The Impact Of Oil Palm Plantations In Wetlands On The Socio-Economic Community Of Banyuasin Regency, South Sumatra, Indonesia

Kalepi Candra[1], D. Budianta[2], A. Napoleon[2], M. Antoni[3]

Abstract

The expansion of private oil palm plantations, including on wetlands, is significantly increasing yearly. Although the use of wetlands has a negative impact on carbon sequestration, there is a need to recognize the positive influence of oil palm plantations on the socio-economy of surrounding communities. Therefore, this research aimed to evaluate the impact of oil palm plantations in wetlands on communities. A total of 200 households were included through a field survey and questionnaires were used to obtain data on income, assets, education, and health. The results showed a positive impact of oil palm plantations, such as an increase in education by 103.75% falling in a moderate category. In the health sector, a significant increase was observed in health service facilities by 131.90%, while the total income experienced an increase of 219.87% with a moderate income level classification. From the category of employment type, an increase in income occurred by 18.18%, including asset ownership such as houses, land, and motorized vehicles by 46.45%, 70.43%, and 1,157.58%, respectively. This research recommends that companies collaborate with the government to encourage community businesses and the economy as well as improve access roads between villages and districts.

Keywords: Assets, Wetland, Income, Education, Oil Palm Plantation.

1. INTRODUCTION

As the largest country in Asia, Indonesia is comprised of 17,499 islands with an area of 7.81 million km^2, an ocean area of 3.25 million km^2, an exclusive economic zone of 2.25 million km^2, and a land area of 2.01 million km^2 (Pratama, 2020). Geographically, the country is located between the continents of Asia and Australia as well as the Indian and Pacific Oceans, creating favorable conditions for soil fertility and the growth of various plant types, including oil palm (lau et al., 2020).

Indonesia has a total water area of 6,400,000 km^2, comprising 38 provinces, including South Sumatra Province. The province has a swamp area of 14,836.62 km^2, consisting of Tidal Swamp (RPS) and Lebak Swamp (RL). Banyuasin, one of the 12 regencies has 19 RPS areas and 1 RL area. Among the water areas are Pulau Rimau and Selat Penugukan districts (Bappeda Sumsel, 2014), where there are 11 oil palm companies, including PT Cipta Lestari Sawit (PT.CLS) (Banyuasin, 2021).

The expansion of oil palm plantations, including private, state-owned, or smallholder has resulted in both positive and negative environmental impacts (Saad et al., 2022); (Fleiss et al., 2020); (Gray & Lewis, 2014); (Ogahara et al., 2022); (Bok et al., 2022); (Rizali et al., 2021). Positive impacts include socio-economic improvement of the community (Anyaoha & Zhang, 2022) and contribution as a source of foreign exchange, playing an essential role in the country economy (Chuan et al., 2013); (Korol et al., 2021). The expansion impact of oil palm p[1]lantation businesses that use wetlands is not yet known.

[1]*Doctoral Program of Environmental Science, Graduate School, Universitas Sriwijaya, Jl. Padang Selasa No.524 Bukit Besar, Palembang, South Sumatera, Indonesia*
[2]*Soil Science Department, Faculty of Agriculture, Universitas Sriwijaya, Jl. Raya Inderalaya–Prabumulih Km. 32 Ogan Ilir, South Sumatera, Indonesia*

Therefore, this research aimed to measure the magnitude of socio-economic impacts generated by business activities.
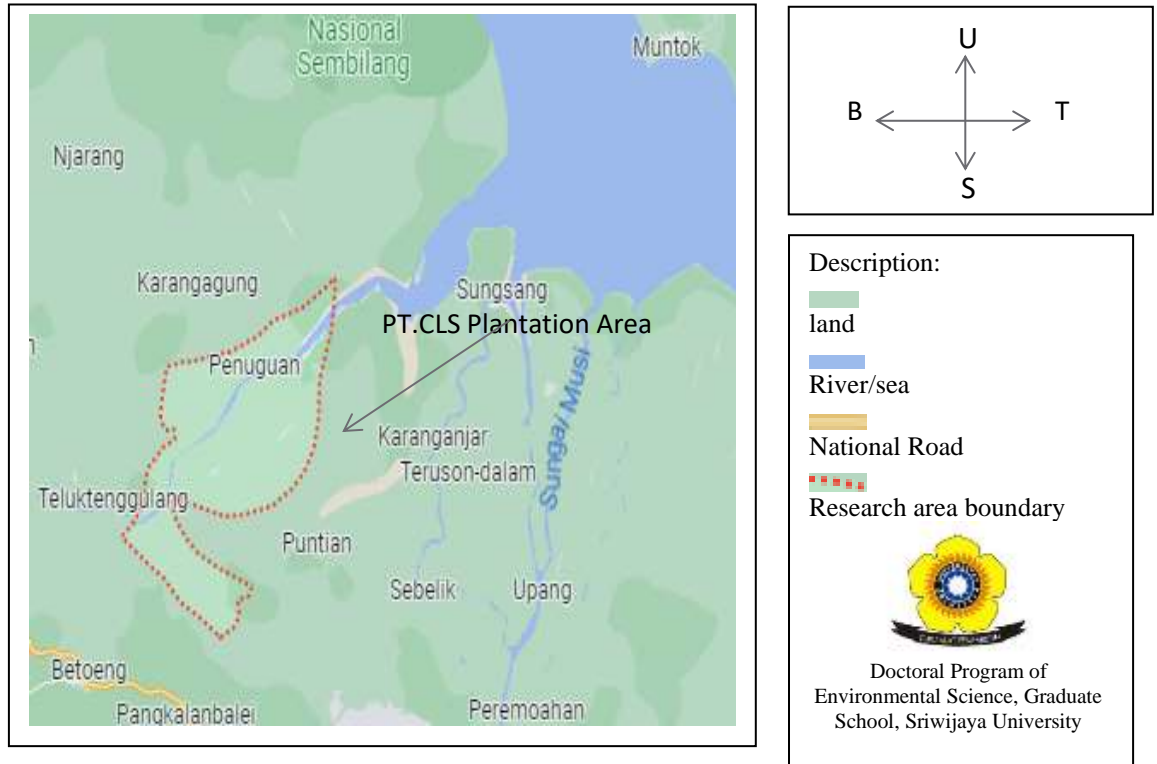
2. MATERIAL AND METHOD

2.1 Research Location

Figure 1. Scale 1: 20.000

This research was conducted in Pulau Rimau and Selat Penugukan Districts, Banyasin Regency, including four villages, namely Bumi Asih, Majatra, Wonosari, and Bumirejo, as shown in Figure 1. These four villages have oil palm plantations owned by PT. CLS, with three estates, namely MWE (Majatra Wonosari Estate), BAE (Bumi Asih Estate), and BRE (Bumi Rejo Estate). The total area is +52.13 km^2, which is used for core oil palm plantations and is geographically located at 2039'08.332 "South latitude-104030031.860 East longitude and 2042'03.873 "South latitude-104030056.842 East longitude (PT. CLS ISPO Audit, 2022). Hantu River is west of the land, with a width of +10 m and an average depth of < 5 m. To the south is Banyuasin River, which has a width of +400 m and a depth of > 5 m, directly connected to the Bangka Sea and China Sea. The nearest settlement to oil palm plantations is +4 km away. On the left, right, and front of the main plantations, there are plasma plantations of PT. CLS covers an area of 63.39 km^2, while the rest are smallholder plantations and farms.

2.2 Data Collection
This research used the survey method conducted on a population to obtain primary and secondary data. The data was collected through the distribution of questionnaires, which included information on income, education, assets, and health (Dharmawan et al., 2019).

[3]*Agribusiness Department, Faculty of Agriculture, Universitas Sriwijaya, Jl. Raya Inderalaya–Prabumulih Km. 32 Ogan Ilir, South Sumatera, Indonesia*

The questions in the questionnaire were designed to be open-ended and closed-ended, facilitating the classification of answers. A total of 200 households were selected as the sample from 1,543 households around the research location. The sample was selected from various professions around the area. Subsequently, the data obtained from the plantation manager and Banyuasin Regency government were classified into components categorized as independent or dependent.

2.3 Data Analysis
The data collected were analyzed using a preliminary classification approach. The quantitative data analysis method used in this research was expected to be material for determining the right handling. Data obtained through surveys and distributing questionnaires were assessed and calculated to correspond with the analytical method in the specific field.

2.3.1 Assessment
The level of income and education was analyzed using the Likert scale method, as shown in Table 1. This included assigning scores to the respondents' answers, which have been classified based on the assessment category (Sevia A.U, et al., 2022) on the aspects analyzed.

Table 1. Weight value of the answer level

No	Answer Level	Value
1	Unknown / Low/Minim	1
2	No/Moderate/Adequate	2
3	Yes/High/Good	3

(Source: Sevia A.U et al., 2022)

The interval that occurs in the data analysis is:

Interval $= \dfrac{\text{Highest score - Lowest score}}{3}$

Interval $= \dfrac{3 - 1}{3}$

$= 0.667$

The answer measurement criteria are summarized in Table 2.

Table 2. Assessment category interval

No	Interval Value	Category
1	1 - 1.667	Low
2	1.668 -2.335	Moderate
3	2.336- 3	High

(Source: Sevia A.U et al., 2022)

The magnitude of change is determined using the expression below:

$$\text{Percentage change} = \frac{\text{Situation After - Situation Before}}{\text{Situation Before}} \times 100 \quad \text{(Formula 1)}$$

2.3.2 Value Calculation

For data whose values are not yet known, the analysis is carried out through calculation using mathematical formulas according to the aspects to be evaluated:

1. Social Facilities Health Services

   Asset value = (Area afterward - Previous Area) x Standard Price

   (Formula 2)

2. Individual Asset Value

   a. HOUSE

      Asset value = Area x Valuation Price

      (Formula 3)

   b. LAND

      Asset value = Average area x NJOP price (IDR5,216)

      (Formula 4)

   c. RANMOR

      Asset value = Number of units x unit price

      (Formula 5)

3. RESULT AND DISCUSSION

3.1 Socio-Economic

Variables such as income, education, asset ownership (house, land, motor vehicle), and availability of health facilities are given to determine the socio-economic condition of the community.

3.1.1 Education

The assessment of education level at the age of 34 years and above was calculated as the insurer and considered unaffected by the education sector during the operational period of oil palm plantation company around 2006. The average highest education in the community was junior high school, typically completed between the ages of 15 and 17 years. Therefore, communities aged 18 or older in 2006 were considered not impacted in the education sector. Dependents in the education sector included those aged 6 to 34 years, which were considered the age of socio-economic impact. Weighting according to the education category was divided into primary school (P1), junior/senior high school (P2), and university (P3).

Table 5. Education level of communities around oil palm plantations

Code	Education	Weight	Previous Condition			Condition Afterward			Difference Formula 1 (%)
			Total (People)	Percentage (%)	Score	Total (People)	Percentage (%)	Score	
P1	Elementary School	1	160	80	160	46	33	46	-71.25
P2	Junior/Senior High School	2	40	20	80	153	76.5	306	282.5
P3	University	3	0	0	0	1	0.5	3	100
Total			200	100	240	200	100	355	
Average					1.20			1.78	103.75

Assessment classification		Low		Moderate	

(P1: education level 1) (P2: education level 2) (P3: education level 3)

Before the presence of oil palm plantation companies, the education level was dominated by P1 at approximately 80%, P2 at 20%, and P3 had no percentage. With a score of 1.20 as presented in Table 2, the education level was classified as low. After 2006, there was a change with a decrease in the P1 community of approximately 33%, a significant increase in P2 reaching 76.5%, and P3 at 0.5%. With a score of 1.78, the education level was classified as moderate in 2022. The change in education level from P1 to P3 was calculated using Formula 1. Based on the results, P1 experienced a decrease of -71.25%, while P2 had a large increase of 282.5%, with a total increase of 103.75% in community education after 2006.

3.1.2 Health

In the health aspect, the assessment was conducted by determining the value of assets allocated for health services to the community, measuring the additional facilities before and after oil palm plantations. The amount found was calculated using the unit price set by the Banyuasin Regency Government (Formula 2).

Table 13. Increased availability of health facilities for the community

No	Community Health Center	Location	Total (Unit)	Previous Condition		Condition Afterward		Difference (m^2)	Difference Formula 1 (%)
				Health Worker (People)	Area (m^2)	Health Worker (People)	Area (m^2)		
1.	Dana Mulya	Pulau Rimau	1	46	147.42	46	241.6	94.18	63.89
2.	Sumber	Pulau Rimau	1	47	214.5	47	296.5	82	38.23
3.	Mekarsari	Selat Penungguan	1	46	135	46	379.05	244.05	180.78
4.	Karang	Selat Penungguan	1	36	157.5	36	600	442.5	280.9
	Total Area				654.42		1517.6	862.73	131.90%
	Asset added value							IDR5.569.336.372,11	

An increase in health facilities with the expansion of buildings was observed at the four health centers in Pulau Rimau and Selat Penugukan districts, reaching 862.73 m^2 or 131.90% increase, with an asset value of IDR 5,569,336,372.11. PT CLS also provided two clinics in plantation areas 1 and 2, offering free services to employees and the general public. The addition of health facilities, including buildings, equipment, and health personnel, was in line with the increase in community population.

3.1.3 Income

Income earned from an activity referred to as community income was categorized into three income levels, namely IDR 250,000 - 1,833,333 (Pn1), IDR 1,833,334 - 3,416,664 (Pn2), and IDR3,416,665 - 5,000,000 (Pn3), with weighting according to category. Subsequently, calculations were made to obtain a general assessment score on the income level of the community.

Table 3. Community income around oil palm plantations

Code	Income category	Weight	Condition Before			Condition After			Difference Formula 1 (%)
			Total (People)	Percentage (%)	Score	Total (People)	Percentage (%)	Score	
Pn 1	IDR250.000 – 1.833.333	1	157	78.5	157	44	22	44	-71.97
Pn 2	IDR1.833.334 – 3.416.664	2	38	16	76	126	63	252	231.59
Pn 3	IDR3.416.665 – 5.000.000	3	5	2.5	15	30	15	90	500
Total			200	100	248	200	100	386	
Average					1.24			1.93	219.87
Assessment classification				Low				Moderate	

(Pn1: income level 1) (Pn2: income level 2) (Pn3: income level 3)

The calculations in Table 3 showed the changes in community income before and after the presence of oil palm companies. Previously, Pn1 dominated with 78.5%, which decreased to 22%. Pn2 experienced a significant increase from 38% to 63%, with a total score of 1.93, classified as moderate. The change in Pn1 category reached -71.97%, while Pn3 was 500%, while a total 219.87% increase was observed in the income category. This significant variation was attributed to direct and indirect employment factors in the company. Approximately 92% of the community preferred to shop at the nearest local grocery store, increasing the turnover of funds around the company.

A total of 44.5% of communities increased the fields of work after the presence of oil palm companies. The impact of occupation on income and the difference between pre- and post-company income was calculated using Formula 1. Occupation types were grouped into Farmers, Laborers, and Others such as traders, drivers, craftsmen, etc. Equalization in 2022 shows a significant change in income.

Table 5. Changes in community income around oil palm plantation area

No	Occupation	Condition Before			Condition After				Difference Formula 1 (%)
		Income (IDR)	Companding (IDR)	Total (People)	Income (P) (IDR)	Side Job (S) (IDR)	Total(P+S) (IDR)	Total (People)	
1	Farmers	1.078.431	2.586.610	137	1.642.157	922.500	2.564.657	102	-0.85
2	Laborer/ KHL	1.063.636	2.550.470	48	2.490.909	1.117.241	3.608.150	55	41.47
3	Others	906.977	2.175.379	15	1.203.488	1.275.000	2.478.488	43	13.93
Average									18.18

Regarding occupational classification, there was a decrease in income by 0.85% in the farmer occupation, while the highest increase of 41.47% was obtained in the laborer

occupation. Influencing factors included the application of work wages based on achievement or employee wage standards set by the government. Based on the results, a significant increase of 18.18% was observed in income.

3.1.4 Asset Ownership

Tangible assets owned by the community include houses, land, and motor vehicles (Kurniawan, 2022). For local permanent buildings, the calculation was carried out by taking the middle value between the results of the market price survey and the standard banking analyst valuation price, along with the land and building area. For semi-permanent or non-permanent house buildings, the calculation was carried out by applying the market price of the survey results (formula 3), the figures were further assessed by estimating changes in asset value (formula 1.

Table 7. House ownership around oil palm plantation area

No	Type (R.70) (T 1.250 m^2)	Unit price	Previous Condition		Condition Afterward		Increase (Formula 1) (%)
			Total owner (people)	Percentage (%)	Total owner (people)	Percentage (%)	
1	Wood	55.677.087,5	29	14.5	38	19	31.03
2	Semper	60.667.087,5	12	6	21	10,5	75
3	Permanent	132.552.088	105	52.5	140	70	33.33
Average							46.45

Before the presence of oil palm plantation companies, 52.5% of the community owned permanent houses, while 20.5% owned non-permanent houses. After the advent of companies, the ability to own assets in the form of permanent houses increased to 70%, while ownership of non-permanent houses was 29.5%. An increase of 46.45% was observed in the asset sector in the form of houses. In addition to houses, communities also have assets in the form of plantation/agricultural land. The calculation of land assets was carried out by taking the middle value of the land area interval, namely 0.5 - 2.33 ha (L1), 2.34 - 4.17 ha (L2), and 4.18 - 6 ha (L3). These values were calculated with the middle value of the NJOP price (IDR 5,216) of plantation land in the districts of the research location using Formula 4.

Table 9. Plantation/farmland ownership around mustard palm plantations

Code	Area (ha)	Asset Value (IDR)	Previous Condition		Condition Afterward		Increase (Formula 1) (%)
			Total (People)	Percentage (%)	Total (People)	Percentage (%)	
L1	0.5 – 2.33	73.806.400	97	48,5	171	85.5	76.29
L2	2.34 – 4.17	170.824.000	20	10	27	13.5	35
L3	4.18 – 6	265.494.400	0	0	1	0.5%	100

Average								70.43

(L1: land area1) (L2: land area 2) (L3: land area 3)

Before 2006, there was 58.5% of the community-owned land, with 48.5% in L1 category and 10% in L2 category. This land ownership was related to the transmigration program, where the community received land from the government through houses and agricultural land. After 2006, an increase was observed in plantation/agricultural land ownership. Based on the result, L1 and L2 reached 85.5% and 0.5%, with the highest increase at 76.29% and 35%, respectively. Furthermore, there was a 70.43% increase in land ownership. Before 2006, land ownership, specifically by transmigration from Java (86%), was relevant when correlated with immediate acquisition of land for housing and agricultural businesses.

In addition to land, this research also included motor vehicle assets, which were assessed using market prices from surveys and clarifications. Asset values were determined according to category, namely Cars (R1), Motorcycles (R2), and Boats (R3), using Formula 5.

Table 11. Ownership of motor vehicles in the community around oil palm plantations

Code	Vehicle Type	Unit Price (IDR)	Previous Condition			Condition Afterward			Increase (Formula 1) (%)
			Total (unit)	Owner (People)	Percentage (%)	Total (unit)	Owner (People)	Percentage (%)	
R1	Motorcycle	8,672,500	11	5	5.5%	272	191	136	2,372.73
R2	Boat	40,000,000	0	0	0%	1	1	0.5	100
R3	Car	167,222,222	0	0	0%	10	10	5	1000
Average									1,157.577

(R1: Motor vehicle 1) (R2: Motor vehicle 2) (R3: Motor vehicle 3)

Before oil palm plantations started operating, 5.5% of the community-owned an R1 motor vehicle due to difficult road access and low income. However, 95% of households owned an R1 category vehicle after operations, where 136%, 5%, and 0.5% owned an R1, R3, and R2 vehicle, respectively. The almost universal ownership of R1 vehicles was due to the suitability to the needs and conditions of the community in the research location. The increase in vehicle ownership (Formula 1) shows a significant rise in R1 category of 2,372.73%, while R2 increased by 100%, resulting in an elevation of 1,157.577%. This increase was triggered by the high purchasing power of the community and the improvement of land access by the government and companies since 2006. The initiatives also included the construction of plantation block access roads and the improvement of inter-village roads.

3.2 Community Expectation

In addition to surveys, direct information from sampling related to daily requirements was obtained to determine the real needs of the community. Mathematical calculations were made and calculated according to the number of audiences. The results showed that 45% of the community expected infrastructure development, while 55% anticipated business/economic assistance. These two points are important factors for companies and the government in determining development policies and regional regulations (Perda) of Banyuasin Regency for the following year. Furthermore, welfare, measured in terms of the economy, served as the main focus. Infrastructure development, particularly roads, is

considered a key factor in supporting the community economy. Roads facilitate the movement of economically valuable goods to market and can save transportation costs compared to sea transportation (Pusat Komisi Publik, 2012).

Conclusion

In conclusion, this research showed that PT. CLS, as a productive oil palm plantation company, positively impacted the socio-economy of the community. The results showed that the positive impact, such as an increase in education by 103.75%, was categorized as moderate. In the health sector, there was an increase in health service facilities by 131.90%, while the total income increased by 219.87% with a moderate level classification. From the category of employment type, income increased by 18.18%, while asset ownership such as houses, land, and motor vehicles increased by 46.45%, 70.43%, and 1,157.58%. This research recommended that companies collaborate with the government to promote businesses and the community economy. Furthermore, improvement of access roads between villages and districts should be prioritized as part of development efforts in the area.

Acknowledgment

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