

AN INTRODUCTION TO

The Biological Education and Research Forest of Andalas University

DR. RIZALDI
DR. WILSON NOVARINO
DR. NURAINAS
M. IDRIS, M.SI.
DR. JABANG NURDIN
DR. MAIRAWITA

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Aerial view of The Biological Education and Research Forest (HPPB), Bukit Kamulau, Limau Manis, Padang, West Sumatra, Indonesia

Foreword

The praise and thanks to the presence of Allah. We accomplished a book about an introduction to the Biological Education and Research Forest (Hutan Pendidikan dan Penelitian Biologi, thereafter called HPPB), Andalas University. The HPPB consists of natural forest and biodiversity garden maintained within a forest station. The forest station is mainly allocated for the needs of education, research and conservation.



The HPPB is managed by Department of Biology in cooperated with Technical Service Unit of Biodiversity (UPT. KEHATI) of Andalas University. This book purposes to introduce resource and facilities organized by the forest station in order to support education, research, and conservation. We hope students, teaching staffs, researchers, and our collaborators could get informed and come with great interest to work using those facilities. For further information please contact the head of HPPB, Department of Biology, Andalas University and also find some references from previous studies conducted in HPPB.

We acknowledge the rector of Andalas University, the dean of Mathematics and Natural Science Faculty, the head of Technical Service Unit of Biodiversity (UPT. KEHATI) and the head of International Office (UPT Layanan Internasional) for their advices. We express special gratitude to the head of Biology Department, retired faculty members, students and alumni for continuous support toward revitalization of HPPB. At last, we acknowledge to all people who have contributed on providing materials for this profile and information book. Here, in commemorate 30 years anniversary of HPPB, we hope this book bring benefit to all readers.

Dr. Rizaldi, M.Sc.

(Head of The Biological Education and Research Forest)



Preface

In 1980, Andalas University planned a grand design for new campus in Limau Manis. As a dean of Science Faculty (FIPIA), I was directly involved to carry out a preliminary survey to the appointed area. I was fascinated with the beautiful heavy green vegetation of Bukit Kamulau which belongs to the new campus territory. Following several discussions about the needs of representative forest station for biological studies, my colleagues (The late Prof. Drs. Anas Salsabila, M.Sc. And The late Drs. Rusjdi Tamin) and I proposed to the rector of Andalas University to allocate Bukit Kamulau as The Biological Education and Research Forest (HPPB). The forest consists of secondary tropical rainforest ecosystem and aquatic ecosystem along the water streams with tremendous biodiversity. Furthermore, this location is easy to be accessed and monitored by students and users. So far, The Department of Biology has successfully maintained this facility for education, training, conservation, and promoting eco-friendly green-campus.



In the future, I hope HPPB could increase collaboration with not only Indonesian researchers, but also foreign researchers. I believe The Department of Biology in near future could extend it function for ecotourism. To the end, supporting facilities must be constructed including representative research station, information center, and research facilities (camping ground, observation tower, greenhouse, and modern research equipment).

Prof. Dr. Marlis Rahman, M.Sc.
(Initiator of The Biological Education and Research Forest)

Preface

Andalas University has been recognized as a member of first cluster universities in Indonesia based on various assessment criteria. In the era of intense competition among Indonesian universities to produce skilled and competitive graduates, Andalas University must be able to optimize all facilities and potential resources. The Biological Educational and Research Forest (HPPB) is one of the university resources that could be managed to achieve optimal value for use. Therefore, the strategic management programs needs to get support from all stakeholders.



This is the first book covering valuable information about the HPPB and exposing the potential of flora and fauna through representative photos. I give my appreciation to the authors and to the Department of Biology who have showed great efforts in managing and introducing the potential forests to a larger range. Given the long history of the HPPB and its potential resource, we encourage the ongoing revitalization efforts and develop supporting facilities. We hope this effort will expand the use of the forest from educational and research forest into edu-ecotourism which is in line with the business strategy plan (*Renstra Bisnis*) of Andalas University. This effort also supports the University's green-campus program that could raise the UI Green Metric Ranking of Andalas University from the eighth position in 2014 among hundreds national universities.

Prof. Dr. Tafdil Husni, S.E., M.B.A.
(Rector of Andalas University)



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Introduction

The Biological education and Research Forest (HPPB) is an educational facility consisted of natural forest and biodiversity garden. This facility adjacently situated to main campus area of Andalas University located in the western edge of Bukit Barisan Mountain at Limau Manis, Padang, West Sumatra Province. The forest characterized by high annual precipitation evergreen rainforest. It is owned by the University and managed by Biology Department in coordination with Technical Service Unit of Biodiversity (*UPT. Keanekaragaman Hayati*). Based on the results of previous studies by the HPPB's initiators in 1980's, this forest area is proven to have a high biodiversity richness. Throughout its history, HPPB has benefited in supporting education, research and community service (*Tridarma Perguruan Tinggi*), especially in training and educating students majoring in biology, producing conservation cadres, resulting research publications, serving local community and enhancing cooperation with various parties both nationally and internationally.

Along with the development of higher education, campus as an education industry should be able to create an eco-friendly management model through green campus programs. It is realized that the HPPB can provide greater support through better revitalization and governance. The main function of HPPB as an educational and research facility for lecturers and students, further has been extended into eco-tourism site, health sports and hobbies while consistently supporting eco-friendly green campus programs. Thus, here we reformulate vision, missions and our objectives for an effective HPPB management.

This is the first source book about HPPB. This book is covering wide topic about HPPB including; history of HPPB and important function of forest station for education and research in the field of biology; the unique biodiversity of HPPB; the organization structure of HPPB within Andalas University; services and facilities provided by HPPB; collaboration of research study conducted in HPPB with local, national and international collaborators; and potential research study need to explore for the future of HPPB in biodiversity and conservation of Sumatran species.



Vision, Missions, and Objectives

Vision:

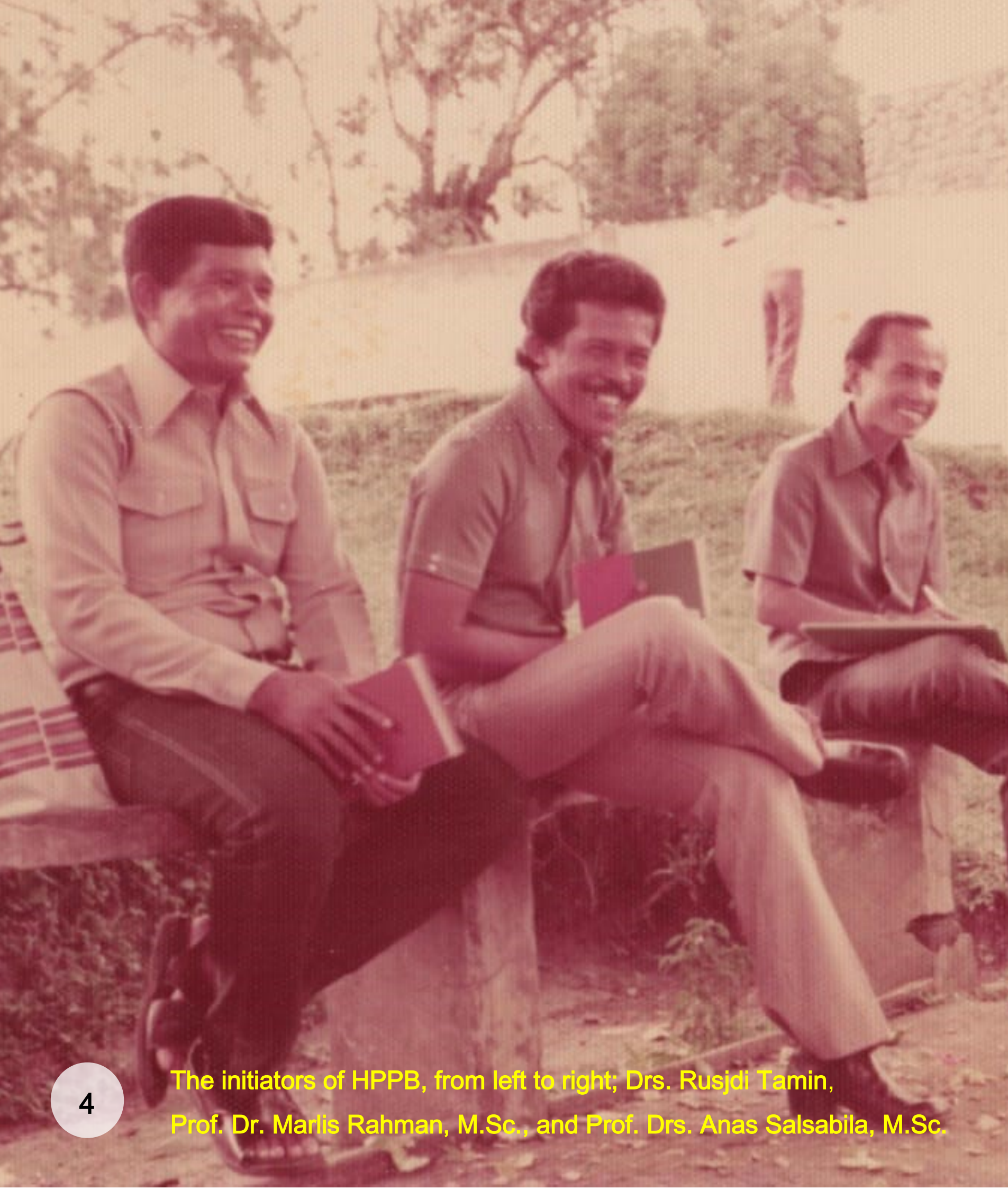
To be an excellent forest station for education, research and conservation on Sumatran tropical biodiversity by 2035

Missions:

- To facilitate education on field biology for various education levels in Andalas University and external parties
- To facilitate research on tropical biodiversity of Sumatran Rainforest
- To extend collaboration with various stakeholders in promoting education, research, and tropical biodiversity conservation
- To support Andalas University in promoting eco-friendly green-campus

Objectives:

- To fulfill demand on field biology education in term of natural facility and to enhance nature responsibilities
- To fulfill demand on research facility for Sumatran Tropical Rainforest
- To share mutual benefits among stakeholders in promoting education, research, and tropical biodiversity conservation
- To foster university in developing eco-friendly green-campus through edu-ecotourism



History

The preparation and construction of Andalas University (UNAND) campus begin in 1980's at Limau Manis, Padang. Faculty of Science (FIPIA) was appointed to design and select suitable forest area within Andalas University territory for biological studies. Bukit Kamulau was selected because of having high biodiversity and unique landscape after flora and fauna inventories conducted by Marlis Rahman, Anas Salsabila, and Rusjdi Tamin. They become initiators for establishment of forest research station in Bukit Kamulau.

The establishment of The Biological Education and Research Forest (HPPB) officially declared on December 10th, 1989. The official declaration of HPPB was made by Prof. Dr. Jurnal Kamil M.Sc. (University Rector) and attended by Prof. Dr. Ir. Fachri Ahmad (University Vice Rector I), Drs. Rasul Hamidi (University Vice Rector II), Prof. Dr. Hendra Esmara (head of University Research Board), and Prof. Dr. Thamrin Nurdin (Head of Plan and Development Region Bureau, BAPPEDA, West Sumatra). Prof. Dr. Marlis Rahman was appointed as the head of HPPB. Since that time, The HPPB has been used by many students and researchers, and publish several scientific papers in national and international levels.

In 2009, the main forest station building and other facilities were ruined due to severe earthquake occurred in West Sumatra. Since then, research activities in the HPPB was decreased. From 2016, we begin revitalization project supported by Andalas University to achieve our vision.



Characteristic

The Biological Education and Research Forest (HPPB) of Andalas University is located in Bukit Kamulau, Limau Manis, Padang (0°54'S, 100°28'E), West Sumatra, Indonesia. The eastern side is adjacent to Bukit Barisan Mountains and the western side to Andalas University campus building. The northern side is bordered by village of Batu Busuk, Air Sekayan river and the southern side to Agriculture Research field (organized by Faculty of Agriculture), and Air Nareh river. The forest is categorized as a secondary Laura-Fagaceous lowland evergreen rain forest. The total area of HPPB is 150 ha extension ranging from 275 to 450 m above sea-level.

HPPB was categorized as A type climate, characterized by very wet and high annual rainfalls which ranges from 3,724 to 5,546 mm/years (1980-2002). The daily temperatures of HPPB ranges from 21 to 29°C with relative humidity ranges from 68 to 90%. Soil type mainly red clays soil (ultisol) which relatively high fertility. Such condition support the most forest vegetation those in turn provide resources for diversity of micro and macro fauna.

The Biological Education and Research Forest (Hutan Pendidikan dan Penelitian Biologi)



Legend

- Natural Forest
- Medicinal Plant Garden
- Biodiversity Garden
- Durian plantation
- Pathway

0 0,1 0,2 0,4 0,6 Kilometers

Coordinate System: WGS 1984 UTM Zone 47S
Projection: Transverse Mercator
Datum: WGS 1984
Author: Gonzalo Pérez Pérez
Date Saved: 06/06/2018



Ixora lobbii (Glossy ixora)



Biodiversity

HPPB supports a high diversity of plants and animals including several endemic species of Sumatra. Some species have been identified and some of them remain unidentified. A recent study undertaken in the area estimated a richness of 530 tree species with a predominance of Euphorbiaceae, Moraceae, Fagaceae, and Lauraceae species. Several studies about the diversity of Gingers (Zingiberaceae family) have also been undertaken in this area by the supervision of Andalas University Herbarium. (ANDA). More than half of the plant species are considered fruit species for frugivorous animals. There are 25 species of epiphyte ferns, 165 species of trees, 34 species of wild orchids, 21 species of gingers, and other taxa.

While for the animals, there are 5 species of termites, 30 species of ants, 21 species of spiders, 23 species of dragonflies, 51 species of butterflies (Rhopalocera), 18 species of amphibia, 8 species of snakes, 160 species birds, at least 100 species of mammals. For instance, the endangered ape Agile Gibbon (*Hylobates agilis*) endemic from Sumatra and Malay Peninsula and the endemic flashy red Sumatran surili or Mitred Leaf monkey (*Presbytis melalophos*) are very common in the area, occurring in high densities and are relatively easy to see (or hear) while walking around the main path that goes through the middle of the forest. Other common primate species are Long-tailed macaque (*Macaca fascicularis*) and Pig-tailed macaque (*M. nemestrina*) which also occur in high numbers and the ape Siamang (*Symphalangus syndactylus*) which can be observed in the North area of HPPB. Regarding other mammals, there is a high population of wild board (*Sus scofra*) and the presence of Tapir (*Tapirus indicus*), Sumatran sun bear (*Helarctos malayanus*), Black giant squirrel (*Ratufa bicolor*) and Sunda flying lemur (*Galeopterus variegatus*) has also been recently recorded in the area.

A. List of exotic flora existing in the natural forest:

- Dipterocarps (*Dipterocarpus* spp., *Hopea beccariana*, and *Shorea* spp.)
- Oaks (*Castanopsis costata*, *Quercus oidocarpa*, and *Lithocarpus meijeri*)
- *Rhizantes* (Rafflesiaceae)
- The pitcher-plant (*Nepenthes ampullaria*, *N. mirabilis*, *N. gracilis*)

B. List of exotic fauna existing in the natural forest:

- Slow loris (*Nictycebus coucang*)
- Sumatran tiger (*Panthera tigris sumatrae*)
- Lesser mouse-deer (*Tragulus javanicus*)
- Red Muntjac (*Muntiacus muntjak*)



***Nepenthes mirabilis* - The common swamp pitcher-plant**

(insert: a pitcher of *Nepenthes mirabilis* [top] and *Nepenthes gracilis*, The slender pitcher plant [bottom])



Nepenthes ampullaria - The flask-shaped pitcher-plant
(insert: two types of pitchers in *Nepenthes ampullaria*)



Amomum apiculatum - The ginger

(insert: flowers)



Bulbophyllum lobbii - The Sumatran bulbophyllum
(insert: flower of *Bulbophyllum lobbii* [top] and *Bulbophyllum auratum* [bottom])



Arachnis sp. - Scorpion orchid

Vanda sumatrana - The Sumatran Vanda

(insert: flowers of *Vanda sumatrana*)





Balanophora sp. - Balanophoraceae, holoparasite
(insert: *Balanophora elongate* [left] and *Balanophora fungosa* [right])

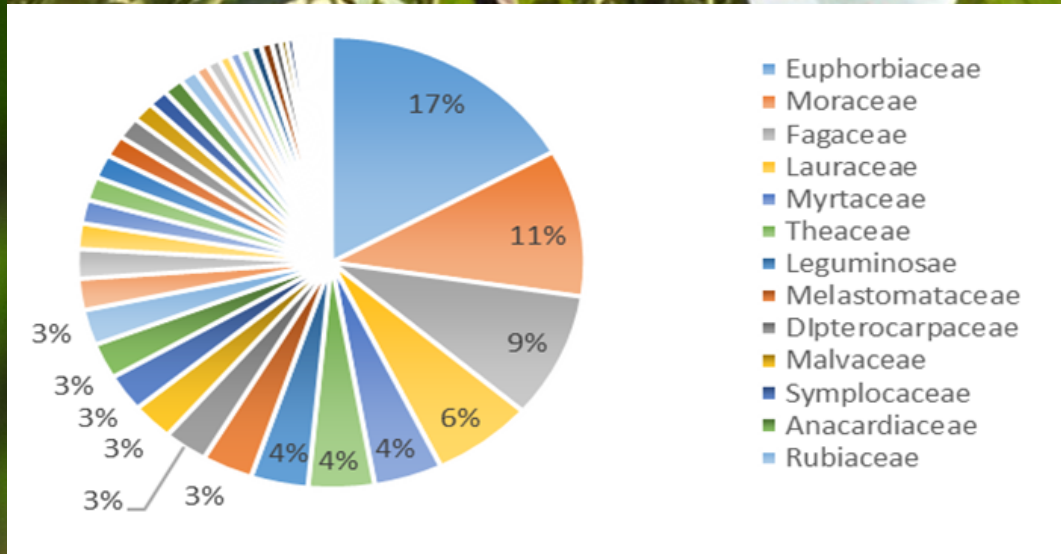


Rhizanthus deceptor - Rafflesiaceae, holoparasite
(photograph by W. Meijer, insert: *Tetrastigma leucostaphylum*,
rafflesiaceae host plant on vegetative stage [left] and fruits [right])



Artocarpus sp. - Moraceae

(insert: *Endospermum diadenum*, food source of Agile gibbon [top] and graph of the most abundant tree's family recorded in HPPB [bottom], data was recorded by G.P. Perez, 2018)





Primate species of HPPB

(A). *Macaca nemestrina* [Pig-tailed macaque]; (B). *Macaca fascicularis* [Long-tailed macaque]; (C). *Hylobates agilis* [Agile gibbon]; (D). *Symphalangus syndactylus* [Siamang]

The agile gibbon, singing gibbons (*Hylobates agilis*)

(insert: the agile gibbon in action that can be observed in HPPB)





Helarctos malayanus - Malayan Sun Bear
(insert: captured by camera trap)

2016-05-25 6:52:04 PM M 1/3



22°C



Tapirus indicus - Asian Tapir
(Insert: trap installment for studying Asian Tapir)



HCO ScoutGuard

08.21.2015 03:05:25



Mammal species of HPPB

(A). *Hystrix brachyura* [Malayan porcupine]

(B). *Rusa unicolor* [Sambar deer]

(C). *Muntiacus muntjak* [Red muntjac]

(D). *Tragulus javanicus* [Lesser mouse-deer]

HCO ScoutGuard

09.04.2015 05:03:21



27°C



03/06/12 03:12 PM

HPPB-3



ScoutGuard

07.25.2015 08:59:42



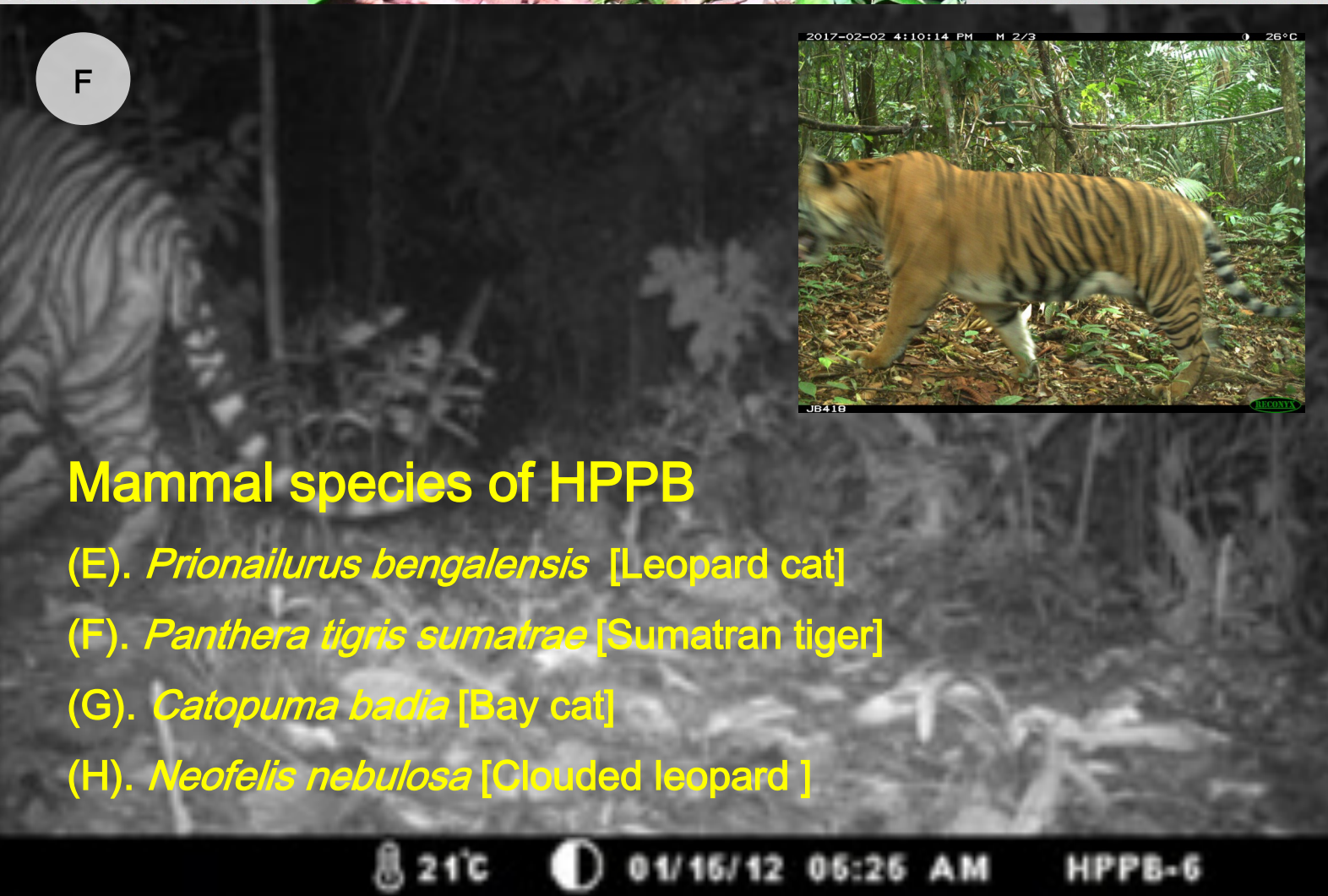
HCO ScoutGuard

08.24.2015 01:43:11



HCO ScoutGuard

06.12.2016 07:23:53



Mammal species of HPPB

(E). *Prionailurus bengalensis* [Leopard cat]

(F). *Panthera tigris sumatrae* [Sumatran tiger]

(G). *Catopuma badia* [Bay cat]

(H). *Neofelis nebulosa* [Clouded leopard]

21°C



01/16/12 06:26 AM

HPPB-6



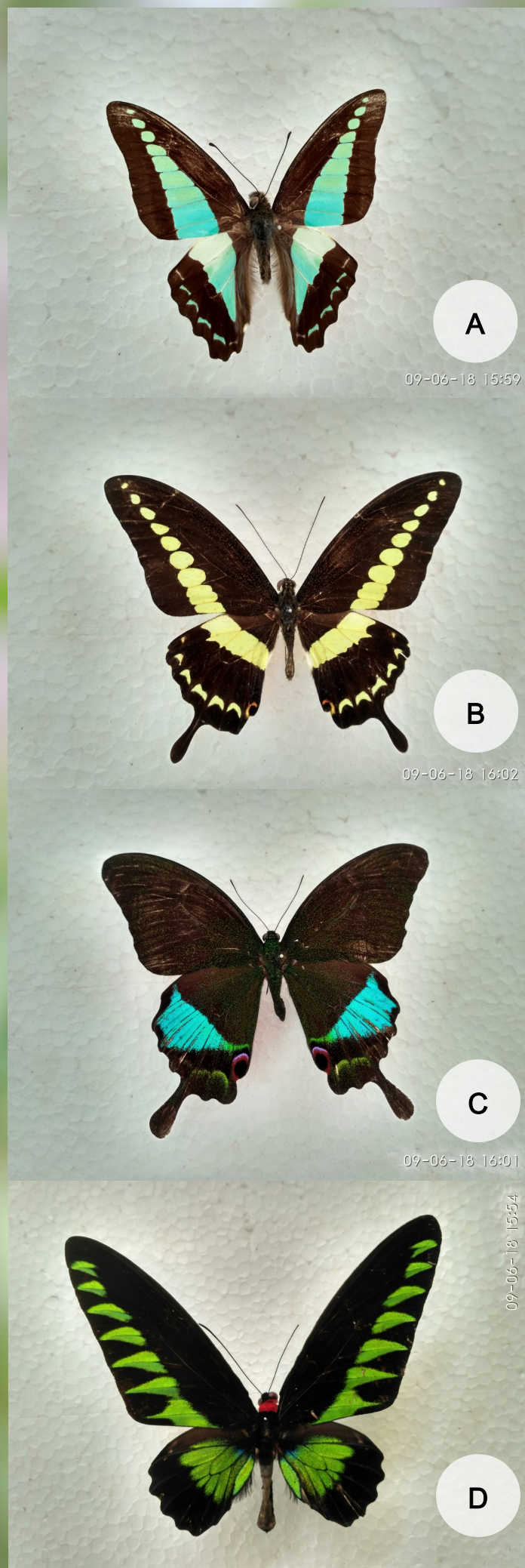
HCO ScoutGuard

06.15.2016 06:20:31



Bird species of HPPB

- (A). *Lanius tigrinus* [Tiger shrike]
- (B). *Muscicapa dauurica* [Asian brown flycatcher]
- (C). *Haliaeetus leucogaster* [White-bellied sea-eagle]
- (D). *Eurystomus orientalis* [Oriental dollarbird]
- (E). *Eurylaimus javanicus* [Javan broadbill]
- (F). *Treron vernans* [Pink-necked green-pigeon]
- (G). *Berenicornis comatus* (White-crowned Hornbill)



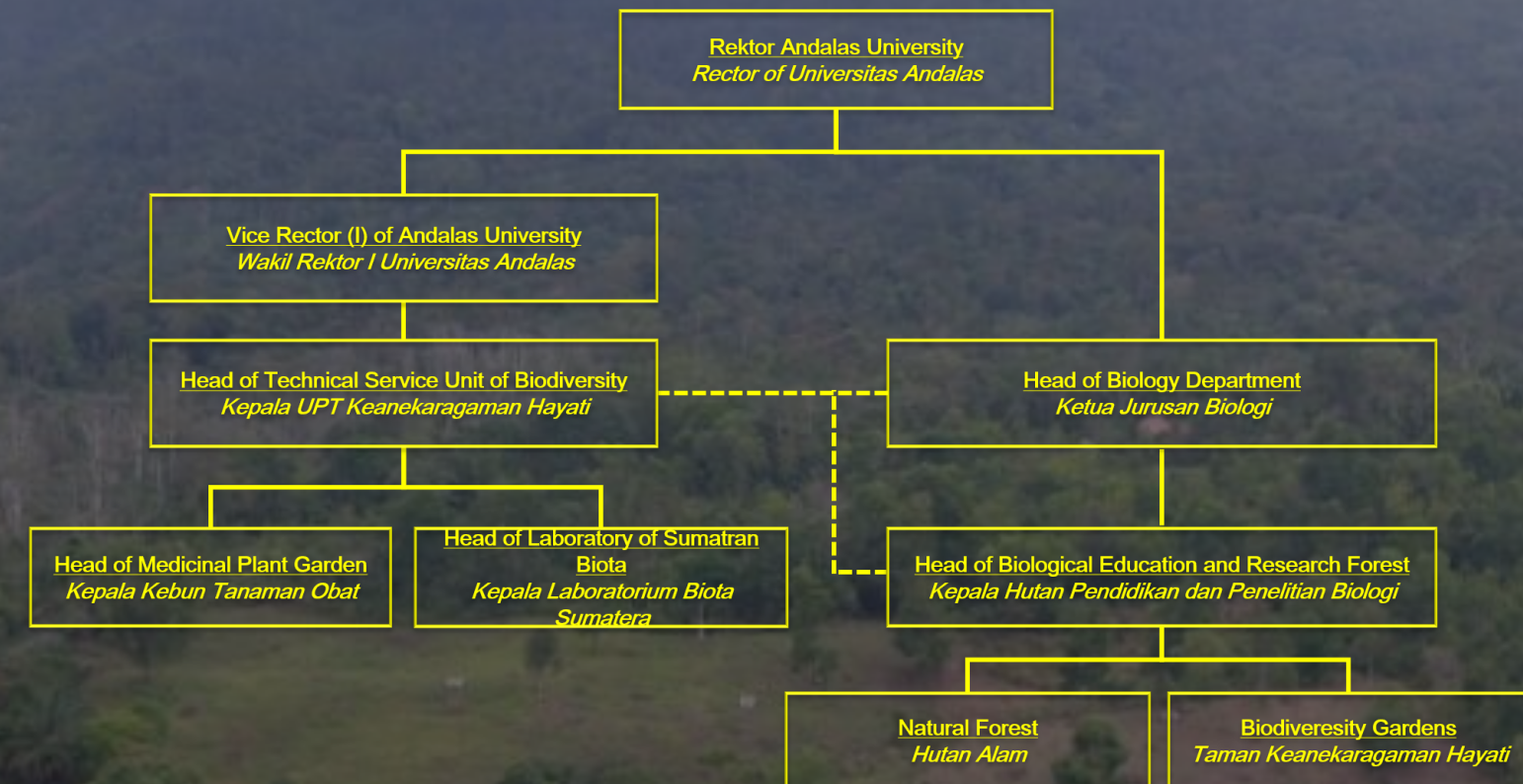
Exotic butterfly species of HPPB - *Ideopsis* sp. [Glassy tigers]

(Insert: [A]. *Graphium sarpedon* - common bluebottle, [B]. *Papilio demoleus* - Lime swallowtail),
[C]. *Papilio karna* - Jungle jade, [D]. *Trogonoptera brookiana* - Rajah Brooke's birdwing)



Organization Structure

The position of HPPB within Andalas University organization is shown below:



HPPB is a facility owned by Andalas university and managed by Department of Biology as shown in the chart above. It also coordinates with Technical Service Unit of Biodiversity (UPT. KEHATI). HPPB consists of natural forest (Hutan Alam) and biodiversity garden (Taman Keanekaragaman Hayati).

An aerial photograph of a dense, green forest. A narrow path or road is visible, winding through the trees. In the background, a building with a red roof is partially visible through the foliage.

Services

HPPB provides several services for students, academic staffs, researchers of Andalas University and external parties. Those services focus primarily related to education, research, training, and outdoor activities including;

1. Plant and animal identifications
2. Wildlife observations
3. Tracking animals and plants
4. Birds watching
5. Camping and day camp
6. Join research
7. Monitoring tropical biodiversity
8. Hiking, jogging and out-bond
9. Community development program
10. Edu-ecotourism

Education and research activities in HPPB



An aerial photograph of a lush green forest. In the center-left, a red tent is pitched on a clearing. Below it, a dark-colored car is parked on a dirt path. To the right, a body of water is visible, reflecting the surrounding trees. The forest is dense with various shades of green, indicating a healthy ecosystem.

Facilities

HPPB has several facilities to support education, research and outdoor activities including:

1. Natural forest and biodiversity gardens (150 ha)
2. Research station (temporary)
3. Walking paths and directions
4. Forest hut
5. Permanent forest plot
6. Gazebo
7. Camping grounds
8. Jogging tracks
9. Information center and library
10. Parking area



Gazebo, constructed in 2017

(Insert from top: temporary research station, build in 2010; jogging tracks, and former research station build in 1995, ruined in 2009 after earthquake)



Dr. Yamato Tsuji and team (Macaque feeding ecology research)
The Primate Research Institute, Kyoto University, Inuyama, Aichi Pref., Japan



Dr. Andie Ang and team (Leaf monkey research)
Jane Goodall Institute, Singapore

25.04.2018

Collaboration

HPPB has collaboration with national and international institution for various activities. Those institution include:

1. Natural Resources Conservation Bureau (BKSDA), West Sumatra
2. Forest and Environmental Department, West Sumatra
3. Indonesian Institutes of Sciences (LIPI)
4. Indonesian Army Forces
5. Local University: Batusangkar Islamic National University, Tanah Datar; Padang Pharmaceutical College, Padang
6. National University: Raden Fatah Islamic National University, Palembang; Bogor Agricultural University; Bandung Institute of Technology
7. International University; Kyoto University, Osaka City University, Kagoshima University, Sun Yat Sen University, Ibaraki University, Kanazawa University, Edinburgh Napier University, Jane Goodall Institute.
8. NHK broadcast, Japan
9. The Royal Botanic Gardens, Edinburgh
10. Non Government Organization; WWF, WCS, ZSL, FFI, WARSI



Prof Zhang Peng and team (Primate behavior and ecology research)
Sun Yat Sen University, Ghuangzhou, China



Visit by Directorate general of Energy and Natural Resources Conservation Bureau



Expert visit: Prof. Dr. Yatna Supriyatna, M.Sc. (in the center), replanting Andalus (*Morus macroure*) - floral mascot of West Sumatra



Anniversary of HPPB in 2016 attended by faculty members, retired faculty members and alumni



Gibbon researcher appreciated by head of Biology Department

[From left to right; Dr. Henny Herwina (Ants specialist), M. Nazri Janra, M.Si., M.A. (Birds specialist), Gonzalo Paez Perez (Gibbon researcher), Dr. Mairawita (Insect taxonomist, head of Biology Department), Dr. Rizaldi (Primate specialist), M. Idris, M.Si. (Plant physiologist)]



Border check and patrol lead by Rector of Andalas University in 2016

Potential Research

There are several studies being conducted in HPPB and potential research collaborations including:

1. Inventory of Sumatran tropical forest biodiversity
2. Ecology and behavior
3. Population dynamic and monitoring
4. Forest dynamic and monitoring
5. Impact of global warming to plant phenology
6. Fresh water ecology and bioindicator
7. Carbon stocks
8. Medicinal plants (herbs) and exploration for edible plants resources
9. Genetic diversity and genetic resources for domestication and breeding
10. Exploration of endophytic microbes and fungi

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An aerial photograph of a lush green forest. In the center, there is a small clearing with a building that has a red roof and a blue awning. A small pond is visible in the lower part of the clearing. The surrounding forest is dense with various shades of green. The title 'Photograph Contributors' is written in yellow text on the right side of the image.

Photograph Contributors



1. Prof. Dr. Dahelmi
2. Dr. Rizaldi
3. Dr. Wilson Novarino
4. Dr. Nurainas
5. Dr. Mairawita
6. Dr. Henny Herwina
7. M. Nazri Janra, M.Si., M.A.
8. M. Idris, M.Si.
9. Ilham Kurnia, M.Si.
10. Inda Dwi Solina, M.Si.
11. Rizki Paramitha Mukti, M.Si.
12. Junaidi, S.Si.
13. Irvan Prasetyo, S.Si.
14. Sepriyoga Virdana, S.Si.
15. Tengku Lidra, S.Si.
16. Fika Efendi, S.Si.
17. Dr. Andie Ang
18. Mr. Dickson Ng
19. Mr. Gonzalo Paez Perez
20. Try Surya Harapan
21. W. Meijer (*Rhizantes deceptor*)

Additional Information

Information about HPPB:

Department of Biology,
Faculty of Mathematics and Natural Science, Andalas University
Kampus UNAND Limau Manis Padang
West Sumatra 25163, Indonesia
Email : biologi@fmipa.unand.ac.id
Website: <http://biologi.fmipa.unand.ac.id/>

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