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The Utilization Of Landsat Imagery For Valuing Forest Environmental Service In Controling Pneumoia Incidence Rate Under The Scenario Of Global Warming: Study At Lampung Province_Sumatera

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Absract. Since the last decade, prior to the emergence of COVID-19, the incidence of pneumonia, pneumonia in Indonesia has steadily increased (Minister of Health RI, 2020) along with deforestation phenomenon (Adhyaksa et al, 2019) and global warming (Mirsaeidi et al, 2016). Forest recovery ecosystem is a must to negate this disease. This research was conducted on determining the economic value of the ecosystem service to compensate reforestation program. This research was conducted in Lampung Province started from May to October 2021, by utilizing of Landsat imagery series of 2009, 2012, 2015, 2018, and 2019 for detecting forest covers. The effect on the incidence of pneumonia was determined using multiple linear regression models and to make some simulations work for estimating the reforestation costs. The results prove that the increasement air temperature, and the changes area of state forests, people's forests, bare land, plantations, and urban areas affect the incidence of pneumonia significantly. The determination of the value of environmental services for public costs is required at IDR 942,227,915,- from the maintenance cost of IDR 249,216,000, the cost of reforestation at the state forest area of 5,907,792 Ha and the people's forest of 6,040,689 Ha in case the air temperature increase up to 2°C as the way to mitigate the global warming.

Keywords: economic compensation, global warming, and reforestation.

INTRODUCTION

Public health programs are an essentially investment in every development that aims at improving health for all people as well as increasement on awareness, willingness, and ability to achieve the highest public health status in Indonesia, which is an effort of all components of the nation (Wikurendra, 2019). Climate change continues to be one of the main health concerns, such as infectious diseases. The transmission of certain diseases has been modified by environmental and climatic processes. In temperate climates, vector-borne disease outbreaks are estimated to occur due to the increase in temperature, while changes in rainfall and flooding patterns will also affect the presence, density, fitness, and ultimately the transmission dynamics of vector species (Wijk et al., 2020). Meanwhile Sari et al. (2014) describe the climate, which includes temperature, humidity,

rainfall, and wind speed, as one of the physical environmental factors that are at risk of influencing the occurrence of pneumonia.

Pneumonia is an acute infection or inflammation of the lung tissue (alveoli) caused by pathogenic microorganisms namely Diplococus pneumonia bactery In Southeast Asia, recent meta-analyses have shown that the increased prevalence of vector-borne diseases such as pneumonia and pulmonary TB is associated with land conversion, including forest clearing, agriculture, etc (Anigbo & Choudhary, 2018). According to various studies, the factors associated with the incidence of pneumonia in children under five years of age are individual factors for each child and land changes that affect the environment (Mustika et al., 2016). According to research conducted by Adhyaksa et al. (2017) and Rosari et al. (2017), changes in land cover and population density have an effect on increasing the incidence of pneumonia. Deaths due to cases of pulmonary tuberculosis and pneumonia in the Lampung region are increasing every year. Lampung Province, which consists of 15 regencies/cities, has natural conditions in the highlands and lowlands and coastal areas are potential areas for the spread of Pneumonia infectious diseases.

The objectives of the study were (1) to determine the contribution of forest ecosystems to pneumonia disease control and (2) to evaluate the role of forests in providing environmental services for pneumonia disease control. It is necessary to reveal and conduct a study of the impact of changes in forest and land cover on the incidence of pneumonia to see the value or assessment of the role of forest cover in controlling pneumonia. If this study can provide information on the extent of casualties, the results can be used as a basis for calculating compensation for changes in ecosystem areas or forest cover. In addition, it can be used as a basis for policymakers to control deforestation of forest ecosystems, which is closely related to controlling pneumonia.

MATERIAL AND METHODS

Study area and time

This research was conducted at the Department of Environmental Sciences, University of Lampung. While the research time starts from May 2021 to October 2021.

Material obtainment and preparation

The tools used in this research include computer hardware and software, as well as stationery. The hardware used is a notebook, a global positioning system (GPS), and a digital camera. The software used is geographic information system (GIS) software, Minitab 16, and Microsoft Office 2016. The materials used include Landsat imagery of capture 2009, 2012, 2015, 2018, and 2019 respective. Landsat imagery data collection methods are carried out by downloading on the situs of www.earthexplorer.usgs.gov. While other data were obtained by collecting from relevant agencies, namely the Central Statistics Agency (BPS) of Lampung Province, the Lampung Provincial Forestry Service, and the Lampung Provincial Health Office.

Data analysis

The analytical method used is multiple linear analysis. A multiple linear analysis method is used to determine the linear relationship between two or more independent variables (X) and the dependent variable (Y). The following is a model of multiple linear analysis:

$$[Y]_{it} = \delta_0 + \delta_1[TEMP]_{it} + \delta_2 [STWF]_{it} + \delta_3 [POPF]_{it} + \delta_4 [BAR]_{it} + \delta_5 [PLNT]_{it} + \delta_6 [SETTL]_{it} + \delta_7 [MFARM]_{it} + \delta_8 [RICE]_{it} + \delta_9 [URBN]_{it} + e_{it} \quad (1)$$

The working hypothesis as the following:

$H0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = \delta_8 = \delta_9 = 0$ (2)

$H1: \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq \delta_7 \neq \delta_8 \neq \delta_9 \neq 0$ (3)

The variables, symbols in the model, units, data sources for response variables and predictors are presented in Table 1.

Table 1. Variables, symbols in the model, units and scores, data sources.

No	Variable	Symbol	Unit and Score	Data source
1	Pneumonia Incidence Rate	$[Y]_{it}$	Per 10,000 inhabitants	Lampung Provincial Health Office
2	Temperature	$[TEMP]_{it}$	°C	Meteorology Climatology and Geophysics Agency Lampung
3	State Forest	$[STWF]_{it}$	% of total provincial area	Landsat image nterpretation accompanied by terrestrial ground check
4	People's Forest	$[POPF]_{it}$		
5	Bare land	$[BAR]_{it}$		
6	Plantation	$[PLNT]_{it}$		
7	Settlement	$[SETTL]_{it}$		
8	Mixed Farm	$[MFARM]_{it}$		
9	Rice field	$[RICE]_{it}$		
10	Urban Area	$[URBN]_{it}$		

Source: Research results (2021)

Hypothesis testing

Hypothesis testing is part of inferential statistics, which aims to draw conclusions about a population based on data obtained from a population sample. At the same time, the F test was conducted to determine the effect of the independent variable on the dependent variable. The t-test was used to test whether the independent variable had a partial effect on the dependent variable. The significance level used in this study was 10%. The coefficient of determination test is intended to determine the percentage or percentage of total variation of the dependent variable explained by the independent variable. The equation used is multiple regression, so the value used is R-squared. Testing the parameters of the multiple linear regression equation was carried out using Minitab 16.

Determination of the Value of Environmental Services for Health Fee Charge

In 2004, Law Number 40 concerning the National Social Security System (SJSN) was issued. This law mandates that social security is mandatory for all residents, including the National Health Insurance through a Social Security Administering Body treatment costs for pneumonia are recorded by tracing secondary data from the Minister of Health's Regulation Number 52 of 2016 concerning Health Service Standard Tariffs in the Implementation of the Health Insurance Program. Based on the cost of the Indonesian-Case-Based Groups Tariff or INA-CBG Tarif, which is the amount of claim payment by BPJS (People Cooperative for Healthcare Insurance) Health to Advanced Level Referral Health Facilities for service packages based on disease diagnosis groupings and procedures, the standard INA-CBG rates for Regional Government Hospital A 2 are presented in Table 2 below.

Table 2. Tariffs for Pneumonia Healing Services at Public Hospital (INA-CBG's).

No	INA-CBG code	Pneumonia Severity	Healing Service Charge, IDR		
			Class 3	Class 2	Class 1
1	J-4-16-I	Mild	3,912,100	4,694,600	5,477,000
2	J-4-16-II	Moderate	7,620,200	9,144,200	10,668,300
3	J-4-16-III	Severe	13,006,700	15,608,000	18,209,300

Source: Minister of Health Regulation Number 52 of 2016.

Model Simulation as an Environmental Services Valuation Approach

In this simulation, the concept of the economic valuation method uses a market price approach, which can be done through a human capital approach. This is conceptually very relevant to public health, and an appropriate human capital approach is the medical expense or medical billing approach. This maintenance fee will be used as a reference in assessing the environmental services of the Pneumonia forest. Forest assessments can be calculated using changes in environmental impacts as measured by land changes using a human resources approach under the 2012 Minister of Environment Regulation on Guidelines for Economic Assessment of Forest Ecosystems.

RESULTS AND DISCUSSION

Pneumonia Pain Rate in Lampung Province

Pneumonia is the leading cause of death in children (infants) under 5 years of age worldwide, compared to other diseases such as AIDS, malaria, and measles (Adawiyah et al., 2016). Based on the 2018 ARI routine report data, the incidence (per 1000 children under five) in Indonesia was 20.06%, almost the same as the previous year's data of 20.56% (Ministry of Health Care, 2018). Table 3 provide data for Pneumonia sufferers of children under five in Lampung Province by district/city in 2002, 2009, 2015, 2018, and 2019 with an Incident Rate (IR) of 10,000 children under five.

Table 3. Pneumonia Incident Rate (IR/10,000 population) of children under five years old of the 14 districts/cites of Lampung Province.

No	**County/City**	**Year**				
		2009	**2012**	**2015**	**2018**	**2019**
1	West Lampung	1,2	2.6	2,3	9.9	5.4
2	Tanggamus	6.4	0.7	3.2	2.7	2.8
3	South Lampung	5.0	12.2	13.0	13.2	15.3
4	East Lampung	8.3	6.6	1.7	9.3	6.5
5	Lampung Tengah	6.5	6.2	2.7	4.7	3.5
6	Lampung Utara	0.8	1.5	0.7	14.7	14.8
7	Way Kanan	11.8	7.9	6.0	4.5	11.5
8	Tulang Bawang	0.4	1.9	4.6	5.2	7.9
9	Pesawaran	6.4	0.0	8.5	8.9	14.9
10	Pringsewu	0.0	2,3	0.5	1,4	0.4
11	Mesuji	5.5	6.6	29.2	11.2	12.9
12	Tulang Bawang Barat	0.0	1.5	3.9	4.8	6.7
13	Bandar Lampung	24.1	27.6	15.9	22.3	18.0

14	Metro	13.9	8.9	14.6	14.0	18.9

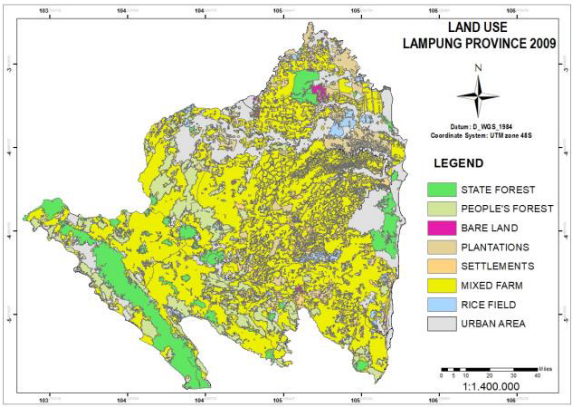
Source: Lampung Provincial Health Office Profile (Processed by Authors).

The incidence rate of pneumonia in Lampung Province in Table 3 shows that the occurrence of an increase every year, especially in South Lampung, North Lampung, Tulang Bawang, and West Tulang Bawang districts, but that several other districts experienced different fluctuations. The increase in pneumonia is indeed influenced by several factors, namely, intrinsic factors and extrinsic factors. According to Khasanah et al. (2016), intrinsic factors include age, gender, nutritional status, immunization status, breastfeeding, and vitamin A administration, while extrinsic factors are usually biological, social, and physical factors. As per research conducted by Adhyaksa et al. (2017), the occurrence of fluctuations in the incidence of pneumonia in Lampung Province is influenced by land and climate changes that affect vector life, apart from other factors that influence it. Fluctuations in the incidence of pneumonia in the Regency/City of Lampung Province in 2009–2019 will be explained in Figure 1 below.

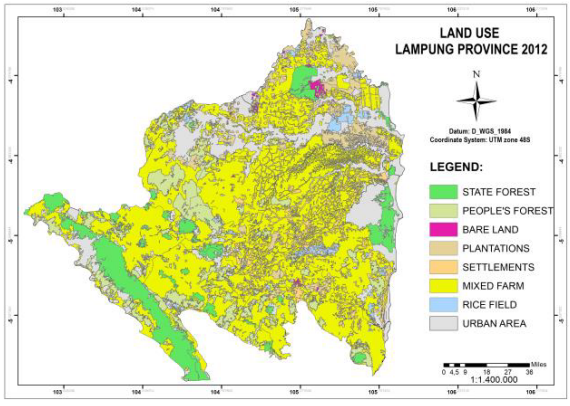
The fluctuating incidence of pneumonia in Lampung Province, as shown in Table 3, is due to climate change that supports the development of pathogens that cause pneumonia. The incidence of pneumonia was quite high in 2015 in Mesuji Regency, with an incidence rate of 29.2 per 10,000 population. Land use changes result in climate change, which will also cause temperature changes. This will affect the pathogenic bacteria that live in the house, such as the bacteria that cause pneumonia, which will last longer. Streptococcus pneumoniae bacteria have the property of being able to survive for several days in ordinary culture.

Land Cover in Lampung Province

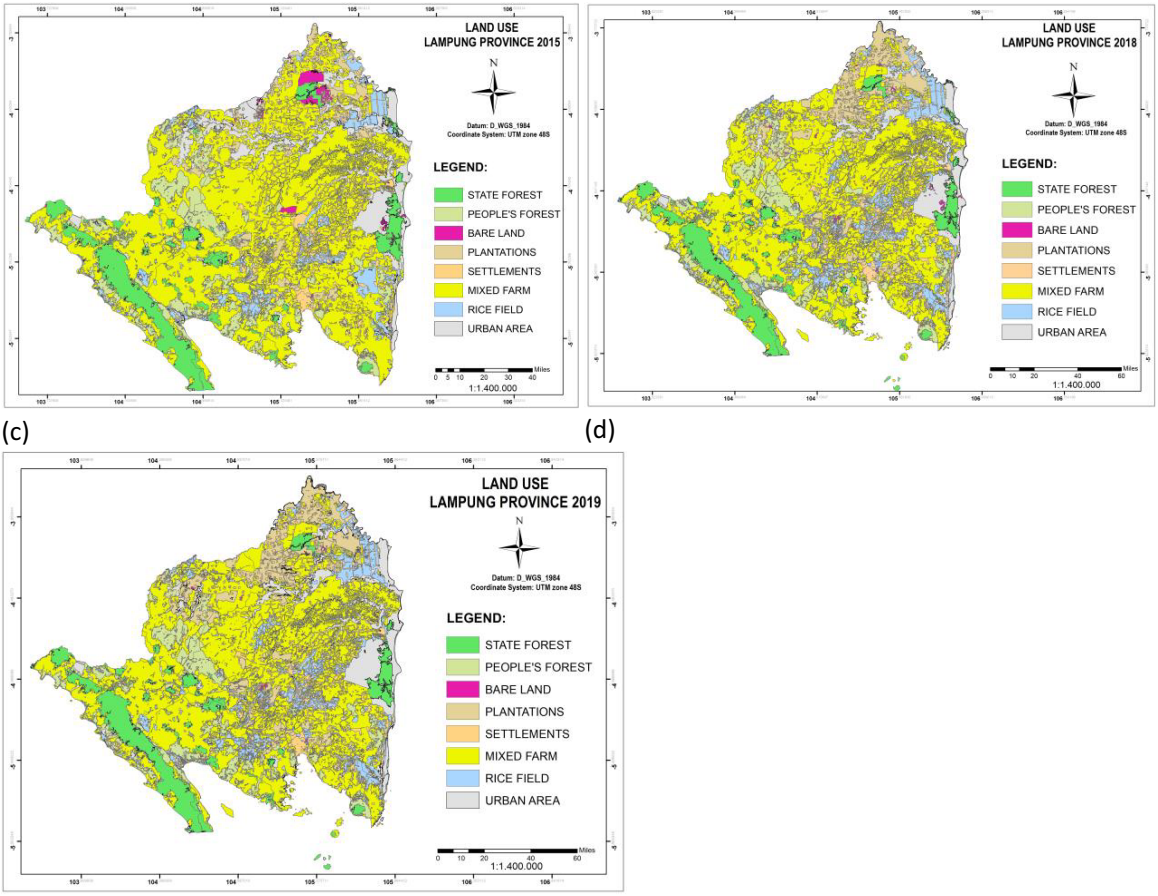
The use of Landsat imagery is needed to identify district/city land cover in Lampung Province in 2009, 2012, 2015, 2018, and 2019. The land cover classes identified are state forest, people's forest, vacant land, plantations, settlements, mixed agriculture, rice fields, and urban area. The land cover classification of Lampung Province in 2009, 2012, 2015, 2018, and 2019 is interpreted in the layout of Figure 2 as follows.



(a)



(b)



(c) (d)

(e)

Figure 1. Land cover of Lampung Province Source: Landsat Interpretation of (a) 2009, (b) 2012, (c) 2015, (d) 2018, and (d) 2019.

DISCUSSION

Linear Regression F Test

The F test in this study was carried out to see the effect of all independent variables, namely land changes and temperature, together on the dependent variable of pneumonia. The results of the F test explain that the P-value is 0.000, which means that land changes have a very influential role in increasing the number of pneumonia cases with a confidence level of up to 99%, which can be proven by the data. These findings also show that the possibility of missing data for all independent variables is only 0.0001, or one incident per 10,000 people.

Multiple Linear Regression T Test Against Dependent Variables

In this study, the T test was used to see how the influence of each independent variable of land change on the dependent variable of pneumonia was affected. The results of the T test on multiple linear regression can be seen in Table 4 as follows.

Table 4. The results of the optimization of the model parameters of the effect of land use changes on Pneumonia morbidity.

Predictor	Symbol	Coef	SE Coef	T	P
Constant	-	-91.50	49.12	-1.86	0.067
Temperature	$[TEMP]_{it}$	3,157	1,781	1.77	0.081
State Forest	$[STWF]_{it}$	33.87	16,44	2,06	0,044
People's Forest	$[POPF]_{it}$	33,17	11,37	2,92	0,005
Bare Land	$[BAR]_{it}$	257,02	64,91	3,96	0,000
Plantation	$[PLNT]_{it}$	21,169	9,232	2,29	0,025
Settlement	$[SETTL]_{it}$	10,08	11,71	0,86	0,393
Mixed Farm	$[MFARM]_{it}$	8,211	6,788	1,21	0,231
Rice Field	$[RICE]_{it}$	3,889	8,767	0.44	0.659
Urban Area	$[URBN]_{it}$	13,392	4,555	2.94	0.005

S = 4,56894 R-Sq = 60.0% R-Sq(adj) = 54.0%

Source: Research Results (2021). Note: i=county, t=year

Description S = Standard Error of Estimate (SEE)

R-Sq = R Square (Coefficient of Determination)

R-Sq (Adj) = Adjusted R Square (Coefficient of Determination)

The relationship among the independent variable (X) and the dependent variable (Y) in the regression:

$$[Y\_\ PNE\ ]it = -91.5 + 3.16\ [TEMP]_{it} + 33.9\ [STWF]_{it} + 33.2\ [POPF]_{it} + 257\ [BAR]_{it} + 21.2\ [PLNT]_{it} + 10.1\ [SETTL]_{it} + 8.21\ [MFARM]_{it} + 3.89\ [RICE]_{it} + 13.4\ [URBN]_{it} \quad (4)$$

Based on the data processing in Table 4, the R-Sq value, or the resulting determinant coefficient, is 60%. This value indicates that the diversity of the incidence of pneumonia can be explained by the model. The remaining 40% is explained by other variables outside the model. The variables that significantly affect the incidence of pneumonia from the results of data processing in Table 4 are temperature, state forests, people's forests, bare land, plantations, and urban areas. The results of the T test and the coefficient of determination state that the temperature has a p value of 0.081, which means that it has a confidence interval of 90%. The value of the coefficient is 3.157, which explains that every increase in temperature of 1 °C will increase the incidence of pneumonia by 3.157 cases per 10,000 people in Lampung Province. These results are in line with the research conducted by Onozuka et al. (2009) in Japan, which explained that an increase in temperature of 1 °C will increase the incidence of pneumonia by 16.9%. According to Qiu et al. (2016), temperature affects the incidence of pneumonia because a change in temperature will accelerate the growth of pathogens that are potentially relevant to respiratory tract infections.

Based on the results of the T test and the coefficient of determination, it is stated that the state forest also has a significant effect on the incidence of pneumonia with a p-value of 0.044 with a 95% confidence level. State forest has a coefficient value of 33.87, which means that every 1% decrease in forest land will increase pneumonia by 33.87 cases per 10,000 population in Lampung Province. The area of state forest in Lampung Province fluctuates every year. This can cause deforestation,

which results in climate change. similar to the research conducted by Paynter et al. (2010), which said that climate change caused 17% of child deaths due to pneumonia and that the rainfall model in Indonesia was positive for respiratory infections. The research of Mirsaeid et al. (2016) also shows that pneumonia is one of the biggest causes of death in the United States. After further research, it turns out that this is influenced by climate change, which directly or indirectly affects the incidence and severity of respiratory infections by influencing vectors and host immune response.

The people's forests also have a significant effect on the incidence of pneumonia, with a p-value of 0.005 and a confidence level of 99%. The coefficient value of people's forest is 33.17, which means that if the area of people's forest decreases by 1%, it will increase pneumonia by 33.17 cases per 10,000 population in Lampung Province. people's forests are much more influential than state forests. This is because people's forests are usually not far from where people live. As in the research conducted by Arianasari et al. (2021), the existence of people's forests affects the microclimate and also changes the rate of increase in temperature around them. Research by Kim et al. (2016) also stated that geographic and local climatic variables also affect health development, especially in the development of pneumonia.

Bare land is one of the variables that has a significant effect on the increase in pneumonia, with a p-value of 0.000 with a 99% confidence level. The coefficient value of bare land is 257.02, meaning that when bare land is increased by 1%, it will increase the incidence of pneumonia by 257.02 cases per 10,000 population. As has been proven from the previous tables, the highest bare land occurred in 2015 in Mesuji Regency, where 0.07% of the area was turned into bare land. These results are in line with research conducted by Adhyaksa et al. (2017) that found the most common cause is that people bare land by burning, making them more susceptible to respiratory tract diseases. Likewise, plantations also affect the incidence of pneumonia with a p-value of 0.025, a 95% confidence level, and a coefficient value of 21.169. This value explains that when plantation land decreases by 1%, it will increase pneumonia by 21.169 per 10,000 population. This happens also because at the time of land clearing, the community is more dominant in burning, so the smoke from the burning causes disturbances to the respiratory system.

Based on the results of the study, it also showed that urban areas had an effect on the incidence of pneumonia with a p-value of 0.005 with a confidence level of up to 99%. The coefficient value is 13,392, which means that for every increase in urban land area by 1%, there will be an additional 13,392 cases per 10,000 people. This can happen because the temperature in urban areas tends to be higher due to changes in climatic conditions due to human activities such as the use of fossil fuels, which affect the effect of greenhouse gases, which results in an increase in temperature in urban areas. Streptococcus pneumoniae bacteria usually grow rapidly at a temperature of 31 ˚C to 37 ˚C, so when the temperature rises in urban areas, it will cause toddlers who live in homes with temperatures that do not meet the requirements to be susceptible to pneumonia. These results are in line with research conducted by Agustyana et al. (2019) that found there are industrial activities that produce pollutants and trigger the formation of dry air, thereby triggering high indoor air temperatures in urban areas and causing the spread of these bacteria.

Development of Adaptation Scenarios to lessen the Global Warming Through Simulation of Environmental Services Valuation Approach.

Based on Table 4, the variables that have a significant effect on the incidence of pneumonia are temperature, state forests, people's forests, bare land, plantations, and urban areas. The following is a simulation of the valuation of environmental services from temperature, state forests, and people's forests. The coefficient value of the regression equation for temperature is 3.157 and the total population of Lampung is 8.85 million (BPS, 2021). In Table 2, previously explained about the cost of treatment for pneumonia, this simulation will use a treatment cost of IDR 4.4 million/patient, namely the tariff for class 2 (Minister of Health Regulation #58 of 2016). In order to eliminate pneumonia, a simulation will be used using reforestation costs of 58 million for the entire population of Lampung Province, amounting to 8,850,000 people with an area of 3,357,600 ha. Tables 5 below contain the simulation results of the increase in the incidence of pneumonia per temperature increase of 0.25 °C to the upper limit of global warming of 2.0°C and simulations of the effects of changes in state forests and people's forests.

Table 5. Simulation of the impact of rising temperatures and changes in state forest land and people's forests on the severity of Pneumonia patients.

Variable	Global Warming Scenario	Pneumonia Increasement	Total Incidence of Pneumonia	Total Cost for healing
	°C	Person/per 10 Thousand Population	Total People	IDR§ (Million)
Temperature	0.25	0.8	7,080	31,152,000
	0.50	1.6	14,160	62,304,000
	0.75	2.4	21,240	93,456,000
	1.00	3.2	28,320	124,608,000
	1.25	4.0	35,400	155.760,000
	1.50	4.8	42,480	186,912,000
	1.75	5.6	49,560	218,064,000
	2.00	6.4	56,640	I249,216,000
Location	Reforestation acreage that needed at location of: [a] State Forest, or else at [b] people's Forest to negate Pneumonia increasement as the impact of global warming for each scenario above			Reforestation costs to negate pneumonia correspond to the global warming scenario at both locations
	%		**Ha**	**IDR§ (Million)**
[a] State Forest	0.21		742.896	43,087,968
	0.42		1,485,792	86.175.936
	0.63		2,228,688	129.263.904
	0.84		2,971,584	172.351.872
	1.05		3,714,480	215,439,840
	1.25		4,422,000	256.476.000
	1.46		5,164,896	299.563.968
	1.67		5,907,792	342.651.936

	0.21	755,086	43,794.997
	0.43	1,510,172	87,589,995
	0.64	2,265,258	131,384,992
[b] people's	0.85	3,020,345	175,179,990
Forest	1.07	3,775.431	218,974,987
	1.28	4,530,517	262,769,984
	1.49	5,285.603	306,564,982
	1.71	6,040,689	350,359,979

Source: Research results (2021). § Note: 1USD= IDR 14,500

Based on the results from the tables above, it can be seen that it is necessary to reforest up to 1.67% of state forests and 1.7% of people's forests to suppress the increase in average annual temperature of 2 ° C, which if allocated to mitigation costs, can reach IDR.942. 227. 915,-. The mitigation costs themselves are obtained from the sum of the maintenance costs and the costs of reforestation in state forests and people's forests, a maintenance fee of IDR 249,000 and reforestation of 5,907,792 ha of state forest and 6,040,689 ha of people's forest to eliminate the increase in the incidence of pneumonia. These results are in line with research conducted by Seno et al. (2018) that found that to prevent the transmission of vector diseases, a fee of IDR 307,030, 746, is required for a 10% increase in forest area in Lampung Province.

CONCLUSION

The conclusion of this study is that this study proves the real effect of land cover change on the incidence of pneumonia. The land cover variables that have an effect on this research are temperature p-value 0.081, state forest p-value 0.044, people's forest p-value 0.005, bare land p-value 0.000, plantation p-value 0.0025, and urban p-value 0.005. A determination of the value of environmental services for public costs is required at IDR. 942,227. 915, which is obtained from the maintenance fee of IDR. 249,216,000 and reforestation costs for state forests of 5,907,792 Ha and people's forests of 6,040,689 Ha if the temperature rises by up to 2 °C.

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CONFLICT OF INTEREST

We are no conflict of interest on this research result.

REFERENCES

Adawiyah, R., and Duarsa, A.B.S. Factors Influencing the Incidence of Pneumonia in Toddlers at the Public Health Center in Bandar Lampung City in 2012. Yarsi Medical Journal 2016; 24(1): 051-068.

Adhyaksa, A., Bakri, S., Santoso, T. The effect of land cover on the incidence of pneumonia in children under five in Lampung Province, Sylva Lestari Journal 2017;5(1): 26-34.

Agustyana, K., Ginandjar, P., Saraswati, L. D., Hestiningsih, R. The Relationship between Physical Conditions of the House and the Incidence of Pneumonia in Toddlers in Urban Areas (Study in the Work Area of the Bergas Health Center). Journal of Public Health 2019;7(1): 176-185.

Anigbo, A. R., Choudhary, R. C. The Effects of Climate Change on Tuberculosis. Suresh Gyan Vihar University International Journal of Environment, Science and Technology 2018;4(1): 33-40.

Arianasari, V., Safe'i, R., Darmawan, A., Kaskoyo, H. 2021. Estimation of Above Ground Carbon Deposits in people's Forests in Urban Areas, Bandar Lampung City, Lampung Province. Journal of Forestry Science 2021.

Central Statistics Agency of Lampung Province. Lampung in Figures 2020. Books. BPS Lampung Province. Lampung 2021; page 710.

Indonesian Ministry of Health. Basic Health Research 2018. Ministry of Health of the Republic of Indonesia, Jakarta. 1592)2018;174-184.

Khasanah, M., Suhartono, Darminto. The Relationship between Environmental Conditions in the Home and the Incidence of Pneumonia in Toddlers in the Working Area of the Puring Public Health Center, Kebumen Regency. Journal of Public Health 2016;4(5):27-34.

Kim, J., Kim, J. H., Cheong, H., Kim, H., Honda, Y., Ha, M., Hashizume, M., Pool, J., Inape, K. Effect of Climate Factors on the Childhood Pneumonia in Papua New Guinea: A Time-Series Analysis. International Journal of Environmental Research and Public Health 2016;13(213): 1-16.

Mirsaeidi, M., Motahari, H., Khamesi, M. T., Sharifi, A., Campos, M., Schraufnagel, D. E. Climate change and respiratory infections. Perspectives 2016;13(8): 1223–1230.

Bakri, S., Wardani, D. W. S. R. Changes in land use in Lampung Province and its effect on the incidence of dengue hemorrhagic fever (DHF). Sylva Lestari Journal 2016;4(3):35—46.

Onozuka, D., Hashizume, M., Hagihara, A. Impact of weather factors on Mycoplasma pneumoniae pneumonia. Thorax 2009;64:507–511.

Paynter, S., Ware, R. S., Weinstein, P., Williams, G., Sly, P. D. Childhood Pneumonia: A Neglected, Climate-Sensitive Disease?. The Lancet 2010;376: 1804-1805.

Minister of Health RI: Regulation Number 52 of 2016. Standard Tariffs for Health Services in the Implementation of the Health Insurance Program. Indonesian Ministry of Health. Jakarta.

Minister of Health RI. 2020. The 2019 Profile of Indonesia Disease Report.

Qiu, H., Sun, S., Tang, R., Chan, K. P., Tian, L. Pneumonia Hospitalization Risk in the Elderly Attributable to Cold and Hot Temperatures in Hong Kong, China. American Journal of Epidemiology 2016;184(8): :570–578.

Rosari, R. S., Bakri, S., Santoso, T., Wardani, D. W. S. R. The effect of land use change on the incidence of pulmonary tuberculosis: Study in Lampung Province. Sylva Lestari Journal 2017;5(1): 71-80.

Sari, E. L, Suhartono, Joko, T. The Relationship between Home Physical Environment Conditions with the Incidence of Pneumonia in Toddlers in the Working Area of the Pati I Public Health Center, Pati district. Journal of Public Health2014; 1(2): 56–61.

Seno, Y, Wardani, D. W. S. R., Bakri, S. Utilization of Landsat imagery for the valuation of state forest environmental services in controlling dengue hemorrhagic fever (DHF): A study in Lampung Province. Journal of Tropical Forests 2018;6(3): 237-248.

Wijk, M.V., Naing, S. Y., Franchy, S. D., Heslop, R. T., Lozano, I. G., Vila, J., Delpierre, C. B. Perception And Knowledge Of The Effect Of Climate Change On Infectious Diseases Within The General Public: A Multinational Cross Sectional Survey-Based Stu. Knowledge Assessment Of Climate Change And Infectious Diseases Within The General Public 2020;1-14.

Wikurendra, E. A. Factors Affecting the Incidence of Pulmonary Tuberculosis and its Management Efforts. Journal of Health Ecology 2015;9(4):1340-1346.

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