

## Lampiran II

Nomor : B/112/E3/RA.00/2021

Hal : Pengumuman Penerima Pendanaan Penelitian di Perguruan Tinggi Tahun Anggaran 2021

**PENERIMA PENDANAAN PENELITIAN DI PERGURUAN TINGGI NON BADAN HUKUM  
TAHUN ANGGARAN 2021**

NO	PTN / LLDIKTI	NAMA INSTITUSI	SKEMA	NAMA	NIDN	JUDUL	DURASI PENELITIAN (Tahun)
1439	PTN	Universitas Padjadjaran	Penelitian Pendidikan Magister menuju Doktor untuk Sarjana Unggul	UNANG SUPRATMAN	0004076602	Senyawa anti-kanker dari tumbuhan <i>Dysoxylum lignicarpum</i> dan <i>Dysoxylum paracyticum</i>	3
1440	PTN	Universitas Padjadjaran	World Class Research	UNANG SUPRATMAN	0004076602	Senyawa Triterpenoids yang beraktivitas sitotoksik dari tumbuhan <i>Dysoxylum lignicarpum</i> dan <i>Dysoxylum parasiticum</i>	3
1441	PTN	Universitas Padjadjaran	Penelitian Pendidikan Magister menuju Doktor untuk Sarjana Unggul	YUDI AZIS	0013127801	Students' Learning Effectiveness in Using MOOC. Is PIIT, Digital Literacy, Self-Regulation, and E-Service Quality Matters?	3
1442	PTN	Universitas Padjadjaran	World Class Research	YUNIA SRIBUDIANI	0028067705	Analisis Mutasi gen KLF1 dan BCL11A Serta Pengembangan Metoda Terapi Pasien Thalassemia Mayor Melalui Induksi Peningkatan Level Ekspresi HbF Menggunakan miRNA	3
1443	PTN	Universitas Palangka Raya	Penelitian Kerjasama Antar Perguruan Tinggi	DYAH AYU PRAMODA WARDANI	0009019301	Ekstraksi Silikon Oksida dari Biomassa Alang-Alang	2
1444	PTN	Universitas Papua	Penelitian Terapan	ABADI JADING	0008087804	Rancang Bangun Pneumatic Conveying Ring Dryer Skala Komersial Kapasitas 1 Ton Menggunakan Tungku Gasifikasi Biomassa untuk Meningkatkan Produksi Tepung dan Pati Kering Berbasis Sagu dan Umbi-umbian di Papua Barat	2
1445	PTN	Universitas Papua	Penelitian Terapan Unggulan Perguruan Tinggi	AGUSTINUS MURDJOKO	0023037905	Indikasi Geografi HHBK Buah Hitam Berbasis Tipologi Pemanfaatan Sebagai Dasar Pengembangan Pangan Lokal Unggulan Di Kabupaten Teluk Wondama	2

**DAFTAR PENERIMA DANA PENELITIAN DARI KEMENDIKBUDRISTEK TAHUN 2021**

No	Nama Peneliti	Judul Penelitian	Dana yang Disetujui (Rp)	No Kontrak
1	RICARDO FERDINAND TAPILATU	IDENTIFIKASI PENANDA MOLEKULER IKAN KERAPU DI BENTANG LAUT KEPALA BURUNG - PAPUA: IMPLIKASI BASIS DATA GENETIK IKAN EKONOMIS PENTING DI DAERAH 3T (TERDEPAN, TERPENCIL, TERKECIL)	151.050.000	138/E4.1/AK.04.PT/2021
2	RICARDO FERDINAND TAPILATU	INFORMING AND GUIDING CONSERVATION STRATEGIES TOWARDS SUSTAINABLE MANAGEMENT OF MANTA RAYS IN THE HEART OF CORAL TRIANGLE – RAJA AMPAT	127.225.000	138/E4.1/AK.04.PT/2021
3	MEIKE MEILAN LISANGAN	Potensi Ekstrak Air Rumput Kebar ( <i>Biophytum petersianum</i> ) Sebagai Antimikroba dan Antioksidan secara In Vitro dan pada Beberapa Model Pangan	101.300.000	138/E4.1/AK.04.PT/2021
4	INSAR DAMOPOLII	Pengembangan Media Pembelajaran Komik Berbantuan Augmented Reality Untuk Meningkatkan Hasil Belajar dan Keterampilan Berpikir Kritis Siswa SMA	126.979.000	138/E4.1/AK.04.PT/2021
5	BARAHIMA	Transformasi invensi berbasis sagu menjadi inovasi yang berorientasi entrepreneurship dalam rangka mengakselerasi daya saing dan kemandirian Bangsa di bidang pangan	568.100.000	220/E4.1/AK.04.PT/2021
6	AGUSTINUS MURDJOKO	Indikasi Geografi HHBK Buah Hitam Berbasis Tipologi Pemanfaatan Sebagai Dasar Pengembangan Pangan Lokal Unggulan Di Kabupaten Teluk Wondama	127.992.000	291/E4.1/AK.04.PT/2021
7	ABADI JADING	Rancang Bangun Pneumatic Conveying Ring Dryer Skala Komersial Kapasitas 1 Ton Menggunakan Tungku Gasifikasi Biomassa untuk Meningkatkan Produksi Tepung dan Pati Kering Berbasis Sagu dan Umbi-umbian di Papua Barat	194.670.000	291/E4.1/AK.04.PT/2021
8	PAULUS PAYUNG	Perbaikan Rancangan Prototipe Perontok dan Pengupas Pokem ( <i>setaria italica</i> ) Mekanis Untuk Penanganan Pasca Panen Pokem di Papua	129.056.000	291/E4.1/AK.04.PT/2021

# Riwayat pengusulan dalam sistem SimlitabmasNG

The screenshot shows the SimlitabmasNG web application interface. The browser address bar displays the URL: `simlitabmas.kemdikbud.go.id/ng/main.aspx?page=30`. The application header includes the name "SimlitabmasNG" and the user profile "Dr AGUSTINUS MURDJOKO S.Hut, M.Sc.". A sidebar on the left contains navigation options: Beranda, Daftar Usulan Baru, Daftar Usulan Lanjutan, Pelaksanaan Kegiatan, Riwayat Usulan, Profil, and Pemetaan Riset PT. The main content area is titled "Riwayat Usulan" and shows a list of proposals. The first proposal is "1. Silvikultur HHBK Buah Hitam Berbasis Tipologi Lahan Bagi Pengembangan Hasil Produksi Untuk Pemenuhan Kebutuhan Skala Rumah Tangga, UMKM dan Industri Masa Depan" under the category "Penelitian Terapan Kompetitif Nasional" for the year 2022-2022. The second proposal is "2. Indikasi Geografi HHBK Buah Hitam Berbasis Tipologi Pemanfaatan Sebagai Dasar Pengembangan Pangan Lokal Unggulan Di Kabupaten Teluk Wondama" under the category "Penelitian Terapan Unggulan Perguruan Tinggi" for the year 2023-2023. The details for the second proposal are expanded, showing "1. Identitas Usulan" with "Bidang Fokus" as "Pangan" and "2. Personil" listing three members: "Anggota Pengusul 1" (Dr. ANTONI UNGIRWALI S.Hut, M.Sc.), "Ketua Pengusul" (Dr. AGUSTINUS MURDJOKO S.Hut, M.Sc.), and "Anggota Pengusul 2" (ZULFIKAR MARDIYADI S.Hut). A "Unduh Proposal" button is visible at the bottom right of the proposal details. The Windows taskbar at the bottom shows the system tray with the date "13/05/2022" and time "11:07".

## Kontrak kegiatan dengan LPPM UNIPA (di bawah)



**KONTRAK PENELITIAN TAHUN JAMAK  
PENELITIAN TERAPAN  
Tahun Anggaran 2021  
Nomor : 316 /UN42.15/PG/2021**

Pada hari ini Senin tanggal 28 bulan Juni tahun Dua Ribu Dua Puluh Satu, kami yang bertandatangan di bawah ini :

- 1. Prof. Dr. Ir. Budi Santoso, MP** : Ketua LPPM, Universitas Papua, dalam hal ini bertindak untuk dan atas nama Universitas Papua, yang berkedudukan di Jl. Gunung Salju Amban Manokwari Kode Pos 98314 Email: lp2m@unipa.ac.id untuk selanjutnya disebut **PIHAK PERTAMA**;
- 2. Dr. Agustinus Murdjoko, S.Hut, M.Sc** : Dosen Fakultas Kehutanan Universitas Papua, dalam hal ini bertindak sebagai pengusul dan Ketua Pelaksana Penelitian Tahun Anggaran 2021 untuk selanjutnya disebut **PIHAK KEDUA**.

**PIHAK PERTAMA** dan **PIHAK KEDUA**, secara bersama-sama sepakat mengikatkan diri dalam suatu Kontrak **Penelitian Terapan** Tahun Anggaran 2021 dengan ketentuan dan syarat-syarat sebagai berikut:

**Pasal 1  
Ruang Lingkup Kontrak**

**PIHAK PERTAMA** memberi pekerjaan kepada **PIHAK KEDUA** dan **PIHAK KEDUA** menerima pekerjaan tersebut dari **PIHAK PERTAMA**, untuk melaksanakan dan menyelesaikan **Penelitian Terapan Tahun Tunggal** Tahun Anggaran 2021 dengan judul **“Indikasi Geografi HHBK Buah Hitam Berbasis Tipologi Pemanfaatan Sebagai Dasar Pengembangan Pangan Lokal Unggulan Di Kabupaten Teluk Wondama”**.

**Pasal 2  
Dana Penelitian**

- (1) Besarnya dana untuk melaksanakan penelitian dengan judul sebagaimana dimaksud pada Pasal 1 adalah sebesar Rp. 127.992.000 (Seratus Dua Puluh Tujuh Juta Sembilan Ratus Sembilan Puluh Dua Ribu Rupiah) sudah termasuk pajak.
- (2) Dana Penelitian sebagaimana dimaksud pada ayat (1) dibebankan pada Daftar Isian Pelaksanaan Anggaran (DIPA) Direktorat Sumber Daya, Direktorat Jenderal Pendidikan Tinggi, Kementerian Pendidikan, Kebudayaan, Riset dan Teknologi Tahun Anggaran 2021 Nomor SP DIPA-023.17.1.690439/2021 revisi ke-04, tanggal 4 Juni 2021.

### **Pasal 3**

#### **Tata Cara Pembayaran Dana Penelitian**

- (1) **PIHAK PERTAMA** akan membayarkan Dana Penelitian kepada **PIHAK KEDUA** secara bertahap dengan ketentuan sebagai berikut:
- a. Pembayaran Tahap Pertama sebesar 90% dari total dana penelitian yaitu  $90\% \times \text{Rp. } 127.992.000 = \text{Rp.115.192.800}$  (Seratus Lima Belas Juta Seratus Sembilan Puluh Dua Ribu Delapan Ratus Rupiah), yang akan dibayarkan oleh **PIHAK PERTAMA** kepada **PIHAK KEDUA** setelah **PARA PIHAK** membuat dan melengkapi rancangan pelaksanaan penelitian yang memuat judul penelitian, pendekatan dan metode penelitian yang digunakan, data yang akan diperoleh, anggaran yang akan digunakan, dan tujuan penelitian berupa luaran yang akan dicapai.
  - b. Pembayaran Tahap Kedua sebesar 10% dari total dana penelitian yaitu  $10\% \times \text{Rp. } 127.992.000 = \text{Rp.12.799.200}$  (**Dua Belas Juta Tujuh Ratus Sembilan Puluh Sembilan Ribu Dua Ratus Rupiah**), dibayarkan dibayarkan setelah **PIHAK KEDUA** mengunggah catatan harian laporan komprehensif pelaksanaan penelitian, laporan akhir, capaian hasil, poster, artikel ilmiah dan profile, pada tanggal 16 November 2021 dan menyerahkan hard copy laporan akhir, 1 keping CD dan SPTB 100% yang asli masing-masing satu eksemplar agar dimasukkan ke LPPM paling lambat tanggal 19 November 2021.
  - c. Pembayaran Tahun Kedua dan Tahun Ketiga mengikuti Mekanisme pembayaran sebagai mana dimaksud pada huruf a dan b dengan ketentuan akan diberikan jika sesuai dengan hasil penelitian capaian tahun pertama yang dilakukan oleh Komite Penilaian Keluaran dan/atau *Reviewer* Keluaran Penelitian.
- (2) Dana Penelitian sebagaimana dimaksud pada ayat (1) akan disalurkan oleh **PIHAK PERTAMA** kepada **PIHAK KEDUA** ke rekening sebagai berikut:

Nama	: Agustinus Murdjoko
Nomor Rekening	: 1540005094937
Nama Bank	: Mandiri

- (3) **PIHAK PERTAMA** tidak bertanggung jawab atas keterlambatan dan/atau tidak terbayarnya sejumlah dana sebagaimana dimaksud pada ayat (1) yang disebabkan karena kesalahan **PIHAK KEDUA** dalam menyampaikan data peneliti, nama bank, nomor rekening, dan persyaratan lainnya yang tidak sesuai dengan ketentuan.

### **Pasal 4**

#### **Jangka Waktu**

Jangka waktu pelaksanaan penelitian sebagaimana dimaksud dalam Pasal 1 sampai selesai 100%, adalah terhitung sejak **Tanggal 3 April 2021** dan berakhir pada **Tanggal 16 November 2021**.

## **Pasal 5**

### **Target Luaran**

- (1) **PIHAK KEDUA** berkewajiban untuk mencapai target luaran wajib penelitian berupa <sebutkan target luaran tambahanyang dijanjikan pada proposal>.
- (2) **PIHAK KEDUA** diharapkan dapat mencapai target luaran tambahan penelitian berupa <sebutkan target luaran tambahanyang dijanjikan pada proposal>.
- (3) **PIHAK KEDUA** berkewajiban untuk melaporkan perkembangan pencapaian target luaran sebagaimana dimaksud pada ayat (1) kepada **PIHAK PERTAMA**.

## **Pasal 6**

### **Hak dan Kewajiban Para Pihak**

- (1) Hak dan Kewajiban **PIHAK PERTAMA**:
  - a. **PIHAK PERTAMA** berhak untuk mendapatkan dari **PIHAK KEDUA** luaran penelitian sebagaimana dimaksud dalam Pasal 7;
  - b. **PIHAK PERTAMA** berkewajiban untuk memberikan dana penelitian kepada **PIHAK KEDUA** dengan jumlah sebagaimana dimaksud dalam Pasal 2 ayat (1) dan dengan tata cara pembayaran sebagaimana dimaksud dalam Pasal 3.
- (2) Hak dan Kewajiban **PIHAK KEDUA**:
  - a. **PIHAK KEDUA** berhak menerima dana penelitian dari **PIHAK PERTAMA** dengan jumlah sebagaimana dimaksud dalam Pasal 2 ayat (1);
  - b. **PIHAK KEDUA** berkewajiban menyerahkan kepada **PIHAK PERTAMA** luaran Penelitian Berbasis Kompetensi dengan judul “Indikasi Geografi HHBK Buah Hitam Berbasis Tipologi Pemanfaatan Sebagai Dasar Pengembangan Pangan Lokal Unggulan Di Kabupaten Teluk Wondama”. dan catatan harian pelaksanaan penelitian;
  - c. **PIHAK KEDUA** berkewajiban untuk bertanggungjawab dalam penggunaan dana penelitian yang diterimanya sesuai dengan proposal kegiatan yang telah disetujui;
  - d. **PIHAK KEDUA** berkewajiban untuk menyampaikan kepada **PIHAK PERTAMA** laporan penggunaan dana sebagaimana dimaksud dalam Pasal 7.

## **Pasal 7**

### **Laporan Pelaksanaan Penelitian**

- (1) **PIHAK KEDUA** berkewajiban untuk menyampaikan kepada **PIHAK PERTAMA** berupa laporan kemajuan dan laporan akhir mengenai luaran penelitian dan rekapitulasi penggunaan anggaran sesuai dengan jumlah dana yang diberikan oleh **PIHAK PERTAMA** yang tersusun secara sistematis sesuai pedoman yang ditentukan oleh **PIHAK PERTAMA**.
- (2) **PIHAK KEDUA** berkewajiban mengunggah Laporan Kemajuan Catatan Harian Penelitian, SPTB 90% yang telah dilaksanakan ke SIMLITABMAS paling lambat **18 September 2021**.
- (3) **PIHAK KEDUA** berkewajiban menyerahkan *Hardcopy* Laporan Kemajuan dan SPTB 90% kepada **PIHAK PERTAMA**, paling lambat **20 September 2021**.
- (4) **PIHAK KEDUA** berkewajiban mengunggah Laporan Akhir, capaian hasil, Poster, artikel ilmiah, profil dan SPTB 100% pada SIMLITABMAS paling lambat **16 November 2021** (bagi penelitian tahun terakhir).  
**PIHAK KEDUA** berkewajiban menyimpan Rekapitulasi bukti Penggunaan Anggaran 100% (Asli) dan menyerahkan kepada **PIHAK PERTAMA** jika diperlukan

(5) **Laporan hasil Penelitian sebagaimana tersebut** pada ayat (4) harus memenuhi ketentuan sebagai berikut:

- a. Bentuk/ukuran kertas A4;
- b. Di bawah bagian cover ditulis:

Dibiayai oleh:  
Direktorat Sumber Daya,  
Direktorat Jenderal Pendidikan Tinggi  
Sesuai dengan Kontrak Penelitian  
Nomor: **291/E4.1/AK.04.PT/2021**

### **Pasal 8** **Monitoring dan Evaluasi**

**PIHAK PERTAMA** dalam rangka pengawasan akan melakukan Monitoring dan Evaluasi internal terhadap kemajuan pelaksanaan Penelitian Tahun Anggaran 2021 ini sebelum pelaksanaan Monitoring dan Evaluasi eksternal oleh Direktorat Sumber Daya Direktorat Jenderal Pendidikan Tinggi.

### **Pasal 9** **Penilaian Luaran**

1. Penilaian luaran penelitian dilakukan oleh Komite Penilai/*Reviewer* Luaran sesuai dengan ketentuan yang berlaku.
2. Apabila dalam penilaian luaran terdapat luaran tambahan yang tidak tercapai maka dana tambahan yang sudah diterima oleh peneliti harus disetorkan kembali ke kas negara.

### **Pasal 10** **Perubahan Susunan Tim Pelaksana dan Substansi Pelaksanaan**

Perubahan terhadap susunan tim pelaksana dan substansi pelaksanaan Penelitian ini dapat dibenarkan apa bila telah mendapat persetujuan tertulis dari Direktur Sumber Daya Direktorat Jenderal Pendidikan Tinggi, Kementerian Pendidikan, Kebudayaan, Riset dan Teknologi.

### **Pasal 11** **Penggantian Ketua Pelaksana**

- (1) Apabila **PIHAK KEDUA** selaku ketua pelaksana tidak dapat melaksanakan Penelitian ini, maka **PIHAK KEDUA** wajib mengusulkan pengganti ketua pelaksana yang merupakan salah satu anggota tim kepada **PIHAK PERTAMA**.
- (2) Apabila **PIHAK KEDUA** tidak dapat melaksanakan tugas dan tidak ada pengganti ketua sebagaimana dimaksud pada ayat(1), maka **PIHAK KEDUA** harus mengembalikan dana penelitian kepada **PIHAK PERTAMA** yang selanjutnya disetor ke Kas Negara.
- (3) Bukti setor sebagaimana dimaksud pada ayat (2) disimpan oleh **PIHAK PERTAMA**.

## **Pasal 12** **Sanksi**

- (1) Apabila sampai dengan batas waktu yang telah ditetapkan untuk melaksanakan Penelitian ini telah berakhir, namun **PIHAK KEDUA** belum menyelesaikan tugasnya, terlambat mengirim laporan Kemajuan, dan/atau terlambat mengirim laporan akhir, maka **PIHAK KEDUA** dikenakan sanksi administratif berupa penghentian pembayaran dan tidak dapat mengajukan proposal penelitian dalam kurun waktu dua tahun berturut-turut.
- (2) Apabila **PIHAK KEDUA** tidak dapat mencapai target luaran sebagaimana dimaksud dalam Pasal 5, maka kekurangan capaian target luaran tersebut akan dicatat sebagai hutang **PIHAK KEDUA** kepada **PIHAK PERTAMA** yang apabila tidak dapat dilunasi oleh **PIHAK KEDUA**, akan berdampak pada kesempatan **PIHAK KEDUA** untuk mendapatkan pendanaan penelitian atau hibah lainnya yang dikelola oleh **PIHAK PERTAMA**.

## **Pasal 13** **Pembatalan Perjanjian**

- (1) Apabila dikemudian hari terhadap judul Penelitian sebagaimana dimaksud dalam Pasal 1 ditemukan adanya duplikasi dengan Penelitian lain dan/atau ditemukan adanya ketidakjujuran, itikad tidak baik, dan/atau perbuatan yang tidak sesuai dengan kaidah ilmiah dari atau dilakukan oleh **PIHAK KEDUA**, maka perjanjian Penelitian ini dinyatakan batal dan **PIHAK KEDUA** wajib mengembalikan dana penelitian yang telah diterima kepada **PIHAK PERTAMA** yang selanjutnya akan disetor ke Kas Negara.
- (2) Bukti setor sebagaimana dimaksud pada ayat (1) disimpan oleh **PIHAK PERTAMA**.

## **Pasal 14** **Pajak-Pajak**

Hal-hal dan/atau segala sesuatu yang berkenaan dengan kewajiban pajak berupa PPN dan/atau PPh menjadi tanggungjawab **PIHAK KEDUA** dan harus dibayarkan oleh **PIHAK KEDUA** ke kantor pelayanan pajak setempat sesuai ketentuan yang berlaku.

## **Pasal 15** **Peralatan dan/alat Hasil Penelitian**

Hasil Pelaksanaan Penelitian ini yang berupa peralatan dan/atau alat yang dibeli dari pelaksanaan Penelitian ini adalah milik Negara yang dapat dihibahkan kepada Universitas Papua sesuai dengan ketentuan peraturan perundang-undangan.



**Pasal 16**  
**Penyelesaian Sengketa**

Apabila terjadi perselisihan antara **PIHAK PERTAMA** dan **PIHAK KEDUA** dalam pelaksanaan perjanjian ini akan dilakukan penyelesaian secara musyawarah dan mufakat, dan apabila tidak tercapai penyelesaian secara musyawarah dan mufakat maka penyelesaian dilakukan melalui proses hukum.

**Pasal 17**  
**Lain-lain**

- (1) **PIHAK KEDUA** menjamin bahwa penelitian dengan judul tersebut di atas belum pernah dibiayai dan/atau diikutsertakan pada Pendanaan Penelitian lainnya, baik yang diselenggarakan oleh instansi, lembaga, perusahaan atau yayasan, baik di dalam maupun di luar negeri.
- (2) Segala sesuatu yang belum cukup diatur dalam Perjanjian ini dan dipandang perlu diatur lebih lanjut dan dilakukan perubahan oleh **PARA PIHAK**, maka perubahan-perubahannya akan diatur dalam perjanjian tambahan atau perubahan yang merupakan satu kesatuan dan bagian yang tidak terpisahkan dari Perjanjian ini.


Perjanjian ini dibuat dan ditandatangani oleh **PARA PIHAK** pada hari dan tanggal tersebut di atas, dibuat dalam rangkap 2 (dua) dan bermeterai cukup sesuai dengan ketentuan yang berlaku, yang masing-masing mempunyai kekuatan hukum yang sama.

PIHAK PERTAMA



Prof. Dr. Ir. Budi Santoso, MP  
NIP. 1966808121994031003

PIHAK KEDUA



Dr. Agustinus Murdjoko, S.Hut, M.Sc  
NIP. 11979032320060410092





KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET, DAN TEKNOLOGI  
UNIVERSITAS PAPUA

LEMBAGA PENELITIAN DAN PENGABDIAN KEPADA MASYARAKAT

Jalan Gunung Salju Amban Manokwari–Papua Barat

Email: lp2m@unipa.ac.id

Laman: lppm.unipa.ac.id

**SURAT TUGAS**

Nomor: 436/UN42.15/PG/2021

Ketua Lembaga Penelitian dan Pengabdian kepada Masyarakat Universitas Papua menugaskan kepada:

No.	Nama	Unit Kerja	Kedudukan dalam Tim
1.	Dr. Agustinus Murdjoko, S.Hut., M.Sc.	Fakultas Kehutanan	Koordinator Tim Lapangan
2.	Dr. Antoni Ungirwalu, S.Hut., M.Sc.	Fakultas Kehutanan	Koord. Inventarisasi & Sosekbud
3.	Zulfikar Mardiyadi, S.Hut., M.Si.	Fakultas Kehutanan	Koordinator pemetaan drone dan GIS
4.	Dr. Richard Lewerisa, S.Si., M.Sc.	Fakultas MIPA	Anggota Tim Geofisik
5.	Nithanel Mikael Hendrik Benu, S.Hut.	-	Anggota Tim Inventarisasi
6.	Andi Saragih, S.Hut., M.Si.	-	Anggota Tim Pemetaan/drone
7.	Daniel C. Marlisa	-	Anggota Tim Inventarisasi

untuk melaksanakan penelitian yang berjudul “Indikasi Geografi HHBK Buah Hitam Berbasis Tipologi Pemanfaatan Sebagai Dasar Pengembangan Pangan Lokal Unggulan Di Kabupaten Teluk Wondama pada tanggal 31 Oktober – 14 November 2021.

Demikian Surat Tugas ini dibuat untuk dipergunakan sebagaimana mestinya.

Manokwari, 28 Oktober 2021

Ketua,



Prof. Dr. Ir. Budi Santoso, M.P.  
NIP. 196808121994031003

Tembusan:

1. Wakil Rektor Bidang Akademik;
2. Dekan Fakultas Kehutanan.
3. Dekan Fakultas MIPA.

### PROTEKSI ISI LAPORAN AKHIR PENELITIAN

Dilarang menyalin, menyimpan, memperbanyak sebagian atau seluruh isi laporan ini dalam bentuk apapun kecuali oleh peneliti dan pengelola administrasi penelitian

### LAPORAN AKHIR PENELITIAN MULTI TAHUN

ID Proposal: 5e0c4db7-0f9c-4244-b1c7-4f9e5bf011da  
Laporan Akhir Penelitian: tahun ke-1 dari 2 tahun

#### 1. IDENTITAS PENELITIAN

##### A. JUDUL PENELITIAN

Indikasi Geografi HHBK Buah Hitam Berbasis Tipologi Pemanfaatan Sebagai Dasar Pengembangan Pangan Lokal Unggulan Di Kabupaten Teluk Wondama

##### B. BIDANG, TEMA, TOPIK, DAN RUMPUN BIDANG ILMU

Bidang Fokus RIRN / Bidang Unggulan Perguruan Tinggi	Tema	Topik (jika ada)	Rumpun Bidang Ilmu
Lingkungan dan keanekaragaman hayati	-	Pemetaan sumberdaya lokal Papua (akustik, echosounder, sonar, remote sensing dan SIG)	Budidaya Kehutanan

##### C. KATEGORI, SKEMA, SBK, TARGET TKT DAN LAMA PENELITIAN

Kategori (Kompetitif Nasional/ Desentralisasi/ Penugasan)	Skema Penelitian	Strata (Dasar/ Terapan/ Pengembangan)	SBK (Dasar, Terapan, Pengembangan)	Target Akhir TKT	Lama Penelitian (Tahun)
Penelitian Desentralisasi	Penelitian Terapan Unggulan Perguruan Tinggi	SBK Riset Terapan	SBK Riset Terapan	4	2

#### 2. IDENTITAS PENGUSUL

Nama, Peran	Perguruan Tinggi/ Institusi	Program Studi/ Bagian	Bidang Tugas	ID Sinta	H-Index
AGUSTINUS MURDJOKO Ketua Pengusul	Universitas Papua	Kehutanan		6195074	4
Dr Dr. ANTONI UNGIRWALU S.Hut, M.Sc. Anggota Pengusul 1	Universitas Papua	Manajemen Hutan Alam Produksi	Membantu ketua tim untuk mengkoordinir kajian sistem pengetahuan dan pemanfaatan buah hitam	6024148	2
ZULFIKAR MARDIYADI S.Hut Anggota Pengusul 2	Universitas Papua	Kehutanan	Membantu ketua tim dalam mengkoordinir kajian SIG dan pemetaan penyebaran buah hitam	0	0

#### 3. MITRA KERJASAMA PENELITIAN (JIKA ADA)

Pelaksanaan penelitian dapat melibatkan mitra kerjasama, yaitu mitra kerjasama dalam melaksanakan penelitian, mitra sebagai calon pengguna hasil penelitian, atau mitra investor

Mitra	Nama Mitra
Mitra Pelaksana Penelitian	Masyarakat Lokal Pengolah dan Pemanfaat Buah Hitam
Mitra Calon Pengguna	Masyarakat Pemanfaat Lokal Buah Hitam

#### 4. LUARAN DAN TARGET CAPAIAN

##### Luaran Wajib

Tahun Luaran	Jenis Luaran	Status target capaian ( <i>accepted, published, terdaftar atau granted, atau status lainnya</i> )	Keterangan ( <i>url dan nama jurnal, penerbit, url paten, keterangan sejenis lainnya</i> )
1	Dokumen pendaftaran paten proses	Terbit nomor pendaftaran paten	

##### Luaran Tambahan

Tahun Luaran	Jenis Luaran	Status target capaian ( <i>accepted, published, terdaftar atau granted, atau status lainnya</i> )	Keterangan ( <i>url dan nama jurnal, penerbit, url paten, keterangan sejenis lainnya</i> )
1	Artikel pada Conference/Seminar Internasional	Terbit dalam Prosiding	ICTA UGM
1	Artikel di Jurnal Internasional Terindeks di Pengindeks Bereputasi	Accepted	Biodiversitas

#### 5. ANGGARAN

Rencana anggaran biaya penelitian mengacu pada PMK yang berlaku dengan besaran minimum dan maksimum sebagaimana diatur pada buku Panduan Penelitian dan Pengabdian kepada Masyarakat Edisi 12.

**Total RAB 2 Tahun Rp. 289,329,000**

**Tahun 1 Total Rp. 127,992,000**

Jenis Pembelanjaan	Item	Satuan	Vol.	Biaya Satuan	Total
Bahan	Bahan Penelitian (Habis Pakai)	Unit	2	35,700,000	71,400,000
Bahan	Barang Persediaan	Unit	2	5,077,000	10,154,000
Bahan	ATK	Paket	5	9,287,600	46,438,000

**Tahun 2 Total Rp. 161,337,000**

Jenis Pembelanjaan	Item	Satuan	Vol.	Biaya Satuan	Total
Bahan	Bahan Penelitian (Habis Pakai)	Unit	2	49,250,000	98,500,000
Bahan	Barang Persediaan	Unit	4	4,921,750	19,687,000
Bahan	ATK	Paket	5	8,630,000	43,150,000

#### 6. HASIL PENELITIAN

**A. RINGKASAN:** Tuliskan secara ringkas latar belakang penelitian, tujuan dan tahapan metode penelitian, luaran yang ditargetkan, serta uraian TKT penelitian.

Penelitian Indikasi Geografi HHBK Buah Hitam Berbasis Tipologi Pemanfaatan Sebagai Dasar Pengembangan Pangan Lokal Unggulan Di Kabupaten Teluk Wondama untuk tahun pertama menjawab dua tujuan utama dari tiga tujuan yaitu: (1) melakukan inventarisasi keanekaragaman hayati dan penyusunan taksonomi tumbuhan buah hitam sebagai spesies endemik di Kabupaten Teluk Wondama, (2) melaksanakan pemetaan lingkungan geografis potensi dan penyebaran buah hitam menggunakan aplikasi SIG-Drone, (3) menghasilkan Indikasi Geografi (IG) buah hitam berbasis

pengetahuan tradisional. Pada tahun pertama (2021) dengan adanya situasi pembatasan akibat adanya penyebaran C-19 kami merasionalisasikan kembali target tujuan khususnya untuk aspek ekologi dan sosial terhadap pemanfaatan Buah hitam oleh etnis Wandamen. Penggunaan drone sangat membantu di lapangan meskipun pembatasan membuat ruang pengambilan data pada empat Distrik secara sampling harus kami lakukan bersamaan dengan pelaksanaan inventarisasi tegakan buah hitam. Hasil pelaksanaan dibagi dalam dua tahap pelaksanaan lapangan yaitu pada awal tahun (Maret) 2021 dan tahap dua pada bulan November 2021, secara realistis baru menghasilkan satu publikasi internasional dan dua paten Kekayaan Intelektual Komunal (KIK) Sumberdaya Genetika (SDG) Buah hitam (Pi Airawi) dan KIK Pengetahuan Lokal Sagu buah hitam (Biream Tereu) untuk etnis Wandamen (sub etnis Wamesa) di 4 Distrik (Wasior, Teluk Duari, Wondiboy dan Rasiey). Sementara luaran utama lainnya dalam proses berjalan. Hasil kajian pada tahap pertama menghasilkan data base kondisi vegetasi khususnya pohon di dalam habitat buah hitam di hutan alam, hutan sekunder dan kawasan pekarangan merupakan salah satu tujuan dalam penelitian ini di mana mengungkapkan peran pohon buah hitam bagi masyarakat lokal. Indikasi Geografi HHBK Buah Hitam Berbasis Tipologi Pemanfaatan Sebagai Dasar Pengembangan Pangan Lokal Unggulan Di Kabupaten Teluk Wondama melalui strategi pengelolaan berkelanjutan diperoleh dari konsep konservasi tradisional dengan melestarikan sosial budaya etnis Wandamen. Oleh karena itu, masyarakat setempat akan tetap melakukan pengelolaan pemanfaatan secara berkelanjutan. Kemudian, habitat Buah Hitam dapat digunakan untuk mengembangkan konsep perlindungan tradisional, terutama di hutan primer. Untuk Artikel ilmiah yang dimuat di jurnal pada Internasional bereputasi dari tahapan penelitian ini sudah tercapai 1 publikasi yang terpublis di Jurnal *Floram Floresta e Ambiente* 2021; 28(3): e20210042. <https://doi.org/10.1590/2179-8087-FLORAM-2021-0042>. ISSN 2179-8087 (online) dengan judul *Floristic Composition of Buah Hitam Habitats in Lowland Tropical Mixed Forest of West Papua, Indonesia*. Sementara perolehan kekayaan intelektual yang sudah tercapai dalam kegiatan ini adalah paten Kekayaan Intelektual Komunal (KIK) Sumberdaya Genetika (SDG) Buah hitam (Pi Airawi) dan KIK Pengetahuan Lokal Sagu buah hitam (Biream Tereu) untuk etnis Wandamen adalah bagian dari tahap awal untuk selanjutnya akan menyusun Indeks Geografi (IG) Buah hitam. KIK SDG Buah hitam dan KIK Pengetahuan Lokal Sagu buah hitam telah tercatat sebagai paten yang dimiliki Kabupaten Teluk Wondama Provinsi Papua Barat yang telah diserahkan kepada Pemerintah Daerah Kabupaten Teluk Wondama dengan nomor regsiter SDG.10.2020.0000002 dan register PT.10.2020.0000012. Untuk luaran proseding internasional dan jurnal nasional lainnya saat ini masih dalam draft dan proses tahapan pelaksanaan dengan diterimanya makalah kami yang judul *Revealing the cultural heritage of Buah Hitam for culture and nature conservation in Teluk Wondama, West Papua, Indonesia* pada INTERNATIONAL CONFERENCE INDONESIAN BIOLOGY CONSORTIUM 2021 (ICKOBI 2021) tanggal 24-25 November 2021.

**B. KATA KUNCI:** Tuliskan maksimal 5 kata kunci.

Komposisi; habitat; buah hitam; pengetahuan ekologi lokal; Wandamen

Pengisian poin C sampai dengan poin H mengikuti template berikut dan tidak dibatasi jumlah kata atau halaman namun disarankan ringkas mungkin. Dilarang menghapus/modifikasi template ataupun menghapus penjelasan di setiap poin.

**C. HASIL PELAKSANAAN PENELITIAN:** Tuliskan secara ringkas hasil pelaksanaan penelitian yang telah dicapai sesuai tahun pelaksanaan penelitian. Penyajian dapat berupa data, hasil analisis, dan capaian luaran (wajib dan atau tambahan). Seluruh hasil atau capaian yang dilaporkan harus berkaitan dengan tahapan pelaksanaan penelitian sebagaimana direncanakan pada proposal. Penyajian data dapat berupa gambar, tabel, grafik, dan sejenisnya, serta analisis didukung dengan sumber pustaka primer yang relevan dan terkini.

Pengisian poin C sampai dengan poin H mengikuti template berikut dan tidak dibatasi jumlah kata atau halaman namun disarankan ringkas mungkin. Dilarang menghapus/memodifikasi template ataupun menghapus penjelasan di setiap poin.

**C. HASIL PELAKSANAAN PENELITIAN:** Tuliskan secara ringkas hasil pelaksanaan penelitian yang telah dicapai sesuai tahun pelaksanaan penelitian. Penyajian dapat berupa data, hasil analisis, dan capaian luaran (wajib dan atau tambahan). Seluruh hasil atau capaian yang dilaporkan harus berkaitan dengan tahapan pelaksanaan penelitian sebagaimana direncanakan pada proposal. Penyajian data dapat berupa gambar, tabel, grafik, dan sejenisnya, serta analisis didukung dengan sumber pustaka primer yang relevan dan terkini.

Berdasarkan peta jalan (road map) Penelitian Indikasi Geografi HHBK Buah Hitam Berbasis Tipologi Pemanfaatan Sebagai Dasar Pengembangan Pangan Lokal Unggulan Di Kabupaten Teluk Wondama untuk menjawab tiga tujuan yaitu: (1) melakukan inventarisasi keanekaragaman hayati dan penyusunan taksonomi tumbuhan buah hitam sebagai spesies endemik di Kabupaten Teluk Wondama, (2) melaksanakan pemetaan lingkungan geografis potensi dan penyebaran buah hitam menggunakan aplikasi SIG-Drone, (3) menghasilkan Kekayaan Intelektual Komunal (KIK) buah hitam berbasis pengetahuan tradisional. Pada tahun pertama penelitian tahun 2021 dengan adanya situasi pembatasan akibat adanya penyebaran C-19 kami merasionalisasikan kembali target dari tiga tujuan khususnya untuk aspek ekologi dan sosial terhadap pemanfaatan Buah hitam oleh etnis Wandamen. Penggunaan drone sangat membantu di lapangan meskipun pembatasan membuat ruang pengambilan data pada 4 Distrik secara sampling harus kami lakukan. Hasil pelaksanaan dibagi dalam dua tahap pelaksanaan lapangan yaitu pada awal tahun (Maret) 2021 dan tahap dua pada bulan November 2021, secara realistis baru menghasilkan satu publikasi internasional dan dua paten Kekayaan Intelektual Komunal (KIK) Sumberdaya Genetika (SDG) Buah hitam (Pi Airawi) dan KIK Pengetahuan Lokal Sagu buah hitam (Biream Tereu) untuk etnis Wandamen (sub etnis Wamesa) di 4 Distrik (Wasior, Teluk Duari, Wondiboy dan Rasiey). Sementara luaran utama lainnya dalam proses berjalan. Proses olahan data penyebaran dengan analisis GIS masih berlangsung untuk tujuan publikasi dan peta penyebaran buah hitam.

Hasil kajian pada tahap pertama untuk data base kondisi vegetasi khususnya pohon di dalam habitat buah hitam di hutan alam, hutan sekunder dan kawasan pekarangan merupakan salah satu tujuan dalam penelitian ini dimana mengungkapkan peran pohon buah hitam bagi masyarakat lokal. Komposisi jenis pohon di habitat Buah hitam menunjukkan bahwa variasi di hutan primer, di hutan sekunder, dan kebun. Hutan primer di sini dicirikan sebagai hutan tropis campuran dengan banyak spesies (Murdjoko dkk., 2021). Kepadatan jenis pohon di ketiga habitat tersebut membentuk kelimpahan individu kecil sebagai proses populasi yang dinamis di hutan tropis. Habitat tersebut membentuk kondisi iklim mikro seperti sinar matahari, kerapatan, dan kelembaban serta memiliki konsekuensi pada karakter kayu masing-masing jenis pohon (Camargo & Marengo, 2017; Candido et al., 2019; Cordeiro et al., 2020; Zhang et al., 2021). Terlepas dari komposisi spesies, regenerasi spesies pohon di tiga habitat Buah Hitam berhasil dilakukan selama proses alami. Hubungan struktur vertikal pada ketiga habitat Buah Hitam meliputi semai, pohon, tiang, dan pohon, dimana individu kecil (bibit dan pohon) sebagian besar lebih besar daripada individu yang lebih besar (tiang dan pohon) yang mengindikasikan permudaan alami (Pamoengkas et al., 2019; Sales de Melo dkk., 2019; Siminski dkk., 2021). Dari hasil penelitian ini, masyarakat telah mengetahui peran buah hitam secara budaya, sehingga mereka dengan sengaja menanam di kawasan hutan sekunder yang adalah bekas perkebunan berpindah dan pekarangan sekitar tempat tinggal. Dalam komunitas masyarakat skala lokal, etnis Wandamen memiliki identitas dan entitas dalam proses pemanfaatan pangan buah hitam (*Haplolobus monticola*) dan masih dipertahankan hingga saat ini (Ungirwalu dkk, 2016; Ungirwalu dkk 2017). Berdasarkan observasi dan wawancara bahwa Buah Hitam sering diambil oleh kelelawar sebagai makanan, penduduk setempat menggunakan pengendalian hama tradisional yang dikenal sebagai api-ami dan kabareru, yang merupakan bagian dari pengetahuan ekologi tradisional di daerah tersebut (Ungirwalu et al., 2017). Secara ekologi, pohon buah hitam menjalankan proses regenerasi secara alami dengan baik yang dapat dilihat dari keberadaan semai dan pancang di hutan alam. Selain itu, proses perkecambahan dari biji juga tidak mengalami hambatan, sehingga ketika biji tersebut diletakkan di kawasan hutan sekunder maupun pekarangan dapat tumbuh menjadi semai dalam keadaan baik. Kondisi ini dapat dilihat pada keberadaan pohon buah hitam di ketiga lokasi tersebut yang diidentifikasi sebagai habitat pohon buah hitam yang dapat dijadikan rujukan utama dalam menyusun dokumen Indeks Geografi (IG) Buah hitam di Kabupaten Teluk Wondama.

**D. STATUS LUARAN:** Tuliskan jenis, identitas dan status ketercapaian setiap luaran wajib dan luaran tambahan (jika ada) yang dijanjikan pada tahun pelaksanaan penelitian. Jenis luaran dapat berupa publikasi, perolehan kekayaan intelektual, hasil pengujian atau luaran lainnya yang telah dijanjikan pada proposal. Uraian status luaran harus didukung dengan bukti kemajuan ketercapaian luaran sesuai dengan luaran yang dijanjikan. Lengkapi isian jenis luaran yang dijanjikan serta unggah bukti dokumen ketercapaian luaran wajib dan luaran tambahan melalui Simlitabmas mengikuti format sebagaimana terlihat pada bagian isian luaran

Untuk Artikel ilmiah yang dimuat di jurnal pada Internasional bereputasi dari tahapan penelitan ini sudah tercapai 1 publikasi yang terpublis dapad Jurnal Floram Floresta e Ambiente 2021; 28(3): e20210042. <https://doi.org/10.1590/2179-8087-FLORAM-2021-0042>. ISSN 2179-8087 (online) dengan judul Floristic Composition of Buah Hitam Habitats in Lowland Tropical Mixed Forest of West Papua, Indonesia. Sementara perolehan kekayaan intelektual yang sudah tercapai dalam kegiatan ini adalah peten Kekayaan Intelektual Komunal (KIK) Sumberdaya Genetika (SDG) Buah hitam (Pi Airawi) dan KIK Pengetahuan Lokal Sagu buah hitam (Biream Tereu) untuk etnis Wandamen adalah bagian dari tahap awal untuk selanjutnya akan menyusun Indeks Geografi (IG) Buah hitam. KIK SDG Buah hitam dan KIK Pengetahuan Lokal Sagu buah hitam telah tercatat sebagai paten yang dimiliki Kabupaten Teluk Wondama Provinsi Papua Barat yang tercatat dan telah diserahkan kepada Pemerintah Daerah Kabupaten Teluk Wondama dengan nomor regsiter SDG.10.2020.0000002 dan register PT.10.2020.0000012. Untuk luaran proseding internasional dan jurnal nasional saat ini masih dalam proses tahapan pelaksanaan dengan diterimanya makalah kami yang judul Revealing the cultural heritage of Buah Hitam for culture and nature conservation in Teluk Wondama, West Papua, Indonesia pada INTERNATIONAL CONFERENCE INDONESIAN BIOLOGY CONSORTIUM 2021 (ICKOBI 2021) tanggal 24-25 November 2021,.

**E. PERAN MITRA:** Tuliskan realisasi kerjasama dan kontribusi Mitra baik *in-kind* maupun *in-cash* (jika ada). Bukti pendukung realisasi kerjasama dan realisasi kontribusi mitra dilaporkan sesuai dengan kondisi yang sebenarnya. Bukti dokumen realisasi kerjasama dengan Mitra diunggah melalui Simlitabmas mengikuti format sebagaimana terlihat pada bagian isian mitra

Kerjasama yang terbangun dengan mitra masyarakat etnis Wandamen khususnya sub etnis Wamesa di keempat Distrik (Wasior, Teluk Duari, Wondiboy dan Rasiey) pada tahun pertama dapat berjalan walaupun dengan keterbatasan untuk pertemuan langsung. Komunikasi kami tetap berjalan dengan baik terutama pada saat terjun ke lapangan dalam pengambilan data dan pendokumentasian proses pembuatan dan pemanfaatan buah hitam. Selama penyusunan dokumen KIK buah hitam dan Sagu buah hitam kami melibatkan Badan Penelitian dan Pengembangan Provinsi Papua Barat dan Kantor Wilayah Papua Barat Kementerian Hukum dan Hak Asasi Manusia RI dalam menyusun dan menuskuln dokumen peten Buah hitam dan Sagu Bauh hitam. Selanjutnya pada pelaksanaan seremoni penyerahan surat pencatatan kekayaan intelektual komunal kepada beberapa kabupaten pada saat Peringatan Hari Ulang Tahun Provinsi Papua Barat ke – 21 Tanggal 12 Oktober 2020 beberapa waktu lalu. Saat kami juga melibatkan beberapa peneliti dari kampus terkait kolaborasi penelitian karena luasan dan jangkauan kajian di 13 distrik Kabupaten Teluk Wondama cukup luas dan sulit sehingga data komperenhensif terkait biofisik dan kimia serta sosial-budaya dapat dilakukan bersamaan dengan penelitian ini.

**F. KENDALA PELAKSANAAN PENELITIAN:** Tuliskan kesulitan atau hambatan yang dihadapi selama melakukan penelitian dan mencapai luaran yang dijanjikan, termasuk penjelasan jika pelaksanaan penelitian dan luaran penelitian tidak sesuai dengan yang direncanakan atau dijanjikan.

Kendala utama adalah selama tahun 2020-2021 penyebaran Covid-19 dengan adanya pembatasan wilayah di berbagai tempat di seluruh Indonesia, Hal ini tentunya sangat berpengaruh pada pelaksanaan kegiatan lapangan dan koordinasi dengan beberapa pihak terkait, terutama Pemda Kabupaten Teluk Wondama dan masyarakat lokal. Pengumpulan data untuk analisis tanah dan GIS pada laboratorium tersertifikasi standar sulit dilakukan dengan adanya pembatasan sehingga beberapa rencana publikasi kami terhambat dengan belum keluarnya data dan analisis tersebut.



**G. RENCANA TINDAK LANJUT PENELITIAN:** Tuliskan dan uraikan rencana tindak lanjut penelitian selanjutnya dengan melihat hasil penelitian yang telah diperoleh. Jika ada target yang belum diselesaikan pada akhir tahun pelaksanaan penelitian, pada bagian ini dapat dituliskan rencana penyelesaian target yang belum tercapai tersebut.

Sesuai dengan peta jalan yang direncanakan dalam penelitian ini tahap analisis biofisik berupa analisis vegetasi berbasis penyebaran menggunakan GIS/Drone masih kami lakukan khususnya untuk 4 distrik awal dan 9 distrik lainnya yang akan difokuskan untuk pelaksanaan kegiatan tahun ke-2 sangat bergantung pada kondisi pandemi tahun 2022 yang diharapkan tidak terjadi pembatasan skala besar (lockdown). Penyusunan HKI Indeks Geografi (IG) berbasis pemanfaatan sudah kami siapkan untuk diajukan berdasarkan pada lokus penyebaran dan pemanfaatan menurut kearifan lokal dalam sub enis Wandamen, terutama pada wilayah pulau-pulau dan tanah besar. Jarak dan transport yang digunakan untuk mencapai lokasi pada wilayah distrik di Palau sangat bergantung pada kondisi cuaca dan ketersediaan BBM (pada waktu tertentu terjadi kelangkaan) karena lokasinya hanya dapat dijangkau dengan sarana transportasi laut. Pelibatan beberapa peneliti lain dari kampus di lingkungan UNIPA terkait kolaborasi penelitian karena luasan dan jangkauan kajian di 13 distrik Kabupaten Teluk Wondama cukup luas dan sulit sehingga pengambilan data komperenhsif terkait biofisik dan kimia serta sosial-budaya dapat dilakukan bersamaan dengan penelitian ini.

**H. DAFTAR PUSTAKA:** Penyusunan Daftar Pustaka berdasarkan sistem nomor sesuai dengan urutan pengutipan. Hanya pustaka yang disitasi pada laporan akhir yang dicantumkan dalam Daftar Pustaka.

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Dokumen pendukung luaran Wajib #1

Luaran dijanjikan: Paten proses

Target: Terbit nomor pendaftaran paten

Dicapai: Draft

Dokumen wajib diunggah:

1. Dokumen Draft

Dokumen sudah diunggah:

-

Dokumen belum diunggah:

1. Dokumen Draft

Dokumen "" tidak ditemukan.

Dokumen pendukung luaran Tambahan #1

Luaran dijanjikan: Artikel di Jurnal Internasional Terindeks di Pengindeks Bereputasi

Target: Accepted

Dicapai: Published

Dokumen wajib diunggah:

1.

Dokumen sudah diunggah:

1. Artikel yang terbit

Dokumen belum diunggah:

-

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DOI: <https://doi.org/10.1590/2179-8087-FLORAM-2021-0042>


## Floristic Composition of *Buah Hitam* Habitats in Lowland Tropical Mixed Forest of West Papua, Indonesia


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Dony Aristone Djitmau<sup>1,2</sup> 

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### Abstract

The biotic factors in tropical lowland forests, especially vegetation, are essential for the sustainable management of forest products. The study aimed to investigate the species richness and diversity of trees in *Buah Hitam* habitats, and study the tree communities formed by tree species by collecting the data from the habitats of *Buah Hitam* in *Wondama* Bay, West Papua, Indonesia viz. primary forest, secondary, and the garden with plots 9, 9, and 8 respectively. The species richness and diversity were higher in the primary forest than that in the secondary and garden. Tree communities indicated that the primary forest differed from the secondary and garden. The habitat types have been shaped as a result of anthropogenic activities for decades. This finding is necessary to set the consensual programs by the government and local people particularly in conservation and sustainable management for the three habitats.

**Keywords:** Bird's Head Peninsula, Dendrogram, *Haplolobus*, tree community, PAleontological STatistic

## 1. INTRODUCTION

Understanding the ecological and phytogeographical factors influencing the distribution of diversity in a certain area is imperative (Jung et al., 2020; Pan et al., 2013; Slik et al., 2018). This study focused on tropical forest, as it exhibits hyper diversity under topographical conditions. In addition, the lowland tropical rainforests constitute high biodiversity in terms of the composition of faunal and floral species (Levi et al., 2019; Lugo, 2009). Biodiversity produces some benefits such as the production of timber and non-timber (Villaseñor et al., 2018; Zimmerman & Kormos, 2012). Therefore, the local community as a social factor has been part of the forest, because they have lived and utilized the forest for generations. Most of these practices are based on their local knowledge, which takes into account the sustainability of the forest as a natural

resource (Page et al., 2016). By using the method, they have developed traditional concepts of local knowledge for generations. Subsequently, it is part of the interaction between people and forests, in which their livelihood depends on the forest as a natural resource (Armatas et al., 2016; Ungirwalu et al., 2017). Recently, the area in the lowland tropical rainforests is mainly threatened by disturbance, in particular by anthropogenic factors, mainly due to socio-economic development and implemented by the government through empowerment programs, especially in developing countries (Paiva et al., 2020).

Papua is part of the rainforest that contains widespread tropical ecosystems, from coastal to alpine areas (Cámara-Leret et al., 2020; Fatem et al., 2020; Kuswandi et al., 2015; Murdjoko et al., 2020, 2021). The local communities have frequently interacted with forests for centuries leading to the development of their knowledge. Non-wood forest products are one of the forest services necessary for their survival, such as nutritional needs, ornamental purposes, etc

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(Cámara-Leret, Raes, et al., 2019; Cámara-Leret & Dennehy, 2019; Gaveau et al., 2021). The *Buah Hitam* is a non-wood forest product that has benefited the local *Wandamen* ethnic groups, in particular, living in the part of the eastern part of the Bird's Head Peninsula in *Wondama Bay* (Ungirwalu, 2019; Ungirwalu et al., 2016, 2017, 2014). Furthermore, it is taxonomically described as a species of the genus *Haplolobus* in which the accepted name of Latin botanical names is still debated. The *Haplolobus* sp was described because the specific morphological characters differed from the accepted species, such as *Haplolobus floribundus* (K.Schum.) and H.J.Lam *Haplolobus monticola* Husson. Then, the *Buah Hitam* was referred to as this species. The traditional use of *Buah Hitam* has shown the local knowledge of ethno-techno-conservation concepts by ethnic *Wandamen* (Ungirwalu et al., 2017). This concept is one of the examples of the application of sustainable management by local communities in tropical rainforests. Hence, it is necessary to study the habitat of *Buah Hitam* by using an ecological approach, with little knowledge of the *Buah Hitam* ecological habitat.

Ethnic *Wandamen* grouped the habitats of *Buah Hitam* in this area, generally in lowland location. Then, the location was divided into three groups based on the information, which are primary forest, secondary forest, and garden (Ungirwalu, 2019; Ungirwalu et al., 2018). All habitats are characterized by the high density of vegetation particularly trees as the main structure. Thus, the environmental condition was different among the habitats, presumably affecting the species guild of tree, species composition, and structure (Murdjoko et al., 2021). Consequently, the ecological process was hypothesized in the three habitats of *Buah Hitam* varies. Subsequently, this investigation focused mostly on tree species comprising the habitat of *Buah Hitam* in *Wondama Bay*. So, the tree structure of floristic diversity, tree species richness, and tree community remained scientifically unknown. Moreover, an understanding of the species composition and species guilds in forest ecosystems is essential in order to set up suitable programs for sustainable forest management.

The specific objectives of this research were to, (1) investigate the species richness and diversity of trees in *Buah Hitam* habitats, and (2) study the tree communities formed by tree species. The results can be used to support scientific information of non-timber forest product management in

tropical rainforest and direct conservation programs based on the traditional concept since the forest is part of the customary forest of ethnic *Wandamen*.

## 2. MATERIAL AND METHODS

### 2.1. Study Area

This study was conducted in the eastern part of Bird's Head Peninsula and the locations were selected by considering the activity of the local community in utilizing the *Buah Hitam* (Figure 1). The four areas were selected to place the plots and they were administratively located in four districts of the Teluk Wondama Regency viz. *Wasior* (*Rado*, 2°40'18.06"S, 134°30'17.33"E), *Wondiboi* (*Kaibi*, 2°48'14.19"S, 134°31'59.08"E), *Rasiey* (*Tandia*, 2°50'32.28"S, 134°32'31.27"E), and *Duari* (*Sobey*, 2°33'16.20"S, 134°28'39.67"E). The four locations of the study area were mainly in lowland forest with elevation 24-98 m above sea level and close to the sea in western and northern parts while the southern part was the coastal area of Teluk Wondama Regency (Two districts: *Kuri* and *Idoor*) and the eastern part of Wondiwoi Mountains (Nature Reserve) (Ungirwalu et al., 2018). The study area was divided ecologically into three habitats of *Buah Hitam* namely primary forest, secondary forest, and the garden. The primary forest was the characteristic of the old-growth forest where anthropogenic intervention was infrequent. The secondary forest was a re-growth forest resulting from the fallow swidden whilst garden was the location nearby home with vegetation area formed by utilizing the useful plant grow naturally or artificially without agricultural treatments. The information regarding the *Buah Hitam* habitats was obtained by applying the Snowball sampling during an interview with local people. The locations were predominantly inhabited by ethnic groups of *Wandamen* consisting of subethnic groups namely *Wamesa*, *Kuri*, *Miere*, *Mairasi/Toro*, *Ambumi*, and *Dusner* (Ungirwalu et al., 2018). They have been utilizing *Buah Hitam* as part of their life for generations in which they also apply the local wisdom as part of traditionally sustainable management of *Buah Hitam*. Most of the local people depend on natural resources for their livelihood, as used by the traditional farmers in swidden (Ungirwalu et al., 2017).



**Figure 1.** The four locations of the research study on the main map (white boxes).

The locations are mainly characterized by tropical mixed forests with a large number of families and species of vegetation, of which tree species were the main structure (Murdjoko et al., 2021; Ungirwalu, 2019). Alluvial soil was the major species at the sites, with raw organic material ranging from 1.1 % to 2.33 % (C-organic), cation exchange capacity (CEC) was around 5.23-11.56 meq/100g, nitrogen (N-total) was from 0.12-0.19 % and Soil pH was about 4.51-6.14 (Ungirwalu et al., 2018). The climate data of mean temperature and mean humidity were 26.4°C (23.3 °C and 31.2 °C, minimal and maximum) and 86.4 % (64.4 % and 97.6 %, minimal and maximum), respectively (Badan Pusat Statistik Kota Teluk Wondama, 2019).

## 2.2. Sampling and vegetation observation

Twenty-six samples of the plots, which consists of 9 plots in primary forest, 9 plots in secondary, and 8 plots in the garden were placed. The distribution of plots based on locations were *Wasior* (2 plots for each primary forest, secondary forest, and garden), *Wondiwoi* (2 plots for each primary forest, secondary forest, and garden), *Rasiey* (3 plots for each primary forest,

and secondary forest, 2 plots in garden), and *Duari* (2 plots for each primary forest, secondary forest, and garden). The plot size was 20 m x 20 m for tree data with a diameter above 20 cm and there were three subplots inside the main plot to collect data of pole as categorized with diameter between 10-20 cm (10 m x 10 m), plot with size 5 m x 5 m was used for the collection of sapling as categorized with a height taller than 1.5 m, and plot with size 2 m x 2 m was used for the collection of seedling as categorized with the height less than 1.5 m. The plots were set purposively with a minimal distance of at least 100 m in the habitat of *Buah Hitam* in primary forest, secondary, and garden. The data was collected in the form of taxonomic information (family and species), the number of individuals, and diameter (cm). The species and family were obtained from voucher identified in Herbarium *Papuaense* of "Balai Penelitian dan Pengembangan Lingkungan Hidup dan Kehutanan (BP2LHK) Manokwari" and Herbarium *Manokwariense* (MAN) Pusat Penelitian Keanekaragaman Hayati Universitas Papua (PPKH-UNIPA), Manokwari. The scientific names of the tree were based on The Plant List (TPL) (<http://www.theplantlist.org>) and Taxonomic Backbone of the World Flora Online (WFO) ([www.worldfloraonline.org](http://www.worldfloraonline.org)).

### 2.3. Data analysis

Tree species richness and diversity. The tree vegetation in the primary forest, secondary, and garden were compared by applying the sample rarefaction (Mao's tau) by setting a matrix of presence-absence data abundance (Taxa S using 95 % confidence). The species accumulation curve was performed to describe the species number in three habitats over the number of individuals (Colwell et al., 2004). The Shannon-Wiener index ( $H'$ ) and Pielou's evenness ( $J'$ ) were implemented to analyze the species richness and evenness (Shannon, 1948; Spellerberg & Fedor, 2003). The Species abundance curve or Whittaker plot in primary forest was applied to analyze the dominant families and the tree species (Peet, 2007; Whittaker, 1972). The abundance of individuals based on families and tree species was in vertical axis with the rank of families and species in descending order in horizontal axis.

Tree community. The tree species were grouped by executing Dendrogram and discussing the tree species growing along with *Buah Hitam*. The graphs of individuals of tree species against diameter class (cm) were employed by dividing them into 7 diameter classes with an interval of 10 cm. To depict statistically the relationship between tree density and *Buah Hitam* density, the linear regression was computed with the correlation, then 95 % of the confidence interval in the regression graph was calculated and shown using tree density as an independent variable and *Buah Hitam* density as the dependent variable. The multivariate analysis of Correspondence Analysis (CA) was instigated to examine the tree communities by considering the plots of three habitats in two axes on the graph of CA (Vleminckx et al., 2015). The vertical structure of the three habitats was displayed by comparing the density proportion of seedlings, saplings, poles, and trees in the graphs. The data was analyzed by operating the (PAleontological STatistics) software version 4.03 as a freeware data analyzer (Hammer et al., 2001).

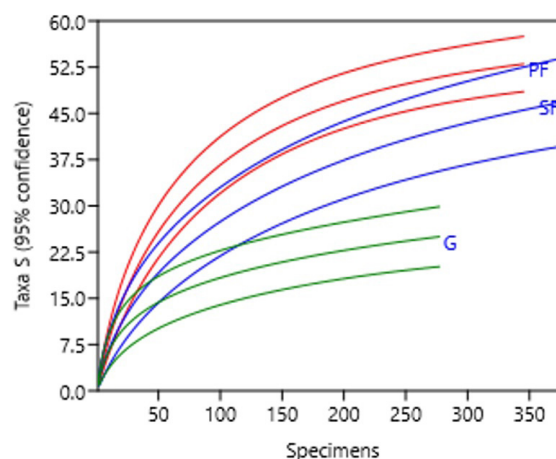
## 3. RESULTS

### 3.1. Taxonomic richness and diversity in three types of *Buah Hitam* habitat

The data were described as 1003 individuals of vegetation, 33 families, and 83 species of trees. The individuals distributed in primary forest, secondary, and garden were 345, 381, and 277 respectively. The highest distribution of taxonomic groups for family was in the secondary forest (26 families), followed by families in the primary forest (24 families), and

the lowest number of families was in the garden (16 families). There was a decrease in species number from primary forest (53 species), secondary forest (47 species), and garden (25 species) (Figure 3 on the left side). The Sample rarefaction showed the number of species growth with the increase in the number of individuals (Specimens) in three habitats of *Buah Hitam* (Figure 2). The three species curves displayed the non-linear model in which the growth started early and predictably reached a plateau as optimal species number during the data collection. This investigation focused on tree species as structural vegetation of *Buah Hitam* habitat in the three locations.

The species richness of the tree vegetation in the tree locations was defined by means of Shannon wiener index ( $H'$ ), while the species evenness was expressed as Pielou's evenness index ( $J'$ ) shown in Figure 3 on the right side. The tree species richness displayed the decrease between locations of primary forest and secondary and then there was a gradual increase in garden but lower than the primary forest.



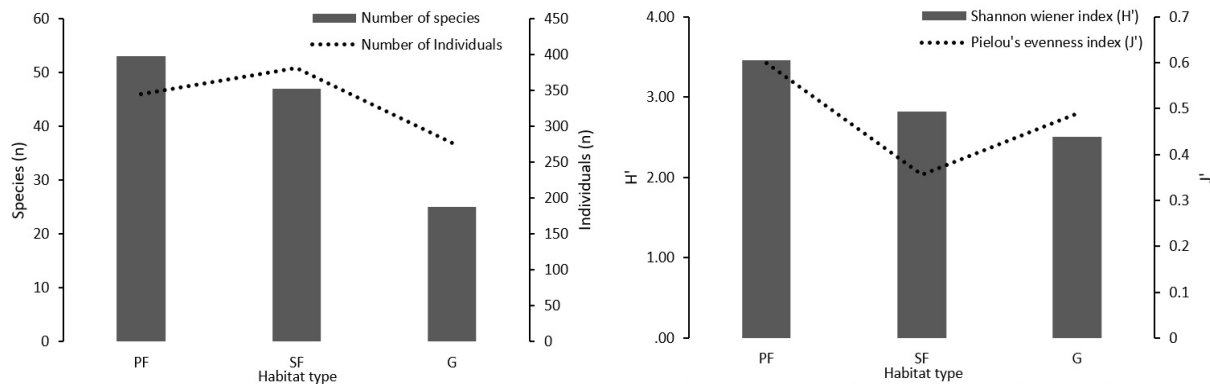
**Figure 2.** The number of species against the number of individuals (specimens) using Sample rarefaction (Mao's tau) in primary forest (PF) and secondary forest (SF), and Garden (G). The confidence intervals for the three species curve were 95 percent.

Species density was ranked in three habitats in ascending order, as shown in Figure 4. The *Haplolobus* sp was the dominant species in the three habitats with the variation of density. The dominant family in the three habitats was *Burseraceae* based on the number of individuals and species (Figure 4). The highest density was in the secondary forest in which the dominant species were more or less than 120 individuals. The dominant species in the garden was about 65 individuals, and the dominant species in the primary forest was approximately 45 individuals. The dominance of families and tree species in three habitats has been shown

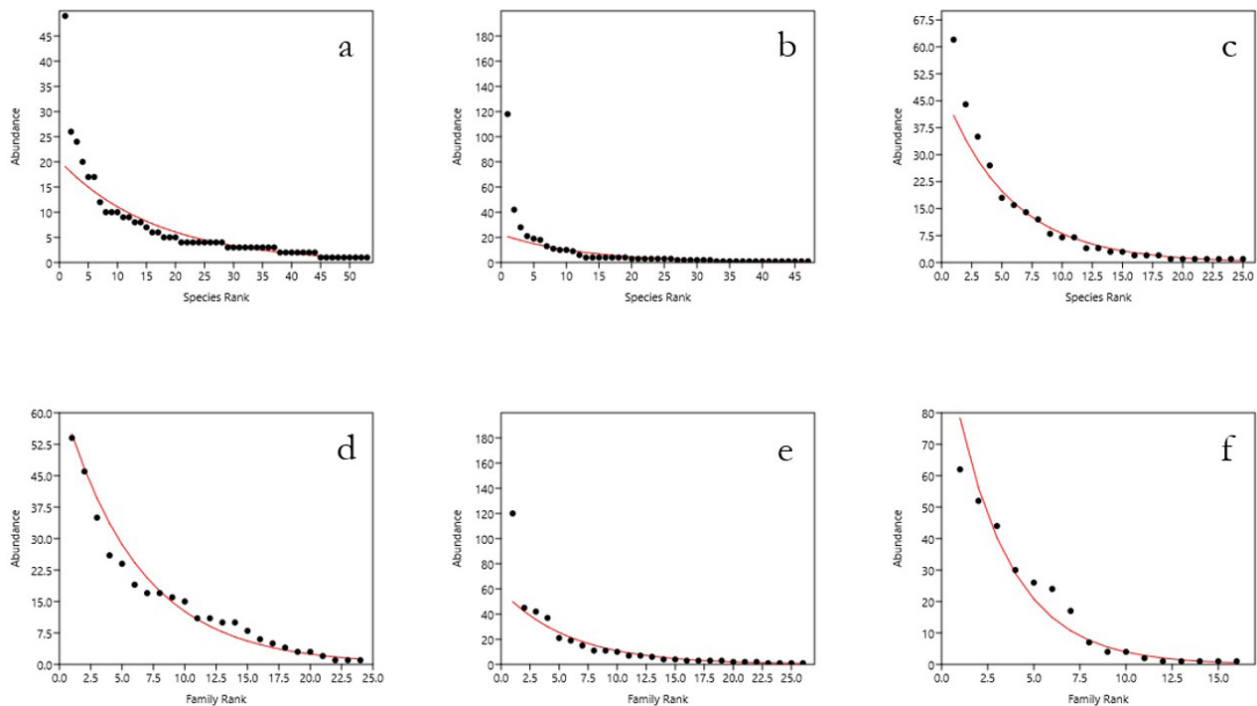


for ten families and species, the composition of which varies between the three locations, as shown in Figure 4 below for the dominant family and above the dominant species. The five dominant families in primary forest were *Burseraceae*, *Sapindaceae*, *Myristicaceae*, *Meliaceae*, and *Moraceae*. The top five families in the secondary forest were *Burseraceae*, *Moraceae*, *Meliaceae*, *Sapindaceae*, and *Lamiaceae*. The garden was dominantly presented by families of *Burseraceae*, *Sapindaceae*, *Meliaceae*, *Anacardiaceae*, and *Lamiaceae*. The five dominant species in primary forest

were *Haplolobus* sp, *Artocarpus integer* (Thunb.) Merr, *Lansium domesticum* Corrêa, *Litsea timoriana* Span and *Myristica fatua* Houtt. The secondary forest was mainly presented by *Haplolobus* sp, *Artocarpus altilis* (Parkinson ex F.A.Zorn) Fosberg, *Lansium domesticum* Corrêa, *Artocarpus heterophyllus* Lam., and *Mangifera indica* L. whilst the species of *Haplolobus* sp, *Lansium domesticum* Corrêa, *Mangifera indica* L, *Nephelium lappaceum* L, and *Syzygium malaccense* (L.) Merr. & L.M.Perry grew predominantly in the garden.



**Figure 3.** Species and individual number (left) as well as Shannon-Wiener index ( $H'$ ) and Pielou's evenness index ( $J'$ ) (right) in primary forest (PF) and secondary forest (SF), and Garden (G). The bar charts use the primary axis (left scale) and the line charts use the secondary axis (right scale).

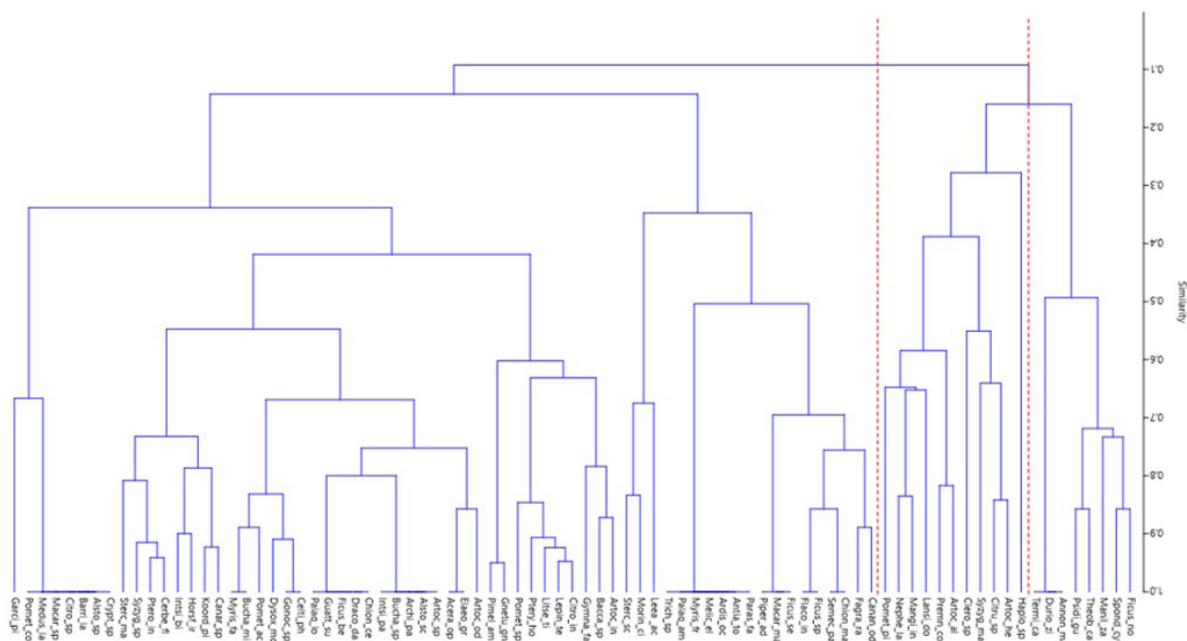


**Figure 4.** Ranking of the species abundance curve or Whittaker plot in primary forest (a) and secondary forest (b), and Garden (c). The family rank is displayed in primary forest (d) and secondary forest (e), and Garden (f). Y-axis (Abundance) is the relative abundance and X-axis (Rank) is the species and family rank.

### 3.2. Ecological group forming in Buah Hitam habitat

Tree species in tropical rainforests shaped the tree communities as part of a mixed forest. The groups were

presented here using the similarity of Dendrogram regardless of the small and larger individuals. The group of tree species showed the heterospecific association in the three habitats of *Buah Hitam*.



**Figure 5.** Dendrogram of tree species using similarity index (%). The ten species between dashed red lines have the same group as *Buah Hitam* in the three habitats. The abbreviations for species are displayed in Table 1 (Tree Species and Acronym).

**Table 1.** List of tree species (83) and family (33) in primary forest (PF) and secondary forest (SF), and Garden (G) with number represented as density.

No.	Family	Tree Species	Acronym	PF	SF	G
1	Anacardiaceae	<i>Buchania</i> sp	Bucha_sp	2		
2		<i>Buchania microphylla</i> Engl.	Bucha_mi	4		
3		<i>Dracontomelon dao</i> (Blanco) Merr. & Rolfe	Draco_da	3		
4		<i>Koordersiodendron pinnatum</i> Merr.	Koord_pi	4	2	
5		<i>Mangifera indica</i> L.	Mangi_in	6	13	27
6		<i>Semecarpus papuana</i> Lauterb.	Semec_pa		3	
7		<i>Spondias cytherea</i> Sonn.	Spond_cy		1	3
8	Annonaceae	<i>Annona manirote</i> Kunth	Annon_ma			1
9		<i>Cananga odorata</i> (Lam.) Hook.f. & Thomson	Canan_od	1	3	
10		<i>Guatteria sumatrana</i> Miq.	Guatt_su	3		
11	Apocynaceae	<i>Alstonia scholaris</i> (L.) R. Br.	Alsto_sc	2		
12		<i>Alstonia spectabilis</i> R.Br.	Alsto_sp	1		
13		<i>Cerbera floribunda</i> K.Schum.	Cerbe_fl	4	3	1
14		<i>Lepiniopsis ternatensis</i> Valetton	Lepin_te	10		
15	Burseraceae	<i>Canarium</i> sp	Canar_sp	5	2	
16		<i>Haplolobus</i> sp	Haplo_sp	49	118	62

(Continue...)

Table 1. Continued...

No.	Family	Tree Species	Acronym	PF	SF	G
17	Cannabaceae	<i>Celtis philippensis</i> Blanco	Celti_ph	5		
18	Cardiopteridaceae	<i>Citronella</i> sp	Citro_sp	1		
19		<i>Citronella incarum</i> (J.F.Macbr.) R.A.Howard	Citro_in	9		
20		<i>Gonocaryum</i> sp	Gonoc_sp	5		
21	Clusiaceae	<i>Garcinia picrorhiza</i> Miq.	Garci_pi	1	1	
22	Combretaceae	<i>Terminalia catappa</i> L.	Termi_ca			1
23	Elaeocarpaceae	<i>Aceratium oppositifolium</i> DC.	Acera_op	3	1	
24		<i>Elaeocarpus grandiflorus</i> Sm.	Elaeo_gr	3	1	
25	Euphorbiaceae	<i>Macaranga</i> sp	Macar_sp	1		
26		<i>Macaranga mappa</i> (L.) Müll.Arg.	Macar_ma		2	
27		<i>Pimelodendron amboinicum</i> Hassk.	Pimel_am	10	9	
28	Flacourtiaceae	<i>Flacourtia inermis</i> Roxb.	Flaco_in		4	
29	Gentianaceae	<i>Fagraea racemosa</i> Jack	Fagra_ra	2	3	
30	Gnetaceae	<i>Gnetum gnemon</i> L.	Gnetu_gn	10	11	
31	Lamiaceae	<i>Clerodendrum</i> sp	Clero_sp			18
32		<i>Premna corymbosa</i> Rottler & Willd.	Premn_co		21	8
33	Lauraceae	<i>Cryptocarya</i> sp	Crypt_sp	1		
34		<i>Litsea timoriana</i> Span.	Litse_ti	9	1	
35	Lecythidaceae	<i>Barringtonia lauterbachii</i> R.Knuth	Barri_la	1		
36	Leguminosae	<i>Archidendron parviflorum</i> Pulle	Archi_pa	2		
37		<i>Intsia bijuga</i> (Colebr.) Kuntze	Intsi_bi	8	2	
38		<i>Intsia palembanica</i> Miq.	Intsi_pa	2		
39		<i>Paraserianthes falcataria</i> (L.) I.C.Nielsen	Paras_fa		1	
40		<i>Pterocarpus indicus</i> Willd.	Ptero_in	4	4	1
41	Malvaceae	<i>Theobroma cacao</i> L.	Theob_ca			4
42	Malvaceae	<i>Durio zibethinus</i> L.	Durio_zi			1
43		<i>Pterygota horsfieldii</i> (R.Br.) Kosterm.	Ptery_ho	8		
44		<i>Sterculia macrophylla</i> Vent.	Sterc_ma	3	4	
45		<i>Sterculia schliebenii</i> Mildbr.	Sterc_sc		10	
46		<i>Trichospermum</i> sp	Trich_sp		1	
47	Meliaceae	<i>Dysoxylum mollissimum</i> Blume	Dysox_mo	6		
48		<i>Lansium domesticum</i> Corrêa	Lansi_do	20	42	44
49	Moraceae	<i>Antiaris toxicaria</i> Lesch.	Antia_to		1	
50		<i>Artocarpus altilis</i> (Parkinson ex F.A.Zorn) Fosberg	Artoc_al		28	14
51		<i>Artocarpus heterophyllus</i> Lam.	Artoc_he		4	7
52		<i>Artocarpus integer</i> (Thunb.) Merr.	Artoc_in	17	4	1
53		<i>Artocarpus odoratissimus</i> Blanco	Artoc_od	2	1	
54		<i>Artocarpus</i> sp	Artoc_sp	2		
55		<i>Ficus</i> sp	Ficus_sp		4	
56		<i>Ficus benjamina</i> L.	Ficus_be	3		
57		<i>Ficus nodosa</i> Teijsm. & Binn.	Ficus_no		1	2
58		<i>Ficus septica</i> Burm.f.	Ficus_se		2	
59	Myristicaceae	<i>Gymnacranthera farquhariana</i> (Hook.f. & Thomson) Warb.	Gymna_fa	24		

(Continue...)

Table 1. Continued...

No.	Family	Tree Species	Acronym	PF	SF	G
60		<i>Horsfieldia irya</i> (Gaertn.) Warb.	Horsf_ir	7	3	
61		<i>Myristica fatua</i> Houtt.	Myris_fa	4		
62		<i>Myristica fragrans</i> Houtt.	Myris_fr		1	
63	Myrtaceae	<i>Psidium guajava</i> L.	Psidi_gu			3
64		<i>Syzygium</i> sp	Syzyg_sp	4	3	2
65		<i>Syzygium malaccense</i> (L.) Merr. & L.M.Perry	Syzyg_ma	4	4	12
66	Oleaceae	<i>Chionanthus celebicus</i> Koord.	Chion_ce	3		
67		<i>Chionanthus macrocarpus</i> Blume	Chion_ma		3	
68	Phyllanthaceae	<i>Baccaurea</i> sp	Bacca_sp	17		
69	Piperaceae	<i>Piper aduncum</i> L.	Piper_ad		2	
70	Primulaceae	<i>Ardisia ochracea</i> Elmer	Ardis_oc		1	
71	Rubiaceae	<i>Morinda citrifolia</i> L.	Morin_ci		10	4
72	Rutaceae	<i>Citrus</i> sp	Citru_sp		1	7
73		<i>Melicope elleryana</i> (F. Muell.) T.G. Hartley	Melic_el		1	
74	Sapindaceae	<i>Nephelium lappaceum</i> L.	Nephe_la	3	19	35
75		<i>Pometia acuminata</i> Radlk.	Pomet_ac	4		1
76		<i>Pometia coriacea</i> Radlk.	Pomet_co	1		
77		<i>Pometia pinnata</i> J.R. Forst. & G. Forst.	Pomet_pi	26	18	16
78		<i>Pometia</i> sp	Pomet_sp	12		
79	Sapotaceae	<i>Manilkara zapota</i> (L.) P.Royen	Manil_za			2
80		<i>Palaquium amboinense</i> Burck	Palaq_am		1	
81		<i>Palaquium lobbianum</i> Burck	Palaq_lo	3		
82	Stemonuraceae	<i>Medusanthera laxiflora</i> (Miers) R.A. Howard	Medus_la	1		
83	Vitaceae	<i>Leea aculeata</i> Blume ex Spreng.	Leea_ac		6	

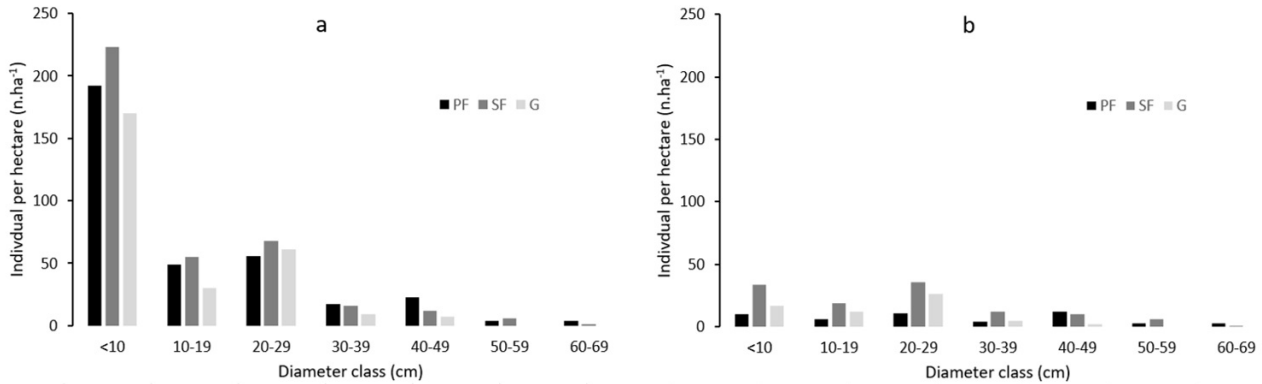
The formation of the tree community here is focused on the tree species growing around *Buah Hitam* species (Figure 5) and the acronyms of tree species were shown in Table 1. The result showed that ten species had a strong relation with *Buah Hitam* namely *Artocarpus heterophyllus* Lam., *Citrus* sp, *Sterculia schliebenii* Mildbr., *Clerodendrum* sp, *Artocarpus altilis* (Parkinson ex F.A.Zorn) Fosberg, *Premna corymbosa* Rottler & Willd., *Lansium domesticum* Corrêa, *Mangifera indica* L., *Nephelium lappaceum* L., and *Pometia pinnata* J.R. Forst. & G. Forst.

The individuals of tree species showed the reverse J-shaped model in the tree habitats of *Buah Hitam* (Figure 6 a). The individuals of tree species were distributed from small diameter to more or less 60 – 69 cm, unless for individuals in the garden in this class diameter, which was missing. In contrast, the distribution of individuals of *Buah Hitam* in the three habitats did not follow the reverse J-shaped model, but there was the availability of *Buah Hitam* in almost class diameter except the diameter larger than 50 in garden habitat. The regeneration of *Buah Hitam* was running well as the number of individuals of small and larger was available

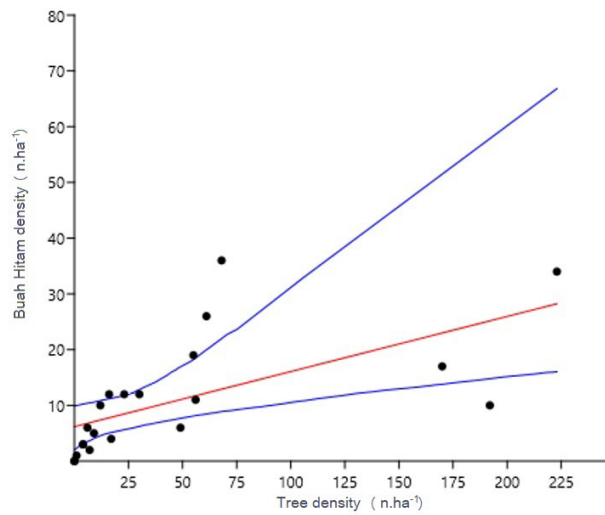
even though the number of individuals was not abundantly distributed (Figure 6 b).

Figure 7 showed that the equation model was described linearly as  $y = 0.0988x + 6.1845$ , where the indicated y was a dependent variable and x was the symbol for the independent variable. The contribution of tree density to the number of *Buah Hitam* density was explained statistically using a coefficient of determination ( $R^2$ ), in which about 40 % of the distribution of *Buah Hitam* density was expressed by tree density in the three habitats. Furthermore, 95 % of the confidence interval was applied to the linear regression as shown when the blue lines explained the upper and lower limit.

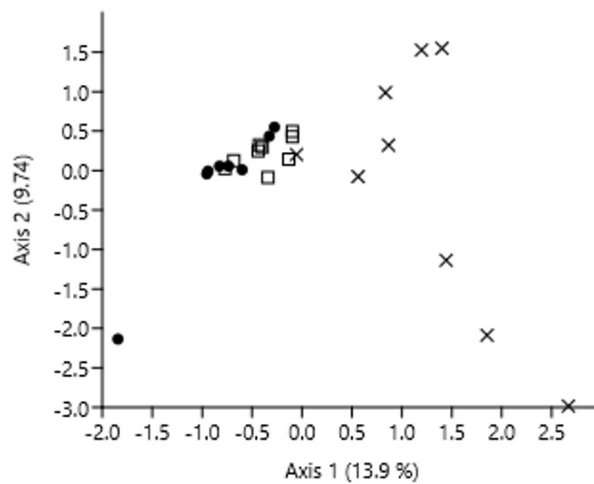
The Correspondence Analysis has displayed the tree communities form in the habitat of *Buah Hitam* as illustrated in Figure 8. The plots of primary forests seem to be distributed by creating groups unless one plot joining another group, while the plots of secondary forest and garden tend to constitute a group except for one plot of the garden. The first axis (Axis 1) explained 13.9 % of the variation in this model while the second axis (Axis 2) described 9.94 % of the variation of this model.



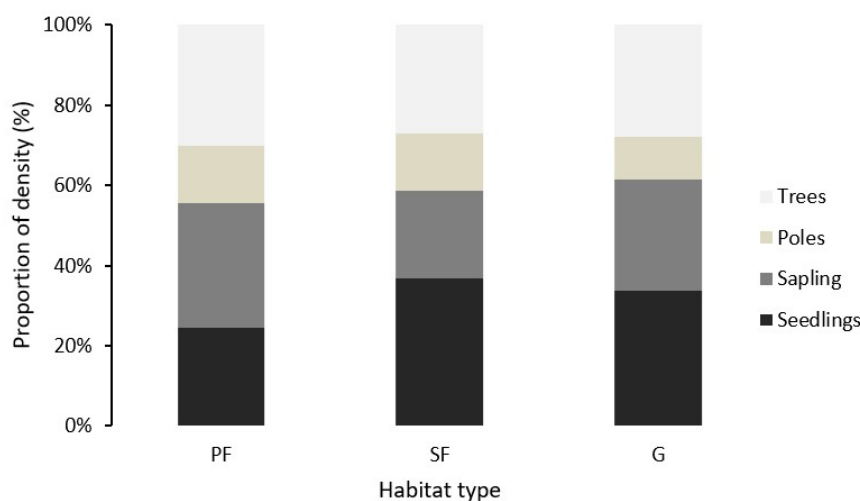
**Figure 6.** The destruction of individuals of tree species against diameter class (cm) in three habitats of *Buah Hitam* (a). Distribution of *Buah Hitam* individuals based on diameter class (cm) (b).



**Figure 7.** The correlation between tree density ( $n.ha^{-1}$ ) denoted by  $x$  and the density of *Buah Hitam* denoted by  $y$  ( $n.ha^{-1}$ ) was described as a linear model with equation  $y = 0.0988x + 6.1845$  and coefficient of determination ( $R^2$ ) = 0.3908. The 95% confidence limits (blue lines) for the average (red line) are shown in the graph. That is a tendency that the number of *Buah Hitam* increased with increasing tree density in the areas.



**Figure 8.** Correspondence Analysis of plot distribution in primary forest (x) and secondary forest (□), and Garden (●) to show the pattern of tree communities.



**Figure 9.** Density proportion of seedlings, saplings, poles, and trees in primary forest (PF) and secondary forest (SF), and Garden (G).

The structure of tree species under three habitats can be explained by specifying the density ratio. Then, the distribution of tree species in the three habitats was described by seedlings, saplings, poles, and trees as shown in Figure 9. The number of seedlings was highest in secondary forest and the lowest number of seedlings was present in primary forest. The saplings were abundantly in the primary forest followed by garden and secondary forest, respectively. The larger individuals were described using poles and trees, as the number of both seems to be more or less similar among the three habitats.

#### 4. DISCUSSION

The species composition of the trees in the habitats of *Buah Hitam* showed that variation in the primary forest, in the secondary forest, and the garden. The primary forest here is characterized as a mixed tropical forest with many species (Murdjoko et al., 2021). This biotic state in the primary forest was similar to that of the secondary forest, especially the composition of the tree species, while the garden contains fewer tree species compared to the two forests (Murdjoko et al., 2017; Tawer et al., 2021). The secondary forest is a result of the swidden activity where the rotation of agriculture was not studied intensively and the cycle is unclear during traditional crops. The ex-field of crops were normally left recovering itself during post-swidden. Therefore, the composition of species differed from the primary forest by the decreasing number of tree species. Subsequently, the garden was created through the establishment of a settlement in an area that previously functioned as a secondary forest and the

local communities have been living there for generations. Gardening is about gathering useful plants, but they have spent some time planting the vegetation extensively while making a living from the forest and other natural resources (Ungirwalu, 2019). Hence, there has been some composition of tree species growing in the garden.

The density of tree species in all three habitats formed an abundance of small individuals as a dynamic population process in the tropical forest. The habitats formed microclimate conditions such as sunlight, density, and humidity and have a consequence on the wood character of each tree species (Camargo & Marengo, 2017; Candido et al., 2019; Cordeiro et al., 2020; Zhang et al., 2021). Regardless of the species compositing, the regeneration of tree species in three habitats of *Buah Hitam* was successfully established during the natural process. The vertical structure relationship in the three habitats of *Buah Hitam* includes seedlings, trees, poles, and trees, where small individuals (seedlings and trees) were mostly larger than larger individuals (poles and trees) indicating as natural regeneration (Pamoengkas et al., 2019; Sales de Melo et al., 2019; Siminski et al., 2021)

The individuals of *Buah Hitam* have a strong relationship with other tree species in which the ten species were mostly present along with *Buah Hitam* (Figure 5). The dendrogram was executed to see how many species had heterospecific associations forming the tree community. The six species, namely *Artocarpus heterophyllus*, *Citrus* sp, *Sterculia schliebenii*, *Clerodendrum* sp, *Artocarpus altilis*, and *Premna corymbosa* mostly grow in the secondary forest and garden. The formation of the *Buah Hitam* tree community was mainly a result of human activity, while the *Buah Hitam* seed was used less

when it was used in the ethnobotanical process, which left the number of seeds on the ground, especially in the secondary forest and garden. This was a part of traditional activity including the *Buah Hitam* utilization. Besides, the reproductive season of this species is annual, and therefore the availability of *Buah Hitam* has met the local people's needs particularly as nutrient supply. This may be the reason that the correlation between tree density and *Buah Hitam* density was about 39 % where the increase of tree density positively affects the density of *Buah Hitam*. It was imperative to explain that the tree community of *Buah Hitam* habitats formed generally two groups viz. mainly primary forest and both secondary forest with garden (Figure 8).

The regeneration of *Buah Hitam* was mainly influenced by anthropogenic factors, especially in secondary forests and gardens. Thus, the number of *Buah Hitam* individuals with a diameter of less than 30 cm in the secondary forest and garden compared to those in the primary forest are shown in Figure 6b. The *Buah Hitam* in primary forest regenerated naturally for decades and is, therefore, the less number of small individuals. Thus, the regeneration process depends on the natural dynamic (Tuan & Dinh, 2020) as seed dispersal was predictably conducted by bats or other wildlife (Naniwadekar et al., 2015; Seidler & Plotkin, 2006). Some of the seeds have been moved away from the parent trees creating a negative-conspecific association (Murdjoko et al., 2016, 2020). Based on observation and interviews that the *Buah Hitam* was frequently taken by bats as food, the locals used traditional pest control known as *apiaimi* and *kabareru*, which was part of the traditional ecological knowledge in the area (Ungirwalu et al., 2017). The traditional pest control was mostly conducted in the secondary forest where the distance from their home was taken into consideration. Only a few have implemented the traditional pest control in the primary forest by having specific reasons such as the abundance of harvestable fruits from trees. In the garden, the *Buah Hitam* trees rarely experienced pest activity such as bats. Consequently, the *Buah Hitam* trees in primary forest functioned as the food supply for wildlife.

#### 4.1. Strategic implication for sustainable forest management

Strategies of sustainable management acquired from traditional conservation concept by conserving the socio-culture of ethnic *Wandamen*. Consequently, the local people would still conduct the sustainable management of utilization. Then, the habitat of *Buah Hitam* can be used to develop traditional protection concepts, especially in the primary forest. The

majority of the local population continues to believe that the dynamics are limiting natural resources in order to preserve the forest ecosystem. This research revealed that the primary forest has been preserved as a natural place and the local people have utilized the part of the secondary forest as a result of shifting cultivation. Although their livelihood fully depends on natural forest, they only worked in secondary forest and garden as swidden agriculture, as their ancestors carried out in a similar field. However, extensive research regarding swidden and conservation is less known, yet the swidden has been conducted for generations (Fujiki et al., 2017; Mukul & Herbohn, 2016).

Thus, this research suggested that the traditional concept of conservation should be considered by the government to view the development on a conservation basis, as formally stated in the declaration (Cámara-Leret, Schuiteman, et al., 2019; Indrawan et al., 2019). Involving the local community in regional development is mandatory in order to acquire the traditional concept that supports the sustainable management of natural resources, especially forests. The government has reviewed the Mount Wondiwoy nature reserve, but on the edge of the nature reserve, consideration should be given to the case where the government is required to establish a forest based on local knowledge as consensus programs. In brief, by delineating the forest area to create traditional zones, this can be the possible program for conservation particularly *in-situ* conservation programs, and conduct the regular monitoring of species in this area particularly vegetation.


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Dokumen pendukung luaran Tambahan #2

Luaran dijanjikan: Artikel pada Conference/Seminar Internasional

Target: Terbit dalam Prosiding

Dicapai: Sedang direview

Dokumen wajib diunggah:

1. Naskah artikel
2. Bukti sedang direview

Dokumen sudah diunggah:

1. Naskah artikel
2. Bukti sedang direview

Dokumen belum diunggah:

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# Revealing the cultural heritage of *Buah Hitam* for culture and nature conservation in *Teluk Wondama*, West Papua, Indonesia

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## Abstract

*Buah Hitam*, as a non-timber forest product, has been part of the activities of *Wandamen* ethnic in *Teluk Wondama* Regency, West Papua, Indonesia for generations using the traditional concept. However, information on the utilization remained unknown scientifically. Hence, the study aimed to uncover the application of traditional ecological knowledge during utilization and its role in nature and culture. We collected data using interviews with 26 respondents and field observation by making 26 square plots of 20 m x 20 m. The research showed that *Buah Hitam* has been utilized mainly by males, farmers, and adults. Moreover, they still apply the traditional ceremonies using *Buah Hitam* as the primary object. Habitats provided significant tree species richness in primary forest, secondary forest, and home garden. Moreover, local people not only utilize *Buah Hitam* as the main product, but they also use other vegetation during the process. Furthermore, they traditionally save the habitats as they have realized the role of *Buah Hitam* in their activities. This finding showed that the conservation of *Buah Hitam* benefits both nature and culture conservation.

Keywords: New Guinea, flora, tree, ethnobotany, *Haplolobus*

## Introduction

West Papua is part of New Guinea in which ecologically the biotic and abiotic conditions show the high variation and anthropologically the people consist of plenty of ethnicities (Cámara-Leret et al., 2019; Cámara-Leret & Dennehy, 2019). A study has revealed that the vegetation in this area is the most diverse in the world and many of them have not been taxonomically identified (Cámara-Leret et al., 2020). Therefore, this condition has attracted the attention of many researchers to contribute to filling many scientific gaps. At the same time, indigenous people have still been

exploiting the products of nature for centuries such as vegetation utilization. Most of them have applied the traditional knowledge with local wisdom in which they realize the sustainability of nature and its products (Kutal et al., 2021). In some areas of Papua, indigenous people still counting their life on nature such as the forest. The products of nature are a manifestation of ecosystem services of tropical rainforest and the products can be classified as timber and non-timber forest products (Ungirwalu et al., 2019). Many studies have uncovered the utilization of non-timber forest products in a few areas of West Papua Province (Ungirwalu et al., 2014, 2016, 2017), whereupon numerous areas must get involved in a scientific investigation.

*Teluk Wondama*, administratively as part of regencies in West Papua Province, harbors the richness of socio-culture where they have shown their interaction with the forest for centuries. Some studies have uncovered that indigenous people have traditionally used *Buab Hitam* as an important part of their socio-culture. Many rituals and traditional ceremonies have included *Buab Hitam* product as the main object and the knowledge has been speeded out around *Wondama* people, even though some parts of people do not perform the traditional process. Based on some researches, only at least people administratively living in two districts still regularly carry out the utilization (Ungirwalu et al., 2017). Correspondingly, the existence of trees in the habitats must be taken into consideration during this research. There is a report that mentioned that the habitats were classified as primary forests, secondary forests, and gardens (Murdjoko et al., 2021). Moreover, the knowledge of this utilization should be scientifically reconstructed to contribute the theoretical and practical development. This attempt is now getting more attention from scientists and stakeholders such as policymakers locally or internationally. Hence, this finding would be beneficial for them particularly to develop the sustainability of products of nature and socio-culture conservation.

*Buab Hitam* tree is taxonomically known as *Haplolobus* sp belonging to a family of *Burseraceae* in which this species was assumed to have undescribed morphological characters. Thus, in this research, we referred *Buab Hitam* to *Haplolobus* sp as in consonance with other studies in New Guinea particularly *Wandamen* ethnic living in mainly West Papua (Murdjoko et al., 2021).

This study aimed to investigate the role of *Buab Hitam* utilization in the socio-cultural life of *Wandamen* ethnic and the habitats of *Buab Hitam* to link between people and nature. This result could be valuable to promote traditional ecological knowledge of indigenous people in Papua.

## **Materials and Method**

This research was taken place in *Teluk Wondama* Regency where we collected data in two districts (*Duari* and *Wasior*) for social information and four districts (*Wasior*, *Wondiboi*, *Rasiey*, and *Duari*) for tree information. Mostly, local people live in coastal areas even though *Teluk Wondama* has

mountainous areas, particularly in the eastern part. Ethnographically, this area is dominantly inhabited by *Wandamen* ethnic where they have lived in *Wondama* for centuries creating their traditions such as language, art, knowledge, etc.

Ecologically, the area harbors a high number of species as part of tropical rainforest and the surface varies from lowland to highland areas up to about 2000 m a.s.l.. The vegetation form the ecosystem types and structurally the vegetation vertical layers as characters of tropical forest. The trees are the main structure of the ecosystem in which the canopy layers supported by larger trees result in microclimate in the ecosystem.

Data of social was obtained from in-depth interviews using the snowball method to collect data in this area. The interview was started by observing and deciding the key respondents, then we asked them to point people as the next respondents. The interview would be ended if we have found the respondents who regularly conduct the utilization. The snowball method is part of the purposive sampling method where the accuracy of data depends on people's direction. Hence, we also informally asked the informants in this area to validate the respondent and we visited the area where they process it. Data of vegetation were collected in four districts by setting the samplings in the four districts. Data are means for 20 m by 20 m plots for trees in primary forest, secondary forest, and garden where we placed 9 plots for each primary forest and secondary forest as well as 8 plots for gardens. Inside the 20 m x 20 m plot, we set three subplots comprising 10 m x 10 m plot for poles, 5 m x 5 m plot for saplings, and 2 m x 2 m plot for seedlings. The trees were characterized as individuals with a diameter larger than 20 cm, the poles were individuals with a diameter between 10 cm – 20 cm, saplings were individuals with a diameter less than 20 cm plus height taller than 1.5 m, and seedlings were individuals with height less than 1.5 m. Vegetation data were taxonomic information, number of individuals, and for pole and tree, we measured diameter at breast height (cm). The taxonomic information was identified by technicians from Herbarium *Papuaense* of "Balai Penelitian dan Pengembangan Lingkungan Hidup dan Kebutuhan (BP2LHK) Manokwari" and Herbarium *Manokwariense* (MAN) Pusat Penelitian Keanekaragaman Hayati Universitas Papua (PPKH-UNIPA), Manokwari. The scientific followed The Plant List (TPL) (<http://www.theplantlist.org>) and Taxonomic Backbone of the World Flora Online (WFO) ([www.worldfloraonline.org](http://www.worldfloraonline.org)).

The social data was analyzed using tabulation in which we put respondent characteristics as rows and the process of utilization as columns. Then, the presentation of results was displayed in percentage (%) by comparing the number of respondents based on its character and the stage of the process with the total respondent. The vegetation data were shown in a comparison of species

number between vertical structure (seedlings, saplings, poles, and trees) and *Buab Hitam* Habitats (primary forest, secondary forest, and garden).

## Results

The tropical rainforest in Papua has provided product such as a non-timber product for a long time. Many research showed that people have utilized the forest product particularly non-timber products for centuries. This can be seen that many parts of traditional activities have been including natural resources like forest production. Hence, *Buab Hitam* has been part of *Wandamen* ethnic living in *Teluk Wondama* Regency, West Papua, Indonesia. It remains unclear when they start exactly *Buab Hitam* in this area, but based on the result of the interview, they have been utilizing *Buab Hitam* for generations. They obtained the knowledge of *Buab Hitam* utilization from their ancestors by conducting the process directly in the field. This

Table 1. The proportion of respondents (%) during the process of utilization of *Buab Hitam* is based on education, profession, age group, and gender.

Respondent characteristics		Process of utilization (%)				Total (%)
		Not participated	Pre-harvest	Harvest	Post-harvest	
Education	Elementary school	6.38	2.13	4.26	4.26	17.02
	Junior high school	0.00	12.77	8.51	14.89	36.17
	Senior high school	4.26	14.89	8.51	19.15	46.81
Profession	Farmer	6.38	23.40	12.77	27.66	70.21
	State official	0.00	4.26	2.13	4.26	10.64
	Student	4.26	2.13	6.38	6.38	19.15
Age group	Children	4.26	2.13	4.26	4.26	14.89
	Adults	2.13	17.02	10.64	19.15	48.94
	Youth	4.26	10.64	6.38	14.89	36.17
Gender	Female	2.13	4.26	6.38	10.64	23.40
	Male	8.51	25.53	14.89	27.66	76.60
Total (%)		10.64	29.79	21.28	38.30	100.00

The knowledge of *Buab Hitam* utilization is widespread in the people of *Teluk Wondama*. During the interview, we obtained that about 10 % of respondents did not take part directly in the utilization process of *Buab Hitam* in pre-harvest, harvest, and post-harvest. Nevertheless, they are involved in the traditional ceremonies which use *Buab Hitam* as a main part of the product. More or less 90 % of respondents are engaged in *Buab Hitam* utilization in which they participate 30 % in pre-harvest, 21 % in harvest, and 38 % in post-harvest. Mostly, males dominate during the

three processes while adults contribute more than children and youth and the livelihood is primarily as a farmer as well as the education background is senior high school. The utilization process is not depending on the profession, in the interview and observation, even though some of the respondents have served as state officials, they still spend their time utilization events. Most people are the sub-ethnic group of *Wamesa* living in the coastal area of *Teluk Wondama*, while some other sub-ethnic no longer utilize *Buah Hitam*.

Table 2. Species composition of habitat structure of *Buah Hitam* is expressed as species number in primary forest (PF) and secondary forest (SF), and garden (G).

Structure	Habitats of <i>Buah Hitam</i>		
	PF	SF	G
Seedlings	22	22	12
Saplings	34	28	18
Poles	21	13	8
Trees	27	19	12

We observed directly in the field by getting the information from the respondent and we classified that *Buah Hitam* is mainly found growing in lowland tropical forest where it's distributed in primary forest, secondary forest, and garden. The trees contain the structure of seedlings, saplings. Poles, and trees in the three habitats. Taxonomically, the species distributed in the habitats consist of 53 species in the primary forest, 47 species in the secondary forest, and 25 species in the garden. The species richness showed that primary forest comprises the highest species number followed by secondary forest and garden. There are a variety of species in the tree habitats and structure as shown in Table 2.

## Discussion

### Socio-cultural role of *Buah Hitam*

*Buah Hitam* is traditionally processed as food particularly during the fruiting period as they observe directly in its habitat. The product is sago food which is most of the time prepared during special events such as a traditional wedding. In the past, most people in *Wondama* carried out the utilization, but now only a few parts of people have been utilizing the utilization. The sago food plays an imperative role as this food is traditionally valuable when they present this food to the families during the ceremony. That is how they respect each other using that food that is the most important object. Even though in some cases the people substitute the food with other valuable objects such as money and yield production, but they still realize the value of the *Buah Hitam* (Ungirwalu et al., 2016, 2017). The substitution in tradition is a consequence of the adaptation of

social alteration (Peterson et al., 2019; Martins & Shackleton, 2021). This happens if they conduct the ceremonies, not in the fruiting period, so they could replace the sago food.

We highlighted in this research that there is a knowledge erosion in some people in *Wondama* as only the sub-ethnic *Wamesa* still perform the utilization. This could result from job opportunities, study, and weddings. Mostly, they had more opportunities to get a job in *Teluk Wondama* Regency since the last decade when it was definitively developed as a regency. Thus, some people moved to *Wasior*, the capital of the regency, to get a job there either as state officials or entrepreneurship in the private sector. The job opportunities could lead to social alteration in developing countries (Paredes & Hopkins, 2018). Furthermore, the study could result in some people leaving the original area as they would continue their education to a higher level (Aguilar-santelises et al., 2015). Many districts provide the study up to junior high school, so some students must move to the place where they have senior high school. Especially, if they would go to universities, they must indeed migrate as there are no universities. The wedding of people with another outside can cause some of them to move to live outside, mainly women would join the man family. The three factors have led to the degradation of knowledge in utilization. Those are a result of socio-cultural dynamics which result in the adaptation of traditional concepts and practices. Some studies have shown that in developing countries, modernization has influenced the socio-culture (Drané et al., 2018).

Most people still have the perception where *Buab Hitam* has the traditional value even though some of them no longer utilize. The understanding of *Buab Hitam* as culture and traditional belief systems still exists. They obtained the information from the elderly people as they have contact with them. Therefore, there is the chance to regain the knowledge of utilization as pre-harvest, harvest, and post-harvest.

### **Habitats as nature and people connection**

For generations, the *Buab Hitam* has been part of people in *Wondama* as can be seen from the plants of *Buab Hitam* in the secondary forest and garden. In the past, when people harvested in the primary forest, then they let the trees grow in the secondary forest during the cleaning process and they also plant the trees in the garden. This phenomenon could be an indicator that this tree has an exclusive function in the life of *Wondama* people. They have conducted the traditional concept to manage the utilization for decades. The habitats are located in the coastal area that is mostly lowland area. In the primary forest, people have understood whether the area is harvestable or not because they have applied the traditional rule to ban from taking anything in the specific area (Ungirwalu, 2019; Murdjoko et al., 2021). This procedure has been agreed upon by all people in *Wondama* as part of traditional beliefs such as occult practices. This is in consonance with some



studies that revealed the local belief still exists despite threatening of modernization and social dynamic (Armatas et al., 2016; Friday et al., 2020).

The activities of people generally interact with the forest in which most of them have the job as farmer and they also exploit in the primary forest. Moreover, they create the area to cultivate and some areas were left growing as secondary forests. Many local people in Papua practice the swidden and have a consequence for forming the secondary succession after post-shifting cultivation (Heinimann et al., 2017). This study uncovered that secondary forests consist of plenty of trees from the forest floor and upper layer of the forest. The other studies found out that vegetation from some life forms is rich in this area. The difference between primary and secondary forests is the number of species and density of larger trees that were cut during land preparation in slash-and-burn agricultural activities. Notwithstanding that most vegetation was planted in the garden by people, the vertical structure of vegetation of seedlings, saplings, poles, and trees exist with at least the species richness was about a half of primary forest. Moreover, the gardens are covered by vegetation mainly understory vegetation. Those species are salient vegetation to support their livelihoods such as medicinal plants, edible plants, and ingredient plants. The vegetation has been used to support the daily life of people for many uses. They also apply other salient vegetation during the utilization such as leaves to packaging and tight the sago (Ungirwalu et al., 2016). Furthermore, they still use firewood to cook the sago, even though some people have modern stoves. Most of the processes are still carried out traditionally as they believe that traditional could keep the taste as their ancient did in past. The taste of sago is important as a traditional indicator of the goals of ceremonies such as farming production, meeting, and wedding (Ungirwalu et al., 2017). The exploitation can be an important part of the socialization of people where they gather in the certain ritual of the ceremony. The natural resource has been involved in most traditional people's life as a symbol of interaction between people and nature where they have developed the traditional concepts and practices.

### **Consensual sustainable schemas to support nature and culture conservation**

The knowledge of utilization has the potency to be distributed again especially for those who are not engaged. Then, the people would have an understanding of the function as part of their culture. Consequently, in the future, the culture of utilization would exist as cultural richness. This could be part of the conservation program of cultural heritage in Papua particularly *Wondama*. The sustainable development of West Papua Province promotes conservation of culture as the statement of the development goals has been officially pronounced.

As part of their culture, the presence of trees and their habitat is essential to support the tradition. The people living in *Wondama* have the awareness of keeping the habitats. They have applied the

traditional concepts and practices during the utilization which are ecologically harmless to the environment such as pest control and harvest technique. The trees are found in the primary forest, secondary forest, and garden as stated in some researches (Ungirwalu et al., 2016; Murdjoko et al., 2021). The process is scientifically known as ethnobotanical knowledge which could benefit people and nature in order to promote the sustainability of nature. The ethnobotanical knowledge has been used in some countries to encourage conservation programs.

Those situations above could be seen by local government to be set as development agendas particularly in *Teluk Wondama* Regency. The potency could be developed as a tourist destination as this area has a historical background of Protestant Missionary where this could be the supporting point. Hence, the development of tourism in *Wondama* would also benefit culture and nature conservation. The utilization could play an important role to support the tourism program and not only conservation of culture and nature could be achieved, but the economic profit would be gained by local people. The main goal of tourism in many countries is to give direct profit to local people.

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Authors: Agustinus Murdjoko, Antoni Ungirwalu, Zulfikar Mardiyadi, Bernadus Bennedictus Rettob

Corresponding author: Antoni Ungirwalu

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## Dokumen Realisasi Mitra

LAMPIRAN II  
 PERATURAN MENTERI HUKUM DAN HAK ASASI MANUSIA  
 REPUBLIK INDONESIA  
 NOMOR 30 TAHUN 2017  
 TENTANG  
 PEDOMAN INVENTARISASI KEKAYAAN INTELEKTUAL KOMUNAL

FORMULIR INVENTARISASI PENGETAHUAN TRADISIONAL (PT)

FORMULIR INVENTARISASI PENGETAHUAN TRADISIONAL (PT)

1. a. Nama Kanwil.

Kantor Wilayah Papua Barat Kementerian Hukum dan Hak Asasi Manusia RI

b. Nomor Pencatatan.

2. a. Nama PT (isi nama yang paling umum dipakai).

Pengetahuan Tradisional Pembuatan Sagu Buah Hitam

b. Nama lain (varian atau nama lain PT), jika ada.

Beriam Tereu

3. Jenis PT (contreng satu atau lebih).

v	(1)	Kecakapan teknik (know how), keterampilan, inovasi, konsep, pembelajaran dan praktik kebiasaan lainnya yang membentuk gaya hidup masyarakat tradisional termasuk diantaranya pengetahuan pertanian, pengetahuan teknis, pengetahuan ekologis, pengetahuan pengobatan termasuk obat terkait dan tata cara penyembuhan, serta pengetahuan yang terkait dengan SDG
v	(2)	Adat istiadat masyarakat, ritus (magis), dan perayaan-perayaan, sistem ekonomi tradisional, sistem organisasi sosial
v	(3)	Pengetahuan dan kebiasaan perilaku mengenai alam dan semesta, pengobatan tradisional; dan
v	(4)	Kemahiran membuat kerajinan tradisional, makanan/minuman tradisional, moda transportasi tradisional

4 Nama orang yang melaporkan PT (kalau dari instansi, sebutkan nama instansi, bagian dan jabatan).

Nama : Antoni Ungirwalu (Universitas Papua)  
Alamat : Jalan Gunung salju Amban-Manokwari Provinsi Papua Barat  
  
Kode pos : 98414  
No. Telp : 081344123400  
Alamat email : a.ungirwalu@unipa.ac.id

5 Tempat dan tanggal pelaporan.

Provinsi : Papua Barat  
Kabupaten : Manokwari  
Kecamatan : Manokwari Barat  
Tanggal pelaporan :

6. Persetujuan pencatatan PT dari Kustodian PT (nama komunitas/organisasi/asosiasi/badan/paguyuban/kelompok sosial atau perorangan/masyarakat hukum adat) yang menjaga, memelihara dan mengembangkan serta bertanggung jawab atas PT yang dilaporkan.

~~Ada/~~ tidak ada\* pantangan untuk mempublikasikan \_\_\_\_\_ .

Telah mendapat persetujuan dari :

1. Balibangda Provini Papua Barat
2. Pemerintah Kabupaten Teluk Wondama
3. Komunitas suku etnis Wandamen

(\* coret yang tidak perlu)

7 Nama Kustodian PT (nama komunitas / organisasi / asosiasi / badan / paguyuban / kelompok sosial atau perorangan / masyarakat hukum adat) yang menjaga, memelihara dan mengembangkan PT yang dilaporkan.

Nama : Masyarakat suku/etnsi Wandamen-Papua  
Alamat : Kabupaten Teluk Wondama  
  
Kode pos :  
No. Telp :  
Alamat email :



8. Diisi nama orang-orang yang memiliki pengetahuan dan keterampilan tentang PT tersebut.

Nama : Luter Marani, David Marani  
Alamat : Kampung Subey Kabupaten Teluk Wondama  
  
Kode pos :  
No. Telp/ fax. :  
Alamat email :

10. Nama daerah PT (lokasi utama, dan lokasi lain juga disebutkan).

Nama : Kabupaten Teluk Wondama  
Alamat : Kabupaten Teluk Wondama  
  
Kode pos :  
No. Telp/ fax. :  
Alamat email :

12. Uraian/deskripsi/sejarah singkat PT yang dilaporkan saat ini : (Apa? Siapa? Dimana? Bagaimana? Kapan? Bagaimana prosesnya? Serta bagaimana fungsi/kegunaan PT yang bersangkutan)

"Beriam tereu" adalah wujud karya akhir dari sumberdaya alam hasil hutan bukan kayu (HHBK) jenis tumbuhan buah hitam. Secara aktual buah hitam sebagai artefak dalam wujud simbol bagi identitas etnis Wandamen. Pengolahan pasca panen buah hitam dalam masyarakat etnis Wandamen dikenal dengan sebutan "*Beriam tereu*". Peralatan dan bahan yang digunakan untuk "*Beriam tereu*" berasal dari sumberdaya lokal. Proses pasca panen umumnya akan melibatkan kerabat atau kelompok lainnya dalam kegiatan ini. Hal ini erat terkait dalam proses sosial antara anggota komunitas marga/klen/keret dalam masyarakat adat etnis Wandamen. Proses pengetahuan tradisonal pembuatan "*Beriam tereu*" dilakukan dalam 4 (empat) tahapan, yaitu: (a). Pembedaan tungku pembangkaruan atau para-para (*Roi*), (b). Proses ritual adat, (c) Pembuatan dan pembungkusan adonan, serta (d). Proses pembakaran.

14. Kondisi PT saat ini (contreng salah satu).

Sedang berkembang  
 Masih bertahan  
 Sudah berkurang/terancam punah  
 Sudah punah/ tidak berfungsi lagi dalam masyarakat

Keterangan: Diisi dengan memberi tanda (✓) pada kondisi dimana PT yang dilaporkan termasuk didalamnya.

\* boleh memberi tanda lebih dari satu.

12. Upaya pelestarian/promosi PT selama ini (contreng satu atau lebih).

v	(a) Promosi langsung, promosi lisan (mulut ke mulut)
v	(b) Pameran, peragaan/ demonstrasi
v	(c) Selebaran, poster, surat kabar, majalah, media luar ruang
	(d) Radio, televisi, film (pal TV setiap hari minggu)
	(e) Internet
	(f) Belum ada upaya untuk pelestarian/ promosi PT yang bersangkutan
v	(g) Riset

Keterangan: Diisi dengan memberi tanda ('1) pada kondisi dimana PT yang dilaporkan termasuk didalamnya.

\* boleh memberi tanda lebih dari satu

13. Dokumentasi, diisi sesuai jenis format dokumentasi (contreng satu atau lebih, menurut jenis dokumentasi yang dikirim).

v	a) Naskah	i) Peta
v	b) Buku	j) Kaset audio
	c) Mikrofilm	k) CD audio
	d) Foto biasa	l) CD data
	e) Slide	m) VCD/DVD
	f) Foto digital (jpeg, dsb)	n) Kaset beta
	g) Album	o) Film seluloid
	h) Gambar	p) dan lain-lain (Kliping koran)

Keterangan: Diisi dengan memberi tanda ('1) pada dokumentasi yang dimiliki dari PT yang dilaporkan

\*boleh memberi tanda lebih dari satu, diharapkan minimal dalam bentuk rekam (visual/kaset/MP3/MP4) dan foto

14. Referensi ( ditulis sumber secara lengkap: nama penulis, tahun, judul buku, tempat terbit, penerbit); sumber lisan/ nama pelaku (saksi sejarah) yang masih hidup, usia, dll.

1. Ungirwalu, A. Awang, S.A, Maryudi, A., Suryanto P., 2016. :Pengelolaan Adaptif Buah Hitam (*Haplolobus monticola* Blumea) Etnis Wandamen-Papua”, *Jurnal Manusia dan Lingkungan* 23(2):266–275.
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Keterangan :

Diisi dengan menuliskan referensi yang digunakan dalam pelaporan PT baik berupa naskah/buku/sumber lisan.

**Catatan :**

Inventarisasi KIK hanya bersifat pencatatan untuk perlindungan defensif.

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