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Production of Palm Oil in Indonesia

Country-focused commodity analysis in the context of the Bio-Macht project.

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List of Abbreviations

CPO	Crude Palm Oil
EFB	Empty Fruit Bunches
FFB	Fresh Fruit Bunches
FoKSBI	Forum Kelapa Sawit Berkelanjutan Indonesia / Indonesian Sustainable Palm Oil Forum
FONAP	Forum on Sustainable Palm Oil
GHG	Greenhouse Gases
GDP	Gross Domestic Product
HCSA	High Carbon Stock Approach
HCVA	High Conservation Value Area
ICS	Internal Control System
ILUC	Indirect Land-Use Change
KUD	Koperasi Unit Desa = Village Cooperative System
LUCF	Land-Use Change and Forestry
POME	Palm Oil Mill Effluents
PPE	Personal Protection Equipment

Abstract

This study provides insights into the commodity based characteristics, environmental and social hot spots and policy instruments such as certification for palm oil cultivation in Indonesia as a result of the Bio-Macht Project funded by the German Federal Ministry of Education and Research (BMBF). In a first step, basic agro-technical particularities of the oil palm are covered followed by an analysis of the global as well as the Indonesian markets for palm oil. During the last ten years, numerous certification schemes for palm oil were developed aiming to foster sustainability in the value chains for palm oil. However, both, their ambition level in theory as well as their implementation in practice in Indonesia vary considerably. Therefore, the schemes are evaluated comprehensively. In a second step, a study team by Oeko-Institut e.V. (Germany) and Universitas Padjadjaran (Indonesia) conducted field-research including primary data collection via stakeholder interviews in the provinces West-Java, Riau (Sumatra) and Central and South Kalimantan (Borneo), Indonesia. The resulting empirical evidence suggests a rather limited effectiveness of the analysed certification schemes for the palm oil sector in Indonesia with regards to the analysed environmental hot spots, whereas some positive impacts on social concerns could be observed. Concluding, the study recommends additional measures such as the landscape certification approach as well as appropriate financial mechanisms and due diligence requirements to more effectively tackle environmental and social hot spots in the context of palm oil production in Indonesia.

1. Introduction

Palm and palm kernel oil are very relevant raw materials for the bioeconomy in Germany and Europe. It is used in the food and feed industry as well as in many areas of the chemical industry such as detergents, cleaning and care products. Beyond, palm oil is of great importance for the energy sector as a raw material for the production of biodiesel and HVO (hydrogenated vegetable oil) that are used in the transport sector or for electricity production. In 2017, about 1.1 million tonnes of palm oil and about 120,000 tonnes of palm kernel oil were consumed in Germany of which 78% of the palm oil and 58% of the palm kernel oil were certified by a sustainability scheme (Meo Carbon Solutions 2018). The proportion of certified palm oil in Germany has increased continuously since 2013 with developments in the food industry being much more dynamic than in the chemical industry. Furthermore, in 2017, more than 50% of palm oil was consumed by the energy sector that is regulated under the European Renewable Energy Directive (RED) referring to mandatory certification requirements. At the same time, consumption of palm oil in the material sectors (feed and food, chemical industry) had been declining since 2013. The main driver of this development was the ongoing discussion about environmental and social hot spots of palm oil cultivation in regions and countries with large areas of primary forests and ongoing losses of carbon-rich and biodiverse areas in the course of the expansion of agricultural land.

By far, the largest producing and exporting country of palm oil is Indonesia (49%) followed by Malaysia (33%) in 2016 (OEC 2019). According to (Chatham House 2019) Indonesia alone, was exporting 5,4 million tonnes of crude palm oil (CPO) to other countries worldwide in 2016. However, palm oil production in Indonesia is related to several ecologic, social and economic risks. One of the most relevant environmental risks (see section 8) is due to land use change and related deforestation and fire (Carlson et al. 2018). Between 1995-2015, the average annual oil palm plantation expansion in Indonesia occurred at a rate of 450,000 ha/a resulting in an average of 117,000 ha/a of deforestation (Austin et al. 2017).

Figure 1-1: Large Scale Palm Oil Plantations in Kalimantan, Indonesia

Source: Oeko-Institut e.V. (November 2018).

Further environmental hot spots are the loss of biodiversity, conversion of peatland and green house gas emissions (see chapter 8). Beyond, this study focuses on social and human right risks related to palm oil cultivation in Indonesia (chapter 9).

In order to face both, environmental and social risks of upstream oil palm cultivation in Indonesia, in recent years, numerous palm oil certification schemes and roundtables (Austin et al. 2017) were developed and applied within the value chain of palm oil from Indonesia. The purpose of this study is to analyse the ambition and effectiveness of a set of palm oil value chain certification schemes used in downstream markets in Germany for the environmental, social and economic situation upstream in Indonesia. Therefore, the study firstly introduces the general agro-technical and economic characteristics of oil palm cultivation (chapter 2) that are relevant to evaluate certain aspects of the effectiveness of certification schemes. This is followed by a compilation of the most relevant palm oil certification schemes (chapter 3) and further initiatives and approaches (chapter 4). The theoretical part of the study, then, is concluded by an evaluation of the criteria of the selected certification schemes (chapter 5).

The second part of the study has a more empirical focus on palm oil certification in Indonesia. It mostly reflects the results of an intensive field research mission to the Indonesian provinces West-Java, Riau (Sumatra) and Central and South Kalimantan (Borneo) from 11 – 25 November 2018. After setting the empirical methodological approach (chapter 6), the focus is on general economic characteristics of palm oil from Indonesia from the perspective of the supply side. This is followed by an analysis of environmental (chapter 8) and social (chapter 9) impact of palm oil production in Indonesia. According to the following levels of the value chain, chapter 10 follows characteristics of local collection and trade of palm oil in Indonesia. Beyond certification, in chapter 11 alternative instruments and approaches to foster sustainability in the palm oil sector are compiled followed by the discussion of the results in chapter 12 and the closing conclusions in chapter 13.

The report is complemented by the documentation of two good practice examples of downstream companies in Germany in the Annex A (chapter 14).

2. About Palm Oil

Palm oil is a vegetable oil produced from the fruits of the oil palm (*Elaeis guineensis*, commonly referred to as African oil palm). Although palm oil can also be extracted from the fruits of *Elaeis oleifera* (American oil palm) and *Attalea maripa* (maripa palm), the higher yields of *Elaeis* guineensis make it by far the economically most important type of oil palm dominating oil palm plantations throughout the tropics[1]. While palm oil is produced from the pulp of the fruits, the kernels also contain oil of comparable economic value.

2.1. Climate and Soils of Oil Palm Plantations

Oil palms are plants of the humid tropics and have highest growth rates and yields in regions with high temperatures, humid climate and little seasonal changes over the year. Although oil palms can tolerate a certain level of temporary and periodic water deficit and lower temperatures, growth rates and yields are sub-optimal under such conditions. According to (Corley & Tinker 2016), the optimal climatic conditions for the oil palm can be summarized as follows:

- Annual rainfall of 2000 mm or greater, evenly distributed, without any marked dry season and preferably at least 100 mm in each month;
- Small vapour-pressure deficit;
- A mean maximum temperature of about 29-33°C and a mean minimum temperature of about 22-24°C;
- No extreme temperatures or wind speed;
- Sunshine of 5-7h/day in all months and daily solar radiation of 15MJ/m^2.

Oil palms are not very demanding in terms of soil requirements. (Corley & Tinker 2016) lay out that oil palms can tolerate a wide variety of acidity and water status as long as pH-level is above 4 and the soil provides a minimum of organic matter and ion exchange capacity. Exemptions are soils influenced by seawater (saline soils), some deep sandy soils and some low density volcanic ashes where palms are prone to lean or fall. One key factor is soil texture to enable sound development of roots. Here, clays, sandy clays, clay loams and silty clay loams are ideal for oil palms while gravel-content provides disadvantages for root development. Although oil palms can develop roots until a depth of several meters, oil palms can also be grown on shallow soils, presupposing they provide sufficient supply with nutrients, oxygen and water. Although peat soils have long been regarded us unfavourable for oil palms due to anaerobic conditions and low pH-levels, recent and new oil palm plantations in Indonesia increasingly make use of such soils by applying drainage measures and regulating pH-level and nutrient status (Corley & Tinker 2016).

2.2. The Life-Cycle of Oil Palms and Oil Palm Plantations

2.2.1. Seed germination and planting

For oil palm plantations, propagation is mostly done by seeds. Although vegetative propagation from tissue is possible, it still provides various challenges and is therefore rarely applied beyond experimental level.

[1] In the further analysis, term ‘oil palm’ is used as synonym for *Elaeis guineensis.*

Under natural conditions oil palm seeds germinate sporadically after a period of dormancy that can last up to several years. In plantations seeds are usually germinated using the dry heat method that involves heating at 37-39°C for 50 days and a subsequent increase of moisture. After germination, seedlings are planted in a nursery where plants are grown for 10 to 16 months before being transferred to the plantation. In the nursery, seedlings are mostly planted in soil filled polyethylene bags. In the very initial nursery phase, seedlings are mostly protected against direct sunlight to prevent overheating. Irrigation and weed control (mostly manually) are important aspects of nurseries.

In areas with no pronounced seasonality, young palms can be transferred to the plantation at any time of the year. In other areas, transplanting is preferably done in the rainy season and ideally shortly before a period with pronounced rainfall. Palms are usually arranged in triangular formations with 7.5m to 10m between two palms. This results in a density of 115 to 205 palms per hectare (Corley & Tinker 2016).

2.2.2. Growth and development

After around two years (around 2 years after being transplanted to the plantations) palms start developing a trunk. Annual growth-rates of palm height depend on the ecological conditions and vary between 25 and 50 cm (Verheye 2010). When the palms are well established in their newly planted environments they develop one inflorescence in the axil of each newly formed leaf. While oil palms are monoecious (male and female flowers occur separately on the same plant), young palms typically first develop male inflorescences (Corley & Tinker 2016). At a later stage, each inflorescence may be male or female and some of them are aborted before anthesis. The timespan from leaf initiation to harvest of ripe fruits of the related female inflorescence is around 26 to 44 months (Corley & Tinker 2016). The first fruit bunches of a young oil palm are typically quite small and have a poor oil / bunch ratio (Corley & Tinker 2016) so that reasonable harvest are usually achieved 4 years after planting (Obidzinski et al. 2012).

The fruit bunches are located in the axils of the palm leaves and may contain between 1,000 and 4,000 fruits. Mature bunches weights typically range between 15 kg and 25 kg but can occasionally reach 50 kg (Verheye 2010).

Oil palms can reach ages of up to 200 years (Verheye 2010) can reach heights > 30 m. Nevertheless, in commercial plantations old and tall oil palms provide some challenges:

- Fruit bunches are more difficult to be harvested from tall palms. This applies for the identification of the ripeness and the right harvesting time, as well as for the process of cutting the fruit bunches.
- In addition, the falling height during the harvesting process often causes damages and losses of fruits.
- While older palms develop larger fruit bunches, the individual fruits have varying ripeness. In this context, palm oil from larger fruit bunches is sometimes of lower quality compared to those of smaller bunches.
- Development of new palm varieties cause younger palm generations to be more productive compared to older varieties.

For these reasons, oil palms are commonly replanted after 20 to 25 years (Corley & Tinker 2016).

2.2.3. Maintenance

Maintenance activities mainly encompass the management of the vegetation cover between the palms, pruning and fertilization. Irrigation is uncommon on oil palm plantations. Although water deficit can negatively affect yields (see section 2.1), irrigation is costly and mostly does not justify related investments in the Indonesian context. The main maintenance activities are shortly described in the following paragraphs:

- A main maintenance task is the management of the vegetation cover between the palms. A low vegetation cover is desired to prevent soil erosion and to support a preferable soil structure. Erosion control is particularly relevant in the first 4 to 5 years of palm growth where much of the surface soil is not yet protected against direct rainfall by the palm leaves. On the other side, certain species and higher vegetation are undesired due to their competition with palms over sunlight, water and nutrients. Due to their ability to fix nitrogen, many plantations promote a cover of leguminous creepers. Typically, this leguminous cover declines over the years when palms form an increasingly dense canopy reducing sunlight for the lower vegetation level. In this mature state of plantations management of vegetation cover is either done manually or, increasingly common, by the application of herbicides. Management of vegetation cover is also required to maintain accessibility of the palms.
- Pruning is another maintenance task to be conducted routinely. While some plantations prune up to the fruit bunch to allow easy visible inspections of ripeness, research has shown that this practice is likely to reduce yields as it involves the pruning of green leaves. Therefore, most plantations conduct less intensive pruning mostly focusing on dead leaves.
- Application of fertilizer is done to improve palm yields. While the type of fertilizer strongly depends on the type and nutrient status of the soil, empty fruit bunches (EFBs) are readily available from the palm oil mills and allow a recycling of nutrients. Palm oil mill effluents (POME) can also be applied as fertilizer but are – from a logistical perspective – more difficult to be evenly applied on plantations. As EFBs have a comparably low nitrogen status, it can be mixed with the much N-richer POMEs to produce compost. Although such compost production requires additional processing, it was shown to have economic benefits over the application of fertilizers with comparable nutrient contents (Corley & Tinker 2016). This management option was also identified as being an environmentally preferable option as it recycles nutrients while avoiding methane-emissions that are potentially generated during dumping of EFBs and pond-storage of POME (Stichnothe & Schuchardt 2010).

2.2.4. Harvesting

In oil palm plantations, harvesting is a constant task as there is no pronounced seasonality for ripe fruit bunches (Scholz 2004). Fruit bunches are harvested when some of the fruits are already loose. Bunch-specific harvesting time is a critical factor for maximizing economic return that is strongly determined by oil quality and volume. To determine the right harvesting time, regular visual inspections of palms and fruit bunches are necessary.

Harvesting is done manually using chisels for smaller palms where fruit bunches are easily accessible and by using hooked knifes mounted on poles for larger palms. While it should be avoided to cut any green leaves during the harvesting process of young palms, harvesting of taller palms typically require the removal of lower leaves to get access to the bunches (Corley & Tinker 2016).

Due to the quite complex geometry, the harvesting process could not yet be mechanized and remains quite labour intensive.

2.2.5. Use of fertilizers, pesticides and alternatives

Fertilizers represent a reportedly high share of the total cultivation costs of palm oil. Accordingly, companies and smallholder associations in Indonesia report shares of more than 60% of the variable cost of a palm oil plantation due to fertilizers. Reportedly, the special challenge of environmentally-friendly planation management refers to an optimization of a mineral and organic fertilizer use to maximize yields by suitable applications that mitigate additional leaching into the ground water.

Typical fertilizers on palm oil plantations are (Rival & Levang 2014):

- Conventional fertilizers made from petrochemical products and from non-renewable mineral sources,
- Biomass and by-products generated in plantations and oil mills can be recycled and used as organic fertilizers

According to (Rival & Levang 2014) over the lifetime of a planation of 20 years, around 850 kg of fertilizer are used per hectare in Indonesia. Reportedly, it is particularly the use of compost (e.g. empty fruit bunches) from oil mills that have a great potential to reduce this number (see Figure 2-1).

Figure 2-1: Compost (Empty Fruit Bunch) used as fertilizer on a palm plantation

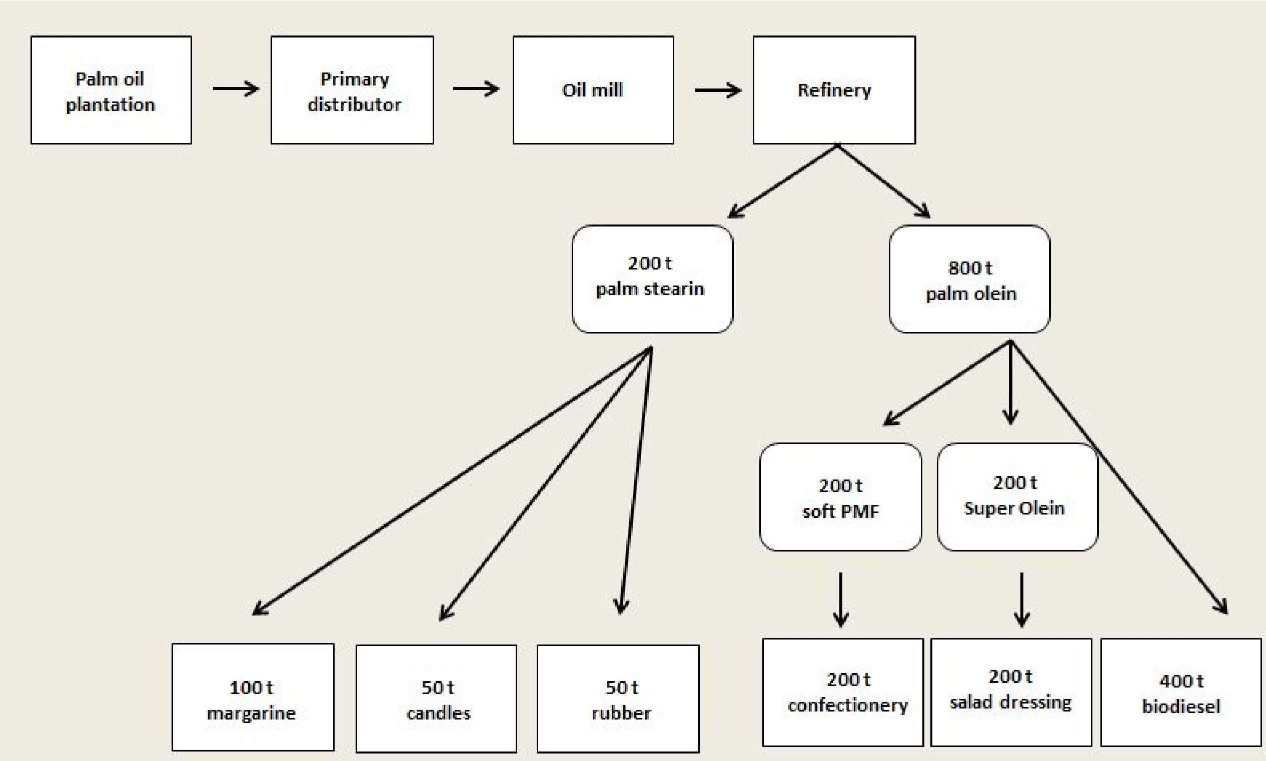
Source: Oeko-Institut (2018)

According to (Rival & Levang 2014) the use of pesticides in oil palm cultivation is limited to herbicides on new plantations to control growth or create harvesting paths. Furthermore, in parts of South East Asia (SEA) it is common to use rat poison. However, it is more and more replaced by an integrated pest management approach (IPM) introducing barn owls (Tyto Alba) that are natural predators of rats. A successful application of a special fungus (Cordyceps) as a substitute for pesticides on oil palm plantations has also been reported from Indonesia in this context.

2.3. Processing, Refining & Outputs

Figure 2-2 shows a simplified, exemplary supply chain of palm oil and its possible use in the sectors (1) food and feed, (2) bioenergy and material use. After cultivation on the palm plantation, the harvested fruits are sold (or transferred to company owned mills) on to the oil mill by a collector and processed to crude palm oil (CPO) there (see also chapter 10).

Figure 2-2: General simplified palm oil supply chain



Source: Oeko-Institut e.V.(2018).

The next steps of the value chains are related to further processing of palm oil in a refinery to palm stearin, palm olein and subsequently to other palm oil derivatives. These derivatives are used to produce final products in three sectors food, feed and bioenergy.

From Indonesia's particular perspective, the palm oil's high economic value is represented by its intermediate products such as Crude Palm Oil (CPO) and Palm Kernel Oil (PKO). Derivatives from crude palm oil (CPO) include cooking oil, margarine, cake fat, cosmetics, lubricants, detergents, carbohydrate sources for the oleo-chemical industry. In turn, palm kernel oil (PKO) has derivative products such as fatty acids and lauric acids (Pahan 2012). For further details of the complex processing and downstream products of palm oil see (Norazura et al. 2017).

2.4. Uses and Downstream Markets

In order to follow the value chain of palm oil to downstream markets, in this section the most relevant uses and markets for palm oil products with a focus to Germany are sketched.

According to (Meo Carbon Solutions 2018) the most relevant economic sectors demanding palm oil in Germany are:

- Food
- Feed
- Bioenergy
- Washing, care and cleaning agents (WPR) and cosmetics
- Other chemistry and pharmacy.

2.4.1. Food

In 2017, 246,500 tonnes of palm oil and 30,100 tonnes of palm kernel oil were consumed in the food sector (Meo Carbon Solutions 2018). Around 85% of them were certified by a sustainability scheme (e.g. RSPO, ISCC, EU-Bio, see chapter 3). The most important segments in this sector are margarine and spreads, bakery products, confectionery, convenience foods, meat products as well as fast food products and other gastronomic products.

2.4.2. Feed

In Germany, the feed sector consumed around 148,250 tonnes of palm oil in 2017 (Meo Carbon Solutions 2018), but only 26% were certified by a sustainability scheme. The most important segments are livestock feed and domestic animal feed.

2.4.3. Energy

In the bioenergy sector, 581,400 tonnes of palm oil was consumed in 2017 in Germany. By far the most significant segment is transport, in which 523,000 tonnes of palm oil was used as biodiesel or HVO. In addition, 58,300 tonnes of palm oil was consumed as biofuel for power generation (Meo Carbon Solutions 2018).

2.4.4. Washing, care and cleaning agents (WCC) and cosmetics

For the production of products in the sector WCC and cosmetics mainly palm kernel oil derivatives are used. Therefore, in 2017, 73,680 t of palm kernel oil and 30,260 t of palm oil added up to more than 100,000 t palm (kernel) oil-based derivatives. The most important segment in this sector is the household, washing, care and cleaning products sector, with a consumption of more than 40,000 t of palm kernel oil (Meo Carbon Solutions 2018).

2.4.5. Other chemistry and pharmacy

The sector “other chemicals and pharmaceuticals” is divided into a total of eight segments, which consumed around 120,000 tonnes of palm oil and 15,000 tonnes of palm kernel oil in 2017. The most important segment of the chemical industry where palm oil is used is candle production. In Germany, over 86,000 tonnes of palm oil were consumed as part of candles in 2017. In addition, the segments “rubber” and “biolubricants” are of great importance in which almost 10,000 t of palm oil (and in the biolubricants segment another 10,000 t of palm kernel oil) were consumed.

3. Certification Schemes for Palm Oil

In the following sections, the most prominent sustainability certification schemes and roundtable initiatives that are applicable for palm oil, are introduced and sketched. A comprehensive evaluation of the schemes is provided in section 5.

3.1. Roundtable on Sustainable Biomaterials (RSB)

The Roundtable on Sustainable Biomaterials (RSB 2018) is an independent and global multi-stakeholder coalition which works to promote the sustainability of biomaterials, including biomass and biofuels. Starting with the development of principles for sustainable biofuels production in 2007, RSB further expended its scope in 2013 to include all biomaterials.

The RSB-Standard has been designed and continuously developed to support certification in all contexts of biomass and anywhere in the world. It sets out the general requirements for operations, producing, converting and processing biomass, biofuels or biomaterials. The standard consist of 12 principles covering environmental (e.g. greenhouse gas emissions) and social issues (see chapter 5).

In principle, the RSB-Standard can be applied to any type of biomass, including palm oil. However, currently there is no RSB-certified palm oil available (Hennenberg 2018).

3.2. Roundtable on Sustainable Palm Oil (RSPO) & RSPO next

The Roundtable on Sustainable Palm Oil (RSPO 2018) was established in 2004 on an initiative of the World Wildlife Fund (WWF). RSPO is a non-profit organisation. It is based on the engagement of stakeholders and has more than 3,000 members worldwide. RSPO has developed a set of environmental and social criteria which companies must comply with in order to produce Certified Sustainable Palm Oil (CSPO). The application of these criteria shall minimize negative impacts from palm oil cultivation on the environment and communities in palm oil-producing regions. In 2017, almost 19% of palm oil on the world market was certified according to RSPO criteria (FONAP 2018b).

The European Renewable Energy Directive (RED, see section 3.7) covers sustainability requirements that are not comprehensively addressed by RSPO. Consequently, an additional set of criteria, the so called RSPO-RED requirements, have been developed under RSPO to achieve compliance with the RED. RED compliance is necessary, if palm oil is used for bioenergy in the European Union.

Under the head of RSPO members can extend their certification by voluntary criteria called RSPO-NEXT. The additional focus of RSPO-NEXT on deforestation the aspects (1) no fire, (2) no planting on peat, (3) reduction of greenhouse gas emissions and (4) respect for human rights and transparency. For an evaluation of both schemes as well as a conclusion, see section 5.

3.3. International Sustainability & Carbon Certification (ISCC)

In the course of the EU Renewable Energy Directive's sustainability requirements for biofuels (RED 2009), the German Government promoted the establishment of the International Sustainability and Carbon Certification (ISCC) system for certifying biofuels. ISCC started operation in 2010 focussing on biofuels. Today, ISCC is a globally applicable certification system covering the entire supply chain and all kinds of bio-based feedstocks and renewables. The ISCC standard addresses ecological and social sustainability requirements, greenhouse gas emissions savings and traceability throughout the supply chain (see section 5.2). In parallel to RSPO, ISCC plays an important role in the certification of palm oil (ISCC 2018).

3.4. Indonesian Sustainable Palm Oil System (ISPO) & Indonesian Sustainable Palm Oil Forum (FoKSBI)

In 2009, the Government of Indonesia (GoI) has introduced a mandatory standard, called Indonesian Sustainable Palm Oil (ISPO). ISPO aimed, in a stepwise approach, to reach ambition levels of international certification schemes like RSPO. However, ISPO is not yet recognized on international CPO markets in a comparable way, as the level of ambition is still lower (see section 5.2).

Nevertheless the ISPO scheme promotes sustainable palm oil production as follows. Under ISPO a set of seven principles (see below) have been defined which are further specified by corresponding criteria for different aspects of oil palm production. They basically refer to prescribing actions that are expected by the stakeholders in the oil palm value chain. During the introduction of ISPO, the Indonesian Ministry of Agriculture had established an appraisal commission as an authoritative body in order to assess the compliance of stakeholders in the oil palm value chain with ISPO standards. The goal of the Government of Indonesia had been that by 2014 all oil palm companies would be certified under ISPO, which however was not the case.

In particular, the aim of the ISPO scheme is to define standards on the establishment and sustainability management of oil palm plantations including transportation, processing and marketing. These standards are formulated by principles and criteria and are meant to be legal guidelines for sustainable oil palm production. ISPO includes the following principles:

1. Licensing system and plantation management,
2. Technical guidelines for oil palm cultivation and processing,
3. Environmental monitoring,
4. Labor standards,
5. Social responsibility,
6. Empowerment of local communities,
7. Sustainable business improvement.

In 2015, ISPO was revised and became mandatory for palm oil companies and voluntary for smallholder farmers (Ernah et al. 2016). ISPO is regulated under Regulation “Permentan No. 11 / Permentan / OT.140 / 3/2015 concerning the Indonesian Sustainable Palm Oil Certification System” (Fuadah, D. T. & Ernah 2018). Due to a lack of monitoring, however, the credibility of the ISPO standards is generally regarded as low (Brandi 2013).

In 2018, the Government of Indonesia has launched a National Action Plan (RAN) including stakeholders that are members of the Indonesian Sustainable Palm Oil Forum (FoKSBI). FoKSBI is a forum for stakeholder coordination providing input, views and recommendations for action plans. Its role is mainly to encourage economic growth by the development of sustainable oil palm plantations taking into account environmental protection and community welfare. The RAN was designed in line with the government's plan regarding the development of sustainable oil palm plantations. RAN aims to support the achievement of 70% sustainable palm oil development by 2020 based in ISPO (Permentan 11/2015). The National Action Plan (RAN) consists of four main components: (1)

Increased capacity of planters; (2) Environmental management and monitoring; (3) Governance and mediation of conflicts, and (4) Implementation of ISPO and market access (FoKSBI 2017). For the comprehensive analysis and evaluation of the criteria for the ISPO standard see chapter 5.

3.5. Sustainable Agriculture Network (SAN)

With the Rainforest Alliance Certification System (Rainforest Alliance 2018), the Sustainable Agriculture Network (SAN) aims at conserving biodiversity and ensuring sustainable livelihoods by transforming land-use practices, business practices, and consumer behaviour. The SAN certification system can be applied worldwide for agricultural cultivation, including palm oil and animal husbandry systems. SAN distinguishes between 37 ‘critical criteria’ (Level C), which must be fulfilled at a level of 100% in the third year after certification has started. Furthermore, there are 82 ‘continuous improvement criteria’ (Levels B and A). The Level B criteria must be met at 100% in the sixth year after certification, whereas Level A criteria must be met at least 50% by that time.

3.6. EU Organic Certification (EU-Bio)

For the first time in 1991, the European Council issued an EU-wide label for organic food (EU-Bio). The revised certification is based on the requirements given in EU regulation 834/2007 (European Council 2007 2007). It covers ecological requirements for the cultivation of crops (e.g. basically dispenses with synthetic chemical plant protection and with easily soluble mineral fertilizers) as well as animal breeding (e.g. permanent access to open air areas), see also section 5.2. Social issues are not directly addressed; however, some of the criteria (e.g. the restricted use of pesticides) have positive social impacts at the same time.

3.7. EU Renewable Energy Directive (RED-2009)

The EU Renewable Energy Directive (“RED 2009”) (EU 2009) gives minimum safeguards for the production of biofuels and bio-liquids. RED 2009 covers reductions of greenhouse-gas emissions compared to fossil fuels and the mitigation of negative impacts on areas of high biodiversity value, such as primary forests, protected areas, and highly biodiverse grasslands, and for areas of high carbon stock like wetlands, forests, and peatlands. Globally mandatory criteria on water, soil and social aspects for agriculture and forestry production are excluded under RED 2009 to avoid conflicts with rules of the World Trade Organization (WTO).

The European Commission has approved a number of voluntary certification schemes that demonstrate compliance with the RED 2009 criteria (EU 2019). Besides RSB, RSPO and ISCC (see above) also the following schemes apply to palm oil under RED 2009: NTA 8080 (Dutch scheme based on NTA 8080-1:2015), 2BSvs, Biomass Biofuels voluntary scheme (The association 2BS 2019) and HVO-VS, Renewable Diesel Verification Scheme, (HVO Verification Scheme 2019). For a comprehensive evaluation of the schemes, see section 5.2.

By the end of 2018, the recast of RED 2009, the so called RED II (European Parliament 2018), has been adopted by the European Parliament. RED II shall apply from 2020 to 2030. With regards to palm oil, RED II has implemented a systematic fade out of bioenergy related with high indirect land-use change-risks produced from feedstock for which a significant expansion of the production into land with high-carbon stock is observed until 2030. Oil crops and especially palm oil, are very likely covered by this criterion (Searle, D. & Giuntoli, J. 2018).

4. Further Initiatives & Approaches

Besides the above-mentioned standards and certification schemes, there are further initiatives and approaches, which aim to make the production of palm oil more sustainable. The following sections give a short overview of existing initiatives and approaches, which are of specific relevance for the German and European market.

4.1. The Forum on Sustainable Palm Oil (FONAP)

The Forum on Sustainable Palm Oil (FONAP) is a multi-stakeholder initiative consisting of altogether 52 companies, NGOs, associations and the German Federal Ministry for Food and Agriculture (as of Dec 2018). It was founded in 2013 and aims at an increase of the proportion of certified palm oil on the German, Austrian and Swiss markets. FONAP members have committed to increase the share of certified palm oil, palm kernel oil, and fractions and derivatives with different time and quantity goals for the different supply chains in public (FONAP 2018a). Furthermore, the improvement of existing standards and certification schemes for palm oil is a self-declared goal. In this context, FONAP was inter alia involved in the latest revision of the RSPO principles and criteria (see chapter 14). FONAP is an official supporter of the Amsterdam Declaration (Amsterdam Declaration on Eliminating Deforestation & fully Sustainable Palm Oil Supply Chain by 2020), whose member countries Germany, the Netherlands, the UK, Denmark, Norway, France and Italy at the time of signature (2015) pledged to use 100% certified palm oil by 2020 (European Palm Oil Alliance 2018)

4.2. Palm Oil Innovation Group

The Palm Oil Innovation Group (POIG) was founded in 2013 and is a multi-stakeholder initiative comprising of NGOs, palm oil growers, retailers, manufacturers and members with vertically integrated production, processing and trade operations[2]. It builds upon the Roundtable on Sustainable Palm Oil (RSPO) and supports the implementation of the RPO principles and criteria. Additionally, it is a self-declared goal to create and promote further innovations in the palm oil industry as for example labour rights innovations. The POIG aims to support the inclusion of these additional aspects into existing standards and certification schemes. In order to enable market recognitions for the compliance with the POIG charter and verification indicators, POIG developed an auditable framework (POIG 2018).

4.3. High Carbon Stock Approach (HCSA)

The High Carbon Stock Approach (HCSA 2018), published in 2015, is a pragmatic land use planning tool to identify high carbon stock forests and to protect them against deforestation focussing on tropical forest countries. It aims at respecting customary rights and meeting community needs while at the same time considering the company's operational reality. In short, the approach offers a paradigm shift to include forest conservation as a cornerstone of any expansion of agriculture in tropical forest landscapes (HCS Approach Steering Group 2015).[3] The approach shall be used by plantations and supply chain actors to reduce their impact by not clearing or purchasing goods from HCS forests (HCSA 2018). The HCSA methodology can be combined with the HCVA (see Section 4.4). It is interlinked, e.g., with the RSPO, and has been integrated as an integral part in

2 A list of POIG members can be found here: http://poig.org/about-the-palm-oil-innovation-group/poig-members/ ; last accessed 11.12.2018.

the 2018 revision of the RSPO Principles & Criteria (HCSA 2018). The HCSA methodology is interlinked with the RSPO, and has been integrated as an integral part in the 2018 revision of the RSPO Principles & Criteria (HCSA 2018).

4.4. High Conservation Value Area (HCVA)

High Conversation Values (HCVs) (HCV 2018) "[…] are biological, ecological, social or cultural values which are outstandingly significant or critically important at the national, regional or global level" (HCV 2018)(HCV Resource Network 2018). In total, the High Conservation Value Approach (HCVA), covers six HCVs:

- Species diversity
- Landscape-level ecosystems and mosaics
- Ecosystems and habitats
- Ecosystem services
- Community needs
- Cultural values

The HCV Approach is a three-step methodology that is referenced as a tool for achieving the protection of High Conservation Values (HCVs) primarily in prospective forestry and agricultural areas. The three steps include identification, management and monitoring. Since 2015, the Roundtable on Sustainable Palm Oil (RSPO) (see section 3.2) requires oil palm growers to hire Licensed Assessors to conduct HCV assessments before establishing any new oil palm plantings (HCV 2018). In practice, HCV assessments are often carried out together with HCSA assessment (see section 4.3).

4.5. BioGrace

The BioGrace voluntary scheme (Biograce 2018) is a comprehensive, user-friendly GHG calculator based on Excel that can be used for GHG calculation of biofuels. BioGrace is in line with the sustainability criteria of the Renewable Energy Directive (RED 2009) and has been recognised as a voluntary scheme by the European Commission. Biofuel suppliers can use BioGrace to show compliance with RED 2009's GHG reduction criteria and can combine BioGrace with other certification schemes covering the other sustainability criteria of RED 2009.

5. Evaluation of Certification Schemes

5.1. Evaluation Method

In this chapter, the certification schemes described in chapter 3 and 4 are evaluated. The applied evaluation method is primarily based on ISO 13065 "Sustainability criteria for bioenergy". This international standard specifies principles, criteria and indicators for bioenergy supply chains to facilitate assessment of environmental, social and economic aspects of sustainability. However, ISO 13065 is not a standard of its own. Rather, it defines the framework conditions in which bioenergy standards should be developed. Because ISO 13065 focusses on agricultural bioenergy production, it can also be applied to standards that certify the cultivation of palm oil.

The evaluation method used here asks to what extend the criteria as well as given examples for indicators given in ISO 13065 for environmental and social aspects are covered in a standard. Furthermore single aspects covered in the European Renewable Energy Directive (RED 2009) but missing in ISO 13065 (compare Table 5-1) were included.

Each aspect was evaluated between 0 and 100, whereby a score of 100 means that the indicators and requirements in ISO 13065 or RED 2009 are 100% fulfilled. With a rating of 0, the aspect is missing in the evaluated standard.

In addition to environmental and social aspects, systematic requirements are evaluated. They cover the applied type of supply chain monitoring (segregation, mass balance or book and claim), if the reliability has been proven by the EU Commission or if the standard has the membership of ISEAL (ISEAL 2018), and to what extend data collection requirements given in ISO 13065 are covered.

Table 5-1: Evaluation method: Applied criteria

Criterion	Source
Environmental aspects	
Biodiversity outside of protected areas	ISO 13065
Soil quality and fertility	ISO 13065
Soil erosion	ISO 13065
Water withdrawals	ISO 13065
Water contamination	ISO 13065
Air emission	ISO 13065
Waste management	ISO 13065
Obligation to Lable GMO	ISO 13065
Additional environmental aspects from RED 2009	
Biodiversity within protected areas	RED 2009
GHG-balance	RED 2009
Land with high carbon stock	RED 2009
Social aspects	
Human rights	ISO 13065
Labour rights	ISO 13065
Land use rights and land use change	ISO 13065

Criterion	Source
Water use rights	ISO 13065
Food security	ISO 13065
Systematic requirements	
Supply chain monitoring	RED 2009
Reliability of certification systems	RED 2009, ISEAL
Requirements for data collection	ISO 13065

Source: Oeko-Institut, based on ISO 13065 and RED 2009

5.2. Results

The evaluation of the palm oil and biomaterial standards is summarized in Figure 5-1. The following point can be highlighted:

- The RSB certification system – originally developed for the certification of biomaterials and bioenergy – achieves very high ratings for the various requirements and aspects, with scores usually exceeding 80 percent points.
- The ISCC-Plus certification system can also be regarded as ambitious. However, there are weaknesses for individual requirements. For example, the ISCC-Plus is evaluated with less than 50 points for three environmental aspects (water withdrawals, water contamination, air-emission) and for three social aspects (land use rights and land use changes, water use rights, food security).
- Also the RSPO certification system covers most evaluation criteria with high scores. However, deficits have been recognized for water protection and air emission issues. Also, RSPO offers no GHG-balancing and does not sufficiently guarantee that no conversion of areas with high carbon stock – forests and wetlands – takes place. However, the RSPO-RED extension coverers the latter two gaps, whereas RSPO-NEXT is less ambitious on these issues.
- The SAN standard reaches relatively high scores for environmental evaluation criteria with a mean score of 73, but social issues (with a mean score of 31) are not well addressed. In addition, GHG-balancing is missing, and the protection of areas high carbon stock is not sufficiently addressed.
- The ISPO standard has been evaluated for both environmental and social aspects with low scores indicated by the mean scores of 19 and 27, respectively. Also the protection of areas of high carbon stock and even the protection of biodiversity within protected areas reach low scores.
- With regards to further RED-related standards, the Dutch NTA 8080 reaches quite high scores for all issues similar to ISCC and RSPO. However, the 2BSvs and HVO-VS standards strongly focus on complying with the RED criteria only. Consequently, they hardly cover the evaluated environmental and social issues.
- The evaluation of the EU organic label (EU-Bio) is very poor. All social requirements and the RED 2009 criteria are missing and all environmental aspects are rated below 20 scores. However, aspects such as the elimination of the use of mineral fertilizers and pesticides, on which the EU organic label focuses, are only considered indirectly in the evaluation criteria.

- High Carbon Stock and High Conservation Value Approaches (HCS/HCV) reach high scores for the evaluation criteria related to the protection of biodiversity and carbon stock. The BioGrace approach fulfills GHG-balancing requirements.

In sum, it should be noted that the standardized assessment based on the ISO 13065 standard in combination with RED 2009 clearly shows that the extent to which environmental and social aspects are covered can vary considerably between standards.

With regards to the evaluated standards that are applicable for the certification of palm oil, standards like RSB, ISCC, RSPO and NTA 8080 show a high degree of compliance with the requirements set in the evaluation showing that an ambitious design of standards is possible. However, in particular the RSB is so ambitious, that by today (February 2019), no palm oil plantation is certified according to the standard. Consequently, the effectiveness of standards that are too ambitious, in combination with the fact that its use is purely voluntary, can approach towards zero if not used at all (.

Finally, the standard SAN performs well for environmental issues, but shows deficits for social issues. In contrast, the design of other evaluated standards, namely ISPO, 2BSvs, HVO-VS and the EU organic label is comparatively low compared to the evaluation criteria.

Figure 5-1: Evaluation of palm oil standards

Certification system	RSB	RSPO-RED	RSPO-NEXT	RSPO	ISCC	NTA 8080	SAN	ISPO	2BSvs	HVO-VS	EU-Bio	BioGrace	HCV/HCS
Version	Version 3.0 (2016)	RSPO P&C (2013)	RSPO P&C (2013)	RSPO P&C (2013)	Version 3.0 (2016)	NTA 8080-1 (en) (2015)	Version 1.2 (2017)	11/Permentan/OT.140/3/2015 (2015)	Version 2.1 (en) (2016)	neste oil (2013)	EG 834/2007 (2007)	Version 4d (2015)	ALS_02_N (2017)
Product	all products	palm oil	palm oil	palm oil	all products	all products	all products	all products	all products	all products	all products	all products	all products
Geographic context	global	global	global	global	global	global	global	Indonesia	global	global	global	global	global
Particular assumptions	--	--	--	--	--	--	--	--	--	--		GHG only	Biodiversity and carbon stock only
Systematic requirements (RED)													
Supply chain monitoring	Segregation, Mass balance	Mass balance	Segregation, Mass balance	Segregation, Mass balance	Mass balance	Mass balance	Segregation	Book and Claim / Content Ratio Accounting	Mass balance	Mass balance	Segregation		
Reliability of certification systems	100	100	100	100	100	100	100	0	100	100	100	100	33
RED requirements													
Biodiversity inside protected areas	100	100	100	100	100	100	100	33	100	100	0		100
GHG-balance	100	50	0	0	100	100	0	50	50	50	0	50	
Land with high carbon stock	100	100	78	0	100	100	33	11	100	100	0		67
Environmental aspects													
Mean value of environmental aspects	91	69	69	69	59	72	73	19	6	0	9		95
Biodiversity within the area of operation, outside protected areas	88	100	100	100	60	100	100	18	0	0	11		95
Soil quality and productivity	94	81	81	81	88	77	79	25	10	2	15		
Soil erosion	100	83	83	83	100	100	100	25	8	0	8		
Water withdrawals	100	33	33	33	38	88	71	17	8	0	0		
Water contamination	88	71	71	71	45	32	62	17	8	0	19		
Air emission	94	33	33	33	0	50	0	17	8	0	8		
Waste management	75	83	83	83	83	58	100	14	0	0	0		
not included in the mean value													
Obligation to lable GMO	33	0	0	0	100	33	100	0	0	0	100		
Social aspects													
Mean value of social aspects	91	92	93	92	54	55	31	27	3	0	0		
Human rights	100	100	100	100	100	0	0	0	0	0	0		
Labour rights	87	87	93	87	100	77	87	73	17	0	0		
Land use rights and land use change	100	100	100	100	17	25	50	50	0	0	0		
Water use rights	100	72	72	72	22	72	17	11	0	0	0		
Food security	67	100	100	100	33	100	0	0	0	0	0		
Systematic requirements													
Requirements for data collection	83	8	8	8	0	100	58	0	33	0	50	100	83

Source: Oeko-Institut

6. Methodical Approach of the Field Research in Indonesia

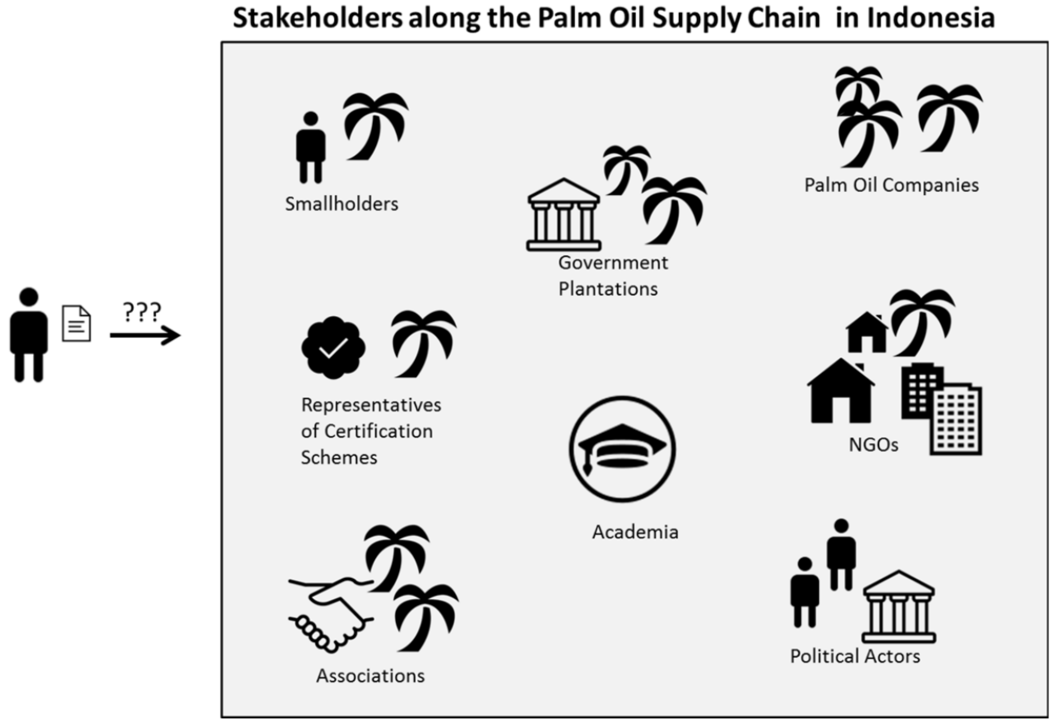
Firstly, the regions visited for field-research on palm oil in Indonesia were selected based on volumes of palm oil production. Accordingly, as most of the Indonesian palm oil is produced in Sumatra and Kalimantan (Obidzinski 2013) the respective regions were chosen for field-visits for stakeholder interviews between 11 – 25 November 2018. West-Java (especially the country's capital Jakarta) was visited because numerous policy-related actors are based there. Altogether, the interviews were conducted in the following cities and surroundings: Bogor and Jakarta (Province West-Java), Pekanbaru (Province Riau), Pankalan Bun (Province Central Kalimantan), Banjamarsin (Province South Kalimantan) and Bandung (see Figure 6-1).

Figure 6-1: Selected regions for field research in Indonesia

Source: *Map data ©2019 Google*

The selection of stakeholders aimed to cover the main relevant actors along the Indonesian palm oil supply chain with a special upstream focus (palm oil plantations). It covered different production systems (see section 7.2), including smallholders, government and commercial plantations, but also representatives of certifications schemes, academia, NGOs, associations and political actors (see Figure 6-2). Palm oil producing actors were selected in order to make sure that experiences with the certification schemes that are currently applied in Indonesia were covered. Furthermore, producers that currently hold several certifications were interviewed. This allowed for learnings about the differences between existing schemes, either in practical implementation or underlying motivation.

Figure 6-2: Selection of Stakeholder Groups for Interviews



Source: Oeko-Institut (2018).

After the identification of suitable interview partners, two (semi-structured) questionnaires were developed. Based on the variety of stakeholders, it was decided to prepare focussed questions for palm oil producers (e.g. farmers) and policy makers and related actor (e.g. government, NGOs etc.; see Figure 6-3). For example, palm oil producers were asked about their motivation to participate in (different) certification schemes, the standard's practical impact they experienced and their role and impact they have in the certification schemes. Also, policy makers were asked about their role and impact on existing certification schemes and the overall impact they experienced of palm oil standards and other approaches in Indonesia. Furthermore, they were asked about the current state of palm oil production in Indonesia and how the supply chain is currently organized.

Figure 6-3: (Semi-structured) Questionnaires used for field research

Questionaire for farmers

- Motivation to participate in certification scheme
- Impact of the certification schemes on farmers
- Role / impact of farmers in certification schemes

Questionaire for policy makers

- Status quo: Palm oil production / supply chain in Indonesia
- Impact of palm oil standards / due diligence in Indonesia
- Role / impact of the governance in certification schemes

Source: Oeko-Institut (2018).

As a first step, all interview transcripts were verified with the informants. Secondly, the answers of different stakeholders compared systematically compared with each other. Thereby, contradicting and conflicting information, as well as similar answers, were identified. These empirical results, including differences and consensus opinions are pointed out within the next chapters.

7. Palm oil Production in Indonesia

7.1. History and Economic Relevance of Palm Oil Production in Indonesia

The oil palm was introduced into the Indo-Malayan archipelago during colonial times. In 1848 four seedlings were planted in the Bogor Botanic Gardens in West-Java and seeds from these palms were used for subsequent introduction of the palm to other parts of Indonesia (Corley & Tinker 2016). Until 1911 these plantations either had an ornamental character (allies, gardens…) or served experimental purposes to explore potential economic exploitation. One of these experimental plantations was located in Deli, Sumatra, and the progenies of this plantation (‘Deli palms’) were used for most Indonesian palm oil plantations in the coming decades. The first large scale plantation was set-up in 1911 in Sumatra and planted areas reached 110,000 ha in 1940 (Corley & Tinker 2016). During World War II and the independence struggles, oil palm expansion stalled and only slowly regained pace after independence. In 1957 remaining Dutch owned plantations were transferred to government owned companies (Amzul 2011) but yields per hectare were low (Corley & Tinker 2016). In 1968, the central government started to invest in the palm oil sector through its state run company Perseroan Terbatas Perkebunan (PTP). While production was mainly concentrated in North Sumatra, in the 1980s the government started to expand palm oil production to other areas of Indonesia, particularly to Kalimantan and Papua (Amzul 2011).

The government’s role in developing the palm oil sector has been crucial. This strong government role goes back to the Agrarian Law imposed by the Dutch government in 1870 that declared that all land without proof of ownership was the property of the state. Effectively, this brought large parts of Indonesia’s forests into government ownership where it mostly remained until today. Based on this ownership model, the government either developed the land with own enterprises, or issued concession permits to private companies for pre-defined time periods while retaining ownership of the land (Leonald & Rowland 2016).

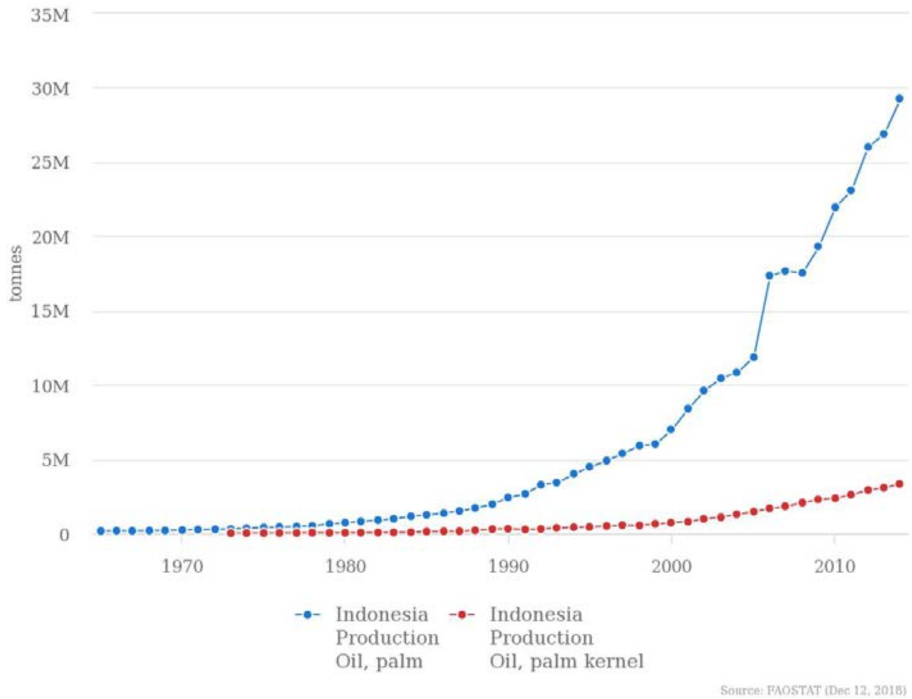
The development of palm oil production in the 1980s and 1990s is closely linked to the Indonesian *Transmigrasi* programme that resettled several million landless people from densely populated Java, Bali and Madura to less populated islands. While the Transmigrasi programme had the aim to reduce overpopulation in Java, Bali and Madura, it also had the goal to reduce poverty by providing farming opportunities to landless poor, and to better utilise natural resources in sparsely populated areas such as Sumatra, Kalimantan (Indonesian part of Borneo) and Sulawesi. In 1983 the palm oil sector was entrusted to the Ministry of Transmigration who introduced a palm oil development model where companies (often the government owned PTP) were given free access to land (mostly 5,000 to 10,000 ha of government forest). In return, the companies were required to develop this land according to a nucleus–plasma model[4]: While the nucleus (inti) formed the core of the plantation including the processing infrastructure, the companies also had the obligation to support the development of smallholders in the outer parts of the plantations (plasma) (Rival & Levang 2014; Amzul 2011). This scheme Nucleus Estate and Smallholders model (locally called *Perkebunan Inti Rakyat – PIR*) was supported by the World Bank and was almost exclusively designed for Transmigrasi migrants.

In addition to this PIR system, the KKPA-model (Koperasi Kredit Primer Anggota, Members' Primary Credit Cooperative) was developed in the 1990s. Under this model, peasants and smallholders with land titles (mostly forest and bushland) formed cooperatives who met an agreement with a company to develop the land into a palm oil plantation. While part of the area remained under control of the company, a certain share (between 20% and 40%) was given back to the smallholders. These smallholders were obliged to deliver their harvests to the company's oil mill (Rival & Levang 2014). Since around 2000, this development model became rare. Instead, new palm oil plantations were either set up by companies and investors, or by farmers who were able to obtain bank loans by using existing plantations as security (Rival & Levang 2014).

Until the 1980s, government owned companies dominated the oil palm production in Indonesia. During the 1990s, private companies took over this leading role and in 2008 nearly 53% of the Indonesian oil palms were managed by private companies (Amzul 2011). Next to private and government owned companies, also smallholders constantly gained importance in palm oil production with 39% of all oil palms being manged by smallholders in 2008.

[4] The terminology was adopted from the structure of biologic cells with a central nucleus and the surrounding cell plasma.

Figure 7-1: Annual production volume [Mio t] of palm oil and palm kernel oil between 1965 and 2014 in Indonesia

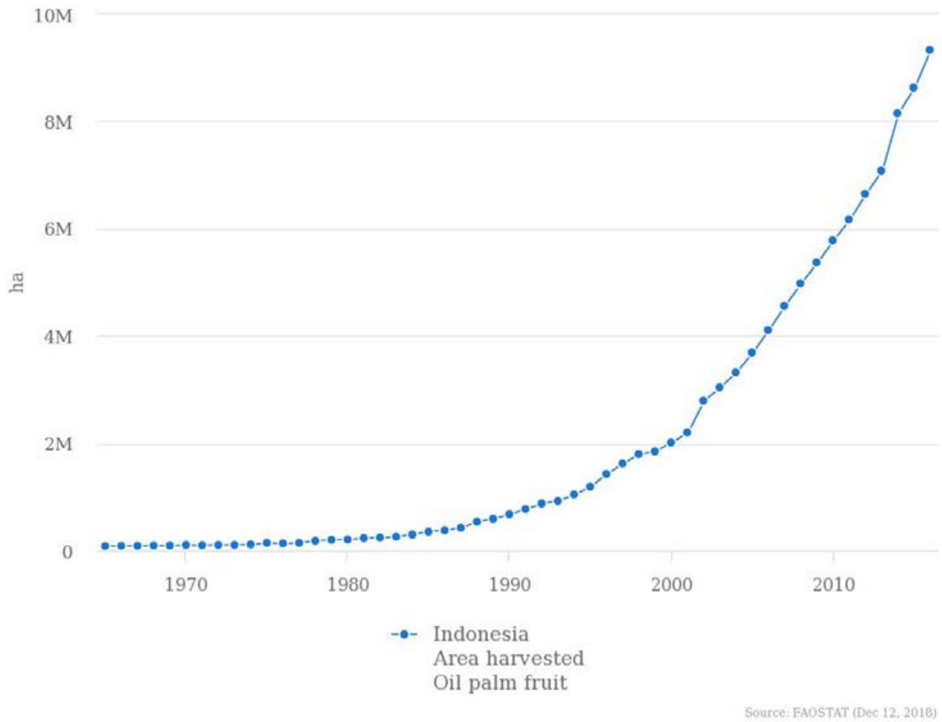


Source: (FAO 2017)FAO (2018). FAOSTAT - Food and agriculture data. Database available at http://www.fao.org/faostat/en/#compare , last accessed on 12 December 2018.

Palm oil production in Indonesia increased exponentially from the late 1960s until today (see Figure 7-1). In the same time the total land area covered by oil palm plantations increased from around 70,000 ha in 1961 to more than 7.4 million ha in 2014 (see Figure 7-2). In total, palm oil plantations covered 4.1% of the Indonesian land area and 17.7% of Indonesia's agricultural land in 2014. In terms of the total size of agricultural land, oil palms are today the most dominant crop in Indonesia after paddy rice[5] (FAO 2017).

[5] Paddy rice farms covered a total area of 13.8 million ha in 2014.

Figure 7-2: Total size of oil palm plantations in Indonesia [Mio. Ha] between 1965 and 2016



Source: (FAO 2017) FAO (2018). FAOSTAT - Food and agriculture data. Database available at http://www.fao.org/faostat/en/#compare , last accessed on 12 December 2018.

This rapid expansion also led to a situation where suitable land for new oil palm plantations is increasingly scarce, motivating new plantations to use peat soils that were originally regarded as unfavourable for oil palm cultivation (Corley & Tinker 2016).

While there is a stable domestic consumption of palm oil (mostly for cooking oil, but also a rising share of biofuels) Indonesian palm oil production always had a strong export focus. In 2013, 76.5% of the Indonesian palm oil and 53.6% of the palm kernel oil were exported (FAO 2017).

Finally, oil palm has a general economic comparative advantage with regards to specific yields. In much of the humid lowland tropics, oil palm production is one of the most economically attractive forms of land use (Budidarsono et al. 2012).

Table 7-1: Average annual oil yields of major oil crops

Oil crop	Average oil yield [t / ha x a]
Oil Palm	3.72
Soybean	0.40
Sunflower	0.55
Rapseed	0.72

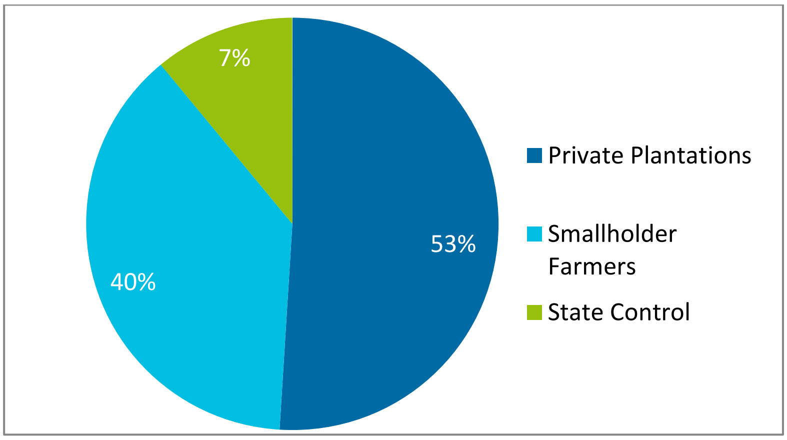
Source: (Shimizu & Desrochers 2012)

This is also due to the high productivity of the oil palm that yields an average of 3.72 t of oil per hectare and year, which is significantly higher than those of other oil crops (see Table 7-1).

7.2. Classification of Agricultural Systems

Generally, there are three types of oil palm plantations in Indonesia: (1) private plantations which comprise about 53% of Indonesia's oil palm production area in hectares, (2) smallholder farmers with around 40% and (3) production under state control with just 7% (see Figure 7-4) (Directorate General of Estate Crops 2016).

Figure 7-3: Share of agricultural systems of the palm oil sector in Indonesia



Source: (Directorate General of Estate Crops 2016)

Private or state plantations typically are large scale plantations with a total area up to 10,000 ha, while smallholdings plantations have an average size of 2-5 ha, however with a maximum size of 50 ha. There are two types of smallholder production and marketing schemes: (1) the first type involves independent smallholders who are free to market their products, however, have to rely on official government extension services for technical support. (2) The second group are smallholders who have contractual arrangements with large private oil palm companies. Large companies require these small contractors to supply them with oil palm fruits through the company's facilities. The companies, in turn, typically provide financial and technical services to these contractual smallholders (Ernah 2015);(Erniwati 2017).

As documented in (Directorate General of Estate Crops 2016), Indonesia's oil palm smallholdings have increased during the period of the last twenty years. In 2015, smallholder plantation areas had a size of around 4 million hectares and producing 2 million tons of CPO. Meanwhile, large scale, state-owned plantations had a size of around 700,000 hectares producing more than 400,000 thousand tons. Private plantations had a size of around 6 million hectares corresponding to a yield of more than 3 million tons.

Regionally, Sumatra is the primary location of oil palm production in Indonesia, comprising about 80% of national production, corresponding to 21 million tons and 7 million hectares followed by Kalimantan with 8 million tons and 3 million hectares. In recent years, however, oil palm has also expanded to include Java, Sulawesi and Papua (Directorate General of Estate Crops 2016).

7.3. Indonesia's Role on the World Market

Indonesia is the largest producer of palm oil in the world. In 2014, its palm oil production was at around 30 million tons or 50% of the palm oil world production, followed by Malaysia with its production of around 20 million tons or 34% .Other relevant palm oil producing countries are Thailand, Nigeria, Columbia and Papua New Guinea (see Table 7-2).Countries in ASEAN are the main producers of world palm oil, so the increasing availability of ASEAN palm oil, the availability of world palm oil will increase.

Table 7-2: The main palm oil producing countries in the world

Country	Production in 2014 (Tons)	Share (%)
Indonesia	29,344,500	50
Malaysia	19,667,016	34
Thailand	1,970,000	3
Nigeria	960,000	2
Colombia	1,109,586	2
Papua New Guinea	520,000	1
Others	4,787,232	8
World	58,358,334	100

Source: (Agricultural Information System Indonesia 2017)

In turn, the main destinations of Indonesia's palm oil exports are China, Singapore, Malaysia, India, Pakistan, Bangladesh, Sri Lanka, Egypt, the Netherlands and Germany (Chatham House 2019).

8. Environmental Impacts in Indonesia

8.1. Deforestation

In 1975, around 72% of the Indonesia's land area was covered by tropical forest. Since that time, this share has declined to around 50% and deforestation further continues. Although official figures suggest a reduced in deforestation rates over the last years (FAO 2017; Yulianti et al. 2012) and even a growing forest net-area since 2010 (FAO 2017), remote sensing data show continuously high and even increasing deforestation rates (Margono et al. 2014). Although various government policies aim at forest conversation, 40% of recent deforestation took place in areas were land clearing is prohibited, which gives rise to the assumption that related government policies are widely ineffective (Harball 2014). Despite deforestation, Indonesia is still the country with the third largest area covered by tropical forest[6] (FAO 2017).

Deforestation of primary forests and its consequences for biodiversity, water cycle and local, regional and global climate is the environmental issue most commonly addressed in relation to palm oil production. While it is widely agreed that the development of palm oil plantations was and still is an important driving factor in converting primary forests into agricultural land, the extent of this role is to some degree disputed. While some stakeholders argue that only a small percentage of palm oil plantations were installed on freshly cleared forest land (Obidzinski et al. 2012), remote sensing analysis suggests that more than 53.8% of the oil palm area newly planted between 1989 and 2013 are located on land that had a forest cover prior to 1989 (Vijay et al. 2016). Analysing forest losses within industrial concessions, (Abood et al. 2015) conclude that oil palm plantations where

[6] No. 1: Brazil, No. 2: Democratic Republic of the Congo, No. 3: Indonesia

responsible for a forest loss of around 1.6 million ha between 2000 and 2010 (~11% of the total forest loss in this period)[7]. While these figures give insights into concession-related deforestation, the authors cannot derive conclusions on the causes of forest loss in areas without official concession, which make up more than 50% of the total forest loss during the studied time period. Thus, 1.6 Mha and 11% have to be regarded as lower boundaries for oil palm related forest loss between 2000 and 2010.

The discrepancies between the various figures can largely be explained by the fact that land use changes often follows a sequence over time: While logging is often an initial motivation, it leaves behind degraded forests and bushland that is often utilised for palm oil plantations within the coming years (Corley & Tinker 2016; Margono et al. 2014). This leads to the important question of the main drivers of deforestation: On the one side, setting-up of oil palm plantations on degraded land suggests that deforestation was motivated and caused by other economic interests and activities. Following this argument, related plantations could be recognised as a more responsible means of palm oil production as they would avoid deforestation in other areas. On the other side (Rival & Levang 2014) stress that logging and the setting-up of oil palm plantations are often carried-out in a planned sequence that follows a quite simple economic consideration: While logging enables quick gains, part of these profits are often used for setting-up palm oil plantations on the cleared land. In this case, palm oil estates would - although being planted on degraded land - undoubtedly be part of the economic motivation for forest conversion. Both scenarios exist in parallel in Indonesia and it is therefore quite difficult to exactly quantify the role of Indonesia's palm oil industry in deforestation. (Gaveau et al. 2016) made the attempt to differentiate and quantify the two scenarios for Borneo (for both, the Indonesian and the Malaysian part of the island) using satellite imagery and by applying a five year threshold between forest degradation and setting-up of plantations: For areas that were planted within five years after forest degradation, it was assumed that deforestation and setting-up of plantation were both part of a combined economic plan so that related plantations were attributed as being relevant drivers in deforestation. For plantations that were set-up >5 years after degradation of old-growth forest, it was assumed that no economic links to deforestation existed. The analysis yielded that rapid planting of deforested areas was much more common in the Malaysian part of the island were 57-60% of all deforestation between 1973 and 2015 was associated with rapid conversion into industrial plantations. In the Indonesian part of Borneo (Kalimantan) only 15-16% of degraded forests were converted into plantations within a five-year period (11-13% attributed to oil palm plantations) and most plantations were in fact set-up on land cleared before 1973 or on land degraded by drought and recurring burning during El Niño years. Nevertheless, the authors also detected a sharp increase of *within-five-year conversions* in Kalimantan since 2005 causing a total forest loss of 1.2 Mha between 2005 and 2015. While the majority of such conversions is linked to pulpwood plantations, palm oil plantations shows a comparable trend.

In this context is has to be noted that the findings by (Gaveau et al. 2016) cannot be extrapolated to other parts of Indonesia as deforestation in Kalimantan was until 1998 more strongly determined by General Suharto's patronage system than other parts of Indonesia. Under this system military elites were granted large timber concessions in the areas bordering with Malaysia in return of loyalty to Suharto (Leonald & Rowland 2016).

Regarding the further development of Indonesian's oil palm industry, various authors stress that the availability of degraded land would be sufficient to enable oil expansion for various years to

[7] Other concession types studied were fiber plantations (~1.9 Mha / ~12.8%), logging (~1.8 Mha / ~12.5%) and mixed concessions (~0.9 Mha / ~6.3%).

come (Wicke et al. 2011; Corley 2009). (Corley 2009) estimates that the increasing world-demand for palm oil for food purposes will require an additional 12 Mha of palm oil plantation area world-wide until 2050. While only part of this expansion will take place in Indonesia, the author claims that the country hosts 8 Mha of *Imperata*-grassland that could largely accommodate the required expansion.

While there is certainly significant potential to develop existing degraded land into plantations and to take pressure from primary forest, the following issues need to be considered:

- There is no uniform definition for degraded land. The term is often used for a broad range of land covers, which include secondary forests, bushland, land used by smallholders and for extensive grazing activities, as well as fully degraded land with eroded topsoil and particularly low biodiversity dominated by *Imperata* grass. Thus, the environmental implications of oil palms on "degraded land" cannot be determined uniformly.
- Much of the land currently listed as "degraded" is at least partly used by smallholders or other persons who have some form of customary rights to the land (Corley 2009). An expansion of plantations onto such land will require a balancing of interests to avoid social tension (Wicke et al. 2011). According to (Rival & Levang 2014) this is a major reason why many investors opt for palm oil plantations in forest areas as related concessions are much easier to be obtained than on land currently used by smallholders.
- Furthermore, palm oil plantations on grassland or other types of degraded land often face financing difficulties as land preparation does not enable an initial timber harvest that could be used to bridge the financing gap until first oil palm harvest is achieved. While this economic consideration is already highlighted above, it is also supported by (Corley 2009).

The last two points largely explain the recent expansion of oil palm plantations on peatlands (see section 8.3). While uncontested forest land on conventional soils and suitable terrain (lowland) is getting increasingly scarce, forested peatlands offer both, timber availability, as well as land not yet fragmented by smallholders.

The following figures represent known facts about deforestation in Indonesia, as well as about the role palm oil plantations played in the related developments. According to (Austin et al. 2017), nationwide oil palm plantation expansion occurred of 450,000 ha/y that resulted in an average of 117,000 ha/y of deforestation between 1995-2015. However, in the most recent five year period (2010-2015), the analysis shows that the rate of deforestation because of new plantations has remained quite stable since 2005, even if there were large increases in the extent of plantations. Hence, the proportion of plantations replacing forests decreased from 54% during 1995-2000 to 18% during 2010-2015.

With a focus on Borneo, (Gaveau et al. 2018) empirically found deforestation peaks between 2009 and 2012 with a decline in Indonesia and Malaysia afterwards. In particular, the annual plantation expansion would be positively correlated with annual forest loss in both parts of Borneo. In turn, they stress that the correlation would vanish when considering "plantation expansion versus forests that are cleared but not converted to plantations". Also, they could show a positive correlation of the price of CPO with plantation expansion. Hence, the reduction of deforestation in 2017 was mainly due to low CPO prices, however, also to wet conditions and improved fire prevention.

8.2. Loss of Biodiversity

The conversion of tropical rainforest into monoculture oil palm estates represents a massive loss in biodiversity. While affected flagship species such as the Orang-Utans are used for communication purposes on this issue, a vast number of further species are affected by this trend. Although specific research on biodiversity changes from primary and secondary forests to palm oil plantations are limited, existing data clearly show a distinct decline (Savilaakso et al. 2014).

8.3. Conversion of Peatland

Around 11% of Indonesia (~200,000 km^2) is covered by peatland, mostly in the low lying forest areas of Sumatra, Kalimantan and Papua. While peatlands have formerly been regarded as unfavourable for palm oil production (Corley & Tinker 2016), they have been increasingly transformed into plantations when easily accessible land for agricultural development became less available around two decades ago. While today drainage and fertilization allow oil palms to be successfully grown on peatland, this type of soil is now sometimes even regarded as superior for palm oil production (The Ministry of Forestry of the Republic of Indonesia 2008). Next to the general problems of converting forests into monoculture plantations, conversation of peatlands has significant additional implications for the global carbon cycle: While untouched peats are stable carbon stocks that are estimated at 55,000 Mt in Indonesia (Yulianti et al. 2012), drainage and utilization leads to a mineralisation of organic substance and a release of CO_2 (also see section 8.4). This process is aggravated during peat fires that are commonly ignited when fire is used to clear land for agricultural purposes. Peat and forest fires are particular pronounced during El Niño events such as in 1997-98 and 2015-16 when many parts of Indonesia experience below average rainfall and fires produced a dense haze that affected large parts of Southeast Asia.

8.4. Greenhouse Gas Emissions

Deforestation and conversion of peatlands are a major source of global greenhouse gas emissions. According to UNFCCC, land-use, land-use change and forestry (LULUCF) were responsible for 821 Mt CO_2e or around 60% of Indonesia's GHG emissions in 2010 (UNFCCC), making the country to one of the biggest emitter of greenhouse gases. In addition, emissions are particularly pronounced during El Niño events and the related forest and peat fires. (Page et al. 2002) estimated that 810 – 2,570 Mt of carbon was emitted during the 1997 El Niño forest and peat fires in Indonesia.

As laid-out in section 8.1, not all these emissions can be attributed to palm oil production as land-use, land-use change, as well as forest and peat fires have various drivers, including logging and other agricultural uses. Nevertheless, the issue stimulated an extensive debate on the GHG-emission of palm oil. According to (Brinkmann Consultancy 2009) GHG-emissions of crude palm oil (CPO) can be attributed to the following processes:

- Emissions arising from operations during growing of oil palms and processing of fresh fruit bunches (FFB):
  - Emissions related to the use of fossil fuels for plantation internal transport and machinery
  - Emissions related to the use of fertilizers
  - Emissions related to the use of fuels in the palm oil mill, and the use of palm oil mill by-products;
  - Emissions from Palm Oil Mill effluents (POME)

- Emissions arising from changes in carbon stocks, during the development of new plantations and during the operations of plantations. This includes in particular changes in aboveground and underground biomass and soil organic matter (including peat).

As emissions vary greatly between different production systems, (Brinkmann Consultancy 2009) gave ranges for each category based on available studies and scientific literature and calculated the total greenhouse gas emissions of the production of crude palm oil (CPO) (see Table 8-1).

Table 8-1: Greenhouse gas emissions of the production of crude palm oil (CPO)

GHG emission factor	Emissions per ha [kg CO_2e/ha * annum]	Emissions per tonne CPO [kg CO_2e/Tonne CPO]
Operations		
Fossil fuel use (transport & machinery)	180 - 404	45 to 125
Fertilizer use	1,500 - 2,000	250 to 470
Fuel of mill & utilization of mill products	0	0
POME	2,500 – 4,000	625 – 1,467
Total operations	*4,180 – 6,404*	*920 – 2,062*
Emissions from carbon stock change		
25 year discounted GHG emission from conversion of grass	1,700 – 25,000	425 – 7,813
Annual carbon sequestration by oil palms	-7,660	-1,915 - -2,393
Emissions from oil palm on peat	18,000 – 73,000	4,500 – 22,813
Total emissions related to carbon stock change	*12,040 – 90,340*	*3,010 – 28,233*
Total	**16,220 – 96,744**	**3,930 – 30,295**

Source: (Brinkmann Consultancy 2009)

The analysis shows that production of crude palm oil is associated with significant greenhouse gas emissions that mostly result from land-use and land-use change. While palm oil production on plantations that replaced grassland shows the lowest GHG-emissions, production on peatland is associated with the highest GHG-missions.

Generally, this data can also be used to identify the most important means to reduce GHG emissions of palm oil production:

- Plantations on degraded land, preferably grassland;
- Sound management of POME, ideally by reusing it as a fertilizer together with EFB to replace other fertilizers (also see section 2.2.3).

While the data presented in Table 8-1 provide a good overview on GHG-emission ranges, data interpretation has to take into account that 100% of the emissions were attributed to crude palm oil.

Thus, no allocation to by-products (with palm kernel oil being economically the most relevant) was made. In addition, the study did not quantify indirect land-use change (ILUC) effects that can occur when oil palms replace agricultural production, which subsequently needs to be compensated on other land.

8.5. Additional Empirical Evidence

This section provides additional empirical findings, based on the field research in Indonesia (see chapter 6):

- Several plantation owners reported on a relation of certification schemes to improve agricultural practices (Best Agricultural Practices, BAP) that in turn increased productivity and yields (measured in terms of t/ha).
- Most of the smallholder cooperatives as well as companies *reported* that the land had not been converted recently. Furthermore, both groups highlighted that their strategy would not be further expansion of palm oil plantations but intensification according to higher productivity and yields.
- Finally, one palm oil plantation reported that alternative plantation management (Integrated Pest Management, IPM), e.g. the application of innovative pest management based on a specialized fungus (Cordyceps) considerably reduced the use of pesticides on palm oil plantations.

9. Social Impacts in Indonesia

In this chapter social impacts are analysed using the social life-cycle assessment methodology developed by Oeko-Institut and applied in various sector and cases before (Manhart & Grießhammer 2006; Manhart et al. 2011). The methodology is closely aligned to the UNEP-SETAC life-cycle assessment methodology (Andrews et al. 2009) and is therefore based on an international accepted evaluation framework for social impacts in product supply chains and industries. The results provided in the following chapters are mainly based on primary data gathered within numerous on-site interviews (see chapter 6).

9.1. Impacts on Workers

In the following sections, the impacts of palm oil production on workers are described. In this context, changes that have resulted from the introduction of different certifications are highlighted[8]. The report focuses on aspects which were addressed during the conducted interviews in Indonesia and is supplemented by existing literature. As all interviews were conducted with official spokespersons of participating companies and institutions, especially the answers regarding critical aspects should be weighed carefully.

Regardless the effectiveness of any certification scheme or the impact on environmental and social issues, it should be kept in mind that the production of palm oil provides numerous employment opportunities and is a source of income for around three million workers in Indonesia (see chapter 9.3.1).

9.1.1. Safe and healthy working conditions

All standards that are used to certify palm oil supply chains in Indonesia require companies to ensure that their staffs are equipped with suitable personal protection equipment (PPE). This is especially relevant for workers in the field and oil mills as plantation maintenance, harvesting and processing of FFB all involve certain safety and health risks. Although being mandatory, several companies reported to have severe difficulties to convince their workers to use the provided PPEs. Breathing masks and protective clothing which are supposed to be worn, e.g. for pesticide application, are reported to be not worn because they cause discomfort in Indonesia's high temperatures and humidity. Companies reported to have difficulties to change years of habit of workers who worked without respective protection equipment before (certification). They reported to use different approaches to convince their staffs to use PPE. Some companies provide trainings and explanatory posters; others introduced penalty and reward systems. So far, none of the described approaches was found to have the desired impact.

9.1.2. Freedom of association and right to collective bargaining

The issue of associations and right to collective bargaining was not addressed in connection with big commercial companies within the interviews. As smallholders can only get certified in Indonesia if they are organized in a KUD (Koperasi Unit Desa = Village Cooperative System), standards actively support the bundling of bargaining power for them. Only if smallholders are organized in a cooperative, they can receive a tax ID and work as a business in Indonesia. Thereby, palm oil certifications are intended to actively support the (financial) empowerment of smallholders.

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[8] Although most companies related improved working conditions to the implementation of certifications schemes, one company reported to have introduced certification as proof for already existing good working conditions.

9.1.3. Equality of opportunity, treatment and fair interaction

Certified companies reported that men and women would be treated equally as employees. A direct comparison with uncertified companies, and also a worker's verification, was not possible during the field research. The issue of fair interaction is addressed in a number of the following sections.

9.1.4. Forced labour

Although Indonesia has adopted the International Labour Organization Forced Labour Convention in its national legislation, (Amnesty International 2016) reports about forced labour incidents on Indonesian oil palm plantations. They found that workers on plantations were penalized for failing to meet targets or mistakes they did. The collection of unripe fruits or missed collection or distribution targets of palm fruit and fertilizer are named as examples. In the described cases, workers were forced to work unpaid overtime in order to compensate missed targets or were threatened to lose their job. These practices were identified as forced labour by the ILO Committee of experts. As the conducted interviews were hold with official spokespersons only, no new primary data was collected on this aspect. The issues of remuneration and working hours are elaborated on in chapters 9.1.6 and 9.1.7.

9.1.5. Child labour

According to (Amnesty International 2016), also child labour was found to take place on Indonesian palm oil plantations. It is reported that when collection targets were too high, in some cases workers are supported by their family and children. A report published by Rainforest Action Network (RAN) (Rainforest Alliance 2018), the Indonesian labour rights advocacy organization OPPUK and the International Labour Rights Forum (ILRF) revealed human and worker´s rights violations on RSPO certified palm oil plantations of Indofood, Indonesia´s biggest food company. Besides payments below minimum wage (see chapter 9.1.6), workers exposure to highly hazardous pesticides (see chapter 9.1.1), also cases of child labour were reported (Averbeck 2017).

The palm oil producing stakeholders visited by the research team reported that their children would not work in the plantations. At the same time they reported about the establishment of schools and kindergartens in the course of certification. From their experiences, the establishment of these institutions does not only allow worker's children to qualify for better employment opportunities in the future, but also to prevent smaller children to be brought to plantations for lack of alternatives. Also the members of a smallholder association that cooperates with a large scale company highlighted the positive possibility for children to visit the plantation's school. Whereas in most cases it was not possible to visit the newly built infrastructure, one company enabled the research team to visit a school of the plantation.

The topic of child labour had been on the agenda of the Indonesian government for more than 15 years. A pilot Action Research on Hazardous Forms of Child Labour in Palm Oil Plantation Sector in Indonesia was conducted by the responsible Directorate in the Ministry of Manpower and Transmigration in 2002. It was found that more than half of the child labourers did work because their parents ordered them to and that their parent´s received most of the money they earned (International Labour Organization 2019). Therefore, the current attempt to provide better working conditions for parents and education for their children at the same time is likely to reduce the cases of child labour in Indonesian palm oil production.

9.1.6. Remuneration

According to the interviewed companies, labour costs represent the highest cost share in palm oil production accounting for approximately 60% of the overall costs on the plantations[9]. This is why wages are a very important cost factor for the overall production costs of palm products.

In Indonesia, there are official minimum wages which are specified by the government for all provinces. Based on the Ministry of Labour Republic Indonesia Regulation No 15/2018[10], new minimum wages are defined every year. The calculation of next year's minimum wage is based on the current fiscal year's inflation and gross domestic product (GDP) growth rate (WageIndicator 2019). According to one interview partner, minimum wages are further differentiated for specific sectors, e.g. for plantation workers[11]. During the course of the study no information regarding the practical implementation of the official minimum wage from a worker´s perspective could be collected.

Nevertheless, it was found that not all workers are paid based on a wage per hour. Instead, some stakeholders reported that workers are paid e.g. by the amount of FFB they harvest. In this case, it was reported that workers are paid their daily wage if they succeed to reach a certain target. If they succeed to harvest more than a predefined threshold (one given example was 600 kg FFB/worker), they are paid a premium. In theory, Article 17 of the Ministry of Manpower Decree No. 7/2013[12] is supposed to make sure that "piece rate" workers are not paid below the applicable minimum wage. In practice it was found that in some cases workers can hardly reach the predefined targets by the company, and need their family to support them (see chapters 9.1.4 and 9.1.5) (Amnesty International 2016). As independent interviews with workers without supervisors could be conducted, there is no further empirical evidence on these issues.

Smallholders who are not directly employed by a company but work independently do not get a salary but live upon the revenues of sold FFB. Thereby, they strongly depend on the local price paid per kg FFB. According to one government plantation, the price of the FFB is based on a Provincial Regulation, which refers to the Ministry of Agriculture Regulation[13]. Prices are determined once a week based on several factors such as (1) yield, (2) world market prices and (3) material balance. A decreasing world market price thereby has a direct impact on the income of small scale oil palm farming. Additionally, the price is related to the dollar exchange rate. It was reported that currently (as of Nov 2018) the FFB price is comparably low at around 700 - 950 IDR / kg whereas "normally" it would be 1300 IDR / kg. All certification schemes that are used in Indonesia do not include a minimum price. This is why RSPO, ISCC and ISPO certified smallholder cooperatives in Indonesia are also affected by falling world market prices. In the course of the interviews, it became clear that these conditions make it especially challenging for smallholders to reach certification. Most smallholder cooperatives reported to receive additional funding, either from a RSPO smallholder fund, or by companies that are interested to buy certified palm oil from smallholders. As the application of (inter alia) RSPO certification by smallholders was identified to be restricted by a number of (bureaucratic) barriers, the 2018 revision of the RSPO principles and criteria in-

[9] Only one company reported that fertilizer costs are the highest expenditure of the company.

[10] Decree No. 7/2013 of the Ministry of Labour Republic Indonesia: https://jdih.kemnaker.go.id/data_puu/Permen_15_2018.pdf, as of 23.01.2019

[11] In Riau Province, there is a minimum wage for the agricultural sector of around 2.617.000 Rp. (as of 2018).

[12] Ministry of Manpower Decree No. 7/2013: http://turc.or.id/news/wp-content/uploads/2016/01/12.-Permen-No-7-Th-2013.pdf, as of 29.01.2019

[13] https://sawitplus.co/news/detail/5219/gubernur-riau-keluarkan-sk-upah-minimun-sektor-pertanian-rp-2617500, as of 29.01.2019

cludes an own set of criteria for smallholders.[14] By this, it shall be easier for smallholders to become RSPO certified in the future.

In general, responses regarding the financial benefit of producing certified palm oil were contradictory. Some producers reportedly experienced significant financial benefits after reaching certification. These were not only based on better sales prices but also on the reduction of maintenance costs. According to these farmers, the optimization of processes (better agricultural practices) helped them to save money e.g. on fertilizer and pesticides. Palm oil companies reported that higher revenues gained through certification are passed on to workers in different forms, including improved safety measures, routine health checks, the support of housing maintenance and child care. A salary increase or an annual premium was mentioned only as one of various options. Other stakeholders reported to have no significant financial benefit. They mentioned market access as main motivation for certification. In this context, one of the interviewed smallholder cooperatives said to not feel sufficiently valued for the effort of certification.

9.1.7. Working hours

In the case of palm oil production, workers are not always paid by hour, by in some cases also by daily targets they have to reach (weight of harvested FFB, sacks of distributed fertilizer etc.; see also chapter 9.1.4). This is why working hours can be longer, if certain targets are not reached within normal working hours. For typical working hours, interview partners mentioned slightly different numbers, ranging from 7 hours per day at 25 days of a month to 40 hours per week, spread over 6 days. According to certified palm oil producers, hours are counted as overtime if workers stayed longer. Data verification of actual working hours was not possible within the scope of this study.

9.1.8. Employment security

According to (Murray Li 2015), the issue of employment in the palm sector is underrepresented in literature. Also in the course of the field research of this study, not much new information could be collected. According to certified palm oil companies, the introduction of the respective management systems for certification had positive impacts on the workers, due to official contracts and legal employment. However, it is not clear, whether these improvements also affect non-staff employees (daily workers) who work for the same companies.

9.1.9. Social security

Social security of workers is directly influenced by several of the above described issues, e.g. remuneration (see chapter 9.1.6) and employment security (see chapter 9.1.8). For smallholders, the organization in cooperatives (KUD) offers an additional frame for social security (see chapter 9.1.2). At the same time, the certification of whole groups involves the risk of losing the certification, if a single group member violates certification criteria. In order to avoid such cases, Internal Control Systems (ICS) are used for mutual control of smallholders. This seems to lead to hesitant willingness to show plantations and processing infrastructure, in fear of losing certification.

[14] This information was shared to the participants of the FONAP General Assembly on 18.10.2018 in Berlin.

9.2. Impacts on Neighbouring Communities

Besides the impacts on individual workers, the production of palm oil has a significant impact on neighbouring communities. For the analysis of these impacts in the next sections, the same focus on interview results and impacts of certifications applies (see introduction of chapter 9.1).

9.2.1. Safe and healthy living conditions

According to (Murray Li 2015), the operation of palm plantations is associated with certain health and safety issues for surrounding communities. Pesticides and fertilizers which are used to optimize the productivity of plantations pollute local streams and rivers and thereby represent various risks. First of all, washed out chemicals threaten the health of the population nearby. Furthermore, the pollution can cause a loss of food and income. The palm oil certification schemes used in Indonesia request a more effective and tailored use of pesticides and fertilizer. Thereby, fewer chemicals are supposed to be washed out. Additionally, a government representative reported that riverbanks receive special protection. Also, theoretically the next palm trees must be at a distance of at least 50 m. At the same time, the challenging task to control huge plantation areas and the error rates the use of samples implies were reported. The practical effect of the above listed requests could not be evaluated within this study.

9.2.2. Human rights

In the course of the interviews, the issue of land conflicts was named to be the most prominent problem of palm oil production in Indonesia by several stakeholders. Also, (Murray Li 2015) lists land conflicts as one of the most prominent issues raised besides environmental concerns. Different maps of the national and province governments were reported to represent a significant obstacle when it comes to the settlement of land conflicts and deforestation. According to Indonesian academia, the boarders on different maps vary up to several kilometres which is why the settlement between different parties becomes even more challenging.

Existing certification schemes (see chapter 5) try to address this issue by requesting legal land ownership for all plantations. As in the past it was not common, especially for smallholders, to have written land permits, this represents another obstacle for smallholder certification (see also chapter 9.1.6) and cause of conflict.

The overall issue of human rights is supposed to be addressed more strongly in the new revision of the ISPO, which was not yet released at the time of the field research (November 2018). The revision is supposed to include new, critical aspects regarding human rights, further social aspects and transparency. Originally, the signature for the ISPO revision was planned for autumn 2018. However, it was not signed by Indonesia's president after local NGOs raised increasing concerns that it would weaken ISPO's credibility instead of strengthen it.

9.2.3. Indigenous rights

Many issues regarding indigenous rights are closely connected to land conflicts elaborated on in the section before (see section 9.2.2). According to Indonesian academia, the absence of written land permits and varying maps on different political levels represent a significant risk for indigenous people rights violation. Indigenous communities that have lived in the same place for many years can find themselves in the position of suddenly being declared to live in protected forest areas or land that was officially released for palm oil production. In both cases, violations of indigenous rights are likely.

Especially large scale plantations have frequently been associated with negative social impacts for rural communities and indigenous people. Although oil palms appear to improve income in some cases, especially in rural areas the benefits are not equally distributed. According to (Obidzinski et al. 2012), positive impacts by oil palms are more likely to benefit migrant smallholders with prior exposure to oil palm. "[…] because palm oil cultivation requires a significant investment and a certain amount of experience, these benefit seem to accrue to those above a certain threshold of agricultural skill and income " (Obidzinski et al. 2012). Potentially, the uneven distribution of benefits leads to an increased conflict potential when it comes to oil palm cultivation in rural Indonesia.

9.2.4. Community engagement

Community engagement is requested by the different certification schemes in order to prevent conflicts resulting from palm oil production. Conflicts inter alia arise with neighbouring communities which are affected by plantations, however, from their point of view do not sufficiently benefit from their establishment. During the interviews, labour conflicts (provision of jobs) were named as one prominent example.

In order to promote exchange and to distribute benefits more equally, certified companies are requested to have respective data about communities (stakeholders) which are likely to be affected and have an active communication with them. Therefore, a stakeholder meeting has to be conducted once a year. According to one of the national associations, stakeholder meetings are supposed to be used to discuss, deal with complaints and to settle conflicts between different parties. Furthermore, companies are supposed to install complaint boxes and provide solution centres. Also certification schemes themselves offer complaints panels which are supposed to solve disagreements up to the court. It was reported that the RSPO complaint mechanism supports compliances with the standard's social criteria. If workers of a RSPO certified plantation report grievances, an additional audit will be carried out. If violations of the standard are found, the respective companies' RSPO certification is suspended for three months. If mistakes within the auditing process are revealed, the auditing body is hold responsible. By this, the implementation of social RSPO criteria is supposed to be enforced.

Further possible options of community engagement are so called "plasma smallholders" that do not belong to the oil palm company, but produce for the company and sell their FFB directly to them. Additionally, community development programs are conducted by certification schemes, as for example by the RSPO. In the course of these activities, trainings regarding best agricultural practices or seed use are offered. Some smallholder cooperatives reported, that during the certification process they learnt a lot of useful information, which brought benefits for the whole community (e.g. how to build a well and how to improve the economic social welfare of the community).

9.2.5. Socio-economic opportunities

Many of the issues, which were discussed in the previous sections, have a great impact on the question, whether or not the socio-economic opportunities of oil palm plantations are used and whether benefits are distributed more evenly among stakeholders (see chapters 9.1.1 till 9.2.4).

One aspect that was named to have an especially important influence on the economic opportunities of smallholders is the quality of oil palm seedlings. The quality of the seedlings was explained to be the most important factor regarding the overall productivity of a plantation over its use phase. At the same time, in the past, the access to high quality seedlings was mainly restricted to commercial and state-owned companies. As the number of high quality seedlings was lower than actual demand[15], smallholders often ended up using poor quality seedlings. Therefore, one national association supports smallholders to place orders in time. Reportedly, they provide active support by providing necessary information, infrastructure to buy high quality seedlings and discounts. Furthermore, it was reported that the timing of the first fertilization has an important impact on the productivity. Again, professional companies were reported to have an advantage compared to smallholders, as they know the right timing and financial liquidity for buying fertilizer at any time. In turn, smallholders might not have the money in time.

According to one report, improved welfare and socio-economic conditions of local communities should be prioritized by all companies, regardless whether they are certified or not (e.g. RSPO certified companies are obliged to support local communities). The existence of plantations would automatically prioritize the people living in the surrounding area to become labourers on the plantation. A more even distribution of financial and social benefits makes the emergence of conflicts less likely, whereas contrasting developments are evaluated to bear great conflict potential (see section 9.2.2).

9.3. Impacts on the Indonesian Economy and Society

9.3.1. Employment creation

According to (PASPI 2017), the growth of oil palm plantations in Indonesia has lead to many new employment opportunities in Indonesia, particularly in rural areas. Accordingly, the number of employees working on oil palm plantation was around 2 million in 2000 and increased to around 8 million in 2016. This means that the number grew at a factor 4 within sixteen years period. Recent estimates anticipate a further increase due to Indonesia's intensification program as well as a further growth of oil palm areas. The employment was created in various economic sectors, however, mainly in rural areas such on plantations, FFB trade, transportation, related financial services and the downstream chemical industry. Contributions of oil palm plantations to the Indonesian GDP was estimated at 182 billion IDR in 2014 (Agricultural Information System Indonesia 2017) which translates into ~2% of the countries GDP in 2014.[16]

9.3.2. Contributions to the national economy & the national budget

Based on average data for 2013 – 2017 (Agricultural Information System Indonesia 2017), Indonesia's main palm oil production was located in six provinces that contributed to 73.73% of the national total palm oil production. The provinces Riau and North Sumatra are the largest centres of CPO production in Indonesia with contributions of 23.80% respectively, followed by Central Kalimantan, South Sumatra, West Kalimantan and Jambi with contributions of 11.04%, 9.60%, 6.88% and 6.13% respectively.

Indonesian exports palm oil as crude palm oil (CPO), palm kernel oil (PKO) and other derivatives. However, the biggest proportion (93.34%) is exported as CPO (Agricultural Information System Indonesia 2017). Developments of export volumes of palm oil (CPO) from 1981–2016 show a con-

[15] It was reported that the estimation of the right amount of needed oil palm seedlings and timing is crucial, as otherwise providing companies have the risks of not selling the seedlings in time (time frame for planting is strongly restricted). This induces a big financial risk, and made companies to produce rather less seedlings.

[16] Also other current estimates (Indonesian Palm Oil Association, GAPKI) result in a share of the palm oil industry of 1.5-2.5 % of the countries total GDP in 2017, see Indonesia Investments (2017).

tinuing increase with an average growth of 23.67% per year. In 1981, the volume of Indonesia's palm oil exports was only 196.36 thousand tons with an export value of 106.94 million US $. By 2016, this increased up to 22.76 million tons and US $ 14.37 billion. In very small proportions, Indonesia does also import palm oil (Agricultural Information System Indonesia 2017).

Beyond, the Indonesian palm oil industry is a considerable tax payer i.e. with regards to land and building tax, individual or income tax, value added tax and international trade tax (e.g. export tax). All taxes translate into revenues for government and local administrations. The tax contributions of palm oil plantations translate into the state budget as well as regional budgets by a specific fiscal mechanism. Interviews revealed that the oil palm estate fund management[17] also collects a fee from oil palm companies based on the export price of US $ 10 - 50 per tonne.

9.3.3. Price effects of certification schemes

This section refers to the insights on possible price effects of certification schemes on the marketing price of CPO, based on the empirical survey with stakeholders in Indonesia (see chapter 6). In this context, it has to be highlighted, that almost all stakeholders reported that current prices of CPO are not affected by the certification schemes. Whereas the motivation to join voluntary certification schemes (e.g. RSPO) originally was to reach better prices, this assumption was dispersed in practice for many palm oil producers (companies, smallholder cooperatives). Reportedly, overcapacities of (mostly uncertified) palm oil dominate markets leading to precarious economic situations for smallholders (see also section 9.1.6).

9.3.4. Impacts on conflicts

The issue of land conflicts was mentioned to be the most prominent problem of palm oil production in Indonesia as well in the conducted interviews as existing literature (see chapter 9.2.2). Missing data especially on existing smallholder plantations, and different maps were named to fuel risk potential.

In order to solve the problem, several national institutions address the topic. The Indonesian palm oil platform (Forum Kelapa Sawit Berkelanjutan Indonesia, FoKSBI) has an own working group on conflict resolution and concession rights. The aspect is also addressed in the National Action Plan on Sustainable Palm Oil, which was agreed upon by the multi-stakeholder participants of FoKSBI. It runs from 2018 – 2022 and lists the implementation of a one map policy tool as an instrument to tackle and settle land conflicts (FoKSBI 2019).

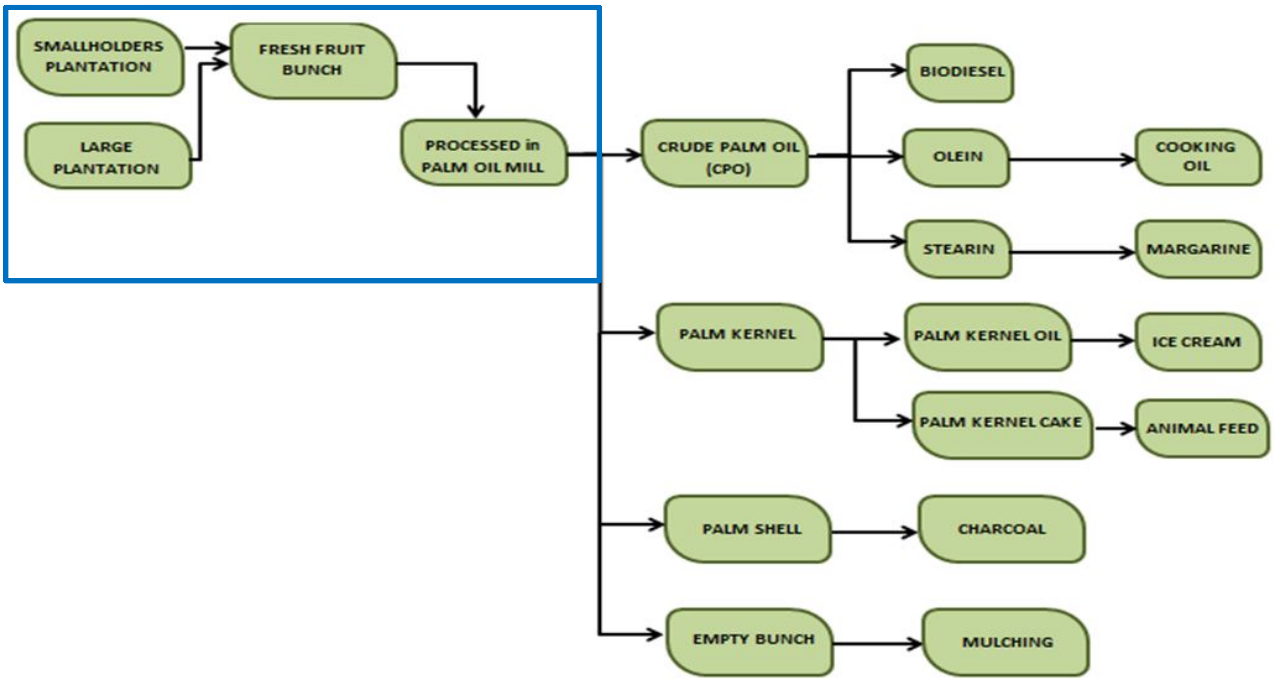
Additionally to land conflicts, disagreements between companies and smallholders were named as common source of conflict.

10. Local Collection and Upstream Trade in Indonesia

The structure of the oil palm deviated biomass products from Indonesia is quite branched and can be illustrated in a general tree diagram (Pahan 2012),(see Figure 10-1). The reason for this is that oil palm biomass can be processed according to various needs. In addition to the fruit, solid waste such as fibre and shells can be used as alternative fuels. Furthermore, empty fruit bunches (EFB) can be recycled into compost, and the palm leaf sheath is often used as raw material for broom sticks.

[17] Badan Pengelola Dana Perkebunan Kelapa Sawit (BPDPKS).

Figure 10-1: Tree diagram of the upstream palm oil industry in Indonesia



Source: Own illustration based on Pahan 2012.

However, as illustrated in Figure 10-1, the scope of this study covers the upstream parts of the palm oil value chain including smallholder and large scale plantations where Fresh Fruit Bunches (FFB) are harvested and transported to oil mills (blue box). At the mill, FFB are further processed into Crude Palm Oil (CPO) and palm kernel oil (PKO). By-products are palm shell and empty bunches. As the steps of the value chain from the plantation to the palm oil mill are typically located in Indonesia (close to the plantations) they are covered by this upstream report. In many cases CPO is already exported to other countries (see section 2.4) where derivatives are generated.

Typically, smallholders or company workers harvest FFB (Figure 10-2) and transport them to collection points near roads. There, they are loaded on trucks and transported to the next oil mill (Figure 10-2, right picture).

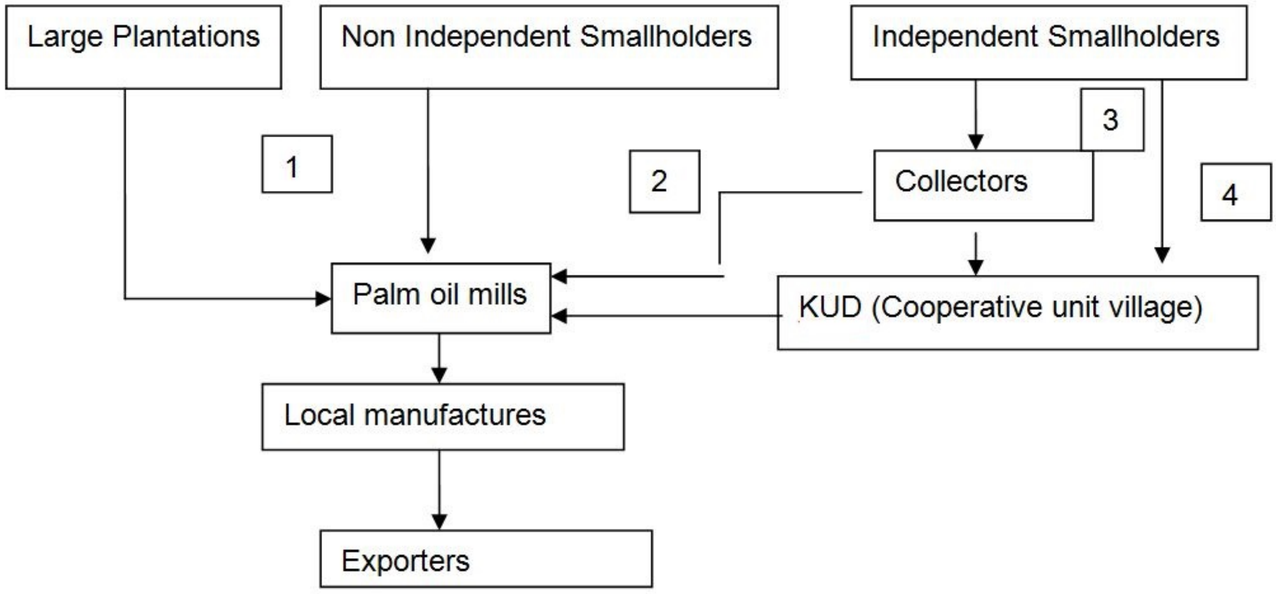
Figure 10-2: Fresh Fruit Bunches (FFB) & Typical Transportation

Source: Oeko-Institut (2018).

Hereby, local value chains of palm oil Fresh Fruit Bunches (FFB) from the plantations to the mills are characterised by different economic actors. Figure 10-2 illustrates typical the actors and four possible local value chains:

1. Large plantations and non-independent smallholders directly transport FFB to palm oil mills.
2. Independent smallholders sell to local collectors that in turn sell to palm oil mills. In this context, a low level of integrated collaboration between palm oil companies and palm oil farmers was observed in many cases. This forces independent oil palm farmers to sell their products (FFB) to local traders/middlemen at different prices as they do not have direct access to the downstream market.
3. Independent smallholders sell to local collectors/middlemen that in turn sell to cooperatives (KUD) that finally sell to palm oil mills. Cooperatives (KUD) buy from independent farmers or collectors according to an agreed price.
4. Independent smallholders directly deliver to a cooperative (KUD) that sell to the palm oil mills.

Figure 10-3: Four relevant local value chains for FFB



Source: Own illustration base on survey (2018).

In this context, it shall be highlighted, that reportedly (see section 6) the establishment of smallholder cooperatives (KUD) had a positive impact on the bargaining power of smallholders translating in better prices and higher revenues for the smallholders. Also, long term contracts including reliable trade relations on the local level, lead to favourable conditions for the independent smallholders at the first step of the value chain.

Finally, Figure 10-4 provides an insight into discharge and cooking of FFB. Once cooked and separated from the empty fruit branch, the palm oil fruits are pressed to obtain the crude palm oil (CPO).

Figure 10-4: Discharge and preparation for cooking of FFB

Source: Oeko-Institut (2018).

Depending on the oil mill, the palm kernels are also processed on to PKO; otherwise the kernels are sold further downstream for processing.

11. Alternative Instruments and Flanking Approaches

This chapter aims to briefly sketch further instruments and approaches to foster sustainability of the Indonesian palm oil sector.

11.1. Landscape Approach (Jurisdictional Approach)

As an alternative to single commodity and supply chain certification schemes (see section 3), so called landscape and jurisdictional approaches have been developed. Although the different approaches involve different stakeholders, goals, alignment of activities, and accountability measures, they overlap considerably in their aims and approaches. These include, but are not limited to, the responsible production of agricultural and forest commodities within a certain jurisdiction or landscape. Therefore, these initiatives bring together the relevant stakeholders within the region and try to agree on common goals and aligned activities. Furthermore, shared monitoring and verification are commonly part of these approaches. By this, the initiatives aim to tackle the recognition by companies, governments and NGOs, that responsible sourcing and production is complex and that it is not always effective to work with individual producers in individual supply chains (Proforest 2016). Also during the interviews in Indonesia it was noted that sustainability criteria should not address one commodity only, but all sectors. Behind this background, RSPO and ISPO were said to be perceived as discriminating as they only address palm products.

11.2. Due Diligence Requirements

The concept of ‘due diligence’ relates to requirements of companies to evaluate and address human rights as well as environmental risks within the value chains of their products. The approach is related to the United Nations Guiding Principles for Business and Human Rights (UNOHC 2011) that was translated into legally mandatory requirements for conflict minerals (tin, tungsten, tantalum and gold) within the US American Dodd Frank Act, Sec. 1502 in 2010 (Manhart & Schleicher 2013) as well as in the EU conflict minerals directive EU 2017/821 (EU 2017).

Due Diligence requirements basically cover a “five-step framework” that imply that companies should (OECD 2016):

1. Establish strong company management systems,
2. Identify and assess risk in the supply chain,
3. Design and implement a strategy to respond to identified risks,
4. Carry out independent third-party audit of supply chain due diligence at identified points in the supply chain,
5. Report on supply chain due diligence.

In recent years, the concept was elaborated on and specified for several sectors on a voluntary scale e.g. the new OECD Guidance that applies for all mineral supply chains (OECD 2016) or the OECD Due Diligence Guidance for Responsible Supply Chains in the Garment and Footwear Sector (OECD 2017). Especially, whenever due diligence requirement are implemented in a mandatory form, the combination of the concept with voluntary certification schemes within step 4 (independent audits) proved to be more effective as compared to the voluntary nature of the certifications schemes alone (Manhart & Schleicher 2013). Hence, a tailored mandatory international due diligence concept for the palm oil sector is likely to foster voluntary certification schemes and should therefore be considered for the palm oil sector as well.

11.3. Financial Support for Smallholders in Indonesia

Empirical evidence within the conducted interviews revealed that especially smallholders are in need of access to finance in order to make sure they can continue to participate in markets for sustainable palm oil. Accordingly, smallholders need finance for the establishment, maintenance and particularly for the replanting of palm oil plantations. As explained in section 2.2.2, palm oil plantations have a typical life cycle of 25-30 years, whereas during the first 4-5 years, the plants do not provide fruits. Hence, apart from the necessary reinvestment into seedlings, smallholders are faced with a revenue gap during the first years of the plantation. However, also productivity and the quality of FFB are highly related to access to finance.

Due to the very complex background of the financial situation of smallholders in Indonesia (CIFOR 2017), the Indonesian Government opened the CPO-Fund in 2017 for replanting activities of smallholders[18]. Basically, it is a subsidy program for smallholders that cultivate plantations older than 15 years with a productivity of less than 10 tons of FFB per year (CIFOR 2017).

According to (CIFOR 2017) as well as the interviews, accessibility of finance is key to make sure that smallholders in Indonesia can continue to improve towards sustainable palm oil.

12. Discussion

The study shows that the cultivation of palm oil in Indonesia is related to many environmental as well as social hot spots. In order to address them, in recent years a set of voluntary certification schemes for palm oil were developed by downstream actors, especially from the European and particularly from the German perspective (see chapter 3). However, the effectiveness of the analysed certificates specifically, as well as the voluntary nature in most cases, has been questioned widely during the past years. In the following, this hypothesis shall be discussed subsequently and conclusions and recommendations shall be provided in chapter 13.

From the environmental perspective, deforestation and related land use change was, and still is one of the most pressing hot spots in the context of palm oil cultivation in Indonesia. The analysis in chapter 5 shows that existing standards (e.g. RSPO) principally include requirements on legality and land rights that in any case exclude the illegal conversion of primary rainforest into palm oil plantations within the certification scheme. In addition, there are criteria in various standards that address the aspect of land use change. In the RSPO, for example, there is a criterion "responsible development of new plantings". The RSPO-Next standard refers to "a directive against further deforestation, according to which palm oil plantations may only be created in areas where vegetation and soil contain little carbon. The cultivation of oil palms on peatland is also prohibited ". Accordingly, the ISCC refers to the criterion "High Conservation Value (HCV) with high biodiversity or high carbon storage capacity”.

However, from the perspective of the empirical evidence of this study, it is a major problem that the palm oil market is still dominated by conventional palm oil that is mainly exported to large consumer markets such as China and India. Hence, still, palm oil from plantations that are grown on formerly rainforest areas currently finds sufficient downstream demand. In many cases, sustainability certifications are used by plantations that already follow sustainability standards and that do not have to invest additional effort to reach the standard (“deadweight effects”). This observation is supported by the fact that the revenues for certified palm oil are mainly not significantly higher as

[18] Director General of Estate Crops Regulation No. 29/KPTS/KB.120/3/2017 on the implementation of replanting, human resource development and infrastructure assistance in the framework of the CPO fund.

compared to conventional palm oil. Hence, currently, there are not enough economic incentives for upstream palm oil cultivating actors (both, companies and smallholder association) to invest into better standards for palm oil. Due to this parallel structure, the certifications do not provide sufficient effective protection against further deforestation, even if they contain criteria for that. New data on deforestation rates, e.g. in (Austin et al. 2017), between 2005 and 2015 in Indonesia show that the deforestation rate remained almost constant. Hence, to tackle deforestation effectively, a strong regulatory implementation of and compliance with the “zero-deforestation” policy in Indonesia is indispensable to effectively safe further primary forest, but also with regards to peatlands (see section 8.3).

Generally, it was found, that the huge size of palm oil plantations makes it very difficult to control compliance with social and environmental rules. Responsible institutions face the challenge to identify suitable samples that are representative and can serve as indicators for the overall plantation management. Furthermore, in the course of the study, “deadweight effects” were found to limit the overall effectiveness of certification schemes. Especially regarding environmental and legal issues it was found that existing sustainability certifications alone do not sufficiently prevent unwanted negative effects like deforestation. Plantations which are legally developed and do not violate environmental regulations are likely to get certified. At the same time, the market for conventional palm oil which might come from non-compliant plantations is still big enough.

In comparison, deadweight effects seem to be lower regarding social issues. Although some companies were found to use certification as verification for good working conditions, it was found that a significant share of plantations related improved working conditions directly to certification. With regards to health and safety requirements, companies reported to have difficulties to change the behaviour of workers. Although different approaches were used, none was found to have the desired impact (see chapter 9.1.1). In order to tackle the problem, other, more participatory methods, were mentioned to be taken into account. In other sectors, e.g in the context of cotton from Ethiopia, it was found that it was knowledge sharing amongst peers that was very likely to result in a permanent shift in behaviour (Hilbert et al. 2018).

A major strength of the certification schemes proved to be the fact that certification schemes require smallholders to be organized in cooperatives (see chapter 9.1.2). This supports their bargaining power related to the following downstream traders. Overall, certification schemes were found to trigger some positive developments for employees at most examined plantations (see chapters 9.1.1 and 9.1.8). Additionally, educational opportunities could be identified to be beneficial, even not only for farmers directly involved, but for whole communities.

13. Conclusions

Based on the preceding chapters as well as the discussion in chapter 11.3, this chapter draws a set of final conclusions from the findings and evidence elaborated above:

1. Even if stakeholders highlighted that the current palm oil strategy would be based on intensification of plantations rather than expansion, current data shows (Austin et al. 2017) that the rate of deforestation due to new palm oil plantations has remained stable since 2005 (117,000 ha/a). Hence, the impact of both, new zero-deforestation policies as well as voluntary commitments based on the certification schemes (see chapters 3-5) can be questioned considerably.
2. The RSPO standard had been reportedly used in hope of market access to European markets as well as better prices. However, in many cases, the companies and smallholder cooperatives did not receive considerable additional revenues to be able to reach the standard (dead-

weight effect). Hence, a direct effect of the certificates towards the environmental as well as the income situation can be doubted. However, a set of indirect positive effects (e.g. schools for communities) could be identified.

3. The mandatory Indonesian ISPO standard falls behind most of the other analysed standards in terms of ambition (see chapter 5). However, as compared to all other standards being purely voluntary, the specific strength of the ISPO standard it connected with its mandatory nature for the palm oil industry (not for smallholders). However, human resources and compliance problems are key problems for an effective implementation of the standard.
4. The ambition levels of social aspects vary considerably among the standards (see section 5.2). However, based on the empirical findings (conducted interviews) no significant differences on the social impact of different certification schemes were noticed. Instead, stakeholders reported a perceived similarity of the ambition level of applied standards.[19]
5. From a social perspective, certification schemes seem to be a chance and challenge for smallholders at the same time. The mandatory organization in cooperatives allows them for better bargaining power and increased social security (see chapters 9.1.2 and 9.1.9). Evidence was found that smallholder cooperatives benefit from trainings and other supportive measures which are provided by certification bodies or commercial companies. At the same time, certification is especially challenging for them due to the requested management and control systems that have to be built up from the scratch in most cases. It was found that many smallholder groups do not manage to reach certification by themselves, but have to rely on additional financial and structural support (see chapter 9.1.6).
6. Against this background, the introduction of specific smallholder criteria in the RSPO standard (see chapter 9.1.6) seems to be a suitable approach to address some of the existing barriers for certification. In the future, it should carefully be evaluated, whether the current revision has achieved the desired effects.
7. The Indonesian crude palm oil fund (see chapter 11), was meant to provide more financial support for smallholder cooperatives. Used responsibly, the financial means could support additional smallholders to manage the resource intensive certification process. Furthermore, a direct support by (international) companies has shown to be an effective instrument for smallholder certification. The provision of financial support and market access helped additional cooperatives to reach certification. One opportunity to enable such projects is the RSPO Smallholder Engagement Platform[20]. The platform aims to bring together smallholders with potential project partners and gives an overview about joint projects worldwide.
8. Besides the described challenges in the process of certification in the first place, the financial benefit of the analysed certification schemes in Indonesia was found to be insufficiently low. Although contradicting experiences regarding financial benefits existed (see chapter 9.1.6), many stakeholders explicitly did not list them as main motivation for certification. It was found that the impact of a dropping world market price outweighed the premiums paid for certified palm oil overall. Therefore, an improved financial benefit for certified palm oil producers could help to tackle the current situation that the demand for palm oil from certified smallholders exceeds the supply. Fairtrade certification as it is used e.g. for palm oil production in Colombia could be one possible option to introduce minimum prices and a better financial security.

[19] Against the background, that all interviews were conducted with official spokespersons of participating companies and institutions, all findings regarding the impacts on workers and neighbouring communities should be handled with special care.

[20] http://rsep.rspo.org/

9. For government and commercial plantations it was found that in most cases certification triggered positive impacts for employed workers and staff. Improved health and safety requirements (see chapter 9.1.1), and non-monetary benefits in forms of infrastructure and insurance (see chapter 9.1.6) were named as direct impact of certification. Other stakeholders named certification as an option to verify fair employment conditions for costumers.
10. Access to high quality seedlings for smallholders was identified as a suitable action in order to support intensification, instead of expansions of plantations (see chapter 9.2.5). Furthermore, better access to finance for replanting is a key for smallholders to improve sustainability and productivity (see section 11.3).
11. Also, it was reported that the efforts towards certification were flanked by innovative planation management (best agricultural practices) that had an impact on yields as well as environmental benefits (e.g. by Integrated Pest Management (IPM) methods to reduce the use of pesticides). However, in most cases the benefits were not related directly to the certificate but to voluntary engagement beyond.
12. The uneven distribution of benefits of palm plantations was identified as a significant source of conflicts, with nearby communities and/or indigenous populations (see chapters 9.2.3 and 9.3.4). As people with a certain level of knowledge and financial opportunities are more likely to profit from palm oil production, this aspect should be specifically addressed in the future.
13. Furthermore, the absence of written land permits and varying maps represent a risk of human rights violations, especially for indigenous populations (see chapter 9.2.3). It was found, that respective measures as an official one map policy are currently under development (see chapter 9.3.4) and could help to tackle this issue in the future.
14. Beyond certification schemes, this study recommends to effectively flank voluntary instruments with mandatory instruments (e.g. tailored due diligence requirements for actors among the value chain referring to certification schemes) as well as innovative certification approaches (e.g. landscape certification approach, see chapter 11.1).
15. Finally, further need for innovative financial mechanisms towards sustainable palm oil had been identified. One reason for this is mostly due to the concluding trade-off between social and environmental aspects. As discussed in chapter 9 low palm oil prices and a lack of sufficient price premiums for certified sustainable palm oil lead to precarious situations for smallholders. In turn, in chapter 8, it could be shown that deforestation and plantation expansion is closely correlated with the world market price for CPO. Hence, the elaboration of a tailored financial mechanism (i.e. based on the current CPO-Fund) that creates strong incentives to effectively save primary forests and guarantees sufficient revenues for smallholders is recommended.

14. Annex A: Examples of Good Practice Downstream Companies

This Annex refers to the documentation of good practice downstream companies in Germany concluding comprehensive stakeholder interviews within work package 2 of the BioMacht Project.

14.1. Weleda AG, Schwaebisch Gmuend, Germany

14.1.1. Background

Weleda is a manufacturer of certified natural and organic cosmetics and anthroposophic pharmaceuticals. The headquarters are situated in Arlesheim (Switzerland) and the largest branch in Schwäbisch Gmünd (Germany). Weleda includes 22 companies in 18 countries, and Weleda products are available in more than 50 countries. In 2017, the company employed 2440 people worldwide; the net sales totalled around 401 Mio Euro. Weleda uses, mainly for pharmaceutical products, about 300 raw materials that are grown in own biodynamic gardens. Other approximately 1.200 raw materials needed for their products are bought worldwide. According to Weleda, the use of sustainable raw materials has been an integral part of the corporate philosophy since its establishment 1921.

14.1.2. Palm oil Certification

Weleda uses rather small amounts of pure palm oil which is RSPO Identity Preserved (IP), organic and Fairtrade certified. The palm oil is not bought individually, but in a blend of different fats. In comparison, palm derivatives make up the biggest share of palm products used. Palm derivatives are bought as RSPO Mass Balance (MB).

According to Weleda, RSPO Segregated (SG) and IP palm derivatives are not available at the moment. Due to the complex supply chain, comprising up to 20-30 stages, it is very costly to build up separated production facilities for all necessary steps. At an earlier stage, one of the big suppliers offered RSPO SG certified derivatives, but stopped the production a while ago as a result of low demand. Weleda was not able to use the RSPO SG certified derivatives, as the use of these derivatives was not in line with their “Natrue” certification. “Natrue” is a standard for natural and organic cosmetics, and comprises additional criteria for all raw materials, including palm oil.

Furthermore, Weleda is a member of the Union for Ethical Biotrade (UEBT). The UEBT supports and verifies companies’ commitment to innovation and sourcing that contribute to improve people’s livelihoods and to maintain and protect biodiversity.

14.1.3. Experiences with Certificates

According to the experiences of Weleda, certification allows smallholders to earn a better living. As approximately 80% of the worldwide palm oil is produced by smallholders, the theoretical impact of certifications is very high. The RSPO platform PalmTrace offers their members the opportunity to buy certificates of independent smallholders (I.S.), if the palm oil they use is not certified itself. Besides PalmTrace, there are a lot of additional initiatives, which aim at improved working and living conditions of small palm oil farmers.

In the past, various weaknesses of RSPO certification were identified. Weleda reports that a number of the issues addressed by FONAP (see below) were taken into account and incorporated in the current review of the principles and criteria. The process of revision was perceived to allow effective participation of multiple stakeholders and to take into account different focuses and perspectives.

Overall, Weleda reports a limited effectiveness of certificates due to the lack of political support. The voluntary commitment of companies like Weleda would not be enough to trigger an effective transformation of palm oil production. Weleda claimed that it is important to introduce cross-sectoral, international mandatory requirements and predefined quotas for the use of certified palm products. At the same time, Weleda has identified an increasing need for education to convey knowledge about the products in which palm oil is contained, and about the consequences (on land use) an avoidance strategy would have.

In order to actively promote a more sustainable palm oil production, Weleda requests higher penalties for illegal deforestations. Furthermore, certification should aim to avoid palm oil production in monocultures and promote alternative agricultural approaches. The cultivation of palm trees mixed with other crops and fruits would e.g. allow for reduced use of pesticides. In general, initiatives should place an even stronger focus on the effectiveness in the producing countries.

14.1.4. Activities beyond Certification

Since 2013, Weleda has been a member of the Forum for Sustainable Palm Oil (FONAP), and is currently part of its board. The forum comprises various members, including companies, non-governmental organisations (NGOs), certification bodies, associations and the German Federal Ministry of Food and Agriculture (BMEL). The aim of FONAP is to boost the proportion of certified palm oil on the German, Austrian and Swiss markets to 100% by 2020, and to improve existing standards and certification schemes. In 2018 it was involved in the revision of the RSPO principles and criteria (see above), and its members publish an annual report on the current status of the process to reach the joint commitments made under FONAP. In the course of different working groups, FONAP members meet on a regular basis and discuss specific issues.

14.2. Daabon Europe GmbH, Pulheim, Germany

14.2.1. Background

Daabon is a company which produces organic tropical crops like bananas, coffee, avocado and palm oil, and sells the products worldwide. For this purpose, Daabon operates a total of five offices in Santa Marta (COL), Miami (USA), Sidney (AUS), Pulheim (GER), and Tokio (JPN). While in the beginning the company's focus was on bananas, today, palm oil is the most important product. In 2018, around 26,500 tonnes of palm oil were produced; in 2019 it will be around 10,000 tonnes more. The palm oil is cultivated on Daabon's own plantations (haciendas) in the north of Columbia and by many smallholders. In Daabon's own mills and refineries, the produced palm oil is converted into all different palm products and sold in Europe, USA, Asia and Australia. The whole supply chain is covered according to Daabon's maxim: "From the soil to the market - producers and exporters"

14.2.2. Palm oil Certification

Daabon has been certified for the produced palm oil by different certification schemes. About 30 years ago, the production was shifted from conventional to organic palm oil. Today, the palm oil is certified organic according to specific standards valid in the markets. Daabon's sale is conducted in accordance with the following certification schemes: Japanese Agricultural Standard (JAS), US National Organic Program (NOP), EU organic regulation, Chinese organic certification, Australian organic certification and BIOSUISSE. Furthermore, Daabon is certified according to the Rainforest Alliance Sustainable Agriculture Standard, Fair Trade USA and RSPO/ IP. In order to support the shift towards more sustainable palm oil production, and to validate own voluntary actions beyond the above listed standards, Daabon is a member of RSPO next and the Palm Oil Innovation Group (POIG). Within RSPO next, specific hot spots of palm oil production exceeding the RSPO criteria are addressed. These include, but are not limited to, the topics of deforestation, planting on peat, human rights and transparency. The Palm Oil Innovation Group is a multi-stakeholder initiative which also builds upon the RSPO. Besides the three thematic areas of environmental responsibility, partnerships with communities including workers' rights and corporate and product integrity, innovations in the palm oil industry are promoted.

In the case of Daabon, deforestation is avoided by focusing on land which has already been used for agricultural purposes before. According to Daabon, most of the areas which are used for their palm oil production today have been used by other actors since the seventies, e.g. for cotton production or cattle.

14.2.3. Experiences with Certificates

At the basis of Daabon's activities are the diversified and long years of experiences with palm oil certifications (see above). For a company which is using many different standards, compliance and audit processes were reported to represent a practical obstacle. As for most certifications it is not possible to merge audits, multiple audits have to be conducted, entailing a higher input of time and resources. At the same time, the great variety of standards causes uncertainty of consumers. Therefore Daabon recommends a unification of existing standards.

According to Daabon, the major investments in terms of money and time are a general problem of the certification schemes being used, not only with respect to the audit and compliance processes. The regulations should seek to avoid bureaucratic hurdles and generate greater dynamism in terms of improving the conditions of life for the people working along the supply chain. Daabon reports that many of the palm oil standard criteria have been implemented within the company for many years, and that alternative approaches were developed by the company itself. From their point of view, multi-stakeholder initiatives should tackle these issues more stringently.

In Germany, private certification bodies are responsible for the control of compliance. In comparison, Daabon believes that systems where the state retains control to some extend are more effective. The Netherlands stand out as a very positive example in this respect. There, a single institution (semi-state and semi-private), is responsible for carrying out organic certification.

Overall, Daabon observed an increasing awareness for sustainability issues of palm oil production, not only on the part of end consumers, but also of the population in producing countries. According to Daabon, the increased request for more sustainable palm oil has sensitized local residents for the production hot spots as well.

14.2.4. Activities beyond Certification

According to Daabon, changes in producing countries, which are often developing countries, are most likely to be achieved through education. This is why most local projects focus on knowledge transfer. One example is sewing courses, which are offered for the wives of the workers. They have the opportunity to take part in these courses, to sew the working outfits for the men. Another example is the offer to conduct vocational training in a remote oil mill of Daabon. As the oil mill is located near to a very small town, it is not possible for workers to complete vocational training in town. This is why Daabon organized the opportunity to complete the respective training in the oil mill. Furthermore, Daabon introduced a social program, aiming at enabling palm oil smallholders to establish honey production as an additional business.

Generally, Daabon supports small producers of palm oil in their supply chain in the form of technical assistance, for example. The support of Daabon's cooperatives in Columbia is implemented by FLOTRABAN. This organization having the character of a foundation administers the premiums payed to the cooperatives, and decides on what they are to be used for.

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