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Biodiversity of Birds in the Green Urban Area of Petrochemical Industry, Palembang, South Sumatra, Indonesia

Yona Selvia Arma Dewita[1], Hilda Zulkifli[1,*], Harmida[1]

[1] *Biology Department, Faculty of Mathemathics and Natural Sciences. Sriwijaya University*
**Corresponding author. email: hilda.zulkifli@yahoo.com*

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Abstract: The study on "The Biodiversity of Birds in the Region of Green Open Space (GOS) of The Petrochemical Industry, Palembang, South Sumatra, Indonesia" was conducted from August to September 2014 with the objective to determine the diversity of bird species. The method used to inventory bird species was *Indice Ponctuels' Abondance* (IPA) method. The results of the study revealed that there were at least 19 species of birds included in 14 families, in which four of the bird species were the species protected by the law, namely *Halcyonchloris*, *Haliasturindus*, *Halcyonsmyrnensis*, and *Nectariniajugularis*. The plant species as the habitat of the birds included *Pterocarpus indicus* Willd. (16.74%), *Polyalthialongifolia* Sonn. (14.02%), *Cocosnucifera* L. (12.98%), *Elaeisguineensis* Jacq. (7.76%) and *Mangiferaindica* L. (7.71%) with the diversity index of 2.96. These data prove that the area of green urban industry can also serve as a habitat for wildlife such as birds provided that the management of the green open space remains the concern of the industry.
Key words: Birds Biodiversity, Urban Industrial Area

Abstrak (Indonesian): Penelitian "Keanekaragaman Burung di Kawasan Ruang Terbuka Hijau (RTH) Industri petrokimia, Palembang, Sumatra Selatan, Indonesia" dilakukan pada bulan Agustus sampai dengan September 2014 bertujuan untuk mengetahui keanekaragaman jenis burung,. Metode yang digunakan metode *Indice Ponctuels' Abondance* (IPA) untuk inventarisasi jenis burung. Hasil penelitian mencatat terdapat minimal 19 jenis burung yang tercakup dalam 14 famili., dimana diantaranya tercatat 4 jenis burung yang merupakan jenis yang sudah dilindungi undang-undang yaitu *Halcyon chloris*, *Haliastur indus*, *Halcyons myrnensis*, dan *Nectarinia jugularis*. Jenis tumbuhan sebagai habitat burung tercatat *Pterocarpus indicus* Willd. (16,74%), *Polyalthialongi folia* Sonn. (14,02%), *Cocosnucifera* L. (12,98%), *Elaeisguineensis* Jacq. (7,76%) dan *Mangiferaindica* L. (7,71%) dengan indeks keanekaragaraman (diversity index) 2,96. Data ini membuktikan bahwa pada kawasan green urban industry juga dapat berfungsi sebagai habitat satwa seperti burung dengan catatan pengelolaan ruang terbuka hijau tetap menjadi perhatian industri.
Kata Kunci: keragaman burung, daerah industri perkotaan

1. Introduction

The industrial area is an area that is made by man with a special purpose as a center of industrial activities, however, due to the scarcity of land, the industrial area is often used as a residential area of the workers of the industry. One example of this case is the petrochemical industry in Palembang, South Sumatra, that has used the industrial area as a residential for a long time. The Green Open Space that has been well maintained for a long time has brought positive impacts on the region which is indicated by the intrinsic function of the area as the habitat for wildlife, both for the primates and the birds. The location of the area, which is on riverside, also supports the function of the habitat. The inventory study of bird species in the area of green open space of the residential area of the industrial zones will be the basis of the management of the area of biological resources of the zone.

The existence of wildlife, especially birds, is believed to be an indicator to maintain a balance between nature and the built environment to improve the quality of the urban environment. Birds are obvious animals which are loved very much by the public and they can bring in other animals into the ecosystem. Some important requirements to support birds' habitat are the diversity of plant species; the quality ground cover plants; and the variations of plants' height. Plant density has a correlation with the number of birds because the high density of plants is an opportunity for birds to obtain food.

It cannot be denied that the quality of human life can be enriched if they are in contact with nature every

day. Therefore, it is believed that a city that lacks parks and other green open spaces cannot support the lives of its residents. The existence of green open space serves as the city's lungs and water catchment areas, and it also assists in reducing and filtering air pollutants, lowering noise levels, improving the microclimate, and reducing erosion. Most importantly, it can be a recreational place and wildlife habitat, especially birds [1].

Table 1. The Diversity of Birds on the Study Site

No.	Familia	Latin Names	Local Names
1	Accipitridae	*Haliastur indus**	Elang Bondol
2	Alcedinidae	*Halcyon chloris**	Cekakak Sungai
3		*Halcyon smyrnensis**	Cekakak Belukar
4	Artamidae	*Artamus leucorhynchus*	Kekep Babi
5	Campephagidae	*Chrysoccyx* sp.	Burung Kedasi
6		*Lalage nigra*	Kapasan Kemiri
7	Capitonidae	*Megalaima haemacephala*	Takur Ungkut-ungkut
8	Columbidae	*Geopelia striata*	Perkutut Jawa
9		*Streptopelia chinensis*	Tekukur Biasa
10	Cuculidae	*Centropus bengalensis*	Bubut Alang-alang
11	Dicaeidae	*Dicaeum trochileum*	Cabai Jawa/ Kemade
12	Meropidae	*Merops philippinus*	Kirik-kirik Laut
13	Nectariniidae	*Nectarinia jugularis**	Burung Madu Sriganti
14	Picidae	*Dendrocopus moluccensis*	Caladi Tilik
15	Ploceidae	*Lonchuraleucogastroides*	Bondol Jawa
16		*Lonchura punctulata*	Bondol Peking
17		*Passer montanus*	Gereja
18	Pycnonotidae	*Pycnonotus aurigaster*	Cucak Kutilang
19	Sturnidae	*Acridotheres tristis*	Kerak Ungu

* protected by Indonesian Law

In Malaysia and Singapore, the local authorities increase the area of green open space for public and roadside plants, especially flowering plants that add to the aesthetics of the area and its conservation function of natural resources [2]. The new policy of the city authorities of Sheffield UK on increasing the density of "new houses" from 20-25 to 30-50 houses / hectare projects a decrease in the availability of urban green space if the policy implementation is not carefully controlled [3].

2. Experimental Sections

The experiment was conducted from August to September 2014 in an open green space of a residential area of 230 ha in the petrochemical industrial area in Palembang. Birds inventory was done by using Indice Ponctulle's Abondance method [4]. The recording of bird species was performed on each track of the settlement through both the sound recording and photo identification. In addition, the names of plants expected to function as a habitat for birds were also recorded along the transect of the observation. This inventory was used as the basis for the calculation of the diversity (Shannon Wienner formula) of the plant species in the study site.

3. Result and Discussion

Green open space plays an important role in supporting biodiversity and important ecosystem services providers in urban areas. The existence of parks also provides a key contact of the people and the biodiversity and the natural environment [3]. The green open space has different functions in urban systems, among others are: the function of environmental improvement and conservation as a recovery of the atmosphere, reducing pollution and improving urban microclimates; the function of civil society; the function of recreation; the function of aesthetics and the function of tourism with its uniqueness [5].

Green open space (GOS) is an area that is fostered for the protection of certain habitats (flora and fauna). The green open space is one of the potential areas to be developed as a means of *ex-situ* conservation. This condition will create a habitat for many species of wildlife, especially birds, as a provider of food, cover (shelter), a playground and breeding place. The diversity of bird species is one of the important biological resources because it has a certain ecological role. [6]Hernowo & Prasetyo (1989) explained that birds could be used as indicators of the environment, because if there was an environmental degradation, birds were the nearest natural components affected. Generally various species of birds can be found in various types of habitat (forest / agroforestry / plantation / outdoors).

The results of the study showed that at least 19 species of birds were recorded which were included in 14 familia in which *Poleidae* familia were bird species with the greatest frequency. The eagle of *Bondol* type (*Haliastur indus*), is a resident bird albeit very rarely

encountered with a frequency of 1-2 birds. This type of eagle is under trade protection status in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendix II category: this species will become extinct if trade continues to be carried out in the absence of any regulation. There are 61 species of this type of eagles of this family recorded in Indonesia, 12 of which are found in Merang Peat Swamp Forest-Kepahyang (MPSF-K). Similarly, the birds of the familia Alcedinidae (*Halcyon chloris and Halcyon smyrnensis*), which are fish, insect, or small vertebrate-eating birds, are also found in MPSF-K [7]. The results of the observation of birds in the Green Open Space of the petrochemical industry area recorded four types of birds which are included in the protected category by the legislation (Indonesian Government Regulation No. 7 of the Year 1999), namely: *Haliastur indus* (*Elang Bondol*); White-throated kingfisher or locally known as *Cekakak Belukar* (*Halcyon smyrnensis*), and the Olive-backed sunbird (*Nectarinia jugularis*). As a comparison in City Park and the Green Open Space of Padang there are 34 bird species, seven species of which are protected by legislation [1], two of them are the same bird species found in this study: *Haliastur Indus*, *Halcyon sp*. In addition, the same species of *Passer montanus* is the dominant species. In comparison with the results of the study of bird species in the City Forest of Diponegoro in Pekanbaru [8] which show that there are 27 species of birds, of which the dominant type is Cucak Kutilang (*Picnonotus aurigaster*) and the Olive-backed sunbird (*Nectarinia jugularis*).

In the residential area in the city of Taubate, Sao Paulo, Brazil, which correlates with the 26 bird families, the types of plants in the green open space of high abundance are: *Tabebuia ocracea* and *T. impeginosa* (26% each); *Ficus* sp., (8.7%), whereas the built-up area is dominated by *Caesalpinia pluviosa* (35.7%); Bauhinia *aculeate* (12%) and *Dypsis lutenscens* (10%). The diversity of bird species observed is 64 types of 26 familia with a high abundance of (> 90%), consisting of *Thraupis sayaca*; *Coereba flaveola*; *Troglodytes aedon* and *Eupetomena macroneura*. *Passe domesticus*; *Columbia livia*; *Notiochelidon cyanoleuca*; *Columbina talpacoti* and *Thraupis sayaca* (abundance of > 80%) [3]. The diversity of bird species in the study site of the petrochemical industry area is also closely linked to the availability of the environmental resources where the study site is located which is close to Musi river, which is an important resource in the life of the birds. In addition, various types of plants in the study site also supports the habitat for many birds, such as *Banyan* (*Ficus sp*.), *Salam* (*Syzygium polyanthum*), although each of them has a low abundance. *Angsana* (*Pterocarpus indicus*) is of the highest abundance in the region because it is the kind of plant purposely planted by area managers as a kind of shade. The types of plants such as *Syzygium*, *Fagraea* and *Vitex* are known to be attractive plants to invite insects, and they have fruits which are attractive to invite birds (Hails and Cavanagh, 2013). The results of the tally along the residential area show the abundance of each type as follows: *Pterocarpus indicus* Willd. (16.74%), *Polyalthialongi folia* Sonn. (14.02%), *Cocos nucifera* L. (12.98%), *Elaeis guineensis* Jacq (7.76%) and *Mangifera indica* L. (7.71%) with a diversity index of 2.96 (The diversity category is fairly high).

According to Setiawan [9], some characteristics of the plants which are suitable and can be nurtured to prepare for the natural environment for birds are: the fruits of which can be used as a source of bird's feed; bearing fruit throughout the year; having lateral / horizontal branching; their canopies are not necessarily always high and are not necessarily always dense (especially for the setting of sunlight); and not the kind of trees of sharp thistles, producing sticky sap, or toxic. This means that, to increase the diversity of bird species, the number of each individual species of trees is very important, and more importantly is the number of their species or kinds. Therefore, it is necessary to manage the area to preserve this diversity of trees.

4. Conclusion

1. Biodiversity of plants showed 54 species covered in 27 families. Based upon its composition found five species dominant with relative density as follows *Pterocarpus indicus* Willd. (16.74%), *Polyalthia longifolia* Sonn. (14.02%), *Cocos nucifera* L. (12.98%), *Elaeis guineensis* Jacq. (7.76%) and *Mangifera indica* L. (7.71%). Shannon diversity index was 2.96.

2. Biodiversity of birds showed at least 19 species covered in 14 families. Four species were identified and protected by law: *Halcyon chloris*, *Haliastur indus*, *Halcyon smyrnensis*, and *Nectarinia jugularis.*

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