BIODIVERSITAS
Volume 20, Number 8, August 2019
Pages: 2197-2205

ISSN: 1412-033X
E-ISSN: 2085-4722
DOI: 10.13057/biodiv/d200813

Short Communication: Floristic survey of vascular plant in the submontane forest of Mt. Burangrang Nature Reserve, West Java, Indonesia

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Manuscript received: 1 July 2019. Revision accepted: 18 July 2019.

Abstract. *Cahyanto T, Efendi M, Shofara RM. 2019. Short Communication: Floristic survey of vascular plant in the submontane forest of Mt. Burangrang Nature Reserve, West Java, Indonesia. Biodiversitas 20: 2197-2205.* A floristic survey was conducted in submontane forest of Block Pulus Mount Burangrang West Java. The objectives of the study were to inventory vascular plant and do quantitative measurements of floristic composition as well as their structure vegetation in the submontane forest of Nature Reserves Mt. Burangrang, Purwakarta West Java. Samples were recorded using exploration methods, in the hiking traill of Mt. Burangrang, from 946 to 1110 m asl. Vegetation analysis was done using sampling plots methods, with plot size of 500 m^2 in four locations. Result was that 208 species of vascular plant consisting of basal family of angiosperm (1 species), magnoliids (21 species), monocots (33 species), eudicots (1 species), superrosids (1 species), rosids (74 species), superasterids (5 species), and asterids (47), added with 25 species of pterydophytes were found in the area. The three families of plants are Lauraceae (10 species), Urticaceae (9 species), and Rubiaceae (8 species) dominating those areas. Fourteen species belong to IUCN red list: Least concern/LC (12 species), Vulnerable/VU (1 species), and endangered/EN (1 species). Furthermore, *Castanopsis argentea* A.DC, *Pinanga javana* Blume and *Amorphophallus decus-silvae* Backer & Aldrew belonging to protected plants are also found in the area. Based on the assessment of analysis vegetation, the forest has experienced disturbance, the density of trees is commonly low and has a lot of gaps. Many vacant lots are found. On the other side, there is the presence of invasive plant species that may slow down a succession into climax growth of local plant.

Keywords: *Amorphophallus decus-silvae,* ecology, Mt. Burangrang, plant conservation, vascular plant

INTRODUCTION

The mountain forests, one of them in Java Island area, are the last zone of in situ conservation of plant species from deforestation and exchanging of land which has been carried out in the last nearest time. The requirement of food and settlement has pressed to open much larger land (Setiawan and Sulistyawati 2008; van Welzen and Raes 2011; Tsujino et al. 2016). On the other hand, diversity loss and dynamic vegetation succession that were often found in the mountain forest of Java (Zuhri and Mutaqien 2011; Purwaningsih et al. 2017; Zuhri et al. 2018), will encourage innovation to the conservation of the flora on every mountain, such as in Burangrang Nature Reserve.

Mount Burangrang NR is part of the tropics mountain in West Java; this area is up to 2.700 ha and covers two regencies namely Purwakarta and Subang (BBKSDA 2016). Ecologically, Burangrang Nature Reserve area has an important part as a territory for water catching and water reservoirs for its surrounding area. Besides that, Mt. Burangrang becomes a natural habitat of Java primate, such as *owa java*, *lutung* and *surili*, so that flora conservation to support the animals woof must be regarded (BBKSDA 2016). On the other hand, some areas of Burangrang Nature Reserve are adjacent immediately with agriculture and plantation so the plants are susceptive to be coming into natural forest, as reported by Zuhri et al. (2018) in Mount Gede.

The book *Flora of Java* composed by Backer and Bakhuizen v.d. Brink (1963; 1965; 1968) in comprehensive way consists of the description of flora in Java and The Mountain Flora of Java (van Steenis 1972; 2006). Specifically, this book describeshighlands flora and it becomes the most references inventory of the flora in Mount Burangrang Nature Reserve. More than 400 species of highlands flora, including *Nephenthes gymnamphora*, *Morinda sarmentosa*, and *Vernonea cymosa* are found in Mt. Burangrang Nature Reserve area (Van Steenis 2006). However, the list of flora must be made clear. So, this reseach is purposeful to get the data about the kinds of flora in the hills forest of Mount Burangrang Nature Reserve, Purwakarta, West Java, Indonesia.

MATERIALS AND METHODS

Study area

The study was conducted in the submontane forest on Mt. Burangrang Nature Reserve, Purwakarta District, West Java Province, Indonesia at 946 to 1104 m asl., in

coordinates: 06°43'37.8" S to 6°43'441" S and 107°33'21.5" E to 107°33'07.8" E. The topography condition of the study site was rather flat and uphill with slopes of 10-45°. Microclimate measurements were carried out during study, i.e. temperature (23.2-27.9°C, in the afternoon), air humidity (up to 92%), pH (6.2-7.2), soil humidity (50 to 90%), and light intencity (137 to 2240 lux).

Procedures

There are two types of data taken from the site, i.e. (i) list of vascular plants, both in the plot and around observation plots, and (ii) data of floristic composition and vegetation structure.

Inventory of vascular plants

Sampel were recorded using exploration methods (Rugayah et al. 2004), in the hiking traill of Mt. Burangrang Purwakarta (±3.2 km length) (Figure 1). The Species were recorded based on their scientific names and families, while the unidentified species were made herbarium voucher referring to de Vogel (1987), to be identified later using an identification book such as *Flora of Java* (Backer and Bakhuizen v.d. Brink 1963; 1965; 1968), *Varenflora voor Java* (Backer and Posthumus 1939), *The Mountain Flora of Java* (van Steenis 2006), *A Revised Flora of Malaya* (Holttum 1966), *Flora Malesiana* Vol. 4 (2012) and other papers (Zhu et al. 2012; Girmansyah 2008; Hadiah 2007). The naming of species, genera, families and taxon level refers to the Angiosperm Phylogeny Group classification (1998; 2003; 2009; 2016) for flowering plants, while for lycophytes and fern, it refers to Christenhusz et al. (2011) and Rothfels et al. (2012).

Vegetation sampling

Collecting data procedure was done by the vegetation analysis technique using purposive sampling (plot) in depended path. Sampling was done using four plots in altitude of 946-1110 m asl.. Every plot has magnitude of 10x50 m^2, which is then divided into 5 subplots (Figure 2). For vertical category (dbh>10 cm), a subplot with measurement of 10x10 m^2 is used, but on the boundary (dbh<10) and low flora, a subplot with measurement of 5x5 m^2 is used. The species and the quantity of plants in every sub plot are recorded. The diameter of high pectoral timbers is measured (dbh) and recorded. Measurement at the area covers the species, the quantity of individual on every species, the diameter of tree, and height of tree.

The measurement analysis of diversity of plants and low plants uses index as follow (Ismaini 2015), namely, the index of diversity of Shannon-Wiener (Magurran 1988):

$$H' = -\sum_{i=1}^{5} (pi)\ (ln\ pi)$$

Where, H': the result of diversity index of Shannon-Wiener and pi: proportion of every species i. so H' is sum of whole pi ln pi for all species in community.

The Index of Species Evenness: (E)=H'/ln S, where E: index of species evenness, H': the result of diversity index of Shannon-Wiener, and S: sum of species which have been observed.

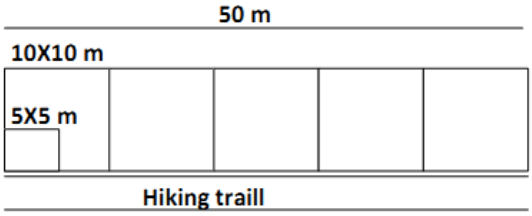

Figure 2. Plot sampling layout. Plot size: 10X50 m.

Figure 1. Location of Mt. Burangrang Nature Reserve, Purwakarta, West Java, Indonesia

Data analysis

Analysis of structure and vegetation was done by counting Importance Value Index (IVI) by formula:

IV = RD+RF+RDo,

Where, RD: Relative Density, RF: Relative Frequency, RDo: Relative Dominance (%). The Calculation of INP, according to Soerianegara and Indrawan (1982), is as follow:

$$\text{RD} = \frac{\text{number of individuals of a spesies}}{\text{total number of individual}} \text{ x } 100\%$$

$$\text{RF} = \frac{\text{frequency of a species}}{\text{sum frequency of all species}} \; x \; 100\%$$

$$\text{RDo} = \frac{\text{dominance of a species}}{\text{dominance of all species}} \; x \; 100\%$$

RESULTS AND DISCUSSION

List of vascular plants in Mt. Burangrang Nature Reserve

A total of 208 species of vascular plant (more or less 35% species of the western mountain flora of Java) belonging to 85 families have been recorded along transect on Block Cipulus Mt. Burangrang, both in the plots or outside the plots (Table 1). Based on the Angiosperm Phylogeny Group classification (1998; 2003; 2009; 2016), these species can be classified into: basal family of angiosperm (1 species), magnoliids (21 species), monocots (33 species), eudicots (1 species), superrosids (1 species), rosids (74 species), superasterids (5 species), and Asterids (47 species), plus 23 species of fern and 2 species of lycophytes. The gymnosperms group was not found in this observation.

Based on their habits, the tree type with 72 species has more member group than other types, such as: herbs, shrubs, climbing, epiphytes, creeping and palms type, with 56 species, 30 species, 27 species, 16 species, 5 species, and 2 species respectively. Lauraceae (10 species) and Fagaceae (2 species), the typical families in the submontane to montane forest, can also be found in this area. Other families with the high number of species members in study are Urticaceae (9 species), Rubiaceae (8 species), Moraceae (7 species), Orchidaceae (6 species), Phyllanthaceae (6 species), Arecaceae (6 species) and Araceae (6 species).

A total of 14 species belongs to IUCN redlist, with categories of least concern (12 species), vulnerable (1 species), and endangered (1 species). Furthermore, *Castanopsis argentea*, *Pinanga javana* and *Amorphophallus decus-silvae* are included in protected plants (Permen LHK No 20 tahun 2018). Furthermore, *A. decus-silvae* , wellknown as endemic flora of Java (Yuzzami et al. 2017), were found at flowering phase (up to 2.15 m high). Other species, i.e. *Kadsura scanden* and *Calamus ciliaris* belonging to 200 of rare species in Indonesia, were also found here (Mogea et al. 2011). Some of pterydophytes belong to IUCN red list based on an assesment by Fernando et al. (2008) in Philiphines, i.e. *Asplenium nidus* L. (VU), *Cyathea contaminans* (Wall. Ex Hook) Copel. (VU), *Huperzia squarrosa* (G. Forst.) Trevis. (EN), *Aglaomorpha heraclea* (Kuntze) Kopel. (VU), and *Microsorum membranifolium* (R.Br.) Ching (LC).

In addition to native species of Java, exotic species were also found in Mt. Burangrang Nature Reserve, such as *Coffea arabica*, *C. canephora*, *Melastoma affine*, *Clidema hirta*, *Chromolaena odorata*, *Austroeupatorium inulifolium*, *Ageratina riparia*, *Lantana camara* and *Brugmansia suaveolens*. *Brugmansia suaveolens*, *M. acuminata*, *A. riparia*, *L. camara* and *C. odorata* have been naturalized in Java for long years ago (Backer and Bakhuizen v.d. Brink 1963; 1965; 1968; Tjitrosoedirdjo et al. 2016). Firstly, these species are imported for medicinal, food or ornamental plants in the Dutch colonial through botanic gardens. *Brugmansia suaveolens*, for example, was imported from the Americas for ornamental plant (Bruggeman 1927; Dakkus 1930), but today, it grows wild on the banks of rivers, on moist areas or on little shade and it can also be found in various regions in Indonesia (Wahyuni and Tjitrosoedirdjo 2013; Zuhri and Mutaqien 2013; Junaedi 2014; Sutomo et al. 2018). Exotic species can threaten as invasive as reported in various regions in Indonesia (Setiawan and Sulistyawati 2008; Wahyuni and Tjitrosoedirdjo 2013; Zuhri and Mutaqien 2013; Tjitrosoedirdjo et al. 2016; Sutomo et al. 2018), so we need to be aware about this.

Floristic composition and structure vegetation

Diversity of tree in the observation plot in Mt. Burangrang Nature Reserve

A total of 48 individuals of tree (belong to 14 species from 10 family) were found in observation plot which were dominated by pioneer species i.e. *Villebrunea integrifolia*, *Antidesma tetrandum*, *Acronychia trifoliolata* and *Dendrocnide stimulans* (Table 2). It indicated that forest of lower submontane of Blok Cipulus Mt. Burangrang is disturbed or experienced secondary succession. Data of diameter distribution of tree (Figure 3**)** supported this statement too. Small trees (dbh<50 cm) dominate more than large trees (dbh>50 cm). The Shannon-Wienner's diversity index (H' value=1.85) on tree level shows the result of medium category. While, the equality value only 0.35 (J<0.5) indicates the spread of species that are not evenly distributed at the tree level.

Villebrunea integrifolia (Gaudich.) *Miq.* shows increasing trends on the number of individual in observed plot. Increases of individual can be seen from each plot and *Villebrunea integrifolia* (Gaudich.) *Miq.* has the highest number of individual which was found throughout the area. Furthermore, Plot 2 is the most distributed area containing *Villebrunea integrifolia* (Gaudich.) Miq., *Antidesma tetrandum* Bl., *Acronychia trifoliolata* Zoll & Moritzi, *Dendrocnide stimulans* (L.f) Chew, and *Litsea angulata* Bl. Some species of lower submontane, such as, *Litsea*

diversifolia Bl., *L. mappacea* Boerl. and *L. angulata* Bl. were also found here (Backer and Bakhuizen v.d. Brink 1963; Sunarto et al. 2019). For, the type of mountain flora, only 1 individual for each type were found, while *Piper aduncum* L., a well-known exotic species (Hartemink 2010), may only be found in one plot, but not in other plot. The distribution of *P. aduncum* species is more commonly found in riparian areas with a little light.

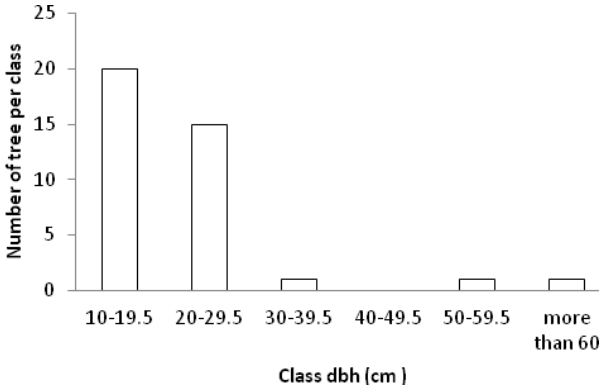

Figure 3. Frequency histogram of diameter distribution of tree (tree with dbh> 10 cm)

Table 1. A list of vascular plant in Mt. Burangrang Nature Reserve, West Java, Indonesia both in the plots and outside observation plots

Names of taxa	Habits	Conserv. status
Basal Angiospermae		
Schisandraceae Blume.		
Kadsura scandens (Blume.) Blume.	Cl.	NE
Magnoliids		
Annonaceae Juss.		
Fissistigma latifolium (Dunal.) Merr.	Cl.	NE
Polyalthia subcordata (Blume). Blume	Sh.	NE
Uvaria schizocalyx Back.	Sh.	NE
Aristolochiaceae Juss.		
Aristolochia coadunata Back.	Cl.	NE
Lauraceae Juss.		
Cinnamomum porrectum (Roxb) Kosterm.	T	NE
Cryptocarya ferrea Blume.	T	NE
Endiandra rubescens (Blume) Miq.	T	
Litsea diversifolia Blume.	T	NE
Litsea cf *garciae* Vidal.	T	NE
Litsea mappacea Boerl.	T	NE
Litsea noronhae Blume.	T	NE
Neolitsea javanica Back.	T	NE
Phoebe grandis (Nees) Merr.	T	NE
Tetranthera angulata (Blume) Ness.	T	NE
Magnoliaceae Juss.		
Magnolia sumatrana (Miq.) Figlar & Noot.	T	LC
Magnolia lillifera Druce.	T	LC
Monimiaceae Juss.		
Kibara coreacea Hook.f & Thomson.	T	NE
Myristicaceae		
Knema cinerea Warb.	T	NE
Piperaceae Giseke		
Peperomia laevifolia (Bl) Miq.	Ep.	NE
Piper aduncum L.	T	NE
Piper sulcatum Blume.	H	NE
Monocots		
Amaryllidaceae J. St. Hill.		
Curculigo capitulata (Lour.) Kuntze.	H	NE
Araceae Juss		
Alocasia longiloba Miq.	H	NE
Amorphophallus decus-silvae Backer & Aldrew.	H	Protected plant
Homalomena pendula (Blume) Bahk.f.	H	NE
Pothos scandes L.	H	NE
Raphidophora sp	H	NE
Schismatoglottis acuminatissima Schott.	H	NE
Arecaceae Berch. & Presl.		
Calamus ciliaris Blume.	Cl.	NE
Calamus heteroideus Blume.	Cl.	NE
Caryota mitis Lour.	Pl.	LC
Pinanga javana Bl.	Pl.	Protected plant
Plectocomia elongata Mart ex Bl.	Cl.	NE
Asparagaceae Juss.		
Cordyline fruticosa (L.) A. Chev.	Cl.	NE
Ophiopogon caulescens (Bl.) Backer	H	NE
Commelinaceae Mirb		
Commelina palludosa Bl.	H	NE
Forrestia mollissima (Bl.) Kord.	H	NE
Costaceae Nakai		
Costus speciosa (J.Konig) Sm.	H	NE
Dioscoreaceae R.Br.		
Tacca chantrieri Andre.	H	NE
Musaceae Juss.		
Musa acuminata Colla.	H	LC
Orchidaceae Juss.		
Appendicula sp	Ep.	NE
Coelogyne cf *speciosa* (Blume.) Lindl.	Ep.	NE
Corymborkis sp.	H	NE
Eria sp.	H	NE
Habenaria angustifolia Kunth	H	NE
Liparis sp.	Ep.	NE
Pandanaceae R.Br.		
Freycinetia insignis Blume.	Cl.	NE
Freycinetia javanica Blume.	Cl.	NE
Poaceae Barnhart		
Dinochloa scandens (Blume ex Nees) Kuntze	Cl.	NE
Isachne pangerangensis Zoll. & Moritzi.	H	NE
Smilacaceae Vent.	Cl.	NE
Smilax leucophylla Blume.		
Smilax zeylanica L.	Cl.	NE
Zingiberaceae Martinov.		
Etlingera coccinea (Bl.) S.Sakai & Nagam	H	NE
Zingiber inflexum Blume.	H	NE
Eudicots		
Proteaceae Juss.		
Helicia robusta (Roxb) R.Br. ex Blume.	Sh.	NE
Superrosids		
Altingiaceae		
Altingia excelsa Noronha.	T	NE
Rosids		
Anacardiaceae R.Br.		
Semecarpus cuneiformis Blanco.	T	NE
Begoniaceae C.Agardh		
Begonia isoptera Dryand & Sm.	H	NE
Begonia longifolia Blume.	H	NE
Begonia multangula Blume.	H	NE
Brassicaceae Burnett		
Cardamine hirsuta L.	Cr.	NE
Cannabaceae Martinov.		
Trema orientalis (L.) Blume.	T	LC

Celastraceae R.Br.		
Euonymus indicus B.Heyne ex Wall.	T	NE
Clusiaceae Lindl.		
Garcinia sp.	T	NE
Cucurbitaceae Juss.		
Gynostemma pentaphyllum (Thunb.) Makino	Cl.	NE
Melothria leucocarpa Blume.	Cl.	NE
Zehneria japonica (Thunb) H. Y.Liu	Cl.	NE
Cunoniaceae R.Br.		
Weinmannia blumei Prantl.	T	NE
Elaeocarpaceae Juss.		
Elaeocarpus angustifolius Blume.	T	NE
Elaeocarpus pirrei Kord & Valeton	T	NE
Euphorbiaceae Juss		
Claoxylon longifolium (Blume) Endl ex Hassk.	T	NE
Homalanthus populneus (Geiseler) Pax.	T	NE
Macaranga tanarius Mull. Arg.	T	NE
Ostodes paniculata Bl.	T	NE
Homalanthus giganteus Zoll & Moritzi.	T	NE
Fabaceae Lindl		
Archidendron clypearia Jack & Nielsen.	T	NE
Derris elliptica (Wall) Benth.	T	NE
Hylodesmum repandum (Vahl) H.Ohashi & R.R.Mill.	T	NE
Paraserianthes lophantha (Wild) I.C.Nielsen.	T	NE
Fagaceae Dumort.		
Castanopsis argentea (Blume.) A.DC.	T	EN, protected plant
Lithocarpus elegans (Blume) Hatus ex Soepadmo	T	NE
Juglandaceae DC ex. Perleb.		
Engelhardtia spicata Lechen ex Blume	T	LC
Malvaceae Juss.		
Sida acuta Burm.f.	H	NE
Sterculia coccinea Jack.	T	NE
Sterculia foetida L.	T	NE
Sterculia rubiginosa Vent.	T	NE
Melastomataceae Juss.		
Clidemia hirta (L) D.Don.	H	NE
Creochiton bibracteata (Blume.) Blume.	H	NE
Melastoma affine D.Don.	Sh.	NE
Meliaceae Juss.		
Aglaia eximia Miq.	T	NE
Dysoxylum excelsum Blume.	T	NE
Dysoxyllum nutans (Bl.) Miq.	T	NE
Moraceae Gaudich.		
Ficus ampelas Burm.f.	Sh.	NE
Ficus heterophylla L.f.	T	NE
Ficus laevicarpa Elme.	T	NE
Ficus sp.1 (small fruit)	Sh.	NE
Ficus sp.2 (big fruit)	Sh.	NE
Ficus variegata Blume.	T	NE
Maclura cochinchinensis (Lour). Corner.	T	NE
Myrtaceae Juss.		
Syzygium accuminatissimum (Blume.) DC.	T	NE
Syzygium racemosum (Blume.)DC.	T	NE
Syzygium rostratum (Blume.) DC.	T	NE
Phyllanthaceae Martinov.		
Antidesma tetrandum Blume.	T	NE
Antidesma tomentosa Blume.	T	NE
Bischofia javanica Blume.	T	NE
Breynia microphylla (Kurzweil ex Teijsm. & Binn) Mull. Arg.	Sh.	NE
Bridelia insulana Hance.	T	NE
Glochidion rubrum Blume.	T	NE
Polygalaceae Hoffmanns & Link		
Polygala venenosa Juss ex Poir.	Sh.	NE
Rosaceae Juss.		
Rubus fraxinifolius Hayata	Cl.	NE
Rubus rosiifolius Sm.	Cl.	NE
Rutaceae Juss.		
Acronychia trifoliolata Zoll & Moritzi	T	LC
Luvunga sarmentosa Kurz.	Cl.	NE
Toddalia asiatica (L) Lamk.	Cl.	NE
Salicaceae Mirb.		
Flacourtia rukam Zoll. & Moritzi	T	NE
Sapindaceae Juss.		
Acer laurinum Hassk.	T	LC
Staphylleaceae Martinov.		
Turpinia sphaerocarpa Hassk.	T	NE
Thymelaeaceae Juss.		
Daphne composita (L.f.) Gilg.	T	NE
Urticaceae Juss		
Boehmeria nivea (L.) Gaudich.	Sh.	NE
Debregeasia longifolia (Burm.f) Wedd.	T	NE
Dendrocnide stimulans (L.f) Chew.	Sh.	NE
Elatostema paludosum Miq.	H	NE
Elatostema strigosum Hassk.	H	NE
Oreocnide integrifolia (Gaudich) Miq.	T	NE
Pilea melastomoides (Poir.). Wedd.	H	NE
Poikilospermum suaveolens (Blume) Merr.	T	NE
Villebrunea integrifolia Gaudich.	T	NE
Vitaceae Juss		
Leea angulata Korth ex Miq.	H	NE
Leea indica (Burm.f) Merr.	Sh.	NE
Cissus bicolor Domin	Cl.	NE
Superasterids		
Amaranthaceae Juss.		
Achyranthes bidentata Blume.	H	NE
Iresine herbstii Hook.	H	NE
Balanophoraceae A. Rich.		
Balanophora elongata Blume.	H	NE
Polygonaceae Juss.		
Persicaria chinense (L.) H.Gross.	H	NE
Persicaria nepalensis (Meisn). Miyabe	H	NE
Asterids		
***Acanthaceae* Juss**		
Peristrope hyssopifolia (Burm.f) Bremek	H	NE
Strobilanthes paniculata Miq.	H	NE
Actinidiaceae Gilg & Werderm		
Saurauia cauliflora DC.	T	VU
Saurauia reinwardtiana Blume.	T	NE
Adoxaceae		
Sambucus javanica Blume.	T	NE
Viburnum sambucinum Blume.	Sh.	NE
Apiaceae Lindl.		
Hydrocotyle javanica Thunb.	Cr.	LC
Alyxia reindwarthii Blume.	Cl.	NE
Hoya multiflora Blume.	Cl.	NE
Parameria laevigata (Juss.). Moldenke.	Cl.	NE
Rauvolfia javanica Kord & Valeton.	T	NE
Thylophora villosa Blume.	Cl.	NE
Araliaceae Juss.		
Arthrophyllum diversifolium Blume.	T	NE
Schefflera rugosa (Blume) Harm.	Sh.	NE
Trevesia sundaica Miq.	Sh.	NE
Asteraceae Bercht. & J.Presl		
Ageratina riparia (Regel) R.M.King & H.Rob.	H	NE
Chromolaena odorata (L) R.M.King & H.Rob	H	NE
Vernonia arborea Buch-Ham.	Sh.	NE
Balsaminaceae A.Rich		
Impatiens platypetala Lindl.	H	NE
Campanulaceae Juss.		
Lobelia angulata Forst.	Cr.	NE

Cornaceae Bercht. & J.Presl		
Alangium rotundifolium (Hassk.) Bloemb.	T	NE
Gesneriaceae Rich. & Juss.,		
Aechynanthus cf *radicans* Jack.	Cl.	NE
Agalmyla parasitica (Lamk.) Kuntze	Cl.	NE
Cyrtandra pendula Blume.	H	NE
Cyrtandra picta Blume	H	NE
Rhynchoglossum obliquum Blume.	H	NE
Lamiaceaea Martinov.		
Clerodendrum inerme (L.) Gaertn.	Sh.	NE
Paraplomis oblongifolia (Blume) Prant.	H	NE
Plantaginaceae Juss		
Plantago major L.	H	NE
Primulaceae Batsch ex Borkh		
Embelia pergamacea A.DC.	Cl.	NE
Maesa latifolia A.DC.	Sh.	NE
Rubiaceae Juss		
Coffea arabica L.	Sh.	NE
Coffea canephora Pierre ex A. Froenhener	Sh.	LC
Ixora coccinea L.	Sh.	NE
Lasianthus cf *stipularis* Blume.	Sh.	NE
Lasianthus stercorarius Blume.	Sh.	NE
Mussaenda frondosa L.	Sh.	NE
Mycetia cauliflora Reinw	Sh.	NE
Rubia cordifolia L.	Sh.	NE
Scrophulariaceae Juss.		
Torenia asiatica L.	H	NE
Stemonuraceae Karehed.		
Gomphandra javanica (Blume.) Valeton	T	NE
Solanaceae Juss.		
Brugmansia suaveolens (Humb. & Bonpl. ex Willd.) Bercht. & J.Presl	H	NE
Theaceae Mirb.		
Camellia lanceolata (Blume.) Seem.	Sh.	NE
Gordonia excelsa (Blume.) Blume.	T	NE
Pyrenaria serrata Blume	T	LC
Schima wallichi (DC) Kort.	T	LC
Verbenaceae J.St.Hil.		
Lantana camara L.	Sh.	NE
Fern		
Aspleniaceae Newman		
Asplenium tenerum (G. Forst.) var. *pallidum* (Blume.) Veldk. & Wardani	Ep.	NE
Asplenium pellucidum Lamk.	Ep.	NE
Asplenium nidus L.	Ep.	VU*
Asplenium salignum Blume.	Ep.	NE
Hymenasplenium unilterale Lamk.	H	NE
Athyriaceae Alston		
Diplazium esculentum (Retz.) Sw.	H	NE
Diplazium dilatatum Blume.	H	NE
Diplazium sp.	H	NE
Cyatheaceae Kaulf.		
Cyathea contaminans (Wall. Ex Hook) Copel.	T	VU*
Davalliaceae M.R.Schomb.		
Davallia denticulata (Burm.f.) Mett. ex Kuhn.	Ep.	NE
Dennstaedtiaceae Lotsy		
Dennstaedtia scandens (Bl.) T. Moore	Cr.	NE
Dryopteridaceae Herter		
Bolbitis sp.	H	NE
Dryopteris sp.	H	NE
Hymenophyllaceae Mart.		
Cephalomanes javanicum C. Presl.	H	NE
Marattiaceae Kaulf.		
Angiopteris avecta (G. Forst.) Hoffm.	Sh.	NE
Nephrolepidaceae Pic.Serm.		
Nephrolepis bisserata (Sw.) Scott.	Ep.	NE
Polypodiaceae Berecht. & J. Presl.		
Pyrrosia albicans (Blume) Ching	Ep.	NE
Goniophlebium persicifolium (Desv.) Bedd.	Ep.	NE
Aglaomorpha heraclea (Kuntze) Kopel.	Ep.	VU*
Microsorum membranifolium (R.Br.) Ching	Ep.	LR*
Pteridaceae E.D.M.Kirchn.		
Antrophyum reticulatum (Forst.) Kaulf.	Ep.	NE
Pteris longipinnula Wall. ex J. Agardh	H	NE
Thelypteridaceae Ching ex Pic. Serm.		
Chingia ferox (Bl.) Holttum	H	NE
Lycophytes		
Lycopodiaceae P.Beauv. ex Mirb.		
Huperzia squarrosa (G. Forst.) Trevis.	Ep.	EN*
Selaginellaceae Willk.		
Selaginella sp.	Cr.	NE

Note: T: Tree, Sh: Shrub, H: Herbs, Ep: Epiphytes, Pl: Palm, Cl: Climbing, Cr: Creeping, LC: Least concerns, VU:Vunereable, EN: Endangered, *according to Fernando et al. (2008)

Table 2. Species distribution of tree in Plot 1, Plot 2, Plot 3 and Plot 4 in Mt. Burangrang Nature Reserve, West Java, Indonesia

Scientific names	Family	Number of individual				IV	Basal area (m^2)	Mean hight (m)
		Plot 1	Plot 2	Plot 3	Plot 4			
Villebrunea integrifolia (Gaudich.) Miq.	Urticaceae	1	5	7	11	121.05	388.63	9.17
Antidesma tetrandum Bl.	Phyllanthaceae	-	6	-	-	30.26	35.91	11.83
Acronychia trifoliolata Zoll & Moritzi	Rutaceae	1	3	-	-	27.19	11.65	12.83
Dendrocnide stimulans (L.f) Chew	Urticaceae	-	2	1	-	23.03	5.86	6.83
Polyalthia rumphii (Bl. ex Hensch) Merr.	Annonaceae	-	-	-	1	13.60	1.13	10.30
Ficus sp.	Moraceae	1	-	-	-	9.43	259.40	25.00
Cyathea contminans (Wall. Ex Hook.) Copel.	Cyatheaceae	-	-	2	-	9.43	7.17	5.85
Litsea diversifolia Bl.	Lauraceae	-	-	1	-	9.43	4.91	10.50
Ficus variegata Bl.	Moraceae	-	-	-	1	9.43	2.55	7.20
Alangium rotundifolium (Hassk.) Bloemb.	Alangiaceae	1	-	-	-	9.43	1.43	15.20
Litsea mappacea Boerl.	Lauraceae	1	-	-	-	9.43	1.33	9.20
Litsea angulata Bl.	Lauraceae	-	1	-	-	9.43	0.95	7.50
Dysoxylum excelsum Bl.	Meliaceae	-	-	1	-	9.43	0.79	13.30
Piper aduncum L.	Piperaceae	1	-	-		9.43	0.79	12.05
Total		6	17	12	14		722.50	

Notes: IV: importance value

The density level and number of tree species in Mt. Burangrang show lower value than other forest type in the similar altitude in Java (Tabel 3). Likewise, the canopy covering in the tree level shows a "gap" in almost all observation plots. It brings to a conclusion that vegetation in Mt. Burangrang has been disrupted and has come to a succession period as it has happened in Mt. Wilis (Purwaningsih et al. 2017). The smaller plot area causing low density and species were found.

Domination of mountain flora, ex. *Aglaia eximia* and *Polyalthia subcordates*, showed a positive regeneration trend compared with a high trees (Table 4). *Polyalthia subcordata*, *Sambucus javanica*, and *Aglaia eximia* were commonly found on those heights, as reported by Zuhri et al. (2018) in the remnant forest of Cibodas Botanic Gardens. *Pinanga javana* (Pinang jawa), is also spread throughout observation plots. *Pinanga javana* grows from low land to high land on Mt. Slamet area, Baturaden (Zulkarnaen et al. 2019).

Table 3. The comparison of density and number of tree species in submontane forest Mt. Burangrang Nature Reserve and other submontane forests in Java, Indonesia

Parameters	Present study	Purwaningsih et al. (2017)	Helmi et al. (2009)	Suryanti (2006)	Suryanti (2006)	Suryanti (2006)	Rahayoe (1996)
	Mt. Burangrang	Mt. Wilis	Bodogol	Mt. Kendeng	Mt. Malang	Mt. Panenjoan	Citalahab
Elevation (m asl)	946-1104	1100	806	1000	1000	1000	1000-1.200
Plot size (ha)	0.2	0.25	1.0	1.0	1.0	1.0	0.7
Density (tree/ha)	190	836	352	406	421	405	395
Number of species	14	13	70	64	69	69	51

Table 4. Species distribution of seedling of some trees in Plot 1, Plot 2, Plot 3 and Plot 4 in Mt. Burangrang Nature Reserve, West Java, Indonesia and its importance value

Scientific names	Number of individu				NI	RD	RF	RDo	IV
	Plot 1	Plot 2	Plot 3	Plot 4					
Aglaia eximia Miq.	80	-	3	4	87	25.22	3.76	5.15	34.13
Polyalthia subcordata (Blume.) Blume.	21	5	1	4	31	8.99	6.77	9.28	25.03
Ficus sp.	37	-	-	-	42	12.17	3.76	5.15	21.09
Endiandra rubescens (Blume) Miq.	7	-	9	-	16	4.64	3.76	5.15	13.55
Engelhardtia spicata Lechen ex Blume	6	-	5	-	11	3.19	3.01	4.12	10.32
Leea indica (Burm.f.) Merr.	-	12	-	6	11	3.19	3.01	4.12	10.32
Sambucus javanica Blume.	-	1	3	6	10	2.90	3.01	4.12	10.03
Pinanga javana Bl.	-	4	3	1	8	2.32	3.01	4.12	9.45
Cyathea contaminans (Wall. Ex Hook) Copel.	-	4	2	-	6	1.74	3.01	4.12	8.87
Dysoxyllum nutans (Bl.) Miq.	14	-	-	-	14	4.06	1.50	2.06	7.62

Note: NI: Number of Individu, RD: Relative Density, RF: Relative frequency, RDo: Relative Dominance, IV: Importance value

Table 5. Ten species of undergrowth vegetation with the highest importance value

Scienfitic names	Number of individu				NI	RD	RF	RDo	IV
	Plot 1	Plot 2	Plot 3	Plot 4					
Achyranthes bidentata Blume.	-	16	33	88	137	9.33	5.46	5.46	20.26
Elatostema strigosum Hassk.	63	21	-	88	172	11.72	3.83	3.83	19.37
Homalomena pendula (Blume) Bahk.f.	43	28	25	10	106	7.22	6.01	6.01	19.24
Etlingera coccinea (Bl.) S.Sakai & Nagam	18	57	17	-	92	6.27	6.01	6.01	18.29
Boehmeria nivea (L.) Gaudich.	6	38	25	23	92	6.27	5.46	5.46	17.20
Commelina paludosa Blume	-	34	16	2	52	3.54	5.46	5.46	14.47
Schismatoglottis acuminatissima Schott.	-	57	31	4	92	6.27	3.83	3.83	13.92
Elatostema paludosum Miq.	-	-	37	92	129	8.79	2.19	2.19	13.16
Psychotria angulata Korth	-	3	47	5	55	3.75	3.83	3.83	11.40
Coffea arabica L.	98	-	-	-	100	6.81	2.19	2.19	11.18

Note: NI: Number of Individu, RD: Relative Density, RF: Relative frequency, RDo: Relative Dominance, IV: Importance value

Diversity of undergrowth in the observation plot in Mt. Burangrang Nature Reserve

The existence of undergrowth species plays an important role in maintaining the microclimate in the land. *Achyranthes bidentata* Blume., *Elatostema strigosum* Hassk., *Homalomena pendula* (Blume) Bahk.f., *Etlingera coccinea* (Bl.) S. Sakai & Nagam and *Boehmeria nivea* (L.) Gaudich are the 10th species that dominate the forest of Mt. Burangrang (Table 5). The high value of importance shows the success of a plant in controlling the area by growing and developing with the habitat which has high humidity and relatively acid-netral pH, although there were some wider gaps in some areas due to fallen trees. This shows that *Achyranthes bidentata* Blume is a dominant crop, with wide adaptability and tolerance to environmental factors (Ismaini et al. 2015). But, there was also a threat from the plants having a high growth rate such as *Etilingera coccinea* which has the potential as an invasive species as reported in several regions in Indonesia and this needs attention. *Etlingera coccinea* has a tight rhizome and forms a population that can inhibit other types of growth (Zuhri and Mutaqien 2013; Tjitrosoedirdjo et al. 2016).

Homalomena pendula and *Boehmeria nivea* were found throughout the observation plot. The production of large amounts of seeds can accelerate the spread of these species even further into the forest. *Coffee arabica* was only be found in plot I, which was directly adjacent to community plantations and the plot was a former plantation land cultivated by communities that had been planted with coffee decades ago.

The conclusion, Mt. Burangrang Nature Reserve stores a large variety of vascular plants including some rare plants as listed in IUCN redlist and nationally, but the condition of the forest in this zone shows disturbed forest which needs recovery as soon as possible. The presence of invasive trees could be slow down the succession toward climax. Further, research on interaction of biodiversity and surrounding community need to be done later to support the continuation of forest life in this area.

ACKNOWLEDGEMENTS

The author thank the head of the biology department and Isma Dwi Kurniawan, who has provided funding for this research through student research assistance programs, Department of Biology, Science and Technology faculties. chairman Balai Besar Konservasi Sumber Daya Alam (Nature Conservation Agency; West Java) for giving research permission to Burangrang Nature Reserve. The author also thank Tatang and Oding (Mt. Burangrang NR), Muslim (Cibodas Botanic Gardens), who has helped material collection in the field.

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