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Birds observed during the monitoring period of 2013-2017 in the revegetation area of ex-coal mining sites in South Kalimantan, Indonesia

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Abstract. *Soendjoto MA, Riefani MK, Triwibowo D, Metasari D. 2018. Birds observed during the monitoring period of 2013-2017 in the revegetation area of ex-coal mining sites in South Kalimantan, Indonesia. Biodiversitas 19: 323-329.* The number of bird species in the reclaimed and revegetated ex-mine site increases as the vegetation age increases. To test the hypotheses, the number of bird species was recorded at 08.00-12.00 and 14.00-17.00, 6-8 days for eight consecutive semiannual monitorings of 2013-2017 in four revegetation sites. Since the second half of 2015, another revegetation site, namely BP was added. Bird species were recorded in 25 m right side and 25 m left side of the observation path and within a radius of 25 m of observation points. To show an increase in the number of bird species, the number of newly discovered bird species in the given semiannual monitoring was added to the number of bird species in the previous semiannual monitoring. The number of bird species in the early semiannual monitoring was used as the baseline value. A bird species was categorized as a resident if the species was observed in each monitoring in the four vegetated sites. Up to the last monitoring, 53 bird species were recorded in the first four sites and 70 bird species in five sites (four reclamation and revegetation sites and one additional site, BP), while in the early semiannual monitoring (second half of 2013) birds recorded were only 30 species. This result shows that the older the vegetation age in the vegetated site, the greater the number of bird species utilizing the site. Seventeen species of birds were categorized as residents. These resident bird species includes White-breasted Woodswallow, Pied Triller, Scaly-breasted Munia, Asian House-martin, Pacific Swallow, Long-tailed Shrike, Blue-throated Bee-eater, Olive-backed Sunbird, Sooty-headed Bulbul, Yellow-vented Bulbul, White-breasted Waterhen, Ashy Tailorbird, Yellow-bellied Prinia.

Keywords: bird, resident, species, vegetated site, coal mining

INTRODUCTION

Active coal mining will shift horizontally from the old site (the former site of the mine) to a new site. In the old site, the deposit has been exhausted and the activity carried out is environmental management, which essentially is reclamation and revegetation. At the new site, the mine is directed to reach the location of the mine deposit, and the deposit is taken for use. Along with the shift, the company is faced with a dilemma that has economic and ecological impacts associated with the disposal accumulation site before the coal deposit at the new site is mined. Should the company be freeing up new sites controlled by the community or reusing old sites that are likely to have been reclaimed and revegetated several years ago?

By assuming that the volume and depth of the mine deposit location at the new site is the same as at the old site, reuse of the ex-mine site may be more economical, if the conditions are as follows. Firstly, the old site is relatively close to the new site. Secondly, the cost of using the old site that is still under the control of the company is cheaper than the cost to free the new site that is usually controlled by the community, especially if the management phase of the old site is just or not more than the reclamation. Thirdly, the reuse of old sites is more strategic, because the company does not face conflicts with the community that at times arise and even the long-term impact that disrupts the company's operations in line with the acquisition of new land.

However, if the management of the old site environment has reached more than reclamation phase (in this case the revegetation phase), the use of this site will create economic and ecological problems. Economic problems are related to financial loss, as costs have been invested to revegetate the old site and also maintain its vegetation. Maintenance costs include rents generated from stands (especially those categorized as woody plants) to grow larger or higher, and also the cost of replacing dead plants before they grow optimally.

Ecological issues vary. One of the issues is the number of bird species affected by reuse of ex-mining sites. The bird is one of the biological components that utilizes vegetation sites and readily observable in the field rather than amphibians and mammals. The longer the vegetation in the reclamation site, the higher the number of bird species that use this site. Some bird species even become residents of the site.

This study aimed to test the above-mentioned hypotheses. The results are expected to be used as consideration by the company to at least specify which sites are selected to accumulate new disposal.

MATERIALS AND METHODS

Observations were made at 07.00-12.00 and 14.00-18.00, 6-8 days for eight consecutive semiannual monitorings in May or June (first half) and November or December (second half) in the monitoring period of 2013-2017 at the four reclamation and revegetation sites (herein after referred to as the revegetation site) of PT Adaro Indonesia, Tabalong and Balangan, South Kalimantan, Indonesia. The first semiannual monitoring was in December 2013. One observation site was added since the second half of 2015, namely BP (Bumi Perkemahan Paringin, Paringin Camping Ground) of Balangan, South Kalimantan, Indonesia, the former coal mining site that was reclaimed and revegetated in 1996/1997. Location of each observation site and the main stands is presented in Figure 1 and Table 1.

Bird Species was recorded on the 25 m left or 25 m right site of the observation path and/or within a radius of 25 m from the observation point. Supporting equipment for observations included both binoculars and camera that were equipped with telelens (70 x 300) or (80 x 400). Bird species were identified with identification key by MacKinnon et al. (2010).

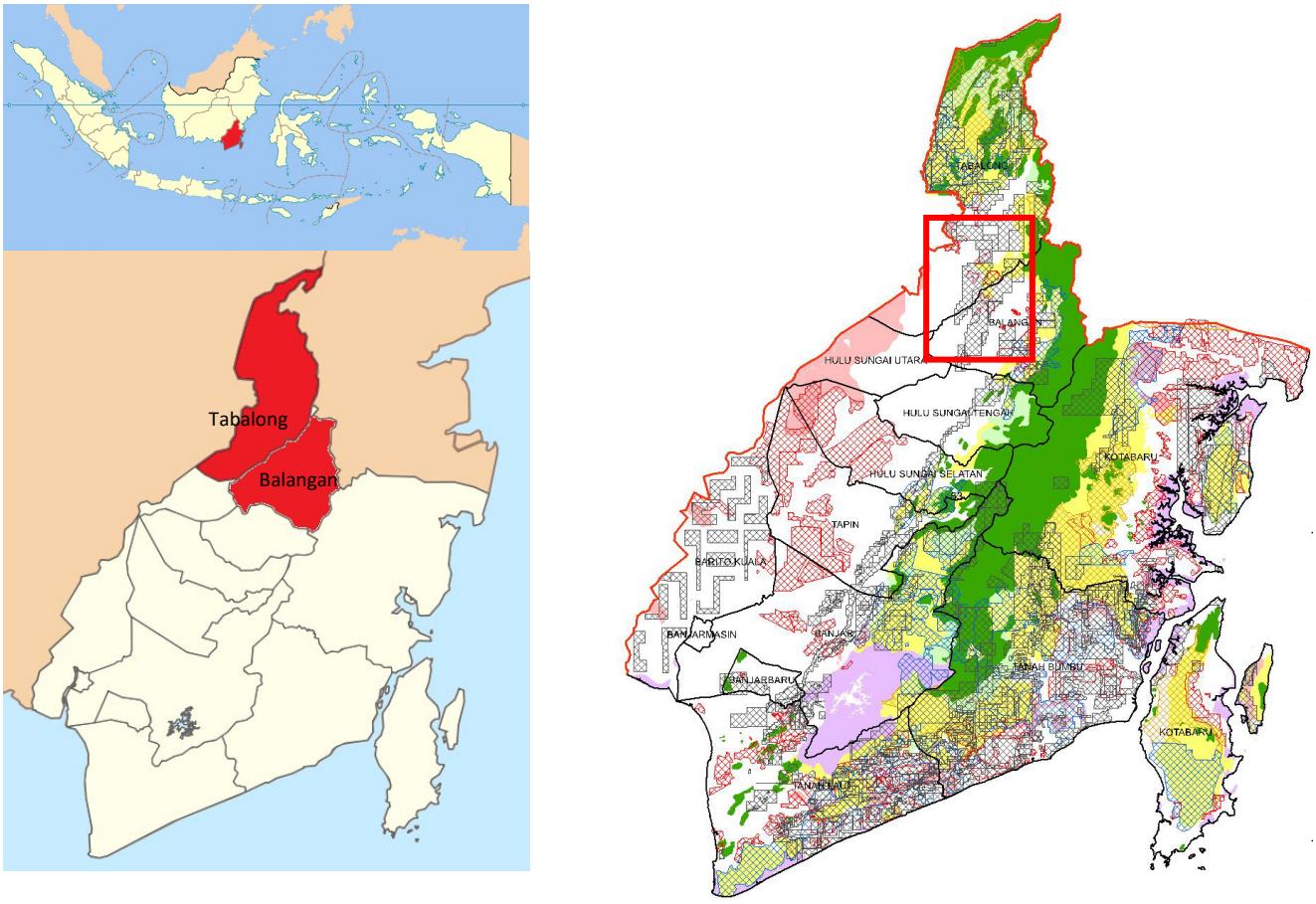


Figure 1. Study site Tabalong and Balangan districts, South Kalimantan, Indonesia

Table 1. The location of each observation site and the age of the main stands

Site		Area (ha)	Coordinate		Time of revegetation	Age until May 2017 (years)
			E	N		
S-1	Disposal C 6-7	1.39	338619	9760701	September 2012	4.67
S-2	Disposal Wara	0.36	330507	9758599	May 2012	5.0
S-3	Disposal S-7	3.21	330914	9753890	February 2012	5.25
S-4	Disposal IPBF	2.27	330932	9752964	February 2012	5.25
BP	Bumi Perkemahan Paringin	± 100	-	-	1996/1997	>19

An increase in the number of bird species is shown by adding the number of newly discovered bird species in the given semiannual monitoring to the number of bird species recorded in the previous semiannual monitoring. The number of bird species in the early semiannual monitoring was used as the baseline value.

The residential status of a bird species was classified into two categories, i.e., resident and migrant. A bird species is categorized as a resident if it is observed in each monitoring in four revegetation sites. Any bird excluded in this criterion is categorized as a migrant. This categorization may only be temporary as it depends on the proposed criteria employed.

RESULTS AND DISCUSSION

Number of bird species recorded at the beginning of monitoring (second half of 2013) was only 30 species and then fluctuated in the following monitorings (Table 2). Although the number of bird species recorded in certain semiannual monitoring was the same as that of the other one, the compositions were not necessarily the same. In the monitoring carried out at the second half of 2013, Brahminy Kite was present but Wandering Whistling-Duck was absent. A contradictory result did occur in the first half of 2014 monitoring.

The fluctuations in the number of species within different monitoring period reflected the dynamics of species by time, which are more likely due to differences in environmental conditions over time. These environmental conditions include the availability of species and variety of feed sources, the convenience of birds to behave (mainly related to breeding from pair searching, nesting, mating, egg laying, parental caring), and bird safety from biological factors (predation by predators, disturbance or threat by human) or physical factors (heat, high humidity, no shade), while time is represented by the observation period during the dry season (first half) and rainy season (second half). Effective management, such as avoiding human activity in bird habitats is needed in habitat protection (Rittiboon and Karntanut 2011).

Soendjoto et al. (2015) mentioned that the factors that caused differences in the number of species of birds among habitat types are the diversity of plant species, vegetation strata, availability of feed, as well as safety and comfort of habitat types. Birds often exhibit distinct behaviors associated with vegetation structure and composition that may influence habitat selection and foraging efficiency (Zakaria et al. 2016). The distribution, diversity and density of avian species are influenced by microhabitat factors such as ground cover (i.e., the proportion of soil covered with vegetation), plant species richness (i.e., the number of plant species), vegetation type (i.e., trees, shrubs, grasses, emerged and submerged vegetation, sedges, reeds, ferns, and herbs), vegetation structure (i.e., vegetation height and diameter), and microclimate factors (i.e., temperature, humidity, and light intensity) (Rajpar and Zakaria 2011). Microclimate change in a site triggers birds to divert activity from uncomfortable atmosphere to a comfortable one, from a comfortable atmosphere to a more comfortable one, or from a site with fewer feed resources to another with abundant feed resources (Soendjoto and Gunawan 2003). Climate factors drive resident birds to shift to a certain direction (Wu and Zhang 2015). Temperature strongly affects daily feeding patterns (Bonter et al. 2013). Local weather is an important determining factor in eggs laying period (Carey 2009).

Plant species planted after reclamation (recovery of the soil layer in the former mining pits) were commonly legumes. Legumes that usually serve as a cover crop include *Centrosoma, Pueraria*, *Calopogonium,* and *Crotalaria*, while those serving as fillers and then developing into the main stands are sengon (*Paraserianthes falcataria)*, *Acacia mangium, A. auriculiformis*, turi (*Sesbania grandiflora)*, johar (*Cassia siamea)*, trembesi (*Samanea saman)*, kaliandra (*Calliandra callothyrsus)*, malapari (*Pongamia pinnata*), and lamtoro (*Leucaena glauca).* Vegetation protects the soil effectively from winds that may carry toxic particles, runoff, and soil erosion (Makineci et al. 2011). In general, legume is intentionally planted to improve soil fertility (Sheoran et al. 2010; Smith et al. 2016; Stagnari et al. 2017).

In addition to legume species, there were also intentionally planted non-legume species including jabon (*Anthocephalus cadamba), Gmelina arborea*, karet (*Hevea brasiliensis)*, *Eucalyptus deglupta,* and randu (*Ceiba pentandra)*. Besides intentionally planted plant species, there were also plants that grew spontaneously or were not planted such as alaban (*Vitex pubescens),* sendilau udang (*Commersonia batramia*)*, Alphitonia excelsa, Trema* and various species of Cyperaceae (*Fimbristylis, Scleria bancana*) and Poaceae (*Paspalum, Pennisetum setaceum, Saccharum spontaneum*). Cyperaceae and/or Poaceae grew on vacant land that has not been overgrown, covered, or dominated by legumes or on shallow-topsoil land. Non-legume species and naturally growing plants not only increase the diversity of plant species in the revegetation site, but also provide a variety of feed for nectarivores (such as Sunbirds), granivores (Munias), or frugivores (Bulbuls), especially if they are flowering and fruiting throughout the year. There were 107 plant species of varying levels of growth in the PT Adaro Indonesia reclamation site that was then revegetated and the vegetation age was 1-2 years (Soendjoto et al. 2014a). As a comparison, there were 106 plant species existed in a reclaimed coal mining dump of Czech Republic within 13-15 years since reclamation (Kabrna et al. 2014).

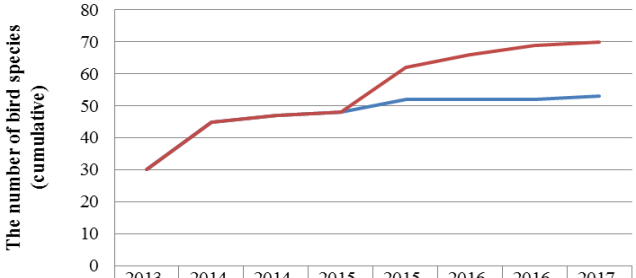
Different things happened in cempedak (*Artocarpus integer)*, durian (*Durio zibethinus)*, or pampakin (*D. kutejensis)*. These plant species were not planted in the reclamation site but were cultivated on community-controlled land around the mining site. Cempedak usually flowers in October-November, durian flowers in August-September, and pampakin flowers in September-October. Areas cultivated with these plants are visited by nectarivores, granivores, and frugivores in certain months only. However, the site may be visited throughout the year

by insectivores, such as Hooded Pitta. The year-round availability of insectivores makes the birds also visited this site for insect as a potential feed, in addition the suitable environmental moisture for the birds. Hooded Pitta is a bird that is very sensitive to habitat disturbance since this bird is nesting in understory forest (Hashim and Ramli 2013). The insectivorous birds are most influenced by habitat disturbance (Mansor and Sah 2012).

Seventeen bird species including residents were observed, especially in the vegetated site of about five years old. These included White-breasted Woodswallow, Pied Triller, Scaly-breasted Munia, Asian House-martin, Pacific Swallow, Long-tailed Shrike, Blue-throated Bee-eater, Olive-backed Sunbird, Sooty-headed Bulbul, Yellow-vented Bulbul, White-breasted Waterhen, Ashy Tailorbird, and Yellow-bellied Prinia. A bird becomes a resident because of its ability to explore a relatively narrow area and at the same time, adapts to the local environment. The resident birds' annual survival depends on the availability of food resources which is affected by weather condition (Santisteban et al. 2012). However, it is likely that the number of bird species categorized as residents is more than 17 species.

Asian Blue-quail, in this case, is not or rather has not been included as a resident. Its habit of wandering above the ground and at a point hidden in vegetation of about 1 m tall grass makes Asian Blue-quail was not easily observed, and consequently, not data was recorded on this bird. The presence of birds can be recorded when the observer walks on the grass. Birds appear suddenly from the bottom of the grass vegetation and fly away.

As with Asian Blue-quail, the presence of Black-winged Flycatcher-shrike was not easily detected because the size of the bird is relatively small. Also, the birds rarely sing, their voices are disguised among sounds in the forest or field, the color of the feathers on the entire body is camouflaged, and they are often active in tree canopies that can reach 30 m high from the ground, such as the canopy of sengon.



	2013-2	2014-1	2014-2	2015-1	2015-2	2016-1	2016-2	2017-1
4L	30	45	47	48	52	52	52	53
4L+BP	30	45	47	48	62	66	69	70

Figure 1. The cumulative number of bird species in each semiannual monitoring in 4 reclamation/revegetation sites and Bumi Perkemahan Paringin

The number of bird species increased from 30 in the reclamation site overgrown by the main stands over 1.25 years old (second half of 2013) to 53 in the same site with the main standing of more than 4.67 years old (first half of 2017). This shows that the number of bird species increased with the age of vegetation or primary standing (Figure 1). However, it does not necessarily mean that all birds will settle in this vegetated environment continuously. Some bird species made the reclamation site their entire range, but other species used the revegetation site only as part of their whole home range. A migrant bird might have been included in the last criterion. The species most likely to be grouped as a migrant (at least locally in BP) is Barn Swallow. This bird was not only rarely observed during the monitoring period of 2013-2017 but also has never been observed perching in vegetation. This is very different from the Pacific Swallow which is usually perching on dry branches of trees, or wooden pole ends that appear 1 m or more above the water surface of settling pond in BP. Biamonte et al. (2011), who compared the number of bird species in Costa Rica's Central Valley with the number of bird species studied by others reseachers in the same place 16 years ago found a decrease in the number of bird species, although 58% of them were the same species.

The dynamics of the bird species do not only happen by time, but also by space. In other words, the number of bird species varies based on the period of observation and by habitat type as well (Soendjoto et al. 2014b). Figure 1 proves that in the last four semiannual monitorings, the number of bird species in the site revegetated 19-21 years ago was greater than that in the site revegetated 3-5 years ago. The number of bird species in the two-year and ten-year post-harvested hill of dipterocarp tropical rainforest was 49 (each), in the twenty-year post-harvested hill of dipterocarp tropical rainforest was 55, and in the thirty-five-year post-harvested hill of dipterocarp tropical rainforest was 59 (Rajpar and Zakaria 2014). The increase in richness and diversity of bird species is in line with the increase in a particularly high canopy, secondary canopy development, and bush cover (Styring et al. 2011). The abundance of bird species in different regions was affected by various factors, such as patch size, development class, stands age and tree height (Jokimäki and Solonen 2011).

In subsequent monitoring, it is predicted that the number of bird species will increase, more than 70 or at least close to 76 species. The last number (76 species) was used a baseline as this number of bird species had been previously observed by Soendjoto et al. (2016) in a research focusing on birds and was conducted only in BP. Marthy et al. (2017) recorded 139 bird species in the less degraded forest and 133 bird species in the highly degraded forest. Further study is needed to obtain the maximum number of bird species inhabiting a maximum succession of revegetation sites, similar to primary forests or undisturbed forests. Holl (2002) ascertain that it took much longer than 35 years and must also be supported with management that facilitated long-term succession to make ex-coal-mining sites in the eastern part of USA were able to host the entire complement of the local flora.

In conclusion, the number of birds species found in the reclaimed and revegetated ex-mining sites in South Kalimantan increased as long as the vegetation in the site was preserved. Seventeen species were categorized as residents in the reclamation and revegetation site of PT Adaro Indonesia, South Kalimantan.

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Table 2. List of bird species found in the reclamation/revegetation site of PT Adaro Indonesia, South Kalimantan, Indonesia

Family	Scientific name	Indonesian name	Common name	2-2013	1-2014	2-2014	1-2015	2-2015		1-2016		2-2016		1-2017	
				4S	4S	4S	4S	4S	BP	4S	BP	4 S	BP	4S	BP
Accipitridae	*Elanus caeruleus*	Elang tikus	Black-winged Kite	●	●	●	●	-	-	●	-	●	-	●	-
Accipitridae	*Haliastur indus*	Elang bondol	Brahminy Kite	●	-	-	-	-	-	-	-	-	-	-	-
Accipitridae	*Ictinaetus malayensis*	Elang hitam	Black Eagle	-	-	●	●	-	-	-	-	-	-	-	-
Accipitridae	*Spizaetus cirrhatus*	Elang brontok	Changeable Hawk-eagle	-	-	-	-	-	-	-	-	-	-	●	-
Alcedinidae	*Alcedo meninting*	Raja udang meninting	Blue-eared Kingfisher	-	-	-	-	-	-	-	●	-	●	●	-
Alcedinidae	*Pelargopsis capensis*	Pekaka emas	Stork-billed Kingfisher	-	-	-	-	-	●	-	●	-	-	-	●
Alcedinidae	*Todirhamphus chloris*	Cekakak sungai	Collared Kingfisher	-	-	-	-	●	-	-	-	-	●	●	●
Anatidae	*Dendrocygna arcuata*	Belibis kembang	Wandering Whistling-Duck	-	●	-	-	-	●	●	-	-	-	-	-
Apodidae	*Apus affinis*	Kapinis rumah	Little Swift	-	●	●	-	-	-	-	-	-	-	-	-
Ardeidae	*Ixobrychus sinensis*	Bambangan kuning	Yellow Bittern	-	●	-	-	-	●	-	-	-	●	-	-
Artamidae	*Artamus leucorynchus* *	Kekep babi	White-breasted Woodswallow	●	●	●	●	●	●	●	-	●	●	●	-
Campephagidae	*Hemipus hirundinaceus*	Jinjing batu	Black-winged Flycatcher-shrike	-	-	-	-	-	●	-	-	-	-	-	-
Campephagidae	*Lalage nigra* *	Kapasan kemiri	Pied Triller	●	●	●	●	●	●	●	●	●	●	●	●
Campephagidae	*Pericrocotus flammeus*	Sepah hutan	Scarlet Minivet	-	-	-	-	●	-	-	-	-	●	-	-
Caprimulgidae	*Caprimulgus affinis**	Cabak kota	Savannah Nightjar	●	●	●	●	●	-	●	●	●	●	●	-
Chloropseidae	*Aegithina viridissima*	Cipoh jantung	Green Iora	-	●	●	●	-	●	●	●	-	●	●	●
Chloropseidae	*Chloropsis sonnerati*	Cica daun besar	Greater Green Leafbird	●	-	-	-	-	-	-	-	-	-	-	-
Ciconiidae	*Leptoptilos javanicus*	Bangau tongtong	Lesser Adjutant	●	●	-	●	●	-	●	-	-	-	-	-
Columbidae	*Chalcophaps_indica*	Punai Tanah	Emerald Dove	-	-	-	-	-	●	-	●	-	●	-	-
Columbidae	*Geopelia striata**	Perkutut	Zebra Dove	●	●	●	●	●	-	●	●	●	●	●	-
Columbidae	*Stigmatopelia chinensis**	Tekukur biasa	Spotted-Dove	●	●	●	●	●	●	●	●	●	●	●	●
Columbidae	*Treron olax*	Punai kecil	Little Green-pigeon	-	●	-	-	-	-	-	-	-	-	-	-
Columbidae	*Treron vernans*	Punai gading	Pink-necked Green-Pigeon	-	●	●	●	-	-	●	-	-	●	●	●
Cuculidae	*Cacomantis merulinus*	Wiwik kelabu	Plaintive Cuckoo	●	●	●	●	●	●	●	●	-	●	●	●
Cuculidae	*Centropus bengalensis**	Bubut alang-alang	Lesser Coucal	●	●	●	●	●	●	●	●	●	●	●	-
Cuculidae	*Centropus sinensis*	Bubut besar	Greater Coucal	-	-	-	-	●	●	-	●	-	●	-	●
Cuculidae	*Phaenicophaeus chlorophaeus*	Kadalan selaya	Raffles's Malkoha	-	-	-	-	-	●	-	-	-	-	-	-
Dicaeidae	*Dicaeum trigonostigma*	Cabai bunga-api	Orange-bellied Flowerpecker	-	●	-	-	-	-	-	●	-	●	-	-
Dicaeidae	*Dicaeum trochileum*	Cabe jawa	Scarlet-headed Flowerpecker	-	●	●	●	●	●	●	●	-	●	●	-
Estrildidae	*Lonchura fuscans*	Bondol kalimantan	Dusky Munia	●	●	●	-	●	-	-	●	-	●	-	●
Estrildidae	*Lonchura malacca*	Bondol rawa	Black-headed Munia	●	●	●	●	-	-	-	●	-	-	●	●
Estrildidae	*Lonchura punctulata**	Bondol peking	Scally-breasted Munia	●	●	●	●	●	-	●	-	●	-	●	-
Falconidae	*Microhierax fringillarius*	Alap-alap capung	Black-thighed Falconet	-	-	-	-	-	●	-	●	-	-	-	-
Hirundinidae	*Delichon dasypus**	Layang-layang rumah	Asian House-martin	●	●	●	●	●	●	●	-	●	-	●	-
Eurylaimidae	*Cymbirhynchus macrorhynchos*	Sempur hujan sungai	Black-and-red Broadbill	-	-	-	-	-	-	-	-	-	●	-	-
Hemiprocnidae	*Hemiprocne longipennis*	Tepekong jambul	Grey-rumped Treeswift	-	-	-	-	-	-	-	-	-	●	-	-
Hirundinidae	*Hirundo rustica*	Layang-layang api	Barn Swallow	-	-	●	-	-	-	-	-	-	-	-	-
Hirundinidae	*Hirundo tahitica**	Layang-layang batu	Pacific Swallow	●	●	●	●	●	●	●	●	●	●	●	-
Laniidae	*Lanius schach**	Bentet kelabu	Long-tailed Shrike	●	●	●	●	●	-	●	●	●	●	●	-

Megalimidae	*Megalaima rafflesii*	Takur tutut	Red-crowned Barbet	-	-	-	-	-	●	-	-	-	-	-	-
Meropidae	*Merops philippinus*	Kirik-kirik laut	Blue-tailed Bee-eater	●	-	●	●	●	●	-	-	-	●	-	-
Meropidae	*Merops viridis**	Kirik-kirik biru	Blue-throated Bee-eater	●	●	●	●	●	●	●	●	●	-	●	●
Motacillidae	*Anthus novaeseelandiae*	Apung tanah	Common Pipit	●	●	●	●	●	-	●	-	-	-	●	-
Nectariniidae	*Aethopyga siparaja*	Burung-madu sepah raja	Crimson Sunbird	-	●	-	-	-	-	-	-	-	-	-	●
Nectariniidae	*Anthreptes malacensis*	Burung-madu kelapa	Plain-throated Sunbird	●	●	●	●	-	●	-	●	-	●	●	●
Nectariniidae	*Arachnothera longirostra*	Pijantung kecil	Little Spiderhunter	-	-	-	-	-	-	-	●	-	-	-	●
Nectariniidae	*Nectarinia jugularis* *	Burung-madu sriganti	Olive-backed Sunbird	●	●	●	●	●	●	●	●	●	●	●	●
Nectariniidae	*Nectarinia sperata*	Burung-madu pengantin	Purple-throated Sunbird	-	-	-	-	-	-	-	●	-	-	-	●
Phasianidae	*Coturnix chinensis*	Puyuh batu	Asian Blue Quail	●	●	●	-	●	-	-	-	●	-	●	-
Picidae	*Picoides moluccensis*	Caladi tilik	Sunda Woodpecker	-	-	-	-	-	●	●	●	-	●	●	-
Picidae	*Dinopium javanense*	Pelatuk besi	Common Goldenback	-	-	-	-	-	-	-	-	-	●	-	-
Pittidae	*Pitta sordida*	Paok hijau	Hooded Pitta	-	-	-	-	-	●	-	-	-	●	-	●
Podargidae	*Batrachostomus javensis*	Paruh-kodok jawa	Javan Frogmouth	-	-	-	●	-	-	-	-	-	-	-	-
Psittacidae	*Loriculus galgulus*	Sirindit	Blue-crowned Hanging-parrot	-	-	-	-	-	●	-	-	-	-	-	-
Pycnonotidae	*Pycnonotus aurigaster**	Cucak kutilang	Sooty-headed Bulbul	●	●	●	●	●	●	●	●	●	●	●	●
Pycnonotidae	*Pycnonotus brunneus*	Merbah mata merah	Red-eyed Bulbul	-	-	-	-	-	●	-	●	-	●	●	●
Pycnonotidae	*Pycnonotus erythrophthalmos*	Merbah kacamata	Spectacled Bulbul	-	-	-	-	-	-	-	●	-	-	-	-
Pycnonotidae	*Pycnonotus goiavier**	Merbah cerukcuk	Yellow-vented Bulbul	●	●	●	●	●	●	●	●	●	●	●	●
Pycnonotidae	*Pycnonotus plumosus*	Merbah belukar	Olive-winged Bulbul	-	●	-	-	-	●	-	●	-	●	●	●
Rallidae	*Amaurornis phoenicurus**	Burak-burak	White-breasted Waterhen	●	●	●	●	●	●	●	●	●	●	●	●
Rhipiduridae	*Rhipidura javanica*	Kipasan belang	Pied Fantail	-	●	●	●	●	●	●	●	●	●	●	●
Scolopacidae	*Actitis hypoleucos*	Trinil pantai	Common Sandpiper	●	-	●	-	-	-	-	-	-	-	-	-
Silviidae	*Gerygone sulphurea*	Remetuk laut	Golden-bellied Gerygone	-	●	●	●	-	-	●	●	-	●	●	●
Silviidae	*Orthotomus ruficeps**	Cinenen kelabu	Ashy Tailorbird	●	●	●	●	●	●	●	●	●	●	●	●
Silviidae	*Orthotomus sericeus*	Cinenen merah	Rufous-tailed Tailorbird	-	-	-	-	●	●	-	●	-	●	●	●
Silviidae	*Prinia flaviventris**	Prenjak rawa, ciblek	Yellow-bellied Prinia	●	●	●	●	●	●	●	●	●	●	●	-
Sturnidae	*Acridotheres javanicus*	Kerak kerbau	Javan Myna	-	●	●	●	-	-	●	-	●	-	●	-
Sturnidae	*Aplonis panayensis*	Perling kumbang	Asian Glossy Starling	●	-	-	●	●	-	●	-	●	-	-	-
Timaliidae	*Macronous gularis*	Ciung-air coreng	Striped Tit-babbler	-	●	●	●	●	●	●	●	-	●	●	●
Zosteropidae	*Zosterops palpebrosus*	Kacamata biasa	Oriental White-eye	-	●	●	-	-	-	-	-	-	-	-	-
			Number of species	30	40	37	34	31	35	31	36	22	39	37	27

Note: * = resident, ● = present, - = absent, 4S = four sites, BP = Bumi Perkemahan Paringin

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