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Bioeconomic and environmental valuation of dipterocarp estate forest based on local wisdom in Kutai Kartanegara, Indonesia

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Abstract. *Muliadi M, Lahjie AM, Simarangkir B.D.A.S., Ruslim Y. 2017. Bioeconomic and enviromental valuation of dipterocarp estate forest based on local wisdom in Kutai Kartanegara, Indonesia. Biodiversitas 18: 401-408.* Research was conducted in the dipterocarp estate forest in Kutai Kartanegara District, East Kalimantan Province, Indonesia and aimed (i) to find out the potentials of logs; (ii) to find out the correlation among variables based on bioeconomic and environmental analysis; (iii) to analyze the value of bioeconomic and environmental equilibrium; (iv) to find out the price of logs based on local wisdom. Findings showed that bioeconomic analysis based on local wisdom in dipterocarp plantation forest at different estating distance had different potential and increment, while the same maximum increment was found at 40 years and their equilibrium was found at 30 years. Other local wisdom also showed there was a strong relationship between bioeconomic and environmental variables. Diameter influenced the price of logs and local wisdom suggested higher than the market prices at the diameter of 35 cm at $ 230.50 USD, while the price of log in the market was actually $145 USD. Thus the unpaid environmental services amounted to $ 85.5 USD m^{-3}. Therefore the government should change the amount of the current levy. If there is no change, the government will not be able to finance the restoration of estate forest and natural forest and have further impacts on climate change.

Keywords: Bioeconomic and environmental valuation, dipterocarp estate forest, local wisdom

INTRODUCTION

Developing estate forests not only need good civil-cultural engineering but also need cost calculation and a more exact analysis for restoring forest. Costs for development are required for the initial process of land preparation until harvest time (Florian 2014). However, not all people understand modern economic calculations. In East Kalimantan Province, Indonesia, most of local community (Dayak Tunjung Tribe, Dayak Benuaq Tribe, and Kutai Tribe) have local wisdom in assessing forest bioeconomic and environmental valuation by calculating the centimeters of the trunk circumference as the basic consideration for current forest management. The use of timber products will only increase so the development of more effective ways for reduced harvesting system are paramount to continued protection of diversity in tropical forestry in (Ruslim et al. 2016).Trees provide important products such as fire wood, building construction and medicine (Martins et al. 2014).

The history of economic and environmental valuation of one forest area began by measuring the circumference of a tree trunk using a piece of long string. The string was then split into two pieces and the lengths of the string were measured by using the fist of the customary chief as a unit of length. The valuation techniques local indigenous communities can participate in sustainable forest management (Kovacs et al. 2014)). The number of fists was used to determine the value of economic and environmental valuation of one area of trees. Every tree had different value according to its type. Around the 10th century, the value of economic valuation was equal to the valuable goods possessed by the community, such as antique jars, antique plates, Gongs, Mandau and other equipment. The fist can be measured by centimeter. One fist can be equal with 10 cm. Furthermore, local wisdom is the value existing in one community, which are believed to be true and become the reference for the local community in taking an everyday action (Sumarniasih 2015). The local wisdom is an entity which really determines the dignity of human beings within their community. This means that local wisdom which contains the elements of intelligence, creativity, and local knowledge given by the elites and their community, becomes the determinant in the development of community civilization (Lokers et al. 2016). The concept of local knowledge and traditional wisdom are based on the knowledge value an a set of values applied in traditional societies (Fahrianoor et al. 2013; Rahu et al. 2014; Ratana-Ubhol and Henschke 2015). The local wisdom can be defined as a set of knowledge, values and norms of a particular form of adaptation and life experiences of social groups who live in a particular location. Local traditional wisdom in accordance with its origin is one of the cultural heritage in society and orally by the communities concerned. Local knowledge includes knowledge, whether it is derived from the previous generation as well as the variety of experiences in the present (Tamalene et al. 2014). A local community is a kind of civil society that plays an important role in conserving, reviving, and managing the use of natural resources and the surrounding environment within the community (Muizniecea et al. 2015).

Soedigdo et al. (2014) stated that a set of knowledge obtained by human beings is the result of a learning process of what they see, touch, taste in their environment, which is then actualized in the form of behaviors and is passed on from generation to generation. Wisdom values in managing the natural resources is very important because empirically, one of the most alarming crisis phenomena is a condition when the natural resources are exploited unwisely (Chaiphar et al. 2013). Gradually, the natural resources will be devastated and extinct. All of these are the accumulation of the local community participations. Local community participation will only be realized if the community members have the ability to participate and knowledge about what they are going do, and how they are going to do it. There should also be appropriate incentives in order to motivate them to participate and available institutions which support and maintain their activities.

In the process of its development from century to century, biological process has been able to change the community paradigm and community participation to be bioeconomic science (Henry and Roche 2013). According to Soedigdo et al. (2014) stated that bioeconomics is a change of paradigm in environmental economic development and it is a discipline like natural resource economics, environmental economics and ecological economics. Furthermore, according to (Belhoutchette et al. 2011; Sundar 2012), bioeconomics is a science which is derived from biological and economic synthesis. This is an effort to bridge the concept of holonism and inter-disciplinary methodology. The additional production cost as the effect of one unit of pollutant is always increasing because, the environment is only able to assimilate the waste in a small quantity. If a large amount of waste is disposed into the environment, then the environment will find it difficult to assimilate it. The marginal cost for environmental management usually increases following the controlled production volume (Tikkannen et al. 2012)

Marginal environmental cost curve, which is increasing following the increasing number of production and marginal production cost curve, which is decreasing. The movement from the right side to the left side indicates that the efforts that have been made to control/manage the environment are increasing so that the pollution is decreasing. The marginal production cost curve bends down from the top left to the bottom right. The marginal cost curve increases following the increase of the coal production volume, rising up from the bottom left to the top right.

MATERIALS AND METHODS

This study was undertaken in natural forest plantation of logged-over forest area of Kutai Timber Indonesia company at Sebulu sub-district in Kutai Kartanegara District, East Kalimantan Province, Indonesia from January 2013 to January 2014. The size of rehabilitation area was around 3,000 ha. The study sites were located at 0°14' 22.27" S-116° 58' 22.38" E (Figure 1).

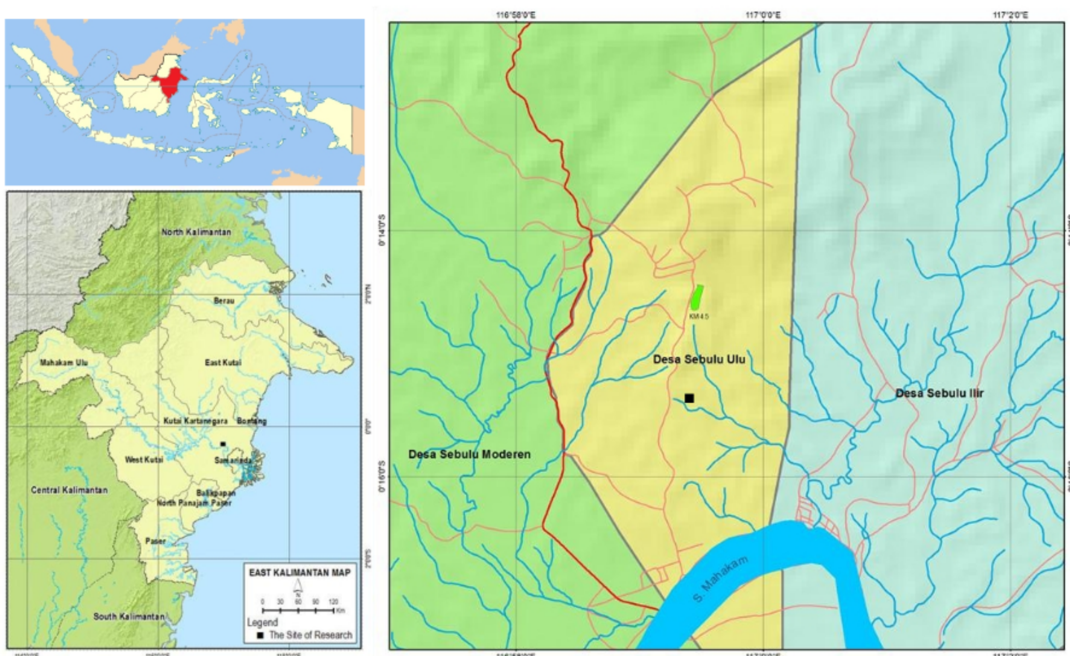


Figure 1. Location studies of Sebulu (■) Kutai Kartanegara district of East Kalimantan, Indonesia

The variables that had been measured as scientific data and had been analyzed based on the scientific principles were then analyzed as follows: The circumference of the tree trunkwas measured using a measuring tape and the height of the tree was measured by using clinometers. Analyzed the simulation of increment, basal area, and the potential of stands. We studied the data of local wisdom by analyzing the bio economy of the increment based on the price of logs (biomass of logs) and the price of environment through the correlation of one variable with another using exponential, power and linear regression, followed by using the determination coefficient (R^2), including the correlation between (i) the volume and the price of logs m^{-3}; (ii) the circumference of trunk and the volume of each tree; (iii) the volume and the price of logs m^{-3}.

The biomass values of logs and environment was determined based on the local wisdom with the indicators of the development of current gold price. The main indicator for the dipterocarpa (*Shorea leprosula*) group is that its circumference is 200 cm with the price of Rp.25,000 centimeter or equal to the price of 0.05 gram of gold, whose current price was Rp.500,000g^{-1}. We calculated the mean anual increment and current annual increment using the Van Gardingen et al. (2003) formula:

$$MAI = \frac{V_t}{t}$$

MAI = Mean annual increment
Vt = Total Volume in ages to-t (m^3)
t = Ages (years)

$$CAI = \frac{V_t - V_{t-1}}{T}$$

CAI = Current annual increment
V_t = Total volume in ages to-t (m^3)
V_{t-1} = Previous total volume (m^3)
T = Second age to-t, minus the first age (in year)

RESULTS AND DISCUSSION

The development of industrial estate forests with *Shorea leprosula* type (at aestateing distance of 2 m x 2 m)

The resulting measurement showed that the maximum production of *Shorea leprosula* at spacing of 2 m x 2 m was reached at the age of 40 years determined by forest bioeconomic analysis of calculating the price of logs. At the age of 40 years, the maximum total volume was 344.22 m^3 ha^{-1}; stand circumference was 79.8 cm; the average tree diameter (d) was 25.4 cm and the clear bore height (h) reached 11.8 m. Furthermore, the potential log production of *Shorea leprosula* based on its cycle (Table 1).

The maximum production of *Shorea leprosula* at aestating distance of 2 m x 2 m was reached at the age of 40 years (Table 1). The maximum mean annual increment (MAI) was 8.61 m^3 ha^{-1} yr^{-1} and the current annual increment (CAI) achieved 8.67 m^3 ha^{-1} yr^{-1}. The price of logs per centimeter based on the bioeconomic analysis of forest at the age of 40 was different. The older the tree, the more expensive the price of the tree per centimeter would be, as is the price of logs per tree. At the age of 3 years, the price of log per centimeter was Rp 2,250, while the price of log per $m^3$was Rp 15,863,811. This price had never been found in the market, but in the investment world, this price could be reasonably accepted. At the age of 40 years, with the tree circumference of 79.8 cm, the price of log per centimeter was Rp. 11,750 and the price of log per m^3 was Rp. 2,451,374, excluding the value of environmental service. This was in line with the calculation simulation of the price of logs based on hand grip index. However, the price of logs in the market ranged between Rp. 1,700,000-Rp. 1,900,000 including the environment service. This means that the market price was not able to restore the condition of the forest. This was also worsened by the small fee contribution per cubic meter from the government, such as USD 60.8 (IDR 730,000) for PSDH; USD 31.3 (IDR 367,000) for Compensation for Stand Value based on the Regulation of Ministry of Forestry, Republic of Indonesia and USD 14 (IDR 168,000) for forestation fund and this was allocated only for natural forest. Mönkkönen et al. (2014) demonstrate the benefits of economic and ecologycal terms from the landscape level planning of forest management.

The simulation of log production in the industrial estate forest with dipterocarp type species can be displayed on Table 1. Based on Figure 2 it can be explained that the intersection point of maximum increment and maximum total volume of *Shorea leprosula* estateed at a estateing distance of 2 m x 2 m based on bioeconomic analysis with the price of logs meets at the age of 40 years with the total volume of 344.22 m^3 ha^{-1} and with the MAI value of 8.61 m^3 $ha^{-1}yr^{-1}$ and CAI value of 8.67 m^3 ha^{-1} yr^{-1}.

To meet the scientific principles of local wisdom on bioeconomic and environmental valuation.The data from Table 1 were further analyzed by using power regression and the results showed the high value of regression coefficient of determination which showed a high level of precision between trunk circumference and volume per tree; circumference and log price (Dingga 2014). The high value of R^2 means that the variables had a strong correlation (Arezoo et al. 2014). Graphically the correlation among the variables can be seen in Figure 3.

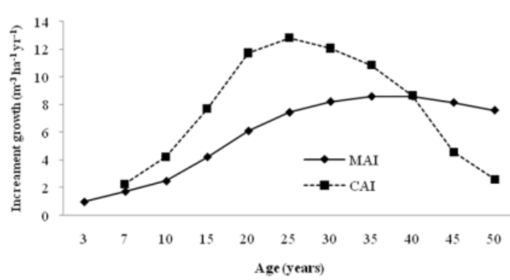


Figure 2. Curve MAI and CAI of *Shorea leprosula* at aestateing distance of 2 m x 2 m at the age of 40 years with the price of logs

Table 1. Simulation of log production of *Shorea leprosula* at aestating distance of 2 m x 2 m based on forest bioeconomic valuation with the price of logs

Age (year)	n	Circumference (cm)	d	H	TV	MAI	CAI	K Price cm^{-1} (Rp)	Price of log m-^{3} (Rp)
3	2200	9.4	3.0	2.2	2.94	0.98		2,250	15,863,811
7	2000	16.6	5.3	3.3	12.08	1.73	2.28	3,000	8,270,290
10	1800	22.6	7.2	4.4	24.82	2.48	4.25	4,000	6,562,231
15	1550	33.0	10.5	6.3	63.38	4.23	7.71	5,750	4,638,143
20	1400	43.0	13.7	8.0	122.11	6.11	11.75	7,125	3,515,685
25	1200	53.4	17.0	9.5	186.21	7.45	12.82	8,750	3,011,414
30	1100	69.0	20.0	10.5	246.62	8.22	12.08	9,000	2,769,898
35	1000	71.0	22.6	11.2	300.87	8.60	10.85	11,000	2,595,726
40	900	79.8	25.4	11.8	344.22	8.61	8.67	11,750	2,451,374
45	800	87.3	27.8	12.2	367.11	8.16	4.58	12,500	2,378,927
50	700	94.2	30.0	12.6	380.11	7.60	2.60	13,4[illegible]0	2,334,361

Note: n = individual tree, k = circumference (cm), d = diameter (cm), h = height (m), TV =total volume (m^3 ha^{-1}), MAI = mean annual increment (m^3 ha^{-1} yr^{-1}), CAI = current annual increment (m^3 ha^{-1} yr^{-1})

Table 2. Bioeconomic valuation on environment value based on production simulation and local wisdom

Age (year)	N	Circumference (cm)	d	h	F	TV	MAI	CAI	K Price of Env.cm^{-1} (Rp)	Price of Envi.m^{3-1} (Rp)
3	2200	9.4	3.0	2.2	0.86	2.94	0.98	-	11,748	82,832,260
7	2000	16.6	5.3	3.3	0.83	12.08	1.73	2.28	7,379	20,341,972
10	1800	22.6	7.2	4.4	0.77	24.82	2.48	4.25	6,113	10,027,996
15	1550	33.0	10.5	6.3	0.75	63.38	4.23	7.71	5,124	4,133,176
20	1400	43.0	13.7	8.0	0.74	122.11	6.11	11.75	4,797	2,367,023
25	1200	53.4	17.0	9.5	0.72	186.21	7.45	12.82	5,126	1,764,005
30	1100	69.0	20.0	10.5	0.68	246.62	8.22	12.08	5,461	1,530,372
35	1000	71.0	22.6	11.2	0.67	300.87	8.60	10.85	6,143	1,449,594
40	900	79.8	25.4	11.8	0.64	344.22	8.61	8.67	6,948	1,449,594
45	800	87.3	27.8	12.2	0.62	367.11	8.16	4.58	7,691	1,463,726
50	700	94.2	30.0	12.6	0.61	380.11	7.60	2.60	8,505	1,476,199

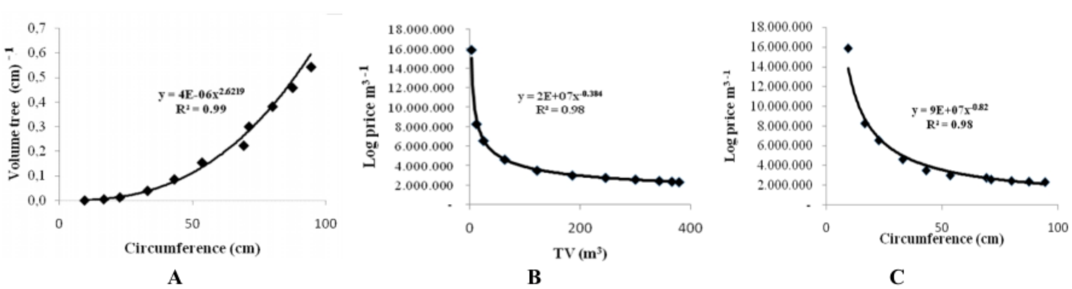
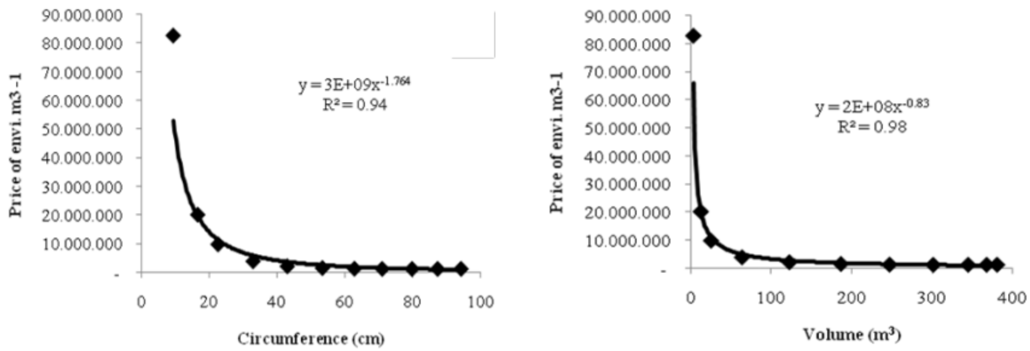


Figure 3. The relationship among the variables of stem circumference and total volume (A).Volume and log price m^{-3} (B) and correlation circumference and the price of logs per tree (C) of *Shorea leprosula* at aestateing distance of 2 m x 2 m based on bioeconomic analysis of log price

Bioeconomic valuation on the environment cost

The average price of logs is directly proportional to age, whereas the older the age and the greater the potential for round logs, while the average price of environmental services and the lower logs. The result of bioeconomic valuation on the environment cost can be seen in Table 2.

Tables 1 and 2 show that the price of biomass and the value of environment based on the stem circumference per centimeter were different. At the initial age under 15 years or its circumference less than 33 cm. The cost of environment was higher while at the age of above 15 years the price of per centimeter of stem circumference is cheaper. This is because the investment in the initial growth is higher so that its growth is not able to cover the service value of environment (Arezoo et al. 2015). Differences between the price of stem circumference under 15 years and above 15 years ranged from 15% to 60%. Relationship between stem circumference and the cost of environment and between stem circumference and the total volume were very high (Figure 4).



A B

Figure 4. The relationship of circumference of tree and price of environment per meter cubic (A).Volumetotal and the price of environment per tree (B) of *Shorea leprosula* at estateing distance of 2 m x 2 m based on bioeconomic analysis of forest with the price of environment

Table 3. The benefit valuation of wood based on bioeconomic and environmental analysis

Age (year)	TV m^3 ha^{-1}	Bio Benefit/ha Rp ha^{-1}	AR BIO Rp m^{3-1}	Envi. Benefit ha^{-1} Rp ha^{-1}	AR Envir. Rp m^{3-1}	MR Envir. Rp m^{3-1}	MR BIO Rp m^{3-1}
3	2.94	46,651,275	15,863,811	243,587,777	82,832,260	-	-
7	12.08	99,899,700	8,270,290	245,717,714	20,341,972	233,070	5,826,753
10	24.82	162,855,360	6,562,231	248,865,497	10,027,996	247,123	4,942,456
15	63.38	293,985,497	4,638,143	261,978,511	4,133,176	340,004	3,400,040
20	122.11	429,309,536	3,515,685	289,043,319	2,367,023	460,848	2,304,239
25	186.21	560,757,750	3,011,414	328,476,783	1,764,005	615,220	2,050,733
30	246.62	683,100,000	2,769,898	377,413,683	1,530,372	810,149	2,025,373
35	300.87	780,976,900	2,595,726	436,139,823	1,449,594	1,082,415	1,804,025
40	344.22	843,822,608	2,451,374	498,985,543	1,449,594	1,449,594	1,449,594
45	367.11	873,337,000	2,378,927	537,354,253	1,463,726	1,676,259	1,289,430
50	380.11	887,316,675	2,334,361	561,119,701	1,476,199	1,828,492	1,075,584

Note: TV= total volume, AR= average revenue, MR= marginal revenue

Table 4. Simulation on bioeconomic valuation of logs for *Shorea leprosula* type and the value of environment service

Age (year)	n	Circumference (cm)	d	h	TV	MAI	CAI	K Price of Logs cm^{-1} (Rp)	Price of logs m^{3-1} (Rp)	K Price of Envir cm^{-1} (Rp)	Price of Envir, m^{3-1} (Rp)
3	850	14.8	4.7	4	5.01	1.67	-	4,250	10,643,380	11,354	28,434,341
7	780	26.7	8.5	5	18.58	2.65	3.39	4,750	5,324,671	7,366	8,256,790
10	680	36.8	11.7	6	35.95	3.60	5.79	5,500	3,823,659	6,179	4,426,221
15	670	50.3	16	7	76.34	5.09	8.08	6,000	2,646,766	5,104	2,394,503
20	640	62.8	20	8,4	135.05	6.75	11.74	7,000	2,084,329	5,065	1,664,066
25	580	78.5	25	9,5	202.75	8.11	13.54	8,500	1,909,684	5,701	1,326,543
30	540	91.1	29	10,7	274.65	9.15	14.38	10,125	1,813,628	6,631	1,187,829
35	510	100.5	32	11,7	340.55	9.73	13.18	11,250	1,693,658	7,591	1,142,764
40	480	110.0	35	13	390.04	9.75	9.90	12,000	1,623,768	8,445	1,142,764
45	420	119.4	38	14	419.91	9.33	5.97	13,250	1,582,090	9,607	1,147,121
50	330	135.1	43	15.3	439.71	8.79	3.96	15,250	1,546,059	11,396	1,155,318

Valuation on bioeconomic benefits of logs and environment service

The price of biomass and environmental value based on diameter of stems in centimeter have differences. At the beginning of growth with a diameter below 33 cm higher price environment, this is due to greater investments in early growth cannot offset the value of environmental services (Table 3).

The average price wasrelated with the age (Table 3), shows the older the age and potential of one tree, the bigger the benefit will be, while the average revenue (AR) of environmental service and the price of logs become lower. According to price of logs and the environment service for the circumference of less than 80 cm (26 cm in diameter) are higher than the market prices and the standard price from the government, such diameter size may not be used in wood processing industries because they require logs with the diameter of 40 cm above. Based on Table 3, the curve of equilibrium can be made, based on the marginal revenue as can be seen in Figure 5.

The equilibrium in Figure 6 can be found at the age of 30 years with the potential of 274 m^3 but the maximum growth was found at the age of 40 with the maximum increment of 8.6 cm $year^{-1}$ (Figure 2 and Table 1). This is congruent with the value of coefficient of determination (R^2) value was higher than 0.94.

The development of dipterocarpestate forest (*Shorea leprosula* at aestating distance of 3 m x 3 m)

Total volume per hectare and the average increment is greater than the spacing of 3 m x 3 m, but the price of logs bioeconomic and environmental services is lower due to the different stand density, so that a larger diameter. The larger the diameter of the stand, the greater the selling price of logs and environmental services (Table 4).

Table 4 shows that the total volume of logs per hectare and the average increment are higher than those at aestating distance of 2 m x 2 m, However, the bioeconomic value of logs and the environment service are lower due to the different density, resulting in larger stem circumference, The size of circumference affects the value of logs and environment service, Furthermore, based on the valuation in Table 4, the growth graph of mean annual increment (MAI) and current annual increment (CAI) can be seen in the Figure 6.

The maximum increment of *Shorea leprosula* at a estating distance of 3 m x 3 m meet at the age 40 year with the average increment of 9.75 m^3 with the total volume of 390.04 m^3 ha^{-1}, This value is higher than that of a estating distance of 2 m x 2 m. Bioeconomic valuation of logs and environment based on local wisdom are highly correlated. The correlations among the variables of stem circumference and the price per cubic meter; the circumference and the volume per tree; and the volume and the price of logs, both environment and log biomass have determination values which are higher than 0.97 using various regressions as presented in Figure 2 and Figure 3. Therefore, local wisdom has been tested just like the modern bioeconomic valuation.

Bioeconomic benefit valuation of logs and environment service at aestateing distance of 3 m x 3 m

The Benefit of logs per cubic meter and environment service can be seen the Table 5. The margin revenue shows that value of biomass at the younger ages has higher value, while at the older ages, the value is lower, inversely proportional to the margin revenue of environment which has lower value at the younger ages and has higher value at the older ages. All of them can be illustrated with equilibrium graphs (Figure 6).

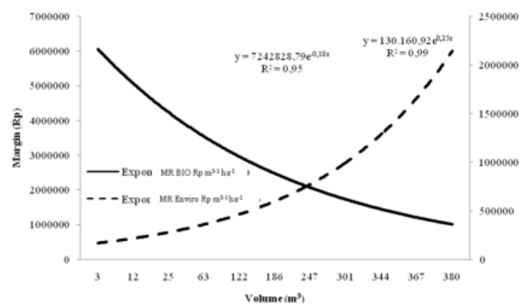


Figure 5. The curve of the correlation between total volume and valuation of margin revenue of logs and the price of environment

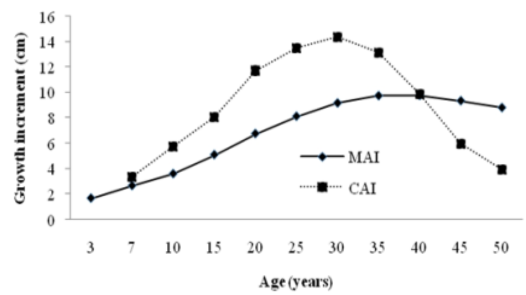


Figure 6. The graph of increment of *Shorea leprosula* at aestateing distance of 3 m x 3 m

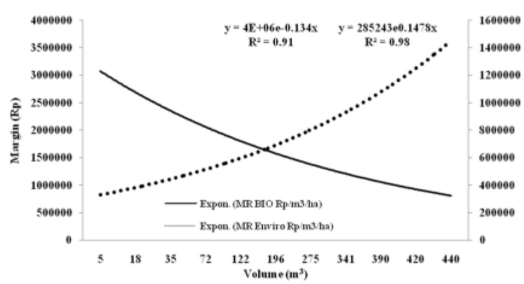


Figure 6. Curve of the correlation between total volume and the value of bioeconomic benefit of forest with bioeconomic-environment

Table 5. Benefit value of logs based on bioeconomic and environmental analysis

Age (year)	TV m^3 ha^{-1}	Bioeconomic Benefit/ha Rp ha^{-1}	AR Bio economy Rp m^{3-1}	MR Bio economy Rp m^{3-1}	Environment Benefit/ha Rp ha^{-1}	AR Environment Rp m^{3-1}	MR Environment Rp m^{3-1}
3	5.01	53,338,743	10,643,380		142,497,216	28,434,341	-
7	17.87	98,933,689	5,537,658	3,547,093	147,512,660	8,256,790	390,180
10	34.89	137,465,757	3,939,527	2,262,818	154,448,432	4,426,221	407,307
15	71.78	202,061,280	2,814,815	1,750,986	171,889,223	2,394,503	472,766
20	122.38	281,478,400	2,299,949	1,569,517	203,656,071	1,664,066	627,807
25	195.76	387,189,875	1,977,887	1,440,707	259,683,153	1,326,543	763,575
30	274.65	498,108,386	1,813,628	1,406,023	326,234,260	1,187,829	843,614
35	340.55	576,779,400	1,693,658	1,193,705	389,171,071	1,142,764	954,964
40	390.04	633,326,400	1,623,768	1,142,764	445,718,071	1,142,764	1,142,764
45	419.91	664,333,005	1,582,090	1,037,932	481,685,733	1,147,121	1,204,001
50	439.71	679,812,746	1,546,059	781,874	508,001,293	1,155,318	1,329,186

Note: TV= total volume, AR= average revenue, MR= marginal revenue

Figure 6 shows that equilibrium value is found at the age of 30 years, but the maximum increment is at the age of 40 years, Therefore, at an estating distance of 2 m x 2 m and at an estating distance of 3 m x 3 m, the dipterocarp estate forests has equilibrium and growth at the same age but different potency.

According local wisdom the price of logs with the diameter between 34 cm to 37 cm is Rp, 1,623,768 m^{-3} in addition to the environment service with the price of Rp 1,142,764. Thus, the total price that should be applied in the market is Rp 2,766,532 or USD= 230,54 m^{3-1}, This value will be able to restore the dipterocarp forest, Therefore, it is necessary to issue a regulation on new forest levy from the government, namely: PSDH = USD 80, DR = USD 17, PNT = USD 37 and other levies with the amount of USD 5, The larger the diameter the lower the price of logs m^{3-1}in the market will be for every additional 10 cm in diameter, namely 1%.

The potential of volume and increment of *Shorea leprosula* Estate Forest at an estating distance of 3 m x 3 m is higher than the potential of *Shorea leprosula* Estate Forest at aestating distance of 2 m x 2 m. Estating distance determines the bioeconomic and environmental value based on local wisdom. Relationship among the variables of bioeconomic and environmental valuation, namely between circumference and tree volume, between circumference and price per cubic meter, between volume and log price, circumference and environment cost, are high with the value of coefficient of determination R^2 which is higher than 95%. The equilibrium of forest area environment at different estating distances was the same at the age of 30 years although they have different potency, Maximum increment was also found at the same age, namely at the age of 40 years with different mean annual increment (MAI). Local wisdom values log biomass based on the size of stem circumference, Logs with the diameter of 35 cm or circumference of 110 cm cost USD 230,5, while the current market price was 58% lower. This is caused by the low fee applied by the government to wood product resource. The change in log price occurs every additional 10 cm of diameter size with the decrease in price of 1%. Current prices for logs in the market indicate that it may not be sufficient to pay the environment service which results in inability to restore the condition of forest and which in turn resulting in the destruction of environment.

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