Improving the Level of Sustainability within Palm Oil and Soybean Plantations

Evaluation of the potential of roundtables to reduce deforestation and conserve biodiversity

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Summary

The roundtables have stated several P&C's which should result in a higher level of sustainability within the oil palm and soybean concessions. However, the general conclusion can be made that these P&C's are not detailed enough to become effective. Lack of details have the result that companies are free to implement the P&C according to their own interpretation. Result is that same certified growers might act on a different level of sustainability. Deforestation of primary forest is not specifically reduced with the implementation of the P&C. This is mainly because the HCV assessment is not implemented on a proper manner and HCV habitats are not protected by the growers or the government. Result is that the potential of the roundtables to protect forest against deforestation is low. Furthermore, the roundtables do not prohibit the conversion of secondary or degraded forest in order to protect biodiversity within and beyond the plantations.

The different roundtables stated several management practices which might be implemented. Research showed that if appropriately implemented and managed, these activities might contribute to the conservation of animal and plant species. However, a proper HCV assessment is essential before these management activities are implemented within the concessions. Failure in the protection of HCVs will result in the destructing of these habitats. In the future the roundtables should improve their P&C and implement the conservation of High Carbon Stock areas. This will result in the protection of even secondary forest. If this assessment is properly implemented, this will increase the sustainability standard of the roundtables.

Content

Chapter 1: Palm oil and soybean cultivation

All over the world there is an increasing demand for palm oil and soy products (Laurance *et al*., 2010). To fulfil the growing demand for palm oil and soybean products, palm oil and soybean plantations are expanding. The majority of these plantations are established in developing countries (i.e. Indonesia, Malaysia and Brazil)(Boucher *et al*., 2011). The development of new soybean and palm oil plantations goes hand in hand with the conversion of (tropical) forest (Boucher *et al*., 2011). This process is of major concern by environmentalists, because expanding palm oil and soybean concessions results in the loss of biodiversity (Sandker *et al*., 2007; Laurance *et al*., 2010).

1.1 Palm oil production

Palm oil (*Elaeis guineensis*) is the world's most produced and consumed oil. This cheap, production-efficient and highly stable oil is used for a wide range of products, varying from food, cosmetic and hygiene products towards being a source for biofuel (OECD, 2013). The worldwide production of palm oil in the year 2013-2014 is expected at 55.7 million tonnes (FAOStat, 2013). For the future, the prediction is that the production will grow to 66.7 million tonnes of palm oil in the year 2022 (OECD, 2013).

Most of the palm oil is produced in Asia, Africa and South America because these areas provide the optimal growing conditions in terms of temperature, sunshine and humidity (Boucher *et al*., 2011). The global palm oil production is dominated in Indonesia and Malaysia; these two countries contributes together for around 85-90 percent of the global palm oil production. In addition, Indonesia is the world's largest producer and exporter of palm oil worldwide (FAOStat, 2013).

In 1964, the total palm oil production in Indonesia was around 157.000 tonnes. For 2013, 50 years later this production has been increased multiple times to 31 million tonnes. This enormous amount of palm oil accounts for 11 percent of country's export earnings of 5.7 billion dollar. To maintain their status of world's largest producer of palm oil, Indonesia has projected to produce 40 million tonnes by 2020 (PWC, 2012). (FAOStat, 2013)

1.2 Soybean production

Soybean (*Glycine max*) is characterized by an extraordinary source of both protein and energy. The majority of the people think of soy in terms of traditional East Asian foods (i.e. soy sauce, soy milk and similar dishes). Instead, most of the soybeans are not consumed by people, but by livestock. Chickens, pigs and cattle eat most of the global soy crop (Fearnside, 2001). Since the 1950's, continues growth of the human population along with more meat consumption resulted in an increasing demand for soy (KPMG, 2013). Additionally, biofuel production is the second largest driver behind soy expansion over the last decades. Therefore, soy became a very profitable crop (Fearnside, 2001; Nepstad *et al*., 2008).

In the year 1961 the worldwide soybean production was estimated around 27 million tonnes. In 2012 the production increased to a total of 253 million tonnes of soybean (FaoStat, 2013). The increase in soybean production could mainly be attributed to North and South-America, because these two continents are producing most of the soy. In 1961 the total production for North-America was around 18 million tonnes and in South-America this production was only a 297 thousand tonnes. In 2012 the total amount of soybean produced in South-America was higher compared to North-America. South-America produced around 131 million tonnes and North-America 87 million tonnes (FaoStat, 2013). Brazil is world leader in the export of soybean. The country produces 66 million tonnes of soybean in the year 2013. Furthermore, the soy export grew more than tenfold in 20 years, from 2.5 million tonnes in 1990 to 31.5 million tonnes by 2010 (Boucher *et al.*, 2011; FAOStat, 2013).

1.3 Effects of palm oil and soybean production

1.3.1 Deforestation

The development of new oil palm and soybean plantations have increased the rate of deforestation in Indonesia and Brazil (Boucher et al., 2011; Greenpeace, 2013).

Deforestation in Indonesia

Indonesia lost at least 1.240.000 hectares of forest over the period 2009-2011, which is equivalent to 620.000 hectares per year. Deforestation is centralized in three provinces, Central Kalimantan (296.000ha/24%), Riau (230.000ha/19%) and West Kalimantan (95.000ha/8%). In Indonesia a total land area of 15 million hectares has been licensed for palm oil development. Based on the data of Greenpeace, over the period 2009-2011 the palm oil sector was responsible for about a quarter of forest loss (300.00 hectares). Nevertheless, in provinces with high palm oil development the proportion of deforestation contributed to palm oil was even higher, varying from 38 to 75 percent. (Greenpeace, 2013)

Overall, the potential economic benefits of the palm sector comes at expense of the Indonesia's natural forests. As demonstrated in Figure 1, for now a total area of 8 million hectares are planted with palm oil. The prediction is that for the year 2020 a total area of 13 million hectares will be covered with palm oil, resulting in further deforestation (PWC, 2012).

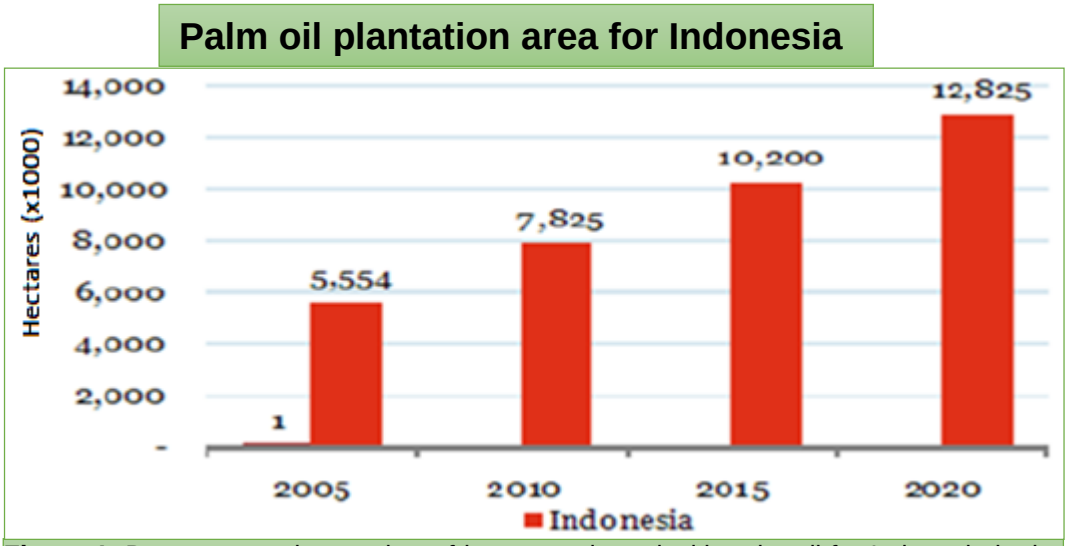

Figure 1. Demonstrate the number of hectares planted with palm oil for Indonesia in the past and future (PWC, 2012).

Deforestation in Brazil

In the late 1990, with the use of new, humid-tropic-adapted varieties, soybean cultivation began to enter the Amazon forest (Boucher *et al*., 2011). Large areas of tropical forests were converted with the use of heavy machinery such as bulldozers for rapid clearing, and soybeans were put into production with substantial amounts of fertilizers and pesticides. As demonstrated in Figure 2, there was an enormous expansion of soy plantations in Brazil (Boucher *et al.,* 2011).

To increase the total amount of soybean, more land has to be converted into plantations. This is what happened over the last decades. In 1961 the worldwide soybean area was around 24 million hectares, this has been increased to 107 million hectares in 2012 (FAOStat, 2013). In line with the total production, the highest amount of new area converted to soybean plantations is in Brazil. The total soybean plantation in Brazil was 240 thousand hectares in 1961.

Nevertheless, this area is increased to 25 million hectares in 2010 (Figure 2)(Boucher *et al*., 2011; FAOStat, 2013).

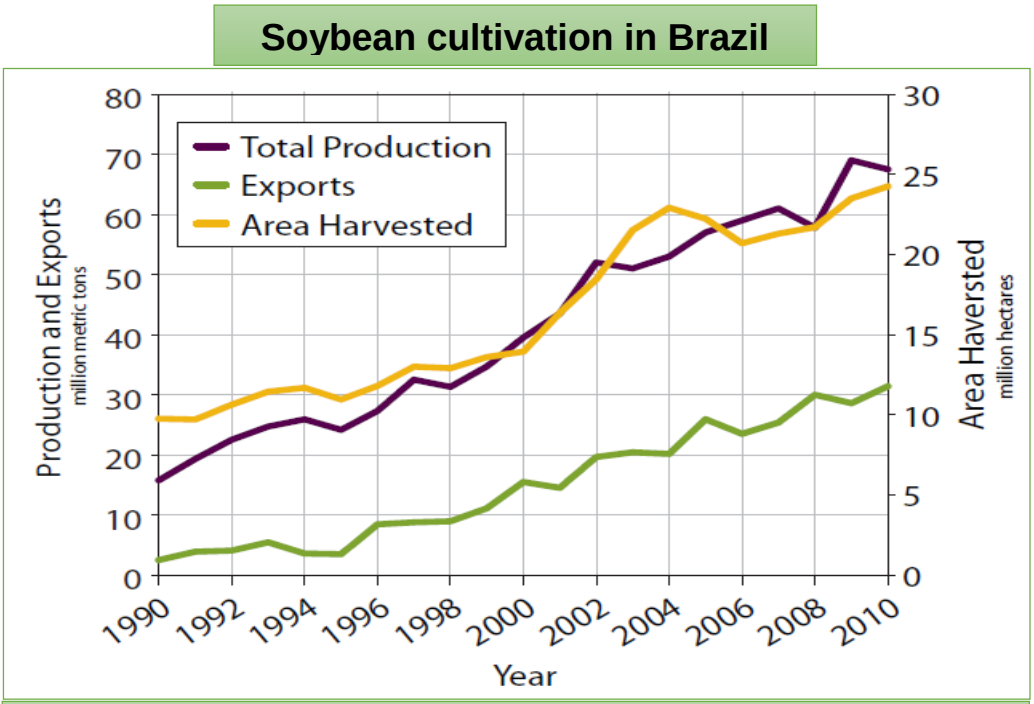

Figure 2. Demonstrate the yearly increase in production (million tonnes) and area (million hectares) planted with soybean in Brazil (Boucher *et al*., 2011).

According to Masuda & Goldsmith (2009) the world soybean production is forecasted at 371.3 million tonnes in 2030. For Brazil, it is predicted that soybean area will be at 30.6 million hectares in 2030. This will increase the competition with other crops, pasture land and the pressure to convert (tropical) forest (Masuda & Goldsmith, 2009).

1.3.2 Biodiversity loss

The expanding soybean and oil palm concessions have resulted in the conversion of primary forest and the loss of biodiversity (Boucher et al., 2011; Koh & Wilcove, 2008; Galford et al., 2010).

The conversion of forest into monoculture plantations is devastating for the environment and biodiversity. The main reason for the loss of biodiversity in oil palm and soybean plantations is that these areas are less complex than natural forests. The crops and trees within these plantations have a uniform age and are cleared with a specific yearly rotation. Furthermore, these plantations contain lower or no canopy, have limited undergrowth, less stable microclimates and receive greater human disturbances (Fitzherbert *et al*., 2008; ZSL, 2011). Most forest species are lost within plantations and replaced with small populations of non-forest species (Danielsen *et al*., 2008). For example, research revealed that with the conversion of primary forest into oil palm plantations, the bird diversity decreased with 77 percent (Koh & Wilcove, 2008). Even the conversion of already logged forest results in a diversity decrease of 73 percent (Koh & Wilcove, 2008). Further analysis showed that the conversion of primary forest and logged forests to oil palm plantations decreases species richness of forest butterflies with 83 and 79 percent, respectively (Koh & Wilcove, 2008). Fitzherbert *et al* (2008) concluded that the species richness found on an oil palm plantation accounts for only 15 percent of the species richness usually found in primary forest. Flora research within oil palm plantations revealed similar patterns. Overall, the majority of individual

plants and animals in oil palm plantations are generalist species with low conservation value (Danielsen *et al*., 2008).

There are no numbers available for the effect of soybean plantations on biodiversity. However, the conversion of primary forest into monoculture soy plantations will also result in simplification of the landscape. Therefore, for soy plantations a similar pattern of biodiversity loss will be found (Bickel & Dros, 2003).

1.3.2.1 Fragmentation

Primary forest might become fragmented with the development of oil palm and soybean plantations (Figure 3). In most of the cases (new) plantations are developed with the clearance of natural habitats. As a landscape is developed for agriculture or infrastructure, areas of natural habitat are broken up into a patchwork of smaller areas, each separated from other by varying distances. This fragmentation isolates subpopulations of species, restricting gene flow and opportunities for pollination, breeding, and feeding. Even if a substantial amount of forest is left within the fragments, it is plausible that those fragments are too small to sustain a fraction of the original biodiversity. (Bakewell *et al*., 2012)

Figure 3. Fragmented forest among new terraced plantations.

1.4 Roundtables to improve the level of sustainability

Several roundtables were developed to improve the level of sustainability within the agricultural sector. Acting sustainable implies that plantations are operating on a level which minimalizes their impact to the environment, that the plantations are considering social standards and acting according to the law. Roundtables are multi-stakeholder associations, consisting of stakeholders from the whole production chain (i.e. growers, manufacturers, retailers). In the philosophy every stakeholder has the same right to come up with their specific interests. Therefore, all the different stakeholders are working together towards a common objective and making decisions by consensus (Vallejo & Cerisiers, 2005).

The Roundtable for Sustainable Palm Oil (RSPO) was developed in 2004 to increase the sustainability of the worldwide palm oil sector (RSPO, 2013). Worldwide, the RSPO is the largest cooperation that promotes the production and use of sustainable palm oil. The aim of the RSPO is to improve the people, planet and profits within the oil palm sector. Since March 2011, the Indonesian government has developed their own sustainability standards which have become mandatory to all palm oil growers in Indonesia. A set of law and regulations have become a standard for producing palm oil sustainable in Indonesia (ISPO, 2013).

Furthermore, The Roundtable for Responsible Soy (RTRS) was created in 2009 to stimulate a more sustainable soy production (RTRS, 2010). ProTerra was created in 2006 with the same objective to increase the sustainability within the soy industry (ProTerra, 2012).

All the roundtables developed own Principles and Criteria (P&C) which should improve the sustainability standard within the palm oil and soybean sectors. P&C are the common threat which companies have to follow before they obtain a certificate. A principle is an essential rule or element which the companies have to follow and criteria are created to judge if a principles has been fulfilled (Lammert van Bueren & Blom, 1996). Furthermore, the roundtables developed Indicators as objective evidence to verify that the criteria is being met. Guidance is

created to help the grower/miller and auditor understand what the criterion means in practice (RSPO, 2012).

The plantations have to reduce their pollution and GHG emissions, limit deforestation and maintain biodiversity within and beyond the plantations. Furthermore, the social standards have to be improved (i.e. harsh labour conditions, no child labour)(RTRS, 2010; ProTerra, 2012; RSPO, 2013). If companies fulfil the Principles and Criteria of the roundtables, they will receive a certificate for their products. A certificate could help the companies to distinguish themselves from their direct concurrent and win the competition, this might positively increase their place on the market (WWF, 2012). Currently, RSPO certified palm oil is sold with a price premium under the 4 dollars per ton (Paoli *et al*., 2010). A sustainable produced soy meal under RTRS certification is sold with a price premium between 3 and 4 dollars per ton (KPMG, 2013).

There is no direct or clear literature available about the effect of these roundtables. This might be the case because the roundtables have a relatively short time of existence. Furthermore, for scientists it could be difficult to do actual measurements in the field of the plantations, because the companies are lacking transparency. However in this thesis an attempt is done anyway to determine the potential of the roundtables to reduce deforestation and conserve biodiversity.

1.5 This thesis

An evaluation of the mentioned roundtables their P&C's will be conducted to determine the potential of the roundtables in order to reduce deforestation and biodiversity loss. Beside the protection of the environment, several P&C's are developed to increase the social standard of employees and reduce greenhouse gas emissions (GHG). However, the effectiveness of these principles will not be discussed in this report.

The main research question is: *Are the Principles and Criteria formulated by the roundtables, RSPO, ISPO, RTRS and ProTerra, effective enough to reduce deforestation and biodiversity loss within palm oil and soybean plantations?* With the sub-questions;

- How effective are the P&C's of the roundtables in protecting the primary forest against further deforestation in Brazil and Indonesia?
- How effective are the P&C's of the roundtables in the conservation of biodiversity within and beyond oil palm and soybean plantations in Brazil and Indonesia?
- Which of the roundtables is most effective in their P&C's?
- How can P&C of the roundtables be improved?

Chapter 2. Environmental concern

As presented above, the increasing demand for palm oil and soy products have resulted in the conversion of tropical forests. Several roundtables were developed to stimulate the production of (more) sustainable palm oil and soy. This chapter will handle the P&C aimed at preventing deforestation and biodiversity loss. A detailed overview of the P&C's of the different roundtables are provided in Appendices 1-3, the most important points are highlighted in the following paragraphs.

2.1 Roundtables for sustainable palm oil

According to the RSPO, several criteria need to be met to produce sustainable palm oil. These criteria envelop handling according to the law, responsible use of biodiversity, protection of the environment and transparency in regulations (RSPO, 2012). The Indonesian Sustainable Palm Oil (ISPO) is a new policy in order to improve the competitiveness of Indonesian palm oil in world markets. Next to social aspects, the objectives of the ISPO are reducing greenhouse gas emissions and providing attention to environmental problems (ISPO, 2013).

A detailed overview of the P&C of the RSPO is provided in Appendix 1 (RSPO, 2013). Currently, no adequate overview is available for the P&C's of the ISPO. However, Gillespie & Harjanthi (2012) stated that in the view of preventing deforestation and conserving biodiversity, the P&C of the RSPO are more extensive and detailed than those of the ISPO. Therefore, the P&C of the RSPO might be more effective than those of the ISPO. Since the ISPO is mandatory in Indonesia, oil palm growers in the RSPO membership are also bound to the P&C criteria of the ISPO. However, because the ISPO might be less effective than the RSPO, the assumption is that for preventing deforestation and conserving biodiversity the P&C of the ISPO will not provide any additional requirements to the RSPO certification (Gillespie & Harjanthi, 2012).

Textbox 1:
High Conservation Value:
HCV habitats indicate areas which are critical in order to maintain rare and endangered species, ecosystems and landscapes and secure essential environmental services. Furthermore these areas are critical to local livelihood and cultural identities (Colchester *et al*., 2009). Member of the roundtables are expected to manage these HCV areas in a manner that those are maintained and enhanced (ProTerra, 2012; RSPO, 2013).

2.1.1 Reducing deforestation

Criteria 7.3 of the RSPO state that new plantations established since November 2005 should not have replaced primary forest or any area required to maintain or enhance one or more High Conservation Values (HCV). HCV areas are of extreme importance in order to protect the biodiversity within and around the oil palm and soybean plantations (Textbox, 1)(RSPO, 2013). This way new plantations are planned and managed in a manner that the identified HCVs are maintained and/or enhanced. Remote sensing imagery will be used to provide evidence that no conversion of primary forest or other HCVs have taken place since 2005. Therefore, satellite photographs, land use maps and vegetation maps should be used to determine the exact forest and HCV areas.

P&C 7.3 is clear in the definition that the conversion of primary forest is forbidden after November 2005. Next to the primary forest, HCVs should also be protected with the conservation of specific land patches. However, beside primary forest, no further details are given about the protection of secondary or degraded forest. The use of remote sensing imagery is an objective and useful method to determine if primary forest has been converted.

Principles and Criteria 7.3. New plantings since November 2005 have not replaced primary forest or any area required to maintain or enhance one or more High Conservation Values.

2.1.2 Biodiversity conservation

The RSPO created several P&C which should lead to the conservation of biodiversity within and beyond the oil palm plantations. Criteria 5.2 is specifically aimed at the protection of rare, threatened or endangered (RTE) species and other high conservation habitats which could be affected by plantation or mill activities within or outside the plantation. To protect the biodiversity a HCV assessment has to be conducted. If HCVs or RTE species are present within or in close proximity of the plantation, these species and areas have to be protected and conserved. This way growers have to avoid damage to and deterioration of HCV habitats. This might be done with the implementation and conservation of corridors to connect HCV areas and/or HCV areas which are protected with the development of buffer zones (Guidance 5.2.2). Disciplinary measures shall be undertaken against employees which harm, kill or capture RTE species.

Overall, the P&C of the RSPO states several management practices which could be undertaken to protect HCV and RTE species, such as implementation of buffer zones, corridors and/or forest fragments. Nevertheless, the P&C are lacking specific details about these management practices. For example, no further information is provided about how these management practices should be implemented and managed in the field (i.e. (optimal) size, width or quality of habitat). Disciplinary measures shall be undertaken for employees who harm RTE species, but no further information is available how and what kind of actions might be undertaken by the company.

Principles and Criteria 5.2. The status of rare, threatened or endangered species and other High Conservation Value habitats, if any, that exist in the plantation or that could be affected by plantation or mill management, shall be identified and operations managed to best ensure that they are maintained and/or enhanced.
Indicator: 5.2.2 Where rare, threatened or endangered (RTE) species, or HCVs, are present or are affected by plantation or mill operations, appropriate measures that are expected to maintain and/or enhance them shall be implemented through a management plan. **Specific Guidance:** For 5.2.2: These measures will include: • Avoiding damage to and deterioration of HCV habitats such as by ensuring that HCV areas are connected, corridors are conserved, and buffer zones around HCV areas are created.

2.2 Roundtables for sustainable soy

Two associations are active to improve the sustainability of soy plantations; The Roundtable for Sustainable Soy (RTRS) and ProTerra. The RTRS and ProTerra are both voluntary certification programs for social responsibility and environmental sustainability. The RTRS certification is applicable to all kinds of soybeans, including conventionally grown, organic and genetically modified. The RTRS is designed to be used for all scales of soy production and all the countries where soy is produced (RTRS, 2010). ProTerra is applicable to all agricultural products and their derivatives (Proterra, 2012).

A detailed overview of the P&C's required to prevent deforestation and for the protection of biodiversity are provided in Appendices 2 (RTRS, 2010) and 3 (Proterra, 2012). Furthermore, the most important aspects of the P&C will be highlighted in the following paragraphs.

2.2.1 Reducing deforestation

In line with the RSPO, both the RTRS and ProTerra developed a criteria which should prevent that primary forest and other HCV habitats are converted into plantations.

Roundtable for responsible soy

The RTRS presents that after May 2009, no expansion of soybean plantations have taken place at the expense of native habitat (Principle 4.4). However, the RTRS made some exceptions which allows the clearing of native habitat (Appendix 2). For example, clearing is possible if it is in line with a RTRS-approved map. Or, when there is no RTRS- approved map, land cleared before 2009 and within 12 years already used for agriculture or pasture could be converted into plantations. Nonetheless, if native habitat is expanding the establishment of new plantations will be forbidden. In areas that are not native forest, the government will develop land use maps and will decide if it is possible for plantations to expand. Nevertheless, before expansion, a HCV assessment is undertaken to prevent the conversion of HCV areas (RTRS, 2010).

Criteria 4.4 is to some extent comparable with criteria 7.3 of the RSPO. They both state a date, depending on their year of existence, from where deforestation of native habitat is forbidden. However, the RTRS have created some exceptions which allows the clearing of native habitat. A RTRS map and land use maps are developed by experts and/or the local government (RTRS, 2010). Therefore, the conversion of (native) habitat depends on their judgement. This process might be open for subjectivity, because local interest might influence the actual judgement. Consequently, the created exceptions along with the judgement of experts and government might result in the conversion of native habitat into soybean concessions.

Principles 4.4 - Expansion of soy cultivation is responsible.
Criteria 4.4.1 After May 2009 expansion for soy cultivation has not taken place on land cleared of native habitat except under the following conditions… (Appendix 2)

ProTerra

Criteria 10.1.1 of ProTerra states that native vegetation and other HCV areas, cleared after 2004 cannot be converted into soybean plantations. Furthermore, certified organization must implement compensatory measures for HCVs cleared after 1994. A compensatory measure is the re-vegetation of areas with native species to reproduce as much as possible what was originally destroyed. The size of the compensatory measure will depend on local or international laws and/or conventions for the specific biome (ProTerra, 2012).

ProTerra is to some extent comparable with the RSPO and RTRS. However, the principles of ProTerra are more extended and detailed. ProTerra reflects a greater number of requirements and indicators that cover a more extensive set of issues. A higher level of details and strictness might have the result that forests are better protected under certification of ProTerra. ProTerra distinct themselves with the promotion of compensatory measures for the loss of HCV after 1994, a date 10 years before their own existence. Furthermore, it is minor, but they are the first organization whichever provided a bit more details about a possible size for the compensatory measures.

Principles and Criteria - 10.1 Land conversion
Criteria 10.1.1 Areas of native vegetation and other high conservation value areas, cleared after 2004 cannot not be converted into agricultural areas or used for industrial or other commercial purposes, in particular the following: Primary Forests (i.e. rainforests); Riparian Vegetation; Wetlands; Swamps Floodplains; Steep slopes; Other high conservation value.
Criteria 10.1.2. In all cases where clearing of HCVAs has already been done after 1994, certified operations must implement compensatory measures to restore appropriate parts of the cleared areas according to national law, or in cases where national law does not address this point, the Environmental Management Plan shall define a program of compensatory measures that are relevant to the local ecosystem and assure the ability of the ecosystem to continue to deliver essential environmental services.

2.2.2 Biodiversity conservation

Roundtable for Responsible Soy

According to principle 4.5 of RTRS biodiversity has to be maintained with the preservation of native vegetation inside the soybean plantations. The plantations have to develop a map and action plan to manage the forest patch properly. Nevertheless, the RTRS provides no further details about the terms and conditions of this action plan. In this case a forest fragment will be created within the soybean plantations. Principle 4.5 is created for the conservation of biodiversity within the soybean concessions and the RTRS developed no further principles for the protection of biodiversity beyond the plantations. Additionally, the RTRS present no details about a minimum size, shape or quality of the forest fragment.

Principles 4.5 - On-farm biodiversity is maintained and safeguarded through the preservation of native vegetation.

ProTerra

A HCV assessment is used to identify HCV areas within and in close proximity of the concessions. For organizations to become ProTerra certified, they have to develop a plan to maintain and increase biodiversity around their facilities (Criteria 10.2). Certified organizations have to maintain or restore areas of natural vegetation around riparian zones, steep slopes, hills and other sensitive parts of the ecosystem. This way buffer zones are created with a width or area of vegetation that shall be sufficient to conserve the natural biodiversity of the area and avoid erosion.

Biodiversity will be maintained with the development and maintenance of vegetation corridors to link areas of natural vegetation (Appendix 3). Furthermore, unproductive areas have to be converted into conservation areas and managed in a manner that restores fertility and biodiversity (ProTerra, 2012). In line with the other organizations, ProTerra prohibits the collection and hunting of threatened and endangered species.

The P&C of ProTerra is more extensive and detailed than the RTRS. ProTerra state a criteria to protect the biodiversity within and around the soybean concessions. For example, the development of vegetation fragments, buffer zones and vegetation corridors. ProTerra states no specific details about the width or size of these areas. Nevertheless, they mentioned that these areas of vegetation have to be sufficient to maintain and favour continues survival of the natural biodiversity (ProTerra, 2012). However, this statement is open for an own interpretation and subjectivity of the companies. Overall, biodiversity might be better conserved under ProTerra certification, compared to the RTRS.

Criteria 10.2. Part of the environmental impact assessment described in 9.1 will be to develop, document, and implement a plan to maintain and maximize biodiversity within and surrounding the operation, which will be updated yearly.
10.2.1 Certified organizations shall maintain or restore areas of natural vegetation around bodies of water and on steep slopes and hills, and other sensitive parts of the ecosystem. **10.2.2** Certified organizations shall gather wild species or products from wild areas only when permitted by law and shall do so only in a manner that assures those species will continue to flourish in their natural habitat along with other species that normally depend on the gathered species. **Guidance** **10.2.1** The width or area of vegetation shall be sufficient to maintain and foster the continued survival of the natural biodiversity of the area and to avoid erosion.

2.3 Differences between the roundtables

All the roundtables have some similarities within their P&C, they all describe that a HCV assessment has to be conducted to identify and protect HCV areas. The P&C of ProTerra is the most detailed, followed by the RSPO and RTRS. For example, the RSPO and ProTerra forbids the conversion of primary forest without any exceptions. ProTerra distinguishes themselves with their requirement to implement compensatory measures for forest cleared after 1994. The RTRS specifically aims at the conservation of biodiversity within their plantations. Notwithstanding, the RSPO and ProTerra might implement management practices to protect the biodiversity outside the borders of their plantations as well. Furthermore, ProTerra is the only organization which provides a bit more information about how the management practices should be implemented and managed.

The differences between the roundtables, might have the result that ProTerra will be the most efficient in the protection of primary forest and conservation of biodiversity, followed by the RSPO and eventually the RTRS.

2.3.1 Monitoring

All the organizations developed their own monitoring system on how to control if members are following their P&C's. The RSPO monitors if deforestation occurred with the use of satellite images and/or areal photo's. ProTerra will control their members on a GPS based approach. For example, with the use of GPS data they will evaluate if expansion has taken place within the Amazon. On the contrary, the system of the RTRS is less strict and might be open for subjectivity. The RTRS will make use of the judgement of experts to determine if land has been converted into plantations. Furthermore, their system allows clearing of native habitat based on land use mapping that is established by the local government. These maps and the opinions of experts might be under influence of local and/or personal interests. To become more reliable, the RTRS has to implement a system which excludes the possibility for subjectivity. (RTRS, 2010; ProTerra, 2012; RSPO, 2013).

2.3.2 Not all forests are protected

The P&C of the roundtables prohibit the conversion of primary forest and HCV areas. However, with these principles not all forests are protected. The roundtables allow the clearance of forest not identified as primary or HCV (i.e. secondary or degraded forest). For Indonesia, large parts of Kalimantan and Sumatra exist of secondary or degraded land. This land might not be identified as HCV areas and could be cleared for the establishment of (new) oil palm plantations. Nevertheless, this will result in a loss of biodiversity (Koh & Wilcove, 2008). (Greenpeace, 2013)

Chapter 3. Management practices in the field

According to the P&C of the roundtables, a HCV assessment and several management practices might be implemented to prevent deforestation and conserve biodiversity. Nevertheless, limited information is available about the impact these management practices. This chapter will provide further information to reveal the effectiveness of the HCV assessment and management practices.

3.1 Effectiveness of the HCV assessment

All the roundtables implement a HCV assessment to identify HCVs within and beyond their plantations. For the roundtables, the HCV assessment is a keystone for sustainability.

3.1.1 The high conservation value assessment

To conduct a HCV assessment several criteria are develop to determine if forest areas should be identified as HCV. The first three criteria are developed for the protection of biodiversity, Table 1. Furthermore, there are also HCV criteria that deal with the protection of critical ecosystem services (HCV4) and locations with social and cultural importance (HCV5 and HCV6)(HCV Resource network, 2014).

Table 1. Criteria developed for biodiversity conservation within a High Conservation Value assessment

HCV 1 – Species diversity. Concentrations of biological diversity including endemic species, and rare, threatened or endangered species, that are significant at global, regional or national levels.
HCV 2 – Landscape-level ecosystems and mosaics. Large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.
HCV 3 – Ecosystems and habitats. Rare, threatened, or endangered ecosystems, habitats or refugia.

Forest areas will become protected if they correspond with criteria HCV 1 or HCV 3. These two criteria's might have the result that forest areas with no critical or endangered species might not be identified as HCV. Nevertheless, these areas might contain high levels of biodiversity (Edwards *et al*., 2012). For example, for the vertebrates living in the Brazilian Amazon, only a few are listed by the IUCN as being threatened with extinction. Overall, IUCN listed species have a small geographical distribution, are found in low densities, or might be too rare for being located in the short time-frame of the HCV assessment (Edwards *et al*., 2012). The absence of critical endangered species or threatened ecosystems might have the result that large areas of forest are not protected under HCV. Despite that these areas might retain high levels of biodiversity. According to Hoffman *et al* (2010). HCV1 and HCV3 are more effective at protecting forests when they are within an ecosystem that has already undergone dramatic changes and thus harbours many imperilled species.

Furthermore the language used within HCV1 and HCV3 might result in further problems. The guidance of these criteria state that forests containing an 'outstanding concentrations' of specific animal groups should be identified as HCV. Furthermore, after identification these areas have to be 'maintained and enhanced'. This kind of descriptions are open for an own interpretations and subjectivity by the assessors, what could be harmful for the biodiversity (Edwards *et al*., 2012).

The HCV2 determines that, depending on the size of the forest fragment, forest patches will become protected against the conversion into plantations or not (Edwards *et al*., 2012). This is done with the establishment of a minimum threshold size determined at national level by multi-stakeholders (i.e. NGO's, academics and representatives of government and business).

According to HCV2 forest areas of a size below the stated threshold are open for clearance if not protected by one of the other HCV criteria (Edwards *et al*., 2012). National interpretations of this criteria have resulted in a wide range of thresholds. For example, within Indonesia the threshold is set at 20.000 hectares, for Ecuador at 100.000 and Papua New Guinea at 500.000 hectares (HCV resource network, 2014). Overall, a smaller threshold will result in a higher number of forest fragments protected under HCV2 (Edwards *et al.,* 2012*)*.

3.1.2 Implementation in the field

After identification with a HCV assessment, HCVs should be protected against deforestation and might be enhanced with the implementation of several management practices (Edwards *et al*., 2012). However, research of Colchester *et al* (2009) presents that the protection of HCV areas is frustrated in West Kalimantan, Indonesia. Their study demonstrate several factors which might influence the conservation of HCVs.

For Indonesia, the oil palm plantations will have three years before preparation of their leased land. After those three years, the government could provide the permit for a final lease and the plantation can be built. For companies to become RSPO certified they have to conduct a HCV assessment. Implementation of a HCV assessment might be time consuming and the result could be that the companies are not ready after the stated years. As a consequence, it might happen that the local government will not permit the final lease of the land. The government is free to reallocate this land to other interested parties, because HCVs are not protected by the Indonesia's law. The result is that the reallocated land might be provided to companies which are not certified. Eventually, previously identified HCV areas might be cleared by the new company, resulting in deforestation and loss of HCV habitat. (Colchester *et al*., 2009).

Furthermore, it happens that companies are not protecting the identified HCV areas. HCVs are handed back to the local government after identification by the companies. In this way, companies prevent the taxation of land which could not be used for crop plantings and it becomes easier to fulfil the P&C of the roundtables. Again those land areas, containing HCVs, might be reallocated by the local government. (Colchester *et al*., 2009)

All the roundtables have created P&C's which should conserve HCVs. This pattern was found within Indonesia, however, these processes might happen in other countries as well. Actually, the presence of HCVs within or in close proximity might not be preferred by oil palm and soybean growers. Especially because extra, and costly, management practices have to be undertaken in order to protect these areas. Eventually, these patterns results in a low potential of the roundtables to conserve HCV habitat.

3.2 Conserving biodiversity within and beyond the plantations

3.2.1 Corridor

The P&C stimulate the development of vegetation corridors along the oil palm and soybean plantations. Corridors are patches of (secondary) forest which connects areas that were otherwise fragmented. In this manner, corridors might contribute to the conservation of biodiversity (Martensen *et al*., 2008; Nasi *et al*., 2008; Höbinger *et al*., 2012), for example, because it stimulates the migration of wildlife species through plantations (Nasi *et al*., 2008; ZSL, 2011).

If areas becomes fragmented, the existing populations will be divided and the overall population size will decline. Those species will go extinct if their population size drops below a certain threshold (Bakewell *et al*., 2012; Höbinger *et al*., 2012). When animals are able to migrate between several forest fragments, the effects of small population sizes may be partly or even greatly mitigated (Laurance, 1991; Martensen *et al*., 2008). The genetic contribution of immigrants can bolster small populations, providing a buffer against extinction. For this reason, species that are good dispersers may be good survivors (Laurance, 1991). Corridors

are especially important for species with low capacity to move through the plantations, such as species sensitive to human disturbance (Martensen *et al*., 2008). Nevertheless, Dixo *et al* (2008) showed that over a longer time span, even species with higher dispersal capacities might suffer from fragmentation. This is because the fragmented population will lose their fitness and those species might become locally extinct.

Oil palm and soybean plantations are an unsuitable habitat for most forest species and act as a severe barrier to animal movement (Fitzherbert *et al,* 2008). The continuous expansion of oil palm and soybean plantations might result in further simplification and fragmentation of the landscape, which increases the barrier effect for the dispersal of animal and plant species. If forest corridors are developed within oil palm and soybean plantation, these might help in the protection and conservation of biodiversity for otherwise separated fragments. For example, the survival rate of bird species and primates becomes higher in landscapes with high connectivity. If fragments are close to each other and/or linked with corridors, birds and primates are able to obtain their necessary resources to survive with daily or occasional movements. The connectivity of several even small fragments made it possible to maintain larger populations and richer communities (Martensen *et al*., 2008; Nasi *et al*., 2008).

If plantations are designed in a manner that they are open and penetrable to animals, an optimal level of biodiversity will be maintained (Nasi *et al*., 2008). This implies the need that corridors are just not developed in random manner across the landscape. Priority have to been given to areas within the concessions that ensures that forest fragments and other natural habitat are well-connected. Currently, the implementation of roads, corridors and other conservation areas are proceeded independently, this will not result in the highest efficiency (Nasi *et al*., 2008). Therefore landscape planning, as plantations stands, corridors and conservation areas, have to be integrated at concession level. This will be the optimal manner to implement the management practices and optimize the efficiency of connectivity.

Corridors might be develop with the regeneration of secondary forest. However, the process of regeneration is slow and the extinction rate within fragments is high (Laurance, 1991). Therefore, secondary forest fragments cannot be seen as an alternative for the conservation of primary forest. The best solution is when corridors are created with the preservation of strips of primary forest.

3.2.2 Buffer zones

A buffer zone is a strip of undisturbed land in order to minimize the negative effects from the plantation to adjacent areas (i.e. primary forest and HCV areas) (ZLS, 2011; Bakewell *et al*., 2012). All the roundtables have a P&C which state that a buffer zone have to be developed in order to protect certain areas.

The negative impact of the oil palm and soy plantations might not be restricted to the borders of the plantations. This phenomena of a negative impact which follows through adjacent areas is also known as the ‘edge effect’. Therefore, buffer zones have to be created to overcome the negative impacts of the oil palm and soy plantation to their surroundings (Nájero & Simonetti, 2010; ZSL, 2011).

Figure 4 demonstrate a whole list of factors with their specific penetration distance which might affect the primary forest adjacent to a plantation (ZSL, 2011). An increased exposure to, for example, sunlight and wind, might have the result that the forest becomes warmer, brighter and drier. Therefore, the climatic and environmental conditions of the forest adjacent to the plantation could change (ZSL, 2011). Eventually, these impacts can reduce the quality of habitat resulting in a shifting species composition or reduced levels of biodiversity (Bakewell *et al*., 2012). Open country pioneer species also increases competition for these areas, often

displacing the original inhabitants. The effectiveness of the buffer zones positively correlates with his created width (Figure 3). A buffer zone of more than 400 metres in width should be the most effective, because at that moment all the negative impacts might be excluded (ZSL, 2011).

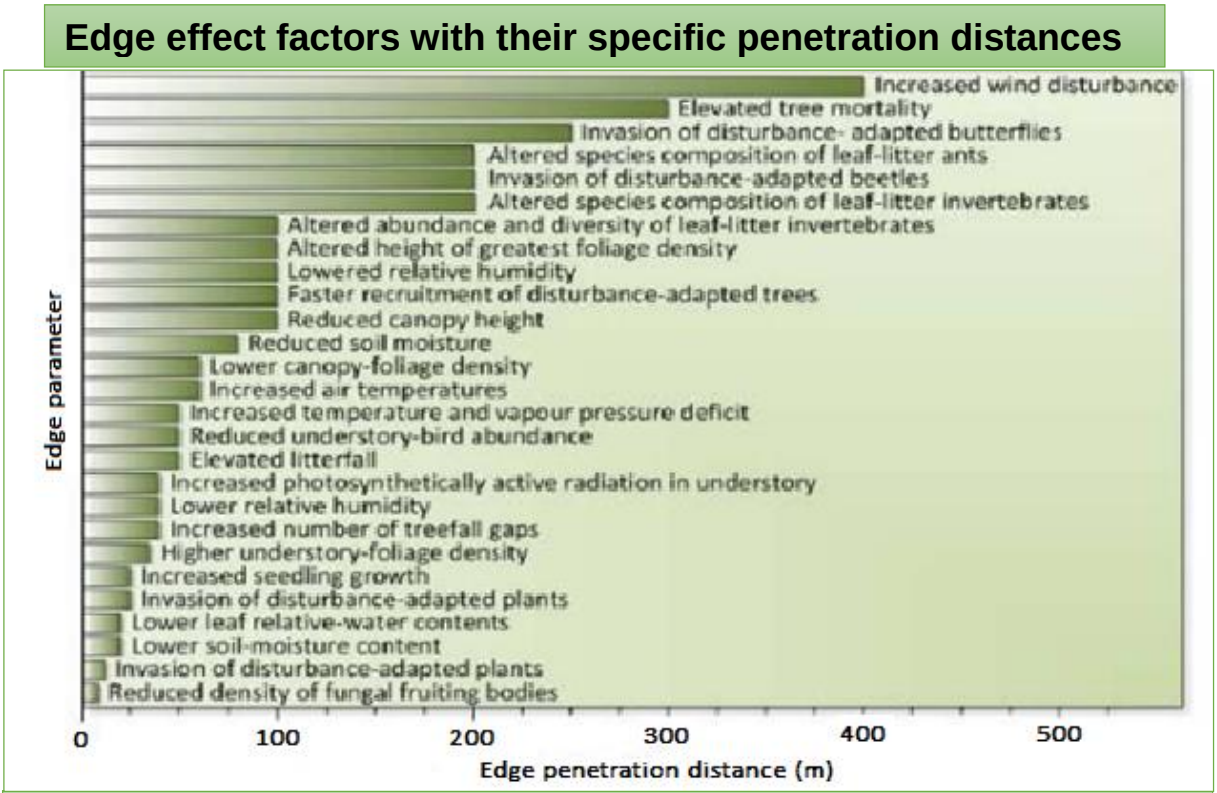

Figure 4. Demonstrate the different edge effect factors with their specific penetration distances (m) (ZSL, 2011)

Beside their function to protect adjacent forest areas, buffer zones might contain levels of biodiversity as well. Buffer zones could provide habitat to certain species with the provision of food, nesting sites and/or shelter (ZLS, 2011). Beside the effectiveness of riparian buffer zones (section 3.2.3), no data is there available about the effectiveness of buffer zones in the protection of HCV or primary forest.

3.2.3 Riparian zones

Riparian zones form the interface between terrestrial and aquatic ecosystems, which are known for their high levels of biodiversity (Nilsson *et al*., 2010). The P&C of the roundtables state that riparian zones have to be maintained and conserved within the concessions (ProTerra, 2012; RSPO, 2013). Riparian buffer zones are often used as a tool to mitigate the negative impacts of land use activities on aquatic resources (Hawes & Smith, 2005). Riparian buffer zones are extremely diverse in their ecosystem en provides food and habitat for unique plant and animal species (Hawes & Smith, 2005). Riparian zones might be especially valuable as a corridor because in most cases they are reaching into the land of the plantations (Höbinger *et al*., 2012). Former research demonstrate that small corridors of secondary vegetation along streams are able to enhance mammalian diversity in fragments (Laurance, 1991). The size and width of riparian zones will determine their quality of habitat and their capacity to overcome the negative impacts from land use activities (Nilsson *et al*., 2010). For example, most erosion has been controlled for vegetated buffers of 10 to 30 meters in width. To overcome nutrient run-off (nitrate and phosphor) a width of at least 5 towards 50 meter have shown to be effective. To protect aquatic wildlife, including trout and invertebrates, the buffer zone demonstrate to be

effective for a width between 10 and 50 meters (Hawes & Smith, 2005). These examples emphasize that the width of the buffer zones is a key determiner for their effectiveness. The wide range of widths depends on soil type, slope, standing vegetation, land use and other factors (Hawes & Smith, 2005).

3.2.4 Forest fragments within the plantations

The P&C's stimulate the companies to conserve certain amounts of forest fragments within their concessions, for example high conservation value habitats (RSPO, 2013). RSPO members *Sime Darby* and *Wilmar*, have each preserved approximately 10 percent of their total planted areas (500.000 and 200.000 ha respectively) (Nikoloyuk *et al*., 2009). According to Greenpeace (2013) members of the RSPO conserve 14 percent of the natural forest within Indonesian oil palm concessions.

According to the roundtables, the conservation of forest fragments within oil palm and soybean plantations should contribute to the protection and conservation of biodiversity (RTRS, 2010; ProTerra, 2012; RSPO, 2013). The conservation of forest fragments within agricultural landscapes could improve the species richness. These forest fragments might harbour populations of species which otherwise would not be present in the plantation (Edwards *et al*., 2010). Furthermore, these areas could provide source populations of beneficial species (e.g. for pest control) and other ecosystem services (Lucey *et al*., 2014). However, little information is available about the efficiency of forest fragments for maintaining or improving species richness within plantations.

Overall the main idea is that species richness will increase with an increasing patch size, along with the habitat quality of the forest fragments (Lucey *et al*., 2014). For example, research showed that fragmentation results in a reduced genetic diversity and connectivity of toad populations in the Brazilian Amazon (Dixo *et al*., 2008). The lowest diversity were found in the smallest fragments, likely because of a decrease in population sizes. They demonstrate a higher proportion of barriers to gene flow among small and medium fragments than between populations in continuous forest (Dixo *et al*., 2008). If fragments of natural forest are maintained in plantations, these areas will be influenced by the edge effect. This could influence the quality of the habitat. Therefore, the prediction is that species which naturally occur in the edge habitat will survive in these fragments (ZLS, 2011). According to Edwards *et al* (2010), the conservation of forest fragments within oil palm plantations did not contribute to the conservation of imperilled bird species. The abundance of bird species were 60 times lower in forest fragments and 200 times lower in oil palm plantations, compared to contiguous forest. Beside their possibility to conserve a certain amount of species, forest fragments might primary function as corridor or 'stepping stones' for (larger) forest patches adjacent to the plantation (Edwards *et al*., 2010; Bakewell *et al*., 2012).

The effectiveness of forest fragments to conserve biodiversity within oil palm and soybean concessions, will depend on their connectivity, size and quality of habitat (Martensen *et al*., 2008; Lucey *et al*., 2014). Overall a higher level of biodiversity will be maintained with an increasing patch size, higher connectivity and a good quality of habitat (Nasi *et al*., 2008; Martensen *et al*., 2008).

3.3 Implementation of the management practices within the plantations

As presented the potential of the management practices to conserve biodiversity will depend on their size, connectivity and quality of habitat. Within oil palm and soybean plantations, the implementation of management practices will be on a direct cost for the concessions, because that land was otherwise used for crop plantings. For example, forests fragments maintained within plantations could reduce the total area available for crop planting. If forest fragments are too small, too isolated or of poor quality, these fragments might not result in any conservation

of biodiversity. In those cases the development of forest fragments might result in substantial economic losses of unplanted land in return for negligible conservation benefits (Lucey et al., 2014). This is in line with Edwards *et al* (2010) which found that forest fragments within plantations have not their desired effect. He stated that the money invested in fragments should preferably be spend at the preservation of large areas of continuous forest.

If the roundtables will not improve their P&C, the predictions are that the management practices will be much smaller than desired. This will have an impact on the effectiveness of these management practices to protect HCVs and other specific areas. However, the implementation of forest fragments and buffer zones within plantations might not be as costly in terms of missed yield and profit. The maintenance of forest fragments might result in an increased level of biodiversity within the plantation, but it is also helpful in preventing flooding and erosion. Flooding can be a major cause of mortality within agricultural concessions, resulting in huge costs (Turner et al., 2008).

3.4 Summary

The criteria of the HCV assessment might have the result that forest areas containing high levels of biodiversity are not protected as HCV. For example, if no IUCN endangered species are found within a specific forest patch, this area is likely to be not identified as HCV. Furthermore, because of national interpretations patch sizes below a certain threshold will not be identified as well. Beside these failures of the HCV assessment, the implementation and protection of HCV areas is also frustrated, as presented for Indonesia.

The principles and criteria of the roundtables stated several management practices which could be implemented to increase the level of biodiversity within the concessions. Buffer zones might contribute to the protection of sensitive parts of the ecosystem adjacent to a plantation. Corridors and forest fragments could result in a higher level of biodiversity within the plantations. However, these activities might be especially useful because they make the connection between forest fragments. The effectiveness of the management practices will depend on their size, connectivity and quality of habitat. Therefore, an optimal effect to conserve biodiversity will be obtained for management practices with a large size, well-connection and of good habitat quality.

Chapter 4. Are roundtables sustainable?

In theory, the P&C's of the roundtables should result in a higher level of sustainability. The main research question was to find out if the roundtables are contributing to a reduced level of deforestation and the conservation of biodiversity. This chapter will provide further information to reveal if the roundtables are reaching their objectives.

4.1 Preventing deforestation

According to previous chapters, there are some problems with the implementation of the P&C within the concessions. This might be a result from a lack of knowledge, but also a lack of motivation and often a lack of good management inside companies (Nikoloyuk et al., 2009). Consequence is that the roundtables are not very effective in the protection of primary forest towards deforestation. First of all, the HCV assessment might not result in the desired protection of HCV habitats. The P&C have to change in such a manner that HCV areas are becoming protected by the companies. Reallocation of land could have the result that HCV habitats are converted into plantations. At second, the P&C are prohibiting the conversion of primary forest. However, secondary forest or degraded forest might still be converted into plantations if not identified as HCV, this will result in a continuous loss of biodiversity.

As presented in Textbox 2 of the Palm Oil Innovation Group, all the roundtables should extent their P&C with the protection of High Carbon Stock areas. The implementation of an additional HCS assessment will result in the protection of secondary forests as well. Eventually, this makes it impossible for plantations to convert primary and secondary forests into oil palm and soybean plantations, even at the moment that these areas contain no HCV habitats.

Textbox 2:
Palm Oil Innovation Group

The Palm Oil Innovation Group (POIG) was developed in June, 2013. The main reason was the RSPO which reviewed its Principles and Criteria. It improved their P&C for social issues, but critical issues as preventing deforestation, GHG emissions and biodiversity protection had no adequate attention. The result was an increasing criticism from consumer companies and NGOs. The POIG, consisting of NGO and palm oil companies, wants to go beyond the requirements of the RSPO. The POIG is still in its infancy, but it will cover additional requirements to increase the level of sustainability (POIG, 2013; WWF, 2013).

The POIG states that they will stop deforestation with the conservation of High Carbon Stock (HCS), including secondary forests. The HCS assessment will be additional on the HCV. This approach combines biodiversity and carbon conservation. Thus, no further deforestation should take place with the expansion or establishment of new oil palm plantations (POIG, 2013; WWF, 2013).

4.2 Biodiversity conservation

As presented in chapter 3, several management practices might contribute to the protection of biodiversity within and beyond the plantations (Nikoloyuk *et al*., 2009; Nájero & Simonett, 2010; Bakewell *et al,* 2012). To become effective, these management practices have to be of a certain size, well-connected and of good quality. According to the P&C of the roundtables, some of these management practices will only be implemented after identification of HCV areas. For example, ProTerra (2012) states that HCV areas are not converted into plantations and even enhanced with the implementation of corridors and buffer zones. Furthermore, if HCVs are found within the concessions these have to be maintained as forest fragments (ProTerra, 2012). Currently, the identified HCV areas might not be protected by the companies and/or government. This will result in a continuous loss of HCV habitats and deforestation of

identified HCV areas. Therefore, it is of high importance that the HCV assessment will be conducted on a proper manner and that identified HCV areas are becoming protected by the companies (and law). Currently, the potential of the roundtables to protect biodiversity is quite low.

Not to mention, if companies are willing to implement these kinds of management practices. The roundtables states no specific details on how to implement and manage these activities in the plantations. For example, the potential of buffer zones, corridors and forest fragments to conserve biodiversity will depend on their sizes and connectivity. The implementation of these management practices might be costly for the company. Therefore, with no clear details, it is assumable that the companies will implement practices of a size or area that is insufficient to conserve high levels of biodiversity.

4.3 P&C development after consensual negotiations

There are some major differences between the P&C's of the roundtables. Yet, it might become clear that the roundtables are facing serious challenges to its effectiveness, for both short and long term. Some of the P&C's are weak, because they lack clear operational meaning. This might be the result of consensual negotiations before a P&C was developed (Nikoloyuk *et al*., 2009). The lack of clear, detailed and appropriate formulated principles result in a reduced effectiveness for the roundtables. Without clear standards, a range in level of performances are possible. Consequently, some of the certified growers will perform at a higher sustainability standard than others (WWF, 2013).

For example, if two palm oil growers are implementing forest fragments and corridors, it is possible that one company is making them of a size that is sufficient to conserve a certain amount of biodiversity and stimulate the migration of wildlife species. However, the forest fragments and corridors of a second company might be of a size that it has a negligible contribution to biodiversity conservation. Both the organizations will obtain the same certificate, because the P&C of the roundtables are lacking essential details and guidance. To conclude, there are no clear requirements for the implementation of the possible management practices. This makes it possible that, for biodiversity protection, two organization with the same certificate are operating on a different level. This pattern will be the case for the implementation of all the P&C of the roundtables, aimed at preventing deforestation and biodiversity conservation.

4.4 Missing the power to punish their members

The process of the RSPO and other roundtables are time consuming and they respond weak if companies are violating their standards. For example, the palm oil grower Duta Palma has a long history of deforestation, illegality and conflicts with local communities. In 2009 a coalition of village heads and NGO's submitted a complaint about the activities of Duta Palma. These violating activities included clearance of HCV and peat forest, use of fire to clear land and failure to hold permit. Eventually Duta Palma was only punished for administrative breaches in 2011. After another critical report of Greenpeace, Duta Palma was expelled by the RSPO in 2013. However, it took nearly six years from the first criticism before the RSPO expelled Duta Palma. (Greenpeace, 2013)

Herakles Farms became RSPO member in 2009, but they were not following the P&C of the RSPO. They planned to clear 73.000 hectares of dense natural forest in Cameroon (Figure 5). The first complaints were made in 2012 and the HCV Resource Network stated that the HCV assessment of Herakles Farms was not adequate to comply with the RSPO principles. In June 2012, the RSPO requested that Herakles suspended their clearance activities. Withal, they ignored it and withdrew their membership. Since this point, clearing has continued and Herakles still claims on its website to follow the RSPO P&C's. (Greenpeace, 2013)

Figure 5. Oil palm nursery of the Herakles Farm's in the tropical forests of Cameroon

The roundtables lack the ability to act powerful on members who are violating their P&C's, as demonstrated by the RSPO (Greenpeace, 2013). In the case of palm oil, the market is fragmented. Non-certified palm oil is easy to sell, because there are sufficient food and energy markets, which accepts any product produced (i.e. China and India) (Nikoloyuk *et al., 2009*). This might have an influence on the 'value' of certified products towards companies. If it is easy to sell the products, certification of the products might not result in major improvements of your own market position. Becoming certified is costly for the companies, and if the price premium for certified products is not adequate, the willingness for companies to handle according to the P&C's will decrease (Paoli *et al*., 2010).

Furthermore, most of the roundtables are voluntary what makes it difficult to punish companies who are violating the P&C's. Punishment might result in withdrew of the membership. At present, because it is easy for growers to sell uncertified products, this will not result in major impacts to the non-certified growers. Only because the ISPO is mandatory, companies will be imposed with penalties if they do not implement the regulations (ISPO, 2013).

4.5 Discussion of this reports methodology

There is a substantial lack of information about the effectiveness of the roundtables. In some cases informative literature was only available for one of the roundtables. However, the assumption is made that information and critical points identified for one roundtables might be applicable to all the roundtables. For example, literature about the implementation of the HCV assessment were only available for the RSPO. Nonetheless, the assumption was made that the same process of reallocation might occur within the other roundtables as well.

Most of the information was available about the RSPO. This is not remarkable, considering its date of existence and the RSPO is the largest organization for palm oil. In this report the focus was aimed to address the effectiveness of the roundtables in their protection against deforestation and biodiversity loss. Beside these issues, roundtables state that they will improve the level of sustainability for GHG emissions, pollution, social standards and transparency (RTRS, 2010; ProTerra, 2012; RSPO, 2013). It might be possible that the roundtables are not that effective for these problems as well. Deforestation is one of the main

drivers behind climate change (Nepstad *et al*., 2008). Thus, because the roundtables are not effective in protecting deforestation, GHG emissions might be emitted. If the roundtables are improving their P&C's, this will have a positive impact on all their stated objectives.

In studies available on biodiversity, the scientists are mainly focussing on one specific species (Edwards *et al*., 2008; Wilcove & Koh, 2008). Eventually, the results of one or a few species is then generalised in the broader sense. This information is used to predict the effect for all plant and animal species. For practical reasons this is the easiest manner, but these general assumptions might be a bit speculative.

4.6 Future research

In future research has to be conducted on the potential of the roundtables to prevent deforestation and conserve biodiversity. For example, to investigate the effect of the management practices, scientist have to follow the complete process of the establishment of a certified plantation. Therefore, forest areas have to be monitored before and after conversion into plantations. These measurements over time will provide clear and objective results about the effectiveness of the implemented management practices.

Furthermore, more research has to be done to evaluate the potential of the management practices. With more knowledge about these activities, it becomes easier to implement those in a proper manner. For example, it is important that the effect of forest patches, corridors and buffer zones on biodiversity will be identified. More knowledge about an optimal size, quality and connectivity could be added to the P&C's, making them more detailed and informative.

Conclusions

To conclude, the P&C stated by the roundtables are lacking specific details and requirements to become effective. A lack of details will have the result that companies and assessors could make their own interpretations. Eventually, this could result in a pattern that companies with the same certificate are operating on a different level of sustainability. Therefore, the P&C have to become more detailed and have to contain more requirements.

The HCV assessment might have the result that areas, which contain high levels of biodiversity, are not identified as HCV. Furthermore, identified HCVs are not protected by the companies or the government. To protect all the HCV areas, roundtables have to go beyond the criteria of the HCV assessment. For example, create an own threshold from were forest fragment have to be protected.

The P&C stated several management practices which could lead to the conservation of biodiversity within and beyond the concessions. However, these practices might only be effective if they are of an appropriate size, well-connected and contain a good quality of habitat. The P&C of the roundtables have be adjusted in such way that these activities will be implemented in a sufficient manner. However, an ineffective HCV assessment could have the result that these management practices are not implemented in the field.

This thesis demonstrate that a lack of details and strictness of the P&C's of the roundtables result in a reduced effectiveness for forest and biodiversity conservation. Of the roundtables, ProTerra might become the most effective because their P&C are the most detailed. In the future, companies have to extend their P&C with more details and requirements. In advance, to control if companies are following the P&C more monitoring have to be done, and a system have to be developed to punish members which are violating the P&C. Nevertheless, the whole certified market have to change in such a manner that the 'value' of certification will increase, and companies become more willing to follow the P&C properly.

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Figures

Front-page: http://en.wikipedia.org/wiki/Palm_oil and http://www.dw.de/brazil-to-take-soy-lead-with-respect-for-rainforest/a-16547231.

Figure 3: http://www.york.ac.uk/media/news-and-events/features/palmoilgallery/EW%20%20forest%20fragments%20(portrait).jpg

Figure 5: http://www.greenpeace.org/usa/en/multimedia/slideshows/-Forest-Clearing-Cameroon/Rainforest-Aerial-Documentation-Cameroon

Appendices

Appendix 1. Table 1 - Principles and Criteria of the Roundtable for Sustainable Palm Oil (RSPO, 2013).

PRINCIPLE 5: ENVIRONMENTAL RESPONSIBILITY AND CONSERVATION OF NATURAL RESOURCES AND BIODIVERSITY
Principles and Criteria 5.2. The status of rare, threatened or endangered species and other High Conservation Value habitats, if any, that exist in the plantation or that could be affected by plantation or mill management, shall be identified and operations managed to best ensure that they are maintained and/or enhanced.
Indicator: 5.2.1 Information shall be collated in a High Conservation Value (HCV) assessment that includes both the planted area itself and relevant wider landscape-level considerations (such as wildlife corridors). 5.2.2 Where rare, threatened or endangered (RTE) species, or HCVs, are present or are affected by plantation or mill operations, appropriate measures that are expected to maintain and/or enhance them shall be implemented through a management plan. 5.2.3 There shall be a programme to regularly educate the workforce about the status of these RTE species, and appropriate disciplinary measures shall be instigated in accordance with company rules and national law if any individual working for the company is found to capture, harm, collect or kill these species. 5.2.4 Where a management plan has been created there shall be ongoing monitoring: • The status of HCV and RTE species that are affected by plantation or mill operations shall be documented and reported; • Outcomes of monitoring shall be fed back into the management plan. 5.2.5 Where HCV set-asides with existing rights of local communities have been identified, there shall be evidence of a negotiated agreement that optimally safeguards both the HCVs and these rights. **Specific Guidance:** For 5.2.1: This information will cover: • Presence of protected areas that could be significantly affected by the grower or miller; • Conservation status (e.g. IUCN status), legal protection, population status and habitat requirements of rare, threatened, or endangered (RTE) species that could be significantly affected by the grower or miller; • Identification of HCV habitats, such as rare and threatened ecosystems, that could be significantly affected by the grower or miller; For 5.2.2: These measures will include: • Ensuring that any legal requirements relating to the protection of the species or habitat are met; • Avoiding damage to and deterioration of HCV habitats such as by ensuring that HCV areas are connected, corridors are conserved, and buffer zones around HCV areas are created; • Controlling any illegal or inappropriate hunting, fishing or collecting activities, and developing responsible measures to resolve human-wildlife conflicts (e.g. incursions by elephants). For 5.2.5: If a negotiated agreement cannot be reached, there should be evidence of sustained efforts to achieve such an agreement. These could include third party arbitration (see Criteria 2.3, 6.3 and 6.4).
PRINCIPLE 7: RESPONSIBLE DEVELOPMENT OF NEW PLANTINGS
Principles and Criteria 7.3. New plantings since November 2005 have not replaced primary forest or any area required to maintain or enhance one or more High Conservation Values.

Indicators:
7.3.1 There shall be evidence that no new plantings have replaced primary forest, or any area required to maintain or enhance one or more High Conservation Values (HCVs), since
November 2005. New plantings shall be planned and managed to best ensure the HCVs identified are maintained and/or enhanced (see Criterion 5.2).
7.3.2 A comprehensive HCV assessment, including stakeholder consultation, shall be conducted prior to any conversion or new planting. This shall include a land use change analysis to determine changes to the vegetation since November 2005. This analysis shall be used, with proxies, to indicate changes to HCV status.
7.3.3 Dates of land preparation and commencement shall be recorded.
7.3.4 An action plan shall be developed that describes operational actions consequent to the findings of the HCV assessment, and that references the grower's relevant operational procedures (see Criterion 5.2).
7.3.5 Areas required by affected communities to meet their basic needs, taking into account potential positive and negative changes in livelihood resulting from proposed operations,
shall be identified in consultation with the communities and incorporated into HCV assessments and management plans (see Criterion 5.2).

Specific Guidance:
For 7.3.1: Evidence should include historical remote sensing imagery which demonstrates that there has been no conversion of primary forest or any area required to maintain or enhance one or more HCV. Satellite or aerial photographs, land use maps and vegetation maps should be used to inform the HCV assessment.

Where land has been cleared since November 2005, and without a prior and adequate HCV assessment, it will be excluded from the RSPO certification programme until an adequate HCV compensation plan has been developed and accepted by the RSPO.

Appendix 2 Table 2. Principles and Criteria of the Roundtable for Responsible Soy (RTRS, 2010).

Principle 4: Environmental Responsibility
Principles 4.4 - Expansion of soy cultivation is responsible.
Criteria 4.4.1 After May 2009 expansion for soy cultivation has not taken place on land cleared of native habitat except under the following conditions: 4.4.1.1 It is in line with an RTRS-approved map and system (see Annex 4.) or 4.4.1.2 Where no RTRS-approved map and system is available: a) Any area already cleared for agriculture or pasture before May 2009 and used for agriculture or pasture within the past 12 years can be used for soy expansion, unless regenerated vegetation has reached the definition of native forest (see glossary). b) There is no expansion in native forests (see glossary) c) In areas that are not native forest (see glossary), expansion into native habitat only occurs according to one of the following two options: Option 1. Official land-use maps such as ecological-economic zoning are used and expansion only occurs in areas designated for expansion by the zoning. If there are no official land use maps then maps produced by the government under the Convention on Biological Diversity (CBD) are used, and expansion only occurs outside priority areas for conservation shown on these maps. Option 2. An High Conservation Value Area (HCVA) assessment is undertaken prior to clearing and there is no conversion of High Conservation Value Areas.

4.4.2 There is no conversion of land where there is an unresolved land use claim by traditional land users under litigation, without the agreement of both parties. **Guidance** 4.4.1.2 c) Options 1 and 2 only apply for areas which are not native forest (as stated in 4.4.1.2 b and c). Therefore native forest cannot be deforested even if an official land use map (Option 1) permits this. 4.4.1.2 c) Option 1: Maps used for this purpose have been subject to adequate and effective public consultation. 4.4.1.2 c) Option 2: HCVA assessment should be undertaken using the existing guidance e.g. HCV Toolkit. The assessors should be recognized by RTRS or the HCV network. 4.4.2 Traditional land users will provide reasonable proof that they have been exercising use or access rights on the area of the property over the 10 years prior to May 2009. Definition of native forest: areas of native vegetation of 1ha or more with canopy cover of more than 35 % and where some trees (at least 10 trees per hectare) reach 10m in height (or are able to reach these thresholds in situ (ie. In that soil/climate combination)) Examples of native forests include Amazon, Mata Atlantica, Yungas, Chiquitano, forest areas of NE China Data capture requirements for future PES schemes: The date of registration of the producer for certification is recorded by the certification body. During the certification audit, the area and type of vegetation of all voluntary reserves of native vegetation (above the legal requirement) are recorded. Following certification, details of the date of registration for certification and the area and type of vegetation of voluntary reserves are added to an RTRS register. When an RTRS PES scheme is developed, payments are available retroactively to the date of registration for certification to all producers on the register.
Principles 4.5 - On-farm biodiversity is maintained and safeguarded through the preservation of native vegetation.
4.5.1 There is a map of the farm which shows the native vegetation 4.5.2 There is a plan, which is being implemented, to ensure that the native vegetation is being maintained (except areas covered under Criterion 4.4) 4.5.3 No hunting of rare, threatened or endangered species takes place on the property. **Guidance** The map and plan should be appropriate to the size of the operation. In group certification the group manager can maintain the map centrally and can be responsible for maintaining and developing a plan for conservation.

Appendix 3, Table 3. Principles and Criteria of the ProTerra Foundation (ProTerra, 2012).

PRINCIPLE 9 - Effective environmental management program
Principle and Criteria 9.1 - Certified organizations shall perform a comprehensive social and environmental impact assessment (SEIA) to identify potentially harmful or damaging impacts of the operation and to define an action plan to address these impacts.
Guidance This plan will take into account the sustainability of the environment, wildlife and endangered species, impact on the local population and indigenous people. If the organization does not have expertise in house to effectively conduct the SEIA, guidance from government, academic or other recognized experts shall be accessed. As part of their Action Plan, Certified organizations shall develop and implement initiatives to maintain and increase biodiversity around their facilities. Examples of such initiatives include the following: a. Creation and maintenance of vegetation corridors to link areas of natural vegetation. b. Conversion of unproductive areas into conservation areas.

Plots that have been farmed with practices that have led to low- or non-productivity may be reclaimed as farmland provided they are stewarded in a manner that recreates fertility and restores biodiversity.
The SEIA will make use of the communication and grievance rectification mechanisms described under Principle 6 to assure that the SEIA process is known to all relevant parties and these are engaged in a transparent and effective manner that assures negative impacts of the operation are minimized and mitigated and positive maximized.

PRINCIPLE 10 - Effective management of biodiversity, non-crop vegetation, and environmental services

Principles and Criteria - 10.1 Land conversion

Criteria 10.1.1 Areas of native vegetation and other high conservation value areas, cleared after 2004 cannot not be converted into agricultural areas or used for industrial or other commercial purposes, in particular the following:
· Primary Forests (i.e. rainforests)
· Riparian Vegetation
· Wetlands
· Swamps
· Floodplains
· Steep slopes
· Other high conservation value
Guidance
An example of a prohibited industrial use of resources would be timber cut for the purposes of drying grain.

For certification decisions, the Amazon biome is defined according to internationally recognized GPS coordinates.

Criteria 10.1.2. In all cases where clearing of HCVAs has already been done after 1994, certified operations must implement compensatory measures to restore appropriate parts of the cleared areas according to national law, or in cases where national law does not address this point, the Environmental Management Plan shall define a program of compensatory measures that are relevant to the local ecosystem and assure the ability of the ecosystem to continue to deliver essential environmental services.
Guidance
Two aspects of the compensatory measures must be considered:
i. The type and place of restoration – areas as described in section 10.1 above should be re-vegetated with native species appropriate to the zone in question, preferably to reproduce as much as possible what was originally destroyed.
ii. The percentage of the originally cleared area that must be restored – this will depend on local, regional, national, and/or international laws and/or conventions as applicable to the biome in question.
For example certified organizations will protect areas that are:
(a) designated by law or by the relevant competent authority for nature protection purposes; or
(b) designated for the protection of rare, threatened or endangered ecosystems or species recognized by international agreements or included in lists drawn up by intergovernmental organizations or the International Union for the Conservation of Nature.

Criteria 10.2. Part of the environmental impact assessment described in 9.1 will be to develop, document, and implement a plan to maintain and maximize biodiversity within and surrounding the operation, which will be updated yearly.

10.2.1 Certified organizations shall maintain or restore areas of natural vegetation around bodies of water and on steep slopes and hills, and other sensitive parts of the ecosystem.
10.2.2 Certified organizations shall gather wild species or products from wild areas only when permitted by law and shall do so only in a manner that assures those species will continue to flourish in their natural habitat along with other species that normally depend on the gathered species.
Guidance
10.2.1 The width or area of vegetation shall be sufficient to maintain and foster the continued survival of the natural biodiversity of the area and to avoid erosion.