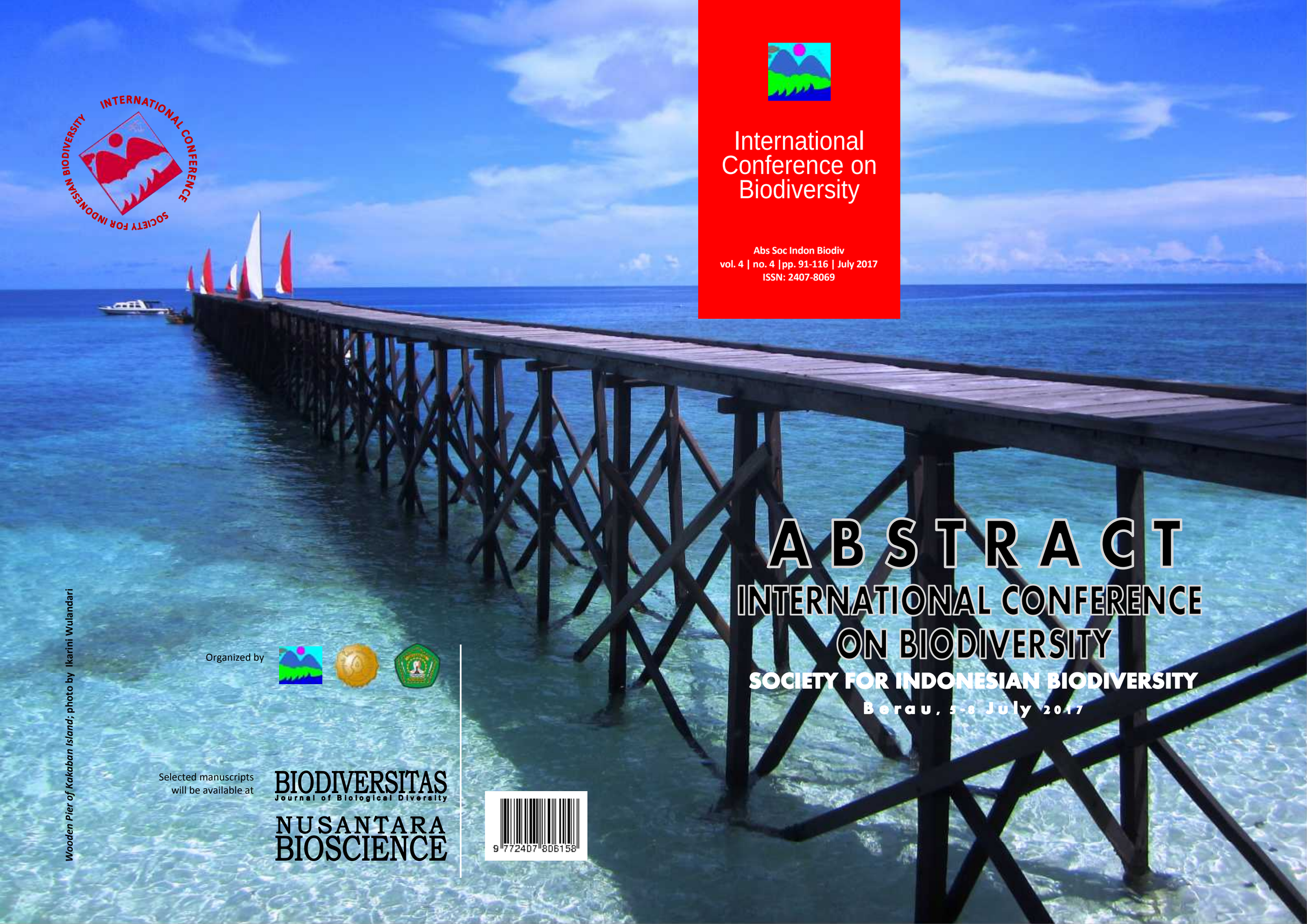

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ABSTRACT

INTERNATIONAL CONFERENCE ON BIODIVERSITY

SOCIETY FOR INDONESIAN BIODIVERSITY

Berau, 5-8 July 2017

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Wooden Pier of Kakaban Island; photo by Ikarini Wulandari

ABSTRACT

INTERNATIONAL CONFERENCE ON BIODIVERSITY

SOCIETY FOR INDONESIAN BIODIVERSITY

Berau, 5-8 July 2017

THEME:

The Heart of Borneo: Land and Water Tropical Biodiversity

SECRETARIAT ADDRESS

Sekretariat Masyarakat Biodiversitas Indonesia, Kantor Jurnal Biodiversitas, Jurusan Biologi Gd. A, Lt. 1, FMIPA UNS, Jl. Ir. Sutami 36A Surakarta 57126, Jawa Tengah, Indonesia. Tel. +62-897-6655-281. Email: biodiversitas@gmail.com. Website: biodiversitas.mipa.uns.ac.id/snmbi.html

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TIME SCHEDULE

International Conference on Biodiversity

Society for Indonesian Biodiversity (SIB)

Berau, Indonesia, 5-8 July 2017

TIME	ACTIVITIES	PERSON IN CHARGE	SITE
July 4, 2017			
	Shuttle from Kalimarau Airport, towards Bumi Segah Hotel, Tanjung Redep, Berau, EastKalimantan		
08.00-12.00	Group I	Committee	-
14.00-17.00	Group II	Committee	-
19.00-22.00	Group III	Committee	-
July 5, 2017			
08.00-09.00	Registration	Committee	Lobby
09.00-09.10	Speech of the Committee	Chairman of the Committee	R1
09.10-09.20	Speech of The International Office	Head of International Office of the Mulawarman University	R1
09.20-09.30	Speech of Institute for Research andCommunity Services	Head of the Institute for Research and Community Services, Mulawarman University	R1
09.30-09.45	Opening speech	Rector of the Mulawarman University	R1
09.45-10.00	Photo Session and Coffee Break	Committee	R1
10.00-11.20	Panel 1 **Prof. Dr. Rochmin Dahuri** **Prof. Dr. Wolfgang Hess**	Moderator	R1
11.20-12.40	Panel 2 **Prof. Kuniyoshi Shimitzu** **Dr. Irawan Wijaya Kusuma**	Moderator	R1
12.40-13.40	Rest, prayer, lunch	Committee	Lobby
13.40-15.40	Parallel presentation I		
	Group 1	Moderator	R1
	Group 2	Moderator	R2
	Group 3	Moderator	R3
	Group 4	Moderator	R4
	Group 5	Moderator	R5

15.40-16.00	Coffee Break	Committee	Lobby
16.00-18.00	Parallel presentation II		
	Group 6	Moderator	R1
	Group 7	Moderator	R2
	Group 8	Moderator	R3
	Group 9	Moderator	R4
	Group 10	Moderator	R5
18.00-18.15	Announcement of the Best Presenters	Chairman of the Board of Assessors	R1
18.15-18.30	Closing speech and other explanations	Chairman of the committee	R1
July 6, 2017			
08.00-09.00	Registration	Committee	Lobby
09.00-11.00	Trip to Derawan Archipelago, Berau, East Kalimantan	Committee	-
11.00-17.00	Natural Tourism at Derawan Archipelago	Committee	-
July 7, 2017			
08.00-17.00	Natural Tourism at Derawan Archipelago	Committee	-
July 8, 2017			
08.00-14.00	Natural Tourism at Derawan Archipelago	Committee	-
14.00-16.00	Depart to Bumi Segah Hotel, Berau	Committee	-
July 9, 2017			
07.00-09.00	Depart to Kalimarau Airport.	Committee	-

Upcoming events:

1. September 2-3, 2017 – Bogor, West Java (National Seminar)
   http://biodiversitas.mipa.uns.ac.id/S/gen/schedules.html

2. September 23-24, 2017 – Palu, Central Sulawesi (International Conference on Biodiversity)
   http://biodiversitas.mipa.uns.ac.id/S/gen/schedules.html

3. October 14-15, 2017 – Pontianak, West Kalimantan (International Conference on Biodiversity)
   http://biodiversitas.mipa.uns.ac.id/S/gen/schedules.html

4. November 4-5, 2017 – Medan, North Sumatra (International Conference on Biodiversity)
   http://biodiversitas.mipa.uns.ac.id/S/gen/schedules.html

5. December 8-10, 2017 – Bali (International Conference on Biodiversity)
   http://biodiversitas.mipa.uns.ac.id/S/gen/schedules.html

TABLE OF CONTENTS

International Conference on Biodiversity

Society for Indonesian Biodiversity (SIB)

Berau, Indonesia, 5-8 July 2017

Ethnobiology and Socioeconomics

Bioscience (Life Science and Technology)

Note: A. Genetic Diversity, B. Diversity of Species, C. Diversity of Ecosystem, D. Ethnobiology and Socioeconomics, E. Bioscience (Life Science and Technology); O. Oral, P. Poster

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ABSTRACT

International Conference on Biodiversity

Society for Indonesian Biodiversity (SIB)

Berau, Indonesia, 5-8 July 2017

Genetic diversity

AO-01

Diversity study of Gaga Chicken (*Gallus gallus domesticus*) based on DNA barcoding analysis

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The aim of the study is to identify the diversity of gaga chicken (*Gallus gallus domesticus*) based on DNA barcoding analysis. The research was conducted during August 2015-January 2016. A number blood sample of 17 slow type and 5 dangdut type of gaga chicken were taken from Sidrap. In addition, 4 blood samples from slow type and 3 of dangdut type were taken from Jakarta. Blood samples were collected from artery brachialis. All blood samples were then kept into tubes containing EDTA to prevent blood coagulation during preservation and stored at-20 oC. Cytochrome c Oxidase Subunit-I (COI) gene is an effective marker for identifying the phylogenetic of gaga chicken. Distribution of polymorphic site sequences of COI, was located at 701-800 base pair. The phylogenetic tree reconstruction revealed that gaga chickens Bullo from Sidrap showed a closed relation with their counterparts from Kebayoran Lama, Jakarta at bootstrap of 89.7%. The highest bootstrap value was 96% that indicates gaga chicken Bullo was closely related to gaga chickens from Sidenreng, Sidrap.

Bootstrap, COI, DNA barcoding, gaga chicken

AO-02

Diversity of morphological and agronomic characters of F1 cassava clones in Lampung, Indonesia

Setyo Dwi Utomo♥, Erwin Yuliadi, Akari Edy, Kresna Shifa Usodri, Muhammad Jumadi, Vetty Pratiwi

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To develop superior cultivars/clones of cassava (*Manihot esculenta*), sexual hybridization is required to generate highly diverse population. The objective of this study was to evaluate the variation in flowering of cassava clones as parents and variation in growth rate and morphology of F1 population. Random natural sexual hybridization of 40 cassava clones was conducted in the highland of Sekincau (1700 m), West Lampung in 2015-2017. At 6 months after planting, reproductive branches, flowers, and fruits were observed in all clones; the lowest percentage of plants producing reproductive branches, flowers, and fruits were 32%, 20%, and 12.5% respectively. This demonstrated that sexual hybridization among cassava clones should be effective in Highland of Sekincau. The harvested botanical seeds were germinated and grown on soil media (10 kg polybag) on 12 December 2015; ≤20 seeds derived from female parent per polybag. The growth rate is the number of seeds growing divided by the number of seeds planted; observed at 12 days after planting. The growth rate of F1 seed harvested from 81 clones was 58% and tend to increase when the seeds were planted after 87 days after harvesting. The F1 population showed high variation in the color of apical leaves and petiole. This indicated that natural hybridization was effective to generate segregating population.

Diversity, germination rate, growth rate, *Manihot esculenta*, sexual hybridization

AO-03

Pest diversity identification in East and North Kalimantan (Indonesia) local upland rice population

Nurhasanah♥, Kadis Mujiono, Widi Sunaryo

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Pest attack is a serious problem in plant production and reduces the economic yield significantly. In this study, identification of pest attack in East and North Kalimantan, Indonesia local upland rice cultivation was conducted to characterize the diversity and intensity of attack in the population. The results showed that there were several types of herbivore and detritivorous insects found in the rice cultivation. Besides the main pests of rice crops, rice bug (*Leptocorisa* sp.) and brown planthopper (*Nilaparvata lugens* Stal), there were also other pests, i.e. grasshoppers (*Locusta* spp.), green stink bug (*Nezara viridula*), coreid bug (*Anoplocnemis* spp.), black and red ant (ordo Hymenoptera). There was no stem borer (*Chilo suppressalis* Walker) found in the population. The pests infected the plants in a different frequency. The highest frequency of infection was caused by grasshoppers (71.83%), followed by rice bug (56.34%), coreid bug (19.72%), red ants (18.31%), black ants (14.08%), green stink bug (9.86%) and brown planthopper (1.41%). The intensity of damage due to the pest attack in the population was also varied, ranging from 0-50%.

East and North Kalimantan, intensity, local upland rice, pest diversity

Diversity of Species

BO-01

The productivity and prospective of job's tear (*Coix lacryma-jobi*) development for staple food crop alternative in East Kalimantan, Indonesia

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Job's tear (*Coix lacryma-jobi* L.) is a native food crop biodiversity of East Kalimantan, this crop generally cultivated altogether with upland rice under shifting cultivation practice. However, since the implementation of rice intensification program by the Indonesian government, job's tear was left and neglected by farmers along with the reduction of upland rice cultivation practice. The prospective of job's teas development as a staple food crop in East Kalimantan was determined by it biological characteristics as a C4 and perennial crop, and also adapted to the upland ecosystem. This is an initial study to evaluate some experiments on the productivity of job's tear under traditional cultivation and fertilizer application. The productivity of job's tear was determined by using some indicators, i.e. crop yield, number of shoots, number of grain per panicle, and grain weight. Results of the study showed that the average productivity of job's tear under traditional cultivation was about 5 ton ha^{-1} and varies from about 3 ton up to >8 ton ha^{-1}. Application of compound fertilizer at the dosage of 200 kg ha^{-1} has increased the 1.000-grain weight more than 15% and also increased grain yield more than 25%. Those data elaborated that job's tear productivity might be improved through soil fertility management, and it was prospective to develop as staple food crop alternative for staple food diversification program in East Kalimantan.

Diversification, job's tear, productivity, staple food

BO-02

Bioactivity in the leaf oil of *Dryobalanops lanceolata*

Harlinda Kuspradini [1,♥], Agmi Sinta Putri[1], Tohru Mitsunaga[2]

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[2]Faculty of Applied Biological Science, Gifu University, Japan

This study aimed to examine the bioactivity of essential oil was collected from the leaves of *Dryobalanops lanceolata* by steam distillation method. This research used antioxidant and antimicrobial test. The antioxidant activity was assayed by DPPH (1,1-diphenyl-2-picryhydraziyl) and using ascorbic acid as a positive control. The antimicrobial properties of the pure essential oils were determined using agar diffusion method. Four different microorganisms were used in this study, that is *Streptococcus sobrinus, Streptococcus mutans, Staphylococcus aureus,* and *Candida albicans.* The zone of inhibition and activity index were measured and compared against a known synthetic standard. The yield of essential oil of *D. lanceolata* obtained in the present study was 0.12%, respectively. The extract inhibited all tested microorganism and susceptible. The best inhibition zone was shown against *S. aureus* (49.3 mm). The essential oil of *D. lanceolata* also has a potency to inhibit the free radicals at concentration 6.25-100 ppm, which the highest percentage was 100 ppm (91.6%). The oil of *D. lanceolata* has been subjected to GC-MS analysis. Twenty-two chemical compounds have been identified and

the major compounds are phenol, 2-methoxy-4-(2-propenyl) (28.73%), gamma-terpinene (15.60%), 2-beta-pinene (9.80%), and 1-limonene (8.09%).

Antioxidant, antimicrobial, *Dryobalanops lanceolata*, GC-MS

BO-03

Community structures of reef fishes based on water characteristics in aquatic tourism park of Anambas Islands, Natuna Sea, Indonesia

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Aquatic Tourism Park of Anambas Islands is one of Marine Protected Areas (MPAs) in Natuna Sea, Indonesia, which is intended to achieve sustainable management of fish and effort to the conservation of ecosystem. Reef fishes are one group of animals associated with coral reef ecosystem which influenced by the water quality. This research aimed to determine the community structures of reef fishes and its relationship to the water quality of coral reef ecosystem in the Aquatic Tourism Park of Anambas Islands. Reef fish data were collected by using Underwater Visual Census (UVC) assisted with Line Intersect Transect (LIT) in 34 stations as well as water quality data collection. Community structures of reef fishes were analyzed by estimating the ecological index, while its relationship to the water quality was analyzed by multiple linear regression. Results showed that community structures of reef fishes in Aquatic Tourism Park of Anambas Islands involve: the average of abundance index was 3.6 ind./m2; diversity index was categorized medium; evenness index was grouped stable; dominance index was classified low. Water quality was in the optimum range of reef fish ecosystem. Abundance index of reef fishes was significantly influenced by dissolved oxygen (DO), whereas evenness and dominance indexes were affected by salinity and DO.

Community structure, reef fishes, water quality

BO-04

Micro and mini cutting application for clonal forestry on *Eucalyptus pellita*

Ellok Dwi Sulichantini [1,♥], Sukartiningsih[2], Rusdiansyah[3]

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Eucalyptus pellita F. Muell which includes of the family Myrtaceae is one of the priorities species for industrial timber estates (HTI) because it has many advantages such as easily to growth, good growth of stem form, high speed of growth, and good quality of wood. However, those advantages can only be achieved through a good clone selection. The growth of *Eucalyptus pellita* F. Muell seedlings that propagate using micro cutting, mini cutting and seed were studied in this experiment. The objective of the study was to know the seedling growth from different propagation methods. The research in nursery was designed using completely randomized design. The treatment was three methods of propagations (micro cutting, mini cutting, seed) in 20 replications, with 27 seedlings for each replication. The results show that the growth of the seedling that propagates by micro cutting or tissue culture method is better than mini cutting and seed. While seedling that produced by seed show the lowest growth. The growth of seedling form micro cutting at 30 and 60 days after planting (dap): the addition of plant height at 30 (18.8 cm) and 60 dap (32.7 cm); the addition of stem diametre at 30 (0.7 cm) and 60 dap (2.9 cm); the addition of leaves at 60 dap (9.9 pcs); root compactness score at 60 dap (2.9); leaf area158 cm2); fresh weight at 60 dap (2.1 g); dry weight (0.9 g), and survival rate (96.9%).

Eucalyptus pellita, mini cutting, seed, tissue culture

BO-05

Earthworms population at the post-coal mining rehabilitation areas, A case study in East Kalimantan, Indonesia

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Coal mining activities in Indonesia results in heavy soil degradation and a significant decrease in earthworm population. This research aims to determine the population of earthworms at the different ages of plant in the post-coal mining rehabilitation areas in a coal mining company, PT Kideco Jaya Agung, East Kalimantan, Indonesia. In this study, we collected 5 samples (a 30x30 cm square, 20 cm depth) of soil at the age of 2,4,6,8, and 10 years of rehabilitation plants at the rehabilitation areas, with 20 m distance between samples to determine the earthworm population. The depth of litter layer and species of plants is also documented in this study. The result shows that there

are only 2 species of earthworms found in this study, which the number increases in line with the age of plants in the rehabilitation areas. Although it differs in the number of species, the number of earthworms in the 10 years of age of rehabilitation plants in the research sites is almost similar to that number in the natural forests. In conclusion, it might take more than 10 years to return to the previous state for the earthworms in terms of the density and the number of species.

Coal mining, earthworm population, rehabilitation

BO-06

Natural resistance and anatomical changes of *Macaranga gigantea* and *Macaranga tanarius* against *Trametes* sp. fungus

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Tree species is one of the most important factors determining the natural resistance of wood products towards microorganism interferences. It has been known that fast growing trees commonly produce weak wood and not resistant against fungal decay. In this study, wood decay resistance of two species of fast growing trees, i.e. *Macaranga gigantea* (Reichb.f. & Zoll.) Müll. Arg. and *Macaranga tanarius* (L.) Müll. Arg. against a white rot decay fungus (*Trametes* sp.) were evaluated. A thirty-six-week decay test was performed with 20 x 20 x 10 mm (radial x tangential x longitudinal) wood blocks in Petri dishes. Decay resistance judged by wood weight loss and microscopic appearance of wood cell degradation. Results showed that *M. tanarius* wood was more resistant than *M. gigantea* wood from decay by *Trametes* sp. with 8.01% and 31.94% of weight loss, respectively. Light microscopy clearly revealed the fungal hyphae penetrate into cell walls and their proliferation and colonization in the cell lumina, as well as the ability of this fungus to degrade several wood cells of both wood species; however, cell wall degradation of *M. gigantea* was more severe than that of *M. tanarius*.

Macaranga, natural resistance, *Trametes*, wood decay, wood anatomy

BO-07

Anatomical structure of wood fossil from Samarinda, Indonesia

Nani Husien♥, Agus Sulistyo Budi

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The aim of this study is to identify petrified wood discovered in Samarinda, East Kalimantan, Indonesia. The material consists of a single piece of petrified wood gray and white in color. Three-dimensional sections (transverse, tangential and radial) were prepared by ground thin section technique. Microscopic characters of the fossil wood were compared with the present wood species. Specimens microscopically identified as the petrified wood of hardwood, it is characterized by the existence wood pores. Further, the xylotomical characters were comparable with the family Dipterocarpaceae. The fossil wood shows close resemblance with the genus of *Shorea* in respect of size and arrangement of pores, rays and axial parenchyma. The similarity was found on the anatomical properties of two preparations of Shorea sp. which are used as comparisons. Therefore, base on this properties, the species of this petrified wood is certainly the genus of *Shorea*.

Axial parenchyma, Dipterocarpaceae, petrified wood, pores arrangement, *Shorea*

BO-08

Antioxidant activities of several tropical fruits extracts from Samarinda, Indonesia

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In our effort to find new materials for antioxidant from natural resources, we have screened 16 selected edible tropical fruits (*Mangifera* sp., *Pometia pinnata, Litsea garciae, Sandoricum koetjape, Bouea macrophylla, Baccaurea montleyana, Diallium* sp., *Baccaurea* sp., *Mangifera casturi, Durio dulcis, Nephelium* sp., *Durio kutejensis, Artocarpus odoratimus, Baccaurea lanceolata, Artocarpus paenifolius,* and *Phyllanthus acidus*). The DPPH, ABTS, SOD and ORAC assays were used to evaluated antioxidants effect of those extracts. The methanol/ethanol/EtOAC/hexane of fruits extracts of Wanyi (*Mangifera* sp.), Kalangkala (*Litsea garciae*), Ramania (*Bouea macrophylla*), Rambai (*Baccaurea montleyana*) were the potent fruits for antioxidant activities with value range 40-50%. These findings indicated that some tropical fruits have potent for antioxidant.

ABTS, Antioxidant, DPPH, ORAC, SOD, tropical fruit

BO-09

Species of zooplankton in Lake Takisung Beach, South Kalimantan, Indonesia

Dharmono♥, St. Wahidah Arsyad

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Inventory is a part of taxonomy where taxonomic basic include classification, identification, and nomenclature. Takisung Beach area is a famous tourist area located in Takisung, Tanah Laut, South Kalimantan, Indonesia. In Takisung beach area there is lake which is one of the aquatic ecosystems in this area that have specificity. In lake are inhabited by various kinds of aquatic biota including plankton. Plankton that has no chlorophyll but has a motion device is called zooplankton. The purpose of this research is to know the species of zooplankton contained in the lake of Takisung beach, Tanah Laut, South Kalimantan. The method used in this research is an explorative method with sampling technique to field using plankton net number 25. The research area of 1.5 km with width 40-60 m and the depth are varied that is 80 cm at the tip and 200 cm in the middle. The samples of the study included zooplankton that was netted by plankton net number 25 at depth to the bottom of waters. Sampling is done systematically i.e., the sampling point is placed on both sides and the middle of the waters with a distance of 100 m per point. Sampling technique in transect and done two repetitions so that in the lake along the 1.5 km will be obtained as many as 90 samples. Based on the result of the research, species of zooplankton in the lake, Takisung beach, Tanah Laut, South Kalimantan of 9 species, i.e., *Actinosphaerium eichornii, Cyclops* sp., *Nauplius* sp., *Pleuroxus striatus, Difflugia* sp., *Brachionus ulcerialis, Tetrahymena termophyla, Philodina roseola* and *Brachionus plicatilis.*

Lake, species, zooplankton

BO-10

Population and vegetation structure of ramin (*Gonystylus bancanus*) in secondary forests of Pematang Gadung and Sungai Sirih Villages, District of Ketapang, West Kalimantan, Indonesia

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Ramin (*Gonystylus bancanus* Miq. Kurz) was one of many prominent species that dominating in peatland forest. The species distribution is mostly in Southeast Asia peatland. The beautiful wood color, pale yellow sometimes grayish with no differentiated of sapwood and heartwood with straight interlocked grain, made it become the most wanted tree species from tropical peatland.The exploitation of Ramin wood since the 1970s caused decreasing of its population in the peatland forest. This study aimed to search information on the Ramin population and vegetation structure left in its habitat in secondary peatland forest of Pematang Gadung and Sungai Sirih villages area of Ketapang District. The study practiced survey method and data collecting was gathered using line plots system. Data assessed were natural regeneration condition-seedling, sapling and pole growth levels-, and tree growth levels. A 20m x 20m size plots were continually established to form a line with the length of 550-680m. Results showed that very little Ramin found in the forests, which were in Pematang Gadung found seedling only 9.8 tree ha^{-1} with height ranges from 131 cm to 150 cm, and sapling level counted 124.2 trees ha^{-1} with diameter ranges from 0,38 to 6,37 cm. At Sungai Sirih village more Ramin found, especially with a bigger diameter. Tree level (diameter >20cm) was registered 74.1 tree ha^{-1} while on the contrary very little seedling (2.8 tree ha^{-1}), sapling level (1 tree ha^{-1}) and pole level (7.4 tree ha^{-1}) established. Based on the tree population counted and the variation of their growth level, the vegetation structure of Ramin did not describe normal form in the natural forest both in Desa Pematang Gadung and Sungai Sirih.

Growth level, ramin population, ramin structure, secondary forest, tropical peatland

BO-11

Diversity of epiphytic orchids and host trees (Phorophytes) in the tropical cloud forest of Arfak Mountain Nature Reserve, West Papua, Indonesia

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Vascular epiphytes are important components of biological diversity in tropical forests. Orchid species is one group of the fascinating vascular epiphytes flourishing this ecosystem. We measured the species richness and abundance of vascular epiphytes of orchid along three vertical crown zones (Inner, middle and outer crown zones) and two trunk zones (below and upper DBH zones) as well as the diameter at breast height (DBH) of host trees growing naturally in tropical cloud forests at Kwau Village of Arfak Mountain Nature Reserve of the Bird Head Peninsular of West Papua, Indonesia. Data were collected from five established line transects. Each transect was 250 m long and composed of twenty-five 10 x 10 m^2 plots. Datasets of species name and the individual number of orchid species were recorded as well as species name and

individual number of host trees (Phorophytes), and vertical distribution of orchid species along the phorophytes. In total 192 individual of 19 orchid species is recorded inhabit 83 trees of 17 species in the secondary misty forest of Kwau Village. *Dendrobium* was the most abundant epiphytic orchid genus hosting the phorophytes with relativity of 30.21%, followed by *Coelogyne* and *Bulbophyllum* with relativity of 19.79% and 12.5% respectively. The genus of *Lithocarpus* is the frequent phorophyte species hosting the largest number of individual orchids, followed by Dodonaea viscosa, *Annesijoa novaguineensis* and *Timonius arfakensis*. Mostly recorded epiphytic orchids occupy the inner crown zones of the phorophytes.

Arfak Mountain Nature Reserve, diversity, orchid, West Papua

BO-12

Biodiversity mapping of epiphytic orchid diversity in the Arfak Mountain Nature Reserve of West Papua, Indonesia

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The Arfak Mountains Nature Reserve is a mountain range found on the Bird's Head Peninsula in the Province of West Papua, Indonesia. The term "arfak" came from the language of the coastal Biak people, meaning "inferior". The reserve shields diversity of flora and fauna surrounded by vast pristine forests ever found in the tropical cloud forests. Many botanical expeditions have been conducted in the region and only a few have reported diversity of the flowering plants including Orchidaceae. The knowledge on geographical distribution of Orchid plants is poorly documented and published. This study is designed to map every orchid plants encountered during the exploration. Five line transects of 250 m long with 20 m width are set perpendicular to the contour. All epiphytic orchids are recorded along with all transects as well as the phorophyte. 17 species of 119 orchid samples and 19 species of 145 individual phorophyte are recorded. All plants encountered during the observation were traced using GPS. Data set will be transfer into Arc GIS to map the horizontal distribution in the study sites. Dendrobium and Bulbophyllum are mostly dominant epiphytic plant hosting to the phorophyte genera of *Lithocarpus* and *Annesijoa*.

Arfak Mountain, Biodiversity mapping, Orchid diversity, West Papua

BO-13

Community-based biodiversity monitoring in agroforestry practices in East Kalimantan, Indonesia

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Tropical forests are important for production as well as for biodiversity conservation. REDD+ aims to reduce deforestation and forest degradation, to maintain and enhance carbon stocks, to enhance sustainable forest management and conservation of biodiversity. Agroforestry practices have been recognized to be suitable land use systems to maintain biodiversity by producing timber forest products and non-timber forest products and may form part of REDD+ programs. Local communities have strong roles to maintain forest biodiversity that needs to be further investigated more specifically. The aims of this research were to assess biodiversity, to analyze agroforestry species characteristics (e.g. shade tolerant, semi-tolerant, or intolerant), as well as to analyze species uses (e.g. construction, fruit, medicine, feed, and others). Fieldwork was conducted in January-February 2016 and January 2017 in Kampung Birang and Kampung Merabu, Berau, East Kalimantan, Indonesia. We trained local community members in plot establishment (60 plots, 50x50 m), tree diameter measurement, tree tagging, and herbarium collection. Local community members identified tree species by local names and listed species uses. The top ten tree species with largest importance value index (IVI) across both villages were 80% shade tolerant species and 20% semi-tolerant species. The dominant tree species in Kampung Birang was Langsat (*Lansium parasitum* (Osbeck) K.C. Sahni & Bennet). Langsat (*L. parasitum*) is a semi-tolerant species with edible fruits of commercial value, and its bark is used as malaria medicine. The dominant pole species in Kampung Merabu was Belangkan/Leban (*Vitex pinnata* L.). It is intolerant/pioneer species and used mainly for firewood. The dominant tree species in Kampung Merabu was Temangar (*Kleinhovia hospita* L.). Temangar (*K. hospita*) is intolerant/pioneer. This species is used for firewood.

Agroforestry, biodiversity, community monitoring Kalimantan, REDD+

BO-14

The analysis of biological parameters of fish stock in Cirata Reservoir (Indonesia): Bioeconomic model

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Fish resources in reservoirs such as Cirata (West Java, Indonesia), have strategic value, especially for the surrounding community, in terms of fulfilling the need for nutritious food, subsistence, and economic purposes. Unfortunately, until now there has been no serious attention from the government to develop and manage fish resources in these waters. Most of the activities and management of fisheries in the reservoir are concentrated in the floating net aquaculture, which is considered to be more economically contributing to the community. Whereas this aquaculture activity requires a large capital, make it difficult to do by the poor surrounding community. While capture fishery is one of the activities that relatively do not require large capital and can be done by the community around the reservoir. Existing conditions indicate a decrease in fish catch, indicating a decrease in fish stocks in reservoirs, which will have a negative impact on the welfare of surrounding community, as well as the sustainability of fish resources and their ecosystems. To meet the food safety and economic needs of the community, a healthy and sustainable fish resource is a must, characterized by sustainable inputs and outputs so that the stock of fish resources will be maintained. In order to fulfill this need, a basic understanding of the biological and economic conditions of the dynamics of fish resources in these waters as a basis for sustainable management is needed. The research was conducted to calculate the biological parameters of fish resources through fox, CYP, Walter Hilborn and Schnute algorithms. Furthermore, the variable of input, output and economic rent of sustainable, optimal and open access management regimes were analyzed. The results of the study indicate that fisheries management using the optimal regime provides the most efficient results, where fewer inputs will result in the maximum profit. Research suggests the need for immediate enforcement of management rules based on sustainable management regimes through input or output restrictions on capture fisheries in Cirata reservoirs.

Biological parameters, bio-economic models, fish stock, optimal, sustainable

BO-15

Biodiversities of plankton and benthos in Lake Jempang, West Kutai, Indonesia

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The discharge of pollutants (pollutants) which is derived from industrial waste, such as oil and gas, palm oil, and coal, and domestic activities, into the Mahakam river basin, may contribute to the declining of water quality of Mahakam river basin including Lake Jempang in West Kutai District, East Kalimantan, Indonesia. The aim of this study was to identify the condition of plankton and benthos in Lake Jempang; The study was conducted through survey, observation, and measurement of plankton and benthos communities. The results showed the abundance, diversity, equitability and the dominance indexes of plankton and benthos are still relatively moderate.

Biodiversity, benthos, Lake Jempang, plankton

BO-16

Diversity of Bryoepiphyte at Mount Telomoyo, Central Java, Indonesia in dry season

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Mount Telomoyo of Central Java, Indonesia has a tropical forest with diversity of Bryoepiphyte. Diversity and abundance of Bryophytes depend on the altitude and ephyphyte host tree (phorophytes). Nowadays, Mt. Telomoyo has been undergoing land forest constriction due to settlement and agriculture by the locals. It impacted to diversity of Bryoepiphyte was growth on phorophytes. This research aims to identify the diversity of Bryoepiphyte in the dry season. Until now, research about the diversity of Bryoepiphyte in Mt. Telomoyo along dry conditions has never been done. The results were important as a database about resistance genes of bryophyte on dry conditions. These genes could be improved as basic research for plant breeding. The collecting method of bryophyte samples was performed by exploration method, that was by taking bryophyte samples from eight stations at 1120 to 1340 m asl. In addition, the measurement of environmental parameters was including, air temperature, altitude, humidity and light intensity. Then, the samples were collected with dried herbarium techniques, and to be identified with a semi-permanent preparation and analyzed using literature. The identification results were presented descriptively and made determination key. This research shows that there are 17 species of Bryoepiphyte at Mt. Telomoyo, namely *Lejeunea flava* (SW) Nees, *Lejeunea holtii* Lind, *Lejeunea aloba* V.D. SD. Lc, *Hygrolejeunea, Frullania riojaneriensis, Porella* sp., *Isopterygium albescens* (Hook) Jaeg, *Leucobryum javense* (Brid) Mitt,

Macromitrium reinwardtii Schwaegr, *Octobleparum albidum* Hedw. *Rhizogonium spiniforme* (L.) Bruch, *Sematophyllum saproxylophyllum* (CM) Fleisch, *Sematophyllum tristiculum* (Mitt) Fleisch, *Thuidium investe* (Mitt) A. Jaeger, *Aerobryopsis longissima* (Doz & Mdk) Fleisch, *Meteriopsis ancistrodes* Renauld & Cardot, and *Rhacopilum spectabile* Reinw & Hornsch. Bryoepiphytes could be classified into 3 groups as Hepaticopsida, Bryopsida acrocarpus, and Bryopsida pleurocarpus. Bryoepiphyte species which have been broadly distributed along Mount Telomoyo was *Leucobryum javense* and *Octobleparum albidum.*

Bryoepiphyte, diversity, dry season, Mount Telomoyo

BO-17

Fruit performance, nutritional values and consumer preference of Talas Banana compared to local commercial bananas from East Kalimantan, Indonesia

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Fruit performance, nutritional content and consumer preferences determine the economic value of a commercial banana. Talas banana is known as a local cultivar from East Kalimantan, Indonesia showing a superior and unique taste compared to other edible bananas. This research was conducted to investigate the fruit performance, nutritional content and consumer preferences of Talas banana compared to other commercial bananas (Ambon, Raja, Kepok, Maulin, Susu and Cavendish) for rural and urban people in East Kalimantan. Talas banana is a medium size banana and smaller than Cavendish or Ambon. The fruit aril is yellow goldish almost similar to Mauli fruit aril color. The nutritional analysis showed that Talas banana had a higher sugar and starch content compared to Ambon and Cavendish. Talas banana had a delicious taste, unique fruit shape, and longer shelf life compared to Ambon and Cavendish. The organoleptic analysis showed that Talas banana is the most preferred by respondents compared to other commercial bananas used in this experiment based on its taste. However, it had a lower number of hands (7-11 fruitset), and a smaller fruit size resulted in lower production per hectare. In conclusion, Talas banana is a potential cultivar to be developed as a superior and commercial banana variety.

Consumer preference, East Kalimantan nutritional value, Talas banana

BO-18

The distribution of *Holothuria atra* at Panjang Island waters, Jepara, Indonesia

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The distribution of sea cucumber, *Holothuria atra*, was determined in the shallow area of Panjang Island, Jepara. The study investigated the size and occurrence of their reproductive activity frequency related with their habitat. The study was conducted in June 2017 using belt transect of 1 x 100m^2 with five replicates. The frequency of *H. atra* and their association with habitat were analyzed. Wet weight of each of *H. atra* was measured. The total of 105 individuals of *H. atra* was observed in which their class size distribution related with their habitat. There are 4 species of seagrass found i.e. *Cymodocea serulata, C. Rotundata, Halodule pinifolia* and *Halophila ovalis*. The reproductive activity mostly in the early stage of gonad development.

Distribution, *Holothuria atra*, Panjang Island, reproduction, sea cucumber

BO-19

Does commercial cultivation as one method of pitcher plants (*Nepenthes* sp.) conservation in Katingan, Central Kalimantan, Indonesia

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Recently, threats to the forest are worrying, biodiversity loss as the effect of human activity is very significant in a tropical ecosystem. The island of Borneo is well known as the center distribution of pitcher plants (*Nepenthes* sp.) with both the most Nepenthes species and the most endemics. As endemic species, the pitcher plants attract urban people as one of an ornamental plant. The objective of this study is to examine the role of local commercial cultivation in pitcher plants conservation. The survey on the presence of pitcher plant species was conducted in two locations: natural forest in Katingan and local commercial cultivation (at Katingan Hilir Village) in Central

Kalimantan. From every different species, give individuals was measured its size and its color was noted. The results showed that seventh species found at local commercial cultivation (*Nepenthes ampularia, N hookeriana, N gracilis, N mirabilis, N raflesiana, N reindwartiana and N tricocarpa), however at natural forest found six species (Nepenthes ampularia, N hookeriana, N gracilis, N mirabilis, N raflesiana, N reindwartiana*), Based on its size and color, at commercial cultivation found 14 variations from seventh species and at natural forest from six species found eight variations. This results showed also human involvement play a role in the conservation of species variability of *Nepenthes*.

Conservation, commercial cultivation, nepenthes, variations

BO-20

Screening of kenaf varieties on high-quality bast fiber production

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Preparation of the fiber before it is used for composite reinforcement is important. Pretreatments with some chemicals will increase the penetration and bonding efficiencies of the polymer matrix. Kenaf (*Hibiscus cannabinus* L.) bast pulps processed by modification of ammonium oxalate, sodium hydroxide, and acidic sodium chlorite treatments gave the higher viscosity and paper strength properties. These treatments kept the kenaf fiber from severe damage as indicated by longer fiber length and higher viscosity. Kenaf plants from several varieties were harvested at 161 days after seeding. The agronomic characteristics, viscosity and fiber properties were measured. There is a high correlation among the agronomic characteristics, but contrary result exists among the fiber characteristics. Single fiber showed much stronger fiber strength than the other two treatments which gave fiber bundles. On the other hand, between the two bundle fibers, the chemical treatment was stronger than conventional retted one.

Bast, kenaf, fiber strength, viscosity

BO-21

Ethnobotany: Cultural review of unique traditional uses of plants in highland and lowland District of Tagkawayan, The Philippines

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The aim of the study is to document the unique traditional uses of plant in Tagkawayan, The Philippines. A descriptive method was utilized in the study that employes an enhanced and adapted survey questionnaire as interview guide for data gathering to 65 knowledgeable elders. The study reveals 17 plants species are known to the informants that are prepared in a special manner for medicinal and culinary purposes. Among the different plant parts used leaves are commonly prepared for herbal treatment and fruits for cooking purposes. The use of rituals for preparing plants as medicine and the inclusion of special ingredients for food preparation was observed. This unexplored knowledge of traditional plant uses is confined to the older generation due to verbal means of information transfer. Documentation of this cultural heritage is a way of preserving and protecting not only our plant's diversity but also our cultural heritage. Moreover, the potential of developing alternative medicines from this traditional practices of plants preparation for treatments of common diseases can also be considered and analysis of biochemical components of plants could also increase its efficacy. Utilization of special ingredients for food preparation to increase nutritive value can be used for food innovation. The result of this study was significantly important more specifically for the younger Filipinos who are too much engrossed with the modernization brought by technology, more so, with anyone who wants to go naturally from preparing the food they ate to healing diseases using plants medicinal values.

Ethnobotany, Tagkawayan, traditional uses plants

BP-01

Autecology of *Acacia nilotica* in Baluran National Park, East Java, Indonesia

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This study aims at finding out: (i) the life cycle of *Acacia nilotica* (L.) Willd. ex Delile or *Vachellia nilotica* (L.) P.J.H.Hurter & Mabb., (ii) seed production and distribution in TNB, (iii) the potency of *A. nilotica* as bio-perspective species, and (iv) the standing structure of *A. nilotica*. Direct field observation was used by this study to find out the life cycle, seed production and distribution in Baluran National Park (TNB), East Java, Indonesia and standing structure. The nested quadratic method using 20 plastics was used to record and list seed production. The data related to standing structure was obtained by creating 10 permanent squares of 20 m x 20 m each, wherein each square, the diameter and height of 10 trees are measured. Meanwhile, the potency of *A. nilotica* as bio-perspective species was investigated from

the secondary data related to the research problem. This study concludes that (i) there are six life cycles of *A. nilotica*; these are seed bank, seedling, juvenile, adult, flower, and seed-in-pods, (ii) the average seed/tree production aged 3 years is 506 seed/trees, (iii) the *A. nilotica* seed distribution in TNB is through animals such as bull, wild buffalo, deer, as well as water in rainy season, (iv) the potency of *A. nilotica* as bio-perspective species can be developed either in the field of forestry, health or industry, (v) the structure of standing *A. nilotica* in TNB is considered as a standing of the same age (coeval standing).

Acacia nilotica, autecology, Baluran National Park

BP-02

Germination of *Macaranga gigantea* seeds from the soil seed bank

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The aim of this study was to determine the potential germination of *Macaranga gigantea* (Reichb.f. & Zoll.) Müll. Arg. seeds from seeds in the soil. Soil sampling was done on a plot of 15 x 15 cm, then taken the soil at a thickness of 0 to 5 cm. The soil samples were taken to the laboratory and shown on a 20x40 cm germination tub. After growing the seedlings counted the number of *M. gigantea* seedlings that grew. The results showed that during the fruiting season the number of seedlings was 116.8 ± 7.93, four months after fruiting season was 2.5 ± 2.0, and one year after the fruiting season was 1.42 ± 0.92. It is presumed that the *M. gigantea* seeds stored in the partial forest floor are dormant and can growth when the environmental conditions are suitable for germination.

Germination, *Macaranga gigantea*, soil seed bank

BP-03

Effect of rice husk biochar application to soil insect diversity on potato cultivation

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The high intensity of disease attack and the intensive use of fertilizers and pesticides which cause saturated fertilizer and pesticide to the land. Remediation using biochar rice husk is one of the technology to decrease fertilizer and pesticide residue. The diversity of soil insects can be used as bioindicators because of their existence depending on soil structure and condition. This study aimed to study the diversity and structure communities of soil insect in potatoes on the difference of husk rice biochar application. The sampling of soil insects was done on potato farmer's land with four treatments i.e., control (farmers way), trichokompos without biochar, trichokompos + biochar with dose 1 ton/ha, and trichokompos + biochar with dose 2 ton/ha. At each point, a single pitfall trap was installed for two nights and then it was taken for identification. The results showed that biochar application had a significant effect on the number of soil insect species (P = 0.037). The soil insect species composition pattern also showed significant differences between the four treatments (R: 0.2306, P-value = 0.001). This means that the application of biochar affects the number of insects species and plays a role in the formation of soil insect diversity beta patterns.

Bioindicator, Non-metric Multidimensional Scaling, Shannon-Wiener Index, remediation

BP-04

Species composition and diversity of species in difference aged of logged-over forest area, Berau, East Kalimantan, Indonesia

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Post logging natural regeneration generally lead to a change of structure and composition of the vegetation. The aim of this research was to investigate the differences of the structure and vegetation composition on 1, 2 and 5 years after logged over forest area. The result indicated that there was a strong correlation between number of seedlings and sapling to the years after logging. However, there was no correlation between species composition to the age after logging on trees of dbh more than 10 cm. There were differences in species dominated in seedling, sapling and trees level. High diversity index differences (H'>3) was on seedlings, sapling and trees with 10-19.9 cm diameter. It was also found that the variation of composition was less in greater dbh. The similarity index between seedling and sapling, sapling and trees, and between trees with 10-19.9 cm and trees with dbh more than 20 cm was also small (<50%). Basal area and volume of commercial species were also increased in line with the increased of dbh so that horizontal continuity can be expected as a continuation of commercial species after logging.

Logged-over forest, species composition, species diversity

Diversity of Ecosystem

CO-01

Inventory of caves fauna and caves mapping of Bukit Merabu Karst, Berau, East Kalimantan, Indonesia

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Bukit Merabu Karst area is a part of Sangkulirang Karst Ecosystem, Berau, East Kalimantan, Indonesia. Some of Bukit Merabu Karst potency is richness of pre-historic culture such as cave painting and also richness of caves fauna inside. The aim of this study was to collect information about Bukit Merabu Karst Ecosystem in the aspect of geology and biology by studying morphology and fauna biodiversity of the caves. This study was conducted in three caves, which were Bloyot Cave, Lubang Tembus Cave, and Sedepan Bu Cave. The method used in this study was cave mapping with forwarding method from top to bottom or bottom to top. Caves Fauna was observed with hand collecting and time search methods. Bloyot cave has a length of 56 m and there are cave paintings such as hand prints and some form of animal shapes on the walls and roof of the cave. Lubang Tembus Cave has a length of 520.7 m. Sedepan Bu Cave has a length of about two kilometers. The hallways that were successfully mapped is 546.5 m long. Cave fauna that dominates in both caves is cave crickets of the family Raphidophoridae. Cave fauna in the Sedepan Bu Cave is more diverse than in the Lubang Tembus Cave's fauna. *Sarax* sp., an Amblypygi species endemic to the region Kalimantan was found in Sedepan Bu Cave. Bukit Merabu Karst caves have a rich fauna that can be an asset for science. Cultural history in this region could become the main attraction for the village Merabu.

Cave, culture, ecosystem, fauna, karst

CO-02

The various sources of household income of paddy farmers in East Kalimantan, Indonesia

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Previous studies identified and classified the various sources of household income in different ways. Some reports showed the non-agricultural sector has a contribution to farmer household income in Indonesia. The objective of this study was to identify the various sources of household income of paddy farmers. This study was held out in East Kalimantan Province, Indonesia. The two-stage cluster sampling was applied to select the study areas. The simple random sampling was used to choose 380 paddy households as respondents. This study used descriptive statistics such as mean and frequency to explore, summarize, and describe data. Pearson moment correlation was applied to examine hypotheses. The sources of household income of paddy farmers in East Kalimantan, Indonesia, are from paddy farm income and non-paddy farm income. Paddy farm income is obtained from paddy farming. Non-paddy income is obtained from various occupations such as annual crops farmers, employees, sellers, fishers, breeders of livestock, carpenters, laborers, and others. The contribution of paddy farm income and non-paddy farm income to household income was 49.29% and 50.71%, respectively. Paddy farm income and non-paddy farm income, individually and collectively, very significantly positively contribute to the total household income of paddy farmers in East Kalimantan, Indonesia, ceteris paribus.

East Kalimantan, household, income, paddy farmer

CO-03

The floristic dynamic of various stages of secondary forests in Malaysia

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The process of succession is a sequential process of the development of floristic community which involves changes in species structure, composition, and diversity over time. The information on the floristic dynamic of various stages at secondary forests in Malaysia is currently lacking. This study was conducted to determine the floristic structure, composition, and diversity of various stage of secondary forest development in the study areas. A total of 997, 1842, and 834 woody tree stems with a diameter at breast height (DBH) of > 5 cm were recorded in 5, 10, and 20 years old of one-hectare secondary forests plots, respectively. The light demanding species dominates ten most common species in 5 and 10 years old of secondary forests. In 20 years old of secondary forest, these species did not exist. *Macaranga gigantea* was the most dominant tree species in 5 and 10 years old secondary forests in terms of basal area and volume per hectare. The most common species of 20 years old secondary forest was Adinandra dumosa based on density, basal area, volume, and Importance Value Index (IVi). The diversity and richness indices of the 10 years old secondary forest were the highest among all study sites.

Diversity, floristic composition, secondary forest, structure, succession

CO-04

Land rehabilitation and soil conservation with agroforestry system of sengon (*Falcataria mollucana*) and groundnut (*Arachis hypogaea*) in critical land

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Land Rehabilitation and Soil Conservation (LRSC) activities in various land conditions are not always successful as expected. The biogeophysical condition in the field and the selection of suitable plant species influence to the success rate of the LRSC. The purpose of this research was to know the growth of agroforestry plant of sengon-groundnut combination and soil and water conservation aspect in the critical land. Data analysis used were plant growth, average of diameter and height of sengon and hydroorological condition such as potential erosion rate, Erosion Hazard Index (EHI), and Erosion Hazard Class (EHC). The results showed that in a steep land (slopes of 15-25%) had the peanut growth rate of 70-80%, average diameter and height of sengon of 8.25 cm and 58.60 cm, potential erosion of 20.05 tons ha^{-1} $year^{-1}$, EHI of 1.43 (medium), and EHC of Class II. In a steep land (slopes of 25-40%) showed the peanut growth rate of 70-80%, average diameter and height of sengon of 7.90 cm and 54.70 cm, potential erosion of 45.50 tons ha^{-1} $year^{-1}$, EHI of 3.25 (medium), and EHC of Class II. LRSC with agroforestry system on different slopes classes has a positive impact because it reduces the erosion rate.

Erosion, growth, land rehabilitation, slope, soil conservation

CO-05

Morphological characteristic and physical environmental of *Terminalia catappa* in East Kalimantan, Indonesia

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Tropical almond (*Terminalia catappa* Linn.) is a large, spreading tree now distributed throughout the tropics in coastal environments. The tree is tolerant of strong winds, salt spray, and moderately high salinity in the root zone. It is widely planted throughout the tropics, especially along sandy seashores, for shade, ornamental purposes, and edible nuts. The timber makes a useful and decorative general-purpose hardwood and is well suited for conversion into furniture and interior building timbers. Fruits are produced from about 3 years of age. The leaves change color from green to red, yellow or gold and copper brown during the dry season and then are shed. *T. catappa* belongs to the family Combretaceae. This study aims to determine the morphological characteristics and physical environment of *T. catappa* Linn. habitat to obtain T.catappa Linn. tree that produces the best biodiesel. The research object was a *T. catappa* Linn. trees that planted as shade trees on side of road in three districts/cities (Balikpapan, Samarinda, and Kutai Kartanegara), that are categorized in pursuance of the height above sea level. Data collected from each tree are physical environmental and morphological characteristics. Flowering and fruiting are also observed to determine the amount of fruit/seed produced by a terminal tree.

Flowering, fruiting, morphological characteristics, physical environment, tropical almond

CO-06

The effect of mercury on vegetation growth in tailings of ex-gold mine

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Tailings of ex-gold mines generally contain mercury. Mercury is one of the chemical compounds that inhibit plant growth. The purpose of this study was to observe the correlation between mercury and the growth of vegetation in the tailings area of ex-gold mine. The research was done with survey method using vegetation analysis in three different age levels of tailings, there are 0-5 years, 6-10 years and ≥ 11 years after mining. The vegetation analysis was carried out using a double plot and placed purposively in the tailings area that has been an overgrown plant. Results showed that the older the tailing the lower the mercury content. The range of mercury content in the tailings area was 0.362 ppm-0.905 ppm. The opposite occurs in the development of vegetation, the older the tailing the higher the amount of vegetation. This condition indicates that the mercury content in the media greatly influences the growth of the vegetation on it.

Ex-gold mine mercury, tailings, vegetation

CO-07

Effect of elevation and land accessibility, income and farmers' perception of vegetation diversity-agroforestry systems in Sigi District, Central Sulawesi, Indonesia

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The objectives of the research were to evaluate the level of landscape vegetation diversity in agroforestry, to determine the effect of elevation, accessibility, income and farmer's perception of vegetation diversity. The research was conducted in Sigi District, Central Sulawesi, Indonesia from July 2014 to February 2015. The method used was the Multidisciplinary Landscape Assessment approach. The research sites located in six representative villages i.e. Padende and Sibedi in the lower landscape (23-75 m asl.), Balane and Doda in the middle landscape (148-504 m asl.), Dombu and Ongulero in the upper landscape (1163-1404 m asl.), with 5 replications in each village. The total area of six villages was 3772.13 ha that consists of 1217.13 ha of agroforestry system (32.3%). The research covered a population of 392 households who had land with agroforestry system. Totally 30 agroforestry farmers and their land (minimum 0.25 ha, homogeneous land system) were selected as key informants. Research activities like observation, survey and analysis were divided into two aspects, biophysical and socioeconomic aspect. The results revealed that landscape level of vegetation diversity in agroforestry system is generally good (H'= 3.1) and need to be optimized to enhance it's role as buffering zone for biodiversity conservation in the agroecosystem landscape and for supporting sustainable livelihood achievement. While efforts to improve vegetation diversity must be adjusted to habitat conditions (elevation and soil health), where vegetation can grow and produce well. The regional development such as accessibility improvement is still needed and it does not threaten the vegetation diversity as long as there is a synergy between human activities and the environment. An increase in level of income with positive perception of farmers on the benefits of vegetation diversity in the future will have a main role on vegetation diversity that is capable for supporting conservation as fundamental asset in sustainable development

Accessibility, agroforestry, diversity index, income, perception

CO-08

The effect of sea salinity and edaphic properties on growth and carbon stock of mangrove forest stands in Taman Hutan Raya Bali, Indonesia

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The mangrove forest is a forest tropic and subtropics typical type, growing along the beach or estuary that affected by the tides. Mangrove is often found in coastal areas that are protected from the onslaught of waves and sloping areas. Mangroves are not or are difficult to grow in coastal areas that are steep and choppy with strong tidal currents because these conditions do not allow the deposition of silt are required as a substrate for growth. Mangrove forest ecosystem has a function as an absorber of carbon dioxide (CO_2) from the air and storing carbon in the form of biomass. The study was conducted from April to November 2016. This study aims to determine the effect of salinity sea water and edaphic on the growth and carbon stock, to determine the number of carbon stocks found in mangrove forests in the area of Taman Hutan Raya Ngurah Rai Denpasar. Preparations of research plot using transect method with the size of 20 m x 50 m as much as 3 plots along the coast. The results showed that Basal Area Value in zone A = 32.59 ba/ha (m2), zone B = 28.41 ba/ha (m2) and zone C = 31.55 ba/ha (m2). While volume values Zone A = 370.18 v/ha (m2), zone B = 313.68 v/ha (m2) and Zone C = 380.01 v/ha (m2). A zone of carbon stock value = 113.7 tons/ha, zone B = 97.4 tons/ha and zone C = 109.7 tons/ha Growth value *Rhizophora* alba volume for this type of zone A = 11.19 v/ha (m^3), zone B = 8.96 v/ha (m^3) and zone C = 10,53 v/ha (m^3). Volume-ready value for *Rhizophora* apiculata type A zone = 1.16 v/ha (m^3), zone B = 1.50 v/ha (m^3) and zone C = 2.14 v/ha (m^3). The influence of salinity and edification for apiculata *Rhizophora* type increasingly toward the sea of its growth tends to decrease, while the type of alba *Rhizophora* increasingly toward the sea tends to increase. The result of chemical element analysis of CEC for zone A = 30.05 zone and zone B = 25.24 C = 25.43, Rated N-Total for zone A = 0.07 zone and zone B = 0.07 C = 0.04 . Value Organic Zone C. Zone A = 2.105 8 = 2.60 and zone C = 0.81. The salinity value of zone A = 1.54% with pH 6.82, zone B = 1.48% with pH 6.90 and zone C = 1.96% with pH 7.26.

Carbon stock, edaphic, growth, salinity

CO-09

The sustainability ecosystem in Kehje Sewen Forest (East Kalimantan, Indonesia) by releasing orangutan

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As a critically endangered (IUCN 2017) and endemic species in Indonesia, habitat for Orangutan Kalimantan (*Pongo pygmaeus*) was decreasing by plantation, mining and human settlement. Under the Ecosystem Restoration Concession (ERC) scheme with 86.450-hectare area, PT. RHOI (Indonesia's Orangutan Habitat Restoration) has the main goal to release all orangutans from Samboja Lestari rehabilitation center to Kehje Sewen forest, East Kalimantan, Indonesia. For consistency work in orangutan, all released orangutans were followed for 2 hours (patrol) and 12-13 hours (nest to nest) data with Focal Animal Sampling method and using telemetry signal by Post Release Monitoring (PRM) team. Since 2012-2017, PT. RHOI was successfully released 68 orangutans (44 females and 24 males), welcoming for 2 new orangutans baby born in the wild, with survival rate 92.65% and mortality case 7.35%. As a flagship species in Kehje Sewen, the orangutan is also an umbrella species for other unique and protected species such as birds, mammals, and herpetofauna. Kehje Sewen forest is a home for orangutan with approximately 405 tree species (48% was orangutan foods). The sustainability of restoration ecosystem was convinced by continuing releasing orangutans, to protect the orangutans and their habitat in order to protect the mother nature

Critically endangered, Ecosystem Restoration Concession, Flagship species, Release

CO-10

Study on land degraded and water in Santan and Marangkayu Watershed, East Kalimantan, Indonesia

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Changes in land use are often not accompanied by land use prevention measures, resulting in degraded the land characterized by high amounts of erosion and sedimentation and also small levels of rainwater infiltration. The existence of human intervention in utilizing the land to fulfill the needs of life has exceeded the carrying capacity then the land becomes less productive. The existence of land clearing that does not take into consideration the principles of soil and water conservation as well as environmental sustainability in watersheds result in primary forest cover less and less, thus simultaneously leading to the expansion of open land and degraded. The area of the Santan Basin and the Marangkayu Watershed, East Kalimantan, Indonesia has changed its utilization function and is not in accordance with the designation as a function of buffer and protection. The area of forest in the watershed area of Santan was 67.35% is still suitable as a protected area, while Marangkayu Watershed was 20.39% not suitable a buffer zone. Land degradation with an indicator of erosion hazard is mild to very heavy. Potential erosion of 1.230 tons/ha/year in the Santan Basin and 1,315 tons/ha/year. The area of critical land in the Santan Watershed was 14,340.57 ha (11,0%). While the area of critical land in Marangkayu Watershed was 3,092.79 ha (11.9%) from wide of DAS. The critical land was located on slopes > 15% by land cover in the form of plantation forest, mixed dryland agriculture, mining and open land. Based on the pH and DO indicator that the Santan and the Marangkayu Watershed indicated contamination. Water quality is included in class IV that can only be used to irrigate crops and/or designated that require alike water quality as those uses.

Degraded land, critical, erosion, watershed

CO-11

Biodiversity in agroforestry system: Arabica coffee plant combination with different types of shade

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Coffee plant (*Coffea arabica* L.) is one of the national superior commodities that have economic value that many cultivated by society. One of the factors that can affect coffee growth and production is the light intensity. Arabica coffee includes a group of plants that require incomplete light to be planted in an agroforestry system from a simple mixed system to a complex (multi-strata) resembling a forest. Shade trees have a huge role in sustainable coffee agroecosystems because the shade is needed to reduce the adverse effects of the blazing sunshine and can extend the life of the economy and become one of the requirements in the world coffee certification. This study aims to observe

the shade tree species used as coffee exploitation in North Toraja Pedamaran located at an altitude of ± 1250 m above sea level and the potential production of arabica coffee produced, this study was conducted from April to October 2016 at the coordinate point 03°01 ' 13,2 "-03°01'18,2" LU and 119°59'44,9 "-120° 00'03,8" LS, with observation and measurement of light intensity by using lux meter on some sample plot. The results showed that different types of shade coffee received different light intensities per minute, as well as with un-shaded coffee, shade tree combinations used by *Calliandra calothyrsus*, a mixture of *C. calothyrsus* and *Leucaena glauca,* and *Ermerellia ovalis*. The intensity of light received by coffee under *C. calothyrsus* 58%, *C. calothyrsus* and *L. glauca* mixture about 65% while shaded by uru-uru (*Ermerellia ovalis*) around (40%). Another biodiversity is the total production of each tree, seed weight, biomass, and litter are different in each model. This agroforestry system can be applied in Borneo with an altitude of about 1000 m asl and the benefits incurred is to improve the conservation and economic aspects of the surrounding people.

Arabica coffee, Agroforestry, light intensity, shade tree

CP-01

Geographic distribution and potential impact of climate change on the mountainous selaginellas of Java, Indonesia

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Selaginella opaca Warb and *Selaginella remotifolia* Spring have been widely known as mountainous spikemosses species which traditionally utilized to treat wound and menstruation and can be utilized as body fitness enhancer. Several efforts in order to collect information of its geographic distribution have been done, but none of them was conducted in the scale of Java Island. Understanding the consequences of climate change which will influence its geographic distribution is essential to formulate conservation and management practices and decisions to incorporate the future condition. This study tried to model the geographic distribution in Java Island both in current and future climate conditions. Carefully selected and bias removed data of both species' presence in conjunction with environmental and bioclimatic data were used to model the current geographic distribution of its potential habitat across Java Island using MaxEnt modeling software. Prior to model the potential impact of climate change using the same software and the same presence data, four greenhouse gas concentration trajectories (RCP 2.6, RCP 4.5, RCP 6.0, and RCP 8.5) in three different period of time (2020, 2050, and 2080) were bias corrected first using the Quantile Mapping (QM) and Change Factor (CF) methods. The current model illustrated the wide distribution of potential habitat across Java Island but slightly limited (with some exceptions) in a mountainous area. Altitude, geological, soil types and annual precipitation become the main four factors which calculated have the biggest contribution in influencing the potential habitat distribution. The reduced potential habitat ranged from 27% to 86% of prior area was the negative impact of climate change that illustrated by all of the future model results. These results confirmed that both *S. opaca* and *S. remotifolia* are sensitive to any climate change condition. In short-to-medium term effort to counteract those negative impact, all of the areas which projected will be under threat by 2020-2050 must be selected and categorized as the prioritized area for ex-situ conservation. Furthermore, the area that expected to withstand the climate change until 2080 should be prioritized as an in-situ conservation area.

Climate change, potential habitat distribution, modeling, *Selaginella*

Ethnobiology & Socioeconomics

DO-01

Evaluation of traditional plant extracts for innate immune mechanisms and disease resistance against fish bacteria *Aeromonas hydrophila* and *Pseudomonas* sp.

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This study reports the effect of ethanol herbal extracts from Borneo Island; they are *Boesenbergia pandurata, Solanum ferox* and *Zingiber zerumbet* on Tilapia (*Oreochromis niloticus*) innate immune mechanisms and disease resistance against *Aeromonas hydrophila* and

Pseudomonas sp. Fish were intramuscular injected with 0.1 mL/fish (1010 CFU/mL) each bacteria on the day 6th of post-injection treatment using extract by several methods (injection, bath, and immersion). The doses of extract are 600 ppm of *B. pandurata*, 900 ppm *S. ferox* and 200 ppm of *Z. zerumbet*. The functional immunity in terms of percentage mortality and Relative Percent Survival (RPS) and innate immune response was assessed at weeks 1, 2, 3 and 4. All the methods were effective to enhance the immune parameters after weeks 2 and the RPS of treatment more than 90%. The results showed that the injection method of extracts is the best application to control *A. hydrophila* and *Pseudomonas* sp. than feed and immersion methods. The study indicates that all the doses of extracts could be significantly influenced the immune response and protect the heath status of tilapia against *A. hydrophila* and *Pseudomonas* sp. infection.

Fish diseases, immunostimulant, prevention, plant extracts, treatment

DO-02

The effects of dietary *Eleutherine americana* on the growth, leukocyte profile, and digestive enzymes activity of *Pangasianodon hypophthalmus*

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The study was conducted to examine the effects of *Eleutherine americana* extract (EAE) on the average weekly gain (AWG), Feed efficiency (FE), digestive enzymes (amylase, lipase, protease) activity, total and differential leukocytes count, and phagocytosis activity of catfish (*Pangasius hypophthalmus*). Four groups of fish with three replicates were fed 15 (P1), 30 (P2), 45 (P3), and 60 (P4) g kg^{-1} of EAE in a basal diet and compared with control (iii) fish without EAE at a rate 3% of body weight for 4 weeks. At the end of the trial, AWG, FE, digestive enzymes activity, and leukocyte profile of all groups of fish were examined. The results showed that fish fed EAE above 15 g kg^{-1} in the diet significantly increased AWG while FCE, lipase, protease, neutrophil, and lymphocyte were not affected by dietary any concentration of EAE. The dietary 45 g kg^{-1} EAE in the diet of fish increased amylase activity and the highest number of leukocyte and phagocytosis activity was found in the fish fed 30 g kg^{-1} EAE in the diet. These findings suggested that the inclusion of EAE higher than 30 g kg^{-1} in the diet is beneficial to improve amylase, leukocyte and phagocytosis activity of fish.

Digestive enzymes, *Eleutherine americana,* growth, leukocyte profile, *Pangasianodon hypophthalmus*

DO-03

Conflict in Crocker: applying ethical analysis to constructive dialogue in a co-managed protected area in Sabah (Malaysia)

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Over a 10-year period, a valley in Crocker Range Park in Sabah (Malaysia) has witnessed a conflict between a community located inside its boundaries - Ulu Senagang/Mongool Baru - and the state government's parks department-Sabah Parks. Sabah Parks sought to designate the area as a co-managed community use zone (CUZ) in which sustainable practices are allowed to continue, but disagreement over how the zone was to be governed resulted in a prolonged impasse. This paper assesses whether conflict management tools could overcome the impasse. This study assessed the CUZ conflict via a systematic methodology known as ethical analysis (EA), which aims to reveal stakeholder interests, values, and principles and identify barriers and bridges to negotiated settlements. First developed in the medical field and subsequently employed in the analysis of forestry disputes, this is the first time that EA has been utilized in the context of protected area management. The EA revealed significant misalignments between stakeholders' positions that were sufficient to prevent a perfect win-win solution from emerging. As such, at least one party would have to make compromises in order for the CUZ to be established. The EA revealed that whilst both sides in this conflict were willing to move forwards with negotiations, they had been prevented from doing so by mutual mistrust and a number of misconceptions that had developed during the negotiation process. The EAtool was fit for purpose in identifying the underlying causes of the CUZ conflict, which were determined to be resolvable so long as both sides were willing to make compromises. The study concludes that other co-managements could similarly benefit from the employment of EA, which can be easily incorporated into existing protected area conflict management models and structures. We propose that the utility of EA can be further enhanced in the conservation management context by incorporating assessments of stakeholder priorities and worldviews into its analysis structure.

Ethical analysis, community conserved areas, facilitating conflict resolution, Sabah

DO-04

Ethnobotanical studies of plants utilization in the Central Kapuas (Indonesia) Gold Mining Region

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Ethnobotany needed to expand the knowledge of human interaction with plants. There are various uses of plants including for food industry, medicine, and are also useful in gold mining. Some miners believe that if there are found specific plants, so it is predicted there is a gold metal. The objective of this research is to (i) learn the knowledge of Dayak Ngaju ethnobotany in Central Kapuas (Indonesia) gold-mining areas, (ii) identify some species of plants used by local miners as an indicator of gold. This mix method research consists of two phases, first phase is ethnobotanical activities, using a qualitative approach, data were collected by in-depth interviews and identification of plant species that believed as an indicator of gold metal. The second phase is the quantitative approaches used to analyze ethnobotanical knowledge. The results showed that the people of Dayak Ngaju in Central Kapuas had local knowledge about the use of plants for food, medicine, industry and gold mining. There are 10 species of plants that believed to be the presence of indicators for gold mining. The highest level of Fidelity level (FL) and the relative value (RUV) of its use is Katune (Agrostistachys sessilifolia (Kurz) Pax & Hoffm)

Ethnobotany, gold mining, plants utilization

DO-05

Utilization of Family Araceae by community in Cisoka Village, District of Majalengka, West Java, Indonesia

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The study about utilization of family Araceae has been conducted in Cisoka Village, Cikijing Subdistrict, Majalengka District, West Java, Indonesia. The method of this study is mixed methods (qualitative and quantitative) with dominant qualitative. Data collected by interview (structured and semi-structured), observation participative, exploration, and collection. The data are analyzed descriptively with emic and ethic approach. The result of the study shows that there are 20 species and 13 cultivars of the family Araceae used by the community. The family Araceae by the community of Cisoka Village are used based on botanical character, that is tuber, petiole, and leaf. The utilization of family Araceae was determined into 4 categories such us food, medicine, decoration, and fish feed.

Araceae, Cisoka, utilization

DO-06

The business scale model from the development of sylvofishery using *Rhizophora* spp. and *Nypa* sp.

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The aquaculture system in the Mahakam Delta develops extensively-traditionally with an area of more than 2 hectares of shrimp ponds and even larger ones than 15 hectares resulting in large increases in mangrove forest destruction. BPS (2010) data shows that approximately 7,874 hectares of shrimp ponds have been unproductive and abandoned by farmers. This has resulted in even more severe ecological damage to the Mahakam Delta region.To maintain and restore the functions of the mangrove ecosystem in the Mahakam Delta with implemented mangrove rehabilitation program in one way with Silvofishery using *Rhizophora* and *Nypa*.The purpose of this research is to make the business scale model from the development of Sylvofishery using *Rhizophora* spp. and *Nypa* sp. Research location in Mahakam Delta, District of Kutai Kartanegara, East Kalimantan Province, Indonesia. Methods of data collection through observation and field interviews with approach System Dynamic using Stella software.Conclusion sylvofishery using *Rhizophora* spp. very feasible to be applied as ponds rehabilitation program in Mahakam Delta because it has a value of BCR above 1 so feasible to run, while Sylvofishery using *Nypa* not feasible to run because has less value of BCR 1. Application of sylvofishery using *Rhizophora* spp. farm other than conserve area of Mahakam Delta also can benefit from The financial aspect of farmers

Nypa, ponds, rehabilitation, *Rhizophora*, silvofishery

DO-07

Biodiversity forest garden based on local wisdom in West Kalimantan, Indonesia

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Local Kodatn Dayak wisdom in West Kalimantan, Indonesia about managing forest shows that human and nature are in one profitable ecological unity. Former cultivation area in its forest is managed with many methods, such as planting forest trees, fruit plants, rubber trees until it turns into the forest garden. This research uses 3 models, monoculture rubber cultivation (model 1), combined rubber with camphor (model 2), and combined rubber with durian (model 3). This research intends to: (i) analyzing maximum production of durian fruits and latex; (ii) analyzing the maximum growth increment of camphor and durian; (iii) analyzing the financial feasibility of rubber cultivation, rubber combined with camphor, and rubber combined with durian; (iv) formulate the model of rubber cultivation. This research also uses other measurement methods other than field measurement, which is: trees diameters and height, durian fruit and latex weight, and questionnaire interviews. The maximum productions of latex from those three models were achieved at the age of 17 years, while maximum production of durian fruits was achieved at the age of 55 years. The maximum growth increment of camphor and durian were achieved at the age of 40 years. Based on NPV analysis, the Net B/C and IRR of those three models were worthy to be cultivated. Financially rubber cultivation combined with durian (model 3) is the most profitable, then monoculture rubber cultivation (model 1), and lastly, rubber cultivation combined with camphor (model 2).

Financial analysis, increment and production analysis, rubber

DO-08

Prospects of utilizing NTFPs management from Setulang village forest based on local knowledge of the Umo Longh community in Malinau, North Kalimantan, Indonesia

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Establishment of Village Forest status gives local people assurance to manage independently but also limits their utilization. Communities are given freedom in the utilization of NTFPs and environmental services, but it is prohibited to utilize timber forest products that can disturb and destroy the life of flora and fauna in it. Utilization of NTFPs by the Umo Longh community to meet the needs of food, medicines, and wicker craft material. Data processing is done by interviewing, FGD, documentation, as well as observation and transect. The analysis method used in this research is CLAPS (Arquiza, 2008; Bakkegaard et al., 2016) followed by the preparation of Village Forest management strategy using SWOT. The result of the research concludes that the NTFPs has good prospect so the commodities that are included in the HHBK category can be managed by the local community independently and sustainably, including big pandan, fruits, and bamboo. In order for NTFPs to be available sustainably, the existence of Village Forest is maintained, therefore required: (i) The existence of government regulatory support that ensures its sustainability; (ii) Community support to comply with agreements and rules made; (iii) The availability of responsible management institutions; And (iv) The availability of adequate funding sources

NTFPs, Umo Longh, village forest

DO-09

Response of growth and development from *Nepenthes mirabilis* on cultivation of unusual habitat with shade level treatment and type of plant media

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Nepenthes mirabilis possesses anti-fungal content which capable utilized in various fields. This plant is widely found growing wild in the forest of North Kalimantan. The aims of this study to determine the response of growth and development from *N. mirabilis* on cultivation of unusual habitat with shade level treatment and type of plant media. This research using method of division of plot divided with main plot is three level shades (N):0% (NO), 40% (N1), dan 75% (N2), following it as small plot is four kinds type of plant media, that is natural habitat media from *N. mirabilis* composed of Talang Kelapa (M0), husk (M1), coconut powder (M2), and peat (M3). The results show the *N. mirabilis* has the capability to adapt in the sunshine (shade 0%) or shaded (40% to 75% shade), but the best formation of pitcher provide in a moderate shade (40%) (4-5 pitcher). Furthermore, we conduct cultivation *N. mirabilis* by utilizing media of coconut powder, husk, and peat. The result shows the formation of more pitchers when *N. mirabilis* cultivated by using coconut wood powder

media and the anatomical character (stomatal density and cuticle of the lower part of the leaf) *N. mirabilis* is strongly influenced by shade and plant media. This research provides new information about *N. mirabilis* response on various plant media and shade levels.

Cuticle, natural habitat, pitcher, stomatal density, sunshine

Bioscience

EO-01

Alteration of acoustic behavior of *Mystus guleo* which influenced by crude oil contamination

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Alteration in fish behavior as an existence of adaptation to environmental changes could be represented by it sound production. The response of *Mystus guleo* to the contamination of crude oil in waters could be studied by analyzing the change of acoustic behavior. In normal environmental conditions, click sound are emitted as a representation of territorial behavior on individual fish, and social, aggressive and territorial behavior on aggregation fish. Frog sound is generated as objectification to resting behavior both on individual and aggregation fish. Contamination of crude oil from 100 ppm in waters caused individual fish to be more active in territory behavior that implied an intensify in the production of click sound with a pulse duration which also increases significantly. Amendment in behavior also occurred in aggregate fish, where it became more passive (crude oil concentration of 100 ppm) and social behavior (1000 ppm). Its consequences were the reduce in click sound and the escalate in frog sound. Alteration in fish behavior followed by sifting in productivity and sound characteristics of *M. guleo* provides an early conclusion regarding the fish condition and adaptation as a consequence of crude oil contamination in the waters.

Acoustic behavior, crude oil, click sound, frog sound

EO-02

Bamboo reinforced-sandbag low crested breakwater as an appropriate technology solution for coastal communities

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Coastal abrasion has become one of the major problems for coastal communities on the island of Java. In Central Java alone abrasion has affected almost 10,000 acres of land, and it has severely damaged the biodiversity of the area. Huge financing is needed to overcome the problem. However, conventional barriers are extremely expensive for local communities, and the government has an only limited budget. As an appropriate technology designed to provide a quick and easy solution to abrasion problem, Bamboo reinforced-sandbag could serve as an alternative for a cheaper breakwater structure with comparable effectiveness. It approximately costs only IDR 2 million per meter, and the number could go down depending on the availability of local resources. As the technology is only a mid-term solution, its usage needed to be combined with bio-conservation method to restore the previous biodiversity balance. This paper focused on the comparative advantage of said structure against conventional structures, with special attention given to the possibility of technology transfer to the society to induce bottom-up initiative. Community participation is believed to be the key to support a sustainable environment. Our recommendation in the concluding section aimed at the government to provide legal instruments and guide i.e. ministerial decree for the technology and urges for a wide socialization to the community as well as business sector dealing with the coastal issue.

Abrasion, appropriate technology, biodiversity, breakwater, Coastal area

EO-03

Antimicrobial extract of *Avicennia marina* against pathogen on postlarva of tiger prawn

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The research aims to study *Avicennia marina* leaf extract to inhibit pathogens in vitro and in vivo on post larvae of tiger prawn. The leaves were chopped, dried and extracted with water solvents, seawater, and ethanol. In vitro inhibitory tests were performed using disc diffusion (ADD) and minimal inhibitory concentration (MIC) methods. The in vivo test on tiger prawn PL-8 was given by submersion, which then tested with *Vibrio harveyi* and *Saprolegnia* sp.

The ADD test showed *A. marina* extract can inhibit *V. harveyi* ranged from 8.33 to 12.33 mm and *Saprolegnia* sp. 7.67-11.67 mm, MIC ranged from 3.91 to 10.42 µg/mL to *V. harveyi* and 6.51-15.63 µg/mL to *Saprolegnia* sp. In vivo tests of *V. harveyi* and *Saprolegnia* sp. infections, showed 60-88% survival and 57.33-86.67%, with protective ability of the highest pathogen infection of 80.80% and 77.80%. The total Vibrio count on tiger prawn gave *A. marina* leaf extract at the end of the study ranged from 15-22x103 Cfu/mL. The best *A. marina* extract that can inhibit microbes and protect the tiger prawn from pathogen infection is ethanol extract concentration 1,250-1,500 ppm, followed by sea water extract 1,500 ppm and water extract 1,500 ppm.

Avicennia marina, pathogen, postlarva, tiger prawn

EO-04

Use of endophytic bacteria from roots of *Cyperus rotundus* for biocontrol of *Meloidogyne incognita*

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Yield loss due to *Meloidogyne incognita* infection in tomato plants cultivation can reach 60%. The problem is able to be solved through the application of endophytic bacteria. In this study, endophytic bacteria from root *Cyperus rotundus* were isolated using Tryptic Soy Agar media. The bacteria obtained were then tested for their safety against plants and mammals. Moreover, selected isolates were characterized by their phenotype and physiological properties, tested for their resistance to antibiotics, and tested for their ability in suppressing the infection rate of *M. incognita* on tomato. Eighteen bacterial isolates were obtained and as many as 8 of them are safe for plants and mammals thus can be used in further tests. A result of the physiological test showed that bacterial isolates tested were able to produce protease enzyme (87.5%), chitinase enzyme (62.5%), and HCN (37.5%), had urease activity (75%) and could dissolve phosphate (87.5%). Endophytic bacteria are also known to have resistance to several antibiotics. Based on the test results, it is known that all endophytic bacteria effectively increased tomato growth and suppressed the severity of *M. incognita* infection. The most stable isolate as a biocontrol agent of *M. incognita* in this study was CRS16.

Antibiotic resistance, biosafety, filtrate culture, lytic enzymes, plant growth

EO-05

Effects of pruning on growth and yield of cucumber (*Cucumis sativus*) variety mercy in acid soil of North Kalimantan, Indonesia

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In recent years, cucumber (*Cucumis sativus*) production in Tarakan, North Kalimantan only reaches 20 tons/ha. In fact, cucumber production potential could reach 49 tons/ha. Several factors that limit the low productivity of cucumbers in Tarakan are acid soil and cultivation techniques which are still limited. This study aimed to determine the effect of pruning on the growth and yield of cucumbers in acid soil in Tarakan. The study was conducted using Randomized Complete Block Design with treatment of without pruning (P0), pruning of shoots on the main stem (P1), pruning of whole lateral branches above the third section (P2), and pruning of 2 lateral branches that emerged first above the third section (P4). The results showed that average plant height was 16.17% (P1) and 2.26% (P2) lower also 0.13% higher (P3) than the control (P0). The highest number of leaves was found in treatment P1 (16.20%) compared to P0. The best fruit diameter was also found in P1 treatment with 4.93% difference compared to P0. Furthermore, a highly significant and the best result on average weight per fruit were also obtained by P1 treatment. The results showed that the fruit weight of P1 treatment (11.39%) was higher than that of P0. This study provided new information that the pruning treatment of shoots on the main stem of cucumber variety Mercy in acid soil could increase the diameter and average weight of cucumber.

Fruit diameter, lateral branches, leaves, low pH, main stem

EO-06

The effect of semen storage and diluent type on the quality of Nunukan Chicken spermatozoa

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The artificial insemination (AI) can be done to overcome the low fertility of Nunukan chicken that it's success rate is influenced by the quality of semen and diluent type that used for storage and prolong the survival of spermatozoa. The aim of this study was to evaluate the effect of semen storage at 4 °C and diluent type, NaCl 0.9% and Ringer's Lactate, on the quality of Nunukan chicken spermatozoa.

Semen was collected by the abdominal massage method. Semen evaluation was conducted microscopically (motility, viability, abnormalities, velocity, and concentration of spermatozoa). Motility of spermatozoa on NaCl 0.9% at 1, 2, 3 and 4 hours were 3.00±0.00 (≥ 80%), 2.50±0,58 (≥ 65%), 1.25±0.50 (≥ 20%), and 1.00±0.00 (≥ 10%), respectively. While on Ringer's Lactate at 1, 2, 3 and 4 hours were 2.25±0.50 (≥ 60%), 1.50±0.58 (≥ 30%), 1.50±0.58 (≥ 30%) and 1.00±0.00 (≥ 10%), respectively. The viability of spermatozoa on NaCl 0.9% at 1, 2, 3 and 4 hours were 70.61±12.62%, 64.07±12.24%, 62.55±14.05% and 51.68±13.51%, respectively. While on Ringer's Lactate at 1, 2, 3 and 4 hours were 58,38±7.16%, 50.44±14.87%, 45.62±9.48%, and 36.81±6.74%, respectively. The velocity of spermatozoa on NaCl 0.9% at 1, 2, 3 and 4 hours were 0.020±0.002 mm/sec, 0.018±0.002 mm/sec, 0.013±0.005 mm/sec, and 0.0085±0.003 mm/sec, respectively. While the velocity of spermatozoa on Ringer's Lactate at 1, 2, 3 and 4 were 0.017±0.002 mm/sec, 0.012±0.002 mm/sec, 0.011±0.005 mm/sec and 0.0097±0.005 mm/sec, respectively. In conclusion, both diluents can maintain the spermatozoa quality that stored at 4 °C for 4 hours, despite the declining trend gradually showed in line with the long storage period. The NaCl 0.9% has a better ability to maintain the spermatozoa quality than Ringer's Lactate diluent.

NaCl 09%, Nunukan chicken, Ringer's lactate, spermatozoa

EO-07

Study of habitat preference for nesting site of Eurasian Tree Sparrow in settlement area, in Banda Aceh, Aceh Province, Indonesia

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Eurasian Tree Sparrows (*Passer montanus*) was a domestic bird in human settlement. These birds have a high tolerance towards human activity so often these birds choice nesting site close to settlements or even on the rooftops of houses. However, the existence of this bird is not solely for granted, the bird selected the suitable site for a nesting site. Lack scientific information of their preference habitat for a nesting site. This research was conducted in Darussalam, Banda Aceh, Aceh Province, Indonesia with descriptive method. Data collected using Index Point Abundance (IPA) technique for collecting data of nest position (tree height, tree selection), nest characteristic and habitat type. The habitat type with grass vegetation in settlement preferred used for nesting site by Eurasian tree sparrow. Based on distance nest tree to food sources, we classified the area in primary areas (0-10 m), the region of submarginal (10-20 m), and marginal areas (20-50 m) from food sources. The bird preferred 5 to 8 m in high, the Eurasian Tree Sparrow also tend to choose trees with high canopies that shady to hide the existence of the bird nests from predators as the preferred tree.

Eurasian Tree Sparrow, habitat, nesting site, preference

EO-08

Preliminary study of habitat characteristics of Small-Clawed Otter (*Aonyx cinereus*) based on the tracks in Ujong Nga Village, District of West Aceh, Indonesia

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Small-clawed Otter (*Aonyx cinereus*) is the smallest among the subfamily Lutrinae, today occurs population decrease of small-clawed otter caused by human activity, depletion of prey species, and exploitation. This research will describe habitat physically and biologically of the habitat characteristic of a small-clawed otter. The parameters which used are a number of tracks found in habitat that is used by the small-clawed otter in Ujong Nga Village, Samatiga, District of West Aceh, Indonesia. The data is collected on small-clawed otter habitat in this village and sample used are 8 plot. The result showed that the small-clawed otter selecting habitat unit with criteria (i) the type of habitat are field, swamp, forest, and riverside; (ii) the availability of many feed (1,33 tracks per plot (iii) the tracks distance to the nest 0-25 m (1,66 tracks per plot), (iv) the tracks distance to water source 0-25 m (2,16 tracks per plot (v) the tracks distance to feces site 0-25 m (1,16 tracks per plot). The conclusion of this research habitat characteristic of Aonyx cinereus is field with an availability of many feeds, close to the water source, close to the nest, and close to toilet site.

Small-Clawed Otter, habitat characteristic

EO-09

Antibacterial activity of ethanolic and n-hexane extraction of pletekan leaves (*Ruellia tuberosa*) against *Escherichia coli* and *Bacillus subtilis*

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Pletekan (*Ruellia tuberosa* Linn.) is semi-woody perennial herb with an elongated fleshy tuberous root; that produces bioactive compounds. In Taiwan, *R. tuberose* could be added in the healthy drink. The aims of this research were

to determine the antibacterial activity and minimum inhibitory concentration of ethanolic and n-hexane extraction of pletekan leaves against *Escherichia coli* and *Bacillus subtilis* as well as the chemical compounds contained in the leaves. This research uses a completely randomized design with 5 treatments and 3 replications. Extract of Pletekan leaves obtained by using maceration and reflux with ethanol and n-hexane. Concentrations used for antimicrobial activity test consisted of P1 (125 mg/mL), P2 (250 mg/mL), P3 (500 mg/mL), P4 (1000 mg/mL) and P5 (2000 mg/mL) with dimethyl sulfoxide (DMSO) as the solvent. Positive controls were antibiotic discs of chloramphenicol 30 µg, whereas the negative control was 0.01% DMSO. Antibacterial activity test was done by using diffusion method with the paper disc. Minimum inhibitory concentration (MIC) was defined by using dilution method. Phytochemical screening of secondary metabolites was done by using thin layer chromatography (TLC). The data were analyzed using One-Way ANOVA test and if there is a significant difference, then continued with Tukey test. The result showed that pletekan leaves ethanolic extract had better antibacterial activity against *E. coli* and *B. subtilis* than n-hexane. MIC of the ethanolic extract against *E. coli* was 500 mg/mL with inhibition percentage 99.1; otherwise against *B. subtilis* was 1000 mg/mL with inhibition percentage 99. The ethanolic extract of pletekan leaves contained alkaloids, flavonoids, tannins, saponins, and glycosides while the n-hexane extract containing terpenoids.

Antibacterial, *Bacillus subtilis*, *Escherichia coli*, *Ruellia tuberosa*, phytochemical screening

EO-10

Compression perpendicular to grain of three wood species

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Borneo has many wood species that could be a structural material. As a structural material, compression perpendicular to grain is required to determine before using, especially wood as railways sleepers. The objectives of this research are to determine compression perpendicular to grain of Bangkirai (*Shorea laevis* Ridl), Medang tanduk (*Nothaphobe ceratoxylon* Kosterm. Spec. Inert) and Kenanga (*Canangium odoratum* Baill), to analyze the difference between radial and tangensial direction of testing load and to know the possibility of these wood as railways sleepers material based on SNI 7900.1:2013. Determination compression perpendicular to grain conducted according to ASTM 143-94 (2000) when reaching 1 mm and 2.5 mm deformations. The average of compression perpendicular to grain at 1 mm deformation of Bangkirai is 127.2 kg/cm^2, Medang tanduk is 68.7 kg/cm^2 and Kenanga 66.9 kg/cm^2 for tangential direction and 161.2 kg/cm^2, 82.7 kg/cm^2 and 96.0 kg/cm^2 for radial direction. Whereas for 2.5 mm deformation of tangential are 170.1 kg/cm^2, 83.8 kg/cm^2 and 87.3 kg/cm^2 as well as for radial are 202.6 kg/cm^2, 98.4 kg/cm^2 and 113.1 kg/cm^2 for Bangkirai, Medang tanduk and Kenanga respectively. Statistically, tangential and radial load direction has a significant difference (1% probability) for these wood species. The conclusion of this research are Bangkirai has higher compression perpendicular to grain value than Medang tanduk and Kenanga. Radial load direction is better than tangential one. Radial direction of 2.5 mm deformation of these species is fulfilled the SNI 7900.1:2013 requirement as railways sleepers material. According to SNI 7900.1:2013, the minimum compression perpendicular to the grain of wood as railways sleepers is 92.0 kg/cm^2 at 2.5 mm of deformation.

Bangkirai, compression, deformation, perpendicular to grain, railways sleeper

EO-11

Antioxidant potential, toxicity and antibacterial properties on the fruit of *Calamus ornatus*

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Calamus ornatus Blume is one of the most common commercial rattan species in the forest area of East Kalimantan, locally name as rotan mantang or rotan seuti. The fruit is edible and like most other edible rattan is believed by local residents to have properties as traditional medicine, but until now there has been no research on the fruit. This study was conducted to determine the bioactivity potential of *C. ornatus* fruit, including phytochemical content, antioxidant activity, toxicity, and anti bacteria. The test is done on the parts of fruit that is pericarp, flesh, and seed. Ethanol is used as a solvent to extract the sample to be tested. The results showed that pericarp and seed sections had high antioxidant activity compared to the flesh; Flesh has toxicity properties, whereas pericarp and seed are not toxic; antibacterial activity against *Escherichia coli*, is present in pericarp and seed, and antibacterial activity against *Streptococcus mutans* is present in the flesh and pericarp.

Antibacteria, antioxidant, fruit, toxicity

EO-12

The effect of clay nanoparticle as wood preservative that resistant to dry-wood termite (*Cryptotermes cynocephalus*)

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The effect of clay nanoparticle as a wood preservative that resistant to dry-wood termite (*Cryptotermes cynocephalus* Light). The application of clay nanoparticle is intended to examine its resistant to an infestation of dry wood termite (*C. cynocephalus*). Loamis crushed into small pieces as clay nanoparticle, which is used as a wood preservative that is soluble in water. The material is dissolved in water at a given concentration, and put it into anggrung (*Trema orientalis*), white meranti (*Shorea bracteolata*), and sengon (*Paraserianthes falcataria* or *Falcataria moluccana*) by full cell method or impregnation. Those three kinds of wood were used as tested sample by a size of 2.5 cm x 2.5 cm x0.5 cm, and furnace-dried. The tested samples were preserved by clay nanoparticle at the air pressure 60 psi for 2 hours and then furnace-dried, and tested by an infestation of dry wood termites. Results of the research showed that mortality of the dry wood termites on those three preserved kinds of wood with clay nanoparticles by concentrations of 2.5% and 5%, which reached 96.4% and 100% on average, respectively, in comparison without preservation by average mortality value was 27.4%. The highest retention of clay nanoparticles was 24.89 kg.m^3 was obtained by concentration of 5% for white meranti and the lowest was 9.32 kg.m^3 by a concentration of 2.5% for anggrung. The application of clay nanoparticle as an effective wood preservative against the infestation of dry wood termite (*C. cynocephalus*) by a concentration of 5% has been proven by mortality 100%.

Mortality, nanoparticle, preservation, termite

EO-13

Evaluation of mined-out forest land rehabilitation and it's potential ecosystem recovery at East Kalimantan, Indonesia

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Rehabilitation of post-mining forest land was confirmed following land clearing, topsoils removal, coal mining, backfilling, topsoils spreading, land preparation and revegetation. Evaluation of forest rehabilitation works was carried out to assess land reclamation, soil erosion-sedimentation control, and land revegetation. This study was carried out at rehabilitated forest land of 154,92 ha in large and 384 research plots by planting fast growing species (*Accacia* sp., *Falcataria mollucana, Pterospermum javanicum, Gmelina arborea, Anthocephalus cadamba,* etc.) and long life species (*Pterocarpus indicus, Shorea balangeran, Shorea laevifolia, Polyalthia glauca, Pterospermum javanicum, Aquilaria malaccensis, Cassia Siamea, Durio kutejensis, Swietenia macrophylla, Mangifera indica* etc.). The evaluation results are referred to the score of rehabilitated forest was 84,5 (eighty-four point five) of land rehabilitation (22,5), soil erosion-sedimentation control (16,0), and land revegetation (46,0). The evaluation score of ecosystem value is referred to the existing food web recovery based on incoming herbivores-predators-carnivores (without top carnivores) at mined-out forest land was 70,0 (seventy point zero) indicating the prospective status of ecosystem recovery. Both evaluation scores of forest rehabilitation 84,5 (>80,0) and ecosystem recovery status 70,0 (3-6 years age) confirming that processes and stages of ecosystem recovery have been in the direction towards pre-mining exploitation.

Ecosystem recovery, forest rehabilitation evaluation, land revegetation, soil erosion-sedimentation

EO-14

The relationship between gonad maturity stage and level osmotic work of sea cucumber *Paracaudina australis* from Kenjeran Waters, Surabaya, Indonesia

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The spawning of holothuroid can be successful depend on various factors such as water quality, temperature, primary productivity, salinity and other physiological adaptation toward influence environment. Because of the

unpredictable environment condition especially fluctuation of salinity can cause various osmotic pressure of coelomic fluid of Holothuroid. Holothuroid *Paracaudina australis* (Holothuroidea: Molpadida: Caudinidae). This sea cucumber is already overexploitation in Kenjeran waters, Surabaya, East Java, Indonesia. The aim of this is to study the relationship between gonad maturity stage and level working osmotic of sea cucumber paracaudina australis from Kenjeran Waters, Surabaya. The research was conducted in Kenjeran Water, Surabaya from August until December 2016. Fifty samples of *P. australis* were collected monthly. Coelomic fluid samples of approximately 200-1000 uL were obtained from all *P. australis* using disposable insulin syringes. According to the result, there is a relationship between gonad maturation stage and level osmotic work. From the stage of gonad maturity 1 to 5, there was upward trend level of osmotic work of coelomic fluid of *P. australis*.

Gonad maturation stage, *Paracaudina australis*, Sea cucumber, Surabaya

EO-15

Analyzing relationship between soil texture and it's permeability on mined-out lands at East Kalimantan, Indonesia

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Coal mining exploitation by applying open pit mining operation causes a great impact and significant disturbance on the existing natural hydrological condition and processes. Post open pit mining frequently leaves number of voids, landscape changes, lack of vegetation cover, increasing surface runoff or overland flow and soil erosion-sedimentation. Organic materials developed after land rehabilitation works is expected to accelerate the formation of soil structure and therefore the soil body would pass water into the soils due to soils texture has an important role on soil hydrological processes. This research was conducted at three sites of land reclamation area of PT Berau Coal mining concession at East Kalimantan, Indonesia. Soil texture varied from moderately fine (35-40% clay) to fine (40-50% clay) and very fine (>50% clay) followed by soil permeability which is ranging from rapid to moderately rapid for the rehabilitated lands of BMO, SMO and LMO sites respectively. Soil permeability with 35-50% clay contents (SMO and BMO sites) is mostly controlled by soil clay contents

Hydrological processes, land rehabilitation, open pit mining, soil permeability, soil texture

EO-16

Biological aspects of Longfin Mojarra *(Pentaprion longimanus*, Cantor 1849) in North Coast of Central Java, Indonesia

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Longfin mojarra (*Pentaprion longimanus*, Cantor 1849) or locally name called as Rengganis is one of demersal fish species that common caught by demersal Danish seine fisheries in the north coast of Java. Observation on biological aspects was made during the year 2014-2015 from Tegal fishing port, central Java. Monthly length frequency, condition factors, sex ratio, maturity were analyzed with total specimen measured was 1719 fishes. The result showed that length-weight relationship tends to be allometric which b < 3. Fulton condition factors ranged between 1.05-2. 87. Male to female sex ratio between 0.8 to mature female occurred the whole year with high percentage of were mostly found during January to April 2015. The estimate first maturity length was 13.04 cmFL. These biological parameters will be used to support the population study of the species in the heavily exploited area.

Longfin mojarra, maturity, North Coast of Java

EO-17

Identification of potential indigenous endophytic bacteria from tomato which had ability to promote growth and control *Ralstonia solanacearum*

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Endophytic bacteria are bacteria that live within plant hosts without causing disease symptoms. Those bacterial endophytes also provide some benefit to plants may be considered to be plant growth-promoting bacteria (PGPB) and can facilitate plant growth by vary mechanisms. Previous research had screened 9 indigenous endophytic bacteria isolates which had the ability to promote growth rate and yields of potato and control *Ralstonia solanacearum* in in planta conditions. This research

purposed to identified and characterized the isolates ability under in vitro conditions. All isolates identified using 16S rRNA identifications using 27F and 1492R primers. The ability distinguishes by the production of IAA, HCN. NH3, and siderophore. Result shows that from 9 isolates, 8 isolates identified with 16s rRNA with 27F and 1492R primers as *Bacillus* toyonensis strain BCT-7112, *B. aryabhattai* strain B8W22 16S, *B. cereus* ATCC 14579 16S, *B. cereus* strain JCM 2152, B. thuringiensis strain ATCC 10792, *B. cereus* strain JCM 2152, *B. cereus* strain CCM 2010 and *Mesorhizobium thiogangeticum* strain SJT. All isolates shown ability to produce IAA hormone with various concentrations, 5 isolates had the ability to produce siderophore, but none of all isolates produce NH_3 and HCN. This research acquired *B. toyonensis* and *B. aryabhattai* from genera *Bacillus* and *Mesorhizobium thiogangeticum* which can be considered new among a group of PGPR.

16S rRNA, *Bacillus*, indigenous, *Mesorhizobium*

EO-18

Health evaluation of Kedangpahu Watershed in relation to the effort of flood handling at Kutai Barat District, East Kalimantan, Indonesia

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The increasing of flood is one of watershed degradation indicators. If the cause of watershed degradation identified, restorations is one of the ways to return its function. Before the restoration held, the first step must be done was identifying of watershed characteristics and health evaluation. Kedangpahu watershed located in Kutai Barat District, East Kalimantan, Indonesia. It consisted of 698.952 hectares area. There are some problems on this watershed as well as increasing of flood frequency and duration. The aim of the research was to justify the status of Kedangpahu health watershed. The method of study using Geographic Information System (GIS). The study conducted by identifying its biophysics elements. The study showed that 63.19% of total area had slope slightly. Average annual precipitation between 826.9-3886,6 mm/year. High precipitation occurs in December, January, April, and May. The water regime index included moderate category (2.34). Meanwhile, the average annual discharge tends to increase year by year. The dissolved sediment concentration 31.75 mg/l. Meanwhile, some land cover area converted to palm oil plantation. Base on land use planning map 53% of total area located at other using area called APL. The health status of Kedangpahu watershed is a moderate category.

GIS, Health status, Kedangpahu, watershed

EP-01

Utilization of mangrove vegetation for economic society of coastal people

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Beach border area in Polewali Mandar District, West Sulawesi, Indonesia is a mangrove forest area located in the coastal area of the sea and a natural habitat of mangrove that serves to provide protection to the life of the coast and sea. People Polewali Mandar District less glance mangrove used as a product worth selling. The main reason is that people are less aware of the potential of biodiversity and how to use mangrove into a product. The devotion of the Real-Life Work-Learning and Community Empowerment (KKN-PPM) program entitled "Utilization of Mangrove Vegetation for Economic Society of Coastal People" was carried out during March-May 2017 in Tumpiling Village and Galeso Village, Wonomulyo Sub-District Polewali Mandar District. This program comes as one of the solutions in the effort of economic sovereignty of coastal society. The implementation of the KKN-PPM Program of the University of West Sulawesi (UNSULBAR) is done by counseling, training and community development on the ecological and economic potential of mangrove forest resources. Tumpiling and Galeso Village, Wonomulyo Subdistrict Polewali Mandar District is rich in mangrove diversity. Mangrove vegetation such as *Avicennia marina* (Fire-fire), *Rhizophora mucronata* (Bangkong), *Bruguiera gymnorrhiza* (Salak), *Xylocarpus granatum* (Lao-lao), *Sonneratia caseolaris* (Parappa), and *Acanthus illicifolius* (Kalli-kalli) . Mangrove is then processed into various kinds of food (products) and handicrafts are worth selling. Processed food products produced such as pastries and jams of mangrove type *Sonneratia caseolaris*, mangrove chips from *Bruguiera gymnorrhiza* type. *Mangium* beverage products from the type of *Sonneratia caseolaris* juice and mangrove species *Acanthus illicifolius* used as herbal tea. The typical mangrove craft comes from *Rhizophora* mucronata to be used as key chains and brose.

Biodiversity, coastal, ecology, mangrove, product

EP-02

The antibacterial activity test of permot (*Passiflora foetida*) leaf extract on *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*

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Indonesia is rich in plants that serve as a medicine, both of which have been studied and untapped. One plant that has not been widely studied is the permot (*Passiflora foetida*). Permot contains an active chemical ingredient that can be used as an antibacterial. Therefore, this research was conducted with the aim to know the antibacterial activity, the effective concentration and the effect of increasing the concentration of permot leaf extract on the inhibition of bacterial growth of *Staphylococcus aureus, Escherichia coli* and *Pseudomonas aeruginosa*. Testing of antibacterial activity using agar diffusion method. The results of antibacterial activity test were analyzed by one-way ANOVA method, followed by LSD test. Anova data showed that the concentration of extracts of 1%, 2%, 3%, 4% and 5% had given activity inhibited the growth of test bacteria compared with benzalkonium chloride 1,5%. Increased concentration of permot leaf extract showed greater inhibition zone diameter of bacterial growth. This study supports the benefits of permot leaf extract as a floor cleaner.

Antibacterial activity, inhibition zone diameter, pathogen bacteria, permot leaf