Biodiversity study of several peatland types in Papua

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Abstract. Research on biodiversity study of several peatland types in Papua had been carried out in Merauke and Mappi. The plot method was used for ecological research and interviews method for ethnobotany research. The results showed that the most important species which have the highest Importance Value Index (IVI) were Beilschmiedia sp., Carallia brachiate (Lour.) Merr. and Kibara corticea (Blume) Hook. f. & A. Thoms. in Kaliki Village, whereas it was Melaleuca leucadendra (L.) L only in Marga Mulia Village, Merauke. The most important species which have the highest IVI were Semecarpus forstenii Blume, Archidendron clypearia (Jack) I.C. Nielsen, and Campnosperma auriculatum (Blume) Hook.f. in Khanami Village, while they were Calophyllum euryphyllum Lauterb, Diospyros toposiodes King & Gamble, and Syzygium effusum (A.Gray) Müll. Stuttg in Yame Village, Mappi. The plants are used for building materials and ships, medicinal materials, food ingredients, animal feed, energy-producing materials/firewood, and material in traditional rituals.

1. Introduction

Indonesia has the most extensive peatlands among tropical countries, which is about 21 million ha, spread mainly in Sumatera, Kalimantan and Papua. In their natural state, peatlands support a broad range of habitats and provide a home for unique biodiversity. Along with storing large quantities of carbon, peatlands also play an important role in the retention, purification and release of water and in the mitigation of droughts and floods. They provide a source for fish, non-timber forest products, and other goods and services. Their special characteristics also make peatlands unique space for culture, leisure, and education activities. Peat has also been extracted to generate energy and supply growing media to the horticulture industry. Many natural peatlands have been converted and drained to allow for conventional agriculture and forestry. Most of the peatlands are still forest cover and are habitat for various species of fauna and rare plants. More importantly, peatlands store carbon (C) in large quantities. Peatlands conversion will disrupt all the functions of the peatland ecosystems [1].

Papua Province has ± 2.8 million ha of potential wetland area for agriculture use, it is second ranks in Indonesia after Sumatera ± 3.9 million ha [2]. Therefore, this area is very potential for agricultural extensification for supporting food sovereignty programs in Indonesia. The type of soil in wetland may be alluvial or peat. The alluvial soil is a precipitate formed from a mixture of materials such as mud, humus, and sand with different mixing ratios, while peat is the result of weathering of organic materials such as leaves, branches, and shrubs in a state of saturated water for a very long
time. Soil is called peat soil if the peat thickness is more than 50 cm, thus, peatland is wetland with peat thickness greater than 50 cm [3].

Merauke Regency is one of the regencies in Papua which has a land area of 4.6 million ha consisting of 3.1 million ha in the form of forest cover and 1.5 million ha in the form of non-forest cover. Forest cover which is around ± 66 % consists of primary forest, secondary forest, swamp forest, eucalyptus/acacia forest, and mangrove forest. Changes in land cover in Merauke Regency between 1990 and 2004 experienced significant alterations in primary forest areas, secondary forests, peat swamp forests, and mangrove forests, which indirectly had an impact on biodiversity. In addition, forest damage can be caused by rampant illegal logging, changes in land, plantations, and settlements [12].

The location of Merauke Regency is in the southern part of Papua Province and the easternmost district of Republic Indonesia. The forest in this area has a vegetation characteristic that is very different from the forest area in northern Papua. Forest in southern Papua especially Merauke and Mappi are monsoon forests where most of the vegetation is dominated by certain species, which successively from the river/sea edge are mangrove forests, swamp forests (mostly in the form of sago), and peat swamp forests. This situation is greatly influenced by climate, where the climate of Merauke and Mappi Districts has a tropical climate with very striking rainy and dry seasons differences [12].

The existence of peat swamp forests in Merauke and Mappi is one of the carbon reservoirs. Indonesia’s tropical peat has a wealth of unique flora and fauna and has a high ecological value. From approximately 258,650 tree species in the world, around 13-15% (around 35,000-40,000 species) exist in Indonesia’s peat ecosystems [8]. About 30,122 tree species with a diameter of 10 cm in a ha in peat swamp forests of Indonesia. The main role of peat swamp forests is as carbon storage in nature [4][6].

Biodiversity and its potential in the Papua forest area, especially Merauke and Mappi have not been fully exploited in peat swamp forests, so it is necessary to collect data and information on vegetation types. Some information has been carried out in the form of tree species vegetation in Wasur National Park [7], areca nut replacement plants by the community around Wasur National Park [10], and the potential of traditional medicinal plants [11].

This research was conducted to complete Herbarium information about plants species and to know plant species in various peat types in Papua. The useful plants’ species in tropical peatlands were also found out for revegetation and economic revitalization of local communities.

2. Materials and Methods
2.1. Study sites
The research was conducted in two Regencies of Papua Province, Merauke and Mappi. Research in Merauke was done in Kaliki Village, Kurik District, and in Marga Mulia Village, Semangga District. However, research in Mappi was done in Khanami Village and Yame Village, Assue District. The study sites in Merauke and Mappi were shown in Figures 1 and 2, respectively.
3.2. Ecological research

Ecological research was carried out by making a plot of 20 m x 20 m in one plot in Kaliki Village of Kurik District and two plots in Marga Mulia Village of Semangga District, Merauke Regency. The research was continued by making one plot in Khanami Village and three plots in Yame Village, Assue District, Mappi Regency.
All plants in the plot were enumerated, measured the circumference of the stem at breast height (± 130 cm), and estimated the free branch height of plants. All the chopped plants which have not yet identified for a taxonomic position, species names, and their usability were taken as herbarium samples as ecological evidence (voucher specimen) or taken for identification purposes. Direct identification in the field was carried out on plant species that have been known with certainty, both taxonomic position and local names. Scientific names (Latin) checking was based on the publication of the latest revision in Flora Malesiana [9] and searching through Plant List APG III [14].

Vegetation data analysis was performed by calculating the Importance Value Index (IVI). The IVI calculation is intended to identify common species and it play an important role in shaping forest ecosystems. IVI is calculated by the equation [5].

\[
\text{Density} (Ds) = \frac{\text{individual number of respective tree species}}{\text{Total area of the plot}} \tag{1}
\]

\[
\text{Relative Density} (RDs) = \frac{\text{Density of respective tree species}}{\text{All tree species density}} \times 100\% \tag{2}
\]

\[
\text{Frequency} (F) = \frac{\text{Observation plot number where respective tree species existed}}{\text{Total number of observation plot}} \tag{3}
\]

\[
\text{Relative Frequency} (RF) = \frac{\text{Frequency of respective tree species}}{\text{All tree species frequency}} \times 100\% \tag{4}
\]

\[
\text{Dominance} = \frac{\text{Basal area number of respective tree species}}{\text{Total area of the plot}} \tag{5}
\]

\[
\text{Relative Dominance} = \frac{\text{Dominance of respective tree species}}{\text{All tree species dominance}} \times 100\% \tag{6}
\]

\[
\text{Importance Value Index (IVI) } = RDs + RF + RD \tag{7}
\]

2.3. Ethnobotany research

Ethnobotany research related to the use of plants was conducted by interviewing 50 respondents in Merauke and 30 respondents in Mappi who were living around the peatlands.

3. Results and Discussion

3.1. Plant Ecology

The results showed that there were two types of peatlands in Merauke Regency, wet peat in Kaliki Village, Kurik District, and dry peat in Marga Mulia Village, Semangga District. The type of peat in Khanami Village and Yame in the Assue District, Mappi Regency was wet peat. The peatlands in Mappi were larger than those in Merauke Regency. Vegetation analysis results in the Kaliki Village plot, Kurik District were presented in Table 1. The results showed that there were 12 trees species in the plot. The most important species which have the highest IVI were Beilschmiedia sp., Carallia brachiate (Lour.) Merr., and Kibara coriacea (Blume) Hook. f. & A. Thomps.
Table 1. Results of vegetation analysis in Kaliki Village, Kurik District, Merauke.

| No. | Family          | Species                                      | Ds  | RDs | F   | RF  | D   | RD  | IVI  |
|-----|-----------------|----------------------------------------------|-----|-----|-----|-----|-----|-----|------|
| 1   | Burseraceae     | Santiria laevigata Blume                     | 2.50| 5.00| 0.25| 6.25| 0.22| 8.42| 19.67|
| 2   | Chrysobalanaceae| Atuna cf. racemose Raf.                      | 5.00| 10.00|0.50  | 12.50| 0.10| 3.75| 26.25|
| 3   | Lauraceae       | Beilschmiedia sp.                           | 5.00| 10.00|0.50  | 12.50| 0.98| 37.50| 60.00|
| 4   | Lauraceae       | Cryptocarya massoy (Oken) Kosterm.           | 2.50| 5.00 |0.25  | 6.25 | 0.01| 0.23| 11.48|
| 5   | Lauraceae       | Litsea sp.                                   | 2.50| 5.00 |0.25  | 6.25 | 0.17| 0.18| 11.43|
| 6   | Monimiaceae     | Kibara coriacea (Blume) Hook. f. & A. Thomps.| 10.00| 20.00|0.75  | 18.75| 0.03| 1.34| 40.09|
| 7   | Myrtaceae       | Tristaniopsis sp.                            | 5.00| 10.00|0.25  | 6.25 | 0.01| 0.18| 14.07|
| 8   | Myrtaceae       | Syzygium callianthum Merr. & L.M. Perry.    | 2.50| 5.00 |0.25  | 6.25 | 0.01| 0.18| 11.43|
| 9   | Myrtaceae       | Eucalyptus papuana F.Muell.                  | 2.50| 5.00 |0.25  | 6.25 | 0.01| 0.48| 11.73|
| 10  | Myrtaceae       | Rhodomyturus tomentosa (Aiton) Hassk.        | 2.50| 5.00 |0.25  | 6.25 | 0.18| 7.06| 18.31|
| 11  | Rhizophoraceae  | Carallia brachiata (Lour.) Merr.             | 5.00| 10.00|0.25  | 6.25 | 0.87| 33.45| 49.70|
| 12  | Rutaceae        | Evodia latifolia DC.                        | 5.00| 10.00|0.25  | 6.25 | 0.01| 0.55| 16.80|
|     | Sum             |                                              | 50  | 100 | 4.00 | 100 | 2.60| 100 | 300  |

All species in Marga Mulia peatland, Semangga District, Merauke Regency was Melaleuca cf. leucadendra (L.) L. from the Myrtaceae family. Vegetation analysis results in Khanami Village plot, Assue District were presented in Table 2. The results showed that there were 13 trees species in the plot. The most important species which have the highest IVI were Semecarpus forstenii Blume, Archidendron clypearia (Jack) I.C., and Macaranga sp.

Table 2. Results of vegetation analysis in Khanami Village, Assue District, Mappi.

| No. | Family         | Species                                      | Ds  | RDs | F   | RF  | D   | RD  | IVI  |
|-----|----------------|----------------------------------------------|-----|-----|-----|-----|-----|-----|------|
| 1   | Anacardiaceae  | Semecarpus forstenii Blume                   | 12.5| 16.67|0.25  | 5.26 | 0.54| 55.15| 77.08|
| 2   | Anacardiaceae  | Campnosperma auriculatum (Blume) Hook.f.    | 5.00| 6.67 |0.50  | 10.53| 0.04| 3.86 | 21.06|
| 3   | Burseraceae    | Canarium sp.                                 | 7.50| 10.00|0.50  | 10.53| 0.04| 4.27 | 24.79|
| 4   | Burseraceae    | Trioma sp.                                   | 5.00| 6.67 |0.50  | 10.53| 0.02| 2.29 | 19.48|
| 5   | Clusiaceae     | Calophyllum sp.                              | 2.50| 3.33 |0.25  | 5.26 | 0.01| 0.99 | 9.59 |
Vegetation analysis results of peatland in Yame plot 1, Assue District, Mappi Regency were presented in Table 3. The results showed that there were 13 trees species in the plot. The most important species which have the highest IVI were Calophyllum erythrophyllo Lauter., Acronychia pedunculata (L). Miq., and Gymnosperma papuanum (S. Moore) L.A.S. Johnson.

**Table 3.** Results of vegetation analysis in Yame Village plot 1, Assue District, Mappi.

| No. | Family       | Species                                      | Ds  | RDs  | F    | RF   | D    | RD  | IVI |
|-----|--------------|----------------------------------------------|-----|------|------|------|------|-----|-----|
| 1   | Cardiopteridaceae | Gonocaryum litorale (Blume) Sleumer. | 2.50 | 3.03 | 0.25 | 5.88 | 0.03 | 1.58 | 10.50 |
| 2   | Casuarinaceae  | Gymnostoma papuanum (S. Moore) L.A.S. Johnson. | 5.00 | 6.06 | 0.25 | 5.88 | 0.53 | 29.31 | 41.25 |
| 3   | Clusiaceae    | Calophyllum astrocoriaceum Whitmore. | 2.50 | 3.03 | 0.25 | 5.88 | 0.01 | 0.64 | 9.55 |
| 4   | Clusiaceae    | Calophyllum erythrophyllo Lauter. | 15.00 | 18.18 | 0.50 | 11.76 | 0.31 | 16.82 | 46.76 |
| 5   | Cunoniaceae   | Ceratopetalum succirubrum C.T. White. | 12.50 | 15.15 | 0.25 | 5.88 | 0.12 | 6.48 | 27.51 |
| 6   | Ixonanthaceae | Ixonanthes papuana (Schltr.) H.J.P. Winkl. | 2.50 | 3.03 | 0.25 | 5.88 | 0.01 | 0.53 | 9.44 |
| 7   | Myrtaceae     | Syzygium sp.                                | 7.50 | 9.09 | 0.50 | 11.76 | 0.15 | 8.32 | 29.17 |
| 8   | Myrtaceae     | Tristaniopsis sp.                           | 5.00 | 6.06 | 0.25 | 5.88 | 0.02 | 0.89 | 12.83 |
| 9   | Myrtaceae     | Rhodaninia cinerea Jack.                    | 2.50 | 3.03 | 0.25 | 5.88 | 0.05 | 2.50 | 11.42 |
| 10  | Myrtaceae     | Syzygium goniopetorium                      | 2.50 | 3.03 | 0.25 | 5.88 | 0.07 | 3.87 | 12.78 |
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Vegetation analysis results of peatland in Yame plot 2, Assue District, Mappi Regency were presented in Table 4. The results showed that there were 21 trees species in the plot. The most important species which have the highest IVI were Diospyros toposioides King & Gamble, Calophyllum soulattri Burm. f., and Schefflera divaricata (Blume) Koord.

Table 4. Results of vegetation analysis in Yame Village plot 2, Assue District, Mappi.

| No. | Family         | Species                        | Ds  | RDs  | F   | RF  | D   | RD  | IVI |
|-----|----------------|--------------------------------|-----|------|-----|-----|-----|-----|-----|
| 1   | Aquifoliaceae  | *Ilex* brassii Merr. & L.M. Perry. | 7.50 | 7.14 | 0.25 | 3.13 | 0.04 | 2.50 | 12.77 |
| 2   | Araliaceae     | *Scheflera divaricata* (Blume) Koord. | 15.00 | 14.29 | 0.75 | 9.38 | 0.11 | 6.87 | 30.53 |
| 3   | Burseraceae    | *Haplolobus floribundus* (K. Schum.) H.J. Lam. | 2.50 | 2.38 | 0.25 | 3.13 | 0.01 | 0.51 | 6.02  |
| 4   | Casuarinaceae  | *Gymnostoma papuanum* (S. Moore) L.A.S. Johnson. | 5.00 | 4.76 | 0.50 | 6.25 | 0.03 | 1.57 | 12.58 |
| 5   | Clusiaceae     | *Calophyllum soulattri* Burm.f. | 10.00 | 9.52 | 0.75 | 9.38 | 0.27 | 16.50 | 35.40 |
| 6   | Clusiaceae     | *Garcinia* sp. | 2.50 | 2.38 | 0.25 | 3.13 | 0.02 | 0.92 | 6.42  |
| 7   | Clusiaceae     | *Calophyllum bicolor* P.F. Stevens. | 2.50 | 2.38 | 0.25 | 3.13 | 0.06 | 3.44 | 8.94  |
| 8   | Clusiaceae     | *Garcinia hunsteinii* Lauterb. | 2.50 | 2.38 | 0.25 | 3.13 | 0.01 | 0.63 | 6.14  |
| 9   | Dipterocarpaeae | *Vatica rassak* Blume. | 5.00 | 4.76 | 0.50 | 6.25 | 0.20 | 12.28 | 23.29 |
| 10  | Ebenaceae      | *Diospyros toposioides* King & Gamble. | 15.00 | 14.29 | 0.75 | 9.38 | 0.25 | 15.13 | 38.80 |
| 11  | Ebenaceae      | *Diospyros ulo* Merr. | 2.50 | 2.38 | 0.25 | 3.13 | 0.00 | 0.07 | 5.58  |
| 12  | Lauraceae      | *Alseodaphne* sp. | 2.50 | 2.38 | 0.25 | 3.13 | 0.01 | 0.46 | 5.96  |
| 13  | Myristicaceae  | *Horsfieldia laevigata* Warb. | 2.50 | 2.38 | 0.25 | 3.13 | 0.03 | 1.75 | 7.25  |

| No. | Family         | Species                        | Ds  | RDs  | F   | RF  | D   | RD  | IVI |
|-----|----------------|--------------------------------|-----|------|-----|-----|-----|-----|-----|
| 1   | Oleaceae       | *Calophyllum soulattri* Blume. | 2.50 | 3.03 | 0.25 | 5.88 | 0.16 | 9.01 | 17.92 |
| 2   | Phyllanthaceae | *Antidesma tetrandrum* Blume. | 5.00 | 6.06 | 0.25 | 5.88 | 0.25 | 13.91 | 25.85 |
| 3   | Rutaceae       | *Acronychia pedunculata* (L.) Miq. | 17.50 | 21.21 | 0.75 | 17.65 | 0.11 | 6.16 | 45.01 |

| No. | Family         | Species                        | Ds  | RDs  | F   | RF  | D   | RD  | IVI |
|-----|----------------|--------------------------------|-----|------|-----|-----|-----|-----|-----|
| 11  | Oleaceae       | *Calophyllum soulattri* Blume. | 2.50 | 3.03 | 0.25 | 5.88 | 0.16 | 9.01 | 17.92 |
| 12  | Phyllanthaceae | *Antidesma tetrandrum* Blume. | 5.00 | 6.06 | 0.25 | 5.88 | 0.25 | 13.91 | 25.85 |
| 13  | Rutaceae       | *Acronychia pedunculata* (L.) Miq. | 17.50 | 21.21 | 0.75 | 17.65 | 0.11 | 6.16 | 45.01 |

| Sum | Ds  | RDs  | F   | RF  | D   | RD  | IVI |
|-----|-----|------|-----|-----|-----|-----|-----|
| 82.50 | 100 | 4.25 | 100 | 1.82 | 100 | 300 |     |
| No. | Family       | Species                                      | Ds  | RDs | F   | RF  | D   | RD  | IVI  |
|-----|--------------|----------------------------------------------|-----|-----|-----|-----|-----|-----|------|
| 1   | Aquifoliaceae| *Horsfieldia* sp.                            | 2.50| 5.26| 0.25| 3.85| 0.01| 0.89| 10.00|
| 2   | Burseraceae  | *Litsea* sp.                                 | 2.50| 5.26| 0.25| 3.85| 0.01| 0.75| 9.86 |
| 3   | Casuarinaceae| *Gymnostoma papuanum* (S. Moore)             | 2.50| 5.26| 0.25| 3.85| 0.08| 5.55| 14.66|
|     |              | *Calophyllum austrocoriaceum*                |     |     |     |     |     |     |      |
| 4   | Clusiaceae   | *Kayea* sp.                                  | 2.50| 5.26| 0.25| 3.85| 0.19| 12.79| 21.90|
| 5   | Clusiaceae   | *Garcinia parvifolia* (Miq.) Miq.            | 2.50| 5.26| 0.25| 3.85| 0.02| 1.48| 10.59|
| 6   | Clusiaceae   | *Ceratopetalum succirubrum* C.T. White.      | 2.50| 5.26| 0.25| 3.85| 0.03| 1.80| 10.91|
| 7   | Cunoniaceae  | *Diospyros ulo* Merr.                        | 2.50| 5.26| 0.25| 3.85| 0.08| 5.92| 15.03|
| 8   | Ebenaceae    | *Fagraea racemosa* Jack.                     | 2.50| 5.26| 0.50| 7.69| 0.14| 9.23| 22.19|
| 9   | Gentianaceae | *Litsea* sp.                                 | 2.50| 5.26| 0.50| 7.69| 0.06| 4.19| 17.14|
| 10  | Lauraceae    | *Ficus* sp.                                  | 2.50| 5.26| 0.25| 3.85| 0.02| 1.31| 10.42|

Vegetation analysis results of peatland in Yame plot 3, Assue District, Mappi Regency were presented in Table 5. The results showed that there were 19 trees species in the plot. The most important species which have the highest IVI were *Palaquium* sp., *Syzygium effusum* (A. Gray) Müll. Stuttg., and *Syzygium anomalum* Lauterb.

**Table 5.** Results of vegetation analysis in Yame Village plot 3, Assue District, Mappi.
Similar to peatland in Khanami Village, in Yame Village peatland was also found species of *Canarium*, and other species like *banyan*, cassava, red guava, white guava, and various woods that were widely used for building materials and ships, with the local name of *tiva* wood, *nani* wood, and *pasang* wood. The results showed that species diversity in Mappi peatland was higher than in Merauke peatland. The condition of peatland in Marga Mulia Village, Semangga District was closer to swamp forest, where only one species was found, namely *Melaleuca cf leucadendra* (L.) L. from the family of Myrtaceae. Based on interviews with the head of Marga Mulia Village, Semangga District that most of the dry peat forest in this area has been turned into rice fields and settlements, so that only a little forest remains.

The condition of peatland in Mappi is better than that in Merauke. There had been no conversion of land from forests to rice fields. In addition, the species were more diverse and more directed towards peat swamp forests. The lack of land-use change in the Mappi peatland was likely due to the high dependence of the community on the forest, especially for the necessities of life such as the use of wood for building houses and ships, and also for traditional medicine, food, and animal feed, therefore the communities surrounding there protect the forests very well.

**Figure 3.** Peatlands in Kaliki Village, Kurik District, Merauke.

**Figure 4.** Peatlands in Marga Mulia Village, Kurik District, Merauke.
3.2. Ethnobotany
The study was conducted in two villages namely Kaliki Village, Kurik District, and Marga Mulia Village, Semangga District. The results of research in Kaliki found about 53 species of plants that are used by indigenous people (Marind Tribe). The utilization of plants by local communities was high since they use the forest for their daily needs. Of the 53 useful plant species utilized by the Marind Tribe in the Kaliki Village, mostly was used as building materials and medicinal materials, but it was also used as food, animal feed, as an energy/firewood producing material, and as an ingredient in rituals / events custom. The most important plant species according to them was *wati* plant (*Piper methysticum*) (Figure 7), which was believed to be an invaluable treasure. This plant is used in rituals or traditional events.

In Marga Mulia Village, Semangga District, around 28 species of plants that found were used by the local community for food, medicine, and building materials. Most of the species used are cultivated plants that exist around their environment. The lack of use for plants in Marga Mulia Village because it was a transmigration area so that it had brought a change in the lives of the Marind Tribe in the Village. According to the head of Marga Mulia Village, initially, the Marind Tribe's
livelihood was hunting and farming in the forest and moving around. However, after being introduced to rice plants, the Marind Tribe began to farm and became a settled farming community and implemented an agricultural system.

The utilization of plants in the peatland of Mappi Regency by surrounding communities was more widely used for building materials and ships. Another plant that commercially utilized is agarwood (gaharu), which was taken directly from the forest or nurseries. The nurseries obtain seeds and saplings from the forest. The people who live around the peat forest in Khanami were a combination of various tribes namely, Auyu Tribe, which is a native tribe in Mappi, some migrant tribes such as Bugis, Javanese and Ambonese. People who live around the peat forests of Yame in Assue District, it was also a combination of various tribes. Although the natives still depend on the surrounding peat forest, they have started to learn farming and trading from migrants. Some of the plants used by the communities around the peatlands shown in Table 6.

**Table 6. Useful plants in Merauke and Mappi peatlands.**

| Family       | Species                                      | Local name         | Part which is used | Utilization                                      |
|--------------|----------------------------------------------|--------------------|--------------------|--------------------------------------------------|
| Acanthaceae  | *Andrographis panulcata* Ness.               | Sambiroto          | Leaves             | Malaria medicine                                 |
| Anacardiaceae| *Buchanania sp.*                            | Kayu dayung        | Stem               | Building materials                               |
| Anacardiaceae| *Mangifera indica* L.                       | Mangga air/piaw    | Fruit              | Food and medicine                               |
|              |                                              |                    | Wood skin          | Diarrhea medication                              |
| Apocynaceae  | *Alstonia macrophylla* Wall. ex G. Don.      | Domber             | Wood skin          | Animal feed for dogs which are used for hunting  |
| Apocynaceae  | *Alstonia scholaris* (L.) R. Br.             | Kayu susu daun lebar| Leaves and wood skin| Malaria medicine, intestinal worms, and toothache medicine |
| Apocynaceae  | *Tabernaemontana pandacaqui* Lam.           | Kayu susu daun keriting | Root              | Diarrhea medication                              |
| Areaceceae   | *Metroxylon sago* (Willd).                  | Sagu/dah           | Sago starch        | Food and medicine                               |
|              |                                              |                    | Midrib             | House wall                                       |
|              |                                              |                    | Leaves             | House roof                                       |
| Arecaceae    | *Derris trifoliata* Lour.                    | Kunad              | Wood skin          | Animal feed for dogs which are used for hunting  |
| Arecaceae    | *Cocos nucifera* L.                         | Kelapa/onggad     | Fruit              | Food and diarrhea medication                     |
| Bambucaceace | *Bambusa sp.*                                | Bambu/illa, yella | Young shoots/bamboo shoots | Stem Hunting gear (material to make arrows) |

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| Family             | Species                          | Part Used       | Medicinal Use                                                                 |
|--------------------|----------------------------------|-----------------|-------------------------------------------------------------------------------|
| Bombacaceae        | *Ceiba pentandra* (L.) Gaertn.   | Stem skin       | Medication to speed dry up the wound                                          |
| Boraginaceae       | *Diospyros ulo* Merr.            | Stem skin       | Pulmonary pain medication                                                      |
| Caricaceae         | *Carica papaya* L.               | Stem skin       | Animal feed for dogs which are used for hunting                               |
| Cyperaceae         | *Sp 1*                           | Stem skin       | Food and malaria medicine                                                      |
| Dilleniaceae       | *Tetracera scandens* (L.) Merr.  | Leaves          | Noken woven                                                                   |
| Euphorbiaceae      | *Codiaeum variegatum* (L.) Rumph. | All parts of the plant | Ornamental plants                                                             |
| Euphorbiaceae      | *Codiaeum variegatum* (L.) Rumph. | All parts of the plant | Ornamental plants and ritual                                                   |
| Euphorbiaceae      | *Phyllanthus niruri* L.          | Root, stem, and leaves | Medicine to facilitate the birth process                                       |
| Fabaceae           | *Sophora tomentosa* L.           | Leaves          | Treating cough and wet lungs                                                  |
| Gentianaceae       | *Fraraea sp.*                    | Leaves          | Internal medicine                                                            |
| Gnetaceae          | *Gnetum Genemon* L.              | Leaves          | Food                                                                           |
| Hypoxidaceae       | *Curculigo sp.*                  | Old leaves      | For sago wrapping                                                            |
| Lamiaceae          | *Coles blumei* Benth.            | Leaves          | Blood booster medication                                                      |
| Lauraceae          | *Alseodaphne* sp.                | Stem            | Building materials                                                            |
| Lauraceae          | *Endiandra* sp.                  | Stem            | Building materials                                                            |
| Leguminosae        | *Acacia auriculiformis* Benth.   | Stem            | Building materials and firewood                                               |
| Leguminosae        | *Cassia javanica* L.             | Stem            | Building materials and firewood                                               |
| Leguminosae        | *Acacia auriculiformis* Benth.   | Stem            | Building materials                                                            |
| Leguminosae        | *Archidendron clypearia* (Jack) I.C. Nielsen. | Wood skin | Fish poison medicine                                                         |
| Malvaceae          | *Abelmoschus manihot* (L.) Medik. | Leaves          | Food and medicine to                                                          |
There were 41 species of plants utilized by the Marind, from 25 families with different habitats, including forests, gardens, roadside, and house yards. The forest edge was the primary habitat of most useful plant species found. Most people use plants as traditional medicine (23 species) and then as building materials (10 species) and food ingredients (9 species). This requires that people live dependent on nature. The potential economic plant was wati plant (*Piper methysticum*). This plant was considered a treasure by the Marind, but its existence has begun to disappear. From the survey results in Merauke Regency, it was known that only one family planted and started cultivating wati with tree prices ranging from 2-10 million rupiah.

### 3.3. Comparison with other tropical peatlands

The results of ecology and ethnobotany were compared to tropical peat swamp forest in Kalampangan and Sebangau, Central Kalimantan. These ecological results were very different on the plant species. The peat swamp forests of Central Kalimantan were dominated by *Tetramerista glabra*, *Calophyllum sp.*, *Shorea sp.*, *Combretocarpus rotundatus*, *Palaquium sp.*, *Buchanania sessilifolia*, *Syzygium sp.*, *Dactylocladus stenostachys*, *Dyera costulata*, *Ilex cymosa*, *Tristaniopsis obovata*, and *Dyospyros sp.* [13]. All the species were not found in Merauke and Mappi peatlands.
However, the ethnobotany results were similar to Central Kalimantan tropical peat swamp forests. The plants were used for building materials and ships, medicinal materials, food ingredients, animal feed, and energy-producing materials/firewood by Dayak Tribe [13].

4. Conclusions

The diversity of flora in Mappi peatland was outweighed Merauke peatland since there has been a minimal land-use change in Mappi peatland. Generally, the use of plants by communities around the peat forest is for the needs of life, medicine, houses, ship, and religious rituals. Local people in Merauke and Mappi still hunt for wildlife for their daily needs.

Most of the local inhabitants of Merauke have a habit of hereditary burning grass (forest floor) with the aim that after the forest was burnt, it will grow new grass so the deer will come to the area and the people can hunt it down. Even though forests burning potentially damage to the ecosystem, people believe that burning forests is a legacy of ancestors that is difficult to change. Therefore, education is needed. It needs to be done in stages to change the habits and culture of the community in order to not burn the forest continuously.

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