Analysis of Plant Biodiversity Using Transect Method in Eden Park Forest 100

Nurhasnah Manurung, Masnadi M, Pandu Prabowo Warsodirej

Abstract: Objective This Research is to know the analysis of plant biodiversity using TransectMethod in Eden Park Forest 100. Samples of this study is all plants that are in the Eden Park Forest 100 of 1 hectare with the size of the entire 40 hectares. They are widely used methods. Forest Park Eden 100 is a tropical rain forests located in Lumban Rang North Sionggang Village, Lumban Julu, Toba Samosir, North Sumatera Province. Analysis:Withinthis forest there are various types of plant diversity that are potential sources. This study aims to determine the diversity of plant species in the forest of Eden Park Forest 100.
Method:Sample is given using quadratic Transect Method. Quadratic Transects are quadratic methods also called plot methods.
Findings:Data retrieval is done by the quadratic transect method. From the results of data collection, found 155 species of plants with an important index value of 1200.92. The species that has the highest density value on the seedlings is 374 while the lowest density value in the tree is 0.629. Forest Garden of Eden 100 is great for the development of teaching materials with Transect.
Result: With this diversity of plants, Eden Park Forest 100 has potential as a protected forest area for resource use.

I. INTRODUCTION

Forest is an ecosystem in which there are various components and has a very high biodiversity and as a germplasm warehouse of various types of plants and if the forest is not treated the forest will be damaged so that it can be ensured that germplasm erosion will result in the extinction of various life in forests and declining biodiversity, therefore it should be noted that biodiversity is a very useful natural resource.Forest Park Eden 100 located in Lumbang Rang, Sionggang Utara village, LumbanJulu District, Toba Samosir Regency, North Sumatra Province is one of the forests that has biodiversity that lives in the forest. Forests have very high diversity so that the Taman Eden 100 forest is very suitable to be used to analyze the density of plant diversity. From the results of a survey

Revised Manuscript Received on December 22, 2018.
Nurhasnah Manurung,Masnadi M, Pandu Prabowo Warsodirej
Fakultas Keguruan Ilmu Pendidikan , UniversitasIslam Sumatera Utara, Jl. Indonesia E-mail: nurhasnahmanurung@fkip.uisu.ac.id Sisingamangaraja Teladan Medan, Sumatera Utara Indonesia E-mail: nurhasnahmanurung@fkip.uisu.ac.id,

conducted on 12 March 2018 there are rare plants with flora that do not yet have a scientific name and even many still use the name Batak language, and on 1 May 2018 research was conducted to obtain the results of analysis of diversity in the forest of Eden Park 100. The diversity of the typical Batak plants in Eden 100 is a special attraction for visitors, such as sampinur, hariara, jabi-jabi, tahul-tahul, andaliman, bintatar, sotul and other plants. The fig tree whose seeds are intentionally imported directly from Israel such as the butter nut tree from the Amazon forest both trees also flourish. The manager provides locations and seeds if visitors want to plant trees and are allowed to put name plate labels according to the name and origin of tourists. By looking at the condition of this forest it has great potential that needs to be developed that can support scientific development and improvement of student science process skills, and this forest as a "natural laboratory". Forest Park Eden 100 has a vision: "The greatness of God is maintained for all people through His creation that is able to support the needs of the ecosystem of the Lake Toba region". Furthermore, they have a mission: (1) to create pilot villages in agriculture, animal husbandry and tourism; (2) making agro-tourism projects; (3) conducting research in agriculture and the Environment; (4) helping the government and the community in an effort to preserve the nature of Lake Toba; and (5) preserve the forest and its contents at the Eden garden agro-tourism location.To carry out biodiversity analysis in the Taman Eden 100 forest, it is necessary to use the transect method to determine a certain level of diversity, the transect method used in Taman Eden 100 is the quadratic transect method. This method is one form of sample can be in the form of a rectangle or circle with a certain area, so we can calculate the density, frequency, dominance and the value of the pertinks.

This is the driving force for conducting research studies on plant diversity, considering that at present the forest is very difficult to find and its location is also very far from the student learning environment. With a number of considerations such as time, facilities and costs, the forest of Eden Park which is very close to the location of the community.

Based on the background of the above problems, the authors are interested in following the Research Umbrella Research Team PDUPT with the title "Analysis of Plant Biodiversity Using the Transect Method in the Eden Park Forest 100"

II. EXPERIMENTAL METHOD

The research design used was calculating plant diversity analysis and the research method used in this study was the transect method, which used a combination of paths and line methods (transects) commonly used to determine certain vegetation such as grasslands and others or a

vegetation of a nature still homogeneous. The population in this study were all plants that were in the forest of Eden 100 at a height variation of approximately 1380 asl with a total area of 40 hectares which was taken by a population of 1 hectare of land to be observed. The research samples were the Division of Spermatophyta plants from the sub Division of Gymnosperms and Angiosperms which were located on a 100 m2 area using quadratic transects. The procedure were :
1. Field Survey
The field survey was carried out as a preliminary observation on the Eden Park 100 forest so that it can be seen the physical phenomena of the field and the determination of the location of the sample.2. Preparation PhaseThe activities carried out at this preparation stage include:a. Management of research permit from the Teacher Training and Education Faculty of the Islamic University of North Sumatra.b. Submit a permit from the Faculty to the forest management party that will be used as a place for research.c. Consult with lecturers in study in determining population and sample.d. Develop work methods with biodiversity analysis material on the transect method3. Implementation PhaseThe activities carried out at this stage of implementation include:a. Determine the location of sampling by using the principle of purporsive sampling, namely the determination of sampling with specific objectives or sampling consideredb. Make a research unit design line as shownc. Record the amount of diversity of each plot made4. Settlement PhaseThe activities carried out at this stage of completion include:1. Processing data from research results.2. Conduct the process of analyzing data from the results of research3. Draw conclusions from the results of the study.4. Compile reports by completing attachments relating to research

Data Collection Technique and Analysis
1. Density
Density (D) = (Number of Individuals of a Type/sample area) x100%
Relative Density(RD) = (Densitiy of a species/density of all species) x100%
2. Frequency (F) = (the number of plots occupied by a species/ the total number of plots)x100%
Relative Frequency (RF) = (frequency of a species/ frequency of all species)x100%
3. Dominance (D) = (plot area of a species/ area of the entire sample)x100%
Relative Dominance (Rdo) = (dominance of a species/dominance of all species)x100%
4. ImportantValue Index (IVI) = (1+2+3)

III. RESULTS AND DISCUSSION

From the result of the study it can be seen the types of plants found in the forest of Eden 100 Based on the results of the study found species with a total of 155 individuals, with a sample area of 100 m divided into 5 plots with the total number of plants is 2404 species. The total number of angyospermae subdivisions is 132 species and the sub-division gymnosperms are 4 species, where the dichotomous class reaches 115 species and the number of 17 monocot species, the pinopsida class has 4 species and the number of species whose class is empty. very much of what has been observed but the number of families of the 155 most species in the forest of Eden 100 is the family of

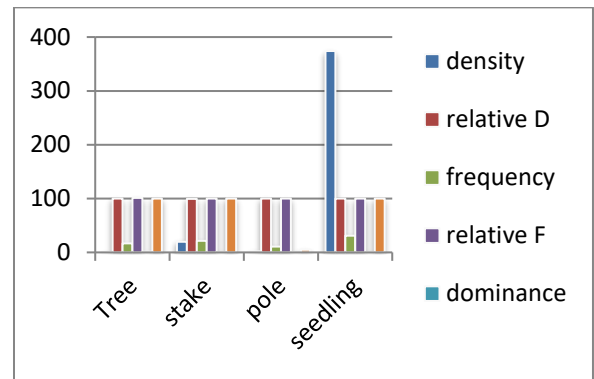Fabaceae where the number is 9, and the total number of families is 72 types of families.

Fig 1. Graphic Biodiversity of Eden Park Forest 100

Data on Plant Observation Results in Taman Eden 100 for the level (phase) of Poles
(1)Petai *Parkiaspeciosa* (2) Jambu Bol *Syzygiummalaccense* (3) Andulpak*Homalanthuspopulneus*(4) Tiung*CyphomandrabetaceaSendt*(5) Kayumanis*Cinnamomumburmanii* (6)Kembangsepatu*Hibiscus rosa-sinensis*Linn. (7)Pisang*Musa x paradisiaca* (8) Biwa*Eriobotrya japonica*(9)Tembelekan*Lantana camara* (10)Jeruk purut*Citrus hystrix*(11)Pinang*Areca catechu* (12)Durian*Duriozibuthinus*(13) Alpukat*Persea Americana* (14) Kaliandra*Calliandracallothyrsus* (15)Kenari*Canariumindicum*(16)Kesemek*Diorpiros kaki*(17) Buahmaja*Aegiemarmelos*(18)Sikkam*Bisehofiajavanica* (19)Johar*Seanasionea* (20)Bisbul*Biospyrosblancai*(21)Ambacang*Mangiferafoetida*(22)Bambu*Bambusa vulgaris*

Data on Plant Observation Results in Taman Eden 100 for the level (phase) of Stakes
(1) Cemara Sumatra*Casuarinasumatrana* (2) Kopi*Coffearobusta* (3)Rukam*Flacourtiarukam* (4)Pakugajah*Angiopterisevecta* (5)Coklat*Theobroma cacao* Linn (6)Jambu air*Syzygiumaqueum*(7)Andaliman*Zanthoxylumacanthopodium* (8) Sanduduk*Melastomamalabathricum*(9) Helikonia*Heliconiapsittacorum*(10)Kastuba*Euphorbia pulcherrima* (11)Nyamplung*Calophylluminophyllum* (12) Honje*Etlingeraelatior*(13) Blackberry*Morus alba*(14)Jambuleci*Psidiumcatleanum*(15)Jeruknipis*Citrus aurantifolia* (16)Jerukmanis*Citrus sinensis*(17)Rumputgajah*Pennisetumpurpure*Liin

Data on Plant Observation Results in Taman Eden 100 for the level (phase) of Seeds
(1) Aur-aur*Commelinanudiflora*Linn.(2)Viola*Viola pilosa* (3)Latteung*Solanumviarum* (4)Bandotan*Ageratum conyzoides* (5) Rumputkarpet*Axonopuscompressus* (6) Rumput Israel*Asystasiagangetica* (7)Primula*Primula vulgaris* (8) Pegagan*Centellaasiatica* (9)Jarong*Achyanthesaspera*

(10)Tapakliman*Elephantopusscaber*(11)Harendongbulu*Clidemiahirta* (12)Suplir*Adiantum*sp (13)Keladitikus*Typhoniumflagelliforme* (14)Pakurane*Selaginella*sp (15) Pakukawat*Lycopodiumcerenuum*(16)Iler*Plectranthusscutellarioides* (17)Pakutandukrusa*Platyceriumbifurcatum* (18)Pakis ekormonyet*Cibotiumbarometz* (19) Pakugaruda*Pteridiumaquilum*(20)Kantongsemar*Nepenthes ampullaria*

From the results of the research data, there are very many species in the Taman Eden 100 forest, but there are still many species of plants that are introduced while the non-introductions are very few because the forest of Eden 100 is a tourist forest, according to Marandus (https: // tamaneden100. files, wordpress.com) Taman Eden 100's forest is to protect the environment and is also beneficial in improving the economy of the surrounding community. Spermatophyta plants are very much in the forest because forests are high tree habitats, as in the opinion of the kingpin, which states that seed plants are a group of plants that live on land, have true roots, stems, leaves and produce seeds. In the subdivision of angyosperm in the dichotile class there is a large population, so there are only a few sub-divisions of gymnosperms. The types of pteridophyta and bryophyta divisions exist, only the spermatophyta division plants are the most so that they are more dominant division of spermatophyta.To obtain the results of vegetation analysis, a transect treatment is needed in a method. According to Gopal and Bhardwaj (1979) in Indriyanto (2012; 42) said diversity analysis required a minimum of three types, namely Density, Frequency and Dominance, in these three types found in the quantitative vegetation analysis section used in the form of a quadratic method. According to Kusmana the quadratic method is a measure whose area is measured in units of squares. At the time of the study used a quadratic method with a sample area of 100 m2. The total yield of all levels of plant diversity in the garden of Eden 100 whose density reached 395.93 relative density 399.54 frequency 80 relative frequency 401,079 dominance 1.65 relative dominance 399,908 and important value index 1200 , 52 where all the results of the data are in appendix 3 and how to calculate them in attachment 6. To get the results, it requires several phases of tree growth, according to Whitmore (1998,16) which are divided into 5 phases, namely: (a) Lower plants: non-vascular plants (not woody), generally located on the forest floor (b) Seedlings: saplings that have a height of less than 150 cm (c) Stakes: saplings of trees more than 150 cm high, but have a stem diameter of less than 10 cm (d) Poles: trees with a diameter between 10 cm and 20 cm (e) Trees: woody plants that have a diameter of more than 20 cm. From Whitmore's opinion, it was found that the number of tree phases was 33 species, pole phase, 22 species, 44 species, and seedlings, 56 species

IV. CONCLUSLION

Based on the results of research and discussion conclusions can be obtained as follows: (1). There is a difference in the level of diversity of vegetation in the forest of Eden 100 and the plants in the forest of Eden 100 are almost part of the cultivated plants.(2). Vegetation analysis with variables of density, frequency and dominance obtained an index of important values of each species, namely tree species as many as 33

species, sapling phase as many as 44 species, pole phase of 22 species, seedling phase of 56 species.(3). The highest important value index of the 4 phases is the tree phase which is 301.12 and the highest total value is found at the relative frequency of 401,079, more dichotine class plants so it can be concluded that the name of the vegetation vegetation community in Eden 100 is taken as sample spermatophyta plant community

REFERENCES

1. Admin, 2008. Metode. Transek.http://www.indonesianbiodiversity.com/indexphp.
2. Amri Sofwan, et.al.(2010).Kontruksi Pengembangan Pembelajaran. Jakarta:Prestasi Pustaka.
3. Ani Mardiastuti.(1999). Keanekaragaman Hayati: Kondisi dan Permasalahanya.Bogor.Fakultas Kehutanan IPB.
4. Arrijani. Dede. Setiadi. Edi. Guhardja dan Ibnul Qayim. 2006.Analisis Vegetasi Hulu DAS Cianjur Taman Nasional.Gunung Gede-Pangrango.Jurnal Biodiversitas.7(2)147-153.
5. Basyirudin Usman, (2002).Metodologi Pembelajaran Agama Islam.Jakarta:Ciputat Pers.
6. Barbour, M.G., J.H. Bark and W.D Pitts.1987. Terrestrial Plant Ecology.Califoria:Benjamin/Cumming Publishing Co..
7. Bappenas, (2004). Wilayah Kritis Keanekaragaman Hayati di Indonesia: Instrumen Penilaian dan Pemindaian Indikatif/cepat bagi Pengambil Kebijakan. Jakarta:UNDP.
8. Binari.(2011). Ekologi Tumbuhan. Medan. UNIMED
9. C.G.G.J.Van Steenis.(1992)., Flora, Jakarta, Pradnya Paramita.
10. Daryanto. (1993). Media Visual untuk Pengajaran Teknik Bandung: Tarsito.
11. Gembong Tjitrosoepomo,(2013). Taksonomi TUmbuhan Spermatophyta. Yogyakarta:UGM.
12. Global Village Translations, (2007). Pengelolaan Keanekaragaman Hayati. Jakarta:Persemakmuran Australia.
13. http://tamaneden100.files.wordpress.com.
14. http://www.tobasamosirkab.go.id/pesona-alam-taman-eden-100-kabupaten-toba-samosir.
15. Indrawan. M, Primark. R., B., & Supriatna. J.,(2007). Biologi Konservasi. Jakarta:Yayasan Obor Indonesia.
16. Indriyanto. 2012. Ekologi Hutan. Jakarta:BUmi Aksara
17. Kershaw, K.A. 1979. Quantitative and Dynamic Plant Ecology, London:Edward Arnold Publishers.
18. Kusmana, C. 1997. Metode Survey Vegetasi. PT. Penerbit Institut Pertanian Bogor; Bogor.
19. Rahman, M. 1992. Metode dan Teknik Biologi Lapangan Tumbuhan. Padang:Universitas Andalas.
20. Rohman, Fatchur dan I Wayan Sumberartha. 2001. Petunjuk Praktikum Ekologi Tumbuhan. JICA. Malang.
21. Sudarsono, *dkk*. 2005. Taksonomi Tumbuhan Tingi. Malang:Universitas Negeri Malang.
22. Surasana.(1994). Panduan Ekologi Tumbuhan. Medan. UNIMED.
23. Suratissa & Rathnayake U S.2016. Diversity and Distribution of Fauna of The NaseseShore, Suva, Fiji Islands with reference to existing threats to the biota. Journal of Asia-Pasific Biodiversity.
24. Syafei, Eden Surasana. 1990. Pengantar Ekologi Tumbuhan. Bandung: ITB.
25. Odum, E.P., 1971. Dasar-dasar Ekologi. Edisi Ketiga Gadjah Mada University Press. Yogyakarta.
26. Oosting, 1956, Dasar-Dasar Ekologi.UGM University Press, Yogyakarta

1580