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The threat of mangrove population types *Xylocarpus moluccensis* at North Maluku, Indonesia

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ABSTRACT

The mangrove ecosystem is a combination of terrestrial and marine ecosystems. These ecosystems are particularly vulnerable to environmental changes and human activities. This research aims to determine the cause of the threat of mangrove types *Xylocarpus moluccensis* in several areas in North Maluku province. The research method using observation plots are laid out continuously, with a size of 20x20 m to the observation level of the tree; mangroves then determine its type and measurement of vegetation parameters include: density, dominance and frequency and determining the Importance Value Index (IVI). The results showed that IVI of mangrove species in the entire region in North Maluku is relatively low, the low IVI describes mangrove species population has suffered enormous damage. Damage due to the activity of the community who tapped mangrove wood for living being offset by replanting. Utilization of mangrove type *X. moluccensis* excessively to the manufacture of wooden roots and the fishing boats. Related utilization, people prefer this type for the manufacture of the inner walls of the boat and the boat floor. This condition causes the mangrove suffered population declines even the trea. Besides the type *X. moluccensis* is also experiencing germination and growth is relatively slow and difficult to be planted on a large scale. Diminishing natural regeneration due to degradation of the trees parent (mother trees), because people always cut down large trees with stems.

Key words : *The Threat, mangrove population, Xylocarpus moluccensis, North Maluku*

Introduction

The mangrove forest is located in the coastal and marine ecosystems that are rich in various kinds of flora and fauna, thus interacting between habitat components. The coastal area is also the ecosystems most vulnerable to human activities (anthropogenic). Generally, human activities in the construction of direct and indirect necessarily have an impact on the destruction of mangrove forest ecosystems in coastal areas (Tolangara *et al.*, 2015).

The province of North Maluku has the potential of mangrove forests were quite extensive in 2006 data is vast mangrove forests in North Maluku is 46.259.41 ha. Data re-verified results using Landsat 7 ETM + in 2010, turned out extensive mangrove forests in North Maluku left only amounted to 24.229.26 Ha. This occurs due to degradation because to development pressure development in coastal areas. Spatial planning does not prioritize the environmental aspects. Where the existence of mangrove forests in the development process is considered as slums and dirty and have no economic or ecological functions were worth keeping, it caused the damage (BP DAS Ake Malamo, 2010).

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Methods

The method used is a survey to determine the type and vegetation parameter measurements include: density, dominance, frequency and importance value index (IVI) of each species of mangrove. With the working procedures as follows:

1. Conduct observations for the determination of the study area with the length of the area of 100 m^2 and 100 m^2 width of the area of study of each area is 10,000 m^2;
2. Data collection techniques using belt transect width of 20 m and distance of 5 m;
3. Then calculate the size of the plot made 20x20 m to the observation level of the tree;
4. Next mangroves specified type, referring to the mangrove botanical compositions (Tomlinson, 1986) and Guide Introduction Mangrove (Noor *et al.*, 2006);
5. The identified species of the mangrove were measured for the vegetation parameters which included:
   a) Measuring the number of the individuals of each species (density determination);
   b) Measuring the circumference at breast height or 1.5 m from ground level and then the circumference was converted into diameter with the formula

$$D = \frac{Kell}{\pi}$$ ((determination of dominance));

Note : D = diameter
Kell = Circumference
p = 3.14

   c) Determining the species of the mangroves in each observation plot (frequency).
6. Data were analyzed referring to the formula by Mueller-Dombois and Ellenberg (1974) as follows.

$$a)\ Relative\ density = \frac{number\ of\ individuals\ of\ species}{total\ number\ of\ individuals}\ x\ 100$$

$$b)\ Relative\ dominance = \frac{dominance\ \ of\ species}{dominance\ of\ all\ species}\ x\ 100$$

$$c)\ Relative\ frequency = \frac{frequncy\ \ of\ species}{sum\ frequency\ of\ all\ species}\ x\ 100$$

d) Importance value = Relative density + Relative dominance + Relative frequency

7. The results of data analysis in the form of Importance Value Index (IVI) is then connected with the activity of the community that affect populations of mangrove

Results

The results of identification on the species of mangrove in some areas in North Moluccas, namely: Jailolo District of West Halmahera, Bacan District of South Halmahera, Wasile District of East Halmahera and Oba District of Tidore Islands. Then proceed with the analysis of vegetation parameters include: relative density, relative dominance and relative frequency of each type of mangrove and IVI, are presented in Tables 1 to 4 below

The results of the analysis of mangrove vegetation in the district Jailolo West Halmahera is low. Is illustrated by the IVI of *A.lanata* is 125.30 (highest), while IVI type *X. moluccensis* is 6.90 (lowest). The low of Importance Value Index describe conditions of the population of mangrove plants have been damaged. One cause damage to the activities of the people who use the potential of mangrove forests in the form of wood as a material making firewood, building material of the house, harbor, fencing and creating a fishing boat, with no replanting, so the

Table 1. Results of analysis of multiple parameters Jailolo mangrove vegetation in the district of West Halmahera

No.	Name of species	Relative density	Relative dominance	Relative frequency	Important Value Index
1	*Rhizophora apiculata*	5.3	5.1	3.2	13,60
2	*Bruguiera gymnorrhyza*	10.5	16.6	10.7	37.80
3	*Xylocarpus moluccensis*	2.3	2.4	2.2	6.90
4	*Osbornia octodonta*	3.4	4.1	10.2	17.70
5	*Sonneratia caseolaris*	21.5	17.2	19.4	58.10
6	*Avicennia lanata*	45.0	46.1	34.2	125.30
7	*Finlaysonia maritima*	12.5	10.0	18.1	40.60

Source: Research Findings Tolangara, 2016

population of mangrove species is threatened. Here are the results of the analysis of mangrove vegetation in the District of Bacan South Halmahera Regency are presented in Table 2.

Based on Table 2, that the population of mangrove plants in the District of Bacan is low. It is described on the IVI type *B. gymnorrhiza* is 164.69 (highest), while IVI type *X. moluccensis* is 7.55 (the lowest). Low Importance Value Index is related to the activity of the community who undertake mangrove logging for the necessities of life to excess. Then this condition will threaten the population of certain species of mangrove in this area. The results of the analysis of mangrove vegetation in the district of Wasile, East Halmahera presented in Table 3.

Based on Table 3, that the mangrove population in the District of Wasile, East Halmahera is moderate. This is reflected from the IVI of *S. caseolaris* is 100.37 (highest), while IVI type *X. moluccensis* is 6.94 (lowest). The results of analysis of mangrove vegetation District of Oba, Tidore Islands are presented in Table 4.

Based on Table 4, the population of mangrove plants in the district of Oba Tidore Islands is low. It is known from IVI type *B. cylindrica* is 123.63 (highest), while IVI type *X. moluccensis* is 8.71 (lowest).

Based on the analysis of vegetation indicated by IVI, it can be concluded that the type of *X. moluccensis*, is the lowest of all regions in the province. This means that the population of plant species *X. moluccensis* in North Maluku is threatened. The threat happens because the community perception that the mangrove wood is a strong wood, when used as a fishing boat weight and resistant to attack by marine borers animals (marine borer). With this assumption, the mangrove wood this type are always logged. As a result of logging and utilization with no replanting (reforestation) by the community and involve the relevant authorities, it is concerned that the population is increasingly threatening mangrove types.

Discussion

The results of the analysis of mangrove vegetation based on the importance value index above can be said that the importance value index also illustrates the density (population) of plant species in a particular area. Thus, the decreased population of mangrove species is closely related to the activities of the community around the forest.

Referring to the standard criteria of tree density and the Guidelines for determining the damage levels according to Decree of Ministry of environment No. 21 of 2004 in Table 9, it can be seen that in some research areas, especially in North Moluccas prov-

Table 2. Results of the analysis of several mangrove vegetation parameters in the Bacan District of South Halmahera

No.	Name of the species	Relative density	Relative dominance	Relative frequency	Important value index
1	*Avicennia alba*	22.32	7.69	10.21	40.22
2	*Rhizophora apiculata*	11.21	12.05	8.46	31.72
3	*Rhizophora mucronata*	22.12	12.23	21.41	55.75
4	*Bruguiera gymnorrhyza*	99.89	54.02	10.74	164.65
5	*Xylocarpus moluccensis*	2.21	3.23	2.11	7.55

Source: Research Findings Tolangara, 2016

Table 3. The results of the mangrove vegetation parameter analysis in the Wasile district, East Halmahera

No.	Name of species	Relative density	Relative dominance	Relative frequency	Important value index
1	*Avicennia alba*	14.62	22.69	8.21	43.52
2	*Bruguiera gymnorrhiza*	25.24	16.08	8.48	49.80
3	*Bruguiera cylindrical*	25.14	22.24	21.44	68.82
4	*Rhizophora apiculata*	14.39	9.02	7.33	30.54
5	*Xylocarpus moluccensis*	3.11	2.21	1.62	6.94
6	*Sonneratia caseolaris*	40.11	37.05	23.21	100.37

Source: Research Findings Tolangara, 2016

ince, mangrove forests in this region have suffered severe damage. This damage has an effect on the decreased population of mangrove plants.

According to the Ministry of Environment (2004), to determine the level of abundance in an area, it can be seen from the density of individual tree/ha, as shown in Table 9. Thus, it can be identified whether or not a forest area has been damaged.

The causes of the damage of mangrove forests are the activities of communities living near the forests (anthropogenic factor), whose lives depend on the available potential of the forest. This is in line with Aswita and Syahputra (2012) who state that most people around the mangrove forest utilize the wood from the forest for their livelihood, for example, they take the mangrove wood to be used as firewood and the harbor, so that this activity threats the population of mangrove.

According to Tolangara and Corebima (2014), the results of a survey and interview with 40 households in the Tuada Village Jailolo District, who worked as fishermen in this area, showed that the life of all the communities living around the mangrove forest depends on the available resources in the forest. The results of this survey also showed that mangrove forests have a major resource of wood for home construction, firewood, ports and a fishing boat.

Mangrove wood products are also used for medicinal purposes, tanning materials, and furniture. The mangrove species which are mostly utilized are *R. mucronata, Ceriops tagal,* and *B. gymnorrhiza* species. They are mainly used as the primary material for home construction and firewood. Furthermore, Tolangara and Corebima, (2014) explain that mangrove *X. moluccensis* species is more widely used for the manufacture of boats and the productions of drugs. Related to the use for the manufacture of fishing boats, the *X. moluccensis* species is more preferred for the manufacture of the inner walls of the boat and the floor of the boats. This is in line with Kusumanti (2009) who states that the majority of fishermen uses any wood materials, including mangrove wood, for the manufacture of wall of the fishing boats and the body of other boats. As a result, due to the continuous utilization, the availability of this type of mangrove wood is fewer in number, moreover, there is no prohibition of cutting down mangrove wood excessively. Thus, the population of the *X. moluccensis* mangrove in some areas of North Moluccas can be categorized as the threat.

The causes of the threat of *X. moluccensis* mangrove is in line with the reports by *Wetlands* Indonesia (2010) stating that the *X. moluccensis* mangrove in several regions in Indonesia has experienced deterioration in the population, due to the excessive use by the local community. Tolangara *et al.*, (2015) also described that the threat of mangrove *X, moluccensis* in some areas in North Moluccas is mainly caused by the activities of local communities. There are also some other causes which make the slow restoration of the mangrove. Those causes are the slow germi-

Table 5. Standard Criteria of tree density and damage level

Criteria	Density (tree/ha)	
Good	Solid	≤ 1,500
	Moderate	≥ 1,000 – 1,500
Damaged	Rarely	< 1,000

Source: Decree of Ministry of Environmental. No. 201 of 2004

Table 4. The results of the mangrove vegetation parameter analysis in the Oba district

No.	Name of species	Relative density	Relative dominance	Relative frequency	Important value index
1	*Rhizophora apiculata*	8.62	7.62	4.21	20.24
2	*Rhizophora mucronata*	11.22	6.09	5.46	22.77
3	*Bruguiera gymnorrhiza*	23.12	12.22	21.41	56.75
4	*Bruguiera cylindrica*	56.89	52.02	14.72	123.63
5	*Avicenia lanata*	7.21	5.23	5.11	17.55
6	*Avicennia alba*	3.12	4.45	4.32	11.89
7	*Sonneratia alba*	4.53	5.26	5.23	15.02
8	*Sonneratia caseolaris*	9.12	7.35	6.78	23.25
9	*Xylocarpus moluccensis*	3.14	3.24	2.33	8.71

Source: Research Findings Tolangara, 2016

nation and growth of mangroves of this type. This is supported by the opinion of Clough (2013) who said that mangrove *Xylocarp* has one drawback: relatively slow growth and difficult to be planted on a large scale.

Dahuri *et al*., (2003) explains that the damage of mangrove which can reduce the number of the individuals, or even can cause the endangerment of the population has occurred since quite a long time ago. This is because the people who live around the forest consider that mangrove is a group of plants that have exceptional ability, because the wood is strong, durable and resistant to various disturbances. Due to this perception, the population of mangrove *X. moluccensis* species becomes the treath, which affects its regeneration ability to decrease.

Additionally, Kusumanti (2009) also added that the regeneration ability of mangroves is declining one due to reduced natural regeneration in each region, is caused by several factors such as; degradation parent trees (mother trees) because people take advantage of mangrove trees with a stem diameter large to be used as a fishing boat, this will obviously affect the availability of seeds in the area.

Conclusion

The results of the research and discussion, it can be concluded that, the Importance Value Index of mangrove species in the entire regions of North Moluccas is relatively low. It shows that the population of mangrove species has suffered enormous damage. The excessive use of *X. moluccensis* mangrove is for the manufacture of fishing boats. The community prefer this type of mangrove for the manufacture of the inner walls and the floor of the boats. This condition causes the mangrove to suffer population declines and severe.

The threat of *X. moluccensis* mangrove is also due to its relatively slow germination and growth, and it is difficult to be planted on a large scale, and the slow regeneration ability due to the decreased natural regeneration in each region due to degradation of the *mother trees,* where the people take down the trees which have large stem diameter.

References

Aswita dan Syahputra. 2012. *Laporan Hasil Penelitian Integrated coastal Management in Pusong Cium Island for Habitat of Tuntong Laut* (*Batagur borneoensis*). Kabupaten Tamiang Aceh. Indonesia.

BP DAS Ake Malamo. 2010. *Laporan Rehabilitasi Hutan Mangrove*

Clough, B. 2013. *Continuing the Journey Amongst Mangroves.* ISME Mangrove Educational Book Series No. 1. International Society for Mangrove Ecosystems (ISME), Okinawa, Japan,and International Tropical Timber Organization (ITTO), Yokohama, Japan. (online), *www. Mangrove-or-jp/isme/nglish/boos/educational-seriesbook1 pdf*, accessed on 30 Agustus 2016

Dahuri R. 2003. *Penglolaan Sumber Daya Wilayah Pesisir dan Lautan secara terpadu*. PT. Pradnya Paramita. Jakarta

Decree of Minister of the Environmental. Nomor 201 Tahun. 2004. *Kriteria Baku dan Pedoman Penentuan Kerusakan Mangrove*. *http://www.menlhk.go.id/berita-85-kumpulan-peraturan-menteri-lingkungan-hidup-dan-kehutanan-tahun-2004-2016.html,* accessed on *31 Desember 2016.*

Kusumanti. 2009. *Tingkat Pemanfaatan Material Kayu pada Pembuatan Gading-gading di Galangan Kapal Rakyat*. (Online), (*http://repository.ipb.ac.id/handle*, accessed on 30 Mei 2016)

Mueller-Dombois, D. and Ellenberg, H. 1974. *Aims and Methods of Vegetation Ecology*. John Wiley & Sons. New York. London, Sydney, Toronto.

Noor, R.Y., M. Khazali, I.N.N. Suryapura. 2006. *Panduan Pengenalan Mangrove di Indonesia*. Wetsland International, Indonesia Programme. Bogor.

Tomlinson. 1986. *Botany Mangrove*, Cambrige University Press.

Tolangara A.R, dan Corebima, A.D. 2014. Xylocarpus moluccensis in North Moluccas, Indonesia, is Going to Extinct: Role of the Local People. *Donish Journal of Research in Environmental Studies*. 1 (1): 001-007 December 2014. ISSN 20141-1162.

Tolangara, A.R., Tuaputty, H. dan Corebima, A.D. 2015. *Comparing Several Mangrove Seedlings*. *Donish Journal of Research in Environmental Studies.* 2 (1) : 008-011 February 2015. ISSN 20141-1162.

Wetlands Indonesia. 2010. *Xylocarpus moluccensis-Wetlends International Indonesia* (Online), (*http://ww.wetlans.or.id*, diakses 8 Agustus 2016)

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