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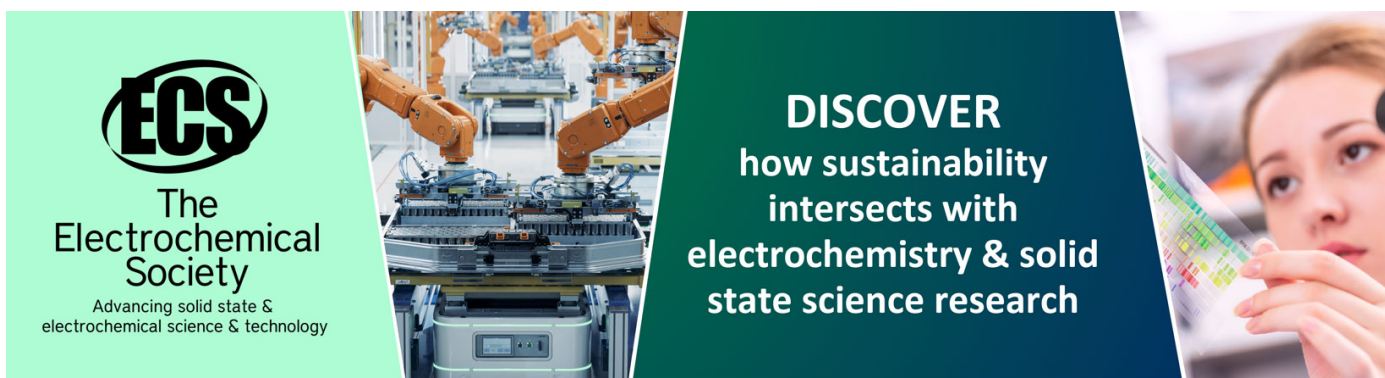
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Positive and Negative Impacts of Oil Palm Expansion in Indonesia and the Prospect to Achieve Sustainable Palm Oil

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Abstract. The aim of the study is to deepen understanding the role of palm oil on Indonesian economy, poverty elevation and to investigate the positive and negative impacts of oil palm expansion, due to the burden of GHG emissions; and prospect to be more sustainable palm oil industry. The statistics show that average rural poverty tends to be lower and Gross Regional Product tends to be higher in provinces which have greater levels of oil palm cultivation. Indonesian oil palm will grow from 10.6 in 2013 to 13.7 million ha by 2020. This will release 135.59 million tons of CO₂ if nothing is done to mitigate BAU emissions. Unless there are sustained efforts to redirect development and expansion of oil palm, plantation growth will continue to encroach on intact forest and peat land.. In fact Indonesia has large areas of degraded land, an estimated total 19,144,000 ha is available for planting oil palm and other crops. A large-scale expansion program driven by estate companies needs to be accompanied by effective smallholder development program in order to achieve the best outcome for local farmers and avoid the conflicts.

1. Introduction

Several factors have led to rapid industry expansion: increasing returns associated with world demand for oil palm the suitability of Indonesia's land and climate for oil palm cultivation; and, in terms of land use and productivity, oil palm's higher productivity than other common oil seeds [19], allowing the price of palm oil to outcompete its competitors. Statistical data indicates that the area of oil palm and the production increase dramatically since 2003 until 2013.

In the last 8 years, Indonesian palm oil exports experienced a growth rate of 11.35% per year, from 11.88 million tons in 2007 to 20.58 million tons in 2013[3]. Likewise, the value of palm oil exports increased with a growth rate of 23.93% per annum. State revenue has also expanded, with export taxes now grossing Rp28.9 trillion in 2013 [3]. Given its contribution to Indonesia's balance of payments, Indonesia's international economy is currently very reliant on the export of palm oil [3].

In terms of regional economic development, Gross Regional Product (GRP tends to be higher in provinces which have greater levels of oil palm cultivation such as North Sumatera, Riau and Central Kalimantan. While issues of increasing inequality and distributional justice associated with oil palm are at times acute, nevertheless the statistics show that average rural poverty tends to be lower in the rural areas where oil palm is developed.



With global demand for palm oil expected to grow further, palm oil offers promising economic prospects for Indonesia, within the constraints of social responsibility and environmental sustainability. However, the pace of oil palm growth has led to an international debate regarding deforestation and climate change. There are concerns about serious unintended social, economic, and environmental consequences, as deforestation and land conversion for oil palm development now contributes 15% to 25% of whose Indonesia's carbon emissions [18].

This is the challenge of sustainable development: how we could find a settlement that accommodates the various stakeholders, Indonesia's environment, biodiversity, and the nation's next generations of people. Given this challenge, this research focuses on the question of how to accommodate the interests of various stakeholders without threatening the environment during future oil palm development.

2. Regional Development and Poverty Alleviation

In the centers of palm oil production, the level of GRP is higher than in the other provinces, were, contributing to poverty reduction; for example, rural poverty in Riau decreased from 21% to 10% in 5 years (2009-2013) [21]. It is evident that in gross terms, oil palm has significantly reduced the inequality of development between Java and Indonesia's outer islands.

Oil palm is the prevalent sector, average rural poverty, poverty depth and the poverty severity index are much lower than where the oil palm is less developed [8]. World Growth Report [25] argues that oil palm expansion has been a significant source of poverty alleviation for the rural poor.

3. The Government role in Economic Improvement of the local people

More than 3.9 million family farmers Palm oil production provides a reliable form of income for a large number of Indonesia's rural poor, about 3.9 million family farmers, employment generated from palm oil production in Indonesia could potentially reach over 6 million families by 2020 and take them out of poverty [25].

Productivity of independent smallholdings could also be improved, through use of high-yielding palm oil varieties and best agronomic practice. High-yielding varieties, under ideal climate conditions and good management, produce up to 5 tons per ha per year [25]; some suggestions are as high as 6-7 tons [13]. With per-hectare average annual production currently at only 2.31 tons for smallholders and 3.19 tons for government-owned and private plantations, there is potential for all holdings to greatly increase their output on existing land, without requiring additional land conversion [25].

Although Indonesia has an estimated 14.19 million ha of additional land which is suitable for oil palm development [8], given the social, environmental and biodiversity risks and associated national and international pressure (such as ISPO; RSPO), it will be important to develop sustainable palm oil practices, which focus on improving productivity on existing plantations while safeguarding Indonesia's remaining forests.

4. Debate of Negative impact of oil palm on Forests and Climate Change

Conversion of forests and peat lands for oil palm cultivation is considered by many to be the largest source of GHG emissions, due to changes in land cover; and oil palm plantations are estimated by Agus [1] to be responsible for a substantial and increasing of total carbon emissions in Indonesia, Malaysia and Papua New Guinea (up from 13% during 2000-2005 to 18% in 2006-2010). Since over 90% of conversion of land for palm oil has occurred in Sumatra and Kalimantan, this places Indonesia among the 10 biggest carbon emitters [5], with one 2012 report placing Indonesia third after China and the USA.

Recent data indicate that while some provinces with large expansions in oil palm plantations have had a concurrent increase in deforestation [6], others have not. For the latter, this indicates that plantation land is being converted from land previously used for food crops, including rice, which may have become less attractive due to poor irrigation infrastructure, falling term of trade for rice farmers, and concerns about climate impacts. Similarly, Fairhurst and McLaughlin [11] reports that many of

Kalimantan's oil palm plantations has been established on lands that were previously degraded forest. [22] emphasize that oil palm plantations store more carbon than alternative agricultural land uses. However, to increase oil palm on such land, we need better agronomic technics and required better field management. Due to unsustainable slash and burning farming, degraded land increased by 8% in last 5 years (2009 -2013) while planting oil palm increased by 38% [7].

Indonesia's land use activities are responsible for most of the nation's carbon emissions, and are estimated to continue to contribute over 50% of Indonesia's total carbon through 2030 – indicating that 2.5% of the world's GHG emission could be emitted from Land Use, Land-Use Change and Forestry (LULUCF) sector and peat land activities in Indonesia [14]. With regard to peat lands, although figures differ somewhat among researchers, some researchers estimate that around 1.7 million ha of peat land have already been planted for oil palm, representing about 20% of Indonesia's total oil palm area [1]. During peat land conversion, carbon emissions are caused not only by land clearing (with emissions estimates ranging from 26-100 Mg CO₂ p.a. for Indonesia; Rieley, J.O. and Jauhianen [20] but from illegal fire (446 M tons CO₂ p.a. for the period 2000-06; JICA 2014). Fires continue to destroy hundreds of thousands of ha of peat and forest in Indonesia per year. Importantly, it is estimated that if Indonesia is able to prevent peat fires, this will reduce the country's emissions by a massive 23-45% [16].

According to palm oil producers, GAPKI [12] cites findings that carbon emissions from oil palm on peat land are lower than emissions from intact peat forest, secondary peat forests and rice fields on peat land. Oil palm on peat land may also absorb more CO₂ per year than tropical forests 64.5 versus 42.2 Ton per hectare per year, according to Henson 1999; although figures vary widely, with IOPRI [15] reporting that oil palm fixes only 18.7 tons CO₂ p.a. Other cited benefits of oil palm on peat, in comparison to other crops, include resilience against erosion, and lower fertilizer and pesticide requirements than other crops.

Given the environmental impacts of destroying Indonesia's remaining intact forest and peat lands, a key development strategy which Indonesia could adopt to support rural communities is to implement sustainable land use planning, involving expanding oil palm into degraded land mostly covered by *alang-alang* grass (*Imperata cylindrica*). Most provinces in Sumatera and Kalimantan contain large areas of degraded land; an estimated total 19,144, 000 ha is available – enough to expand not only oil palm, but also other agriculture crops [7,8].

5. Approach for Future of Oil Palm Expansion and Policy related to Climate Mitigation Actions

Recognizing both issues, ICCSR (2007) has developed a range of detailed policy guidance and mainstreaming tools for the sectorial and cross-sectorial development programs, in order to ensure climate change is considered in all aspects of national, regional and local development planning such as Climate change planning. Indonesia has promulgated Law No 17 of 2007 on long term national development plans (RPJPN), for the years 2005-2025. This legislation should serve as the basis for medium term 5 year development plans (RPJMN and RPJMD) for every province and district in Indonesia.

To follow up law No 17 of 2007, the Indonesian government promoted President Regulation no 61 of 2011, on the National Action Plan (RAN-GRK), which guides the implementation of reducing GHG at the national, province and municipality levels. President Regulation No.61 of 2011 states that Governors and Mayors throughout Indonesia should develop a local action plan (RAD-GRK) by October 2012, and this action plan should cover five areas: Forestry and Peat; Agriculture; Energy; Transportation and Waste Management. The RAD GRK is used to support local development for policy direction, strategy, programs and activities. Currently, 32 out of 33 provinces in Indonesia have set a RAD-GRK, has and these have been mainstreamed into RPJMD and into the local government budgets. One of the major targets to which the government is committed, through these RAN-GRK and RAD-GRK plans, is that Indonesia must reduce its carbon emissions by 26% of BAU by 2020 through its own efforts, and by 41% with international support. Emission reduction from 'land use,

land use change and forestry' (LULUCF) is also featured in the national-level action plan (RAN-GRK) for greenhouse gas emission (GHG) reduction. The national RAN-GRK calls for reductions of GRK emissions of about 23% of Indonesia's total emission in 2020 [10].

On one side of the oil palm debate, industry expansion has real potential to further damage the environment and biodiversity, particularly with respect to contributing to climate change (which itself will have serious economic impacts); along with risks of conflict with local communities in association with environmental, social or economic concerns. On the other side, this research has discussed the important role of palm oil and benefits from a both a macro and micro economic perspective.

6. Scenario of oil palm expansion without harming the environment

To accommodate these complex issues, we developed assumptions to calculate acceptable area and GHG reduction to take into account in the development of new approaches as follow:

- i. Oil palm must only be cultivated by converting secondary forests and degraded lands (including existing agricultural land), which have no ongoing conflicts with local communities.
- ii. Oil Palm expansion will not occur on remaining peat lands and high carbon stock forest, in accordance with the following legislation and other requirements:
 - Law No. 18 of 2013 on the prevention and eradication of forest destruction.
 - Presidential Instruction No: 10/2011, amended to No. 6/2013, concerning the extension of the moratorium.
 - Government Regulation No. 71/2014 on the Protection and Management of Peat lands
 - Minister of Agriculture Regulation No.19 / Permentan / OT.140 / 3/2011 of March 29, 2011, regarding Guidelines for Sustainable Palm Oil in Indonesia.
 - Market demand for plantation companies to hold RSPO certificates.
 - Commit to no deforestation, respecting the rights of indigenous people and local community.
 - Minister of Agriculture Regulation No.19 / Permentan / OT.140 / 3/2011 of March 29, 2011, regarding Guidelines for Sustainable Palm Oil in Indonesia.
- iii. In accordance with government regulations No. 4 of 2001, regarding the control of pollution relating to forest and land fires, no further land clearing in Indonesia is conducted by burning.
- iv. For our calculations, first we estimate trend projections of new palm cultivation through to 2020 (Figure 1). We have assumed that the palm oil industries do nothing to mitigate or minimize GHG emission; i.e. Business as Usual (BAU). With that BAU, we calculate the amount of emissions released into the atmosphere.
- v. We use an emission factor of 42.31 ton CO₂ per ha per year, which is based on Indonesian oil palm research conducted by the Indonesian Oil Palm Research Institute and representing estimates of emissions released from conversion of secondary forest and degraded lands [14].
- vi. Therefore, in calculating the threshold, we do not take into account the emissions from peat and forest fires.

7. Interpretation of acceptable area subject to GHG mitigation actions

Based on estimated trends in oil palm areas using simple regression trend, we calculated that between the years 2013-2020 there would be additional new oil palm expansion areas in Indonesia equating to 13.67 million ha (Figure 1), which we estimated would release CO₂ emissions of 135.59 million tons, representing BAU emissions. Emissions from private estates and smallholdings is higher than from

government-owned plantations, meaning that special attention should be given to improving mitigation efforts on private estates and smallholdings

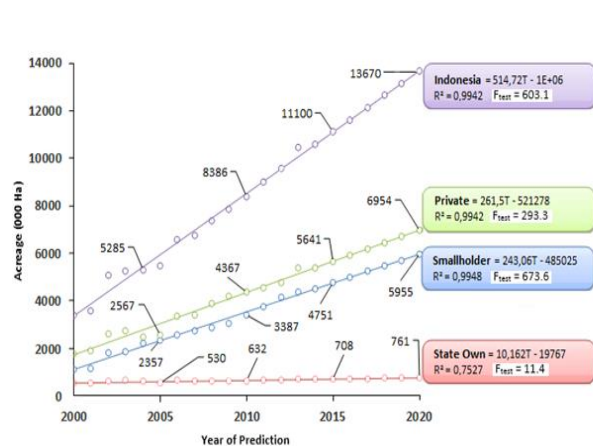


Figure 1. Indonesian oil palm area, and increase by holding type, 2014-2020

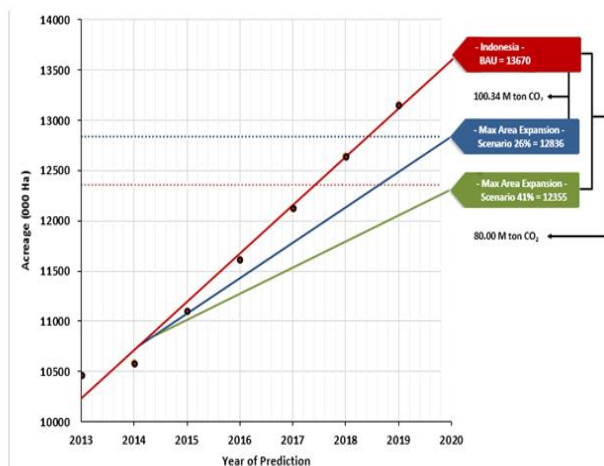


Figure 2. Mitigation actions scenario 26% and 41% of CO₂ emission reduction

Given Indonesia's commitment to 26% reduction in emissions from present-day levels by 2020, and 41% reduction if international support is forthcoming, CO₂ emissions can be reduced by up to 35.25 Million ton and 55.6 Million ton CO₂ respectively. Therefore, total oil palm areas can only grow to a maximum of 12.84 Million ha (to meet the 26% emission reduction target, or 12.36 Million ha if meeting the 41% target (Figure 2).

The targets of emission reductions included in the RAN-GRK and RAD-GRK programs and Reduced Emissions from Deforestation and forest Degradation Programs (REDD+) include all activities associated with oil palm cultivation. Key actions of the programs to reduce emissions include reducing forest fire incidents, including through 'hot spot reduction programs' Other actions and activities of the programs include those associated with effective monitoring and law enforcement, community development, awareness-raising of communities, industries and local governments and intensification of smallholder plantations, not only to prevent forest encroachment but also to increase the productivity of oil palm cultivation.

To meet sustainable palm oil that expansion either by state own plantations, private plantations or smallholders could use three aspects of HCS+ implementation principles, include (1) No deforestation of High Conservation Value (HCS), fully implemented RSPO criterion 7.8, zero burning, national government regulation on ISPO and emission reduction program of RAN and RAD. (2) Protect peat areas means that no new development on peat land, regardless of depth, commit to applying best management practice in existing plantation on peat lands.(3) increase focus on driving socio-economic benefits for local people and transparently work with all parties to resolve verifiable complaints and conflicts [26].

8. Conclusion and Recommendation

Taking into account the challenges of economic issues, regional development, employment and poverty reduction objectives, as well as the government's target of reducing carbon emissions and settling land disputes, oil palm development could be supported and improved in the following ways:

- The goal of sustainable palm oil development cannot be separated from the goals of poverty reduction, conflict resolution, and reducing the impacts of global warming. Therefore A large-scale oil palm expansion program driven by estate companies needs to be accompanied by a well thought and effective smallholder development program. Companies need to bear in mind that they are developing profitable oil palm in areas where local communities may experience issues of poverty, poor levels of health, poor nutrition or food insecurity.

- Large oil palm companies can grow oil palm in degraded grass land. If they are able to use such lands, companies could double oil palm areas without having to open new forest land (intact forest) and peat lands. If land issues could be resolved and local landowners included, oil palm acreage could be increased up to two-fold, without having to convert additional new forest land and peat lands. With current agronomic technology and financing capabilities, large estates could remain profitable if this objective is pursued. In terms of the environment, planting oil palm on abandoned land can improve soil conditions and land coverage, providing GHG mitigation and increasing the accumulation of carbon stock.
- With international assistance for the 41% emission reduction target, the expansion of oil palm could extend to 12.3 million ha, with corresponding GHG emission reductions of 55.6 Million tons of CO₂. Large estates could integrate their expansion program into the government's action plan of the RAN-GRK and RAD-GRK program. The New paradigm requires having empathy towards cultural values and the economy of surrounding communities.

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