation. The study area encompasses 2,830.24 hectares of coastal area in Legon Kulon sub-district in Subang district. Identification of shoreline changes and mangrove vegetation was carried out using the on screen digitating technique in ArcGIS software 10.5.1. Shoreline change was calculated by overlaying Landsat 7 ETM + imagery in 2000, 2003, 2006, 2009, 2012 and Landsat 8 OLI images in 2015 and 2018 along 8,837.6 m coastline using the DSAS (Digital Shoreline Analysis System) program version 5. Mangrove parameters were measured in the form of area and level of greenness through calculation of the NDVI value (Normalized Difference Vegetation Index). The results of this study indicate that since 2000 to 2018, the coast of Subang district has experienced a change in coastline by the process of accretion and abrasion. In general, the level of damage in the coastal area of Legon Kulon is classified as severely damaged with a damage rate of more than 79.5% of the total coastal length. Abrasion has occurred as far as 1,216.13 m, with an abrasion rate of 75.17 m/year, and a maximum abrasion of 5,903.66 m. Accretion has occurred as far as 0.6 m, with an accretion rate of 0.09 m/year, and maximum accretion as far as 58.71 m. Mangroves in Legon Kulon sub-district in 2000 were dominated by canopy density levels in the medium category and has experienced an extensive loss of 767.70 hectares between 2000 to 2018.

Keywords:

Shoreline; mangrove ecosystem; abrasion; accretion; DSAS

Paper 22: Recent Approach to Mangrove Monitoring

Crowdsourcing Data Collection as an Optimatization Method for Mangrove Rehabilitation

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Nowadays, there were plenty mangrove rehabilitation programs had initiated by various sectors: government, private company, until public movement. People start to realizes the important of mangrove ecosystem and tries to save it. Unfortunately, many programs were stop in just ceremonial activity without future commitment about their growth rate, sustainability, nor social impact. Therefore, mangrove rehabilitation activities need some improvement method for record their monitoring with free, easy, and national integrated. This study aims to introduce and implementate a crowdsourcing data collections to mangrove monitoring. Crowdsourcing data collection is a participatory method of building a dataset with the help of a public or large group of people. Hypotheticaly, with better collections of mangrove monitoring data it can optimize mangrove rehabilitation too.

Keywords:

Mangrove; rehabilitation; monitoring; crowdsourcing data collection

Paper 23: Mangrove Ecosystem Health

The Recent Status of Development of Mangrove Health Index based on Remote Sensing Data

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The status of mangrove condition is one of the essential information on conservation planning and management. Assessment of mangrove condition using field measurement requires much effort of time, budget, and human resources when applying for a vast area such as Indonesian mangrove. The synoptic character of remote sensing data provides the efficient of earth surface observation, acquired data on a minute and repeatable. Accordingly, the development of mangrove health index is necessitating to be done. The recent status of development of mangrove index based on remote sensing data described here. The most popular method related to mangrove is the used of vegetation index to describe canopy cover then indicate as mangrove dense, moderate and sparse. The condition of mangrove dense, moderate, and sparse used to estimate the health of mangrove. This method based on only vegetation response from remote sensing and usually applicate terrestrial forest or plantation; occasionally, it is not following field condition. The new candidate method has been developing and potentially used as health index, that is the Mangrove Index, which is derived from two spectra that represent vegetation condition and soil moisture. Soil moisture is an essential parameter on mangrove because it relates to the tidal process on coastal where mangrove growth. Mangrove Index can be used as a single indicator or simultaneous with NDVI. The correlation between mangrove index values with some health indicator based on field measurement has been under analysis. The preliminary analysis resulted in the maximum coefficient of determination (R2) of 0.5 of correlation between Mangrove Index values and some health indicator. The combination of Mangrove Index and NDVI could be differentiated degraded mangrove area and non-degraded mangrove area generally.

Keywords:

health index remote sensing

Paper 24: Mangrove Ecosystem Health

Mangrove Root Diversity and Structure (cone, pencil, prop) Effectiveness in Accumulating Cu and Zn in Sediments and Water in Blanakan River

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The effectiveness of metal accumulation in mangrove species is related to the root structure and diversity. This study aims to investigate the type of roots belong to *Avicennia marina, Rhizopora mucronata* and *Sonneratia caseolaris* in accumulating Cu and Zn from sediment and water. The samples consist of roots, water and sediment collected from 9 stations in Blanakan river. The heavy metals in samples were analyzed by using AAS. The Zn in *A. marina, R. mucronata* and *S. caseolaris* roots were 18.08-54.64 mg/ kg, 9.75-54.75 mg/ kg and 19.58-33.33 mg/kg. While, the Cu in *A. marina, R. mucronata* and *S. caseolaris* roots were 0.33-0.89 mg/ kg, 0.2-54.75 mg/ kg and 0.4-0.99 mg/kg. Related to the effectiveness of mangrove roots in accumulating metals which is measured by Transfer Factor (TF), it was found that *R. mucronata* has the highest TF. The TF of sediment-to-root for Zn in mangrove species is *R. mucronata>S. caseolaris>A. marina*. While, the TF of sediment-to-root for Cu is *R. mucronata>S. caseolaris=A. marina*. The TF ranges of *R. mucronata* for Zn is 0.30-0.38 and for Cu is 0.36-0.46. Hence, the *R. mucronata* with its unique prop root has significant potential in accumulating metals Cu and Zn from sediment.

Keywords:

accumulation; root; river; sediment; transfer factor

Paper 25: Mangrove Ecosystem Health

Health Assessment of Mangrove Ecosystem in Ayau Islands, Raja Ampat West Papua

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Despite their rather universal distribution in tropical inter-tidal coastal area mangrove has been identified driven by some physical, chemical and biological factors which might varied one to another site. Muddy waters, sufficient fresh water supply, high tidal inundation were few factors which commonly correlated with an ideal mangrove growth. Ayau Islands, a group of several small island in the Raja Ampat Islands regency West Papua, however, could be an example on how mangrove were closely interconnected to other tropical coastal ecosystem i.e:, seagrasses and coral reef even though grew in a not such “ideal” condition. A purposive sampling method was applied for this study, two stations was designated in Kanober Island and one station in Dorekar Island. Tree replication sampling plot of 10m x 10m was lied on each station and data were collected following a mangrove monitoring manual. The result showed at least 4 major species, 3 minor species and 12 association of mangrove component were found in the study site. *Bruguiera gymnorrhiza, Rhizophora mucronata, Rhizophora lamarckii, Ceriops tagal* and *Sonneratia ovata* were the most common species. In general the vegetation in a good condition with a high canopy cover.

Keywords:

Mangrove; health assessment; Ayau Raja Ampat

Paper 26: Mangrove Ecosystem Health

Preliminary Assessment of Mangrove Ecosystem Health Using Multitemporal High Resolution Satellite Images: Case of Mangrove Rehabilitation Areas in Indonesia

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Currently Indonesia has the largest total mangrove areas with highest mangrove species diversity in the world, but at the same time Indonesia is facing decreasing of mangrove areas at alarming rate. Rehabilitation efforts in mangrove degraded areas were introduced and still being implemented. In parallel, the success of mangrove rehabilitation program in Indonesia has been assessed quantitatively that focused in observing the canopy extent and chlorophyll content. However, the real mangrove health condition that reflect the rehabilitated mangrove regeneration capacity remain questioned. This assessment aimed to identify new indicators for determining mangrove ecosystem health in mangrove rehabilitation areas by using multi temporal high-resolution optic satellite images. Three mangrove rehabilitation areas were selected for study sites; i.e. West Bali, North Sulawesi and Thousand Islands. By comparing natural and rehabilitated mangrove areas, we can identify mangrove ecosystem health from visual analysis of mangrove canopy structure and regeneration capacity. This approach is a rapid assessment method served as a preliminary guide for monitoring mangrove ecosystem health and evaluating the success of existing mangrove rehabilitation programs.

Keywords:

mangrove rehabilitation; high-resolution satellite image; ecosystem health

Paper 27: Mangrove Ecosystem Health

Kandelia candel (L.) Reproductive Organs Phenology, at Berbak and Sembilang National Park, South Sumatra

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A field observation has been done to know Kandelia candel reproductive organs phenology, at Berbak and Sembilang National Park, South Sumatra, during Nopember 2018 until January 2019 with secondary data addition by field worker. It is found that flower initiation come at April, mature at Nopember until January; 290 days period is needed by flower initiation until prophagule become mature.

Keywords:

phenology; Kandelia candel; prophagule

Paper 28: Mangrove Ecosystem Health

Early Study on the Mangrove Coverage Condition in the West Coast of North Sumatera Province, Indonesia

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The mangrove forest along the western coast of North Sumatera Province is among the less studied in Indonesia, yet the threats for this ecosystem were persistently increasing. With its ca. 200 km shoreline, Central Tapanuli Municipality hosts the highest area of the mangrove in the western coast of North Sumatera. Activities from the anthropogenic sources occur in the area as the consequence of rapid development in the region. The research has been conducted in February-March 2019 by using Hemispherical Photography Method with the objective in studying the status of the mangrove community through analyzing mangrove density, vegetation coverage and important value index. Three locations were selected as the site for the study. The study resulted that a number of 11 mangrove species from 8 families. Based on the ecological parameter, the habitat from all study sites were in the range for supporting the life of mangrove vegetation. The vegetation densities were in the range between 1,400 and 1,511 trees.ha^{-1}, indicating of medium to dense categories. For the canopy coverage, the study sites fell into the category of medium to heavily covered with the coverage value ranged from 72.6-76.64%. The results on Important Value Index analysis showed that all species were found in the range of between 3.25%-100.77%. The lowest and highest values were given by *Scyphiphora hydrophyllacea* and *Rhizophora apiculata,* respectively. The study concluded that the overall condition of the mangrove forest in the study site was considered as in a good to healthy condition.

Keywords :

mangrove; coverage; hemispherical photography; West Coast of North Sumatera

Paper 29: Mangrove Ecosystem Health

Leaf Morphological Variation of Acanthus in Some Estuarine Areas of Cilacap

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A study on leaf morphological variation of Acanthus in some estuarine areas of Cilacap Central java. This study wasaimed at determining leaf morphological variations in relation to habitat. The method used was survey with stratified sampling. The variables measured included leaf shape, size, apex, base, margin, color, and spine. The results of this study indicated that the different location affect some morphological characteristics.

Keywords:

Acanthus; leaf morphologi; variation

Paper 30: Mangrove Ecosystem Health

Translocation Factor of Zinc (Zn) in Water and Sediment by Root and Stem of *Rhizophora* sp. at Blanakan Riparian, West Java

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Mangroves are plants that can transport, absorb, and store heavy metals in the surrounding environment. This study aims to measure the capacity of *Rhizophora* sp. root and stem in transporting, absorbing, and storing Zn from water and sediment of Blanakan Riparian, West Java. *Rhizophora* sp. root, stem, water, and sediment samples were collected from 3 stations located on the Blanakan Riparian, West Java. Atomic Absorption Spectrophotometer was used to analyze the Zn contents from the samples. Likewise, Bioconcentration Factor (BCF) and Translocation Factor (TF) were used to calculate the Zn contents from water and sediment stored in root and stem. The results showed that the range of BCF of Zn in water and sediment in root were 108,214-284,204 and 0,254-0,271 respectively. Meanwhile, the range of BCF of Zn in water and sediment in stem were 112,193-189,611 and 0,233-0,297. Furthermore, the range of TF of Zn in water and sediment were 0,667-1,036 and 0,917-1,095. To conclude, the root and stem of *Rhizophora* sp. can be used to translocate Zn contents from water and sediment at Blanakan Riparian, West Java.

Keywords:

Rhizophora sp.; Root; Stem; Translocation Factor; Zinc.

Paper 31: Mangrove Ecosystem Health

Composition and Zoning Pattern of Mangrove Plants in Donan Sedimented Land, Cilacap

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Sedimented land in mangrove forests is formed because the process of continuous sedimentation occurs naturally so that primary succession will occur in the area. The aim of the study was to determine the composition and pattern of zonation of mangrove vegetation that had been carried out on the sedimented land from Cilacap Donan. The study was conducted using a survey method, and sampling using a 1x1 meter squared plot for seedlings, shrubs and herbs. Size 5x5 meters for poles and size 10x10 meters for trees. The results showed that there were several soils sedimented land , 2 sedimented were taken as samples. In sedimented land 1 for seedlings, shrubs and herbs are the most dominant is *Acanthus illicifolius* with IVI = 47.93%. The most dominant pole is *Avicenia marina* with IVI = 39.06%. For the most dominant tree is *Rhyzophora mucronata* with IVI= 34.13%. In sedimented land 2 for seedlings, shrubs and herbs are the most dominant is *Deris trifoliata* with IVI = 48.15%. The most dominant pillar is *Avicenia marina* with IVI = 38.67%. The most dominant tree is *Avicenia marina* with IVI = 36.40%. Tidal conditions and physical chemical properties that are not too much different cause the composition of mangroves on sedimented land 1 and sedimented 2 to approach similarity. The zoning pattern is not formed significantly, but grouping occurs in several types, starting from the edge to the land.

Keywords:

sedimented land; composition; zoning

Paper 32: Mangrove Interrelated System

Microplastic Monitoring Using Combination of FTIR with Multispectral and Sentinel SAR Remote Sensing

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The microplastic has caused significant threat to marine ecosystem. The amount of microplastic has reached approximately 270.000 tonnes. However, it is difficult to characterize microplastic especially in dense mangrove forests. To cope this problem, this research try to combine the use of Fourier Transform Infrared (FTIR) combined with Sentinel Synthetic Aperture Radar (SAR) and multispectral remote sensing. In the sampling sites, plastic debris were extracted and analyzed using FTIR. Simultaneously, Sentinel SAR and multispectral were used to capture the satellite imagery of related sites. Based on the result, FTIR analysis able to characterize the presence of polyethylene and polypropylene with wavenumber of 3000-2700 cm^{-1}. Likewise, the result of Sentinel SAR remote sensing shows presence of microplastic in the water. The microplastics were characterized by appearance of dark areas. These black patches are accumulated in the water and can be distinguished by its linear or circular patterns. The location of patches is remote and solitary in the middle of the water body. The black patches have negative correlation with the anthropogenic activity and chlorophyll-a but have positive correlation with the microbial activity. For multispectral image, the wavelength of 650 nm, 550 nm and 450 for Red Green Blue compositions was able to identify microplastic entities. To conclude, the presence of microplastics in ocean can be detected earlier by using combination of FTIR with Sentinel SAR and multispectral remote sensing.

Keywords:

FTIR; microplastic; multispectral; Sentinel

Paper 33: Mangrove Interrelated System

Preliminary Detection of Coliform Bacteria and Heavy Metal Pollution in Blanakan River Estuary, Subang, West Java.

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Coliform bacteria are microorganisms that are often used as indicators of the presence of other pathogenic bacteria. Calculation of total coliform bacteria needs to be done to determine the presence of organic waste pollution that occurs in the Blanakan River Estuary, Subang, West Java. The purpose of this study was to determine the total abundance of Coliform bacteria, the status and to study the relationship between total coliform bacteria and Zn heavy metal content in the Blanakan River Estuary. The method that used was purposive sampling carried out at three sampling stations. The results obtained showed that the average coliform content in the three stations ranged from 9.2 x 10^{-2} to 3.0 x 10^{-1}/ml sample. Zn heavy metal content in water at three stations ranged from 0,24 mg/l to 0,44 mg/l. The conclusion of this study is the abundance of the average total Coliform bacteria obtained at each station shows that the total content of Coliform bacteria has exceeded water quality standards according to the Goverment Regulation no 82 of 2001. Whereas the presence of total coliform bacteria has a weak relationship with the presence of metals Zn.

Keywords:

Blanakan; coliform; estuary; water; Zn

Paper 34: Mangrove Interrelated System

Evaluation of Coliform Bacteria and Heavy Metal (Cu) in Upstream of Blanakan River, Subang, West Java

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This study aims to determine the quality of water by evaluating the presence or absence of coliform bacteria and heavy metal Cu as well. The water quality evaluation was conducted in the upstream of Blanakan river considering that the upstream is vulnerable since it receives more pollutants due to human activity. The water samples were collected from three stations in upstream. The Cu in water was analyed by using AAS (Atomic Absorption Apectroscopy). Likewise, the coliform bacteria was counted by using MPN (Most probably Number) method. The results showed that the range of coliform bacteria was from 4,3 x 10-1 APM/ml to 1,1 x 102 APM/ml and the average was 3,69 x 101 APM/ml, which is exceeding the range of water quality standard class I according to Goverment Regulation No.82 of 2001. Meanwhile, the average value of heavy metals Cu is 0,04 mg/L, which is also exceeding the range of water quality standard class I according to Goverment Regulation No.82 of 2001. Hence, the upstream of Blanakan river has been contaiminated by coliform and Cu.

Keywords:

Coliform; Cu; Contamination; Upstream; Water

Paper 35: Mangrove Interrelated System

Assessments of Heavy Metals Zn and Coliform in Midstream of Blanakan River, Subang, West Java

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The midstream of Blanakan is located between upstream and downstream. Due to its location, the water of midstream receives pollutants from nearby upstream. Hence, the purpose of this research is to investigate the concentration of Zn and coliform in the midstream. Coliform is one of the standard used for assessing water quality.The samples were collected from 3 stations in midstream. The Zn in water samples was analysed by using AAS. Meanwhile the coliform was examined by MPN and plate count methods. The results of coliform examination then compared with the river water quality standards issued by Government Regulation No. 82.In midstream of Blanakan, the ranges of coliform were 7,5 x 10^{-1} MPN/ml, 9,3 x 10^{1} MPN/ml and 4,3 x 10^{-1} MPN/ml. Meanwhile, the ranges of Zn contents were 0,23 mg/L, 0,11 mg/L and 0,08 mg/L. According to Government Regulation No. 82, the limit of Zn is 5 x 10^{-2} mg/L and the limit for coliform is 10 MPN/ml. To conclude, the Zn contents in water indicated that the midstream of Blanakan has been influenced by pollutants from domestic waste disposal from nearby upstream.

Keywords:

Blanakan; coliform; midstream; water; Zn

Paper 36: Mangrove Interrelated System

The Potencies of *Streptomyces* spp. Origin of the Mangrove Ecosystem of Segara Anakan

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Segara Anakan is a complex mangrove area with 10 types of mangrove plants. Mangrove rhizosphere is an area rich in organic matter functions as a potential source in exploring potential actinomycetes performing antimicrobial activity. This article reviews the *Streptomyces* collection successfully isolated from mangrove rhizosphere and their antimicrobial potencies. *Streptomyces* spp. have been identified based on the 16S rRNA gene sequence analysis and characterized by the morphology of specific aerial hyphae which are straight, flexous, fascicled, zigzag, loop, or spiral, stable, fragmented into cocoid, oval and elongated fragments. Isolate *Streptomyces* spp. showed antimicrobial activities (antibacteria, anticandida, antifungal plant pathogens, and anti MDR bacteria) which was confirmed by the presence of NRPS and PKS genes.

Keywords:

Streptomyces spp.; Segara Anakan; antimicrobial activity; 16S rRNA; NRPS; PKS genes.

Paper 37: Mangrove Interrelated System

Exploration of Rhizospheric Soil Fungi From Several Food Crops in Purwokerto

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There are several interaction patterns of fungus that live in the rhizosphere of plants, i.e. mutualism, commensalism, saprophytic, and parasitic. The objectives of this study was to determine the genera of microscopic fungus collected from the rhizosphere of groundnut, mays plant, and rice field. In addition, the biodiversity of soil fungi of those three plants was considered. Research method applied was survey with purposive random sampling. The rhizospheric soil sample was obtained from research locations of ground nut, mays plants, and rice field in Purwokerto area. The soil sample were taken from 1-10 cm deep, isolate them, and pure culture preparation as well. Furthermore, obtained data of fungus collection were then analysed descriptively, and also described based on their macro and micro morphology. Then, the collected fungus were identified by using identification manual for fungus. Result showed that fifteen (15) isolates were found in three different rhizosphere of ground nut, mays plants, and rice field of Purwokerto. The description is as follow: *Aspergillus*-1, *Aspergillus*-2, *Penicillium*-1, *Penicillium*-2, Mycophyta, Aureobasidia, Cylindrocarpon, Mucor-1, Mucor-2, Chaetomium, Gliocladium, Trichoderma-1, Trichoderma-2, Pleurophragmium, and Gonytrichum. Finally, the Biodiversity Index (H') noted from rhizosphere of groundnut plants was 0.312; mays was 0.195; and (H') of rice field was 0.124.

Keywords:

Rhizosphere; macromorphology; micromorphology; identification; genera

Paper 38: Mangrove Interrelated System

Effect of Temperature and Zinc (Zn) Temporal Variation in Water on Size Distribution of River Catfish (*Mystus* sp.) at Blanakan River, West Java.

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River catfish (*Mystus* sp.) is a species commonly found in Blanakan River. This species is also consumed by community lived around Blanakan. The aim of this study is to investigate the effect of temporal variation of temperature and metal Zn on *Mystus* sp. size distribution. The fish samples and water were collected from river on early and end of June to represent temporal variation. Simultaneously, the water temperatures was also recorded. The fish sample was measured for it's length and weight. The AAS (Atomic Absorption Spectroscopy) was used to analysed Zn in water samples. The results showed that there was a temperature decrease from 32.9 ^{0}C to 30.8 ^{0}C. The Zn was also decrease from 1.12 mg/l to 0.14 mg/l/ The length of *Mystus* sp. increased from 13.27 to 14.00 cm. In contrast, the weight was reduced from 36.29 to 32.88 gr. To conclude, the temperature and Zn temporal variation have effect on increasing length and reducing weight.

Keywords:

Atomic Absorbic Spectroscopy; Heavy Metal; *Mystus* sp.; Size Distribution; Temporal Variation;

Paper 39: Mangrove Interrelated System

Macrozoobenthos Diversity as a Bioindicator of Metal Pollution at Segara Anakan

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Monitoring the quality of surface water against pollution can be done in various ways, one of which uses organisms as bioindicators. Segara Anakan is an estuarine ecosystem that has the potential to contain contamination carried along the river flow. Macrozoobenthos is one of the organisms that is rightly used as a bioindicator of pollution in the environment. The structure of the macrozoobenthos in Segara Anakan has undergone a change as indicated by the diversity and abundance of low species. Meanwhile, environmental parameters, such as heavy metals in detected sediments are quite high. The concentration of heavy metals varied, namely Hg, Pb, Cd and Cr with the average concentration respectively as follows: 0.04; 4.4; 1,2 and 1,4 ppm. In general, the low abundance of macrozoobenthos was found in stations with high heavy metal content. This shows that there has been heavy metal pollution in Segara Anakan.

Keywords:

Bioindicator; diversity; pollution; macrozoobenthos; segara anakan

Paper 40: Mangrove Interrelated System

Polychaete *Nereis* sp. in the Coastal Farming of Jeruklegi, Cilacap as Potential Prawn Feed

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Polychaete *Nereis* sp. belongs to Nereidae family that lives as benthic organism in estuarine. The high level of amino acid and unsaturated fatty acid in *Nereis* sp. is potentially used as nutrient in prawn feed. These compositions increase the quality of prawn gametes and larva. However, there is still less information about the nutrient composition of *Nereis* sp. in Jeruklegi area. Therefore, a study about nutrient composition (chemical composition) of *Nereis* sp. in this area was conducted as the basic information for the *Nereis* sp. culture in the future. This study used survey method and sampling were conducted in four stations with three replications were allocated to each three-sampling point in each station every two week. The result showed no significant differences among the protein and fat composition of *Nereis* sp. from each station. The range 42,06 – 51,68% of protein and 12,93 – 22% of fat can fulfil the requirements in crustacean farming. The organic materials in this coastal area was considerably high therefore it is potential for *Nereis* sp. culture.

Keywords:
Nereis sp.; prawn feed; substrate; growth

Paper 41: Mangrove Interrelated System

Identification of A New Morphotype of The Intertidal Mangrove Barnacle of Segara Anakan Cilacap

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Barnacle is entirely marine with the genus Amphibalanus is the most common group occupy almost all marine environment, especially the intertidal area. Segara Anakan is a unique mangrove ecosystem in a lagoon estuary located in Cilacap on the southwestern border of Central Java with West Java. Mangrove in this area is also a typical habitat for Amphibalanus spp barnacles. This research aimed to determine the species identity, and the evolutionary relationship among Amphibalaninaes found in Segara Anakan Cilacap based on morphological and molecular characteristics. This research was a survey with purposive random sampling technique applied to collect samples. The species determination and identification was conducted based on the soft parts (body) and the hard parts (shell) and described based on the morphological characteristic. Molecular identification used a mitochondrial COI genetic marker, and targeted region of DNA was obtained by PCR technique using Folmer LCOI and HCOI primer pair for comparative analysis isolated from muscle tissue. Morphological phylogenetic reconstruction was completed using the PAUP program, and the phylogenetic analysis was conducted using MEGA 5 software. The reconstructed cladogram suggested the morphotype of Amphibalanus isolate B10 belong to the genus Fistulobalanus but distinguishable with other known species. The phylogram also suggested the morphotype B10 is the sister species of *Fistulobalanus albicostatus*.

Keywords:

Morphotype; Teritip; *Amphibalanus*; Segara Anakan

Paper 42: Mangrove Interrelated System

Size Variation of River Catfish (*Mystus* sp.) and It's Relationship to Cadmium (Cd) Heavy Metal and pH in Blanakan River, Subang.

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The Blanakan River is habitat for many fish species including river catfish (*Mystus* sp.). River catfish is freshwater fish that can survive in polluted aquatic environment. This fish is also consumed by people living near the river. In fact, Blanakan river is polluted by human activities such as agricultural, transportation and mining activities which make the waters may be exposed by heavy metals. Correspondingly, this study aims to determine the size variation of river catfish and its relationship with Cadmium (Cd) and pH parameter in water. Water and fish samples are collected from two stations. The pH was measured directly from water as well as length and weight of fish. The concentration of Cadmium (Cd) in water was analyzed using AAS (Atomatic Absorption Spectrophotometer). The result showed that the value of pH and Cd concentration were 5.78 – 6.64 and 0.03 ppm – 0.10 ppm respectively. While the ranges for fish length and weight were 13,20 cm – 13,59 cm and 30.69 gr – 34.7 gr. To conclude, the increase of pH can increase the size of fish. In contrast, the increase of Cd reduces the size of fish.

Keywords:

Catfish; Metal; pH; River

Paper 43: Mangrove Interrelated System

Sexual Dimorphism Chracterization of Kurau Fish (*Philimanus perplexa* Feltes, 1991)

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Kurau fish (*Philimanus perplexa*) is one of the economical fish species in Indonesia which is commonly found in PPI Tanjungsari Pemalang. Kurau fish have a rather wide flat body shape, yellowish body color.Characteristic of Kurau fish has seven free filaments on the pectoral fin whose length exceeds the anal fin. Kurau fish is widely used as a consumption fish. Continuous capture without farming can lead to overfishing, so efforts are needed to preserve the Kurau fish. Kurau fish do not have sexual dimorphism, therefore taksonomical information is needed to distinguish male and female Kurau fish. Differences in male and female fish can be seen through morphological performance, morphometrics truss techniques and meristic characters. The purpose of this study was to differentiate male and female Kurau fish based on morphological performance, morphometrics truss technique and meristic characters. The method used in this research is survey. Samples were taken by purposive random sampling technique.Samples of Kurau fish were obtained from PPI Tanjungsari Pemalang which consist of 90 fish. The variables observed were morphological performance, morphometrics truss distance and meristic characters. The measured parameter is the ratio between the truss distance to the standard length. Morphological performance observed were body shape, mouth shape and position, caudal fin shape, scale type and tooth type. Morphometrics truss characters measured are the truss distances that have been determined by 15 points. Meristic characters were calculated, namely the number of hard and soft fingers on the dorsal, anal and pectoral fins; number of scales above and below the linea lateralis; the number of gill archs and the number of scales surrounding the tail shaft and the number of filaments on the pectoral fin. Data on morphological performance were analyzed descriptively, morphometrics truss character measurements were statistically analyzed by the "t" test of the SPSS Version 16.0 program and meristic characters were analyzed descriptively. The results showed that the character of truss mophometrics can be used as a differentiator between male and female kurau fish, namely in the posterior part of the body where males have wider body sizes and are relatively longer than females. Morphological performance and meristic characteristics cannot be the difference between male and female Kurau fish.

Keywords:

sexual dimorphism; morphological performance; morphometrics; meristic; kurau fish (*Phlimanus perplexa*)

Paper 44: Mangrove Interrelated System

Effect of Salinity and Zinc (Zn) Heavy Metal on Water towards Size Distribution of River Catfish (*Mystus* sp.) at Blanakan River, Subang, West Java.

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River Catfish (*Mystus sp*.) is a fish that lives in the estuary area of the Blanakan River and has a high level of physiological adaptation to a wide salinity range. River catfish has been consumed by people lived near river. Related to this fact, this study aims to determine the effect of salinity and Zinc (Zn) heavy metals at water on the size distribution of River Catfish. The fish samples were collected from 2 stations. The salinity was measured directly from water as well as length and weight of fish. The Zn in water was measured by using AAS (Atomic Absorption Spectroscopy). The results showed that the value of salinity and Zn were 20 ppt - 29 ppt and 0,03mg/l – 0,22 mg/l, respectively. While the ranges for fish length and weight were 13,2 cm – 13,6 cm and 30.6-34.7 gr, respectively. Hence we conclude that the salinity and zinc variation has increasing weight and length of River catfish.

Keywords:

Mystus sp.; water salinity; heavy metals; size distribution

Paper 45: Mangrove Interrelated System

The Plankton Composition from Lagoon to Sea Water Entrance in the Western Part of Segara Anakan Mangrove Ecosystem, Cilacap

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There was a unique brackish water ecosystem and affected a change in the plankton composition at lagoon and riverside in Segara Anakan Cilacap. The research purpose was to map phytoplankton and zooplankton composition consisting of freshwater and sea water plankton from lagoon to sea water entrance in the west part of Segara Anakan Cilacap. Survey method was taken with purposive random sampling in fourteen stations and four replicates with new and full moon conditions from March to April 2018 in a wet season. The result showed 52 species of plankton. All species belonged to phylum Cyanophyta (9 species), Chlorophyta (13 species), Chrysophyta (19 species), Euglenozoa (2 species), Rotifera (2 species) and Arthropoda (7 species). Of the 52 species collected in all stations and replicates, phytoplankton has a greater species richness (41 species) than zooplankton (11 species). And also, freshwater plankton (47 species) has a greater species richness than sea water plankton (5 species). The wet season caused freshwater enters brackish water. The largest freshwater of River Citanduy enters the brackishwaters of Segara Anakan Cilacap and causing the dominan species of phytoplankton and freshwater plankton in this area of inland waters.

Keywords:

plankton composition; brackish water; Cilacap

Paper 46: Mangrove Interrelated System

Marine Environment and Biodiversity in Sudanese Red Sea

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Red Sea is Sudan regional water and famous with his attractive and mostly pristine habitats particularly coral reef, also, Red Sea recognized as a global importance for marine biodiversity. Three distinct depth zone are recognized in the Red Sea: shallow reef shelves less than 50 m deep, deep shelves 500 to 1,000 m deep and central trench more than 1,000 m deep.The nominated site is an expanse of coastline including coral reef, mangroves, Sea grasses off-shore islands, soft-bottom mud flats, sand beaches and bottom rocky shores in addition to salt marshes. As a result the Red Sea is rich in biological diversity and provides permanent habitats, breeding grounds and areas of refuge for various marine animals, and its also provides support to several threatened species. Sanganeb Marine National Park (SMNP) is one of the most unique reef structures in the Red Sea which steep slopes rise from a surface of Red sea more than 800 m deep and it is widely reported to be the only Atoll in the Red Sea.

Keywords:

Marine resources and Biodiversity; Red Sea; SMNP

Paper 47: Mangrove Interrelated System

Molecular Profile of *Synedrella nodiflora* (L.) Gaertn from Three Different Altitudes based on IGS atpB- rbcL

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Synedrella nodiflora (L.) Gaertn is the only member of genus *Synedrella*, which is widely distributed over many tropical countries. It has been reported as potentially having many benefits for human life, but it is also commonly found as broad-leaf weed in several crops. In addition to its wide distribution, this species can also grow in a wide range of altitudes. This study was aimed to assess molecular profile of *S. nodiflora* in three different levels of altitudes, i.e. 0, 130 and 800 m above sea level respectively. Intergenic spacer (IGS) *atp*B – *rbc*L was used as the molecular marker. It was shown that no genetic difference among samples from the three altitudes was observed, indicating that any difference that may appear in the phenotype is merely due to morphological and/or physiological adaptation.

Keywords:

Synedrella nodiflora; IGS atpB – rbcL; altitude

Paper 48: Mangrove Interrelated System

Morphological and Physiological Adaptation of *Synedrella nodiflora* (L.) Gaertn in Various Altitudes

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Synedrella nodiflora (L.) Gaertn is a widely distributed tropical plant species. Nevertheless, it has taxonomically been the only member of genus Synedrella. Hence, it is interesting to study the morphological and physiological adaptation in different altitudes. Three altitudes were selected in this study, i.e. 0, 130, and 820 m above sea level. The parameters examined included number of stomata and trichomes per leaf area unit, size of glandular and non-glandular trichomes, size of peripheral and central flowers, number of peripheral and central cypsellas, seed germination. It seems likely that number of trichomes and seed formation tend to show differences among altitudes.

Keywords:

Synedrella nodiflora; adaptation; altitude

Paper 49: Mangrove Interrelated System

Ability of Road Shade Plants As Pb Absorbent in Jalan Jenderal Soedirman Purwokerto

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Air pollution can be determined by using plants as a bioindicator. The purpose of this research was 1) to determine the ambient air Pb concentration and Pb concentration in some leaf road shade plants in Jalan Jenderal Soedirman Purwokerto, 2) to find out the stomata characters (size and density of stomata) related to their ability to absorb Pb. The research method used survey methods. Road shade plant leaves samples taken by purposive random sampling. The variables used in the research include variables such as air Pb and Pb concentrations of leaves, while the dependent variable in the form of anatomical responses. The main parameters were observed in the form of air Pb concentrations, Pb in leaf and stomata anatomical characters. The support parameters are traffic density. The results showed that the concentration of Pb in Jenderal Sudirman road within 1 hour is 0.0147 ?g/m³. Pb concentration was highest in the leaves leaf *Schima wallichii* 0.3524 ppm and lowest *Hibiscus tiliaceus* 0.2354 ppm. Pb accumulated in the leaves very real effect on the density, length, and width of the leaf stomata shade plant in Purwokerto's Jenderal Sudirman Road. Pb concentration in leaves positively correlated with density, length and width of stomata ($p<0.05$).

Keywords:

Absorbent; Pb,; road shade plants; stomata characters

Paper 50: Mangrove Interrelated System

Chlorophyl contain of *Ipomoea pes-caprae* (L.) in Cilacap Coastal Areas in Relation to Habitat

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Bayhops (*Ipomoea pes-caprae* (L.) R. Br.) is a kind of creeping herb growing in the coastal areas which can produce specific metabolites that are beneficial to humans. A study on the chlorophyll content of this plant is important to find alternative sources of chlorophyll for health food supplements. The aims of this study are to determine the chlorophyll content of the bayhops in the coastal areas of Kamulyan, Bunton, and Sodong Cilacap beaches. The research method was experimental with a completely randomized design of 6 treatments with 3 replications. The treatments used consisted of sea sand and soils from Kamulyan, Bunton, and Sodong. The parameters measured are the content of chlorophyll a, chlorophyll b and total chlorophyll. Determination of chlorophyll content was with acetone solvent, then measured by using a spectrophotometer. The results of this study showed that growing habitat influences the chlorophyll content. The bayhops found on further inland of Sodong contained the highest chlorophyll a, chlorophyll b and total chlorophyll.

Key words:

Bayhops; goat's foot; chlorophyll; sand; soil; Cilacap

Paper 51: Mangrove Interrelated System

Ornamental Marine Fish from the South Coast of Cilacap Central Java

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Cilacap has a high potential of marine fisheries. However, no scientific data is available on the potential of marine ornamental fish from that area. Here we reported the preliminary result of the potential of marine ornamental fish from south coast of Cilacap with special emphasize on species richness. A survey method with incidental sampling was conducted. Fish samples bought from the fish collector in Sentolokawat Village, District of South Cilacap at Cilacap City. The fish samples were collected in April, and May 2019. Taxonomic identification of the fish samples was referring to available reference and validated to the data in FishBase. Identification based on color pattern and meristic characters by considering geographic ranges of the specimen placed the samples into 25 species, 11 families, and two orders. Chaetodontidae was the wealthiest family with nine species. Most fish belonged to Perciformes. Our result was less compared to the previous study for the south coast of Java. This could be due to narrower areas and limited sampling periods. Nevertheless, our result provides information about the potential of marine ornamental fish in Cilacap as among promising income source for Cilacap Regency. However, government intervention is absolutely necessary for sustainable used of ornamental fish in the area.

Keywords:

fish; marine; monsoon; ornamental; Cilacap

Paper 52: Mangrove Interrelated System

Phytoremidiation of Liquid Waste Electroplating using *Salvinia* sp.

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Liquid waste of chromium electroplating can cause water pollution if not treated fist.The characteristic of waste among others acidic pH, low of Dissolved oxygen (DO) and high of Total Suspended Solid (TSS). To overcome the negative impact of chromium can be done with water weeds i.e. *Salvinia molesta* and *Salvinia natans.* The objective research was to know the comparison effectiveness between *S. molesta* and *S. natans* as phytoremidiator and the best time exposure. Research design was Randomized Completely Block Design. The main plot was biomass of *S. molesta* and *S.natans* 50 g (B1), 100 g (B2) and 150 g (B3). Subplot was time of exposure i.e 1 days (T1), 6 days (T2) and 12 days (T3). There were 24 treatment combination and each treatment was repeated three times replication. Observed parameters i.e Cr in water, pH, DO and TSS. Data were analyzed by Anova and followed by Tuckeys test. This research showed that both *S. molesta* and *S.natans* were effective on the decrease of Cr in water and TSS on the other hand increase of pH and DO. The most effective treatment was biomass of Salvinia 150 g and 12 days of time exposure. From this research can be concluded that both *S. molesta* and *S.natans* can be used as phytoremidiator to improve water quality but *S. molesta* is more effective as phytoremidiator than *S.natans* . Biomass of *S. molesta* 150 g and 12 days were the effective treatment to improve water quality of chromium electroplating.

Keywords:

Electroplating; chromium; water weeds; DO; TSS

Paper 53: Mangrove Interrelated System

Batik Dye Decolorization by Immobilized Biomass of *Aspergillus* sp.

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The rapidity of the batik industry in the former residency of Banyumas raises problems. Wastewater that discharged into upstream causes accumulation in downstream up to empties into the sea, so it's not only threatens the river ecosystem but also has the potential to cause problems in the mangrove ecosystem in Segara Anakan (the downstream area of the Citanduy River which is very close to the downstream area of the Serayu River Basin). The strategy of batik wastewater management in an effort not to pollute the environment is offered. This study tried indigosol blue batik dye which are often used in the batik industry by using immobilization of the pure fungi biomass compared to biomass which was induced with tanic acid. Combination between incubation time and shaking treatment in immobilization of pure *Aspergillus* sp. biomass that capable to decolorize indigosol blue batik dye were also done. Data of degradation percentage was analyzed using spectrophotometry. The result of comparison of agitated treatment conditions at immobilization using induced with tanic acid and pure biomass *Aspergillus* sp. at 24, 48, 72 hours were 54.7, 75.8, 77.4% and 78.8, 84, 80.1, respectively. While the result of treatment under static conditions were 65.4, 86.3, 73.7% and 79.2, 78.6, 68.2, respectively. The next experiment is showed that 48th hour on static treatment have the highest decolorization percentage up to 67.1%. pH was measured before and after treatment. pH after treatment were decrease both in static and shaking treatment, and also in control treatment both in static and saker treatment. Based on the results of the research, the fact is the use of immobilization biomass of *Aspergillus* sp. in the form of alginate beads can be use for decolorization application in the environment.

Keywords:

Aspergillus;, decolorization; indigosol blue dye; immobilized biomass; tannic acid

Paper 54: Mangrove Interrelated System

Self-Feeding Selection Behavior in German Cockroaches, *Blattella germanica* L. (Dictyoptera:Blattellidae)

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The German cockroaches are pest insects in the housing areas and other places such as in the cars, ships and public transportations that are not well sanitized. One of the safest way to control these pest insects in these sensitive areas is using baits. However, the effectiveness of a bait formulation is dependent on the self-selection behaviour of the cockroaches againsts bait components. The purpose of this research is to assess the self-selection behaviour of the German cockroaches on diets with different nutritional compositions. The treatments consisted of a diet with the ratio of casein:sucrose 100:0, 80:20, 50:50, 20:80, and 0:100. The cockroaches used were males. The observed behavioral parameters included latency, frequency, and duration of visits to the diet. Behavioral observations were conducted for 24 hours (6:00 pm – 6:00 am) using the recording and continous sampling method. The Data obtained were analyzed by using one way anova. The results showed that the nutritional composition of the diet did not affect latency, but it affected the frequency of visits to the diet and the duration of the cockroach on a diet ($p < 0.05$). The highest visit frequency (15.67 times) and the longest duration (2,066,667 seconds) were on the diet with the composition of casein:sucrose 20:80. The German cockroaches orientated randomly at the beginning of choosing a diet and seemed that the diet with the composition of casein:sucrose 20:80 was most preferred than any other diet compositions.

Keywords:

latency; frequency; duration; diet

Paper 55: Mangrove Interrelated System

Preference of Termites to Habitat under the Trees along Altitudinal Gradient in Western Slope of Mount Slamet Central Java

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The western slope of production forest of Mount Slamet locating in 700-1300 m asl, dominated by trees of *Recinus damara* and *Pinus mercusii*. The dominant trees create spesific character habitat and be prefered of termites to inhabited under them. The aims of this research to differ the preference of termites to habitat under the tree on western Slope. The metode used was survey with sampling based on belt transect.(L=100m, W=2m) layed under both habitat for 600 m length. Each transect for 100 m length devided into 20 sections, then the termites sampled on living tree, branch, bark, litter and soil in each section. Diversity, equality and domination of termites were analyzed by Shannon-Wienner index (H¢), Shannon-Evennes index (E), and Simpson's Domination index and correlation test. The result, six spesies of termites *Schedorhinotermes javanicus*, *Odontotermes javanicus*, *Nasutitermes matangensis*, *Capritermes semarangi*, *Procapritermes stiger* and *Microtermes insperatus* were found under both of the trees. The pattern of abundance of each species termites on altitudes showed maximal on mid altitudes. The conclusion were the preference of termites to the dominant tree was not significantly different, the termites diversity were categorized as low level and the most dominant species was *Schedorhinotermes javanicus.*

Keywords:

Altitudinal Ggradient; habitat; preference; termites

Paper 56: Mangrove Interrelated System

Traceability Studies of *Kappaphycus alvarezii* Carrageenan Industries in Indonesia

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Like mangrove, algae ecosystem plays an essential role for fisheries and other marine species in the aquatic habitat. One of abundant and important algae in marine environment is *Kappaphycus alvarezii*. Moreover, Indonesia is a major producer of *K. alvarezii* carrageenan in the world. Since the seaweed technology development in Indonesia tends to increase in various sectors, there is a certain amount of industries are increasingly encouraged to improve algae technology innovation; providing high quality-cheap solution as result in high technology in carragenan development. However, there are still lacks in integrating of seaweed development management and technology. Consequently, people tries to improve quality control and efficacy of *K. alvarezii* supply chain. This study aims to give comprehensive views that can be used for the further comparative research on related carrageenan industries of *K. alvarezii* in Indonesia. In the further development, sustainability issues should be considered. Therefore, the research will be focus on traceability business of carrageenan industries of *K. alvarezii* in Indonesia based on stakeholder analysis; network and power analysis; and institutional analysis.

Keywords:

Kappaphycus alvarezii; Carrageenan Industries; Traceability Studies.

Poster 1: Mangrove Ecosystem Management

The Composition of Mangrove Association Mollusks in Natural and Rehabilitation Mangrove Ecosystem at South Lombok Seashore

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Mangrove association mollusks was one of the indicator to describe the status of mangrove ecosystem's health. This research purposed to comparing the composition of mangrove association of mollusks in natural and rehabilitation mangrove ecosystem. It held on March to June 2019 at 2 types of mangrove ecosystem such as natural ecosystem at Pemongkong, East Lombok and rehabilitation ecosystem at Gerupuk bay. Data collection method used purposive random sampling by placed a plot sized 1x1 m randomly in a larger plot (10x10 m) which have been determine before. The result showed that there are 37 species of association of mollusks which belong to 14 families. 14 species found in both locations, 3 species only found at rehabilitation ecosystem, and 20 species left only found at natural mangrove ecosystem at Pemongkong. Natural mangrove ecosystem Pemongkong had higher abundance of association mollusks with number of abundance 77.692 ind/m2 against rehabilitation ecosystem which only reached 48.746 ind/m2. Potamididae has the highest diversity and abundance value in both location. The resemblance of these 2 ecosystem based on the proportion of each species in the mollusks community showed by Similarity Presentation categorized as low level which only reach 36,36% of similarity.

Keywords:

Association mollusks; Mangrove; Natural; Rehabilitation

Poster 2: Recent Approach to Mangrove Monitoring

Mangrove Ecosystem as A Blue Carbon Asset

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The importance of mangrove ecosystems as blue carbon, causes the need for sustainable mangroves. National mangrove area is 3.67 million hectares; divided in Papua 1,663,657 ha (in 2009), Sumatra 902,205 ha (in 2014), Kalimantan 637,575 ha (in 2009), Maluku 210,996 ha (in 2017), Sulawesi 118,891 (in 2015), Java 129,178 ha (in 2013), Bali Nusa Tenggara 34,835 ha (in 2016). Challenges mangrove deforesation in Indonesia needs solution to maintain mangrove environment. Mangroves are quite critical in the Riau Islands, North Kalimantan, East Kalimantan and West Papua. The solution to maintain mangrove in order to become a sustainable mangrove with ecotourism implementation, so people will preserve the environment so that it remains beautiful.

Keywords:

blue carbon asset; critical mangrove; mangrove ecotourism

Poster 3: Recent Approach to Mangrove Monitoring

The Preliminary Assessment of Mangrove Status at Payung Island in Musi Estuary, Indonesia

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Pulau Payung which located in Musi Estuary, the longest river in Sumatera, hosts a dense mangrove cover in South Sumatera, Indonesia. Mangrove is known to be a highly productive ecosystem and has many functions ecologically. However, human pressure around this area and increasing demand for land represent increasing threats to mangrove. The aims of this research were to investigate the changing of mangrove coverage in 2009 – 2019. In the present study, the mangrove coverage together with species composition was evaluated through remote sensing (Landsat-8) and ground-truth (Transect Quadrat Method) observations. The results showed that the major mangrove composition dominated by 4 genera, *Avicennia, Sonneratia, Rhizopora,* and *Nypa*. The mangrove coverage decreased slightly from 497.65 ha in 2009 became 488.49 ha in 2019.

Keywords:

Mangrove; Musy Estuary; Payung Island; Remote Sensing

Poster 4: Recent Approach to Mangrove Monitoring

An Analysis Model of The Change Mangrove Ecosystem in Cendi Manik village, Sekotong, West Lombok

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Cendi Manik Village is one of the villages that enter to the area of essential ecosystems (KEE) because the area has a very high potency for the survival of organisms. This research aims to determine the change of mangrove ecosystem in Cendi Manik village, Sekotong, West Lombok. The Data is used derived from the Citra Landsat of 2015, 2016, 2017, and 2018. The methods are used is proportional purposive sampling method with NDVI (Normalized Difference Vegetation Index) analysis to distinguish vegetation and not vegetation. Based on the results obtained that the vast mangrove ecosystem in the village of Cendi Manik have changed because of the occurrence of land clearing as the area for salt ponds and settlements by local residents. In addition, the mangrove trees are cutting as fuel for the manufacture of salt.

Keywords:

NDVI, Mangrove, Cendi Manik, Citra Landsat

Poster 5: Recent Approach to Mangrove Monitoring

Estimation of Carbon Deposits in Mangrove Stands Biomass at Bagek Kembar Mangrove Ecotourism Sekotong West Lombok

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The Bagek Kembar mangrove ecotourism area, Sekotong, West Lombok has been designated as one of the mangrove essential ecosystem area in West Nusa Tenggara. One of the ecological services of a mangrove ecosystem is a carbon storage. Mangrove forest have the ability to store carbon 4 times higher than the world's tropical rainforest. This study aims to assess the amount of carbon stored in mangrove stands in the Bagek Kembar mangrove ecotourism area, Sekotong West Lombok. This study uses a random sampling method, which is the placement of random plots in each mangrove zoning. The mangrove zoning is devided based on the distance from the sea and the river starting from 50 meters, 100 meters, 150 meters, 200 meters, 250 meters, and 300 meters. In addition, the mangrove area was devided into two mangrove statuses namely natural mangrove succession and rehabilitation and 10% of the 10x10 meter observation plot sample was taken. So that there were 286 observation plots obtained. Calculation of mangrove biomass using allometric equations. The results of the estimation study of carbon deposits on mangrove stand biomass in the Bagek Kembar Mangrove Ecotourism area of a total 6 zoning amounted to 5467.907 tons/ha.

Poster 6: Mangrove Interrelated System

Enzymatic Activity Profile of *Streptomyces* spp. Isolated from the Mud of the Nipah Mangrove Area in Sungai Kakap sub-district, West Kalimantan

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Streptomyces play a role in the degradation process of organic compounds that exist on the soil, especially in the mangrove area through several enzyme activities. These bacteria can help in providing organic ingredients as a food source for organisms that live around mangroves including the nipah worms (*Namalycastis rhodochorde*). This study aims to determine the enzyme activity profile of seven actinomycetes isolates that have been isolated from mangrove soil in Sungai Kakap district, West Kalimantan. Determining of enzymatic activity was carried out in asparagine glycerol agar which was added with starch, milk casein, cellulose and gelatine. The results showed that seven *Streptomyce s*isolates had proteolytic, cellulolytic, amylolytic, and gelatin degradation activities. *Streptomyces* sp. NrASA1 has the highest proteolytic activity index values, namely 0.9 and *Streptomyces* sp. NrASA3 has the highest amylolytic and cellulolytic activity index values, respectively 0.8 and 0.7.

Keywords:

Streptomyces; cellulolytic; proteolytic; amylolytic

Poster 7: Mangrove Interrelated System

The Diversity of Fish in Cikaniki River, Bogor Regency

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Research on fish diversity in the Cikaniki River, Bogor was carried out in March - June 2019. This study aimed to obtain a Fish Species Diversity Index and Type of Disorders related to Environmental Factors. Selection of the overall selection station (based on purposive sampling) is based on consideration of the representation of the negotiation situation. The diversity of fish species in the Cikaniki river is relatively moderate with a diversity index of 1.67 and high population diversity with an evenness index of 1.83. Fish species *Nemacheilus chrysolaimos*, *Puntius binotatus*, and *Glyptothorax platypogonoides* that oppose the Cikaniki River Index Various types of low value indicate rivers. The most challenging environmental factors are temperature, Biological Oxygen Demand, and Total Solid Suspended with consideration of 0.785.

Keywords:

Diversity; Fish; Cikaniki River

Poster 8: Mangrove Interrelated System

Pathogenicity Profile of Indigenous Bacteria Isolated from Gut and Feces of Nipah Worm (*Namalycastis rhodochorde*)

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Screening and selecting of indigenous gastrointestinal bacteria and nipah worm feces are very important before being applied as probiotics. Previous studies have isolated 10 bacterial isolates from intestinal and nipah worm feces and their known cellulolytic and proteolytic abilities. The purpose of this study was to determine the pathogenicity of all isolates against nipah worms in vitro and in vivo. Testing of pathogenicity in vitro was carried out on blood agar and DNAse agar, while in vivo testing was carried out by injecting 0.1 ml of bacterial suspension into the nipah worm body which was then cultured for 14 days. The results showed that bacterial isolates NrBF6, NrBF 9 and NrBC4 had indications of being pathogenic because they had hemolysis activity in blood agar medium and lysed DNA on DNAse agar medium. Injection suspension of the third liquid bacteria into the nipah worm body showed that the bacteria NrBF6, NrBF9 and NrBC4 had LD50 at the suspension dose of 10^3 bacterial cells for 5, 8, and 20 days, respectively. Symptoms of infection that appeared most dominantly in nipa worms were wounds on the surface of the body, broken body segments and the body looked pale.

Keywords:

Pathogenicity; gastrointestinal bacteria; nipah worm; Namalycastis

Poster 9: Mangrove Interrelated System

The Induction of Asexual Reproduction on *Holothuria scabra* and *Bohadschia marmorata*: The Conservation Effort in Tanimbar Archipelago, Maluku

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Southeast Maluku is the main producer of Indonesian trepang, but lately the resources have been dropped significantly. The effort to multiply trepang through sexual reproductive techniques still requires a long time. Therefore, another method is needed that is faster, more effective, and easier to implement by coastal communities, namely with inducing asexual reproduction of fission using a rubber band. This research using experimental methods in the field and analyzed descriptively. Fission induction conducted by binding 1/3 of the body part anterior to each individual of trepang. This study induces asexual reproduction in two trepan species found on Matakus Island, Tanimbar Archipelago, Maluku, *Holothuria scabra* and *Bohadschia marmorata*. The results showed that *H. scabra* (98%) and *B. marmorata* (100%) can induced fission and divide into two part. The posterior part has a higher regeneration and a better survival rate than the anterior part. The survival rate of *B. marmorata*is higher than that of *H. scabra*. The method of inducing asexual reproduction with rubber band can be used by Maluku coastal communities as an added value for their local wisdom called “sasi”.

Keywords:

Trepang; Asexual reproduction; Tanimbar archipelago

Poster 10: Mangrove Interrelated System

Community structure of Trepang at Namtabung, Selaru Island, Maluku, Indonesia

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Trepang are a term used for members of the sea cucumber (Holothuroidea) which is commonly used as a commodity. Indonesia has a high diversity of trepang, one of the regions that is a producer of sea cucumbers is Maluku. The purpose of this study was to determine the community structure of trepang in Namtabung, Selaru Island, Tanimbar Islands. This research was conducted using the 5x5 m^2 quadratic transect method at 3 stations. Species identification using morphological character. There are 95 individuals consisting of 14 species. Density of trepang at location 0.42 m^{-2} with highest density represented by *Bohadscia marmorata* with 0.12 m^{-2}. The Shannon index calculation results show moderate sea cucumber diversity, the Shimpson dominance index calculation shows no dominance, and the Shannon evenness index shows almost even distribution of each species.

Keywords:

Trepang; community analysis, diversity

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