The impact of sustainable palm oil management on sustainable landscape

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Abstract. With a total area of 16.3 million ha, oil palm plantations in Indonesia are crucial in realizing a sustainable landscape. South Tapanuli District was chosen for this study due to their high conservation value and the possession of a Sustainable Palm Oil Action Plan that is internalized in the Regional Plan document. The analysis was conducted descriptively using secondary data from legal documents and palm oil sustainable certificates, namely ISPO and RSPO, and primary data from 320 smallholders of 6 main commodities and stakeholders from 11 government offices, NGO, and local university. These data were analyzed with Statistical Descriptive Model using indicators of sustainability from economic and other commodity needs. The results show that Sustainable Palm Oil Management has been integrated in the South Tapanuli Landscape Management legal document. Sustainable Palm Oil Management has positive impacts on the economic needs of farmers, namely legal land status, productivity, and income, but does not contribute to the development of other commodities. The implementation of policies and programs is still sectoral with weak coordination between stakeholders. In general, Sustainable Palm Oil Management is potential to support Sustainable Landscape but requires further coordination and integration with the management of other commodities.

1. Introduction
In 2008, Indonesia replaced Malaysia as the largest palm oil producer in the world. With significant growth in 2017, Indonesia contributes to almost half of the global palm oil production. The significant growth of oil palm plantations has contributed to deforestation, transformed the landscape, and raised concerns on biodiversity and sustainability [1]. Even so, the high demand and having the highest productivity and the most efficient land and fertilizer usage among vegetable oil crops has made palm oil development still continue [2]. Oil Palm Sustainable Certifications are then proposed as alternatives to address these concerns [3]. However, a number of previous studies doubt its effectiveness; Oil Palm Sustainable Certifications do not support landscape heterogeneity required for sustainable landscape [4]. On the other hand, palm oil is highly profitable, has contributed to the alleviation of rural poverty and has the potential to improve carbon balance and biodiversity when grown in a landscape mozaik [5]. Land use changes in the oil palm dominated landscape is a complex interaction between economic and ecological spheres. Heterogeneous crop-specific household productivity reveal a comparatively high inertia of land-use change [6]. This study is conducted as an effort to provide empirical case analyses related to these contradictive concerns. Indonesia is seen as the most appropriate case as spatial planning and landscape plans have been formally used since the early 1900s [7].
2. Methods

This study was conducted at the South Tapanuli District in North Sumatra, which has a high biodiversity and an increasing amount of oil palm plantation areas. In addition, there is a total of 13,011 ha of deforestation caused by the development of oil palm independent smallholdings [8]. The sites cover 8 sub-districts, namely Batang Toru, Muara Batang Toru, Angkola Selatan, Angkola Sangkunur representing sub-districts with sustainable palm oil management, and Batang Angkola, Marancar, Angkola Barat, Saipar Dolok Hole representing those without. The definition of sustainable itself is still debatable and being developed. In general, this study uses the concept in SDG, which defines sustainable as a condition that meets the needs of the present without compromising the ability of future generations to meet their own needs. This study adopts [9] the definition of sustainable landscape as the balance in land-use among different sectors and land availability, while sustainable palm oil refers to the RSPO and ISPO P&C indicators. The different sectors are limited to different agricultural commodities, namely Oil Palm, Paddy, Rubber, Arabica, Robusta, Zalacca, which are recorded as having the 6 highest total land size in South Tapanuli.

Figure 1. Engagement of stakeholders in the strategic environment assessment (SEA/KLHS)

This study uses both secondary and primary data. Secondary data were collected from legal documents namely Environmental Strategy Report (KLHS), Mid Regional Plan (RPJMD), Regional Plan (RTRW), Forest Management (KPH), International Certificate P&C (RSPO), and National Certificate P&C (ISPO), while primary data were collected through interviews from 320 samples of
farmers of the 6 commodities, and through FGD from staffs from 11 government institutions, NGO and the local university. The data were analyzed with the Statistical Descriptive Model, using indicators of sustainability from economic needs (legality/land status, ratio of existing and potential productivity and ratio of household expenditure and income), and other commodity needs (Agribusiness system with a maximum score of 22, crop composition with 2 options namely single or multi-cropping, ratio of main commodity and total land area, and comparison of crop performance, particularly in productivity and the agribusiness system).

3. Results and discussion

The results show that the landscape plan in South Tapanuli has been participatively developed. Stakeholders were engaged in identifying their needs and planning the capacity development (Figure 1).

The regional plan document (RTRW) is prepared and finalized by The Public Works and Housing Office (PUPR). During the process, bappeda coordinates all government offices, while the Statistic Office acts as the data pool in preparing the document. The Environmental Office (DLH) provides assessment on suitability and impact, while The Integrated Licencing Office (DPMPPTSP) is responsible for issuing almost all permits. This shows that as a concept and plan, the Landscape management in South Tapanuli is complete.

Land use in the RTRW is designed for a 20 year period, which reflects sustainability and could accommodate plantation crops such as oil palm. The land allocation has taken into consideration all types of forests and other marginal areas such as riparian areas and peatland.

Table 1. Spatial plan in RTRW of Kabupaten Tapanuli Selatan 2017–2037

| No | Land Use                                             | Size (Ha) | Share (%) |
|----|------------------------------------------------------|-----------|-----------|
| 1  | Protection forest                                    | 134,178   | 30.81     |
| 2  | Production forest                                    | 45,226    | 10.38     |
| 3  | Limited production forest                            | 83,626    | 19.20     |
| 4  | Forest reserve                                       | 14,897    | 3.42      |
| 5  | Housing                                              | 2,650     | 0.61      |
| 6  | Dry-land agriculture/ horticulture                   | 86,687    | 19.90     |
| 7  | Wet-land agriculture/ irrigated paddy field          | 17,791    | 4.08      |
| 8  | Mining                                               | 2,824     | 0.65      |
| 9  | Plantations                                          | 31,931    | 7.33      |
| 10 | Riparian of small river                              | 11,594    | 2.66      |
| 11 | Riparian of big river                                | 3,282     | 0.75      |
| 12 | Riparian of lakes                                    | 789       | 0.18      |
| 13 | Peatland                                             | 60        | 0.01      |
|    | Total                                                | 435,535   | 100.00    |

Source: South Tapanuli regional plan document (RTRW) 2017 – 2037

Oil palm plantations are categorized as plantations (which includes oil palm, rubber, Zalacca, Robusta, Arabica, coconut and cacao) with a total of 31,931 ha allocated land size or 7.33% of the total South Tapanuli land size. This proportion is expected to remain until 2037. In 2017, the total land size for oil palm was 93,113 ha (smallholdings: 5,017 ha, state: 2,987 ha, private: 85,109 ha). South Tapanuli only controls licenses for smallholdings, while licenses for state and private plantations are issued by the national ministry office. Therefore, vertical coordination between national ministry staff and sub district authorities, as well as horizontal coordination among government officials in managing various agribusiness commodity sectors need to be improved in order to realize a sustainable landscape. Among the 13 categories of land use, 8 are not allowed to be converted (number 1, 3, 4, 7, 10, 11, 12 and 13), 1 can be converted but not into oil palm (number 20), and 2 can
be converted into oil palm plantations (number 5 and 6). However, with the population increase, residential areas (number 5) are unlikely to be converted into oil palm, leaving a total of 86,687 ha of dry land area (number 6) that could still be converted into oil palm plantations. On the other hand, dry land are mainly used for other crops, including food crops and horticulture. Therefore, the balance between oil palm and other crops need to be considered. Sustainable oil palm management as designed in RSPO and ISPO is expected to be in line with sustainable landscape by improving the performance of oil palm plantations and providing benefits to other crops. The former includes the improvement in the legality, productivity, and income of oil palm smallholdings, while the latter stems from the improvement of agribusiness systems and integration with other crops. This idea is formally supported by The Head of South Tapanuli (Bupati) through the Decree No. 22/2019 concerning the 2018–2028 Sustainable Palm Oil Action Plan.

Figure 2. Composition of land status in sub-districts with (left) and without (right) sustainable palm oil management

Figure 2 shows that sustainable palm oil management could improve the land legality of smallholdings. There are at least 5 land statuses of the 6 commodities in South Tapanuli. The best is certified land, while the worst is no documents whatsoever. In between, there are those that possess trade receipts and letters from head of the village or sub-districts. In general, sub districts without sustainable palm oil management have more areas with no legal documents, shown by the larger orange area in most of the sub-districts.

Figure 3. Ratio of existing and potential productivity (left) and ratio of household expenditure and income (right)

The palm oil sustainable program can also increase productivity through the implementation of Good Agricultural Practice (GAP). Higher productivity is expected to fulfill the household needs of
farmers without expanding their farm size, thus leaving more land for other commodities and allocations. Potential productivity refers to average North Sumatra productivity released by the Statistic Office. Figure 3 shows that except paddy, all commodities still have low productivity. Paddy appears to have an existing productivity that is closest to its potential. This reflects the intensive government intervention, particularly in providing subsidized fertilizers and seedlings for paddy as the staple food of Indonesia. Zalacca is recorded as the 2nd highest, but with only less than half of its potential. South Tapanuli is traditionally known as one of the Zallacca centers in North Sumatra. The existing productivity of palm oil is also less than half of its potential, which is mainly caused by illegitimate seedlings and low fertilizer usage. However, income from Zallaca could not cover the household expenditure of farmers (shown by the ratio of more than 1), while on average, income from oil palm covers smallholder household expenditures with around 20% surplus.

Figure 4. Comparison of paddy and rubber productivity (left) and agribusiness system performance (right)

To estimate the impact of palm oil sustainable management on the performance of other crops, two commodities that are produced on both sub district groups, namely paddy and rubber, are compared. Figure 4 shows that both productivity and agribusiness performance of paddy and rubber in the sub-districts with no oil palm sustainable management are better than those with.

Figure 5. Comparison of crop composition (number of types of crop/single vs multi-cropping) in sub-districts with (left) and without (right) sustainable palm oil management

The impact of palm oil sustainable management on other crops can be evaluated by comparing the crop composition in the sub districts with and without sustainable palm oil management. Figure 5 shows that the former have more single cropping than the latter, shown by the larger blue areas in the left figure.
4. Conclusion and recommendation
The findings show that Sustainable Palm Oil Management has been integrated in the Landscape Management. Sustainable Palm Oil Management has positive impacts on the economic needs of farmers, but does not contribute to the development of other commodities. In general, Sustainable Palm Oil Management has the potential to support Sustainable Landscape but still requires further coordination and integration with the management of other commodities.

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