Butterflies’ Diversity in Green Open Space of Malang City, East Java Province, Indonesia

Ayu Raisa Khoirun Nisa**, Minahanggari Mukti, Muhammad Fathoni Hamzah, Arif Mustakim, Zainal Abidin

Biology Department, Faculty of Mathematics and Natural Sciences, Brawijaya University, Malang, Indonesia

ABSTRACT

Butterflies have some roles in the environment, that is, as pollinator and bioindicator. Habitat is one of important factors to support butterflies’ growth. The aim of this research was to describe butterflies’ diversity in some green open spaces in Malang, East Java Province, Indonesia. Direct observations of butterflies diversity, vegetation structures and abiotic factors in Brawijaya University, Jalan Veteran, Jalan Jakarta, and Velodrom Green Open Spaces were conducted on June 2012. Sampling took place in each site by using cruising method in three times observation: at 07.00, 11.00 a.m. and 3.30 p.m. The data were analyzed by statistical descriptive using Microsoft Excel 2007 and PAST. The results showed that the butterflies’ composition in all sites were dominated by Delias sp., Leptosia nina, and Eurema venusta. The diversity index of all sites showed moderate rank that indicates community equilibrium in the environments was still good. In this case, Velodrom Green Open Space has the highest diversity index, which is about 2,199. Brawijaya University and Jalan Jakarta Green Open Spaces have a high similarity index based on Morisita Index. The highest abundance of butterflies is observed at 11.00-12.30 a.m. Delias sp. and L. nina have temporal spread all day long, while E. venusta does merely in daylight.

Keywords: butterflies, green park area, diversity

INTRODUCTION

Butterflies have important roles in the ecosystem, one of which is pollinator and bioindicator. Butterflies are very sensitive about environmental changing, they are easily affected by even relatively minor perturbations in the habitat. So, the presence of butterflies can be used as an indicator of the environmental quality [1].

Butterflies show distinct pattern of habitat utilization. The nature vegetation is the important factor which determines the dependence and survival of the butterflies in particular habitat [1]. One of butterflies habitat is green open space (GOS), which decreased by the expansion of cities and urbanization. Not only these influence their habitat degradation but also, influence in decreasing of plant species diversity, water quality, and increasing air and soil pollution [2]. In light of these problems, through this research we aim to describe the relationship between butterflies’ diversity and habitat similarity index in some green open spaces in Malang, East Java Province, Indonesia.

MATERIALS AND METHODS

This study was conducted on June 2012 in Brawijaya University, Veteran, Jakarta and Velodrom GOS. Sampling were took place in each GOS using cruising method in three times observation (7.00, 11.00 a.m., and 3.30 p.m). Direct visual observation helped by binocular and identification book or website such as Identification Guide for Butterflies of West Java [3] and Hoskins [4].

The community composition of butterflies was shown by Importance Value Index (IVI) which calculated by adding relative abundance and relative frequency. Species diversity was determined based on Shannon-Wiener Index [5].

\[ H = - \sum \pi_i^2 \log \pi_i \]  

Note: \( \pi_i \) : proportion of the \( i \) species in the total sample
Butterflies’ Diversity in Green Open Space

Communities similarity was determined by Morisita Index \[5\].

\[C_M = \frac{2 \sum X_{ij} X_{ik}}{\left( \sum X_{ij}^2 / N_j^2 \right) + \left( \sum X_{ik}^2 / N_k^2 \right)} \quad \text{N}_j, \text{ N}_k \quad \text{(2)}\]

Note: CH: Morisita Index
\(X_{ij}\): number of species \(i\) in community \(j\)
\(X_{ik}\): number of species \(i\) in community \(k\)
\(N_j\): number of species in community \(j\)
\(N_k\): number of species in community \(k\)

The Morisita Index ranges from a value of 0, where there is no species overlapping in between the communities, to value of 1, when exactly the same species are found in both communities. All of data were tabulated and compiled by using Microsoft Excel 2007 and analyzed by PAST Program.

RESULTS AND DISCUSSION

Importance Value Index (IVI) indicates the influence of species against their community \[6\]. The result showed that in all sites there were varied composition of butterflies’ communities which were dominated by \(Delias\) sp., \(L.\ nina\), and \(E.\ venusta\) (Figure 1). This result was supported by the previous study by Kurniawan \[7\]. \(Troides helena\) was found in Velodrom. This species is one of worldwide protected species \[8\], so their habitat (Velodrom) needs to be conserved in order to support their life.

Respectively, the highest and the lowest butterflies’ diversity took place in Velodrom and Brawijaya GOS (Figure 2a). The diversity index in all sites showed moderate rank \[9\]. It indicates that the community equilibrium in the environment was still good. However, it is necessary to increase the ecosystem diversity quality in all sites to increase their ecological services, too. The higher diversity index, the better the complexity of interaction among species; thus, it may contribute to the community and environment equilibrium.

One of the biotic factors that influence the butterflies’ diversity is the vegetation structure. Velodrom has the highest variation of vegetation structure than the others. This area is dominated by trees, which play an important role as the but-
The result showed that butterflies composition in all sites dominated by Delias sp., L. nina, and E. venusta. The diversity index of all sites showed moderate rank that indicate communities equilibrium in environmental was still good. In this case, Velodrom Green Park Area has the highest of diversity index, it was about 2.199. Brawijaya University Garden and Jakarta Green Park Area have high similarity index based on Morisita Index. The highest abundance of butterflies was observed at 11.00-12.30 a.m. Delias sp. and L. nina has temporal spread all day long while E. venusta just in day light.

ACKNOWLEDGMENT

All praise and thanks to Allah SWT the Lord of mankind, jinn, and all that exists. Author would like to Lutfi Kurniawan, Hellen Aulia P. and all of colleague for sharing information all about butterflies and giving suggestion.

REFERENCE

Butterflies’ Diversity in Green Open Space

Butterflies’ Diversity in Green Open Space


