ABSTRACT
INTERNATIONAL CONFERENCE ON BIODIVERSITY
SOCIETY FOR INDONESIAN BIODIVERSITY
Bali, 6-10 December 2017
ABSTRACT

INTERNATIONAL CONFERENCE ON BIODIVERSITY

SOCIETY FOR INDOONESIAN BIODIVERSITY

Bali, 8-10 December 2017

THEME:

Roles of Biodiversity and Conservation Research under Global Climate Change

SECRETARIAT ADDRESS

Sekretariat Masyarakat Biodiversitas Indonesia, Kantor Jurnal Biodiversitas, Jurusan Biologi, FMIPA UNS, Jl. Ir. Sutami 36A
Surakarta 57126, Jawa Tengah, Indonesia. Tel./fax.: +62-271-663375. 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)**
**Bali, Indonesia, 8-10 December 2017**

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Dr. Eddie van Etten  
Dr. Diane Butle |                                                |                            |      |
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| 13.00-14.00 | Parallel presentation I                         | Moderator                   | R1   |
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| 14.15-15.15 | Parallel presentation II                        | Moderator                   | R1   |
| Group 7: BO-22 to BO-27 |                                      | Moderator                   | R2   |
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15.15-16.15  Parallel presentation III
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Group 14: DO-02 to DO-07  Moderator  R2
Group 15: DO-08 to EO-03  Moderator  R3
Group 16: EO-04 to EO-09  Moderator  R4
Group 17: EO-10 to EO-16  Moderator  R5
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16.15-17.00  Announcement of the Best Presenters  Chairman of the Board of Assessors  R1
Closing speech and other explanations  Chairman of the committee  R1

December 10, 2017

07.00-07.30  Registration for excursion  Committee  Lobby

07.30-13.00  Field trips to turtle conservation, mangrove conservation, Garuda Wisnu Kencana, traditional Balinese dances, and souvenir markets  Committee  Lobby

13.00-15.00  Depart to Airport  Committee  -
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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; AA. Keynote speech
Genetic diversity

**AO-01**

**Storage of the papaya lateral shoot by cryopreservation to maintain plant genetic information in the future**

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Germplasm storage of papaya is very important because this plant easily adapts to genetic changes due to environmental conditions and open system pollination, so it is necessary to retain the current genetics resources in order to conserve the genetic information. The storage of the vegetative part of the plant with cryopreservation is expected to retain the plant's genetic information in the future. This experiment aimed to obtain the ability of the papaya lateral shoot in the selected cryoprotectant to be stored by cryopreservation. The experiment was designed in factorial by Completely Randomized Design with two factors. The first factor was the immersion time duration in PVS2 (Plant Vitrification Solution 2) as cryoprotectant solution with 5 treatments of immersion duration of 0, 10, 20, 30, and 40 minutes. The second factor was culture medium for cultivated the lateral shoot which was added with plant growth regulators such as BA (benzyl adenine) and NAA (naphthalene acetic acid) at levels of 0, 1, 2, 3, and 4 mg L⁻¹, respectively. The results showed that the immersion of lateral shoot in cryoprotectants for 20 minutes gave the better plantlet survival rate after discharge from liquid nitrogen, while the treatment of culture media had not been significant difference.

**AO-02**

**Comparison of different software for RAPD fragment detection and analysis in distinguishing healthy and gall rust** *(Uromycladium falcatarium)* **infected Sengon** *(Falcataria moluccana)*

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²SEAMEO BIO TROP. Jln. Raya Tajur Km 6, Pakuan, Bogor Selatan, Bogor 16134, West Java, Indonesia

One of the approaches for selecting gall rust *(Uromycladium falcatarium)* on sengon tree *(Falcataria moluccana)* was molecular methods using DNA. Many amplification methods can be used, such as AFLP and RAPD. The advantages of using RAPD methods were its rapidness, low cost, and high number of fragments amplified. However, due to a lot of fragments amplified, scoring the fragments sometimes became difficult. Nowadays, there is a lot of software to score the fragments and analyze the data, i.e., Gelquest and PyElph. This research aims to test that two software in scoring and analyzing RAPD Fragments using 15 primers and to looking for an effective marker to distinguish the resistant tree from the susceptible one. The amplification was done with DNA extracted from the cambium using CTAB methods. The two software used gave different score results. Generally, PyElph software produces a higher number of bands analyzed. Clustering analysis was done with Neighbour-Joining method from the two software also gave different results. The primers used had not been able to distinguish the gall rust resistance and susceptible trees. There is still the need to do the amplification with more primers and using different fingerprinting methods. However, the markers analyzed will contribute to the association mapping process.
Falcatoria moluccana, gall rust, RAPD, sengon, software, scoring, Uromycladium falcatarium

AO-03

Ecological and genetic diversity of Shorea balangeran in two types of forest

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2SEAMEO BIOTROP. Jl. Raya Tajur Km 6, Pakuan, Bogor Selatan, Bogor 16134, West Java, Indonesia

Balangeran (Shorea balangeran) belongs to Dipterocarpaceae family distributing naturally in Indonesia with wide range of ecological conditions including peat swamp forests and dry land even in the burnt area. Good adaptability of balangeran remains unknown with respect to molecular (genetic) responses that are important to provide scientific knowledge for supporting forest restoration, especially in peatland restoration efforts. The main objective of this research was to analyze the ecological diversity and genetic diversity of balangeran in two types of forest: peat forest (wetland) and heath forest (dry land). Field research was conducted in Muara Kendawangan Nature Reserve, West Kalimantan, Indonesia based on vegetation analysis by establishing purposively sample plots. Genetic diversity was conducted by RAPD analysis using ten random polymorphic primers. The result showed that both in health and peat forest balangeran was dominated, but only in pole and tree stage. It is indicated that balangeran has poor regeneration capacity. This finding also confirms the endangered status of balangeran as listed in the IUCN Red List of Threatened Species. Genetic analysis using RAPD of the species did not show the clustering between balangeran in peat forest and heath forest, there might be showed that RAPD marker could not distinguish the differences between site.

AO-04

Utilization of informative SSR markers for genetic purity assignments of kopyor coconut hybrids

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Kopyor coconut (Cocos nucifera L.) is an exotic coconut originated from Indonesia. Breeding of improvement of varieties yield per area planted are slow and difficult process. Contaminated progeny has appeared in some breeding programs reveal an obstacle of detection by the traditional method which affects to time and labor. The use of molecular markers improves the integrity of plant breeding programs in perennial crops such as kopyor coconut. In this study, twenty SSR markers were used in primer screening and four selected SSR markers could reveal the polymorphim between sixteen kopyor coconut parental lines. The polymorphic primers capable of differentiating the parental kopyor coconut were subjected utilizing successfully for assessment purity of hybrids derived from these parents. This study demonstrates the utility of SSR markers to determine the genetic variation of parents and the genetic purity of hybrids in kopyor coconut.

AO-05

Cross-species amplification of microsatellite loci in related Zingiberaceae species: Case study in Caringin Sub-district, Garut, West Java, Indonesia

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Zingiberaceae is one of plant family that heavily used by Indonesian people. DNA-based markers, microsatellite, from this family usually develop specifically for one species. The aimed of this research was to investigate the cross-amplification ability of microsatellite markers across Zingiberaceae accessions. This research used ten microsatellite loci developed in two Zingiberaceae species, Zingiber officinale and Amomum tsako, and applied the markers across 34 accessions of Zingiberaceae family collected from four different villages in Caringin Sub-district, Garut, West Java, Indonesia. Results showed that one marker was not able to perform during screening process. One marker was specific for Zingiberaceae officinale. Meanwhile, eight others were able to amplify across species. Polymorphic Information Content (PIC) of the markers ranging from 0.67 to 0.98, suggesting these markers were informative to be used for identification and breeding program. In conclusion, these nine primers are potentially useful to be used as markers in Zingiberaceae identifications and plant breeding program.
AO-06

Sex identification and genetic diversity of *Himantopus himantopus* in Thailand

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Black-winged Stilts (*Himantopus himantopus*) is sexually monomorphic birds and vary considerably in pattern on their crown and hindneck. This research aimed to identify the gender and study genetic diversity of birds in Genus *Himantopus*. For sex identification, chromo-helicase DNA binding protein (CHD) gene was amplified using 2550F/2718R primers. Two PCR products with a size of 461 bp for CHD-W allele and 620 bp for CHD-Z allele were obtained from all female samples whereas only one PCR product from CHD-Z allele was obtained from all male samples. In a total of 277 samples, 144 males and 130 females were determined, whereas CHD gene of the remaining 3 samples could not be amplified by PCR. Additionally, nucleotide sequence of CHD-Z allele and cytochrome c oxidase I (COI) gene were investigated. The CHD-Z allele nucleotide sequences revealed 2 single nucleotide polymorphisms (SNP). However, these sequences were not related to the crown and hindneck patterns. The nucleotide sequence of COI gene showed species differences between birds in genus Himantopus. Moreover, the genetic diversity was studied by using inter-primer binding site (iPBS) technique. Five iPBS primers giving clear and easy countable bands, were selected from 40 iPBS primers. PCR amplification of 36 samples which were selected from 6 crown and hindneck patterns were investigated. The dendrogram showed that bird samples were divided in two groups which were not related to the crown and hindneck patterns but it can identify the genetic differentiation between the resident and the migratory birds.

Black-winged Stilt, *Himantopus himantopus*, iPBS technique, nucleotide sequence

AO-07

Drought resistance level of red and black upland rice accessions from East Nusa Tenggara, Indonesia

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The objective of the present study was to evaluate drought resistance level of red and black upland rice accessions from East Nusa Tenggara and to identify drought resistant genotypes. The study was carried out in Field Laboratory of Universitas Nusa Cendana, Kupang, Indonesia during April to October 2017. A split plot design was employed consisted of irrigation level as the main plot and upland rice genotypes as the sub-plot treatments. The main plot comprised of three levels i.e. 100% field capacity (P0), 75% filed capacity (P1) and 50% field capacity (P2) while the rice genotypes consisted of 40 (37 local accessions and 3 check varieties). Observed variables included both yield and yield component variables. The observed data were subjected to analysis of variance followed by DMRT post hoc test. Grain yield variable was used to calculate the drought-resistant indicators for classification of drought resistance level of the tested rice genotypes. Research results showed highly significant interaction effect of irrigation level by rice genotypes on all observed variables. Based on drought resistance indicators, i.e. STI, SSI, GMP and PYL, 11 rice accessions were classified drought resistant. These included ALR-02, ADN-04, HK-06, NGR-022, HK-07, KMD-01, PMK-01, ADN-05, SBD-04, SLT-01, and Aek Sibundong.

Accession, drought, East Nusa Tenggara, resistance, red and black rice

AO-08

Response morpho-physiology of several koro bean (*Fabaceae*) genotypes on various level of NaCl salt stress

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Diversification of national food demands the acquisition of alternative food. Utilization of marginal land become one of alternative land use result from the narrowness of fertile land in Indonesia. Saline fields are found along the coastline of Indonesia and the land can be used as a cultivated area. Koro bean is one alternative food material that can be developed in the saline so it is expected to meet the needs of food in the country. The objective of this experiment was to investigate morphological and physiological responses of four genotypes of koro bean to salt stress of NaCl. The experiment was conducted in Wirolegi Village, Sub-district of Sumbersari, District of Jember in August up to November 2017 with daily temperature 31°C and relative humidity 75%. The treatment consists of two factors compiled in Completely Randomized Design, repeated three times. The first factor was the level of NaCl salt stress consisting of four levels; control (DHL 0.5 dS/m), 1.0 dS/m, 2.5 dS/m, and 4.0 dS/m. The second factor is the genotype of koro beans consisting
of four levels; koro pedang, koro benguk, koro glinding, and koro komak. The research data were analyzed by analysis of variance and Duncan's multiple range test ($\alpha = 5\%$). Observational variables consisted of the number of leaves, number of root nodules, chlorophyll content, and prolin content.

Fabaceae, koro bean, salt stress

AO-09

Characterization and phylogenetic analysis of multiple spawner Channa striata from South Sulawesi, Indonesia based on mitochondrial COI

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The objectives of this research were to identify molecular character of Cytochrome Oxidase subunit I (COI) gen in snakehead fish from Barru, Sidrap, Towuti Lake Sorowako Luwu Timur (South Sulawesi, Indonesia) and the first generation (F1) of domesticated snakehead fish from Bantaeng (South Sulawesi, Indonesia) and analyzing the phylogenetic relationship of the fishes. Partial sequences of the COI gene of the snakehead fishes were aligned with sequences of snakehead fish deposited in GenBank. The phylogenetic tree was constructed using MEGA 7.0.20 program. Based on the nucleotide sequence of partial COI gene along 558 bp of the Channa striata (Bloch 1793) species form South Sulawesi, we found deletion and insertion. TGTT base deletions occur in two specimens from Sidenreng Rappang (T1 and T2). Deletions of T base also occur in specimen from Towuti Lake Sorowako. While insertion of T base occurs in specimen from Barru, Sidrap. This study also shows that C. striata from Bojo River of Barru District is genetically identical to C. striata from Sidenreng Rappang have a greater variety of nucleotides than C. striata from Towuti Lake and Bojo River Barru. This study also shows that C. striata from Bojo River of Barru District is genetically identical to C. striata from Tasikmalaya West Java. Although both C. striata are derived from different genetic sources, they have a 100% identical to COI nucleotide sequence. C. striata from Bojo River is closely related to the C. striata from Sidrap with genetic distances are 0.01 and 0.026. The genetic distance of C. striata from Sidrap with Towuti Lake is 0.036 to 0.043. The first generation (F1) of domesticated snakehead fish from Bantaeng has potential as a new species, although its morphology characters have the same of C. striata.

Channa striata, Cytochrome Oxidase subunit I, phylogenetic, snakehead fish

AO-10

Variation of RAPD banding patterns on 2nd and 4th generations of gamma-irradiated black rice plant

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Black rice is grouped into functional food due to its high contain anthocyanin, a pigment with antioxidant activity. Black rice productivity is low because black rice has a tall habitus and long flowering time. Black rice was irradiated by gamma rays with dose of 200 Gy and 300 Gy as a method of improving character through random mutation in order to gain better organism. Irradiated black rice then planted and selected in every generation. This research has been conducted in order to understand the variation in RAPD banding patterns from the 2nd and 4th generation of irradiated black rice to make sure that mutation truly occurred. The samples from two generations of mutated black rice are amplified using two RAPD primers, OPAL 08 and OPA 05. The amplicons then separated by horizontal electrophoresis until formed the RAPD bands. RAPD bands obtained from electrophoretic process shown that sample from 2nd generation produces more various bands in width and location. Whether sample from 4th generations produces more aligned bands which show homogeneity in RAPD bands. This is caused by character purification from 2nd generations until 4th generations. In 4th generations, have been formed 7 strains that show better character from their ancestors.

Black rice, gamma rays-radiation, horizontal electrophoresis, induced mutation, RAPD

AO-11

Study on the utilization of red jungle fowl domestication by the community in Bengkulu, Indonesia

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This research aims to study the utilization of red jungle fowl domestication by the community in Bengkulu Province, Indonesia. The research location was conducted in Bengkulu City, Seluma District, Central Bengkulu District and North Bengkulu District in Bengkulu Province.
The sample of breeder is selected using snow-ball sampling method. Selected samples are recorded as data and information sources. Data were collected by interviewing, filling in a list of questions, and measurement/direct observation. The data obtained is processed, presented in the form of tables, drawings, and analyzed descriptively. Based on the research method selected 200 respondents who have reared the red jungle fowl and/or his offspring. The results show that the red jungle fowl was used for cross-breeding with free-range chickens, Burgo chicken, and other chickens. It was also used as breeds for broilers, decoy chicken, fighting cock, and ornamental chickens. As an ornamental chicken, red jungle fowl and his offspring are used as chicken crow, yard decoration, decoy chicken and fighting cock.

Cross-breeding, decoy chicken, red jungle fowl, utilization

AO-12

The morphological diversity and an evaluation of growth stadia development on twelve Foxtail Millet Genotypes (Setaria italica)

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This study was aimed to evaluate the development of foxtail millet (Setaria italica (L.) Beauv) growth stadia of 12 local Papuan genotypes, namely N-1, N-20, BN-9, BN-13, BN-13-2, BN-20, BN-25, BN-31, BN-32, N-3, BN-15, BN-16. The study was carried out from April 8, 2013 to July 1, 2013. The research design used in this study was a randomized block design (RAK) with 12 treatments and 5 replications. The results showed that the 12 genotypes of foxtail millet tested had different sprout growth time ranging from 3-4 days after planting (DAP), 50-53 DAP of boot stadia and 51-54 of heading stadia. Hard seed stadia consisted of soft seed stadia 61-65 HST and hard seed stadia 60-71 DAP. BN-25, BN-13-1, BN-31, BN-9 and N-20 were the fastest genotypes in the boot stadia, while the slowest was BN-32. Genotype BN-25, BN-13-2, BN-31, BN-9, N-20 was the fastest heading stadia and the slowest were BN-32 and BN-13-1. BN-25 is the fastest in the seed stadia while the slowest was N-3. The genotypes which entered the fastest of hard seed stadia was BN-13-1 and the slowest were N-3, BN-32 and BN-20. Seed weight of each panicle of all genotypes ranged from 1.57 to 3.10 g. Seed weight of each plant range from 2.12-3.63 g, and weight of 1000 seeds ranged from 0.89-1.17 g. Genotypes that had the highest seed weight of each panicle was N-1 and the lowest was N-3. The highest seed weight of each plant was BN-16 and N-1. The highest 1000 seed weight was N-1 and the lowest was BN-13-2. Based on the cluster analysis, all genotypes tested showed the character difference with the greatest similarity coefficient of 28%.

Morphology, foxtail millet, growth stadia, Setaria italica

AO-13

Phylogeny of culturable cellulolytic bacteria from Bangka Island Mangrove, Indonesia

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Phylogenetic analysis of the most cellulolytic bacteria isolates were obtained from Sungailiat and Tukak Sadai mangrove in South Bangka District. Isolation was used agar media with 1% Carboxymethyl Cellulosa (CMC). The isolation gets 36 isolates from Sungailiat and Tukak Sadai. Isolate of bacteria grows in agar with 1% CMC and given the Lugol at 72 hours to test cellulose degradation ability. There are three isolates that result the largest clear zone. All of these novel mangrove strains had their 16S rRNA gene sequenced and BLAST analysis revealed sequence identities ranging from 84 to 94%. Genes bank analysis on the best isolates showed proximity to Pseudomonas aeruginosa.

16S rRNA, Bangka Island, cellulolytic bacteria, mangrove

AO-14

Escherichia coli serotype diversity in Industrial Produced Ice Cubes using Multiplex PCR methods

Puryani, Enny Zulaika


Diarrhea is the second cause of death in children worldwide. It is caused by consumption of contaminated food and drinks by Escherichia coli. Ice cubes are food complement which is consumed, the observation made by BPOM RI, the consumption of ice cube as food complement does not fulfills chemical and biological requirements. This is especially from colored drinks. The objective of this study to profile E. coli contamination in ice cubes industry. E. coli were screened using EMBA

Indonesia
selective medium. The colony that grew will be tested for RapID kit and IMViC biochemical test, TSIA, oxidase, catalase, Gram staining, and motility test. Isolates were analyzed by Multiplex PCR methods to obtain the serotype of ETEC, EHEC, or EPEC. The result of 16 samples show a positive E. coli contamination. Isolates number 5 shows positive E. coli contamination with ETEC contamination (Enterotoxigenic Escherichia coli).

Escherichia coli, ice cubes, multiplex PCR

AO-15

Anoa, Dwarf Buffalo from Sulawesi (Indonesia): Evolution and taxonomy molecular based on Cytochrome B Gene

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Anoa is an endemic species of Sulawesi, Indonesia that is currently threatened status. Important issues in controversial anoa conservation study is the taxonomic status between lowland and mountain anoa. Evolutionally, the divergences time of anoa have not been studied. This study aims to explain the anoa taxonomic and to estimate divergence historical process of both anoa types using cytochrome b gene. A total of 10 individuals anoa (5 lowlands and 5 mountain anoa) were used and an additional 7 anoa sequences from GenBank, while for evolutionary reconstruction using 110 cytochrome b gene sequences of Bovine with 6 calibration points based on fossil records and molecular data. Our results validated the cytochrome b gene as a suitable marker for anoa phylogenetics and taxonomy. Phylogenetic analysis suggests both types of anoa were in the Anoa subgenus, while domestic buffaloes (Bubalus bubalis) and Tamaraw (Bubalus mindorensis) as outgroups formed a separate group, Bubalus subgenus. Based on high genetic distance (3.4%), both types of anoa were different species. We also support that binomial nomenclature for lowland anoa is Bubalus depressicornis, whereas mountain anoa is Bubalus quadrlessi. Evolutionary reconstruction shows that estimate divergence times between Bubalus subgenus and Anoa subgenus at 1.7 Mya, while the divergence of both type anoa about 1,406 Mya or in the Early-Middle Pleistocene. At that time, many mammals included anoa that had separations into distinct units of phyletographic, even today are going on to the Quartenary and like the current species levels.

Anoa, cytochrome b gene, evolution, molecular taxonomy

AP-01

Identification of Mildew Locus O genes (MLO) in Durio zibethinus genome corresponding with the Powdery Mildew Diseases

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Powdery Mildew (PM) is a phytopathogenic disease caused by Oidium fungi. The fungi inhibit photosynthesis’ rate, resulting in plant death. One of the plants that is susceptible to PM disease is durian (Durio zibethinus Rumph. ex Murray), which is a tropical fruit native in Southeast Asia with good economy prospect in Indonesia. Previous study has pointed out the importance of Mildew Locus O (MLO) genes in the disease susceptibility. The aim of this study is to give overview about MLO gene that presents in recently published D. zibethinus genome. Bioinformatic analysis, including BLAST, MLA, and Phylogenetic tree construction were conducted to analyze the MLO gene family in D. zibethinus. Result showed 39 variant of MLO gene members after Blastp was performed. Phylogenetic analysis showed that MLO genes from D. zibethinus were clustered together with other MLO genes from monocots and dicots, indicating that these genes might have evolved before monocots and dicots diverged. These findings will facilitate the functional characterization of the MLO genes for Powdery Mildew Disease susceptibility or resistance in D. zibethinus.

Bioinformatics, Durio zibethinus, MLO, phylogenetic relationship

AP-02

A literature update: Genetically Modified Escherichia coli for mercury bioremediation

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Mercury contamination has been a global concern for its impact on neurological development of an organism. In its water-soluble form, methylmercury, mercury is exposed to human through food chain. Researches on microorganisms and their abilities to accumulate mercury have been conducted, including the use of genetic engineering in improving the efficiency of mercury accumulation and creating mercury resistant microorganism. One of the commonly used modified microorganism is Escherichia coli. This review aims to present updates on genetically modified E. coli for methylmercury bioremediation in water. Literature reported that E. coli have been successfully modified to express metallothionein and a
Hg²⁺ transport system by utilizing mer operon, providing a key solution to mercury bioremediation. The resistance is due to catalyzation of two electrons reduction of Hg²⁺ to volatile, low-toxicity Hg⁰. This bioremediation process is commonly done inside various type of bioreactors, with many challenges depending on polluted area. More studies regarding optimum environment for Hg²⁺ reduction can be conducted along with troubleshoots of the challenges.

Genetic engineering, metallothionein, mercury bioremediation, mercury resistance, methylmercury

Diversity of Species

BO-01

Tree species diversity of Wonogiri Karst Area, Central Java, Indonesia

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The research was to know: (i) tree species that compose vegetation of Wonogiri karst area, (ii) the tree species diversity of vegetation in Wonogiri karst area, (iii) important value of each tree species in Wonogiri karst area. This exploratory research was conducted in 5 Sub-districts of Wonogiri karst area. Point Centre Quadrat was used as sampling method with 160 spots placed at 5 Sub-districts (Eromoko, Pracimantoro, Paranggupito, Giritontrto, Girimoyo) of Wonogiri karst area. Tree Diversity was determined by diversity indices category of Shannon Wiener with formula $H' = -\sum (ni/N) \times \ln (ni/N)$. Important value of each species was calculated based on relative dominance, relative frequency, and relative density. The result shows that: there are 33 tree species composed vegetation in Wonogiri karst area. Score of tree species diversity indices is 1.75. Species with highest score of important value is Tectona grandis. Species with lowest score of importance value is Alstonia scholaris. Based on the diversity indices score, the diversity category of tree vegetation of Wonogiri karst area is at middle level.

Diversity indices, importance value, karst area, Wonogiri

BO-02

Identification and laboratory rearing trials of zoanthids (Cnidaria: Verrill, 1865) collected from the four rocky ledges of Pakistan coast

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The aims of the study was to investigate the occurrence and species diversity of Zoanthids in and around the Karachi coast, Pakistan as there is any pertinent record of Zoanthids is not available in published literature from Pakistan, therefore preliminary studies were taken that will be helpful in future wild stock management and conservation perspective. For the purpose field observations as well as laboratory rearing experiment was carried. During the study four different species of zoanthids dwelling rocky intertidal platforms of Sindh coast belonging to three genera have been collected and identified from four different localities. Other than that laboratory, rearing experiment was also performed on trial basis for all four species. Identified species are namely Zoanthus sansibaricus, Z. vietnamensis, Epizoanthus scotinus and Palythoa tuberculosa. Except Z. sansibaricus aforementioned three species have never been reported previously from Pakistan. Whereas, E. scotinus is a rare species being listed in IUCN red list of threatened species (IUCN 2016). Collection sites are Buleji, Manora, Paradise point and Sunera beach. Field surveys made during September and October 2016. During laboratory trials Z. Sansibaricus, Z. vietnamensis and E. scotinus were reproduced in artificial environment successfully. However, P. tuberculosa not reproduced sexually in aquarium besides it was also maintained successfully. Physical parameters of sea water noted weekly. Species survival and growth was recorded at salinity range between 34 (minimum) to 38 (maximum) parts per thousand. Preliminary species identifications and laboratory rearing in artificial environment to assess their stability and growth potential was done successfully.

Karachi, laboratory culture trials, Pakistan, Zoanthid diversity

BO-03

A checklist of identified molluscan species inhabiting Bandri Beach Jiwani along the Baluchistan coast, Pakistan (Northern Arabian Sea)

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The aims of the study was to record the diversity of intertidal molluscan species of Bandri Beach Jiwan, Baluchistan coast, Pakistan (Northern Arabian Sea) to develop baseline information which could be helpful in future conservation perspective. Study revealed the presence of ninety-seven (97) species comprised of 67 Gastropods, 26 Bivalves, 2 Scaphopods, 1 Polyplacophora
and 1 member of Cephalopoda at two of the selected sampling points of Bandri beach of Jiwani coast. Among these members of Cerithids, trochid *Umbonium vestarium*, bivalve *Brachidontes variabilis* and oyster *Clossostrea madrasensis* were found greatly with highest number of individuals. The presents study was the first ever report of occurrence of these species from the area.

Bandri Beach Jiwani, Baluchistan coast, Mollusca, Pakistan

**BO-04**

Elasmobranch fishery outlook with catch profile during 2014 to 2016 at Karachi Fish Harbour, Pakistan

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Efforts have been made to investigate species composition of elasmobranchs at the Karachi Fish Harbour (KFH) (24.8491° N, 66.9761° E) West Wharf, Karachi, Pakistan, the famous landing site. Field surveys were carried out during March 2014 and February 2015 to September 2016. Overall twenty-nine (29) species and 416 individuals comprised of sharks, skates and rays observed. Sharks *Sphyraena lewini* and Narcine timlei have been recorded scarcely at KFH while both of the species are listed in red list of endangered species of IUCN (International Union for Conservation of Nature). Whereas *Loxodon macrorhinus* was the only shark species that found to be more frequent throughout the study period. Studies would be helpful to conserve important species and to develop baseline as a decisive grounds within country to secure vulnerable species.

Diversity, elasmobranchs, fishery, Sindh coast, Pakistan

**BO-05**

Composition of bird species in two different habitat types in Basilisa, Dinagat Islands, Philippines

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This is a baseline study conducted in two different habitat types in the municipality of Basilisa, Dinagat Islands, the Philippines: one slightly pristine (Mt. Arayat) and one totally disturbed (Edera Mining Site Pit 9) areas. Surveys by point counts, mist netting, transect walks and combination were carried out to determine the differences in species composition of bird species. A total of thirty-six (36) species of birds were recorded on both sites, with higher species richness (n=24) and relative abundance (n=287) in the mining site. Despite relatively lower species richness (n=23) and relative abundance (n=79) recorded in Mt. Arayat, it still has the higher species diversity index (H=2.86) compared to the mining site, probably due to the larger number of Philippine-endemic and Mindanao-endemic birds recorded during the survey. Notable species recorded include Mindanao Tarictic Hornbill (*Penelopides affinis*), Writhed Hornbill (*Aceros leucocephalus*), Black-headed tailorbird (*Orthotomus nigriceps*) and the Little Slaty Flycatcher (*Ficedula basilanica*). This goes to show that although anthropogenic disturbances are evident in the mining area, bird species can still survive, though it has to be noted that these species are the ones particularly tolerant to disturbances. It should also be noted that the bird species were recorded in the patches along habitat edges, showing how important to have patches in disturbed areas for the continued existence of wildlife species. Both sites in surveyed still contain secondary forests that can still support a number of endemic species and should be considered for conservation. Further monitoring of both sites is highly suggested as there could possibly be new species to be recorded.

Birds, Dinagat Islands, mining area, Philippines, species composition

**BO-06**

The consortium application of various indigenous *Trichoderma* and *Pseudomonas* to suppress *Plasmodiophora brassicae* the pathogen of clubroot disease on cabbage

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The presence of clubroot pathogen causes large losses for cabbage farmers. Efforts that need to be done is a way of safe control for the environment and consumers. One such way is biological with antagonistic microbes. In the screening of 12 isolates of *Trichoderma* and 15 isolates of *Pseudomonas* indigenous, each of 5 types of isolates was effective in suppressing the clubroot and simultaneously spurring plant growth. This experiment aims to determine the effectiveness of the consortium isolate in suppressing the clubroot disease as well as stimulate the growth of cabbage. This experiment uses a Randomized Completely Block Design 2 factors with three replications. The variables observed were percentage of clubroot incidence and plant growth. The isolate concentration of each treatment was 1x106 CFU per plant. Data were variant analysis and 5% Duncan Multiple RangeTest. Based on this research, the best isolates found were the combination
treatment of *Trichoderma*-2 and *Pseudomonas*-2 isolate with the lowest percentage of clubroot incidence at 5.33±0.45% with the highest chlorophyll number of 6002.37 SPAD. This achievement was followed by the isolate of *Trichoderma*-1 combination of *Pseudomonas*-3 (percentage of clubroot was 11.33±0.55%, chlorophyll 5803.98 SPAD), followed by a combination of *Trichoderma*-2 isolate with *Pseudomonas*-1 (percentage of clubroot was 15.33±0.55%; chlorophyll 5775.91 SPAD).

Cabbage, clubroot, *Pseudomonas, Trichoderma*

**BO-07**

Hierarchical multiplicative partitioning of spatial diversity patterns in plant communities

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Understanding the variation of diversity patterns requires analysis at multiple spatial scales and, spatial scaling of diversity patterns helps us to identify the most important sources of plant diversity for conservation plans. This study aimed to determine the scale with the highest diversity and identify patterns of total plant diversity across different spatial scales. Plants species sampling was carried out in two regions (Dalab and Rika) of Iran. In each region, 8 sites were selected and plants species were sampled in five 2x2m² plots in each site (80 plots in total). Vegetation data were analyzed using function of diversity partitioning and multiplicative partitioning diversity methods. The results showed that diversity within and among regions (α region and β region) had the highest contribution to the total diversity (74.5 and 34.50, respectively). In addition, multiplicative partitioning diversity showed that diversity among plots and sites (β plot and β site) were always greater than expected values. This significant deviation of diversity components from their expected values showed that plant species were distributed non-randomly among and within scales in our study in each region. Our results suggested that plant diversity in largest-scale (region) was highest, so rangeland manager must be focused on this scale for conservation of plant diversity.

Multiplicative partitioning, plant diversity, species richness estimators, Shannon diversity, species richness

**BO-08**

The distribution of vertical leaves and biomass leaves on ten mangrove species at Ngurah Rai Forest Park, Denpasar, Bali, Indonesia

The distribution of vertical leaves and biomass leaves which form the mangrove crown divides into three parts, namely the top part, the middle part, and the lower part. Number of leaves on any parts are highly variable depending on height of each species. The relationship between the height of tree with the height of crown depended on total leaves of each crown on each species as well as the relationship between the total biomass leaves with each species with the height and volume of tree stems, and also has variation on each mangrove species. Author examined the analysis of the relationship between the photosynthetic organs with nonphotosynthetic organs especially on stems in each species. The higher number of total leaves and a large number of total biomass leaves deeply are depended diameter and growth height which are presented in the form of stem volumes. The relationship between the photosynthetic organs and nonphotosynthetic organs on each mangrove species also has been examined. The higher number of total leaves or the number of total biomass largely depended on the stem volume of mangrove. This indicates that the production of photosynthetic organ either in the form of the number of total leaves or the number of total biomass leaves serve to support growth of the stem mangrove trees (height of stem, diameter of stem and volume of stem).

Adaptation, monolayer, mangrove species, vertical leaves and biomass leaves distributions

**BO-09**

Study of the intercropping model of maize and soybean in cajuput agroforestry

Ardian Elonard Purba


Enhancement agricultural production is important in the effort to support food security. The main commodities assessed need to be improved are crops, namely corn and soybeans which become the cantilever element in the agricultural system. The low production of the crop and deficient of availability product that needs to be improved through alternative ways and new technology inputs. One of them is the application of intercropping on agroforestry systems, where the cultivation pattern is intended to increase species diversity in non-conventional ecosystems.
and site-specific land-based uses. Through these models can be seen the ability to grow and the results of agricultural components as well as formulate the appropriate strategy recommendations in the agroforestry system. The experiment was conducted by Strip-Plot design with two factors, that is a plant spacing and land zone. The data were processed using three analyzers, ANOVA test followed by Duncan Multiple Range Test (DMRT) with 5% confidence level, Contrast Orthogonal test as comparison between intercropping system with monoculture, and Optimization test as determinant of optimum yield. The results showed that the effect of plant spacing and land zone on agroforestry system did not have a significant effect, and Land Equivalent Ratio and Area Time Equivalent Ratio between intercropping and monoculture showed intercropping able to maintain yield. While optimum yield based on economic value of land zone did not affect yield, but spacing of 60-70 cm showed optimum yield, that strategy recommendations of intercropping application in agroforestry system as increasing of diversity for yield improvement can be maintained.

Agroforestry, intercropping, land zone, plant spacing

**BO-10**

**Diversity and abundance of orchids in Gunung Dawa, Mts. Menoreh, Kulonprogo, Yogyakarta, Indonesia**

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Orchidaceae is the largest group of flowering plants in the world, and 731 species of them were found in Java Island, Indonesia. Mts. Menoreh is one of the biggest orchid hotspots in the Province of Yogyakarta Special Region, Indonesia. This study was aimed to invent the diversity and abundance of orchids in Gunung Dawa, Mts. Menoreh, which has recently become a popular ecotourism spot in Yogyakarta. This study was done by plot method, using 10 imaginary plots of 20 m x 20 m along the exploration track. Data analysis include species diversity and abundance which consists of density, frequency, and importance value of each species found. The result showed 21 orchid species from 17 genera consists of 13 epiphytic species, 4 lithophytic species, 3 terrestrial species and 1 semiterrestrial species. Among the species found, there were *Vanda helvola* Blume orchids which never been found previously in Mts. Menoreh. *Eria retusa* (Blume) Rchb.f. was the species with the highest density (145 ind/4000 m²), highest frequency along with *Acriopsis lilifolia* (Koenig) Ormerod (70%), and highest importance value (45.51).

Abundance, biodiversity, Mts. Menoreh, orchids, Yogyakarta

**BO-11**

**Selection of superior trees of *Pongamia pinnata* in Bali, Indonesia**

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*Pongamia pinnata* (L.) Pierre is an oil-producing plant for biodiesel feedstock. The main habitat of the species is on the beach and their existence in nature is threatened due to the utilization of the beaches in Bali, Indonesia as means of tourism. The aim of this study was to find *Pongamia* superior trees from natural population in Bali, Indonesia in order to support the cultivation of the species as a source of biodiesel production. The method used was exploration followed by laboratory measurements. Exploration was conducted by walking along beaches in Bali to find *P. pinnata* trees. The number of tree in each location and the coordinates of the locations were recorded. Temperature, humidity, and elevation were also recorded. Growth parameters such as total height, branchless trunk height, girth at breast height, canopy width and pest and diseases were measured. Seed samples were taken for oil content measurement using soxhlet method. Selection of superior trees was done using tree comparison method. Five comparison trees were compared to candidate trees for the growth parameters and oil content. The candidate trees were clustered based on growth parameters and oil content by using PAST software. Results indicated that *P. pinnata* were found in 3 regencies in Bali, namely Buleleng, Jembrana, Badung and Denpasar City. The majority of *P. pinnata*’s trees were found in the northern beaches of Buleleng District. There were 18 candidate trees and 8 of them were selected as superior trees. The 18 candidate trees were clustered into 2 groups, namely group A and group B with similarity index of 84%. The members of each group were mixture of trees from different locations. In conclusion, there were 8 of *P. pinnata* superior trees found in Bali that can be used as sources of propagation.

Candidate tree, distribution, *Pongamia pinnata*, superior tree, similarity index

**BO-12**

**The effect of understory plants occurrence to pollinators visitation in coffee fields: Case study coffee fields in West Bandung District, West Java, Indonesia**
West Java (Indonesia) is one of the excellent producers of the most expensive coffee (Kopi Luwak) in the world. One of the producers of Kopi Luwak from wild palm civet is coffee farmers in Perum Perhutani Resort Pemangkuan Hutan (RPH) Lembang, Kesatuan Pemangkuan Hutan (KPH) Bandung Utara, West Java, Indonesia. Coffee (Coffea spp.) is one of the crops that require insect pollination. Coffee production declines despite the expansion of coffee cultivation area in Indonesia that increases by 2.5 times and this has been associated with less visitation of insect pollinators. Since the visitation of insect pollinators can improve the quality and quantity of coffee, mainly from the abundance and diversity. One of the ways to improve the abundance and diversity of insect pollinators is to provide flowering plants, for example, understory plants. The main objectives of the study were to prove the effect of the flowering plants occurrence to the visitation of insect pollinators. Insect pollinators that visit coffee flower observed in two observation units, i.e., with and without understory plants. The results showed that the abundance of insect pollinators that visit coffee flower in unit with understory plants is higher than without understory plants with a significant difference (P <0.05). Furthermore, the diversity of insect pollinators that visit coffee flower in with understory plants is higher than without understory plants. But, the diversity differences of both locations were not significant (P> 0.05).

Abundance, diversity, coffee, insect pollinators, understory plants, visitation

**BO-13**

**Insect community structure and diversity in coffee of the humid tropics production landscape**

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The quality of coffee beans and productivity of coffee plantation depend on environmental conditions and management system practices. Nevertheless, to date study on socio-and bio-ecological perspectives of coffee production system in humid tropics of Indonesia is still scanty. Such study is necessary as an important measure to support natural conservation in a production landscape. One of the important focuses related to this issue is ‘biodiversity and ecosystem services in coffee production system’. The present study aims to elucidate pollinator insect community, diversity, and regulating ecosystem service (pollination) in coffee production system located in production forest in one of coffee production centers in West Java, Indonesia. Field surveys were carried out using a combination of netting, pan traps, and malaise traps methods. The combined methods were effective to obtain insect diversity data. The results show that not less than 139 of pollinator and non-pollinator insects were caught using netting technique. The most dominant orders are Lepidoptera, Diptera, Hymenoptera, and Coleoptera. Multivariate analysis suggests that distance from forest, air temperature air humidity, light intensity, plot area are measured factor that affect the distribution of insects along complex environmental gradients. The results of this study are very important as basis to establish biodiversity conservation to maintain ecosystem services in production landscape of West Java.

Ecosystem services, insect community, insect diversity, production landscape

**BO-14**

**Inadequate inventory and documentation of medicinal plants: Constraints in planning for species conservation strategies**

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India, with its diverse agro-climatic conditions and regional topography, has been considered as the treasure house of medicinal plant genetic resources. Our herbal wealth constitutes more than 8,000 species and accounts for around 50% of all flowering plant species of India; around 70% of the medicinal plants in the country are spread across the tropical forests of the Western Ghats and the rest in the Himalayas and other parts of India. Available information shows that about 1,800 plant species are used in Classical Indian systems of medicines, and many of these medicinal plants collected from wild face extinction or severe genetic loss due to overexploitation resulting from unsustainable harvesting regimes practiced, destructive collection techniques, etc. Besides, there is a dramatic increase in exports of medicinal plants due to worldwide interest in herbal products as well as in traditional health systems. In the last 10 years, for example, India's exports of medicinal plants have trebled. There is a short supply of many medicinal plants and hence to meet the ever-increasing demand adulteration is becoming rampant. For most of the endangered medicinal plant species, no systematic conservation action has been taken. There is not even a complete inventory of medicinal plants in different regions of India. For sustainable utilization and conservation of medicinal plants effectively, it is vital to know precisely which are the species concerned, what their correct scientific and local names are, and where they grow and their population structure. This information can only tell our total wealth of medicinal plants and how much to utilize and how much to conserve and where. Then only we
can plan their sustainable utilization and conservation effectively. The paper will discuss the priority areas in medicinal plants research such as inventory, documentation and population mapping and conservation biology.

Documentation, inventory, medicinal plants, population mapping, species conservation strategies

**BO-15**

**Diversity and vegetation structure of mangroves on Galang Island, Lamong Bay Area, East Java, Indonesia as one of basic determination of conservation status**

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Galang Island is a part of Lamong Estuary, located on the border of Surabaya and Gresik Districts of East Java, Indonesia. With an area ± 4.5 Ha, mangrove is the main ecosystem and dominant vegetation that exist on Galang Island. Limiting the activities done in Galang island can be considered as one of efforts for conserving mangrove including mangrove planting. However, with various anthropogenic activities around Galang island, such as sawmill activities, wood coating, port activities will have an impact on the existence of mangroves. This research aims to know the structure of a mangrove community on Galang Island in relation to the conservation effort. Mangrove observation was done using vegetation analysis method that was made perpendicular to the shoreline and cruising method to inventory the types of mangroves. At least eight mangrove species were identified from 6 genera and 4 families of three transects made on Galang Island. The types of mangroves found in all observation transects are of the Avicennia marina, Avicennia alba, and Bruguiera cylindrica. Based on IVI (Importance Value Index), mangrove species with the highest IVI is Avicennia marina at 138% or 1.38 (Scale 0-3), and the lowest is Rhizophora mucronata, 24% or 0.24.

Anthropogenic, conservation, Galang Island, mangroves

**BO-16**

**Comparison of muscle protein profiles of sepat fish (Trichogaster trichopterus and Trichogaster pectoralis) from South Kalimantan, Indonesia**

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The aim of this research is to identify muscle protein profiles of sepat fish (Trichogaster trichopterus and Trichogaster pectoralis) from South Kalimantan, Indonesia and compare the results. Fish collected from Barito Kuala and Banjar District of South Kalimantan. Proteins were isolated from muscle using Tris EDTA buffer and then precipitated using ammonium sulfate salt. The protein concentration was measured using Bradford assay and then protein separated based on molecular weight using SDS-PAGE method. The result showed, muscle proteins of T. trichopterus and T. pectoralis can precipitate on optimum condition at ammonium sulfate saturation 70-80% which protein concentration 5.60 mg.mL⁻¹ for T. trichopterus and 6.66 mg.mL⁻¹ for T. pectoralis. The proteins separated into 24 bands for T. trichopterus and 16 bands for T. pectoralis which molecular weight varied from 23 into 180 kDa. This result indicated the fish have different muscle proteins and further study needed protein identification based on amino acids sequence of separate protein using GC-MS analysis.

Bradford assay, protein profiles, SDS-PAGE, sepat

**BO-17**

**Growth response of seedling rice local variety on Trichoderma application**

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The use of synthetic fertilizers in the cultivation of plants is not only unprofitable for consumers, but also has an impact on the environment. To overcome this, then the use of biofertilizer is a wise action. Trichoderma as one of the microbe also potentially used biofertilizer. So far, Trichoderma utilization research is still limited to the superior varieties, while the information of the research on local varieties, especially rice, is still limited. The results showed that local lowland rice seedlings and upland rice varieties gave different responses to Trichoderma application. High plant paddy is not affected by the Trichoderma isolate. In contrast, upland rice seedlings are influenced by the Trichoderma isolates.

Local, rice, seedling, Trichoderma

**BO-18**

**Molecular identification of two fruit flies, Bactrocera spp. (Diptera: Tephritidae) using mitochondrial Cytochrome Oxidase I gene (COI)**

Molecular identification of two fruit flies, Bactrocera spp. (Diptera: Tephritidae) using mitochondrial Cytochrome Oxidase I gene (COI)
Some fruit flies have been reported as the important pest on fruits and vegetables in the world. Agricultural Quarantine Agency of Denpasar (Bali, Indonesia) was reported there are two species of fruit flies was new coming (exotic) in Bali in 2014 based on the morphological identification, namely Bactrocera bryoniae and Bactrocera occipitalis. However, Bactrocera dorsalis complex has similar morphological and have a less distinctive character for taxonomic identification, therefore it is difficult to identify fruit flies accurately. Base on the phenomena the accurate identification is needed. One of the more accurate identification is base on molecular identification using DNA-based barcode. Generally to identify of fruit flies DNA-based barcode using mitochondrial Cytochrome Oxidase I gene (COI) has been conducted. PCR analysis using Fruit Fly MT-COI-F (FFMT-COI-F) 5'-GGAGCATAATYGGRGAYG-3' as forwarding primer and HCO 5'-TAAAATCTCAGGGTGACCAAAAATCA-3' as reverse primer was successfully amplified around 600 bp of COI gene of fruit flies. Base on similarity of sequence product there are two species of fruit flies have been identified are Bactrocera bryoniae and B. occipitalis and same result with morphological identification. Phylogenetic analysis of B. bryoniae based on COI genes showed that B. bryoniae from Bali were similar and in the same group with Bactrocera species from Australia. On the other hand, phylogenetic analysis of B. occipitalis based on COI genes showed that B. occipitalis from Bali were same groups with Bactrocera species from Tarakan (East Kalimantan, Indonesia) and the Philippines.

Cytochrome Oxidase I, fruit flies, mitochondria, molecular identification, phylogenetic analysis

BO-19
Lowland avifauna diversity and abundance in disturbed forest habitats of Halmahera Island, North Maluku, Indonesia

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Across the planet, the main driver of tropical forest avifauna extinctions is habitat loss and fragmentation. Halmahera Island located in the North Maluku (Moluccas), Indonesia has a high bird endemism. However, logging and other anthropogenic activities have degraded around 80% of its natural forests. The impact of habitat loss and degradation on these species is poorly understood. The study used a point count method to estimate population densities of lowland bird species in regrowth logged forest (20 years) and mixed garden areas that were contiguous with natural forests. Abundance and species richness were recorded for each land use type to determine functional responses and conservation importance. The study found that bird species diversity is high in the regrowth forest, but low in mixed gardens. Importantly, almost all of the globally restricted range species were present in the regrowth forest. These results in the logged areas are probably due to rapid habitat regeneration and the presence of undisturbed or slightly disturbed forest patches.

Bird diversity, disturbed forest, Halmahera

BO-20
Two unique plant species in Indian floristic diversity and their possible environmental impacts

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A detailed floristic survey conducted during 2015-2017 in Chithara Village adjacent to Shiv Nadar University, India recorded a total of 272 vascular plant species belonging to 69 families in just 770.78 ha of geographical area. The Leguminosae with 39 species was most speciose family followed by Poaceae (31 species), Compositae (24 species) and Convolvulaceae (14 species). The survey documented two unique plant species viz. Emex australis Steinh, and Ludwigia hyssopifolia (G.Don) Exell; both the species are known as aggressive weed in many countries had very restricted distribution in the study area. E. australis belonging to family Polygonaceae is native to South Africa and commonly called as three corner jack or doublegeet. It is a prostrate, annual, nonoecious herb and characterized by three angled nut enclosed in the spinescent perianth. The species is highly invasive and has the ability to invade the landscape if unchecked as plants produce large quantity of seeds, which have the ability to survive for many years in the soil. E. australis is widespread serious weed of cereal crops in Western Australia. In India, since the only reported occurrence of E. australis is Jammu this is the new record for Uttar Pradesh and Upper Gangetic Plains of India. L. hyssopifolia, belonging to family Onagraceae, commonly called ‘water primrose’, is an erect, annual herb with bright yellow small flowers. It has become an extremely aggressive weed of rice fields and of marshy areas in several countries such as in Malaysia, Indonesia, Borneo, Thailand, Nigeria, Sri Lanka, etc. Though this species is found in many parts of India, is a new addition to the regional flora of western Uttar Pradesh. The paper will...
highlight distribution and medicinal uses of *E. australis* and *L. hyssopifolia* in detail and discuss the possible impact of these species on the ecosystem as invasive species.

*Emex australis*, floristic diversity, India, invasive species, *Ludwigia hyssopifolia*

**BO-21**

**Identification of pathogen of wilt disease in strawberry (Fragaria sp.) and the control potential of microbial antagonists**

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Strawberry (*Fragaria* sp.) is one of the most popular fruits with the high economic value. Strawberry development in Bali (Indonesia) is mostly growing in the Bedugul area including Pancasari Village because it has a suitable climate for the development of strawberry plants. On the other hand, the one problem of cultivation of strawberry is wilt disease, it was reported by the farmer in 2016. One of the possible approaches to control of the disease is using antagonistic microbial. The purpose of this studies in order to identify of pathogen of wilting disease of strawberry plants and analyzed the potential of antagonistic microbial. In this study, the analyses were conducted including isolation, identification, pathogenicity test and inhibit microbe antagonistic by dual culture technique. Molecular identification was conducted base on 16 sRNA using forward primer ITS1-F and ITS4-R as a reverse primer. Base on the morphological and molecular identification the pathogen causing wilt disease on strawberry is *F. oxysporum*. The result was indicated *F. oxysporum* the new reported as pathogen causing wilt disease of strawberry in Bali. In Vitro antagonistic test to *F. oxysporum* showed the results there is a microbial antagonist were able to suppress pathogen growth by 84%. The morphological identified by antagonist microbes indicated the fungi is *Trichoderma* sp.

*Fusarium oxysporum*, strawberries, *Trichoderma*, wilt disease

**BO-22**

**Polyhydroxyalkanoates (PHA) production from palm oil waste: Reviewing the substrate-microbes relationship to favor productivity**

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Global plastic production kept increasing gradually and reached 322 metric tons in 2015. However, the rate of production is inversely proportional to its degradation rate, leading to inevitable environmental issues. The production of degradable bioplastic such as polyhydroxyalkanoates (PHA) can be a way to address this problem. Microorganisms can synthesize PHA using different substrates, one of them being palm oil waste, of which Indonesia is biggest palm oil producers in the world. By utilizing palm oil waste as substrate for PHA production, both plastic and palm oil waste problems can be tackled. The objectives of this review are to provide the overall outlook of PHA production using palm oils waste as the substrate, as well as comparing the PHA yield produced by different microorganism and oil waste. Apparently, Cupriavidus necator is the most common microbe employed in PHA production. In a batch fermentation setting, it can produce about 11.9 g/L PHA from waste frying palm oil which is higher than from waste frying sunflower oil and waste frying rapeseed oil. Understanding the different ability of microorganism to convert substrate into PHA will define the criteria for PHA producing microorganism selection and will help improve PHA yield in upstream processes.

Bioplastic, microorganism, palm oil, PHA

**BO-23**

**Identification of seaweed diversity from coastal area of Sayang Heulang, Garut, West Java, Indonesia**

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Habitat of seaweed is usually distributed in coastal area that had coral, coral fragments and muddy sand substrates such as Sayang Heulang, Garut, West Java, Indonesia so it is necessary to identify seaweed diversity. This identification aims to give more information about seaweed morphology collection in Indonesia. This study was begun by collecting the seaweed twice, first sampling on April 4, 2015, and second sampling on July 12, 2017, using quadratic transect as sampling technique. Analysis of water was needed to know the environmental condition of seaweed growth. Descriptive method was used to identify the seaweed. The result of first sampling suggested that 26
species of seaweeds which have been found consisted of 4 species (16%) from brown algae (Phaeophyta), 8 species (32%) from green algae (Chlorophyta), 9 species (36%) from red algae (Rhodophyta) and 4 unidentified species (16%). While the result of second sampling suggested that 30 species of seaweeds which have been found consisted of 5 species (17%) from brown algae (Phaeophyta), 9 species (30%) from green algae (Chlorophyta), 15 species (50%) from red algae (Rhodophyta) and 1 unidentified species (3%). There is difference of seaweed which found from both samplings that may be caused by growth environment conditions.

Morphology, Seaweed, diversity, Sayang Heulang

**BO-24**

Isolation and screening of local species microalgae in Southeast Sulawesi, Indonesia suitable for mass cultivation in outdoor pond systems

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Isolating and selecting of local species microalgae for any commercial application has a competitive advantage especially for microalgae species intending to be mass produced in outdoors as they are well adapted to the local climatic environment. The aim of this study was to isolate local species microalgae in Kendari Waters, Southeast Sulawesi, Indonesia suitable for mass cultivation in outdoor open pond systems for the development of the native species microalgae for commercial applications and for educational purposes. The study was conducted in several coastal areas in Kendari including Tanjung Tiram Beach, Nambo Beach, Batu Gong Beach, Toronipa Beach and Bokori Island. The isolation of microalgae was done using agar plating technique (1% agar in f/2 medium). The water samples were collected using a plankton net and manually collected in bottle samples. The water samples were plated on agar medium and incubated under dim light, 12:12 hours light and dark cycle and at ambient room temperature. Water quality parameters including temperature, salinity, water transparency, nitrate, phosphate, ammonia, and phytoplankton were also determined at each location. There are hundreds of isolates generated. Pure colonies were isolated after repeated streaking on agar medium. The isolates are dominated by diatom (Bacillariophyceae), filamentous cyanobacteria and Chlorophyceae. Isolates potential for mass cultivation in outdoors including *Diatoma sp.*, *Melosira sp.*, *Navicula sp.* and *Chlorella sp.*, *Chlamydomonas sp.* and *Oscillatoria sp.* All isolates generated will be maintained and further studied for their potential commercial application and for educational purposes.

Isolation, local species microalgae, Southeast Sulawesi

**BO-25**

Soil microbial diversity of palm oil plantation

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Palm oil (*Elaeis guineensis* Jacq.) is one of the world’s most productive and rapidly expanding equatorial crops. It plays a crucial role in many countries particularly in South East Asia and South Africa as it has great economic and social importance. The growing demand for the palm oil has contributed to the changes of land use and also the microbial diversity of the palm oil plantation. The importance of microbial diversity in soil habitats has become an emerging topic since soil microorganisms play a significant role in a number of biological processes occurring in the palm oil plantation. Interestingly, palm oil plantations have different population and characteristic of the microbial diversity. Studies found out that the microbial community significantly influences the characteristics of the host plant. Thus, understanding the character of the soil microbes may contribute to the management of the palm oil plantation. This review focuses on recent data relating the importance of palm oil plantation, soil type and how changes in land use affect the soil microbial diversity in palm oil plantation. Various microbes such as *Streptomyces*, *Pseudomonas*, *Burkholderia*, *Aspergillus* sp. and many other species including novel species had been found at several palm oil plantation in the reviewed literature. Finally, the review discusses the prospect of microbial diversity in the palm oil management.

Bacterial diversity, fungal diversity, microbial diversity, palm oil plantation, soil microbes

**BO-26**

Diversity of decapod crustaceans in intertidal zone of Liya Beach, Wangi-Wangi Island, Wakatobi, Southeast Sulawesi, Indonesia

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Liya Beach is one of the hotspot locations of various biodiversity potentials to be fully utilized in Wakatobi Islands, Southeast Sulawesi, Indonesia, one of which is the diversity of Decapod Crustaceans. Decapod crustaceans are a faunal group showing an important role in coastal ecosystems because of their ecological function and extraordinary diversity. Decapod diversity may change due to habitat dynamics caused by climate change. Changes in
diversity will be more easily monitored by the diversity list of a group of organisms, in addition, diversity list is an essential substance in the development of further research. This study was conducted in the intertidal zone of Liya Beach which designed to provide the diversity list of Crustaceans. Samples are collected with purposive random sampling method from December 2016 to January 2017. The result showed 12 species from 7 families of Crustaceans including Eriphidae, Grapsidae, Pilumnidae, Xanthidae, Diogenidae, Calappidae, and Ocypodidae. This initial exploration would be a preliminary study for further research on nature conservation, Decapod Crustaceans novel utilization in various fields and the basic document of marine territory.

Decapod crustaceans, diversity, intertidal, Liya Beach

**BO-27**

**Diversity of crustacean and its correlation to abiotic factors in mangrove restoration area of Karangsong, Indramayu, West Java, Indonesia**

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Mangrove restoration is part of aquatic systems that have an important role in bringing back the ecosystem services, especially in coastal area. Crustaceans are one of the most important animals found in mangrove ecosystem and used as parameters in successful mangrove restoration. This study aimed to examine the correlation between the diversity of crustaceans with abiotic factors in the Mangrove Restoration area of Karangsong, Indramayu, West Java, Indonesia. Sampling stations of the study site have determined by purposive sampling method for five location with five plots each. The distribution of Crustacean in correlation with abiotic factor was analyzed by Canonical Correspondence Analysis (CCA). The result showed three families of Crustacean were found in the study site, consist of Sesarmidae, Grapsidae, and Varuniidae, with six species, were identified, namely Clisiocoeloma sp., Labuanium sp., Metaplex elegans, Metopograpsus latifrons, Parasesarma asperum, and Parasesarma sp. The highest relative abundance and relative frequency were P. asperum. The diversity index was classified as moderate diversity, with moderate dominance index in general. The most supported abiotic factors to the Crustacean diversity were pH, NH₃, C-organic, and salinity.

CCA, Crustacean, Karangsong, mangrove restoration

**BO-28**

**Phytoremediation of oily sludge using Avicennia marina, Xylocarpus granatum, and Rhizophora mucronata in mangrove restoration area of Karangsong, Indramayu, West Java, Indonesia**

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Mangrove plantation aimed to restore the damaged land to better condition in terms of ecosystem function. One of the function is to reduce the pollution caused by the petroleum. The purpose of this study was to determine the ability of seedlings of mangrove species Avicennia marina, Xylocarpus granatum, and Rhizophora mucronata in lowering levels of Total Petroleum Hydrocarbon (TPH) in soil contaminated with petroleum, which was found in study site of Karangsong. The research used treatments of A: Avicennia marina; B: Xylocarpus granatum; C: Rhizophora mucronata; D: Medium control without the addition of oil sludge waste; E: Control of each plant mangrove and plant growth mangrove observation. The analysis of TPH levels has conducted in the growing media and plant growth. The results of this research showed that R. mucronata performed the highest decrease of TPH in the soil contaminated by petroleum with 32.82% from 23.72 to 15.94 mg/g, followed by X. granatum with 29.28% from 26.68 to 18.87 mg/g and A. marina with 16.3% from 25.35 to 18.68 mg/g. The result also showed that oil sludge could be used as supplementary for mangrove seedlings media.

Avicennia marina, bioremediation, oil sludge. Rhizophora mucronata, TPH, Xylocarpus granatum

**BO-29**

**Protecting flagship species: Conservation research in Central Kalimantan, Indonesia 1996-2017**

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Since 1996, the Borneo Nature Foundation team have been leading research and conservation efforts for flagship
species in Central Kalimantan, Indonesia in particular orangutans, gibbons and felids. Using a range of survey techniques we have collected extensive data on the population density, distribution and behavioral ecology of these species, contributing to conservation strategy and species action plans. This includes demonstrating the importance of Central Kalimantan’s forests for species conservation and documenting the serious negative impacts of illegal logging, the ability of populations to (gradually) recover from disturbance, and impacts of fire on populations in peat-swamp forest. Using case studies from the Sabangau Forest, Central Kalimantan we will show how survey techniques can support an evidence-based approach to conservation management. By incorporating flagship species surveys, we demonstrate how grassroots conservation actions can lead to direct and positive change in landscape conservation. This method also provides important evidence for how a multi-stakeholder approach can work to fully realize and maximise the conservation potential of forests for biodiversity. The survey expertise of Borneo Nature Foundation’s Indonesian field researchers has subsequently been applied to support conservation in multi-use landscapes in other areas of Kalimantan.

Borneo, felids, conservation research, primates, surveys

BO-30

Diversity of trees as power-based supports tourism conservation education Sumatran elephant (Elephas maximus sumatranus)

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This study aims to determine the diversity of trees as a supportive power of conservation-based education tourism. The study was conducted at the Elephant Conservation Center (ECC) of Way Kambas National Park, Lampung, Indonesia by the method of a striped line. The sampling intensity used was 8%, so that 35 plots were obtained. The data collected were analyzed using the important value index (INP), Shannon diversity index as well as the classification of quality of diversity according to Chafid Fandeli. The results of this study showed that there are 14 species of trees making up the secondary forest Elephant Conservation Center of Way Kambas National Park with 3 species have Top Important Value Index is Schima wallichii INP = 43.42%, Dalbergia latifolia INP = 34.21% and Clausena excavata INP = 22.36%. Based on the Shannon index of tree species diversity in the Elephant Conservation Center is 1.00 (medium) and based on Fandeli's opinion, the quality of tree diversity is on a scale of 3 that is classified as moderate. The results of this study are expected to be information in the development of ECC-based conservation education tourism.

Conservation, diversity, trees, tourism, Way Kambas National Park

BO-31

Genetic variation Limnonectes blythii by using RAPD in West Sumatra, Indonesia

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Genetic variation of Limnonectes blythii which taken from three different samples in West Sumatra, Indonesia was analyzed by using RAPD in Laboratory of Molecular Biology and Genetics, Andalas University, Padang, Indonesia. The 30 samples were analyzed from three different areas they were Harau Canyon, Malampah and Pangian. L. blythii DNA was obtained from liver tissue that was isolated by using Roche kit preparation. The eleven primers has been tested and only eight of them produced the ampiclon. They were OPA01, OPA02, OPA03, OPA04, OPA07, OPA09, OPA11, OPA13. According to this research, the highest genetic variation can be found in Malampah population (H = 0.1602 ± 0.2014; I = 0.2403 ± 0.2847). Then followed by population in Pangian (H = 0.1274 ± 0.2000; I = 0.1847). The lowest genetic variation found in Harau (H = 0.1263 ± 0.1966; I = 0.2818). The value of genetic variation was GST = 0.5091. It indicates that 50.91% of genetic variation total were population to population and 40.09% were intra-population differentiation. It was supported by heterogeneity value of the population to population (DST = 0.143) was lower than intra-population heterogeneity (HS = 0.138). Then, the flow of gene population to population (NM = 0.4821), it means that the group of Limnonectes blythii population in West Sumatra can be separated. According to cluster analysis of UPGMA explains that Limnonectes blythii in West Sumatra consists of two clusters they were Harau population and the other one divided into two sub-cluster those are Malampah and Pangian.

Differenciation, Limnonectes blythii population, variation

BO-32

Biodiversity of Gastropods in Karapyak Rocky Shore Coastal, Pangandaran, West Java Indonesia

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The rocky shore coastal of Pangandaran, West Java, Indonesia has a unique ecosystem and diverse invertebrate organism like mollusk from gastropods class. This study aims to analyze the biodiversity of gastropods on the rocky shore in Karapyak Coastal. The study consisted of 5 stations with line transect method square 1 m x 1 m vertically towards the sea and the determination of horizontal station to the shore. The results of the study found 773 individuals spread into nine families. A family of Neritidae dominates with 43%, followed by Cyprinidae with 63%. Nerita sp. is a dominant species found in every station with a high abundance (205 ± 10) ind/m². Based on the cluster analysis of Bray-Curtis showed variations in the distribution and abundance of different gastropods of vertical to oceanic line and almost the same horizontally with the shore. Substrate and tidal water become key parameters to spatial distribution of gastropods in Karapyak Coastal area.

Gastropods, Karapyak, Pangandaran, rocky shore

**BO-33**

Tree species selection for urban forest in Hutan Kota Bumi Perkemahan Cibubur, Jakarta, Indonesia

Haryanti

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Improvement programme of urban forest in Jakarta, Indonesia is an effective way to overcome environmental problems. Hutan Kota Bumi Perkemahan Cibubur, Jakarta with an area of 27.32 hectare plays an important role as it serves as a buffer of the urban critical physical environment, a collection area of germplasm conservation and recreation at urban area. Trees are the main elements of the urban forest that will affect its function. This study aims to identify the urban forest tree species for planting in Hutan Kota Bumi Perkemahan Cibubur with consideration of future climate change factors. Data collection was conducted by survey method to inventory and identify tree species along with their characteristics, followed by literature study and analysis to recommend appropriate tree species. The parameters used are: (i) Diameter and height of tree; (ii) Model of canopy, leaf shape, branch shape and shape of stem; (iii) Tree condition; (iv) Growth ability in critical land or polluted land; (v) Phenology of trees (fruit and flowers). The results of the study recommend 9 species very suitable, 30 species suitable and 10 species of trees less suitable to be planted as urban forest trees in Hutan Kota Bumi Perkemahan Cibubur, with suggestions for the selection of exotic local species as a priority.

**BO-34**

Metagenomics role and function in palm oil plantation development: Identification of endophytic microbial diversity and beyond

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Palm oil (Elaeis guineensis Jacq.) is one of the most important commercial crops in the world, particularly in Southeast Asia. With current biotechnological advancement, researchers have tried to use biotechnology application to improve the quality and rate of palm oil production. It is found out microbial communities play a significant role in host plant performance, particularly roots endophytes. Several kinds of research have shown that the application of endophytes may help the host plants in many ways including biological control, nutrient cycle improvement, and induced plant growth regulation. In palm oil plantations, researchers often focus on the promising endophytes to fight against infectious disease caused by *Ganoderma boninense*. For decades, conventional culture methods have been extensively used for identification and characterization methods. However, these methods have high chance to get false positive results, time-consuming, and limited to only culturable microbes. These limitations can be overcome by using metagenomic approach. In this literature review, previously published works on the role and importance of endophytic microbial communities in palm oil plantations will be discussed. Metagenomic studies from other studies were used as references.

*Ganoderma boninense*, metagenomics, palm oil, root endophytes

**BO-35**

Relationship between plankton structure community and environmental parameters of the fishing grounds in Batu Hideung Water, Pandeglang District, Banten, Indonesia

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Plankton has a role as primary producer in the water and depends on environmental parameters. The aim of this research was to analyze structure community of plankton and its relationship with physical (sea surface temperature,
transparency, current velocity), and chemical parameters (salinity, pH, DO, nitrate, phosphate) of the fishing grounds. The research was conducted 3 times observation at 5 stations during September to October 2017 in Batu Hideung Water, Pandeglang District, Banten, Indonesia. Sampling of phytoplankton and zooplankton were taken horizontally and vertically using net with mesh size of 80µm and 133µm, respectively. Result showed that sea surface temperature ranged from 29.00-30.20°C, current velocity 0.10-1.30 m/s, transparency 7-10 m, salinity 30-34 g/L, DO 6.20-8.60 mg/L, pH 6.20-8.60, nitrate 0.0410-0.6940 mg/L, and phosphate 0.49-0.8761 mg/L. There was 37 genus from 4 class of phytoplankton. The abundance of Bacillariophyta was 52,734 ind./L, Miozoa was 1,315 ind./liter, Chyanophyta was 633 ind./liter and Euglenophyta was 200 ind./liter. There was 35 genus from 18 class of zooplankton, dominated by Copepods with abundance 441 ind./L. Diversity index of phytoplankton ranged from 1.30-2.02, evenness index ranged from 0.52-0.85, and dominance index ranged from 0.19-0.44. Based on multivariate cluster analysis, there were similar environmental parameters in stations 1, 2 and 3, while station 4 was similar to station 5. Based on Pearson correlation analysis, the current velocity and phytoplankton were positively correlated to phytoplankton abundance, whereas temperature, transparency, salinity, DO, pH, and phosphate were negatively correlated with phytoplankton abundance. Nitrate, phosphate, salinity, DO were positively correlated with zooplankton abundance, whereas temperature, current velocity, transparency, and pH were negatively correlated with zooplankton abundance.

Batuhideung Water, environmental parameters, phytoplankton, zooplankton

**BO-36**

*Synopsis and distribution of eight sea cucumber species fished in Lampung, Indonesia*

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Sea cucumbers are harvested in artisanal fisheries that scattered throughout the many Indonesian islands. Thus, number of species involved in trade will remain changing together with more samples from more localities. In 2015, 54 species of sea cucumber that fished for trade in Indonesia have been listed by Setyastuti and Purwati. However, 21 species of it still needed taxonomical validation. To address those problems and to fulfill the gaps in fisheries data information, inventory on commercially sea cucumber in Bakaheuni water, Lampung, Indonesia was conducted. Almost 700 individuals of sea cucumbers that belongs to eight species are successfully discovered. Three most attracting species from these

**findings are Holothuria atra, Actinopyga mauritiana and Stichopus ocellatus. As the highest number of individuals found during the survey, Holothuria atra shows a wide range of distribution. However, it mostly related to the low value of it price in the market, causing it no longer interesting commodity to look for by local fishermen. A. mauritiana previously noted as one of the species which have to be taxonomically confirmed and assurance that it is harvested for trade. Fortuitously, this study discovers the same species, which means it confirms the certainty needed by previous publication. S. ocellatus is newly reported species in Indonesia, not only from fisheries point of view but also from taxonomical study. Hence, this finding wills automatically adding the list of species fished for trade in Indonesia in previous publication. To date, we can re-state that the number of sea cucumber species involved in trade in Indonesia is 55 species.*

*Actinopyga mauritiana, Bakaheuni, new report, Stichopus ocellatus*

**BO-37**

*First record of Holothuria (Semperothuria) roseomaculata Kerr, 2013 (Echinodermata: Holothuroidea) in Indonesia*

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This is the first record of *Holothuria (Semperothuria) roseomaculata* Kerr, 2013 (Echinodermata: Holothuroidea) for Indonesia. One salted form specimen was collected from the local fishermen in Bungin grounds. The research was conducted 3 times observation (salinity, pH, DO, nitrate, phosphate) of the fishing found during the survey, Holothuria atra shows a wide range of distribution. However, it mostly related to the low value of it price in the market, causing it no longer interesting commodity to look for by local fishermen. A. mauritiana previously noted as one of the species which have to be taxonomically confirmed and assurance that it is harvested for trade. Fortuitously, this study discovers the same species, which means it confirms the certainty needed by previous publication. S. ocellatus is newly reported species in Indonesia, not only from fisheries point of view but also from taxonomical study. Hence, this finding wills automatically adding the list of species fished for trade in Indonesia in previous publication. To date, we can re-state that the number of sea cucumber species involved in trade in Indonesia is 55 species.*

Aspidochirotida, Holothuriidae, new record, Sumbawa

**BO-38**

*Comparative root anatomy of epiphytic and terrestrial orchids of Mount Lawu (Java, Indonesia) and their ecological significance*

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BO-39

Inoculation of indigenous phosphate solvent bacteria for enhancing the growth of *Vitex pubescens* in the improved tailings media

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Revegetation of tailing of ex-gold mine requires inoculation of growth-supporting microorganisms, one of which is phosphate solvent bacteria. Inoculation of indigenous bacteria is more promising for the success of revegetation. The objective of this research was to measure the effect of inoculation of indigenous phosphate solvent bacteria on the growth of *Vitex pubescens* Vahl. in the tailings media of ex-gold mine that has been repaired. Improvement of tailings media is done by adding topsoil and compost (3: 1: 1). The research method was an experiment using completely randomized design with subsampling. The indigenous phosphate solvent bacteria used are *Bacillus* sp. and *Micrococcus* sp., a collection of Laboratory of Silviculture of Tanjungpura University (Untan), Pontianak, Indonesia. The results showed that inoculation of indigenous phosphate solvent bacteria significantly increased plant height, shoot root ratio, plant diameter, and plant biomass. While to the increase in the number of leaves, the bacteria has no effect. These results prove that inoculation of indigenous phosphate solvent bacteria can enhance the growth of *V. pubescens* in the tailings media of ex-gold mine that has been improved.

Ex-gold mine tailings, indigenous phosphate solvent bacteria, *Vitex pubescens*

BO-40

Hornbill in Sempu Island Nature Reserve, East Java, Indonesia

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Sempu Island has been declared as a Nature Reserve since 1928. The island located 800 meters from the southern coast of the Province of East Java, Indonesia. The reserve (877 ha) harbors 144 bird species, including two hornbill species, i.e., Wreathed Hornbill (*Rhyticeros undulatus*) and Oriental Pied Hornbill (*Anthracoceros albirostris*). Four days survey in the island using Time Species Counts was done to estimate the relative abundance of the two hornbill species compares to other species. The result of the survey showed that the relative abundance rank was the third and the eighth respectively for Wreathed Hornbill (M=2.136), and Oriental Pied Hornbill (M = 1.273).

Java, Oriental Pied Hornbill, Sempu Island, Wreathed Hornbill

BO-41

Vertical stratification of bird community in Cikepuh Wildlife Sanctuary, West Java, Indonesia

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The complexity of heterogeneous stratification can also be used to determine the distribution of resources in the bird community. However, deforestation causes damaged and may disturb the bird community in the forest. Cikepuh Wildlife Sanctuary in Sukabumi, West Java, Indonesia is an example of degraded forest due to deforestation. Illegal logging in the area leads to approximately 7000 hectares of forest converted into a plantation area. This study was conducted to test the hypothesis of the differences in the diversity of birds in each strata of vegetation and the differences in the diversity of birds in forests and plantation. The study was conducted in March 2016. Point count method was used for bird survey. The calculation of Shannon Wiener's diversity index showed that forests have a higher diversity of birds (3.09) than plantation (2.78). Based on the rank abundance graph, each vegetation strata has a different type of curve. The middle canopy layer has the highest bird abundance while the emergent layer and understory layer was the strata with the lowest abundance.
Birds community, Cikepuh, diversity, stratification

BO-42
Identification of medicinal plants in Joben Resort, Mt. Rinjani National Park, Lombok, West Nusa Tenggara, Indonesia

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The research identifies medicinal plants in Joben Resort of the Mt. Rinjani National Park, Lombok, Indonesia is conducting in Maret-Augustus 2017. This research aimed to know the diversity of medicinal plants used by the community in Jeruk Manis village dan Tete Batu Village, Sikur Sub-district, East Lombok District around Rinjani Nasional Park, West Nusa Tenggara, Indonesia. The method which was used by the researcher interview with community, exploration purposive and identification plants. The result shows medicinal plants 36 family and 61 species. The most useful plant family by community came from Asteraceae. The most common part of plant organ which is used as a leaf and fruit.

Medicinal plants, Mt. Rinjani National Park

BO-43
The influences of climate Factor in Javan Slow Loris behavior (Nycticebus javanicus) in Talun Cipaganti Village, Garut, West Java, Indonesia

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The research has been conducted in order to identify environmental factor in habitat of Javan Slow Loris (Nycticebus javanicus E. Geoffroy, 1812) in Talun Cipaganti village. The research was carried out for 420 hours in March to April 2017 from 05.00 PM to 05.00 AM. Focal animal instantaneous sampling was used to record all behaviors of Javan Slow Lorises with the interval between points was 5 minutes. Data on GPS, environmental temperature, and air humidity were taken at the same time with the process of collecting behavioral data. The result shows that the behavior was directly proportional to the increase of environmental temperature. In addition, there was an inversely proportional relationship between the behaviors and the increase of air humidity. However, there was greater influence of temperature than daily humidity to Javan Slow Loris behavior.

Environmental temperature, focal animal instantaneous sampling, humidity, talan

BO-44
Adaptation of Morus alba and Morus cathayana plants in a different climate and environment conditions in Indonesia

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Mulberry (Morus alba L. and M. cathayana Hemsl.) cultivation business as silkworm feed in Indonesia is increasing. Considering the benefits of mulberry economically, ecologically and pharmaceutically. This study objective is to determine the mulberry plants adaptation to the ability of life and growth of mulberry cuttings. The research was conducted at BPTF Bali, Cianjur Alam Sutera Nursery (West Java) and East Kutai Farming Farm (East Kalimantan), using Randomized Block Design consisted of mulberry treatments (M. alba and M. cathayana). The results show different growth rates from various regions in Indonesia. Mulberry growth in West Java is the best compared to mulberry which growth in Bali and Kalimantan. The highest live percentage in West Java for M. alba (93%) and M. cathayana (90%), in Bali M. alba (88%) and M. cathayana (80%), in Kalimantan M. alba (80%) and M. cathayana (75%). The best high parameters of mulberry plant in West Java for M. alba (80 cm) and M. cathayana (76 cm), in Bali for M. alba (67 cm) and M. cathayana (76cm), in East Kalimantan for M. alba (58cm) and M. cathayana (50 cm). The best mulberry species based on the whole parameter is M. alba in West Java. This means that West Java climate and environmental conditions are good for mulberry cultivation.

Adaptation, cuttings, Morus alba, Morus cathayana, mulberry

BO-45
Study on trampling in tropical seagrass meadows

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The results show that trampling intensity of seagrass meadows in West Java and East Nusa Tenggara, Indonesia. This means that West Java climate and environmental conditions are good for mulberry cultivation.
This study is experimenting the effects of trampling on *Thalassia hemprichii* tropical seagrass meadows around Barrang Lombo Island, Sangkarrang Islands, Makassar, South Sulawesi, Indonesia. The experimental design comprised two trampling treatments (trampling by an adult and by children for three weeks) and a control plot (no trampling). After trampling (adult or children), detached seagrass leaf biomass was higher than uprooted seagrass biomass. Trampling by an adult had a greater effect on seagrass density than trampling by children. Three weeks after trampling ceased, both treatment plots exhibited substantial recovery, with final density closer to control density in the plot trampled by children.


**BO-46**

**Diversity and abundance of epiphytic orchids in Bukit Turgo, Mt. Merapi, Yogyakarta post-eruption in 2010**

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Orchidaceae is the largest group of flowering plants in the world; there are 731 species of orchids found in Java, Indonesia. Several studies showed that there are 90 orchid species in Mt. Merapi, but after the great eruption in 2010 only 51 species remained. Mt. Merapi periodically erupts and releases hot clouds. The eruptive activity in 2010 was certainly deadly for most of the orchids, especially epiphytic orchids. This study was conducted to determine the diversity and abundance of epiphytic orchids in Bukit Turgo after the eruption of Merapi in 2010. This study was done by plot method, using imaginary plots of 20 m x 20 m along the exploration tracks. There were two tracks, Tritis and Turgo; each track was given 10 sampling points. Data analysis include species diversity and abundance which consists of density, frequency, and importance value of each species found. The results show 18 species of epiphytic orchids in Bukit Turgo, Yogyakarta. *Dendrobiyum mutabile* (Blume) Lindl. has the highest density (82 ind/4000 m² on Tritis track and 81 ind/4000 m² on Turgo track), highest frequency (100%), and highest important value (38.67903882 Turgo track and 35.89454392 on the Tritis track).

Abundance, biodiversity, Bukit Turgo, Mt Merapi, orchids

**BO-47**

**Lichen diversity and their potential for medicines and dyes in Geothermal Area of Kamojang Bandung, West Java, Indonesia**

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Study on lichen in geothermal area of Kamojang, Bandung District, West Java, Indonesia was conducted in January until April 2017 which survey method was used for collecting lichen. The Power House of Geothermal Power Plant (GPP) was center point and 2 km line transect was spread into cardinal points (N, E, W, S). Identification of Lichen by using morphology, anatomy and chemistry test was conducted in Laboratory of Plant Taxonomy, Department of Biology, Padjadjaran University, Sumedang, West Java, Indonesia. Literature study was needed to identifying and searching lichen's potents and uses. The data was analyzed that the lichens which were founded in Kamojang are 75 species with 17 families. The lichens which had potential as medicine in GPP Kamojang are *Usnea flexuosa, Usnea baileyi*, and *Usnea barbata* which has usnic acid that can be used for antibacterial, antifungal, and antivirus, *Letharia vulpina* was used for curing stomach ache, and *Parmotrema reticulatum* was used for relieving discomfort from kidney disorders or venereal disease by Mexican. The lichens which used dye are *Parmotrema tinctorium, P. reticulatum* and *Usnea* spp.

Kamojang Geothermal Power Plant, lichen, medicines, dyes

**BP-01**

**Biodiversity of weeds in Ilmen Reserve (Russia)**


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Weeds are a synanthropic flora. Human exposure to the natural landscape leads to the spread of synanthropic plant species, so weeds begin to occupy a significant place in the structure of ecosystem biodiversity. The aim of this study was to investigate the weeds biodiversity structure and to assess the extent of invasion of weeds into the territory of the Ilmen State Reserve (South Urals, Russia). This paper presents the results of a study of weeds during the vegetation period in 2013-2017. 51 species of weeds distributed in 4 genera and 6 families were found on the territory of the Southern Forestry of the Ilmen Reserve. We have found differences between species diversity of weeds on three types of roads (gravel, earth, and foot) and two
types of forests (birch and pine). The greatest degree of invasion was discovered for foot roads. We have noted that a pine forest is the most resistant the invasion of weeds.

Biodiversity, environmental factors, lake, phytoplankton, Shannon index

**BP-02**

**Comparative analysis of gastropods biodiversity after recovery processes in two freshwater lakes: Lake Sevan (Armenia) and Lake Uvildy (South Urals, Russia)**

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The population growth and water and land-use change are the main causes of lakes degradation. The response of aquatic ecosystems to recovery processes that occur after taking measures to reduce the main stressors is important to know. The article considers gastropods biodiversity in two freshwater lakes: Lake Uvildy and Lake Sevan. Lake Uvildy is one of the largest and unique freshwater lakes in the South-Ural region, Russia. In 1975-1977 the region was experiencing a severe drought and many waterbodies dried out. 234 mln m$^3$ was carried over from Lake Uvildy to Argazinskoye Reservoir, the main source of freshwater for Chelyabinsk city. The water level of the lake fell by 4 meters and only in 2008, it returned to its original position. Lake Sevan is the largest waterbody in Armenia and one of the largest freshwater lakes in Eurasia. Since 1930 it has been actively used for irrigating Ararat plain and in hydropower. So, its water level fell by 20 m, and its volume became 40% less. Since the mid-2000 when two tunnels had been built water level started to grow. For the last 6 years, water level was reported to grow by 2.44 m. In October 2010, it reached 1900.04 m. According to the Government Committee on Sevan, water level will have reached 1903.5 by 2029. On the basis of literature and our own research conducted in 2016-2017, we have studied changes in gastropods biodiversity. Currently, gastropods fauna accounts for 23 and 10 species for Lake Uvildy and Lake Sevan respectively. We found out the similarity in species diversity of gastropods in the researched lakes and paucity of gastropods associated with the anthropogenic disturbance and eutrophication of waterbodies due to flooding the coastline.

Biodiversity, freshwater lake, gastropods, recovery processes

**BP-03**

**Phytoplankton biodiversity and its relationship with aquatic environmental factors in lake Uvildy (South Urals, Russia)**

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Lake Uvildy is one of the largest and the most unique of the South Ural region lakes of Russia. The purpose of this paper was to study the relationship between the phytoplankton community structure and the main aquatic environmental factors in Lake Uvildy. The sampling was made during the vegetation period in June-July 2014. The water quality was evaluated using the Shannon biodiversity index. The results identified a total of 38 phytoplankton species, which belonged to 31 genera and 24 families. The phytoplankton species in the lake were mainly represented by Cyanophyta and Bacillariophyta. The Shannon index value comprised 1.27-2.21. According to the saprobity index values (1.63-2.35), the water in the lake is evaluated as satisfactorily clean.

Biodiversity, phytoplankton, environmental factors, lake, Shannon index

**BP-04**

**Bioaccumulation of heavy metals by the macrophytes of South Urals lake systems and their potential use for contamination indicators**


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This research studies possible use of aquatic macrophytes as bioindicators of heavy metal in lake systems. High concentration of heavy metal compounds in the lakes of South Ural (Russia) is natural. Moreover, some of the South Ural lakes are polluted by heavy metals that get into the water together with partly treated sewage of ferrous and non-ferrous industries as well as mining. The paper analyzes similarities and differences of macrophyte communities in seven lakes: Bolshoye Miassovo, Bolshoy Ishkul, Bolshoy Tatkul, Argashay, Ilmenskoye, Savelkul, Baraus. In our research, we determined species diversity, water flora taxonomic structure for each lake. The following types of species were chosen: Potamogeton...
Distribution of dragonflies (Odonata: Insecta) in South Ural lakes, Russia

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This article studies the diversity and distribution of Odonata (Insecta) in the South Urals region lakes (Russia) such as Lake Large Miassovo, Lake Small Miassovo, Lakr Ilmenskoe, Lake Savelkul and Lake Baraus. We revised dragonflies in five lakes during May-September 2014-2016. Dragonflies and larvae were identified up to the species. 36 species belonging to 15 genera were registered. The ratio of the species diversity was shifted towards Anisoptera (62%) relative to Zygoptera (38%). To compare the similarities of dragonfly communities of different lakes we used the Canonical Correspondence Analysis (CCA) and the Jaccard index. The lakes can be divided into two groups: (i) mono-landscape lakes Savelkul and Baraus (22% and 25% of the total number of species, respectively) and (ii) multi-landscape lakes Small Miassovo, Ilmenskoe and Large Miassovo (50%, 72% and 80% of the total number of species, respectively).

Diversity, dragonflies, larvae, lake

Distribution and abundance of phytoplankton in two South Ural lakes, Russia

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To study ecological problems of freshwater reservoirs is an important task. Preservation of water ecosystems in their natural state is of great significance. Phytoplankton is one of the biotic indicators of the lake trophic status and ecological state. The present work deals with phytoplankton structure of two South Ural lakes (Russia). We chose lakes with different trophic states, i.e., Lake Ilmenskoe (mesotrophic) and Lake Argayash (eutrophic). The species composition of common phytoplankton was preserved in June-July during 2012-2014. We used the most common diversity indexes (the Shannon, Simpson, and Margaref Indexes). We analyzed the data using graphs. The graphs were constructed by the similarity calculating method on the basis of the Sorensen-Czekanowski coefficient. It was shown that the lakes have sufficiently high biodiversity and high ecosystem resilience.

Abundance, diversity, indices of biodiversity, phytoplankton
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*Smilax* (Smilacaceae) have long been used as medicinal herbs especially in East Asia and North America as they were known to be rich in steroidal saponin. In Indonesia, pharmacological research on *Smilax* began to be done. This genus is widespread in Indonesia and fairly abundant in West Java, known as edible fruit and medicinal plants. Characteristics of *Smilax* as a dioecious plant with high morphological variations make it thorny in species identification. Various molecular approaches have been devised to overcome identification problems such as DNA barcoding. Therefore, this study was conducted to analyze the DNA barcoding application for identification and phylogenetic of *Smilax* in West Java. A total of 29 samples were used in this study including 12 accession numbers from BOLD systems. The sister group of Smilacaceae, the genus *Ripogenum* used as outgroup in phylogenetic construction. Samples were successfully extracted using CTAB method with some modifications. DNA barcode by rbcL region showed sufficient variation and conserved flanks. Four unidentified specimens have high similarity with *Smilax* leucophyla and lie in the same clade. The phylogenetic tree constructed using Maximum Likelihood statistics showed the monophyletic of Smilacaceae which is consist of three clades. The genus *Heterosmilax* nested with *Smilax* though with low bootstrap values.

DNA barcode, Java, rbcL, *Smilax*

**BP-09**

**Medicinal plants at Warsamdin Forest, Raja Ampat, West Papua, Indonesia**

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Potential of Waigeo Island (Raja Ampat District, West Papua, Indonesia) flora in the forest has not been exposed widely. Natural forest in Warsamdin Village, Raja Ampat still have a biodiversity of plants that potentially economic future. The existing forest area also has potential for ecotourism prospects in the future. This study aims to explore the potential of native flora in Waigeo Island and its potential for people at Warsamdin Village. The research method using purposive sampling tracks, namely in Warsamdin Village and forest along the river of Warambais. The result is a potentially traditional medicine and economic species include red fruit (*Pandanus conoideus*), Papua mangosteen (*Garcinia latissima*), matoa (*Pometia pinnata*) and Papua nutmeg (*Myristica* sp.). Some plant species endemic to Papua for drug also endemic species, such as large betel leaf (*Piper* spp.), Papua handkerchief tree (*Maniltoa* sp.), The ant nest (*Myrmecodia tuberosa* and *Hydnophitum cornicarium*). Potential as a drug and a local name unknown scientific name is described in this paper in more detail.

**Medicinal plants, Raja Ampat, Waigeo Islands, Warsamdin**

**BP-10**

**Biodiversity of fish resources in Sungsang Estuary, South Sumatra, Indonesia**

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Other than as a production area of fish resources, the Sungsang Estuary, South Sumatra, Indonesia is also used by the surrounding population as transportation lines and a center of fishing activities. The purpose of this study is to assess the fish biodiversity in Sungsang Estuary. The species diversity, evenness, dominance, degree of similarity, and composition of fish communities, as well as some physicochemical conditions, were analyzed in order to establish baseline data inventory in Sungsang Estuary. Results showed that all of physicochemical water quality parameters in the Sungsang Estuary were do not exceed the threshold limit value (TLV) the water quality standard, so the physicochemical parameters were good conditions for the fish sustainability. Forty-eight (48) species of fishes belonging to 29 families from freshwater, brackishwater and marine sources were encountered in the water bodies. Thryssa kammalensis, Johnius trachycephalus, and Johnius ambycephalus were a species with relatively high abundance. The index value of diversity classified as moderate (H=1.477-2.708), the index value of evenness classified as high (J= 0.616-0.876), and the index value of dominance classified as low (D = 0.097-0.382). This result showed that the species diversity was good enough, the species spread evenly, no domination and there has a stable community structure. Almost all fish community between the observation locations had no resemblance to each other except between fish community in the waters around the settlement and species in the shipping channel.

**Biodiversity, fish, Sungsang Estuary**
**BP-11**

Estimation of growth parameters and the fishing mortality rates of Malayan Leaf Fish (*Pristolepis grooti*) in Lake Ranau, South Sumatra, Indonesia

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The Malayan Leaf fish (*Pristolepis grooti*) is one of biotic component in Lake Ranau ecosystems, South Sumatra, Indonesia. This study aimed to estimate growth parameters and the fishing mortality rates of *P. grooti* in Lake Ranau. The estimation of population parameters was measured based on length frequency data of the fish which collected in March to October 2013. Growth parameters and fishing mortality rates were calculated using FiSAT program. The results showed that *P. grooti* growth was negative allometric, the fish tended to gain length faster than weight. *P. grooti* population was dominated by length-at-age individual of 10.0 to 11.0 cm with a frequency of 42%. Infinitive length of (L∞) = 17.28 cm and value of growth coefficient (K= 1.4 per year). The natural mortality rate (M = 2.57 per year), the fishing mortality rate (F = 5.36 per year) and total mortality rate (Z = 7.93 per year). The exploitation rate of *P. grooti* (E = 0.68), it was assumed that the fish has experienced overfishing. *P. grooti* recruitment patterns have two peaks in a year.

Fishing rate, growth, long infinitive, mortality, *Pristolepis grooti*

**BP-12**

Vegetation structure at Citatah Karst (Pawon Cave Block and Pasir Masigit Block), West Java, Indonesia

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Citatah Karst is special geological environment that is formed by dissolution and corrosion of soluble rocks, such as limestone and dolomite. Citatah Karst is the oldest karst area in West Java and located in Cipatat Sub-district, District of West Bandung, West Java, Indonesia. Vegetation formation in Citatah karst is unique and influenced by soil development and topography. There are two main locations for this research, i.e. Pawon Cave Block and Pasir Masigit block, each divided into cliff and plateau zone. Quadratic method used for vegetation analysis. The squared size used is 2 x 2 m². Correlation between plant communities and environmental factors measured with multivariate analysis using CCA. There are 68 species of plant found in Pawon Cave Block and Gunung Masigit Block. Diversity Value Index (H') in this location is 2.98. This value showed that the species diversity in this region is high. From the results of the canonical correspondence analysis (CCA), altitude and elevation of land affect the distribution of plant community and vegetation.

CCA, community, karst, vegetation

**BP-13**

Fruits and seeds characteristic of selected species of Mt. Kerinci, Sumatra, Indonesia

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An expedition to Mt Kerinci, Sumatra, Indonesia has been conducted between 18 September and 2 October 2017. The aim of the expedition was to collect fruits and seeds of selected species of Mount Kerinci. The seed will be conserved in Bogor Botanic Garden Seed Bank as part of seed conservation program. Purposive sampling was used during the search of targeted tree plants, environment data, as well as plants data and population, were taken. The fruits and seeds were processed on the field and further processes were conducted following Kew Millennium Seed Bank's guidance. Thirty-two numbers of species were collected from the altitude of 1,702 up to 2,193 m asl. equipped with herbarium for identification. The seeds were orthodox seeds that able to be stored on prolonged time. The expedition was funded by Garfield Weston Global Tree Seed Bank Project as a collaboration between Botanic Gardens Kew and Centre for Plant Conservation Botanic Gardens (Bogor Botanic Gardens).

Orthodox seed, plant conservation, seed bank

**BP-14**

Diversity of macroscopic fungi at Arboretum Universitas Padjadjaran Jatinangor, West Java, Indonesia

Betty Mayawatie Marzuki¹, Afif Makarim L.

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This research was conducted to find out the diversity of macrofungi that grow in Jatinangor Arboretum of the University of Padjadjaran (Unpad), Sumedang, West Java, Indonesia. Jatinangor Arboretum has environmental...
conditions such as natural forests, where the environment is moist, filled with litter and decayed wood and awake and not disturbed by human activities. Such environmental conditions are excellent for the growth and development of macroscopic fungi. The method used in this research is by the method of cruising on each zone in Jatinangor Arboretum. There are 4 zones in Jatinangor Arboretum, namely rare plant zone, industrial plant zone, rice field zone and rural zone. 50 species found in rare plant zones, 12 species in industrial plant zones, 2 species in the rice field zone, and 12 species in rural zones with a total of 60 species. The most common species are Cyathus striatus with an attendance of 8 times.

Arboretum, diversity, macroscopic mushroom, University of Padjadjaran

**BP-15**

Structure of cliffs vegetation at Mt. Pabeasan (Cliff 125) Citatah Karst, West Java, Indonesia

Teguh Husodo*, Parikesit, Radiktya Akasah, Nurullia Fitrani, Karyono

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Cliffs provide unique habitats for many specialized organisms. Topography, climate condition and soil characteristic at cliff influences vegetation formation and structure. Mt. Pabeasan (Cliff 125) located in Citatah karst, West Java, Indonesia. This cliff has a different type of rock formation like slab, face, and overhang. A variety of plant growing on this cliff. The plant survey was conducted using three horizontal transects. On each transect, 18 sampling plot of 2 x 1 m² were established randomly. Correlation between plant communities and environmental factors measured with multivariate analysis using CCA. There are 64 plant species from 27 families were recorded at Mt. Pabeasan. The recorded plant species consisted of 55 vascular plant species and 9 species of pteridophytes. The result showed that Branchiaria eruciformis is dominant plant species in each transect. Important value index for this species is 93.46. Canonical correspondence analysis (CCA) showed that depth of substrate is the most influential environmental factor for distribution and formation of vegetation at Mt. Pabeasan.

Cliff, plant structure, environmental factor, CCA

**BP-16**

Caught fish species diversity of South Morotai, North Maluku, Indonesia

Wildan Ahmad Nabil1*, Imroatul Habibah1, Aryochepridho2, Trijoko3

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South Morotai is a part of Morotai Island, in North Maluku archipelago, eastern Indonesia with high fisheries potential such as fish, sea cucumbers, crabs, shrimp, and algae. Research on fish diversity in South Morotai is needed because there is no sufficient data and information about the potential of Morotai Island marine fisheries. The goal of this research was to collect data on fish species in Morotai, especially South Morotai. This research was conducted by survey on caught fish by local fishermen on July 2017. Result showed that there were 23 species of fish belong to 14 families found in the survey, with the highest diversity belonged to Scaridae family (4 species). Serranidae and Acanthuridae have 3 species each. Balistidae and Labridae have 2 species each. 1 species were identified from each family of Rachycentridae, Lethrinidae, Lutjanidae, Sphyraenidae, and Mullidae.

Caught fish species, diversity, North Maluku, South Morotai

**BP-17**

Orchid exploration in Bintan Island, Riau Archipelago, Indonesia

Dwi Murti Puspitaningtyas


Sumatra is one of the main islands in Indonesia. The biodiversity is higher than Java, but still below compare to Borneo and New Guinea. More less, 1118 species of orchids are found growing in Sumatra, which 41% of these are endemic to Sumatra. The exploration activities were conducted at "Gunung Bintan Besar" Forest Protection, Bintan Island, Sumatra. Orchid exploration was conducted in this area to collect living plants for ex situ conservation purpose. Orchid inventory to record orchid diversity in this area, based on plant collection by purposive random sampling. The results of the study recorded approximately 23 orchid collection numbers found in that area. These were representative of 15 genera and consisted of 14 species of epiphyte orchids and 9 species of terrestrial orchids. Mostly orchids found in this area are lowland orchid which is very common growing in Sumatra. Dendrobium metachilinum Rchb.f. and Plocoglottis lowii Rchb.f. are unique orchid species found in this island.

**BP-15**

Structure of cliffs vegetation at Mt. Pabeasan (Cliff 125) Citatah Karst, West Java, Indonesia

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Cliff, plant structure, environmental factor, CCA

**BP-16**

Caught fish species diversity of South Morotai, North Maluku, Indonesia

Wildan Ahmad Nabil1*, Imroatul Habibah1, Aryochepridho2, Trijoko3

1Faculty of Biology, Universitas Gadjah Mada, Jl. Teknika Selatan, Sekip Utara, Bulaksumur, Depok, Sleman 55281, Yogyakarta, Indonesia. Tel./fax.: +62-274-580839, *email: wildananb@gmail.com
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Caught fish species, diversity, North Maluku, South Morotai

**BP-17**

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Bintan Island, exploration, inventory, orchid

**BP-18**

**Identification and life cycle of marine leech isolated from hybrid grouper under laboratory conditions**

Ketut Mahardika*, Indah Mastuti, Sudewi, Zafran

The aims of this study were to identify and to determine life cycle of marine leech under laboratory conditions. Marine leeches were isolated from hybrid grouper "cantik" (Epinephelus fuscoguttatus ♀ x E. polypephakdion ♂). Observation of the life cycle of the marine leech was done using a petri-dish (diameter 9 cm) with two groups. In group 1, the petri-dish was filled with sterile seawater (with daily water change) and the other group was filled with continuous running water. Results of blast homology analysis exhibited that the amino acid sequence of the marine leech isolated from hybrid grouper "cantik" showed high similarity (99%) with Zeylanicobdella arugamensis. One adult leech could produce 1-63 eggs. The eggs were developed into morula, blastula, and gastrula on day-3. The early phase of embryo with daily water change treatment was started on day-6, and hatch into larvae on day-10. Meanwhile, the eggs incubated with continuous running water were hatched faster (8 days). However, not all eggs were hatch at the same time, some of them were hatched 1-3 days later. Hatching rate of eggs varied from 2.70-100%. The newly hatched Z. arugamensis larva has a transparent color and length of 1-1.5 mm. On day-6, Z. arugamensis larvae were already seen to attach to the body of the fish. The size of the larvae was reached to 3-11 mm on day-9. In that stage, they were able to produce eggs. Therefore, we could state that Z. arugamensis required 17-22 days to develop into the adult stage.

Hybrid grouper “cantik”, life cycle, marine leech, Zeylanicobdella arugamensis

**BP-19**

**Dispersion and density of Javan Gibbon (Hylobates moloch) population in three habitat types of Gunung Halimun Salak National Park, Western Java, Indonesia: Resort Cikaniki, Corridor of Halimun-Salak and Gunung Gagak**

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Javan Gibbon (Hylobates moloch) is a flagship species in Taman Nasional Gunung Halimun Salak (TNGHS), western Java, Indonesia. Their presence was limited because of its habitat quality and quantity. TNGHS has a gap that separates Mount Halimun and Salak. The influence of gap to gibbon dispersion and density has not known yet, while TNGHS management was trying to build corridor forest for continuing Mount Halimun and Salak. This research aim to analysis distribution and density of Javan Gibbon in three habitat types of TNGHS, and analysis biotic and abiotic habitat factors there for becoming baseline data to build corridor forest. For estimating distribution and density of Javan Gibbon, is used line transect perpendicular distance and for analysis, habitat use trekking, plot quadrat, and spatial analysis with Citra Spot 5, Digital Elevation Model (DEM), roadmap, stream map, and resident map around TNGHS. The result is gibbon presence show clumped dispersion in forest area. The number of Javan gibbon in Cikaniki, KHS, and Mount Gagak are 10, 7, and 0 individual, and the density of Javan gibbon is 19; 31; 0 ind./km². Javan Gibbon habitat in Cikaniki is better than others based trekking and plot quadrat. Spatial analysis found suitability Javan gibbon area on gap is 15,30%. Therefore, habitat in gap of Halimun-Salak is not suitable for Javan Gibbon habitat.

Abundance, distribution, habitat, Hylobates moloch

**BP-20**

**Behavioural and ranging changes in orang-utans (Pongo pygmaeus wurmbii) in an area affected by the 2015 forest fires in Central Kalimantan, Indonesia**

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The damage from the 2015 forest fires in Indonesia has not yet been assessed, but these are thought to have destroyed about 5,780 km², 8% forest loss, within the province of Central Kalimantan, Indonesia. Displacement of individuals after this period of habitat destruction in The Sabangau Forest may be contributing to an initial rise in population density, with negative consequences including compromised habitat quality, overcrowding, and a potential breach of carrying capacity. Analysis of ranging and behavioral data from Pongo pygmaeus wurmbii individuals in The Sabangau Forest before and after the fires of 2015, reveals the changes in individual forest use that underpin changes to the size and health of the overall population. In addition, nest survey data reveals changes to the density of orang-utans in an area heavily affected by the 2015 fires. The research presented allows long-term projections about what the future holds for Bornean Orangutans, if action is not taken to mitigate further burning of their habitat, helping to understand and emphasize that taking action is critical.
Relation of riparian vegetation composition on water temperature in Lake Hanjalutung, Central Kalimantan, Indonesia

I Gusti Ayu Agung Pradnya Paramitha*, Riky Kurniawan

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Relation of riparian vegetation composition on water temperature in Lake Hanjalutung, Central Kalimantan, Indonesia was studied. Riparian vegetation plays an important role in maintaining the aquatic ecosystem balance. In Lake Hanjalutung, lost vegetation components can cause sedimentation and change the microhabitat in the lake. This study aims to determine riparian vegetation composition and its relation to water temperature in oxbow lake, Hanjalutung. The study was conducted in April 2016 (wet season) and July 2017 (drought season). Data collection of vegetation was conducted at 3 stations: St. 1 (upstream), St. 3 (the middle), and St. 5 (downstream). Vegetation data were collected by using a survey method with a 20-meter long transect line length drawn from the edge of the lake. The results showed that there were 30 species belong to 21 riparian vegetation families. Patanak species (*Timonius flavescens*) dominate Lake Hanjalutung riparian zone with 289 individuals found throughout the sampling site. Station 5 (downstream) has the largest number of individual riparian vegetation (369 individuals).

Water temperature in Lake Hanjalutung is still within normal range, with an average temperature of 28.85°C in wet season and 29.53°C in drought season. The results of this study can be used as basic information in the lake management system.

Lake Hanjalutung, riparian vegetation, water temperature

Extremophiles in Indonesia: A mini-review

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Extremophiles are organisms found living in extreme environment that are usually considered unbearably fatal. Extremophile classification is defined by the environment's condition where it thrives such as temperature (hyperthermophile and psychrophile), pH (acidiophile and alkaliophile), and salinity (halophile). Indonesia which has diverse environments shows promising variations and even novel species of extremophiles. The purpose of this review is to provide and compile information regarding discovered extremophiles in Indonesia. The discovered extremophiles in Indonesia mostly show similarity towards known species even though some of them are considered as novel species. Nonetheless, research on Indonesian extremophiles is still lacking in general. Due to the unique characteristic extremophiles exhibit, they may provide novel potential applications in biotechnology and medical aspects, such as the ability to produce proteolytic enzyme in a new species which is closely related to Halomonadaceae found in Bledug Kuwu-mud volcano. Therefore, more researches are encouraged for extremophiles discovery in Indonesia.

Biotechnology, extremophile, Indonesia

Mapping diversity of corticolous lichen in Kamojang, Bandung, West Java, Indonesia

Muhammad Feaisal Jatnika*, Joko Kusmoro, Iin Supartinah Noer

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The study of diversity lichen was conducted between January and April 2016. Position of transect was made by using quick survey European Guidelines (EU) method with some modification for collect lichens. The Power House of Geothermal Power Plant was center point and 2 km line transect is spread into cardinal points (N, E, W, S). Every line transect had 0.25 km x 0.25 km plot at 0.5 km, 1 km, 1.5 km, and 2 km. Two of sampling trees in every plot was taken at near center of point on every plot and had size of circumference more than 40 cm. Each subplot (10 cm x 50 cm) was planted on 100 cm until 150 cm on base trunk's cardinal direction (N, E, W, S) which was used for observation of corticolous lichen and divided by into five grid (10 cm x10 cm). The diversity of lichen was analyzed by using EU method to get LDV (Lichen Diversity Value).

Mapping diversity of corticolous lichen was made by using MapInfo 11 and Surfer 9. It was analyzed that 75 species with 17 families were recorded. The highest diversity was in plot 0.5 km south of geothermal power plants whose the value 68.00 and the lowest was in plot 2 km west of geothermal power plants whose the value 12.00.

Diversity, European Guidelines, lichens corticolous, Lichen Diversity Value
The similarity of higher plants species between Pangandaran Nature Reserve-Wildlife Sanctuary’s Forest and Green Canyon’s Riverside Forest in Pangandaran District, West Java, Indonesia

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The research in Pangandaran District, West Java, Indonesia was conducted in September 2017. Survey method was used for collecting data. The Pangandaran Nature Reserve and Wildlife Sanctuary’s (NR-WS) forest was located in 17.9 km to the east from Pangandaran which has elevation 0-165 m asl. and the Green Canyon (GC) was located in 5.59 km to the southwest from Pangandaran which has elevation 13-83 m asl. The identification was conducted in Laboratory of Plant Taxonomy, Department of Biology, Padjadjaran University, Sumedang, West Java, Indonesia and the data was analyzed with Simpson’s Similarity Index to understand about similarity of plant community in two sites. The result of this research is that NR-WS’s forest has 116 species and GC’s forest has 117 species. It was concluded that the plant community in NR-WS Pangandaran and GC forest was not similar with Iss result was 20%. It was that of the community of NR-WS’s forest is more various than GC’s forest although they have same elevation, humidity is different, and GC areas are more productive for agriculture.

Pangandaran, similarity, Sorensen Similarity Index

An eco-friendly fishing model in North Gorontalo District of Gorontalo Province, Indonesia

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This research was conducted in North Gorontalo District, Gorontalo Province, Indonesia. Approach to arrange prospect of capture fisheries using survey method that is research instrument of data collection in the form of questionnaire and observes sheet. This research also applies directly applied method in field by taking sample from two sub-districts by choosing catcher fishing groups that are more representative of existing components. The representation of the fishermen’s area will be made a mentoring of the selected fisheries management. This research uses data collection techniques as follows: Instrument questionnaire is a list of questions in a structured instrument in exploring data and information from respondents; In deep question is directional and in-depth interviews conducted on key person about aspects of the problem under investigation; Focus group discussion is the technique of data collection through focus group discussions on the problem being faced; Observation is to observe directly in the field to the subjects that are part of the research problem; and Conducting direct assistance to fishermen groups who become pilots. Criteria for environmentally-friendly and sustainable fishing gear is high selectivity, does not damage habitat, does not endanger operator, produce high-quality fish, the resulting product does not endanger the consumer, by-catch low, no adverse impact on biodiversity, protected fish, socially acceptable, percentage of the size of captured fish, and use of fuel oil.

Fishing models, sustainable

Habitat structure of the endemic Bali Starling (Leucopsar rothschildi Stresemann) in Bali Barat National Park, Indonesia

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Tropical savannas and dry forests in Indonesia are important types of ecosystems which provide habitat to support various endemic wildlife including the Bali Starling (Leucopsar rothschildi Stresemann, 1912) which is mostly now restricted to Bali Barat National Park, Bali, Indonesia. Given the high extinction risk facing such species, conservation programmes are likely to require multidisciplinary approaches that address both the biological attributes of the species itself, as well as their habitat requirements. Regrettably, for many species, their habitat ecology remains inadequately understood. The objectives of this presentation are to (i) characterize the habitat of the Bali starling in terms of vegetation structure and floristic composition; and (ii) document evidence of vegetation cover changes in Bali Barat National Park. Analysis of remote sensing imagery as well as field sampling of vegetation attributes was conducted to address these objectives. Normalized Difference Vegetation Index (NDVI) was calculated from Landsat imagery using red and near-infrared bands. Tree cover percentage data was obtained from Vegetation Continuous Fields (VCF) product from the University of Maryland. Results showed that forest and savanna are the dominant land cover types in Bali Barat National Park but their distribution is somewhat dynamic with changes in vegetation cover and greenness found across the years in which increasing cover
of woody plants is the general trend. In Bali Barat National Park, the Bali Starling is mostly found at or near distinct vegetation boundaries, such as the border between savanna-forest; savanna-cropland; savanna-shrubland; settlement-cropland; and forest-shrubland. These results further confirm the importance of examining habitat patterns of endemic bird within a landscape that are influenced by multiple factors that interact in space and time. Addressing data shortage in habitat patterns within endemic species distribution is important for conservation managers developing conservation management strategies.

Habitat suitability, species distribution model, tropical savanna, *Leucopsar rothschildi*

**CO-05**

**The comparison of aboveground carbon storage between cocoa-based Agroforestry System (AFS) and cocoa monoculture practice in West Sumatra, Indonesia**

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One of the biggest cause of climate change is deforestation for agricultural purpose. Therefore, Agroforestry System (AFS) is regarded as benign approach to reduce pressure on natural forest while still meeting the needs of local communities. West Sumatra, Indonesia, is commonly developing small-scale AFS with cocoa (*Theobroma cacao* L.) as one of main commodities. However lately there has been a tendency to intensify cocoa-based AFS with an indicator of reduced shade trees so that it leads to monoculture practice. While there have been many studies demonstrated the benefits of agroforestry over monoculture, there has not been much research looking at the comparison of carbon storage to cocoa-based AFS with different types and levels of canopy cover, particularly in West Sumatra. This study aims to compare aboveground carbon storage of three types of cocoa-based AFS developed in West Sumatra; (i) Cocoa-Rubber (CR), (ii) Cocoa Multistrata (CM), (iii) Cocoa-Coconut (CC) with monoculture practice. Using replicated nested plot design, data were collected in April-June 2017 in Pasaman District for CR and CM and Padang Pariaman District for CC and monoculture. Biomass of cacao and shade trees and saplings were determined using allometric equations. The highest total of aboveground biomass and carbon storage is CM (an average of 474.26 Mg.ha⁻¹ containing 237.13 MgC.ha⁻¹ respectively). The lowest total of aboveground biomass and carbon storage is monoculture (an average of 43.91 Mg.ha⁻¹ containing 21.96 MgC.ha⁻¹ respectively).

Cacao-based AFS in West Sumatra has the potential of contributing to carbon storage by increasing the stocking density of shade trees to recommended levels.

**CO-06**

**Socioecological study of talun system in the proposed geopark site in Pangandaran District, West Java, Indonesia**

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Traditional and modernized agricultural production systems developed by humankind under the influence of biophysical and social conditions often result in heterogeneous landscape. The production landscape in the humid tropics Indonesia consists of various components that exhibit different pattern of vegetational structures. This has resulted in different magnitude in terms of biomass energy contribution for domestic uses. *Talun* is among the existing landscape components that exhibit distinct structural patterns of vegetation. To date, bioecological information of this man-made vegetation and its multidimensional functions is limited. Yet, this multi-layered agroforest has been playing an important role for the local inhabitants. This paper to elucidates the multidimensional functions of *talun* and factors affecting the distribution of plant species found in this system. In many areas of West Java, the *talun* system appears as multi-layered agroforest and its diverse species composition is very important habitat for various organisms living in the agricultural landscape. The existence of *talun* system in production landscape represents the evolutionary development of local knowledge in the formation of artificial vegetation. The structural vegetation pattern of *talun* is the result of management practices through the processes of introduction, domestication, and selection of plant species performed by the owners.

Agroforest, socioecology, *talun* system, vegetation structure

**CO-07**

**Conservation of butterfly diversity in agroforestry ecotone habitats of urban landscapes in India**

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Conservation of butterfly diversity in agroforestry ecotone habitats of urban landscapes in India.
Rapid loss of biodiversity due to urbanization is estimated to be between 1,000 and 10,000 times higher than the natural extinction rate. With only 2.4% of world’s land area, India accounts for 7-8% of all recorded species, of which 4.95% area is under various degrees of protection. As it is very challenging to increase area under forest cover, urban/semi-urban landscapes provide good opportunity to boost biodiversity conservation efforts. Urban/semi-urban landscapes provide an interspersed matrix of various habitats connected with ecotone areas which serve as corridors between island habitats. Butterfly sampling conducted in five habitats (grasslands, mixed scrub forest, plantations, agriculture and botanical garden) in a semi-urban landscape near Delhi, India encountered a total of 1,237 individuals of 37 butterfly species belonging to 29 genera under five families. Inventory completeness was approx. 55% of estimated butterfly species richness which is considered as ‘reasonable’ for taking conservation decisions. Highest species richness was recorded in heterogeneous habitats while least in homogeneous habitats. Generalist species were abundant in open habitats like Agricultural Lands and Mixed Scrub Forest while specialist species were restricted to habitats like Plantations and Botanical Garden. Observations were also taken on their feeding habits and diurnal activity patterns. This result suggests that decrease in green areas (agriculture and forests) associated with increased urban areas and roads negatively influence species composition. The role of rapid assessments and butterflies as model taxa in selecting and prioritizing areas and planning conservation strategies in remnant urban/semi-urban ecotone habitats will be discussed.

Butterflies, conservation, ecotone, inventory completeness, urban landscapes

**CO-08**

Utilization of methanotroph bacteria to reduce methane emission from palm oil (*Elaeis guineensis*) oil waste

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Palm oil (*Elaeis guineensis* Jacq.) is one of the largest oil-producing plants in Indonesia. However, the results of palm oil processing into oil has a negative effect, namely the creation of methane gas. As we know that methane gas is one of the greenhouse gases effect gas. This greenhouse gas is causing global warming. To reduce the impact of global warming, this requires a new breakthrough in order to reduce the levels of methane gas in nature. One of the breakthroughs is to use methanotrophic bacteria. This methanotrophic bacteria can be isolated from rice fields or what I do in this research is to directly isolated from the palm oil liquid waste. From the 13 isolate isolated it is known that the 5th isolate has the greatest ability to distill the methane compound into methanol. It is known based on the results of pMMO test using spectrophotometer at 481 nm wavelength, at 5th isolate we can conclude that the concentration of the bacteria is 0.154 M. Where the other isolates have a range of concentration values from 0.078 to 0.139 M. Regression values obtained from the standard curve is 0.99.

Methane, methanotroph bacteria, palm oil waste, pMMO, spectrophotometer

**CO-09**

Seagrass meadows of Leuweung Sancang Nature Reserve, Garut, Indonesia, and their role in blue carbon storage

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Seagrass meadows are important ecosystems known to store significant amounts of coastal and marine carbon, or “blue carbon”. The conservation of these carbon sinks is important in the effort to mitigate global climate change. Leuweung Sancang Nature Reserve (LSNR) is one of the last coastal and lowland conservation sites in Garut, West Java, Indonesia. In this study, we describe the current condition of the seagrass meadows of LSNR and estimate the amount of carbon stored in these ecosystems. Field data were collected from three coastal sites within LSNR, i.e., in the western, central and eastern parts. Sampling for seagrass species composition, density, and biomass, as well as substrate, was conducted using quadrat plots measuring (0.5x0.5) m². Two species were recorded and found in all three sites, i.e., *Thalassia hemprichii* and *Cymodocea rotundata*. Despite low species richness, seagrass at these sites cover a large areal extent and form relatively dense meadows. In general, *C. rotundata* exhibited higher density and cover. Average aboveground carbon stock of *T. hemprichii* and *C. rotundata* measured respectively (6.24 +/-2.2) and (6.53 +/-2.0) g C m². Complete results will be presented and compared to data from other coastal areas of Java, and Indonesia in general.

Blue carbon, carbon stock, Leuweung Sancang, seagrass

**CO-10**

Vulnerability of mangroves to insect leaf herbivory: Study on habitat adaptation for climate change management

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Intertidal mangrove ecosystems are sensitive to climate change impacts, particularly to associated relative sea level rise, although other climate change factors will also exert a strong influence on wetland communities. To investigate vulnerability status, preliminary study of vulnerability condition of mangrove plants to herbivorous insects (diversity and composition dynamics of herbivorous insects) were combined with the correlation between the abundance of herbivorous insects and the level of mangrove leaf damage. We observed mangrove habitats located adjacent to Water Reservoirs (WR), Aquacultures (AQ) and Coastal Areas (CA), at Rhizophora zonation. In mangroves Rhizophora in East Coast Wonorejo, Surabaya, Indonesia herbivorous insects are found to be less than 25% of the total mangrove insects present, mostly found in WR only by 18% of total insects. The diversity of herbivorous insects tend to be low, with the highest levels of diversity found in the WR (H’=1.13) than the other two sites, namely AQ and CA (H’=0.95 and 1.11, respectively). WR habitat showed significantly higher in species composition and abundance (F=247.5; P<0.001) than other habitats. WR was more commonly found Allocoris pulicaria and Harmonia axyridis, while AQ was Harmonia axyridis. The leaf damage level in the WR habitat was significantly higher than for the other two habitats (F=9.15; P<0.001). There was a significant correlation between the level of leaf damage and the abundance of herbivorous insects, especially in WR and CA habitats (P=0.017 and P<0.001, respectively). Estimates relating to the adaptation of habitat, WR habitat are more susceptible to damage by insect herbivores than other two habitats.

Climate change, habitat adaptation, mangroves

**CO-12**

**The abundance and distribution of Arbuscular Mycorrhiza Fungi (AMF) in agricultural soil of Oransbari, South Manokwari, Papua, Indonesia**

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Arbuscular mycorrhizal fungi (AMF) are ubiquitous in soil and play a key role in agricultural soil especially in enhancing soil nutrient availability in phosphorus-deficient soils. The objective of this study was to assess the abundance, distribution, and type of AMF in some agricultural soil and crops in Oransbari, South Manokwari, West Papua, Indonesia. Composite soil and root samples were taken from the rhizosphere of nine crops (0-20 cm depth) at seven agricultural soil. The wet sieving technique was used to assess the number of AMF spores in the soil, while the percentage of root colonized by AMF used gridlines method, some soil characteristics were also analyzed. The result shows that, the number of AMF spores ranged from 5-31 spores/50 grams soil with the highest found in the rhizosphere of tomatoes crop. All crops were colonized by AMF which ranged from 15.3-96.66%. However, the high number of spores in the rhizosphere did not correlate with the high percentage of root colonized by AMF of plants. There were four morphotypes of AMF found across the 9 agricultural crops grown in agricultural soil i.e. *Glomus* sp., *Acaulospora* sp., *Scutellospora* sp. and *Gigaspora* sp. The low number of spores in the soil are due to the land use patterns and soil characteristics (low of some soil nutrients) and plant cultivation technique.

**CO-11**

**Reduction of organic matter and pathogenic microorganisms in the leachate of landfill using Paramecium sp.**

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Leachate contamination from the landfill becomes one of the most problematic environmental issues due to the risks posed to the environment and the human health. Elimination of the leachate contaminants from the environment is thus challenging. A research about leachate biotreatment using Paramaecium sp. has been conducted. This aimed to investigate the effectivity of the biological agent, the protozoa, on Coliform and organics reduction in the leachate. The leachate was collected from the Rajamandala landfill, in Bandung Barat District. The experimental set up consisted of three concentration levels, i.e., 20 mL/L, 30 mL/L and 40 mL/L and was prepared in three replicates. The tests were carried out for 2 day-period for total Coliform elimination, and 14 day-period for BOD treatment. The tests indicated that Paramecium sp. was reliable to reduce the total Coliform and BOD from the leachate. The highest reduction of BOD occurred in the unit of 30 mL/L (about 34.16%); while for the total Coliform, it happened in the same unit with 99% of bacteria elimination. It is, therefore, worthy to consider the application of Paramecium sp. in the landfill wastewater treatment system.

**Biotreatment, BOD, coliform, leachate, Paramecium**
CO-13

Landscape water table level impacts on palm oil (Elaeis guineensis) growth and soil properties on tropical peatland

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Palm oil (Elaeis guineensis Jacq.) plantation is strong driver of economic in Indonesia, however, there are large environment impacts issued. Rapid expansion of peatland land cover changes into large Palm oil plantation in Indonesia raises serious concerns about deforestation and forest degradation, loss of biodiversity, and largely to greenhouse gas emissions (GHG) impacted both from the deforestation and land-use changes. However, less attention was given to the possible environmental impact affected by the hydrological management in the field. Hydrology restoration on peatland should be made to reduce palm oil plantation development on environment responses, yet the impacts on palm oil plant growth are still questioned. This study aims to examine the effects of increasing water level to palm oil plant growths and some soil properties on peatland. Water level within palm oil drainage ditches was set up to 60, 50, 40, 30, and 20 cm by establishing waterflow dams that maintaining the maximum water level in drought on each plot. Palm oil growths were measured involving dry and rainy season of the year 2016-2017. Investigation on the impacts of the increasing water level on palm oil growth and production show significant effects on some growth variables of the plants. Some soil properties were shifted when water table level changes

CO2 respiration, palm oil plantation, tropical peatland, water table levels

CO-14

The characteristics of nest arboreal insect Ordo Hymenoptera at Coffea robusta plantation in Lahat District, South Sumatra, Indonesia

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The diversity of the nests of each type of insect Hymenoptera Order correlates with environmental conditions and their habitat. The diversity of insect nest between palm plantation habitat is different from robusta coffee plantation in Pajar Bulan sub-district, Lahat regency. This research was conducted in June-August 2017, aiming to find out the ecology of arboreal insect nest of Hymenoptera Order on robusta coffee plantation. This research methodology used survey approach with line transect method on right - left of observation line. Nest sampling with nonprobability purposive sampling technique with 4 sample with 5, 10, 15, and 20 years old and nest sampling using Henry and King nomograms. Analysis of ecological data of the nest includes; (i) biotic and abiotic components, identification (morphometric), (ii) observation of nest characteristics including elevation, location, and size (length, width, and circumference); and (iii) observation of nest components and materials. The results found 14 nests, divided into 7 species of arboreal insects Hymenoptera Order. On observation of nest growth patterns for 6 weeks, the nest growing species in the form of increasing size were black ants (Dolichoderus thoraciuss), small black ants, wasps endas (Vespula maculata), wasps yellow jacket (Vespula squamosa), and wasps (Vespia crobro). While the insects with the growing number of nests is the ant rangrang (Ochephylla smaragdina). The average growth of the highest nest per week is in the black ant species (Dolichoderus thoracius) with an average of two cm/week. Characteristics and components of nesting on robusta coffee plantations of various shapes such as round, oval, cone, and parallelogram. The nest component is made up of cardboard, wood, and leaf material. Insect nest found in coffee trees with leaf condition and high stems

Arboreal nest, Hymenoptera, insect robusta coffee plantation

CO-15

The biodiversity stands on production natural forest in TPTII Silvicultural System

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The research was carried out in working area UPHH KPT. Suka Jaya Makmur, Ketapang District, West Kalimantan Province, Indonesia. Growth of meranti (Shorea leprosula) is predicted to reach the first cycle at the age of 25 years of age, with a diameter increment reached 1.67 cm/yr, with an average diameter of 41.83 cm and the productivity reached 91.79 m3/ha. The potential total production of 255.34 m3/ha of TPTII higher than TPTI which only had the potential value of production amounting to 192.43 m3/ha. Meranti plant stand structure resembles the forest plantations spread diameter bell-shaped curve, while the residual stand
structure following the pattern of distribution of natural forests inverted J-shaped curve. Decrease in diversity is shown from the community similarity index (IS) value. The diversity index (H') were variation value, generally were same higher value at TPTII, TPTI and Virgin Forest. Land degradation can be seen from some of the parameters of chemical properties, soil physics and biology. Soil characteristics at different TPTII logged over area, TPTI logged over area and Virgin Forest, TPTII silvicultural systems have advantages in terms of timber production potential, but has the disadvantage of the soil quality.

Diversity, productivity, Shorea leprosula, soil quality, TPTII

CO-16
Level of eating ability from caterpillar Setothosea Asigna Van Ecke (Lepidoptera: Limacodidae) on palm oil plants
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Caterpillars nettle are the most common pest insects attacking oil palms. Although not deadly plants, but these insect pests are very detrimental economically. Expensive palm oil leaves will greatly interfere with the process of photosynthesis of oil palm plants, which in turn will reduce the productivity of oil palm. The study on the ability to eat the caterpillar (Setothosea asigna Van Ecke.) in oil palm plant has been done in August 2016 in Biology Laboratory Faculty of Science and Technology of Raden Fatah State Islamic University of Palembang. This study aims to determine the ability to eat a caterpillar (Setothosea asigna) in oil palm plants. This quantitative research using Hand Collecting method is a direct retrieval method using the hand against the caterpillar, followed by experimental methods to see the ability to eat. Observation variables include the ability to eat caterpillars on oil palm crops and as supporting, data observed temperature and humidity. The results of research that has been done, it is found that the result of damage level caused by Setothosea asigna fire caterpillar on oil palm plant with the average amount of damage level reach 92.73%. The highest percentage of attack rates on the first and the lowest on the second crop.

Degree of damage, palm oil, Setothosea asigna

CP-01
Sustainable indicators of mangrove ecosystem management for tourism development at the
Maroon Mangrove Edupark, Semarang, Central Java, Indonesia

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Maroon Mangrove Ed-upark (MMEP) located adjacent to the Maron beach and Semarang airport (Central Java, Indonesia) and covered 1.5 ha area, has been threatened by abrasion. The park was developed since 2011 as a mangrove plantation area and in 2016 be announced as a new nature tourist destination at Semarang city with a purpose to raise awareness on coastal conservation through ecotourism development. The study aims to determine sustainable indicators for managing the park. Data were collected by conducting field survey and interviewing 61 respondents consist of 51 tourists and 10 key person. From the data collected, 23 indicators were applied to four variables of ecology (7 indicators), economy (5 indicators), social (7 indicators) and institutional (4 indicators). Sustainability indicators were examined by expert judgment using Likert scale and be analyzed by confirmatory factor analysis. The research found that correlation of important indicator from ecology variable extracted in three components, i.e., biodiversity conservation (37%), land use management (20.7%), and carrying capacity (14.6%). For economy, variable relationship is extracted in two components, i.e., exploitation level (41.4%), and varying tourism asset (19.7%). Correlation of social variable is extracted in three components, i.e., participation and appreciation (39%), services (32.6%), and awareness and education (14.6%).

The institutional variable extracted in two components, i.e., collaboration and regulation (35.2%), and management capacity (31.2%). In sequence, important variable of sustainable mangrove management in the park are ecology, economy and institutional, social.

Factor analysis, mangrove, Maroon Mangrove Ed-upark, sustainability indicators

CP-02
Menjangan Besar Waters quality profile, Karimunjawa, Jepara District, Central Java Province, Indonesia

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The profile of water quality and sediment is a representation of the environmental conditions of an ecosystem so that it can be a guidance of conformity and environmental carrying capacity for marine life. The aim of this research is to know the waters quality profile of
Menjangan Besar, Karimunjawa Islands, Central Java Province, Indonesia in terms of nutrient content (N-NO₃ and P-PO₄) and abundance of Total Bacteria and Nitrification Bacteria (Nitrosomonas and Nitrobacter) of water and sediment. The research was conducted in May 2017 by using purposive sampling technique based on the waters environment characteristics under study. Station A is the waters of Karamba location, Station B location of floating homestay and C station karamba seaweed location. The results showed that Nitrification Bacteria content in sediments had a low value when compared with Total Bacteria in the sediments. Total Bacteria content in both water and sediment varies between the location of the observation station. Station A has a higher Total Bacteria abundance value than on other stations. The nutrient content (nitrate and phosphate) is still above the Quality Standard for Marine Biota. The condition of the water quality of Menjangan Besar is oligotrophic tend to mesotrophic, in the sense that the quality of the waters in low to medium conditions, and not yet dangerous for marine biota.

Bacteria, Karimunjawa, Menjangan Besar, nitrate, phosphate

Estimating carbon stocks of sediment on the seagrass ecosystems in Bonetambung Island, Makassar, Indonesia

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Seagrass ecosystem is one of the aquatic ecosystems which has the ability to absorb CO₂ gas in the atmosphere through photosynthesis process then stored in the form of biomass which is then forwarded into the sediment where the seagrass is grown. This study aims to estimate the carbon stock of sediments in the seagrass ecosystem in Bonetambung Island, Makassar, South Sulawesi, Indonesia. Sediment collection is carried out in the seagrass beds area using 5 cm diameter core sediment and depth up to 30 cm. The seagrass cover area is obtained from Landsat-8 satellite image analysis and analysis of carbon content of sediments using Walkley & Black method. The result of Landsat-8 image analysis is found that the extent of seagrass ecosystem cover on Bonetambung Island is 14.18 ha, which is found 4 categories of seagrass cover; very solid (0.2 ha), solid (0.7 ha), medium (6 ha) and rare (7 ha). The result of sediment sampling analysis obtained on Bonetambung Island is dominated by carbonate sediment type with two basic substrate types, medium sand and coarse sand where the coarse sand type has higher carbon content than the medium sand. The average value of sediment carbon content in the seagrass ecosystem is 18.93 MgC/ha¹ at a depth of 0-30 cm. The sediment carbon stock in the seagrass area of Bonetambung Island is 268.42 MgC or equivalent to 1073.4 Mg CO₂. The results show that the seagrass ecosystem plays an important role in maintaining carbon stocks in the sea, so it needs to get attention for its conservation.

Bonetambung, carbon stock, seagrass, sediment

Ethnobotany and Socioeconomics

Ethnobotanical Study of “Pamona” Tribe in Poso District, Central Sulawesi, Indonesia

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Ethnobotanical research of Pamona tribe has been carried out from December 2016 to February 2017 at Buyumpondoli, Pamona Puselemba Sub-district, Poso District, Central Sulawesi, Indonesia. The research aimed to know the interaction between Pamona tribe and their environment especially plant biodiversity being used in their daily need. Basic data of ethnobotany such as traditional plant use in the village have been collected by using semi-structured interview. Key informants such as; traditional healers, village leader, customary leaders, religion leader, shepherds, craftspeople were selected who, because of their elder age, job, family tradition, or personal interest were most likely to have retained ethnobotanical knowledge. We applied a snowball sampling approach. All plants/voucher specimens were collected for identification purpose. Plant collecting was according to the "Schweinfurth method". The observation was included local names of plants, scientific name, family, habitus and traditional uses such; parts used, processing, when relevant harvesting time, recipes and even the time when of year plants were used. The interviews were recorded by audio recorders and notebooks. Photographs were also taken to
record information. Processing of the specimens was conducted at Laboratory of Biodiversity, Tadulako University, Palu, Indonesia. Data were analyzed quantitatively by using ICS (Index of Cultural Significance). We noted that there were 94 species consisting of 44 families were utilized by Pamona tribe. Thirty species were used as food, as medicine 30 species, as building material 11 species, 11 species for traditional rituals and 38 for others. The plant species that have highest ICS was “konau” (Arenga pinnata) and the lowest was “donato” (Clerodendrum sp.).

Central Sulawesi, ethnobotany, Pamona tribe, Poso

**DO-02**

**Ethnobotany study on community around Gunung Gandang Dewata, Mamasa, West Sulawesi, Indonesia**

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As the second highest mountain in Sulawesi, Gunung Gandang Dewata (Mamasa District, West Sulawesi, Indonesia) has a unique landscape with high flora and fauna potential. It is located in Mamasa, West Sulawesi. People around the area are using this natural resource to fulfill their daily needs. The purpose of this study is to determine the perception of the community around Gunung Gandang Dewata, in Dusun Rante Pongko, about the landscapes and plants utilization. The diversity of landscape and plants utilization was studied using interview method, Pebbles Distribution Methods (PDMs), and field survey. The community divides the landscape into 5 types, namely: pangala’ (forest), bela’ (garden), pa’belasan (former garden), uma (rice field), and patondokan (settlement). Rice field is the most important type of landscape for the community because it has benefits as a major food producer (rice). At least there are 181 species of plants that are used by the community and most used as food and firewood. The life of community in Dusun Rante Pongko still has a close relation and high dependence on the surrounding resources, especially with the existence of forest in Gunung Gandang Dewata.

Gunung Gandang Dewata, landscape, plant, utilization

**DO-03**

**Management of bamboo garden (talun bambu) by community Pangauban Village, Pacet Sub-district, Bandung District, West Java, Indonesia:**

Plants diversity and change of bamboo garden land use

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Bamboo garden (talun bambu) is one of traditional agroforestry in West Java, Indonesia which has multifunction. The function are ecologically, economically and socially. But, it is currently undergoing a rapid conversion process into various types of other land uses that are vulnerable to land degradation. The existence of bamboo garden needs to be maintained in order to remain sustainable. The purpose of this research is to know the diversity of plant species that are in the bamboo garden and know the modification of land use change of bamboo garden. The method in this research was used mix-methods with social-ecology approach through interview and observation to know the change of land use. Inventory, identification, and analysis of profile diagrams to know the species diversity as well as the structure of the vegetation community in the bamboo garden. The result of the research can be obtained 132 species of plants, which consist of 7 species of bamboo, 23 species of fruit plants, 23 species of woody plants, 7 species of vegetables, 6 species of ornamental plants and 66 species of weeds. Some owners still maintain the existence of bamboo garden and modify the bamboo garden into mixed gardens (multistoried inter-culture of perennial and annual/biennial crops or type of shelterbelt-type mixed garden).

Diversity, land use, management, bamboo garden, talun bambu

**DO-04**

**Ethnobotany of important medicinal plants growing as weed and their conservation**

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In developing countries, about 80% of the world population depends on traditional medicines for their primary health care as estimated by World Health Organization. There are
about 45,000 plants species in India of which 3,000 are of high medicinal value. In a floristic survey undertaken recently in Chithara village adjacent to Shiv Nadar University, India we recorded a very rich diversity of wild medicinal plants of ethnobotanical importance. Of a total 272 plant species growing as weeds viz., *Bacopa monnieri* (L.) Wettst. (*Water Hyssop, Indian Pennywort*), *Convolvulus prostratus* Forssk. (*Prostrate Bindweed*), *Eclipta prostrata* (L.) L. (*Trailing Eclipta*), *Tribulus terrestris* L. (*Puncture vine*) and *Withania somnifera* (L.) Dunal (*Indian Ginseng*) were highly abundant and very important traditional medicinal plants. For their medicinal properties these plants are well-known in Indian system of medicines and are of high traditional value to indigenous people. The paper will discuss in detail about their traditional/folk knowledge, medicinal properties, plant parts used, diseases treated/cured and their cultivation practices from economic and conservation perspective.

Conservation, ethnobotany, medicinal plants, medicinal properties, traditional/folk knowledge

**DO-05**
Feasibility study and carrying capacity of Lake Batur ecosystem to preserve tilapia fish farming in Bali, Indonesia

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Lake Batur in Bangli District, Bali, Indonesia has potential for fishery development up to 82 ha (5%). Present its scale is about 6.28 ha, hence the extra investment opportunity is up to 75.72 ha. This research aims to evaluate the financial viability of tilapia fish farming with Floating Net Cages (FNC) technology and to assess its carrying capacity to preserve the biodiversity. Discounted investment criteria were used to test farm survey data from 30 fish farmers at top three villages (*Kedisan, Batur Tengah, and Songan B*) with the largest FNC plot. The six water samples, taken by using deep water sampler, were analyzed at Analytical Laboratory Udayana University. The results are (i) Tilapia fish farming with 9 plots and 7 years economic life of FNC is financially viable, indicated by NPV > 0, IRR > 9%, and Net B/C > 1; and (ii) The value of some parameters such as TDS, NO3, BOD, Total-P, NH3, and P-Pi were over the maximum limit of water quality criteria class II based on Government of Indonesia Regulation No. 82/2001. Even though it is financially viable, it should not be developed more within the lake due to the water quality is not suitable for fish farming extension. Advance research is very urgent to know the contributors of water pollution and find out the best solution.

Financial viability, floating net cages, Lake Batur, tilapia fish, water pollution

**DO-06**
Strategy of Baduy community, South Banten, Indonesia, to maintain practicing sustainable swidden farming by temporary migration to non-Baduy area

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Baduy people who live in forest village of Kanekes, Sub-district of Leuwidamar, District of Lebak, Banten, Indonesia have traditionally practiced the swidden farming for a long time, based on the traditional ecological knowledge and beliefs or cosmos. Unlike Sundanese ordinary, Baduy people have prohibited to cultivate the wet rice field system. In addition, in managing the swidden farming system, the Baduy people have prohibited to apply modern rice varieties, inorganic fertilizer, and synthetic pesticides. On the basis of the Baduy culture, the swidden rice has not been sold and put it in the rice barn for more than 50 years. The swidden rice has mainly used for daily home consumption and various traditional rituals. Nowadays, the Baduy swidden farming has been affected by many factors, particularly population increase and food demand increase, but the forest land to be used for practicing swidden farming is limiting. Therefore, to main the sustainability of the swidden farming system, the Baduy people, particularly Outer Baduy have developed special strategy. One of the cultural strategies that have been by Outer Baduy by conducting temporary out-migration (*nganjar*) to neighboring areas, non-Baduy areas or Muslim areas. The aim of the study was to analyze the cultural strategy of the Outer Baduy to maintain the sustainable swidden farming by temporary out-migration to non-Baduy or Muslim areas. Method used in this study was qualitative with ethnoecological approach. Several techniques were used in this study, namely observation, participant observation, and deep interview with competent informants that are purposively selected. The result of the study showed that until now the Other Baduy have maintained the sustainable swidden farming by various means, such as by conducting contemporary out-migration to non-Baduy area of the Muslim territory. They have obtained the swidden fields in non Baduy by some strategies, such land rent, share-cropping, providing labor to the land-owners, and even buying land.

Cultural strategy, outer Baduy, out-migration swidden farming
DO-07

The important role of small-scale farmers in maintaining biodiversity and strengthening local food security in Bali, Indonesia

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In general, the farming system in Bali, Indonesia is occupied by small-scale family farmers of who have lands, on average, less than one hectare. During the decade of 2003-2013, there was a significant decrease in the number of family farmers of which means that there was substantially shifted of lands from agriculture to non-agricultural purposes. The cost of living, lifestyles and skyrocketing of land prices are recognized as part of the causes of the reduction of the shifted lands. The small-scale farmers who grow different species of crops on small farms are essential in maintaining biodiversity. The decline of biodiversity is not just as a result of the depletion of agricultural land, also due to the tendency of the use of hybrid seeds to meet the needs of the rapid growth of the tourism sector. Another concern is that the intensive use of agro-chemicals to cultivate and protect the hybrid crops could kill living creatures that are important in maintaining the environment for sustainable agricultural farming systems. Those explanations indicate that the future local food security could be threatened. There is an initiative of different institutions to preserve local seeds mainly the extinct species by developing community or farmers’ seed bank. Strengthening small-scale farmers in the food chain system by developing environmentally friendly technologies is important.

Biodiversity, food security, seed bank, local seeds, small-scale farmer

DO-08

Text analysis of scientific publication of biodiversity in Indonesia: Indonesian researcher vs. foreign researchers

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The wealth of Indonesia’s Biodiversity resources is one of the largest in the world. This fact has been recognized since the state of Indonesia has not been established. The presence of the Dutch East Indies (VOC) in Indonesia itself is influenced by the wealth of spices in Indonesia. The process of seeking knowledge and exploration of biodiversity resources in Indonesia has begun with the establishment of several institutions in charge of research related to Indonesia’s natural resources such as Bogor Botanical Garden in 1817. In 2016, Handayani et al. has identify the output of biodiversity research in Indonesia based on scientific data-based publications indexed in Scopus. The search is based on the name “Class” recorded on seven “Kingdoms” in Taxonomy referenced from the Integrated Taxonomic Information System (ITIS) accessed through the website http://www.itis.gov/. Based on the research, the number of publications produced by researchers who affiliated abroad is greater than the number of publications from Indonesia affiliated. This fact can be explained by the large demand for foreign research application to Indonesia especially in biodiversity-related area of research. But it remains a big question as to what the different topics and areas of research are between the two, and how the gap of knowledge between the two groups is. This research will use co-word Analysis and Word Count to answer the question. This hope could be an evaluation of future policy and learning for biodiversity researchers in Indonesia.

Biodiversity, co-word analysis, scientific publication, scientometrics

DO-09

Ethnobotany of Smilax leucophylla in Namang Village, Central Bangka District, Bangka Belitung Archipelago Province, Indonesia

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Smilax leucophylla Blume (or akar kekembet) is a climbing plant, growing in the plantation of Bangka Island, including in Pelawan Biodiversity Park and surrounding areas. In this village, S. leucophylla has been used as one of handicraft materials and additional income to local people. The study aimed to reveal indigenous knowledge of local people on the utilization of S. leucophylla. The research was conducted by qualitative method; data collection was done by in-depth interview, observation, and literature study. The result of the research shows that the stem of this species can be used utilization as household appliance product such as sauki and suyak ikan. This household
product is still used nowadays and rarely replaced by plastic material. The local people also produced other woven handicraft such as key chain and household decoration.

Biodiversity Park, ethnobotany, handicraft, Namang Village, Smilax leucophylla

DO-10

Linking zoopharmacognosy with ethnomedication: An evidence base from Sebangau National Park, Central Kalimantan, Indonesia

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Zoopharmacognosy is the ability of animals to perform self-medication. This capability is performed by utilizing the plant secondary metabolite and/or component of the non-nutritional. It is suspected that this behavior is a long-term observation of orangutans’ behavior (Pongo pygmaeus wurmbii), by communities surround Sebangau National Park (SNP), Katingan District, Central Kalimantan, Indonesia as their ethnomedication practice. The treatment can be either prophylactic or therapeutic. Nowadays, many developing herbal treatment methods, but not yet much excavated empirical about the claims. This study aims to study the ability of orangutans to self-medicate in Sebangau ecosystem area. The research was conducted in Punggualas, SNP, 29 April to 3 October 2017. A total of 13 traditional healers (TH) from Karuing (n=4), Baun Bango (n=4) and Jahanjang (n=5) have been interviewed. All plants are listed and photograph. Plants parts and their mechanism of utilization was also kept for record. While the orangutan behavior followed the orangutan protocol, with focus of observation on feeding behavior. Target plants were collected, identified and documented, while the behavior of orangutans was recorded based on the orangutans’ observation protocol, on which focal activities were recorded every 2 minutes, including their social behavior. The observations will be terminated, if during follow, focal get outward the study grid. All data were analyzed descriptively. We have recorded a total 131 plants at various life-form, whereas in Baun Bango (n=59), Jahanjang (n=41) and Karuing (n=21). Plants that were found similar to three villages, removed from the list, so that altogether the plants listed were only 95. There were three focal orangutans been followed, consisting of two dominant male, namely Eboy and Sander, one individual female and infant. The results showed that two male individuals, did not show signs of self-medication behavior, feeding activity only in their natural diets (see the orangutan feed list). Meanwhile, the female individual, showing the behavior. It is characterized by selectively choosing young leaves of Karipak (Mezzetta sp.), pulp of the Pantung (Dyera lowii) and Kamasira (Ilex cymosa), the last to chew the entire Leaf Handipe leaves. Allegedly, this is a preventive measure against fatigue conditions, and the combination of these three plant species is assumed to be related to fitness. This study shows that there is a relationship between the plant part used by the traditional healer and the orang-utan (χ2 = 43.887; n = 115, df = 11, p-value = 0.0000), the relationship between the use of plant parts utilized by the traditional healer and orangutans (χ2 = 15.647; n = 50, df = 8, p-value = 0.0000). Furthermore, there is a relationship between the practice of traditional healer treatment using plant parts and Orang-utan (F1, 113 = 230.158; p-value = 0.000). The study urges to isolate secondary metabolites for further investigation, especially in terms of phytopharmacy.

Ethno-medicine, Katingan, Pongo pygmaeus wurmbii, Sebangau National Park, Zoopharmacognosy

DP-01

Ethnozoology of animal utilization as medicine by the people in Karangwangi Village, Cianjur District, West Java, Indonesia

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Rural people generally recognize a variety of animals not only as wildlife, but also as natural resources that can be utilized for various purposes every day. One of the uses is related to traditional medicine which is derived from animal raw material. Villages adjacent to forest areas, such as nature reserves, generally use animals as medicinal materials. Karangwangi Village, Cidaun Sub-district, Cianjur District, West Java, Indonesia is a village adjacent to the Bojonglarang Jayanti Nature Reserve area. This study aims to explore the knowledge of the community about the utilization of animals by the population as a medicine. The research method used is qualitative method is descriptive analytical. Technique of data collecting done by semi structured interview. Interview conducted to informant key. The results showed that residents in Karangwangi Village used animals as medicines such as Pteropus sp., Naja sp., Rodentia (Ordo), Trachypithecus sp., Lumbricus rubellus, Simiformes (infraordo), Varanus sp., Araneae (Ordo), Oecophylla sp., Cavia porcellus, Gekko gekko, Gekkonidae (Family), and Lacertilia (Upaordo). Local residents make the manufacture of drugs from animals as one of the livelihoods. Society knows the use of animals as a medicine, and the way of processing, for example, bile and blood Naja sp. eaten raw to treat stroke, asthma, and diabetes, as well as boiled Lumbricus rubellus to treat typhoid.
Ethnozoology, Karangwangi Village, medicine, people knowledge

**DP-02**

Value-added analysis of palm sugar processing: Case study of forest village community groups in Rongga and Gunung Halu Sub-districts, Bandung Barat District, Indonesia

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Palm sugar processing was one of the household industries that have been run for several years by farmers in Rongga and Gunung Halu Sub-districts, Bandung Barat District, West Java, Indonesia. Generally, the business activities are very simple. Farmers are using simple business calculation to run the activity, for example, they usually do not calculate labour as a cost, so that they do not know if their activity profitable or not. This study aimed to analyze the income earned from palm sugar processing and analyze the added-value derived from palm sugar processing. Data were analyzed using income, added value, and descriptive analysis. The results show that the total cost (TC) is greater than the total revenue (TR): Rp 42,415> Rp 37,108. This means that palm sugar processing in Rongga and Gunung Halu is not yet profitable. The added value of palm sugar processing is Rp 1,974, with the ratio of added value 0.42 (0.42> 0). This positive added value ratio means that the process has increased the value of the palm juice as the raw material for palm sugar. Palm sugar processing could be profitable and increase the socio-economic welfare of farmers if the business activity is managed effectively and efficiently.

Bandung Barat, community groups, palm sugar

**DP-03**

Analysis of environmental interpretation on the Maroon Mangrove Edupark, Semarang, Central Java, Indonesia

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Maroon Mangrove Edu-park (MMEP) is a new ecotourism destination at Semarang city, located adjacent to the Maron beach and Semarang airport (Central Java, Indonesia). As the name of edu-park, environmental interpretation is become an essential part for development and management of the park. Information about mangrove ecosystem and its functions could raise conservation awareness and stimulate a responsible tourist behavior. The research was conducted from May to Aug 2017, with the aims to identify availability of tourist information, tourist perception about information and to develop environmental interpretation programs in the park. The research used a descriptive approached method. Data were collected by observing the available information and by interviewing 50 visitors as well as conducting Focus Group Discussion (FGD) with 10 stakeholders of the park. The research exhibit information media available in the park are limited to board about mangrove species name, direction, mangrove planting history, ticketing, early history of the park and banning board from the airport area. Only 26.23% tourists recognize the place has name of edu-park, therefore 72.13% of tourist assert that the park lack of information. Although the park has limited personnel, 60.66% tourist states that services in the park are good. According to the road map of tourism development 2015-2020, environmental interpretation program would be developed by providing competent tour guides and upgrading the existing interpretation facilities.

Ecotourism, education, environmental interpretation, information

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**EO-01**

Decolorization of Remazol Brilliant Blue R by laccase of newly isolated *Leiotrametes flavida* strain ZUL62 Originally From Bangka Forest, Indonesia

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The objective of this research was to select the most potential fungal isolate with laccase activity and its capability in decolorization of synthetic dyes. The isolation of body fungal and wood decay samples were taken from six different location in heath forest of Bangka Belitung, Indonesia. In the present study, a total of 13 isolates were conducted the simultaneously screening process by indicator plate method and enzyme activity. The preliminary screening was done to screen ligninolytic fungi, then primary screening using various indicators compound was conducted to select fungal secreted laccase
enzyme. The enzyme activity was performed to select the best fungal isolate with the highest activity value. It was determined that the most potential fungi were belonged to Leiotrametes flavida Strain ZUL62, which had been confirmed by molecular identification with 5.8S rDNA/ITS analyses. In addition, the laccase from L. flavida Strain ZUL62 could decolorize synthetic dye using RBBR exhibited a high rate of decolorization rate of 62% without any mediator for 24 hours. To our best of knowledge, this study represented the first report about L. flavida Strain ZUL62 and its potential application in textile effluent treatment.

Decolorization, laccase, Leiotrametes flavida Strain ZUL62, RBBR, screening

**EO-02**

**Chemical compound and aphrodisiac of Syzygium aromaticum (clove) leaf extract**

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Clove (Syzygium aromaticum (L.) Merril & Perry) is a native Moluccas herb that have been used in many traditional remedies for a number of diseases. There are many varieties of S. aromaticum such as Zanzibar, Tuny (Sikotok), Sipikut and Raja. This study was to investigate the active compounds of S. aromaticum leaf extract used to treat diseases. Leaf of S. aromaticum was collected from Negeri Lima, Maluku, Indonesia. Samples were extracted using methanol and n-hexane solvent. The compound activities were determined using GCMS and spectrophotometry. S. aromaticum leaf extract were contained of 70.43% eugenol, 16.79% caryophyllene, 2.07% caryophyllene oxide, 3.05% longifolenaldehyde, 3.12% tetratetracontane, 5.74% phenol, 31.84% flavonoid, and 0.53% alkaid and steroid compound assay obtained <110 mg/kg. The extract of clove leaf indicates effectively to potential aphrodisiac compound.

Aphrodisiac, clove leaf extract, compound

**EO-03**

**Influence of brewed giving of red rosella calyx powder on HDL**

Sprague Dawley rat serum treated with waste cooking oil

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Waste cooking oil is a source of exogenous free radicals that can cause lipid metabolism disorders. Utilization of red rosella is known to the public as a brew of steaks that contain antioxidants. The purpose of this research is to analyze the effect of brewed giving of red rosella calyx on lipid metabolism disorder and oxidative stress condition in Sprague Dawley rat treated with waste cooking oil through HDL testing. The research method used is Completely Randomized Design (CRD). The sample consists of 24 male rats that were selected randomly and divided into 4 groups: negative control (without treatment), positive control (giving waste cooking oil of 8.92 meq/kg as much as 2 ml/kg BW), treatment 1 (giving waste cooking oil of 8.92 meq/kg as much as 2 ml/kg BW) and brewed giving of red rosella calyx dose of 540 mg/kg BW), and treatment 2 (giving waste cooking oil of 8.92 meq/kg as much as 2 ml/kg BW and brewed giving of red rosella calyx dose of 540 mg/kg BW). Research data are normally distributed (Levene test) and homogeneous (Shapiro-Wilk test). The results show the best value for the treatment of dosage brewed giving of 810 mg/kg BW; it is for HDL of 57.47 mg/dl. It can be concluded that brewed giving of red rosella calyx dose of 540 mg/kg BW (EC50 = 407.52 bp) and 810 mg/kg BW (EC50 = 247.82 bp) can increase HDL. It can be concluded that red rosella calyx can improve lipid profile (HDL) of Sprague Dawley rats treated with waste cooking oil.

Antioxidant, HDL, red rosella, waste cooking oil

**EO-04**

**DNA damage in human embryonic stem cells cultured on feeder-free conditions: The impact of cell density**

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The capability of human embryonic stem cells (hESC) to differentiate into all kind of cell types holds a very promising future for clinical applications. However, hESC's potential is hampered by the genetic aberrations which repeatedly reported in hESC. We investigated the correlation between cell density and DNA breaks in hESC kept in a feeder-free culture system. The experiments were conducted in two feeder-free systems, Laminin-521/NutriStem® and MatrigelTM/NutriStem®. We found that the feeder-free culturing systems induce fewer DNA

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damage in the cells as compared to the feeder-based system. Cell density also had no effects on DNA damage in feeder-free system while it did in feeder-based system.

Cell density, feeder-free, genetic aberrations, human embryonic stem cell

**EO-05**

Source of genetic aberrations in human embryonic stem cell: Common fragile sites and replication stress

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The capability of human embryonic stem cell (hESC) to form all cell types of the human body has made them highly attractive for therapeutic applications. Amongst others, the usefulness of hESC in therapeutic applications highly relies on their genomic integrity and stability. However, hESCs are well documented to frequently acquire genetic changes such as aneuploidies, segmental deletions or amplifications, epigenetic changes, and mitochondrial DNA mutations. This leads to safety concerns regarding the use of hESC in cell-based therapies. Certain genetic or epigenetic changes in hESC might lead not only to altered differentiation potential, but also increased proliferation capacity. A major concern is that, in vivo, this change might lead to tumorigenesis. These review will highlight the reported genetic aberrations found in human embryonic stem cell as a result of replication stress caused by naturally occurring common fragile sites in hESC.

Common fragile sites, genetic aberrations, human embryonic stem cells, replication stress

**EO-06**

Perception of synthetic biology application for biodiversity conservation among Life Science Students in Institut Teknologi Bandung, Indonesia

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The emerging science of synthetic biology uses advanced engineering and biological science to re-design living organisms to carry out specific function. Its application to biodiversity conservation seems promising yet barely addressed. Public perception of any emerging sciences and technologies should be studied, therefore this pilot study sought an insight to public perception of synthetic biology application to biodiversity conservation. As a pilot study, a web-based survey was designed for life science students in Institut Teknologi Bandung, Indonesia. Obtained responses were exported into Excel and analyzed using SPSS 16.0. Results showed that respondents had high agreement (>75%) on biodiversity problems, but the attitude toward risk in tackling problems is more cautious yet still open to new conservation technology. The respondents’ overall perception of synthetic biology application for biodiversity conservation was positive (70% agreed/strongly agreed). The respondents perceived the application as risky but at the same time beneficial. There was a significant correlation between support for new technology development for biodiversity conservation with belief in promises that synthetic biology application’s benefit (0.549, p<0.001). The respondents were still optimistic that the application will not decrease people’s interest in biodiversity conservation. Results from this pilot study can serve as starting point for discussions and assessments of synthetic biology application in biodiversity conservation.

Biodiversity, conservation, Indonesia, public perception, synthetic biology

**EO-07**

The effect of waterlogging stress on chlorophyll content and photosynthesis rate in some tobacco varieties

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Climate plays an important role in determining the success of a plant’s production. According to Meteorological, Climatological, and Geophysical Agency (BMKG) data in 2016 Java Island (Indonesia) experienced a dry season which remains interspersed with rain with a low and high intensity that make difficult to predict rainfall. This affects the productivity of some plants, one of them is tobacco plant (*Nicotiana tabacum* L.) which has a big role in economic field. Tobacco plant has many varieties with specific characteristics. Specific characteristics caused different responses to stress. Some parameters to measured plant productivity include chlorophyll content and photosynthesis rate. This study aims to determine the effect of waterlogging stress on chlorophyll content and photosynthesis rate in some tobacco varieties (manilo, jinten, Jepon Emas, and p951). The results showed that p951 (0.14 mg.g⁻¹) varieties experienced least decreased in chlorophyll content and at photosynthetic rates compared with other three varieties. The varieties that experienced the largest decreased of chlorophyll content were jepon emas (0.43 mg.g⁻¹) while manilo varieties experienced the largest decreased in photosynthetic rate.
Chlorophyll, \textit{Nicotiana tabacum}, photosynthesis, waterlogging stress

**EO-08**

The application of liquid smoke to fungal pathogen \textit{Fusarium oxysporum} on \textit{Hevea brasiliensis}

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Liquid smoke was used for coagulant of latex, food additives, bio insecticide, and bio-fungicide. A fungal pathogen \textit{Fusarium oxysporum} was found infected panel tapping of \textit{Hevea brasiliensis} in local rubber plantations, Seumadam Village, Aceh Tamiang, Indonesia. The objective of this study was to test the application of liquid smoke as a bio-fungicide. The direct observation used as a method for this study. This study was determined a sample area of 2,000 m², and determined 3 (three) treatments on rubber plants, i.e., liquid smoke, chemical fungicide as a positive control, and untreated as a negative control. Observation on the rubber plant in this study was observed once a week after application of treatment with disease intensity as a parameter. Result of this study showed that bio fungicide treatments reduce the disease intensity by 66.67% in first week compared with chemical fungicide reduce the disease intensity by 75%. Conclusion of this study proved that the liquid smoke reduces the disease intensity of panel tapping rubber plants infected by \textit{F. oxysporum}. Liquid smoke proved to inhibit the growth of \textit{F. oxysporum}. Chemical fungicides inhibit fungi faster than liquid smoke.

*\textit{Fusarium oxysporum*}, liquid smoke, rubber plant

**EO-09**

Utilization of agricultural waste for cultivation of paddy straw mushrooms \textit{Volvariella volvacea}

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\textit{Volvariella volvacea*} (Bull.) Singer or paddy straw mushroom is one of edible mushroom cultivated in the tropical and subtropical area. They are usually grown on the lignocellulosic agricultural waste. The study aims to utilize three kinds of agricultural waste as growth media: (i) paddy straw, (ii) cotton waste, (iii) dried banana leaves. They were added 2% (w/w) of lime and composted for 7 days. Then, they were added with 20% (w/w) of rice bran and 0.5% (w/w) of urea fertilizer. The media were laying on the shelf in the 3.0 x 4.0 x 3.0 m³ of mushroom house and pasteurized at 60-70°C for 4-6 hours. They were kept in the mushroom house overnight to maintain optimal temperature of 30-35°C for mushroom growing. Spawn was inoculated on the surface of media. After incubation for 5 days, the mycelia have fully grown to cover the surface of media. The first flush of fruiting body was produced at the egg stage of 7 days after inoculation for paddy straw and cotton waste media and 8 days after inoculation for dried banana leaves media. Analysis proximate showed that fruit body from paddy straw media has the lowest content of total carbohydrate of 3.74%, fat of 0.00%, and moisture of 90.49%. However, it contains the highest protein of 4.69% and ash of 1.08%. The fruit body on cotton waste media has highest production based on wet weight, diameter average and the number of fruiting body. The highest Biological Efficiency of 17.69% was obtained in using cotton waste media. On the other hand, and the lowest of Biological Efficiency of 7.93% was obtained in using paddy straw media.

Agricultural waste, paddy straw mushroom

**EO-10**

Estimation of carbon stock in the seagrass meadows of Jelenga Bay, West Sumbawa, Indonesia

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Blue carbon is a term used to describe the carbon stored in coastal and marine ecosystems. Research and conservation of blue carbon sinks like seagrass meadows are important in the effort to mitigate global climate change. This research aimed to estimate blue carbon stored in the seagrass meadow ecosystem of Jelenga Bay, West Sumbawa, Indonesia. The carbon pools studied include aboveground biomass, belowground biomass, and substrate. Carbon stock in the seagrass community was estimated based on correlation of density, biomass, and organic carbon content. Seagrass density was measured from 45 plots measuring 0.5 m x 0.5 m, in which seagrass biomass for each species was hand collected. Carbon stock in substrate was estimated using the correlation of its dry bulk density and organic carbon content. Substrate samples
were taken at five depths (0-15 cm, 15-30 cm, 30-50 cm, 50-70 cm, and 70-100 cm) using a modified soil corer measuring 1.5 m in length and 2.5 cm in diameter. Organic carbon content was analyzed using the Walkley and Black method. Four seagrass species were found in Jelenga Bay, i.e., Enhalus acoroides, Thalassia hemprichii, Cymodocea rotundata, and Halodule pinifolia. Based on Landsat 8 OLI image analysis, Jelenga Bay has 107.1 hectares of seagrass meadow area. Carbon stock estimation of the seagrass community within that area showed that aboveground seagrass biomass stores as much as 19.1 mg of carbon, whereas belowground biomass stores as much as 28.4 mg of carbon. E. acoroides contributes the highest amount of total carbon stock in the seagrass community, i.e., as much as 26.9 mg (56.7%). Carbon stock estimation in seagrass substrate shows that it stores as much as 45.5 mg of carbon. Substrate at 70-100 cm depth contributes the highest amount of carbon stock compared to other depths, i.e., as much as 14.9 mg (32.5%).

Blue carbon, carbon stock, Indonesia, Jelenga Bay, seagrass meadow

**EO-12**

**Evaluation of denitrifying bacterial communities in Bioelectrochemical Systems (BES) under different operating conditions**

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Denitrification is the conversion process of inorganic nitrogen, including nitrates, into gaseous nitrogen carried out by bacteria. The denitrification pathway can be utilized to remove nitrates from water systems as an environmentally friendly process compared to current methods such as ion exchange, reverse osmosis, and electrodialysis. Recent findings have demonstrated high nitrate removal rate by denitrification in Bioelectrochemical Systems (BES), electrochemical cells that utilize microorganisms to catalyze oxidation and/or reduction reactions. Bacterial community composition in BES is highly affected by system configuration and operating conditions. Parameters such as temperature, pH, and wastewater feed composition are the major factors that influence the relative abundance of specific phyla at the system's electrodes. At neutral pH and ambient temperature, the phylum Firmicutes and Clostridia play a major role in nitrate degradation in BES. However, the dominance of the two phyla is reduced under different operating conditions, which could lead to lower nitrate removal rate and overall efficiency. This review highlighted the relationship between denitrifying bacterial communities with the operating conditions of BES. Identification of dominant communities responsible for nitrate removal is an important step toward developing BES as an environmentally friendly nitrate removal platform.

Bioelectrochemical systems, denitrification, denitrifying bacteria, microbial communities, nitrate

**EO-13**

**Growth responses of local Javanese cardamom (Amomum compactum) and true cardamom (Elettaria cardamomum var. Mysore) to drought stress**

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Over the last two decades, there are accelerations in marine-derived drug discovery as a result of the increased number of antibiotic-resistant bacteria and the lack of new chemical scaffolds found in traditional sources of drugs. This led to numerous ongoing investigations on marine-derived compounds due to their broad spectrum of biomedical properties. While there are countless marine organisms capable of producing bioactive compounds, marine sponges (Phylum: Porifera), and especially its diverse microbial symbionts, is a primary source of marine natural products. Marine sponges are porous and sessile invertebrates with over 15,000 discovered species, each with a unique host of diverse microbe communities. The rich biodiversity and evolution process has enabled sponges, with their microbial symbionts, to develop secondary metabolites that possess desirable pharmacological properties as potent drug candidates. Indonesia has one of the highest marine biodiversity and thus providing the right environment for novel drug discoveries. The objective of this paper is to review sponge-derived compounds that were isolated from the year 2000-2017 and to discuss the possibility for further research based on Indonesia's marine biodiversity.

Bioactive compounds, Indonesia, marine, sponge
Drought stress is a limiting factor in the agriculture. In order to overcome this issue, discoveries of drought-tolerant crop varieties are being pursued. *Cardamom* from the Zingiberaceae family is one of the plant species with the ability to grow under drought stress. This research aimed to obtain the growth response of local Javanese cardamom (*Amomum compactum* (Am. Ex Maton)) and true cardamom (*Elettaria cardamomum* (L.) Maton) and to obtain the type of cardamom that is tolerant to drought stress. This research was conducted by using experimental method and completely randomized design (CRD) with 2 x 4 factorial and four repetitions. The first factor was the variation of field capacity (K) and the second factor was the type of cardamom (J). Parameters measured included the increase of plant height (cm), plant weight (grams), leaf area (cm²), number of leaves, leaf chlorophyll content (mg/L), and leaf proline content (ppm). The data were analyzed by using analysis of variance (ANOVA) with significance level of 95% and Duncan test with significance level of 5%. Results showed that local Javanese cardamom (*A. compactum*) had better growth response and was more tolerant to drought stress compared to true cardamom (*E. cardamomum*).

*Amomum compactum*, drought stress, *Elettaria cardamomum*, local Javanese cardamom, true cardamom

**EO-14**

**The effect of organic fertilizers on growth of ramie (Boehmeria nivea)**

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Decorticated-ramie waste is an agricultural biomass that has the content of potential organic material to be used as raw material Liquid Organic Fertilizer (LOF). The organic fertilizer hereinafter referred to LOF-ramie (*Boehmeria nivea*). The aim of this study to assess the effect of LOF-ramie on plant growth of ramie. The study design was prepared in the pot experiment was carried out using a randomized complete block design with five replicates and level treatments were 10 mL/L, 20 mL/L, 30 mL L, 40 mL/L and control. The result showed that the optimum concentration of the LOA-ramie is 40 mL/L that significantly affect to the parameters of plant height, leaf number, leaf area, root length and dry weight, but there was no significant effect of diameter stem. The positive dose-response of the LOF-ramie applications suggests that there is good potential to further optimize ramie cultivation.

Agriculture, biomass, liquid organic fertilizer, ramie

**EO-15**

**Management and behavior of eagles at Wildlife Rescue Center of Yogyakarta, Indonesia**

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Indonesia is one of the countries with the highest biodiversity, especially on the level of endemism. This potential is hampered by wildlife trade cases especially on animals with high selling value, such as eagles. The animal rescue center is a facility that helps the handling of animals from foreclosure by BKSDA (Nature Conservation Agency) one of them is Wildlife Rescue Center (WRC) Yogyakarta. This research was conducted in January to February 2017. Management methods include cage maintenance mechanism, feeding, and health status. The eagle observation method includes silent behavior, moving, feeding, self-care and voicing performed for 3 hours/day starting at 08.00-11.00 WIB. The data are infrastructure evaluation, maintenance, rehabilitation of *Nisaetus cirrhatus* and *Spilornis cheela* analyzed by the descriptive method, and eagle behavior analyzed by Ad libitum Sampling Method. The results of this research obtained the highest frequency of daily behavior of *N. cirrhatus* and *S. cheela* was voice, while the lowest frequency was silence. The behavior of the individual eagles in the cage of observation and socialization was very different. *N. cirrhatus* in the observation cage assessed still need to undergo the rehabilitation process before it is released while *S. cheela* is considered to have approached its nature.

Behaviour, eagles, rehabilitation, observation, Wildlife Rescue Center

**EO-16**

**Study of morpho-anatomy and physiology of red galangal (Alpinia purpurata) and white galangal (Alpinia galanga) on salinity stress**

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Galangal plant development efforts on saline land still encountering some obstacles such as not much information the tolerant type of saline condition. The purpose of this study was to determine the response of morpho-anatomy and physiology of red galangal (*Alpinia purpurata* (Vieill.) K. Schum.) and white galangal (*A. galanga* (L.) Willd.) to salinity stress. This research used experimental method with Randomized Block Design (RBD). Treatments included two factors: (i) species of galangal
consisting of two levels i.e. red galangal and white galangal, (ii) NaCl concentration consisting of five levels, i.e. 0%, 3%, 6%, 9% and 12%. Each treatment was repeated three times. Observation of the growth parameters was conducted when the plants showed wilting symptoms. The data were analyzed using Analysis of Variance (ANOVA) and posthoc with Duncan Multiple Range Test (DMRT) at α = 5%. The results showed that salinity stress treatment had an effect on reduction of plant height increase, leaf area, dry weight, density of stomata, chlorophyll content and increased thickness of root epidermis, number of root trachea, and proline content in both species of galangal. Red galangal was more tolerant than white galangal.

Galangal, morpho-anatomy, physiology, salinity stress

**EO-17**

**Effects of increasing temperature and nitrate concentration on biomass, growth rate, and free fatty acid of Tetraselmis sp.: searching for source of biofuel from marine microalgae**

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It is well known that marine microalgae have a high diversity and potency as natural food for aquaculture, a high bioactive compound, and source of biofuel. *Tetraselmis* sp. is one of marine-green algae, which has a high lipid content. Effects of increasing temperature and nitrate concentration on biomass, growth rate, and free fatty acid were examined in batch culture using artificial/LED light source. Completely randomized design was used in this experiment with four levels of temperature treatments (28°C, 30°C, 32°C, and 34°C) and three levels of nitrate treatments (0 g/L, 0.2 g/L and 0.4 g/L) with length of culture was 21 days. The result of our study showed that the highest growth rate was found at 30°C with double nitrate concentration account for 8.81%. Statistically, results showed that increasing temperature affected significantly to biomass and free fatty acid, while increasing nitrate was different significantly on growth rate, and biomass.

Cell abundance, growth rate and free fatty acid, source of biofuel, *Tetraselmis*

**EO-18**

**Antibiotic susceptibility of Pseudomonas aeruginosa clinical isolates**

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*Pseudomonas aeruginosa* was a Gram-negative, opportunistic pathogenic bacterium caused nosocomial infection. These bacteria often have been resistant to some antibiotics and difficult to handle. The aim of the research was to investigate the *P. aeruginosa* susceptibility to different antibiotics. This research was conducted using the descriptive-observational method. The *P. aeruginosa* bacteria were isolated from various clinical samples at Dr. Moewardi Hospital Surakarta, Indonesia, in August to November 2017. The isolates were purified using single cell colony technique. The bacterial susceptibility on different antibiotic using automatic equipment (Vitex® 2). The result reviewed that clinical isolate *P. aeruginosa* more resistant to ampicillin, cefazolin, tigecycline, nitrofurantoin and cotrimoxazole. They sensitive to Piperacillin, ceftazidime, cefepime, aztreonam, meropenem, amikacin, gentamicin, and ciprofloxacin. Conclusion was clinical isolates of *P. aeruginosa* have different susceptibility to some antibiotics, most sensitive to amikacin and resistant to ampicillin.

Antibiotic susceptibility, clinical sample, *Pseudomonas aeruginosa*

**EO-19**

**Hepatoprotector effect of methanolic extract of sambiloto leaves against malondialdehyde level in plasma male Wistar rat induced paracetamol**

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Flavonoid and andrographolide in *Andrographis paniculata* leaves are antioxidants that stimulate glutathione formation to increase hepatoprotector effect proven by decreased plasma malondialdehyde levels. To measure the hepatoprotective effect and find the effective dose of sambiloto methanol extract in male rats compared to Curcuma as a positive control with plasma MDA levels as an indicator for hepatoprotection. Pretest and posttest experimental design. Thirty rats were divided into 5 groups: positive control (Curcuma), negative control (paracetamol 900 mg/kg), dose I (500 mg/kg), dose II (1000 mg/kg), and dose III (2000 mg/kg). All rats were treated with toxic dose of paracetamol during the research.
Plasma MDA was measured using Wills methods. The data were analyzed with One-Way ANOVA followed by LSD Post-Hoc test. Post-hoc test showed significant difference between negative control and group treated with sambiloto extract (p=0.000), significant difference between dose II and positive control (p=0.004) as well as between Dose III and positive control (p=0.004), no significant difference between Dose I and positive control (p=0.337). Methanol extract of andrographis has hepatoprotective effect with effective dose of 500 mg/kg. Hepatoprotective effect of A. paniculata at dose of 500 mg/kg is not better than curcumin at dose of 500mg/kg.

Andrographis paniculata, hepatoprotector, plasma MDA

**EO-20**

Survival of patin fry (Pangasius hypophthalmus) in aquaponics with different plant

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This research aims to determine survival of patin (Siamese shark or sutchi catfish) (Pangasius hypophthalmus) in aquaponics system with different plants. The research was conducted in Ciparanje Aquaculture Laboratory, Faculty of Fisheries and Marine Science, Universitas Padjadjaran, Indonesia from June to July 2017. The method of this research is experimental method using Complete Randomized Design with 3 treatment and 4 replication. A treatment: Biofilter with kale treatment, B treatment: Biofilter with lettuce treatment, C treatment: Biofilter with spring onion treatment, and D treatment: control (without filter). The calculate parameters in this research are growth of fish weight, and water quality includes nitrate, ammonia, and phosphate. The result showed that if the highest patin growth is A treatment with absolute weight amount 0.276 g followed by B treatment with absolute growth 0.255 g. The concentration of nitrate, ammonia and phosphate amount 0.042-1.806 mg/L; 0.003-0.084 mg/L; 0.036-2.342 mg/L sequentially.

Aquaponics, growth, patin, water quality

**EO-22**

The effect of sucrose on secondary metabolite content of ant nest plant (Myrmecodia tuberosa) callus

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The ant nest plant (Myrmecodia tuberosa Jack) is a medicinal plant that contains bioactive compounds, such as flavonoids, tannins, tocopherols, phenols, and an abundance of minerals, that are useful as antioxidants. With the constant increase in popularity of the medicinal plant, the M. tuberosa is threatened by extinction if over-exploitation continues. Thus, the effort to conserve these plants is vital. Tissue culture is an alternative method to conserve and produce active compounds that are similar to those of the native ant nest plant with callus. The addition of certain compounds such as sucrose can affect the secondary metabolite content through in vitro plant or callus.The aim of this research was to find the best explant sources, determine the best growth regulator to produce the callus, and evaluate the optimum sucrose concentration to enhance secondary metabolite production of the callus. The results showed that callus was obtained from all growth
regulators. The best callus that was marked by a friable green and yellowish green callus was provided by cotyledon with the growth regulator of 2 mg-L\(^{-1}\) of 2,4-
Dichlorophenoxyacetic acid (2,4-D) and 2 mg-L\(^{-1}\) of kinetin. Calli treated with 30 g of sucrose resulted in the best secondary metabolites, containing alkaloids, phenols, flavonoids, saponins, and steroids.

2,4-Dichlorophenoxyacetic acid, callus, kinetin, Myrmecodia tuberosa, sucrose, secondary metabolite

**EO-23**

**Growth and yield of chili given various dose of mycorrhizal bio-fertilizer on inceptisol soil Aceh, Indonesia**

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The main obstacle in production of chili is the lack of availability of fertilizers and plants are often attacked by disease. Research on the techniques of propagation of mycorrhizal biofertilizers and the adoption of innovations as bio-fertilizer and bioprotector on plants needs to be conducted to improve the economy of the farmer community. Utilization of mycorrhizal bio-fertilizer, production and product value are expected to increase. Besides, the dependence of farmers on artificial fertilizer can be overcome. Particularly in the coastal area of Kreung Raya, Aceh Besar, Indonesia, another constraint in the chili production is the low of P element on Inceptisol soil and cannot be used by the plant to its full potential. This study aimed to investigate the effect of mycorrhizal bio-fertilizer doses and varieties and their interactions on growth and yield of chili in Inceptisol soil. This research was conducted from March to October 2017. The experiment design was used was a factorial randomized block design with three replications. The first factor is a dose of mycorrhizal bio-fertilizer consisting of three-level namely 0 g/plant, 5 g/plant, 10 g/plant and 15 g/plant. While the second factor is varieties i.e., PM 999, Lado F1 and Laris. The variables observed in this study include of the quality of mycorrhizal bio-fertilizer produced by colonization on plants, plant height, stem diameter, number of fruits per plant, fruit weight per plant and yield potential per hectare. The results showed the best variety of were found in LADO F1. While the best dose of growth and root colonization were obtained at a dose of 15 g/plant but not unlike the other two doses and significantly different with without mycorrhiza. However, the best yield was obtained at a dose of 10 g/plant. The best interactions of this research were found in dose of 10 kg/plant and LADO F1 variety. Base on the result of the growth and yield of were obtained in dose of 10 g/plant and LADO F1 variety was very suitable to use and be a recommendation to field experiment.

Chili, colonization, inceptisol, mycorrhizal bio-fertilizer, production

**EP-01**

**IgE production-suppressing effect of asam kandis (Garcinia xanthochymus) extract on mouse hybridoma DNP-Hy cells**

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Asam kandis (dried fruit of *Garcinia xanthochymus* Hook. f. ex T. Anderson) is popularly used as spice in many Indonesian cuisines. Although *Garcinia xanthochymus* has been reported to possess various pharmacological properties, its immunologic functions have not been studied yet. Therefore, in this study, we aim to determine IgE production-suppressing effect of asam kandis extract (AKE) using mouse hybridoma aDNP-Hy cells. AKE was prepared through 24 hours maceration in distilled water. IgE production-suppressing activity of AKE on mouse hybridoma aDNP-Hy cells was examined in time-wise manner. Cell viability and IgE mRNA expression were assessed using trypan blue assay and qRT-PCR, respectively. IgE production-suppressing activity of heat-treated (100°C) AKE was also observed. AKE significantly reduced IgE production by mouse hybridoma aDNP-Hy cells in a concentration-dependent manner both in 24 and 36 hours incubation periods. Furthermore, AKE exhibited its IgE production-suppressing activity without any cytotoxicity and also significantly decreased IgE mRNA expression. Heat-treated AKE showed no IgE production-suppressing activity, indicating that the bioactive substances are heat labile. More interestingly, heat-treated AKE showed cytotoxic effect on mouse hybridoma aDNP-Hy cells. We showed that AKE exhibits IgE production-suppressing effect on mouse hybridoma aDNP-Hy cells. Further studies are necessary to discover underlying bioactive compounds of asam kandis.

Asam kandis, *Garcinia xanthochymus*, IgE
**EP-02**

**Immunostimulatory effect of tempoyak (fermented durian) in inducing cytokine production (IL-6 & TNF-α) by RAW 264.7**

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Indonesia is known to be home to various fermented foods with many-reported usage as potential sources of probiotics. Tempoyak is among one of the Indonesian fermented foods that are rarely studied for its bioactivities. This study was conducted to evaluate the potential bioactivities of tempoyak, individually the immunostimulatory aspects. Water extract of tempoyak was prepared by dissolving the freeze-dried tempoyak sample in distilled water. Immunostimulatory activity of tempoyak water extract was evaluated using RAW 264.7 mouse macrophage cells. ELISA was used to screened cytokine productions (IL-6 and TNF-α) by RAW 264.7 cells following treatment with Tempoyak water extract. In addition to ELISA, RT-qPCR was also used to determine IL-6 and TNF-α mRNA expression. We showed that water extract of tempoyak exerts immunostimulatory effects towards RAW 264.7 cells. This was observed from the increased production of IL-6 and TNF-α in a concentration-dependent manner. This was also supported by increased IL-6 and TNF-α mRNA expression. Our finding suggests that tempoyak has immunostimulatory effects towards murine macrophage cell line RAW 264.7. However, further studies are needed to identify the specific compound responsible for inducing immunostimulatory effects.

Immunostimulatory, IL-6, tempoyak, TNF-alpha

**EP-03**

**Isolation and identification of yeast from fermented guava seeds (Psidium guajava)**

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Guava fruit (Psidium guajava L.) is popular tropical fruit and widely consumed, either as fresh fruits or processed. However, there are large quantities of inedible guava seeds that still contain various nutrients such as fiber, protein, iron, zinc, and unsaturated fatty acids. Fermentation can increase the nutritional contents in guava seeds, facilitating further exploration of the nutritional potential of guava seeds, e.g., to make silage or condiments. To determine the safety of this method, microbiological analysis should be done. Yeasts are indigenous microbes that can be found in most fruits and sometimes cause food spoilage. This research aimed to isolate and identify yeasts in fermented guava seeds. The research was done by fermenting of guava seeds, isolating of yeast from the sample, and identifying of isolated yeast from the sample. Identification was performed on the basis of colony morphology, cell morphology, growth at 37°C on MEA medium and growth in 50% glucose medium (MY50G). Results showed that there were 7 yeast strains isolated from fermented guava seed. These strains were labeled J1, J2, J3, J4, J5, J6 and J7 respectively. Then, each strain was identified based on the genus-defining character of the yeast. Strain J1 belong to the genus Schizosaccharomyces, strain J2, J3, J4 and J7 possibly lead to the genus Pichia, strain J6 belong to the genus Cryptococcus and strain J5 belong into genus Candida. Thus, it is concluded that indigenous yeast found in fermented guava seeds were considered as food spoilage yeasts. Fermentation condition should be evaluated to reduce spoilage microorganisms.

Fermentation, guava seeds, identification, spoilage, yeasts

**EP-04**

**The ability of soil-borne fungi to degrade Polycyclic Aromatic Hydrocarbon (PAH)**

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A research on the ability of soil fungi to degrade Polycyclic Aromatic Hydrocarbon (PAH) has been done. Some species of soil fungi show the ability to decompose organic material found in the soil such as plants and animals remains. Plants cell consists of lignin, cellulose, and hemicellulose. The degradation of lignin produces simpler compounds that can be utilized by fungi. PAH is a hydrocarbon compound that has a similar structure to lignin, thus can be decomposed by soil fungi. The objective of the research was to obtain soil fungi isolates which able to degrade naphthalene (PAH). Soil samples were taken from four different spots in Indonesia, i.e., Muara Angke, Tanjung Priok (both in Jakarta), Pelabuhan Ratu (West Java) and mangrove soil from Bali (Badung, Bali). Isolation process resulted in 27 numbers of soil fungus isolates that are rarely studied for its bioactivities.
isolate. Five isolates produced clear zone on Poly R-478 media. Two isolates formed green zone on ABTS media. *Phialophora fastigiata* MA4 produced the highest amount of laccase (44.86 U/mL). Laccase was produced in acidic condition. *Phialophora fastigiata* MA4 degraded naphthalene (PAH) as much as 38% after four days incubation.

Degradation, laccase, naphthalene, *Phialophora fastigiata*, soil fungi

**EP-05**

Optimization of biotransformation process parameter for conversion benzonitrile to benzoic acid using whole cell of *Rhodococcus pyridinivorans* strain LP3

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*Rhodococcus pyridinivorans* strain LP3 isolated from effluent waste of Antam Gold Mine grew well on benzonitrile up to 25 mM and the highest growth was observed at 15 mM. *R. pyridinivorans* strain LP3 was capable of converting benzonitrile to benzoic acid. In this study, several optimizations for conversion benzonitrile to benzoic acid were done in environmental condition, such as pHs and temperatures. Activity enzymes were evaluated by determining the ammonia production based on Nessler's method. Biotransformation product is benzamide and temperature 30ºC. The str process of benzonitrile to benzoic acid took place at pH 5 and represented in 60 minutes reaction. Enzymes-converting nitrile involved in the biotransformation process are Nitrile hydratase and amidase.

Benzamide, benzonitrile, biotransformation, enzymes converting benzonitrile, *Rhodococcus pyridinivorans*

**EP-07**

Antioxidant activity of crude extract of *Silpau Green Algae (Dictyosphaeria verluysii)* from Southwest Maluku Water, Indonesia

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An antioxidant activity has been studied from the crude extract of green algae Silpau (*Dictyosphaeria verluysii*) that grow in Southwest Maluku water, Indonesia. Silpau grows throughout the season at Kisar Beach. Silpau has been consumed as a traditional food and known to contained nutrients but has not much research and information about bioactive compounds and antioxidant activity. The aim of this research was to know the phytochemical compounds and antioxidant activity of crude extract of silpau. This study was carried out in two stages namely (i) screening phytochemical compound for detection presence of phenolic compound, terpenoids, steroids, tannins, quinones, flavonoids and saponins, and (ii) antioxidant activity test using DPPH method and total phenolic by spectrophotometric. The results showed that the methanol extract of silpau contained steroids, flavonoids, and saponins. The total phenolic of chlorofrom extract 16.9878 mg equivalent of gallic acid/L were higher than methanol extract 2.9630 mg equivalent of gallic acid/L. % DPPH radical inhibition increased with higher concentration with methanol and chloroform solvents, indicated the presence of antioxidant compound activity.

DPPH, phytochemical compounds, total phenolic
EP-08

Molecular identification the causative agent of ulcer on sea cucumber, Holothuria scabra

Des Roza*, Zafran, Indah Mastuti

Sea cucumber, Holothuria scabra is one of the high value of fisheries commodity. Seed production of sea cucumber was development in Institute for Mariculture Research and Development (IMRAD) Gondol, Bali, Indonesia. However, reared in hatchery condition with high density and low water exchange, is susceptible to outbreak of diseases, may causing ulcerative disease. This study was aimed to find the causative agent of ulcer, including isolation and molecular identification by using Polymerase Chain Reaction (PCR) method. The 16S sequence of RNA markers of pathogenic bacteria is a target for amplification by the PCR method. Sequencing of PCR products cooperated with the Laboratory of Biomedical and Molecular Biology, Faculty of Veterinary Medicine, Udayana University, Bali, Indonesia. The obtained nucleotide sequence results are aligned and BLAST with MEGA 5.0 software. Two bacterial isolates consisting of a single gram-negative bacterium isolate identified as Vibrio alginolyticus and gram-positive bacterium isolate identified as Streptococcus sp.

Molecular identification, seacucumber, Holothuria scabra, bacterial Vibrio alginolyticus and Streptococcus sp.

EP-09

Mass mortality of seahorse, Hippocampus kuda larvae in hatchery

Des Roza

Seahorse, Hippocampus kuda is one of important Indonesian ornamental fishes. Recently, over fishing of seahorse occurring because seahorse not only as an ornamental fish also needed for material Traditional Chinese Medicine (TCM). The utilization of ocean not only for fishing but should be developed to be a mariculture in the hatchery. Seed production of seahorse was developed in North Bali, however, in seeding usually followed by diseases attack mainly caused by fungus, bacterium and parasite infection. With refer to pandemic research conducted on larvae of seahorse including isolation, identify by morphological and biological characteristic such as different media and different concentration of NaCl. Controlling, minimum inhibitory concentration test of two kinds of fungicides that is formalin and trifluralin. Results were shown 1 fungus isolate from seahorse, H. kuda larvae with characters strong hyphae, branching and on zoospores production process forming of discharge tube and terminal vesicle, this isolate was classified belonging into order Lagenidiales and identified as a Lagenidium callinectes. This isolate can grow without NaCl but optimal at 2%. While for the controlling usage of formalin 15-20 ppm or trifluralin 1-1.5 ppm effective to depress growth of L. callinectes.

Controlling, fungus, larvae, seahorse, Hippocampus kuda

EP-10

Effect of rice washing water on red galangal growth (Alpinia purpurata)

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Rice washing water contains several nutrients such as magnesium, potassium, iron, calcium, nitrogen, sulfur, and phosphorus that plants need to increase growth. The objective of this research is to know the effect of rice washing water and concentration on the growth of red galangal (Alpinia purpurata (Vieill.) K. Schum). This research method is experimental using Group Random Design 5 x 3 factorial pattern with three repetitions. The first factor was the concentration of rice washing water (K) consisting of 5 levels, i.e. (k0) = 0 ml (control), (k1) = 250 ml, (k2) = 500 ml, (k3) = 750 ml, and (k4) = 1000 ml (k4). The second factor is a kind of rice washing water (M) consisting of 3 levels, namely (m1) = white rice, (m2) = brown rice, and (m3) = black rice. Data analysis using Multiple Variance (ANAVA) and Duncan Multiple Range Test with 95% significance level. The results showed that rice washing water with different kind and concentrations had an effect on the growth of A. purpurata in parameters of high growth, leaf number, leaf area, and wet weight of the plant. Red rice washing water (m2) is the best of rice washing water for wet weight parameters, while the 1000 ml concentration is the best of rice washing water concentration for high growth parameters, leaf number, and leaf area.

Alpinia purpurata, growth, rice washing water

EP-11

Spatial patterns of evapotranspiration distribution in palm oil plantation

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Evapotranspiration is the process of water loss through soil and plant surface. There are several ways in which to determine evapotranspiration, one of them is in a direct way, which is to calculate some climatic factors are processed in a form of simulation modeling evaporation distribution of two-dimensional on the coordinates that have been specified. This research has been conducted on palm oil plantations PT. Bio-Nusantara, Bengkulu, Indonesia. The object of research at the site evapotranspiration distribution is plantation has been producing for 2 years (TM2) under replanting condition, and plantation has been producing for 22 years (TM 22), and comparison site between TM 22 to the field, residential-area, and secondary forest. The results showed in palm oil plantation TM 2 there are herbaceous plants and bushes, at this point, it is resulting more water vapor produced. In TM 22 the plant has a fully developed canopy and all the ground is covered by a canopy therefore, at that point the transpiration of the plant decreases less water vapor. This is because the temperature conditions are inversely proportional to the relative humidity. If the temperature increases, then the relative humidity decreases. Air humidity is a factor that affects evaporation because humidity describes water vapor contained by air that affects the air’s capacity to absorb water vapor. If the air humidity is high, then the evaporation will decrease. As a comparison of a palm oil plantation evapotranspiration measurement result, indicated on area of football field where only has grass in the field, with the intensity of light and wind. Also low humidity affects directly to high amount to evapotranspiration, therefore, more water vapor produced. For area measurement of the palm is the equal to TM 22 result. While the measurement result of palm oil plantation nearby residential area shows that the area which consists of herbaceous plants and bushes, also zinc-roofed residential which the intensity of light and wind directly hit the area, is resulting less water vapor produced. Moreover, the condition of the border area between TM 22 and the palm oil secondary forest contains mixed plantation. The measurement results show that the palm oil secondary-forest has the same height of canopy and almost equal humidity (>76%), but secondary forest plants have a denser plantation density at that point, therefore, it is resulting in less water vapor.

Evapo-transpiration, palm oil plantation, spatial distribution, transpiration, water capacity

EP-13

Seedling phenology of Baccaurea dulcis and fruiting phenology of Baccaurea reticulata

Renita Lestari* Rismita Sari


Baccaurea reticulata Hook.f. is originally from Kalimantan and Sumatra, Indonesia and known as tampoi, kapul or tampe by local people. This species has potential as fruit plant. There are two types of tampoi plants that characterized by its fruits, namely white and yellow color of fruit flesh. Until now, there was very limited study on this plant species including its propagation. The aim of the study was to find out the results of vegetative propagation of tampoi plants by shoot tip grafting technique. Several methods, namely different part of shoot tip, different time of shoot storage and different species of stock were conducted at the study. The results showed that the highest growth of shoot was from second part of shoot trunk as scion compared to control plants. Yellow fruit tampoi plants as scion (storage for 2-6 days) that grafted to white fruit plants as stock were not successful and the scion were all dry after 18 weeks. Similar result was found when the scion of yellow fruit tampoi was grafted to the stock of Baccaurea molleyna and B. macrocarpa. The scion of yellow fruit tampoi plants could only be grafted to the stock of yellow fruit tampoi plants.

Baccaurea reticulata, shoot tip grafting, vegetative propagation

EP-12

Shoot tip grafting vegetative propagation of Baccaurea reticulata

Renita Lestari
**EP-14**

**The plant growth difference which maintenance in aquaponic system with patin fish (Pangasius hypophthalmus)**

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This research aims to know the growth difference between kale, lettuce, and spring onion which maintenance in aquaponic system. The research was conducted in Ciparanje Aquaculture Laboratory Faculty of Fisheries and Marine Science, Universitas Padjadjaran, Indonesia from June to July 2017. The method of this research is experimental method using Complete Randomized Design with 3 treatment and 4 replication. A treatment: Biofilter with kale treatment, B treatment: Biofilter with lettuce treatment, C treatment: Biofilter with spring onion treatment, and D treatment: control (without filter). The parameters which calculate in this research are growth of water spinach, lettuce and spring onion. Water quality calculated as like nitrate, ammonia, and phosphate. The result showed that if kale showing the highest of growth with mean of length is 20 cm and mean of leaf replenishment 11 blade. The concentration of nitrate, ammonia dan phosphate amount 0.042-1.806 mg/L; 0.003-0.084 mg/L; 0.036-2.342 mg/L sequentially.

Aquaponic, lettuce, onion, patin fish, water spinach

**EP-15**

**Genetic manipulation of Cyanobacteria for ethanol production: A mini review**

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Fossil fuel is one of the most prominent global challenges. Development of a sustainable source of energy such as ethanol produced by cyanobacteria could answer this problem. Naturally, cyanobacteria produce ethanol due to its autotrophic characteristic and use light as an energy source and carbon dioxide as a carbon source. This process is dependent on the enzymes rubisco, pyruvate decarboxylase (PDC), and Alcohol dehydrogenase (ADH). The review is done to investigate the possible manipulations of cyanobacteria to enhance ethanol production. Inducing overexpression and mutagenesis of rubisco gene can result in increased carbon fixation ability. Increased carbon fixation will result in increased 3-phosphoglycerate production as precursor to produce pyruvate. Furthermore, by introducing PDC and ADH genes from Zymomonas mobilis genes, cyanobacteria could convert pyruvate into ethanol. These processes will hypothetically force the cyanobacteria to synthesize ethanol from pyruvate by utilizing carbon dioxide. As ethanol can cause growth retardation in cyanobacteria, further research to enhance its stress signals and cell membrane modification are suggested to increase its resistance to ethanol.

Alcohol dehydrogenase, Cyanobacteria, ethanol, pyruvate decarboxylase, rubisco

**EP-16**

**Oil-degrading bacteria and Archaea for oil spill bioremediation in Indonesian Ocean: A mini review**

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Oil spillage in Indonesia's ocean is one of the most influential factors of water pollution. To reduce the pollutant, several techniques have been applied, including bioremediation using hydrocarbonoclastic microorganisms, which are involved in mineralization of hydrocarbon pollutant. Many kinds of oil-degrading bacteria and archaea have been discovered but not all of them have similar survival ability within hypersaline environment. Those differences can affect its performance in bioremediation process. This paper aims to review comparison between bacteria and archaea genus for their ability to degrade oil in the saline environment. Oil-degrading archaea had been shown to be more effective due to its hypersalinity resistance compared to bacteria. Three halophilic archaea genus, such as Halobacterium, Halococcus, and Haloferax showed significant oil degradation activity in 26 g/L NaCl, which resulted in complete degradation of oil in 100 hours. The halophilic archaea (two strains of Haloferax, Halobacterium, and Halococcus) has high activity with around 65% alkanes degradation at 40-50 g/L salinity; while bacteria only reaches 12% degradation in 50 g/L salinity. The comparison between bacteria and archaea activity in oil-contaminated hypersaline seawater can result in determination of the most effective hydrocarbonoclastic microorganisms and thus optimization of oil degradation.

Archaea, bacteria, hydrocarbonoclastic, hypersalinity, oil-degrading

**EP-17**

**Protective effect of ethanol extract of Usnea baileyi on lead acetate-induced cerebrum toxicity in Wistar rats (Rattus norvegicus)**
Lead is one of the heavy metals has been used a lot of in modern industrial. There are many reports of structural changes in brain due to the chronic effects of lead. Usnea sp. has known contain several antioxidant compounds, i.e. saponin, flavonoids, polyphenols, vitamin C and vitamin E. This study aimed to determine the potency of ethanolic extract of U. baileyi to preventing brain damage in rats induced by lead acetate. The sample used 28 male Wistar rats (Rattus norvegicus) divided into 7 groups: negative control (rats were given daily with CMC 0.05%); positive control (rats were given daily with lead acetate 100 mg/kg BW orally once in a day for 35 days); and the treatment group (rats were given the 70 mg, 92.4 mg, 121.8 mg, 160.65 mg and 221.5 mg/kg BW orally once in a day for 30 days, and on the 6th day, were given lead acetate 100 mg/kg BW one hour after the extract U. baileyi administration). After 30 days, brain sample collected for histopathological studies. The results showed that ethanol extract of U. baileyi at doses121.8 and 221.2 mg/kg bw was showed relative weight of brain was heavier than the control treatment, doses U. baileyi 70 and 93.4 mg/kg bw. Meanwhile base on the observation of cerebrum histology showed that ethanol extract of U. baileyi at doses at 160.65 mg/kgBW was significantly decreased of the number of apoptotic and edema cells than other treatment, which was comparable to negative control group. It was concluded that the ethanol extract of U. baileyi could be a potent natural product provide a promising protective effect against lead acetate induced cerebrum toxicity in rats.

Apoptotic, edema, ethanolic extract, lead acetate, Usnea

**Keynote speech**

**AA-01**

Role of biodiversity and conservation research under Global Climate Change

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Biodiversity, includes diversity within species (genetic diversity), between species (species diversity) and ecosystems, plays an important role in maintaining ecosystem productivity, stability, sustainability and other ecosystem services that are essential for human being. Both of terrestrial and marine ecosystems play an important role in regulating climate, absorbing man-made carbon emissions, and thus helping to protect human being from climate change. The effects of the climate change are on the level of individuals, populations, species, ecological networks, and ecosystems. Many studies indicated that the climate change is able to decrease genetic diversity of populations due to directional selection and rapid migration that in turn affect ecosystem functioning and resilience, as well as affecting populations by modifying the web of interactions at the community level. The implications of climate change for genetic and species diversity have potentially strong implications for ecosystem services, especially in decreasing fitness lead to the species extinction. Loss of biodiversity has become a serious issue in many places around the world. Many factors, such as habitat loss and degradation, air and water pollution, over-exploitation and unsustainable use of natural resources, and invasive species, have contributed to the loss of biodiversity. By conserving nature and restoring ecosystems we reduce vulnerability and increase resilience. Nature conservation and restoration is a possibly becoming major and cost-efficient effort against climate change. Under the climate change, individuals of any species must produce adaptive responses, genetically through mutations or selection of existing genotype, or plasticity, by giving short time response within individual lifetime. Current review articles by Brook and Fordham (2015) suggested to more challenging experimental manipulations emphasizing on predicting and managing the outcomes of climate-ecosystem interactions, systematic reviews and associated meta-analysis to summarize individuals studies quantitatively, utilizing cloud-based storage and use of off-site high-performance parallel computing infrastructure, innovative research of coral populations exposure to varying carbon dioxide concentrations, meta-analyses of tundra plant response to experimental warming and marine organisms to ocean chemistry, as well as using genetic information to integrate eco-evolutionary processes into biodiversity models are being suggested for further future research.

Biodiversity, Global Climate Change, conservation

**AA-02**

Biodiversity impacts of fire at local, regional and global scales

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Fire is an integral component of most ecosystems across the globe, with only the wettest, driest and coldest biomes not experiencing at least some burning. Where they occur, fires are a strong selective force as they can eliminate many species (depending on the size and intensity of fire) and
hence can modify vegetation structure and composition; however, where regular fires have occurred over long periods, surviving species typically have acquired strong adaptations to enable them to survive and persist after burning. The biota of fire-prone regions is typically adapted to a specific fire regime (the temporal and spatial pattern of burning) with dramatic shifts in the fire regime (e.g. more frequent burning) likely to result in impacts on flora and fauna. Therefore understanding past and present fire regimes is a crucial to effective management of fire-prone vegetation. This information on fire regimes is usually obtained by mapping and analyzing fire scars using remote sensing techniques and GIS, as well as obtaining historical records and information on the fire adaptations evident in indigenous species. At the global scale, fire is probably second only to climate as a major controller of biome distribution with many areas of the tropics and subtropics having savanna vegetation due to regular burning, whereas without fire they would be forests given the relatively high rainfall. Global climate change is expected to result in changes to fire regimes in many parts of the world, with forested areas experiencing a drier and warmer climate most at risk of increased incidence of severe wildfires. However, predicting changes to fire regimes in responses to climate change is difficult due to complex interactions between climate and fuel accumulation and moisture, vegetation structure, and plant productivity. For instance, it has been predicted that much of the world’s tropical savanna and seasonally dry forests will experience decreased fire activity due to the combination of hotter and drier dry seasons resulting in lower plant growth and grassy fuels. In contrast, many temperate grasslands and forests are predicted to have an increase in fire activity. At regional scales, fires tend to favor certain vegetation types over others reflecting landform/soil patterning, with deliberate burning by humans also contributing to differences in fire regime within regions and landscapes. Case studies from Indonesia and Australia will be given showing distribution of fire hotspots related to the physical environment and weather conditions. This talk will also cover the effects of fires on biodiversity at local scales based on our studies in the Western Australian semi-arid and arid zones, Mediterranean-type forests and tropical savannas. The role of introduced species in altering fire regimes will also be explored.

Biodiversity, impacts of fire, multiplescale

AA-03

The arts and biocultural diversity

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The ‘inextricable link’ between biological and cultural diversity – now termed biocultural diversity – has increasingly been recognized by the international scientific community since the 1980s. The arts as a vehicle for cultural transmission has not been sufficiently acknowledged, documented or explained. This paper suggests that the development of a conceptual framework grounded in the plurality of knowledge systems, values, beliefs, and creative know-how embedded in the arts together with interdisciplinary practice-based methods will have important implications for beneficial human-nature relationships and the ecological resilience of the Earth.

Arts, biocultural diversity, cultural creativity, practice-based methods, tangible and intangible cultural heritage