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# ANALYSIS OF MINIMUM LIVABILITY AND SIMILARITY OF VEGETATION TYPES IN MANGROVE FOREST COMMUNITY BLOCKS WITH DIFFERENT FUNCTIONS IN BURUNG ISLAND NATURAL TOURISM PARK

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## ABSTRACT
In its management, to prevent conflict of interests between the surrounding community and the government, the Burung Island Nature Tourism Park is divided into 5 blocks, and the object of research is the condition of the mangrove forests in 3 blocks, namely the Protection Block, Rehabilitation Block and Utilization Block. The condition of the forests in the three blocks is studied in this research. The aim of the research is to examine the condition and existence of the types of vegetation that make up the forest in the three blocks from the aspect of the minimum liveability value of each type of vegetation in each block, as well as the level of similarity in composition and structure of vegetation types between blocks. Data was collected using the Vegetation Analysis method using systematic plotted paths carried out by purposive sampling in the three blocks. The path is made with a width of 10 m and a length of 100 m, consisting of 9 paths that cut perpendicular to the coastline towards the mainland, with a distance of 100 m between paths. Nine types of vegetation were found, of which *Rhizophora mucronata* was the most dominant type in the three blocks at all growth levels. All types of vegetation at all growth levels in the three blocks have viability values above the minimum value, and the highest minimum viability value is *Rhizophora mucronata*. The composition and structure of the seedling and tree communities in the three blocks tend to be similar, while the sapling communities in the Protection Block and the Rehabilitation Block are not similar, but are similar in the Utilization Block. The seedling and tree communities in the Rehabilitation Block are similar to the Utilization Block, while the sapling communities are not similar.

## KEY WORDS
Management blocks, minimum liveability value, similarity index.

Since 2019, the mangrove forest which functions as a Nature Reserve on Burung Island has changed its function from a Nature Reserve to a Nature Tourism Park, which is then managed by the South Kalimantan Province Natural Resources Conservation Center involving the local government, local communities and the private sector. In general, what underlies the change in function of the Burung Island Nature Reserve area into a Nature Tourism Park area is the aspirations of the Tanah Bumbu Regency government together with its community and especially the residents of Burung Island Forest Village, which is a village located within the mangrove forest ecosystem area which is one of the Nature Tourism Parks, those determined who assess or perceive that the area where they live has economic potential to be developed for the benefit of the welfare of the community in and around the area.

In the Burung Island Nature Tourism Park area, management blocks have been arranged. This management block is needed to regulate the area's space, so that the goals that have been set can be achieved. Apart from that, this arrangement is also intended so that various interests that have the potential to cause conflict can be minimized. The management blocks consist of Protection Block, Utilization Block, Traditional Block, Rehabilitation Block and Special Block. In this research, the blocks that are the objects are the Protection Block, Utilization Block, and Rehabilitation Block, because in these blocks there are natural mangrove forest communities, while the other blocks are fruit orchards planted by the local community.

An analysis of the condition of the mangrove forests in the three blocks is needed to obtain an overview of the composition, structure, minimum viability and similarity of vegetation communities in the three forest blocks which are habitats for various wild animals, especially proboscis monkeys and also as a landscape which is a natural tourist attraction on Burung Island.

The aim of the research is to analyze the condition and existence of mangrove forest vegetation types in the Protection Block, Rehabilitation Block and Utilization Block in relation to the liveability value of each type as well as the level of similarity in the composition and structure of the types between the blocks.

## METHODS OF RESEARCH

This research was carried out from May to November 2023 in the Burung Island Nature Tourism Park area, Batulicin District, Tanah Bumbu Regency. The research object is the mangrove forest plant community in the Protection Block, Rehabilitation Block and Utilization Block within the area. The variable of interest in this research is the composition and structure of the plant species that make up the mangrove forest community in each management block. The data collection technique used in this research uses the Vegetation Analysis method using systematic plotted paths. Vegetation analysis is carried out at the seedling, sapling and tree levels. Vegetation sample data collection was carried out using the purposive sampling method. Example plots were created using a systematic path plot method for each block. The path is made with a width of 10 m and a length of 100 m, consisting of 9 paths that cut perpendicular to the shoreline towards the land (which is covered with mangroves). Within the route, sample plots measuring 10 m x 10 m were created which were systematically located at a distance of 20 m between plots. In the example plot of 10 m x 10 m, subplots were created based on growth level, namely:

- Plot measuring 2 m x 2 m for seedling growth rate;
- Plot measuring 5 m x 5 m for sapling growth level;
- Plot measuring 10 m x 10 m for tree growth level.

In each sample plot for each growth level, the types of vegetation found were recorded along with the number of individuals of each type. Identify the types of mangrove plants in the plot based on growth level criteria, namely:

- Seedlings, namely regeneration starting from sprouts to saplings less than 1.5 m high;
- Saplings, namely seedlings with a height of 1.5 m to saplings with a diameter of less than 10 cm;
- Trees, more than 10 cm in diameter.

The Importance Value Index is an importance index that describes the important role of a type of vegetation in its ecosystem. To determine the Importance Value Index, the Relative Density (RD%), Relative Frequency (RF%), and Relative Dominance (RDo%) of each plant type is added up. Calculations are carried out using the following formulas (Purba, 2009 and Peran et.al., 2013):

$$IVI_i = (\%) = RD_i + RF_i + RDo_i$$

Where: $IVI_i$ = Index of importance of the i-th type of plant; $RD_i$ = Relative density of plant type I; $RF_i$ = Relative frequency of plant type I; $RDo_i$ = Relative Dominance of a type of plant i.

The minimum liveability value (MLV) for each type, including seedlings, saplings and trees from the three management blocks, was analyzed using Franklin's (1980) formula in Indrawan, Primack, and Supriatna 2007), namely:

$$50/500 = MLV/N$$

Where: NKM = Minimum liveability value; N = The number of individuals in the population.

According to Brook et. al. (2007), if MLV < 0.1 the species is threatened with extinction, whereas if MLV > 0.1 the species will be preserved.

The Similarity Index states the degree of similarity in the composition and structure of the species possessed by the two forest communities being compared. The higher the Similarity Index means that the two communities have almost the same species composition and structure. The similarity index formula is:

$$SI = \frac{2w}{A+B} \times 100\%$$

Where: SI = Sorenson Similarity Index; W = The number of IVI (%) of species is the same or smaller in the two communities being compared; A = Number of IVI (%) species in community A; B = Number of IVI (%) species in community B.

If the SI value is > 50%, then the community has relatively similar species composition and structure, if the SI value is < 50%, the opposite is true (Soerianegara, 1978).

## RESULTS AND DISCUSSION

The composition of the mangrove forest community types found in this study consists of undergrowth in the form of ferns, namely sea fern (*Acrostichum aureum*) and shrubs, namely jeruju (*Acanthus ilicifolius*), while the types that form the mangrove forest community consist of 9 types.

Table 1 – Types of Vegetation that Form Mangrove Forests in Burung Island Nature Tourism Park

| No | Species | | Family |
|---|---|---|---|
| | Local Name | Scientific Name | |
| 1 | Api-Api | *Avicennia marina* | Verbenaceae |
| 2 | Bakau Laki | *Rhizophora mucronata* | Rhizoporaceae |
| 3 | Bakau Bini | *Rhizophora apiculata* | Rhizoporaceae |
| 4 | Buta-Buta | *Excoecaria agallocha* | Euphorbiaceae |
| 5 | Langadai | *Bruguiera parviflora* | Rhizoporaceae |
| 6 | Mirih/Nyirih | *Xylocarpus granatum* | Meliaceae |
| 7 | Nipah | *Nypa fruticans* | Arecaceae |
| 8 | Rambai | *Sonneratia alba* | Lythraceae |
| 9 | Waru Laut | *Thespesia populnea* | Malvaceae |

Research by Guffrona, Kusmana, and Rusdiana (2015) in the mangrove forest of Sebuku Island, Kotabaru Regency, South Kalimantan found 10 types of trees and their regeneration, some of which were also found in research at the Burung Island Nature Tourism Park, namely the types *Rhizophora mucronata, Rhizophora apiculata, Bruguiera parviflora, Sonneratia alba, Xylocarpus granatum*, and *Nypa fruticans*.

The composition of types of regeneration at the seedling level of the mangrove forest community in each management block in the Burung Island Nature Tourism Park area is presented in Table 2.

Table 2 – Regeneration of Mangrove Forest Seedling Communities in Each Block

| No | Species | Block | | |
|---|---|---|---|---|
| | | Utilization | Rehabilitation | Protection |
| 1 | *Avicennia marina* | + | + | + |
| 2 | *Rhizophora mucronata* | + | + | + |
| 3 | *Rhizophora apiculata* | + | + | + |
| 4 | *Excoecaria agallocha* | - | + | + |
| 5 | *Bruguiera parviflora* | + | + | + |
| 6 | *Xylocarpus granatum* | - | + | + |
| 7 | *Nypa fruticans* | - | + | - |
| 8 | *Sonneratia alba* | + | + | + |

*Note: + = found; - = not found.*

Table 2 shows that 5 types of seedlings were found in the Protection Block, 8 types in the Rehabilitation Block, and 7 types in the Utilization Block.

The composition of mangrove forest sapling regeneration types in each management block in the area is presented in Table 3.

Table 3 – Rejuvenation of the Mangrove Forest sapling Community in Each Block

| No | Species | Block | | |
|---|---|---|---|---|
| | | Utilization | Rehabilitation | Protection |
| 1 | *Avicennia marina* | + | + | + |
| 2 | *Rhizophora mucronata* | + | + | + |
| 3 | *Rhizophora apiculata* | + | + | + |
| 4 | *Nypa fruticans* | - | + | + |
| 5 | *Sonneratia alba* | + | + | + |

*Note: + = found; - = not found.*

Table 3 shows that 4 types of sapling regeneration were found in the Protection Block, 5 types in the Rehabilitation Block and the Utilization Block.

The composition of mangrove forest tree community types in each management block in the area is presented in Table 4.

Table 4 – Mangrove Forest Tree Community in Each Block

| No | Species | Block | | |
|---|---|---|---|---|
| | | Utilization | Rehabilitation | Protection |
| 1 | *Avicennia marina* | + | + | + |
| 2 | *Rhizophora mucronata* | + | + | + |
| 3 | *Rhizophora apiculata* | + | - | + |
| 4 | *Excoecaria agallocha* | + | + | - |
| 5 | *Bruguiera parviflora* | + | + | + |
| 6 | *Xylocarpus granatum* | + | - | + |
| 7 | *Nypa fruticans* | + | + | - |
| 8 | *Sonneratia alba* | + | + | - |
| 9 | *Thespesia populnea* | - | - | + |

*Note: + = found; - = not found.*

Table 4 shows that 8 types of trees were found in the Protection Block, 6 types in the Rehabilitation Block and Utilization Block.

The condition of dominance between types in a forest community can be seen from the Importance Value Index (IVI%) of each type of vegetation that forms the forest community in question. The higher the IVI value (%) of a species, the more dominant or more important the species in question plays a role in the forest community. IVI (%) of seedling communities for each type of each block in the area is presented in Table 5.

Table 5 – IVI (%) Types of Seedling Community Regeneration in Each Block

| No | Species | IVI (%)Each Block | | |
|---|---|---|---|---|
| | | Utilization | Rehabilitation | Protection |
| 1 | *Avicennia marina* | 15.52 | 22.55 | 33.81 |
| 2 | *Rhizophora mucronata* | 82.73 | 70.65 | 64.70 |
| 3 | *Rhizophora apiculata* | 69.95 | 59.78 | 59.53 |
| 4 | *Excoecaria agallocha* | - | 5.98 | - |
| 5 | *Bruguiera parviflora* | 14.15 | 15.22 | 9.77 |
| 6 | *Xylocarpus granatum* | - | 7.61 | 8.94 |
| 7 | *Nypa fruticans* | - | 3.37 | - |
| 8 | *Sonneratia alba* | 17.65 | 18.84 | 13.29 |
| 9 | *Thespesia populnea* | - | - | 9.56 |

Table 5 shows that there are 5 types of seedling regeneration in the Protection Block, 8 types in the Rehabilitation Block, and 7 types in the Utilization Block. Based on the IVI value

(%) of each type, there are 2 types with the most prominent IVI values in all management blocks, namely the *Rhizophora mucronata* and *Rhizophora apiculata* types, and the IVI values are quite prominent in all these blocks, namely The types of *Avicennia marina* and *Sonneratia alba* are quite prominent only in the Protection Block and Rehabilitation Block, namely the *Bruguiera parviflora* type, so that we get the picture that the *Rhizophora mucronata* type is the most dominant type in the three mangrove forest community blocks, followed by the *Rhizophora apiculata* type. Then what is quite dominant in the three blocks is *Avicennia marina* and *Sonneratia alba*, while what is quite dominant only in the Protection Block and Rehabilitation Block is the *Bruguiera parviflora* type. Other types such as *Excoecaria agallocha, Xylocarpus granatum*, and *Thespesia populnea* are not dominant.

Furthermore, for the sapling regeneration community, the IVI (%) for each type of each block is presented in Table 6.

Table 6 – IVI (%) Types of Regeneration in the sapling Community in Each Block

| No | Species | IVI (%) each block | | |
|---|---|---|---|---|
| | | Utilization | Rehabilitation | Protection |
| 1 | *Avicennia marina* | 20.60 | - | 15.07 |
| 2 | *Rhizophora mucronata* | 98.98 | 100.30 | 86.76 |
| 3 | *Rhizophora apiculata* | 63.84 | - | 53.80 |
| 4 | *Xylocarpus granatum* | - | 28.72 | - |
| 5 | *Bruguiera parviflora* | 16.58 | 29.21 | - |
| 6 | *Sonneratia alba* | - | 41.76 | 27.82 |
| 7 | *Nypa fruticans* | - | - | 16.54 |

Table 6 shows that there are 4 types of sapling community regeneration in the Protection Block and Rehabilitation Block, and 5 types in the Utilization Block. Based on the IVI value (%) for each type, there are 2 most prominent types, namely Rhizophora mucronata in the mangrove forest community in all three blocks, while the *Rhizophora apiculata* type is most prominent only in the Protection Block and Utilization Block. Other types such as *Avicennia marina* are quite prominent in the Protection Block and Utilization Block. The *Xylocarpus granatum* species is quite prominent only in the Rehabilitation Block. The *Bruguiera parviflora* species is quite prominent in the Protection Block and Rehabilitation Block. The *Sonneratia alba* species is quite prominent in the Rehabilitation Block and Utilization Block. The *Nypa fruticans* type is quite prominent only in the Utilization Block. From this condition, it is clear that the *Rhizophora mucronata* species dominates in the mangrove forest communities in the three management blocks, while the *Rhizophora apiculata* species dominates only in the mangrove forest communities in the Protection Block and Utilization Block. Then the *Avicennia marina* type is quite dominant in the mangrove forest community in the Protection Block and Utilization Block. The *Xylocarpus granatum* species is quite dominant only in the mangrove forest community in the Rehabilitation Block. The *Bruguiera parviflora* type is quite dominant in the Protection Block and Rehabilitation Block. The *Sonneratia alba* type is dominant in the Rehabilitation Block and Utilization Block. The *Nypa fruticans* type is quite dominant only in the Utilization Block.

Then for tree communities, IVI (%) for each type of each block is presented in Table 7.

Table 7 – IVI (%) Types of Tree Community in Each Block

| No | Species | IVI (%) each block | | |
|---|---|---|---|---|
| | | Utilization | Rehabilitation | Protection |
| 1 | *Avicennia marina* | 31.90 | 59.52 | 39.81 |
| 2 | *Rhizophora mucronata* | 59.24 | 117.11 | 77.28 |
| 3 | *Rhizophora apiculata* | 51.05 | - | 51.89 |
| 4 | *Excoecaria agallocha* | 27.26 | 20.79 | - |
| 5 | *Bruguiera parviflora* | 43.54 | 41.44 | 44.61 |
| 6 | *Xylocarpus granatum* | 33.05 | - | 46.33 |
| 7 | *Nypa fruticans* | 17.64 | 25.71 | - |
| 8 | *Sonneratia alba* | 36.33 | 35.43 | - |
| 9 | *Thespesia populnea* | - | - | 40.09 |

Table 7 shows that there are 8 types of trees in the Protection Block, 6 types in the Rehabilitation Block and the Utilization Block. Based on the IVI value (%) of each type, there are 3 most prominent types, namely the *Avicennia marina* type in the Rehabilitation Block and quite prominent in the Protection Block and Utilization Block, the Rhizophora mucronata type which is the most prominent in all blocks, and *Rhizophora apiculata* in the Block Protection and Utilization Blocks, while the types that are quite prominent are Excoecaria agallocha in the Protection Block and Rehabilitation Block, *Bruguiera parviflora* in the three blocks, *Xylocarpus granatum* in the Protection Block and Utilization Block, Nypa fruticans and Sonneratia alba in the Protection Block and Rehabilitation Block, and *Thepesia populnea* only in the Utilization Block. Thus, we get an idea that the *Rhizophora mucronata* tree species is the most dominant in the mangrove forest communities in the three blocks, while the *Rhizophora apiculata* species is the most dominant in the Protection Block and Utilization Block. The *Avicennia marina* type is the most dominant only in the Rehabilitation Block. Other species that are quite dominant in the area studied are the *Avicennia marina* species in the Protection Block and Utilization Block, the *Excoecaria agallocha*, Nypa fruticans, and *Sonneratia alba* species in the Protection Block and Rehabilitation Block, the *Bruguiera parviflora* species in the three blocks, the species *Thespesia populnea* only quite dominant in the Utilization Block.

The Importance Value Index (IVI%) in this study also shows that the *Rhizophora mucronata* species is the dominant species at all growth levels (seedlings, saplings and trees) in all management blocks. Research by Guffrona, Kusmana and Rusdiana (2015) in the mangrove forest of Sebuku Island, Kotabaru Regency, South Kalimantan shows that this species also dominates in the mangrove forest area.

Table 8 – Minimum Liveability Value (MLV) for Youth Community Seedlings in Each Mangrove Forest Management Block

| No | Species | MLV Mangrove Forest of Each Type in Each Management Block | | |
|---|---|---|---|---|
| | | Utilization | Rehabilitation | Protection |
| 1 | *Avicennia marina* | 0.9 | 3.9 | 6.6 |
| 2 | *Rhizophora mucronata* | 12.9 | 12.3 | 12.9 |
| 3 | *Rhizophora apiculata* | 12.0 | 12.0 | 12.3 |
| 4 | *Thespesia populnea* | - | 1.2 | 1.2 |
| 5 | *Bruguiera parviflora* | 0.9 | 1.8 | 0.9 |
| 6 | *Xylocarpus granatum* | - | 0.9 | 0.6 |
| 7 | *Sonneratia alba* | 1.5 | 2.1 | 1.8 |

Table 9 – Minimum Liveability Value (MLV) Rejuvenation of the sapling Community in Each Mangrove Forest Management Block

| No | Species | MLV Mangrove Forest of Each Type in Each Management Block | | |
|---|---|---|---|---|
| | | Utilization | Rehabilitation | Protection |
| 1 | *Avicennia marina* | 3.3 | - | 0.9 |
| 2 | *Rhizophora mucronata* | 14.4 | 10.5 | 7.2 |
| 3 | *Rhizophora apiculata* | 9.0 | 1.2 | 3.3 |
| 4 | *Nypa fruticans* | 1.2 | 0.9 | 0.9 |
| 5 | *Sonneratia alba* | - | 2.4 | 2.1 |

Table 10 – *Minimum Liveability Value* (MLV) of Tree Communities in Each Mangrove Forest Management Block

| No | Species | MLV for Each Type in Each Mangrove Forest Management Block | | |
|---|---|---|---|---|
| | | Protection | Rehabilitation | Utilization |
| 1 | *Avicennia marina* | 1.5 | 0.8 | 1.5 |
| 2 | *Rhizophora mucronata* | 2.7 | 1.4 | 3.0 |
| 3 | *Rhizophora apiculata* | 1.8 | - | 1.9 |
| 4 | *Excoecaria agallocha* | 2.4 | 0.3 | - |
| 5 | *Bruguiera parviflora* | 1.8 | 0.5 | 1.9 |
| 6 | *Xylocarpus granatum* | 1.5 | - | 1.9 |
| 7 | *Nypa fruticans* | 1.5 | 0.6 | - |
| 8 | *Sonneratia alba* | 1.8 | 0.4 | - |
| 9 | *Thespesia populnea* | - | - | 1.0 |

Brook et. al. (2007) stated that a species or population is threatened with extinction if its *Minimum Liveability Value* (MLV) is smaller than 0.1 and conversely a species or population is sustainable if its MLV is greater than 0.1. Based on these criteria, all types of mangrove forest formation studied, including seedling regeneration, sapling regeneration, and trees in the three management blocks, had MLV greater than 0.1 (Table 10, Table 11, and Table 12). Thus, up to now we can interpret that the types that make up the mangrove forest community in the Protection Block, Rehabilitation Block and Utilization Block in the Burung Island Nature Tourism Park Area are in a state of preservation. Minimum Liveability Values presented in these tables vary between types. The *Rhizophora mucronata* species in the Protection Block, both seedlings, saplings and trees, has the highest liveability value, followed by the *Rhizophora apiculata* species at the seedling and sapling level which is also the highest in this block, but this species does not have a very high liveability value at the tree level, although Nor is the minimum liveability value too low. In this Protection Block, the tree community that has the highest liveability value is the *Excoecaria agallocha*. In this Protection Block, the species that have a lower liveability value than other species are *Avicennia marina* and *Bruguiera parviflora* at the seedling level, *Nypa fruticans* at the sapling level, and *Xylocarpus granatum* and *Nypa fruticans* at the tree level.

In the Rehabilitation Block, the *Rhizophora mucronata* species again has the highest liveability value at all growth levels (seedlings, saplings and trees) compared to other species, while *Rhizophora apiculata* is highest only at the seedling level, at the sapling level it is relatively low, and at tree level this type is not found. In this block, the species that have a low minimum liveability value compared to other species are *Xylocarpus granatum* at the seedling level, *Nypa fruticans* at the sapling level, and *Bruguiera parviflora* at the tree level.

In the Utilization Block, the *Rhizophora mucronata* type has the highest liveability value compared to other types. The *Rhizophora apiculata* type only at young seedlings and saplings has the highest liveability value, but at the tree level this type is relatively not too high. In this block, those with relatively low liveability values are the species *Xylocarpus granatum* at the seedling level, *Avicennia marina* and *Nypa fruticans* at the sapling level, and *Thespesia populnea* at the tree level.

Furthermore, the description related to the analysis of similarities in composition and structure of species, both seedling, sapling and tree communities calculated using the Index of Similarity (SI %) is presented in Table 11.

Table 11 – Similarity Values between Forest Communities in Management Blocks with Different Functions

| Management Block | Growth Rate | SI Value (%) Mangrove Forest Community in Each Management Block | | |
|---|---|---|---|---|
| | | Protection | Rehabilitation | Utilization |
| Protection | Seedling | - | 87.46 | 81.61 |
| | Sapling | - | 49.49 | 86.08 |
| | Tree | - | 68.87 | 57.39 |
| Rehabilitation | Seedling | - | - | 82.21 |
| | Sapling | - | - | 25.19 |
| | Tree | - | - | 59.86 |
| Utilization | Seedling | - | - | - |
| | Sapling | - | - | - |
| | Tree | - | - | - |

Table 11 shows that for the seedling community in the Protection Block compared to the Rehabilitation Block, the similarity in composition and type structure is 87.46%, while in the Utilization Block it is 81.61%, then between the Rehabilitation Block and the Utilization Block the similarity is 82.21% .

Furthermore, for the stake community in the Protection Block, compared with the Rehabilitation Block, the similarity is only 49.49%, while for the Utilization Block it is 86.08%. Between the Rehabilitation Block and the Utilization Block, the similarity is only 25.19%.

Then for tree communities, the similarity in species composition and structure between the Protection Block and the Rehabilitation Block is 68.87%, while for the Utilization Block the

similarity is 57.39%. Then, between the Rehabilitation Block and the Utilization Block, the similarity in composition and structure is 59.86%.

From the description above regarding similarities in composition and structure of species, it can be seen that the seedling communities between the Protection Block, Rehabilitation Block and Utilization Block have a relatively higher similarity value, also having a higher value in the Rehabilitation Block compared to the Utilization Block. In the sapling community, the similarity value is only high between the Protection Block and the Utilization Block, while between the Protection Block and the Rehabilitation Block it is low, and between the Rehabilitation Block and the Utilization Block the similarity value is also low. Then for tree communities between the Protection Block, Rehabilitation Block and Utilization Block as well as between the Rehabilitation Block and the Utilization Block, it is quite high. There is no similarity in the exact composition and structure of the types between the management blocks being compared, this is because the number of types between the blocks is not exactly the same and is also caused by the dominance value (IVI%) between the different types.

## CONCLUSION

The types of vegetation found are *Acrostichum aureum* (ferns), *Acanthus ilicifolius* (shrubs), and those forming mangrove forest communities, namely *Avicennia marina, Rhizophora mucronata, Rhizophora apiculata, Excoecaria agallocha, Bruguiera parviflora, Xylocarpus granatum, Nypa fruticans , Sonneratia alba,* and *Thespesia populnea*.

The *Rhizophora mucronata* species dominates in all blocks, both in the seedling, sapling and tree communities.

All types of vegetation that make up the mangrove forest in all blocks have a minimum liveability value above the minimum value, although each type has a different value, and the one with the highest minimum liveability value, both in the seedling, sapling and tree communities, is the *Rhizophora mucronata*.

The similarity of seedling and tree communities in the Protection Block, Rehabilitation Block and Utilization Block tends to be the same, while the sapling community in the Protection Block and Rehabilitation Block is not the same, but almost the same in the Utilization Block. Then the seedling and tree communities in the Rehabilitation Block tend to be the same as in the Utilization Block, whereas the sapling communities tend to be different.

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