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Structure, Composition, Distribution Patterns and Diversity of Tree Species in Forest Protected Areas of Nona Mountain Ambon City

Pamella Mercy Papilaya
Biology Education Studies Program FKIP Unpatti

Abstract
Vegetation Protection Forest Nona Mount Ambon City, based on its functions and designation has a very important role in supporting the integrity of natural resources and ecosystems on Ambon island as a whole. However, the conflict in Ambon a few years ago resulted in forest vegetation in the region changed the face and function. Many residential areas have sprung up in the region after the social conflict in Ambon, making illegal logging for individual interests can not be prevented. The purposes of this study were 1) to obtain information about the Importance Value Index (IVI) plant species in Protected Forest Areas of Mount Nona; 2) to determine the structure, composition, distribution patterns of vegetation and diversity of tree species in Protected Forest Areas of Mount Nona. The results showed the species composition of vegetation on forest vegetation in line 1 in the hamlet Siwang 128 types, line 2 includes the hamlet Series as many as 49 types, line 3 includes the area that comprises the backwoods were, the forest area around the TV transmitter RI and PENSIP found 106 types and line 4 covers most of the village castle and the village Amahusu found 56 tree species. The structure of the vegetation consists of trees, poles / saplings, and shrubs, while the pattern of spread of the tree is generally distributed clustered.
Keywords: structure, composition, distribution patterns, diversity of tree species, protected Forest of Nona Mountain, Ambon city.

1. Preliminary

Protected Forest Nona Mount Ambon, based on the function and the designation of protected forest areas of the Mount Nona Ambon city was instrumental in supporting the integrity of natural resources and ecosystems Ambon island as a whole. However, the conflict in Ambon a few years ago made a Protected Forest area of Mount Nona Ambon change the face and function. Many residential areas have sprung up in the region after the social conflict in Ambon, making illegal logging for any individual interest can not be prevented.

Now Protected Forest areas Mount Nona Ambon city can no longer perform his duty to accept and store water. Ground water supply for the city of Ambon is increasingly reduced due to deforestation. The condition is very difficult to prevent because the housing needs of post-conflict social community must be met. On the other hand, the flat land available in the city of Ambon is very limited (Kompas 29/12/2006). Along with the rapid growth of population, uncontrolled and lead to the need for land for settlements, then many people who open new land to be used as a farm or settlement in the upstream region of the mountain around Ambon (Paliama, 2012). Results of research conducted by Haumahu, (2014) to changes in land use in the Peninsula Leitimur indicate that the total area of the forest in the peninsula Leitimur decreased to 2010 which significantly by forest amounted to 3008.06 ha, becoming 1157.04 ha.

Ambon city was the capital of Maluku province is inside one of the small islands in the Moluccas which, according to the results of research conducted by several researchers showed that the damage to the forest ecosystem on the small island is due to three main points, namely: (a). Shifting cultivation activities by the public, (b). Tree felling activities legally and illegally for various energy needs such as firewood, building construction, furniture and other, (c). Activity expansion of land use by the public and the government for various purposes such as residential communities, office buildings, road infrastructure, monoculture plantations and others (the Forest Service Ambon City in 2009; Matinahoru and Hitipeuw, 2005; Van Ernst 2007; Salampessy et al 2010; and Watilei, 2008). Protected forest areas of Mount Nona by decree of the Minister of Forestry No. 430 / KPTS-11/1996 with an area of 877.8 hectares located on the slopes Nona, District Nusaniwe Ambon, now begin to deteriorate due to act of a group of irresponsible people who do illegal logging (Trees Acacia and Eucalyptus species) and C Excavation activities that impact on water catchment areas. Mayor of Ambon admits, the water catchment area in Ambon is increasingly narrow because of the transfer function. The condition is very difficult to prevent because the housing needs of post-conflict social community must be met. On the other hand, the flat land available in the city of Ambon is very limited. (Kompas, 29/12/2006)

Given the complexity of the problems in the area of Protected Forest, Mount Nona Ambon City needed a study to determine the potentials and prospects of its development, so as to formulate development strategies in the region. Thus, the development in the area of Protected Forest, Mount Nona Ambon does not conflict with its primary function. Management of natural resources of small islands like the island of Ambon, the necessary

vigilance high, because the exploitation of natural resources, excessive impact on the extinction of biological resources locally endemic, and threats to water resources initially been limited, as one of the main identifier of small islands -Miami small (Jacob, A. 2013).

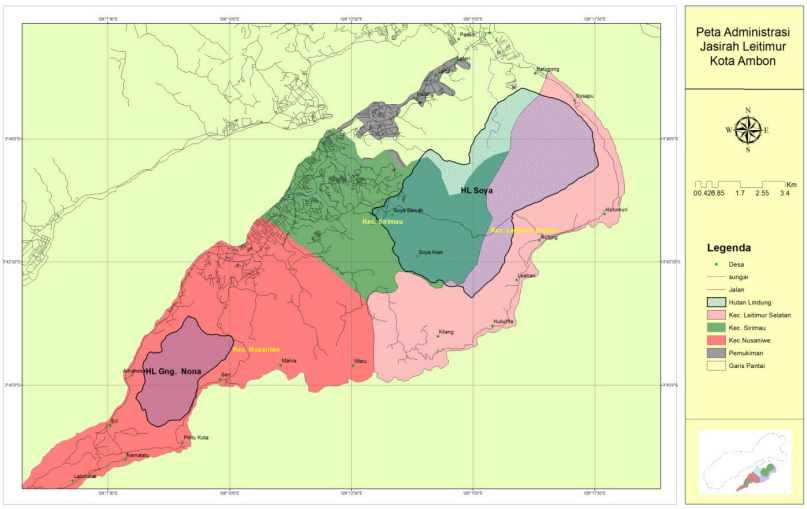
Research regarding ecological aspects that describe the structure and composition of tree species making up the stand as well as the diversity of trees in the Forest Preserve Mount Nona Ambon is very important. Results from this study are expected to have a great benefit, both in supporting the program management of protected forests and to improve science and technology fields of biology, ecology, and forestry. Study of Structure and Composition of forest vegetation and trees of this region is very necessary before the extinction of plant species that are likely potential and usefulness of the information has not been disclosed anyway. The purpose of this research is to study the structure and composition of stands and diversity of tree species in Protected Forest area of Mount Nona Ambon to obtain data on species richness, diversity of species and stand structure. Expected Protected Forest areas Mount Nona Ambon City can be used as a source of learning and research. Expected results of this research data into information which can be used by all parties as the conservation of natural resources and conservation management.

RESEARCH METHODS

The study was conducted in the area of Protected Forest, Mount Nona Ambon based division of Ambon city administration are located in the Peninsula Leitimur Ambon Island with an area of 877.78 hectares of forest, located at an altitude of ± 600 m above sea level - 1200 m above sea level. Geographically Protected Forest, Mount Nona is located in a position 128'08'24 North Latitude and -3'45'36 'east longitude-1121 m above sea level with the boundaries of regions as follows:
North: Sea in the Bay of Ambon outer
West: bordering villages Amahusu
East: bordering hamlet Series
South: bordering villages Latuhalat

Data collection technique

Preceding the study, carried out the data collection in advance in the form of literature. Then do the exploration / survey to determine the general picture and determine the location of which will be observed. This study does not cover the entire area of Protected Forest, Mount Nona Ambon, but the chosen location is considered to represent the entire region to study the diversity of tree species. Implementing research in October 2014 until January 2015 is housed in 4 different locations used two approaches: 1). Vegetation analysis that aims to study the composition of tree species which are dominant in the study area as well as data quantitative and 2). Floristic study that aims to collect data diversity of tree species in the study area along its distribution.



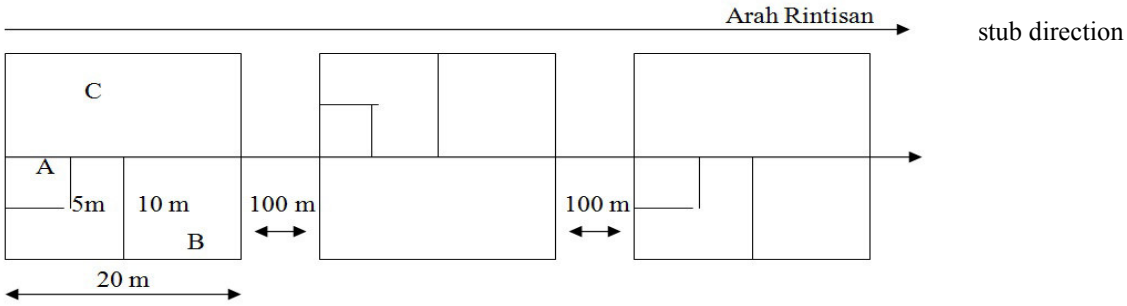
a). Analysis of Vegetation

This research was conducted using the method of plot that makes the plots footage on some land use. Protected Forest Areas of Mount Nona Ambon city is divided into four broad lines of research with each lane of 0.4 ha (20x200 m 2). Can be explained as follows:
1, Line 1 includes forest hamlet Siwang
2. Line 2 covers the woods in the hamlet Series
3. Line 3 covers the woods around the village Wara, TVRI transmitter and PENSIP

4. Line 4 covers in part the forest around the village castle and the village Amahusu

In each lane made research plots measuring 20 m x 20 m for the enumeration of trees. Of each plot were made sub plot measuring 10 m x 10 m for enumeration to level the pole. In the subplot was made sub-sub plots measuring 5 m x 5 m to observe the type of stake. All trees with stems ≥ 10 cm (height 130 cm from the ground) located in the plot footage measured its circumference. Identification of tree species is done directly in the field using a local name and which can be identified using the scientific name, while for individuals who are not known to be directly carried herbarium sample collection. Identify the type of setup to the level of species and differentiated based on their morphological appearance (morphospecies).

Morphological observations done in the field, and for specimens of unknown species were collected and arranged on old newspapers and put in a plastic bag. Furthermore, the specimen given 70% alcohol to wet enough so it does not rot and then dried in the Herbarium Unpatti Biology Laboratory. The process of making herbarium using the "Schweinfruith Method" (Bridson and Forman, 1989) international standard and will be recorded as the database using Brahms ("Biodiversity Research and Herbarium Management System"). Identification carried out also by using List Name Trees of North Maluku and Maluku Selatan (1975) and The Concise Flora Of Singapore. Gymnosperm and dicotyledons. Atlas of seed plants, Backer.



Keterangan :

A: Unit contoh risalah pancang (5m x 5m)

B: Unit contoh risalah tiang (10m x 10m)

C: Unit contoh risalah pohon (20m x 20m)

Description

A. Sample unit of stake treatise
B. Sample unit of pole treatise
C. Sample unit of tree treatise

c. Data analysis

Analysis of data using least square method to calculate the density, frequency and dominance of each species. Density is the number of individuals of a species per hectare; the frequency is calculated based on the number of plots in which a species that is found to be divided by the total number of plots; dominance are expressed by basal area of each species per hectare of trees and saplings. The closing crown is used for the undergrowth plants. The relative value of the three parameters can be calculated in the following manner (Cox, 1992).

The importance

To determine the type of plants that dominate in a research plot analysis to calculate the significance of each study plot.

NP = KR + FR + DR

NP = value is important; KR = Relative Density; FR = Relative Frequency and DR = Dominance Relative

The species composition is calculated based on the number of plant species found.

• Vegetation structure was measured by high stands of vegetation:

If the height stands of> 25m, including the stratum A

If the height of the stand 10 m-25 m, included in the stratum B

If the height stands 4m20m, including in stratum C

If the height of the stand is1m-4m, including the stratum D

If high-standing 0m 1m, including the stratum E

Diversity of species

To determine the species diversity were calculated using Shannon formula Wienner (Kent and Paddy, 1992), as follows:

$$H' = -\Sigma \, pi \log pi \qquad i = n$$

H '= index of species diversity
pi = proportion of an individual species-i with the number of individuals of all kinds

Spreading pattern Tree Species

Determining the pattern of distribution of species uses the Poisson distribution model, by calculating the value of Chi-Square X2). If the value of X2 count <than the tx2 table, then the distribution pattern is random (random). If the opposite occurs, the distribution pattern is non-random. In this case there are two possible patterns of distribution of species that regularly (regular) and clumped (clumped). Steps to be taken are to calculate the variance (V). If V => 1 then clumped distribution pattern, and if V = <1 then the regular distribution pattern (Barbour et al. 1987 and Goldsmith et al.1986).

RESULTS AND DISCUSSION

1. Composition Type and Structure Plant Vegetation and Stands Down

The results of the analysis of vegetation structure that shows the types of plants with large INP are categorized as the main constituent of plant communities in the area of Protected Forest in Mount Nona Ambon. These species are found in all the plots / sample plots. According to Kimmins (1987), variations in the composition and structure in a community among others, are influenced by plant phenology, dispersal, and the birth rate. In addition to fertility and fecundity different for each species also influence the success into a new individual.
Important Value Index of plant species in a community is one parameter that indicates the role of plant species in the community. The presence of a species in an area shows adaptability to a wide habitat and tolerance to environmental conditions.

Based on the results of enumeration plant in the Protected Forest area of Mount Nona Ambon, recorded the composition of species diversity on the location of the observation is quite varied at the level of shrubs, poles, and trees. The composition of this diversity is high. This strongly suggests the main functions of Protected Forest areas Mount Nona Ambon City,. As regulated by Law No. 41 of 1999 on Forestry works for the protection of life support systems to regulate water flow, preventing floods, controlling erosion, preventing sea water intrusion and maintaining soil fertility. This function is determined by the vegetation that covered the region with a diversity of the plant vegetation component.

The species composition at the rate of a shrub found in the area of Protected Forest, Mount Nona Ambon, the kinds of plants that make up the lower generally members of tribes Poceae, Cyperaceae, Araceae, Asteraceae, ferns. There are 143 species found in the four fields of research can be described as follows:

1. In line 1 the type of shrub found comprising 12 families, 16 genera and 32 species.
2. In line 2 types of shrub found comprising 15 families, 17 genera and 24 species.
3. In line 3 the type of shrub found consisted of 18 families, 34 genera and 52 species.
4. In lane 4 shrub species were found to consist of 14 families, 18 genera and 35 species.

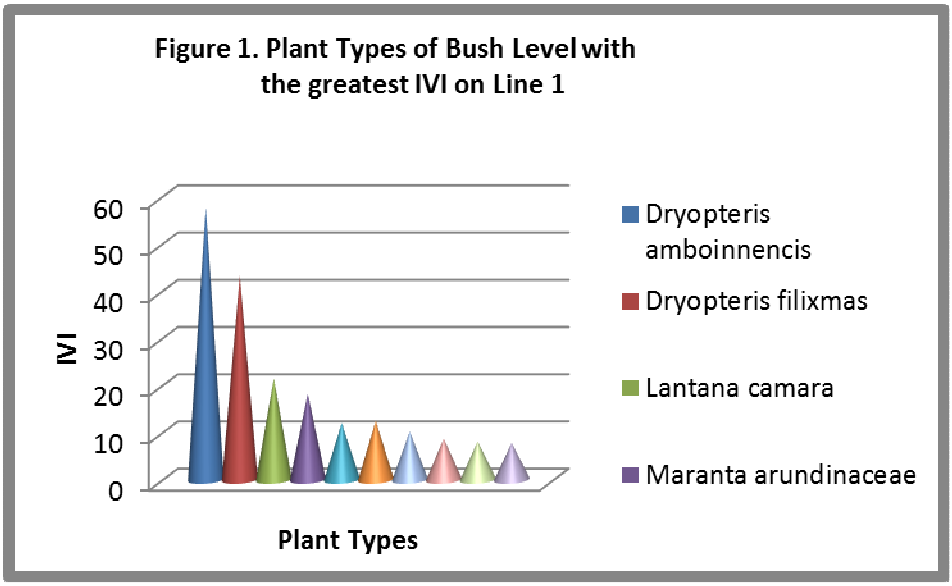
Undergrowth found in research plots in the form of herbaceous plants and shrubs and low plants that cover the bottom of a forest area. Thus the crop function here is to resist the destructive power of items to the falling rain and swift flow of water over the soil surface due to lower plants add soil organic matter and transfer that increase the soil's ability to absorb and resist the flow of rainwater that falls (Dewi, et al, 2008).

The undergrowth is a constituent plant community forest floor near the bottom surface of the ground. This plant is generally in the form of grasses, herbs, shrubs or low shrubs. These types of vegetation there are annual, biannual or perennial with a form of solitary life, with family, upright creeping or climbing. The types of plants that make up the undergrowth plants are generally members of tribes Poceae, Cyperaceae, Araceae, Asteraceae, ferns and others (Indriyanto, 2006).

The types of shrub found in the four fields of research in which there are ten kinds, of which have an important value index (IVI), the largest that can be described as follows:

Vegetation structure On Track I

Vegetation structure at line 1 in the Protected Forest area of Mount Nona passed largely Siwang village area. On this track types shrub found in the village forest land among Siwang that there are ten kinds, of which have an important value index (IVI), the largest. In the forest or on line 1 Siwang village, shrub species most important value is high ferns (Dryopteris amboinensis) amounted to 57.68% (Fig.1). Dryopteris presence amboinensis on the forest path 1 or the village Siwang big enough for the type of ferns is one kind of local Ambon that have high adaptability to environmental factors and including pioneering plants (Monk et al, 2000). This species is found in all the altitude above sea level.



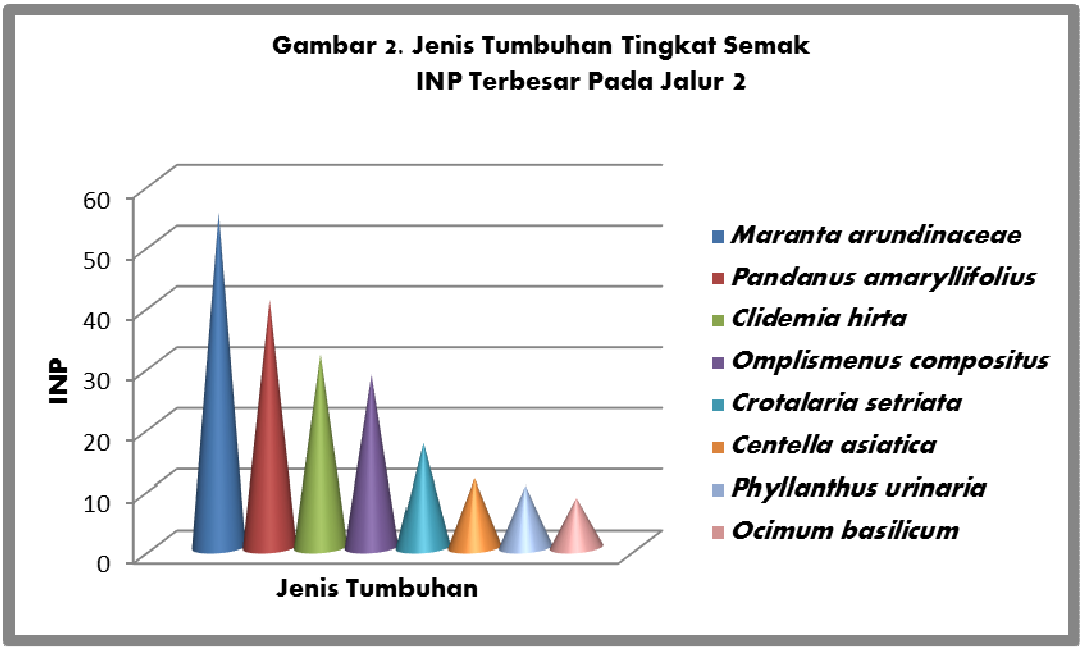
At the poles, the species composition there are 106 species, of which there are ten types with the greatest INP, as shown in Table 1, which puts Gandaria (Bouea macrophylla) as the most dominant plant with an IVI of 36.21%. Gandaria as one of the types of these ecologically, has a particularly important role in restoring the health of the soil and water resources as well the availability of nutrients for leaf litter Gandaria pretty solid. This situation, according to Santoso (2000) that the presence of plants, especially the availability of litter, and the crown form a good root system, in general, will affect the content of organic matter, humification and nutrient content in general. Gandaria also has the ability to spread the seeds that is high enough so that it can quickly dominate this formation as well as Rutong guava (Eugenia malacensis) and Mangustang (Garcinia mangostana).

Table 1. Type of Plant Level Pole Largest IVI on Line 1

No	Name Plant	**INP (%)**
1	Gandaria (*Bouea macrophylla*)	36.21
2	Rutong guava (*Eugenia malaccensis*)	29.74
3	Manggustang (*Garcinia mangostana*)	26.35
4	Ekor tusa (*Acalypha grandis*)	24.67
5	Bau tree (*Hibiscus teleaceus*)	18.43
6	Barabu mango (*Cerbera manghas*)	16.37
7	Salawaku (*Albizzia falcate*)	15.2
8	Pateh basar *(Leucaena glauca*)	12.1
9	Mountain pine (*Casuarina rumphiana*)	10.82
10	Mango (*Mangifera indica*)	10.13

Vegetation structure On Line 2

The structure of the vegetation on track 2 on the Protected Forest area of Mount Nona passed largely hamlet Series. The types of shrub found in this area of which there are eight species that has an important value index (IVI), the largest. On this track the most high shrub species important value is the plant arrowroot (Maranta arundinaceae) amounted to 54.87% (Figure 2). Maranta arundinaceae is included in the undergrowth which tribes Marantaceae growing with shade and moist, are found in the rain forest floor habitat (Wikipedia, 2015)



At the poles, the species composition of stands is found in vegetation Forest Preserve, Mount Nona Ambon on line 2 there are 78 species, of which there are ten types with INP greatest, as shown in Table 2, which put Rutong guava (Eugenia malaccensis) as plant the most dominate with an IVI of 40.28%.

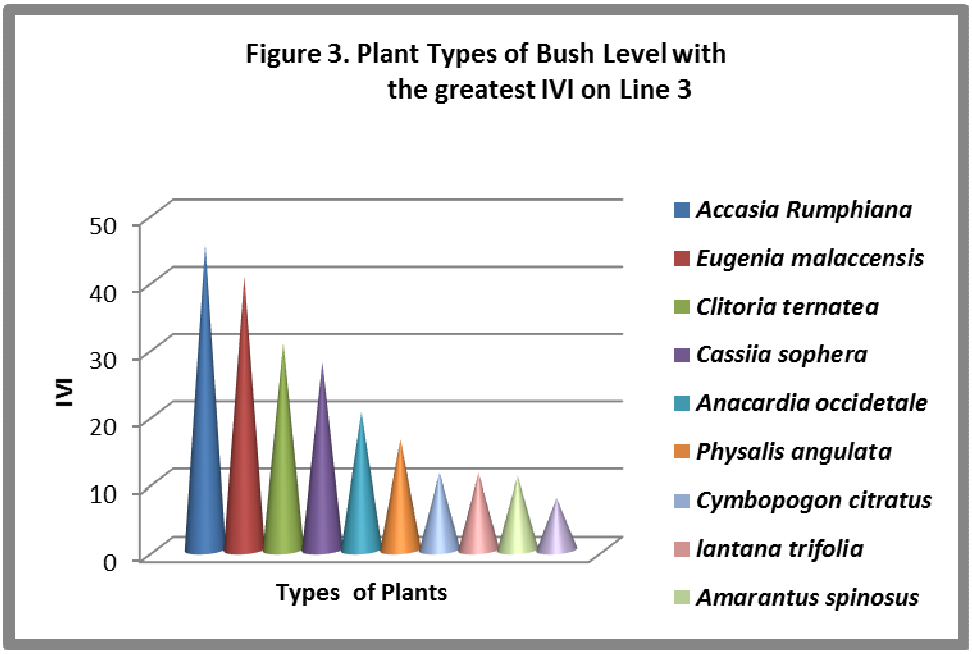
Table 2. Plant Types of Pole Level with the Largest IVI on Line 2

No	Names of Plants	INP (%)
1	Rutong guava (*Eugenia malaccensis*)	40.28
2	Mango (*Mangifera indica*)	21.26
3	Tusa tail (*Acalypha grandis*)	22.85
4	Gondal (*Ficus variegate*)	19.67
5	Mamina (*Pimeleodendron amboinicum*)	18.7
6	Barabu mango (*Cerbera manghas*)	11.35
7	Kumis kucing (*Orthosiphon grandiflorus*)	11.43
8	Delicate leaf betel (*Pternandra coerulescens*)	11.2
9	Kakurang (*Stachytarpheta jamaicensis*)	8.52
10	Gandarusa (*Justicia gendarussa*)	7.23

Rutong guava is a type of plant that includes an IVI high on poles, or trees. This indicates that these plants have the ability to spread is quite high. Besides Mango (Mangifera indica), Tail Tusa (Acalypha grandis), Tail Tusa (Acalypha grandis), Gondal (Ficus variegate), Mamina (Pimeleodendron amboinicum), Mango Barabu (Cerbera manghas), Java Tea (Orthosiphon grandiflorus), Siri leaves fine (Pternandra coerulescens), Kakurang (Stachytarpheta jamaicensis) and Gandarusa (Justicia gendarussa), is also the main constituent of vegetation of this region.

Vegetation structure On Line 3

The types of shrub found in lane 3 includes the hamlet of Wara, the area around the TV transmitter RI and PENSIP that of which there are ten kinds, of which have an important value index (IVI), the largest. Bush highest important value in line 3 is Acacia (Accasia rumphiana) amounted to 45.21% (Figure 3). Cashew tillers Rutong (Eugenia malaccensis) and Clitoria ternatea an undergrowth included in Myrtaceae tribe growing with shelter and moist, are found in the rain forest floor habitat. Clitoria ternatea is a wild plant, commonly used by the people as hedgerows and be useful to the health of both men and women (Wikipedia, 2015). Cassia sophera is a wild plant that dominates the village forest area Wara widely used by the public as drug fever, diarrhea, malaria and medicine to treat lack of appetite.



At the poles, the species composition of stands is found in vegetation forest land village Wara, the area around the TV transmitter RI and PENSIP there are 52 species, of which there are ten types with INP greatest, as shown in Table 3, which puts Breadfruit (Arthocarpus communis) as the most dominant plant with an IVI of 37.28%, Kuini (Mangifera foetida) with IVI value of 23.7. Mango puppet (Mangivera indicia) with IVI at 20:46

Wara village forest land vegetation, the area around the TV transmitter RI and PENSIP are old secondary forests which are more planted by plant species longevity fruit producer. Thus the plants in the area of the village are dominated by plants producing fruit. Many forest lands in the region experienced many changes due to human activities, especially digging C which affects the water flow.

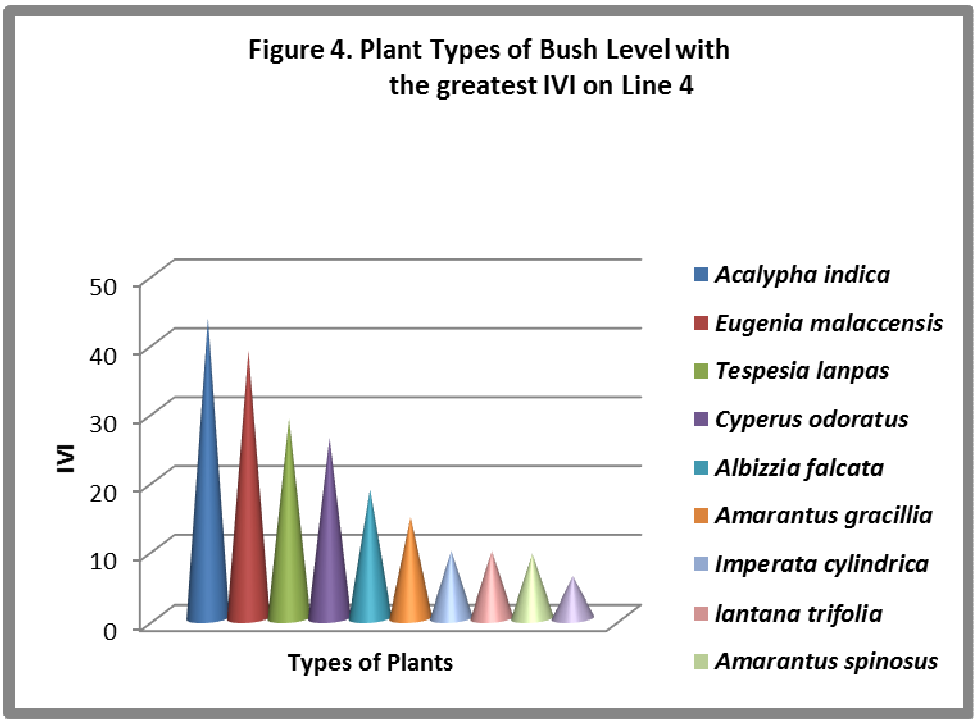
Table 3. Plant Types of Pole Level with the Largest IVI On Line 3

No	Names of plants	INP (%)
1	Sukun (*Arthocarpus communes*)	37.28
2	Rutong guava (*Eugenia malaccensis*)	26.21
3	Kuini (*Mangifera foetida)*	23.7
4	Golek mango (*Mangivera indicia*)	20.46
5	Ganemong (*Gnetum gnemon*)	18.9
6	Canary (*Cannarium vulgare*)	12.44
7	Kapok (*Gosampinus malabarica*)	11.8
8	Bunga tai ayam (*Lantana camara*)	10.81
9	Kangkung Mount (*Ipomea carnea*)	7.3
10	*Katang-katang (Ipomea pescaprea*)	7.01

Vegetation structure On Line 4

The types of shrub found in jalurr 4 includes Part of the village castle and the village Amahusu of which there are ten kinds, of which have an important value index (IVI), the largest. On forests in line 4, shrubs highest important value is Baduri spinach (Acalypha indica) amounted to 43.46% (Figure 4). Cashew tillers rutong (Eugenia malaccensis) with an IVI of 38.75 and Flower cotton-cotton (Tespesia lanpas) is a plant that grows under shades, are found on the forest floor habitat keluran Fortress. Tespesia lanpas is a wild plant, commonly used by the public as medicinal plants to treat venereal diseases useful for male genital desease (Wikipedia, 2015).

The types of shrub found in forest land on lines 4, among others, there are ten kinds of which have an important value index (IVI), the largest. Type bush highest importance value is Acacia (Accasia rumphiana) amounted to 45.21% (Figure 3). Cashew tillers rutong (Eugenia malaccensis) and Clitoria ternatea undergrowth included in Myrtaceae growing tribe bernaungan and moist, are found on the forest floor habitat this area. Clitoria ternatea is a wild plant, commonly used by the public as a hedge and be useful to the health of both men and women (Wikipedia, 2015). Cassia sophera is a wild plant that dominates the forest area in lane 4 widely used by the public as drug fever, diarrhea, malaria and medicine to treat lack of appetite.



The types of shrub found in forest land on lines 4, among others, there are ten kinds, of which have an important value index (IVI), the largest. In the area of forest in lane 4, shrubs highest importance value is Acacia (Accasia rumphiana) amounted to 45.21% (Figure 3). Cashew tillers Rutong (Eugenia malaccensis) and Clitoria ternatea undergrowth included in Myrtaceae growing tribe with shade and humid, forest habitats are found in this area. Clitoria Ternatea is a wild plant, commonly used by the people as hedgerows and be useful to the health of both men and women (Wikipedia, 2015). Cassia Sophera is a wild plant that dominates the village forest area Amahusu widely used by the public as drug fever, diarrhea, malaria and medicine to treat lack of appetite.

Table 4. Levels of Plants Largest Pole INP On Line 4

No	Names of plants	INP (%)
1	Salawaku (*Albiozzia falcata*)	40.52
2	Baru tree (*Hibiscus tiiliaceus*)	21.26
3	Sukun (*Artocarpus Comunis*)	22.85
4	Kuti-kata (*Flacourtia indica*)	19.67
5	Mango (*Mangifera indica*)	18.7
6	Barabu mango (*Cerbera manghas*)	11.35
7	Chrysanthemums (*Senna alata*)	11.43
8	Butterfly flower (*Clotaria incana*)	11.2
9	Coconut (*Cocos nucifera*)	8.52
10	Lead tree (*Tephrosia dichotomy*)	7.23

At the poles, the species composition of stands is found in vegetation, forest land Part of the village castle and the village Amahusu there are 63 species, of which there are ten types with INP greatest, as shown in Table 3, which puts Salawaku (Albizzia falcata) as the plant most dominant with an IVI of 40.52%, a new tree (Hibiscus tilliaceus) with an IVI of 21:26 Breadfruit (Arthocarpus communes) with a value of IVI of 22.85

Forest neighborhood Part of the village castle and the village are an old secondary forest Amahusu more planted by the types of long life fruit-bearing plants. But these forests are denudated as a result of the forest chopping activities by the people for firewood to make bricks. The impact of deforestation, water resources in this area becomes dry. So plants that appear in this area are the pioneer plants which were dominated by weeds and undergrowth dominated by Imperata cylindrica.

2. Composition Type, Marga, Tribe and Diversity Index (H ') Trees Found In Forest Protected Areas Mount Nona Ambon

In the area of Protected Forest vegetation of Mount Nona Ambon tree species were found belonging to 23 orders, 42 families, 98 genera and 128 species (shown in Table 1).

Table 5. Some parameters, Composition Type, Clan, Tribe Trees Found In Forest Protected Areas Mount Nona Ambon

Parameter	Number			
	Lane 1	**Lane 2**	**Lane 3**	**Lane 4**
People	23	23	19	19
Tribe	42	26	39	25
Clan	98	40	73	42
Types	128	69	84	55
Density per hectare	623 trees/ha	335 trees/ha	445 trees/ha	272 trees/ha
LBD per ha	34.42	31.06	43.57	27.41
Wealth Index	12.4	8.6	1.78	0.28
Diversity Index (H')	3.77	3.54	3.5	2.72
Prevalence Index	10.76	0.43	0.4	0.33

Families, genera and species of trees are mostly found in lane 1 (Hamlet Siwang). The tree species are most commonly found in clan Moraceae. Most members are trees with good quality wood, while some form of shrubs. Sheet leaves somewhat similar hard rind (skin), Many species of Moraceae genus produce edible fruit; some of them are fruits that have economic value is high enough, or is a fruit that is important as a producer of carbohydrates (Van Steenis, 2008; Wikipedia, 2015). The clan is the second most abundant species or genera Mytaceae Syzygium. Myrtaceae clan has many species that produce fruit like people, have a beautiful appearance as an ornamental tree, or generate important industrial commodities such as cloves, and various types of nuts. Some species of the genus Myrtaceae are also trees producing quality wood (Van Steenis, 2008); Wikipedia, 2015). According Heyne, (1987) these types of plants are included in the genus Myrtaceae often found by the expedition Rumphius grown in sandy soil that is moist soils and mud, the water source areas or watersheds. He also explained that its spread can reach a height 400-800meter above sea level.

The third clan that has many tree species is the Anacardiaceae clan. This clan has tree species with high economic value among the various types of fruits (Tjitrosoepomo, 2002). One kind enough to dominate is on the tree Gandaria (Bouea macrophylla). Ecologically plant Gandaria lead to the nature of soil fertility and the potential when viewed from several aspects including: (1) leaves Gandaria that fell and buried at ground level will contribute both to the fertility of soil by adding litter into the soil, (2) canopy plants shield-shaped and large and shady tree can be used as a shade, so the plants of Gandaria are often used as a shade plant for plants growing underneath, and (3) Gandaria root system that can protect the soil from erosion, leaching and soil erosion. This will greatly assist the existence of the availability of nutrients around the root Gandaria.

Diversity of species

In general, the index of diversity of tree species in the area of Protected Forest Mount Nona Ambon said diverse and average height above 3, as the region on average is a part of the protected forest of Mount Nona is the area managed for the benefit of protection against flooding and erosion, as well as soil fertility and water regulation. Thus, these forests are still in a state of forests is maintained continuously. (Table 5)

Of the 128 species of trees found in the area Protected Forest Mount Nona Ambon on line 1, of which there are ten types of trees with INP greatest, as shown in Table 2, which puts Gandaria (Bouea macrophylla) as the plant most dominant with an IVI of Amahusu 88.25% in villages, 91.8% in line 4 with an IVI of 68.14%. In theory Gandaria (Bouea macrophylla) is a type of tree that can grow to a height of 400-500 m above sea level, but the reality proves on the island of Ambon this plant can grow to spread at all heights. Fruit Gandaian (Bouea macrophylla) much loved by the people in Maluku as fresh fruit but also fruit that is still easy Manyak vogue in the form of sauerkraut. Leaves easily be used as a food ingredient fresh vegetables. Coconut (Cocos nucifer), Guava rutong (Eugenia malaccensis), Langsa (Lansium domesticum), Mango (Mangifera indica) and Durian (Durio zibethinus) is also a type-jeis fruit trees with an IVI scattered in the area of Protected Forest Mount Nona city Ambon in general. Some species of the genus Artocarpus are the kinds of fruit-trees that grow in the area of Protected Forest Mount Nona Ambon city and used as a source of food. Description of tree species will be presented in succession following the alphabetical order according to the location of its findings in Table 8.

Vegetation structure at line 1 in the Protected Forest area of Mount Nona passed most of the area of the hamlet Siwang undulating terrain with a very steep slope. The number of trees and saplings been collected in the region each recorded 128 species. Wealth index types by 12.4 basal area 43.57 / ha for trees, while the density of trees in this region is high (623 trees / ha) compared to that observed in three other lines only reached 335 trees / ha, 445 trees / ha and 272 trees / ha. Bouea macrophylla dominate the region with an important value 88.25. (Tabel.7.) Similar to the trees, the abundant things are Eugenia malaccencis, Cocos nucifera and Arthocarpus campaden. Eugenia abundant malaccencis, Cocos nucifera, Arthocarpus integer and Arthocarpus campaden. These trees have characteristic of broadleaf forming two formations. Edaphic climax formation is the formation

of which is formed due to the influence of the state of the site, for example, forests formed due to water or swamps and formation climax of climate formation that was formed under the influence of climate and rainfall is high enough for example to the nation Bombacaceae, Anacardiaceae, Myrtaceae and Moracea (Monk, 2000).

Table 6. 10 Type Trees Who Has The Biggest Value INP at the District Forest Area Nusaniwe

No	Names of plants	INP(%)			
		Lane 1	Lane 2	Lane 3	Lane 4
1	*A. campaden*	58.54	43.55	59.2	35.67
2.	*A. communis*	46.32	34.22	21.87	32.74
3	*A. integer*	34,08			88.82
4	*B. macrophylla*	88.25	91.8	68.14	
5	*C. nucifera*	56.11	48.81	56.71	59.4
6	*D. zibethinus*	25.99	71.23	91.5	28.33
7	*E. aromatica*	30.24	24.55	81.8	22.5
8	*E. malaccensis*	76.21		81.75	
9	*G. gnemon*	43.20			37.7
10	*L. domesticum*		89.46	98.12	
11	*M. indica*		57.43	76.77	76.84
12	*M. foetida*		27.88		48.14
13	*M. fragans*	45.03		56,70	
14	*N. lappesium*		69.49		
15	*S. koetjapea*				23.13

The growth of these species naturally according to Edwards et al (in Monk, 2000), is a characteristic of the tropical forests of the mountains, that is the root buttresses are large, straight-trunked, and have shapes kauliflori (fruit grow on the stem), ramiflori (fruit growing on the branches of trees). He also explained that these species are species MEGATHERM, and are limited in the tropics and only in Maluku and Nusa Tenggara. Moreover, because the forest on the island of Ambon in general is an area of protected forest, the area is also used as an area of greenery and nature conservation Maluku region planted with various kinds of fruit trees longevity to increase the income of forest communities, and also can restore health water resources in some areas on the island of Ambon. Another major tree species in three other lines besides Bouea maqcrophylla and other types that dominate them are Durio zibethinus, Lansium domesticum, Mangifera indica, and Nephelium lappesium is a type of tree that has a diameter reaching 110-120 cm high with canopies 18-40 m.

Observations lanes 2, 3 and 4 at an altitude of 700-800 m above sea level, the region has the topography of the terrain, the steep, horizontally up ramps with partially opened canopy. In this area a lot of the types of tribes discovered species of Myrtaceae Family consists of 10 species, 4 of which are fruit-bearing trees and drugs, Eugenia aquea, Eugenia aromatica, Eugenia malaccensis, Exipatori odorata, and Psidium guajava. Very abundant either trees or saplings Types This is a typical tree species planted in addition to the Moluccas by the public, also grows wild and reproduces very quickly is by seed, so that high-frequency presence. 3 Other species are forest trees that grow wild among others Euqualiptus deglupta, Metrosideros nigroviridea, and M. vera. According Heyne, (1987), these species are often discovered by the expedition Rumphius grown in sandy soil that is moist soils and mud, the water source areas or watersheds. He also explained that its spread can reach a height 400-800meter above sea level. Thus the forest area of the island of Ambon is a suitable habitat for these species.

Some trees are also quite abundant either trees or saplings are the types that grow as a result of the damage to the forest ecosystem. The type is Casuarina rumphiana or Albizia falcate. The abundance of these two species is suspected because of the destruction of forests by human activity. Because if the damage caused by a volcanic eruption or fire, then that will develop well are the types of Casuarina rumphiana or Albizia falcata (van Steenis, 1972). It is very possible because the Protected Forest Mount Nona damage is caused by a group of irresponsible people who do illegal logging (tree species Acacia and Eucalyptus) and C Excavation activities that impact on water catchment areas. The condition is very difficult to prevent because the housing needs of post-conflict social community must be met. On the other hand, the flat land available in the city of Ambon is very limited. (Kompas 29/12/2006)

In relation to the nature of good water conservation, also found that the types of trees pioneer. Basal area (LBD) been modest tree only reached 7.1 per ha. This reflects that the small trees (diameter <30 cm) high enough such circumstances allegedly because of the intensity of incoming light results in regeneration more. Polunin, (1994) stated that the topography of the terrain, the physical properties and chemical influence on these conditions.

Trees pioneer that is intended by Primack, (1994), is a tree that can grow in the open under full sunlight, is able to compete with weeds or weed the other, it is easy to sprout when burned or cut, able to live in

conditions of soil thin and poor in nutrients and resistant to drought. These trees are indispensable to ecological preconditions for the growth of trees core properties of soil and water conservation is good. The types of trees, according to Hulster (in Primack, (1994), among others Leucaena glauca, the kinds of Hibiscus, the types Albizzia, Tectonia grandis, Acasia sp, Melaleuca leucadendron, Aleurites moluccana, Arenga piñata, Anacardium occidentale, Parkia speciosa , Bambusa sp, Gnetum gnemon, Artocarpus integer, Gosampinus malabarica, Durio zibethinus, and Eucalyptus deglupta. These species exist that have significant value is low. Therefore, in an effort to rehabilitate critical land in the zone of water infiltration due practice shifting cultivation or illegal logging, it is necessary to plant tree species that are capable of restoring the land conditions such as the types that have been disclosed.

Table 7. Composition of Tree Species Found In Protected Forest Areas of Mountain, Ambon City

Ordo	**Famili**	**Nama Tumbuhan**	
		Nama Lokal	**Nama Latin**
			Nama Ilmiah
Apocynales	1. Apocynaceae	1. Pule Tree	*1. Alstonia scholaris*
		2. Pule Batu Tree	*2. Alstonia spectabilis*
		3. Barabu Mango Tree	*3. Cerbera manghas*
Araucariales	1. Pinaceae	1. Damar Tree	*1. Agathis alba*
Arecales	1. Arecaceae	1. Palm Tree	*1. Arenga pinñata*
		2. Coconut tree	*2. Cocos nucifera*
		3. Red Nut Tree	*3. Cyrtostachys renda*
		4. Sago Palm	*4. Metroxylon sagu*
Casuarinales	1. Casuaninaceae	1. Cassowary tree	*1. Casuarina rumphiana*
		2. Keweala Cassowary tree	*2. Casuarina Montana*
Celastrales	1. Celastraceae	1. Gosebe tree	*1. Eounymus javanicus*
Ebenales	1. Ebenaceae	1. Belo tree	*1. Diospyros lolin*
		2.Black Belo tree	*2. Diospyros maritime*
	2. Sapotaceae	1. Aita tree with delicate leaves	*1. Doploknema oligovera*
		2. White Eru tree	*2. Pouteria firma*
		3. Nani aer tree	*3. Laplacea amboinencis*
Eoporbiales	1. Aralisceae	1. Chicken bone tree	*1. Polycias nodosa*
	2. Euporbiaceae	1. Tusa tail tree	*1. Acalypha grandis*
		3. Pecan tree	*2. Aleurites moluccana*
		3. Kutikata tree	*3. Antidesma bunius*
		4. Dulang tree	*4. Macaranga mappa*
		5. Mamina tree	*5.Pimeleodendron amboinicum*
Geraniales	1. Oxalidaceae	1. Sour startfruit tree	*1. Averhoa bilimbi*
Gnetales	1. Gnetaceae	1. Ganemon tree	*1. Gnetum gnemon*
Guttiferales	1 Clusiaceae	1. Manggustang utang tree	*1. Garcinia insipida*
		2. Manggustang tree	*2. Garcinia mangostana*
Malvales	1.Bombacaceae	1. Durian tree	*1. Durio zibethinus*
		2.Cotton tree	*2. Gosampinus malabarica*
	2. Elaecarpaceae	1.Bird tree	*1. Eleacarpus sphaericus*
	3. Malvaceae	1Mala tree	*1. Hibiscus aruensis*
		2.Hibiscus tree	*2. Hibiscus teleaseus macrophyllus*
		3. Male salamuli tree	*3. Thespesia pupelnea*

	4. Sterculiaceae	1. Jeruwer tree	1. *Commersonia bartrania*
		2. Haulur tree	2. *Pterospermum diversifolium*
		3. Endedar tree	3. *Kleinhovia hospital*
		4. Wind tree	4. *Sterculia foetida*
		5. Chocolate tree	5. *Teobroma cacao*
	5. Tiliaceae	1. Red mew tree	1. *Colona scabra*
Myrtales	1. Alangiaceae	1. Samar tree	1. *Alangium vilosum*
	2. Lecythidaeceae	1. Katang-katang tree	1. *Terminalia catappa*
		2. Lacing tree	2. *Letchi sinencis*
	3.Melastomaceae Melastomaceae	1. Matangasen tree	1. *Astronia ternatana*
		2. Siri tree wth delicate leaves	2. *Pternandra coerulescens*
	4. Myrtaceae	1. Eucalyptus tree with delicate leaves finely	1. *Eucalyptus deglupta*
		2. Water apple tree	2. *Eugenia Aquea*
		3. Clove tree	3. *Eugenia aromatic*
		4. Eucalyptus tree	4. *Mellaleuca leucadendron*
		5. Rutong guava tree	5. *Eugenia malaccensis*
		6. Red Nani tree with rough skin	6. *Metrosideros nogroviridea*
		7. Nani Batu tree	7. *Metrosideros petiolata*
		8. Nani tree	8. *Metrosideros vera*
		9. Gejawas tree	9. *Psidium guajava*
		10. Miser tree	10. *Rhodamnia cinerea*
Pandanales	1. Pandanaceae	1. Pandanus tree	1. *Pandanus tectorius*
Pariatales	1. Cornaceae	1. Forest Hamaleng tree	1. *Maxtisia tricotoma*
		2. Pange tree	2. *Pangeum edule*
	2. Flacourtiaceae	1. Tomi-tomi tree	1. *Flacourtia euphelobia*
		2. Samale tree	2. *Homalia foeditum*
Poales	1. Poaceae	1. Bamboo tree	1. *Bambusa sp*
Hamamelidales	1. Anonaceae	1. Jackfruit tree	1. *Annona muricata*
		2. Sugar apple tree	2. *Annona Squamosa*
		3. Ylang tree	3. *Cananga odorata*
	2. Lauraceae	1. Haloar tree with delicate leaves	1. *Litcea firma*
		2. Avocado tree	2. *Persea Americana*
	3. Myristicaceae	1. Pola tree with delicate leaves	1. *Horsfieldia sylvestris*
		2. Laru tree	2. *Myristica lepodita*
		3. Nutmeg tree	3. *Myristica fragans*
		4. Utang nutmeg tree	4. *Myristica insipida*
		5. Palala tree	5. *Knema tomentella*
Rhamnales	1. Rhamnaceae	1. Red Lema tree	1. *Alphitonia zizyphoides*
Rosales	1. Caesalpinaceae	1. Ironwood tree	1. *Instia palembanica*
		2. Black ironwood tree	2. *Instia bijuga*
		3. Jaya tamarin tree	3. *Tamarindus indica*
	2. Mimosaceae	1. Acacia tree	1. *Acasia sp*
		2.Moringa tree	2. *Albizzia retusa*
		3. Salawaku tree	3. *Albizzia falcate*
		4. Lamtoro tree	4. *Leucaena glauca*
		5. Big petai tree	5. *Parkia speciosa*
		6. Jengkol tree	6. *Pithecelobium lobatum*
	3. Papilionaceae	1. Gayang tree	1. *Inocarpus fagiferus*
		2. Matoa tree	2. *Pometia Pinnata*
		3. Lenggua tree	3. *Pterocarpus indicus*

	4. Rosaceae	1. Mas tree	*1. Parinari corymbosa*
		2. Hotong tree	*2. Pygeum parviflorum*
Rubiales	1. Rubiaceae	1. Samama tree	*1. Anthocephalus macrophylus*
		2. Gumeleng tree	*2. Nuclea mitragyna*
		3. Timon tree	*3. Timonius timmon*
Rutales	1. Burseraceae	1. Walnut tree	*1. Canarium vulgare*
		2. Walnt tree	*2. Canarium sylvestris*
		3. Utang walnut tree	*3. Canarium Montana*
	2. Meliaceae	1. Langsa utang tree	*1. Lagenaria leucetha*
		2. Langsa tree	*2. Lansium domesticum*
		3. Kucapi tree	*3. Sandoricum koetjapea*
	3 Rutaceae	1. Lemon lime tree	*1. Citrus aurintifolia*
		2. SuanggiLemon tree	*2. Citrus maxima*
		3. Bali Lemon tree	*3. Citrus nobilis*
Sapindales	1. Anacardiaceae	1. Cashew tree	*1. Anacardia occidentale*
		2. Gandaria tree	*2 Bouea macrophylla*
		3. Rau fruit tree	*3. Dracontomelum mangiferum*
		4. Kewala tree	*4. Koordersidendron pinatum*
		5. Ambarella tree	*5. Spondia chytherea*
		6. Ambarella utang tree	*6. Spondia pinnata*
		7. Kuini tree	*7. Mangifera foetida*
		8. Mango tree	*8. Mangifera indica*
	2. Sapindaceae	1. Rambtan tree	*1. Nephelium lappesium*
		2. Tawa tree	*2. Pometia piñata*
		3. Koambi tree	*3. Schleichera oleosa*
Solanales	1. Verbenaceae	1. Titi tree	*1. Gmelina moluccana*
		2. Gumira tree	*2. Premna corymbosa*
		3. Teak tree	*3. Tectonia grandis*
		4. Gupasa Gaba-gaba tree	*4. Vitex cofassus*
		5. Gupasa tree	*5. Vitex erioclona*
		6. Gupasa batu tree	*6. Vitex quinata*
Urticales	1. Moraceae	1. Campada tree	*1. Arthocarpus campaden*
		2. Breadfruit tree	*2. Arthocarpus communis*
		3. Rubbr tree	*3. Arthocarpus elastica*
		4. Gomu tree	*4. Arthocarpus incisus*
		5. Jackfruit tree	*5. Arthocarpus interger*
		6. Noso tree	*6. Ficus erecta*
		7. Ampelaas tree	*7. Ficus ampelas*
		8. Banyan tree	*8. Ficus benjamina*
		9. Kasu tree	*9. Ficus pubinervis*
		10. Hanua tree	*10. Ficus melinocarpa*
		11. Poso tree	*11. Ficus septica*
		12. Gondal tree	*12. Ficus variegate*
		13. Noni tree	*13. Morinda cytrofolia*
	2. Ulmaceae	1. Haleki tree	*1. Gironniera canaroides*
		2. Haleki raja tree	*2. Gironniera subaequales*
		3. Lema tree	*3. Trema orientalis*

3. Distribution Pattern Tree Species in Forest Protected Areas Mount Nona Ambon

The results of the analysis of the distribution of 55 species of trees based on the index dispersal, it is known that 55 species of trees found in the area of Protected Forest, Mount Nona Ambon on line 4 has a dispersal index (ID)> 1. This shows that the pattern of the distribution of tree species in the lowlands not random, but clustered. 5 of 55 species were found to have an index value of dispersal (ID) <1. This shows that the pattern of distribution of 5 species of trees found not random but spread.

The results of the analysis of distribution patterns of 128 species of trees based on a dispersal index (ID), it is known that 79 species of trees found in the area of Protected Forest Mount Nona Ambon on line 1 has a dispersal index (ID)> 1. This shows that the distribution pattern is not random but clumped. 49 of 128 tree

species found to have a dispersal index (ID) <1. This shows that the pattern of distribution of 49 species of trees is not random but spread.

The results of the analysis of distribution patterns of 84 species of trees found in the area of Protected Forest, Mount Nona Ambon on line 3 by a dispersal index (ID), it is known that 50 species have dispersal index (ID)> 1. This shows that the pattern of population distribution tree-the trees in this area are not random, but clustered. 34 types of 84 species were found to have a dispersal index (ID) <1. It shows 34 species of trees are found are not random in this spread.

The results of the analysis of distribution patterns of 69 species of trees found in the area of Protected Forest, Mount Nona Ambon on line 3 by a dispersal index (ID), it is known that 53 species have dispersal index (ID)> 1. This shows that the pattern of population distribution tree-the trees in the forest area is not random, but clustered. 16 types of 69 species were found to have a dispersal index (ID) <1. It shows 16 species of trees are found are not random in this spread.

In general, the pattern of distribution of tree species in the area of Protected Forest Mount Nona Ambon is in cluster. Clumped distribution patterns shown showed the presence of a strong interaction between the types of trees that exist, and is associated with other factors in the habitat that is not measured. Smith (1992) explains that the distribution pattern is a consequence or result of the responses or interactions between species. However, this factor is not the sole factor that act alone, but together with other environmental factors, such as the response to get light, the characteristics of nutrient supply or utilization of resources and response to seasonal variations in temperature.

Odum (1998), suggests the distribution group is the nature of the structure in most populations of plants. Grouping is the result of individuals (1) in response to changes in daily weather and season, (2) respond to differences in habitat local (3) as a result of reproductive process, or (4) as a result of the appeal of social improve the lives of a group. In addition, there may be certain tree species that reproduce themselves generative by generating new individuals through the mobility of the grain high that spread far not spread from the mother that cause individual grouping. There are also certain types of grains that have light scattered by the wind so the ability to widely spread in the whole area is quite extensive. It may also assist in the grouping.

One type of tree that dominates in the area of Protected Forest, Mount Nona Ambon city is Gandaria tree. The results of the analysis of the distribution of Gandaria (Bouea. Macrophylla) in the Protected Forest Mount Nona Ambon show results Index dispersal on line 3 (including village Wara, Around the area TV RI and PENSIP) amounted to 0.742198 with distribution patterns spread, line 1 (including village Siwang) of 0.905517 to spread its distribution pattern, line 3 includes hamlet 0.753299 Series with the distribution pattern of spread, and line 4 (including the Village Fortress and village Amahusu) of 0.5114061 to spread its distribution pattern. Ability Gandaria (Bouea macrophylla) spread in the entire study area allegedly due Gandaria (B. macrophylla) are able to create or modify a local micro-climate or habitat that provide habitats that encourage this trait for a more prominent and spread everywhere. According to Cox and Mor (1992), that the individual or group can spread everywhere due also due to the ability of the species capable of responding to changes in habitat, competition, predation, climate change. Other factors are also influential is Gandaria high spread everywhere also as a result of the reproductive process through seed dispersal high mobility, either naturally or through the spread of animal and human intervention, given Gandaria has economic value.

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