Preliminary assessment of RSPO's recommendations for soil erosion control measures

A science-for-policy paper by the SEnSOR programme

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Key messages

The Roundtable on Sustainable Palm Oil's (RSPO) Principles and Criteria together with the detailed best management practices (BMP) document provided for peat soils and draft BMP for riverine buffers address ways to mitigate soil erosion. This report identifies those Principles and Criteria that are both detailed and consistent with scientific evidence and those where further development is required.

Recommendations for targeted improvements to RSPO Principles and Criteria and BMP for the mitigation of soil erosion are:

1. The RSPO's guidelines recognize the importance of protecting soil on slopes and recommend a maximum slope gradient for planting. However, this **slope should always be defined over a given area**.

2. A **terrace construction and maintenance programme** should specified, akin to the road maintenance programme set out in RSPO Principle 4.3.3.

3. Principle 4.3.3 (a road maintenance programme shall be in place) should be expanded to provide **best management practices for road and drain maintenance and construction** or links should be provided to best management practices detailed elsewhere. Particular attention should be paid to areas where roads/tracks and waterways meet.

4. The RSPO's guidelines highlight the importance of protecting fragile soils. A clear **definition** of what constitutes a fragile soil or a **list of fragile soils** should be developed.

5. **Best management practices for growing oil palm on fragile soils** should be provided for all fragile soils identified.

6. There has been little scientific research on soil erosion in oil palm plantations so current guidelines for erosion control are reliant on research carried out in other landscapes. In order fully to understand soil erosion from oil palm plantations and to test the effectiveness of erosion control measures **further research** into rates of erosion, sediment sources and sediment delivery within oil palm plantations is needed.

Scope of the report

The Roundtable on Sustainable Palm Oil (RSPO) Principles and Criteria set out the standards against which accredited oil palm producers are certified (RSPO, 2013). This report provides a critical assessment of the guidance and recommendations for soil erosion control set out within the RSPO's Principles and Criteria (see Appendix 3) and supporting documents.

This report was prepared following a review of peer-reviewed scientific literature as well as government, NGO and industry reports to identify the drivers of soil erosion within oil palm estates. The RSPO Principles and Criteria for erosion control were then assessed against the scientific literature and the guidelines for erosion control provided by both government and non-governmental organisations in tropical regions. Because of the paucity of observational studies directly relating to soil erosion within oil palm plantations, however, the report has also drawn on research from other types of plantations, logged forest and agricultural systems in the tropics. A full list of all the documents reviewed, arranged by landscape feature is given in Appendix 1.

Rationale

Soil erosion represents a threat to the medium to long term sustainability and viability of oil palm plantations. Soil erosion reduces the integrity and fertility of soil leading to lower agricultural and agroforest productivity and therefore increase the need for fertilizers. Downstream from the site of erosion, the enhanced delivery of fine sediments can reduce the channel capacity leading to increased flood risk, and have adverse impacts water upon quality via greater turbidity and nutrient concentrations (Henley et al., 2000; Aylward, 2004; Morgan, 2005; Tan-Soo et al. 2016). Increased deposition of sediments can impair drainage network infrastructure within plantation estates and lead to higher maintenance costs. Also losses of organic carbon from soils due to enhanced surface erosion and mass movement can affect the productivity of soils, decrease carbon storage and increase the emission of greenhouse gases.

The quantification of soil erosion and sediment loss in the tropics is greatly complicated by the highly episodic nature of erosion (and mass movements), with most erosion and mass movements occurring as a result of large storms (Douglas et al. 1999; Sidle et al., 2006). There have been few studies reporting soil erosion from oil palm plantations but a review of plot studies by Hartemink (2006) revealed values ranging from 100 to 7800 t km^{-2} y^{-1} with rates depending on soil type and slope angle.

The RSPO Principles and Criteria provide a range of guidelines for the control of soil erosion within oil palm plantations; this report aims to assess consistency of these criteria with observational evidence of erosion processes presented in peer-reviewed scientific publications.

Key terms

Soil erosion - the detachment of soil particles from the soil mass followed by their transport by wind or water (Morgan, 2005); see Appendix 2 for a detailed description.

Fragile soils – the RSPO's Principles and Criteria do not define fragile soils, but include peat soils, mangrove and other wetland areas. The RSPO's Principles and Criteria identify sandy soils, low organic content soils, and potential or actual acid sulphate soils as being potentially fragile, but again these terms are not defined in terms of threshold values of % sand, % organic content and acid sulphate.

Indicators and guidance – specific actions identified in the RSPO Principles and Criteria (RSPO, 2013) which must be carried out in order to demonstrate the criterion has been achieved.

Landslide – The mass movement movement of soil or rock down a slope.

Principles and Criteria – the standards against which RSPO accredited producers are assessed (RSPO, 2013).

Riparian buffer zones – strips of natural vegetation of varying widths along streams, rivers and lakes surrounded by areas of non-natural vegetation such as modified forest or plantations.

Turbidity – the ability of water to transmit light which is limited by suspended sediment.

Erosion control measures within the RSPO Principles and Criteria

Measures to control soil erosion are predominantly discussed within the RSPO's Principles and Criteria under Principle 4: use of appropriate best practices by growers and millers (p15 in RSPO, 2013) and Principle 7: responsible development of new plantings (p47 in RSPO, 2013). However, erosion control measures are also covered under Principles 5: environmental responsibility and conservation of natural resources and biodiversity (p25 in RSPO, 2013) and 8: commitment to continuous improvement in key areas of activity (p58 in RSPO, 2013). The RSPO's Principles and Criteria relevant to soil erosion are set out in full in Appendix 3.

For this report, the RSPO indicators covering erosion control have been grouped into five distinct landscape features:

Minimising erosion from steep terrain - covering Indicators: 4.3.2 ("a management strategy shall be in place for planting on slopes above a certain limit (this needs to be soil and climate specific)") and 7.4 ("Extensive planting on steep terrain, and/or fragile soils, including peat is avoided").

Cover crops - covering Indicator 4.3.4 ("subsidence of peat soils shall be minimized and monitored. A documented water and ground cover management program shall be in place") and advice within the guidance provided for Principle 4.3 ("practices minimise and control erosion and degradation of soils").

Minimising erosion from roads - covered by Indictor 4.3.3 ("a road maintenance program shall be in place").

Protecting riparian buffer zones - covered by Indicator 4.4.2 ("protection of water courses and wetlands, including maintaining and restoring appropriate riparian and other buffer zones (refer to national best practice and national guidelines) shall be demonstrated").

Prevention of the erosion and degradation of fragile soils covering Indicators: 4.3.1 ("maps of any fragile soils shall be available"), 4.3.4 ("subsidence of peat soils shall be minimized and monitored. A documented water and ground cover management program shall be in place"), 4.3.5 ("drainability assessments shall be required prior to replanting on peat to determine the long-term viability of the necessary drainage for oil palm growing"), 4.3.6 ("a management strategy shall be in place for other fragile or problem soils (e.g. sandy, low organic matter, acid sulphate soils)"), 7.2 ("soil surveys and topographic information are used for site planning in the establishment of new plantings, and the results are incorporated into plans and operations") and 7.4 ("extensive planting on steep terrain, and/or fragile soils, including peat is avoided").

Here, the RSPO's recommendations for erosion control within these five landscape conservation foci are assessed, with a full reference list of research consulted for each landscape type listed in Appendix 1. The report then considers the preparation of Environmental Impact Assessments (EIAs) which underpin the landscape scale actions described above. The preparation of these EIAs is discussed in the RSPO Principles and Criteria discuss under Indicators: 5.1 ("aspects of mill and plantation management, including replanting, that have environmental impacts are identified and plans to mitigate the negative impacts and promote the positive ones are made, implemented and monitored, to demonstrate continual improvement") and 7.1 ("a comprehensive and participatory independent social and environmental impact assessment is undertaken prior to establishing new plantings or operations, or expanding existing ones, and the results incorporated into planning, management and operations").

Minimising erosion from steep terrain

Soil in steep terrain is usually more vulnerable to erosion than that on less steep slopes (Morgan, 2005; Hartemink, 2006).

The RSPO Principles and Criteria recommend that a management strategy is in place for planting on slopes above a certain gradient (Principle 4.3.2) and that extensive planting on steep terrain is avoided (Principle 7.4). The national interpretation for Malaysia defines steep terrain as an area of 25 ha with an average gradient greater than 25° and prohibits planting on this land (RSPO MYNI-TF, 2015). The Indonesian national interpretation of these guidelines refers readers to the Indonesian Government's good agricultural practices for oil palm plantations (Indonesian Ministry of Agriculture, 2011) which state that planting is forbidden on slopes greater than 40 % (~22°). However they do not define the area over which the gradient should be averaged. A single value for slope, without stating the area across which it should be averaged, is inadequate as magnitude of a mean slope angle declines markedly with the size of the area averaged. For terrain with a gradient between 9° and 25° the RSPO's guidelines state that soil conservation measures (e.g. terracing, platforms, cover crop, etc.) should be applied. As long as the terracing is well constructed, this approach is broadly consistent with current scientific research which indicates that the maximum slope appropriate for bench terracing is in the range 15 - 35° (Critchley, 2004).

Within oil palm plantations, over land flow is reduced and bare soil and slopes are commonly stabilised using cover crops and by the construction of terraces. Terraces have been shown to reduce erosion. For example, Sheng (1988) showed that in a Jamaican agricultural system over a 4 year period erosion from bench terraces with continuous mounds was 17 t ha^{-1} compared to 133 t ha^{-1} in an unterraced control plot. Terraced hill sides can, however, still be an important source of sediment (van Dijk et al., 2005). Although terraces can reduce erosion on steep slopes, it is important that they are well constructed and regularly inspected for signs of soil erosion, with rapid corrective action taken where signs of erosion are detected (Paramananthan, 2013) as poorly constructed and managed terraces can increase the risk of landslides (Sidle et al., 2006). Erosion caused by landslides may, in part, be limited through avoiding planting on very steep terrain. It is also important to avoid reducing root cohesion on steep hill sides and the diversion of road drainage onto vulnerable slopes as this leads to an increase in water pressure within soil pores increasing the chance of slope failure (Sidle et al., 2006).

The research discussed here has predominantly been carried out in logged forest or agricultural areas. As it is hard to generalise across different land cover types, it is important that sediment sources within oil palm plantations are identified and quantified and that the effectiveness of erosion control measures is assessed by observations in plantations.

The RSPO's Principles and Criteria address the main issues discussed within the scientific literature and, until more detailed studies have been undertaken within oil palm plantations, it is difficult to offer more precise guidance to plantation managers. In areas where terracing is necessary, the RSPO's guidelines could be strengthened by recommending a terrace construction and maintenance program is put in place so that erosion hotspots are rapidly identified and corrective action is taken.

Cover crops

Cover crops are defined as close growing crops that protect and improve the soil between periods of normal crop production (Fageria et al., 2005).

In oil palm plantations cover crops are commonly sown alongside oil palm seedlings to reduce erosion while the canopy develops and, in the case of leguminous cover crops, provide a source of nitrogen. The RSPO's Principles and Criteria (RSPO, 2013) state that in peat soils a ground cover management program shall be in place (4.3.4) and the guidance provided for Principle 4.3 (practices minimise and control erosion and degradation of soils) states that techniques that minimise soil erosion are well known and should be adopted, where appropriate, and that these should include practices such as ground cover management. The national interpretations of the RSPO Principles and Criteria for Malaysia and Indonesia both advise that ground cover should be established rapidly to control erosion (RSPO INA-NIWG 2008; RSPO MYNI-TF, 2015).

Established cover crop

To be effective, cover crops must grow rapidly, require minimum management, make efficient use of water, have a root system which improves both soil fertility and permeability and should not harbour or attract pests (Baligar and Fageria, 2007). Owing to their added ability to fix nitrogen and thus improve soil fertility, legume species are commonly used as cover crops in oil palm. The ability of cover crops to reduce soil erosion in agricultural systems is well established. Kaspar et al. (2001), for example, demonstrated that oat and rye cover crops following soybean can reduce erosion. There has been little research within oil palm plantations focusing specially on the effect of cover crops. Research has, however, shown that a combined range of soil conservation techniques including the use of cover crops as well as other measures such as the placement of dead palm fronds across slopes can reduce erosion rates by 30 to 80% (Annammala, 2015; Walsh et al., 2016).

As with terracing it is important that cover crops are inspected regularly and replanted in areas in which the cover crop has failed, with priority given to areas particularly vulnerable to erosion such as terrace slopes.

Minimising erosion from unpaved roads

Unpaved roads are thought to be a major source of sediment in oil palm plantations (Carlson et al., 2014) and have been shown to be a major sediment source in both tropical agricultural systems (Dunne, 1979) and logged forest (Douglas et al., 1999; Ziegler et al., 2007) with the production of sediment from roads being over eight times higher than that from agricultural land (Ziegler et al., 2000). In steep terrain, roads aligned across slopes can also disrupt downslope soil drainage and be instrumental in causing landslides (Douglas et al., 1999; Sidle et al., 2006).

The RSPO Principles and Criteria (RSPO, 2013) identify the importance of road maintenance for controlling erosion and states that "a road maintenance program must be in place" (Indicator 4.3.3) and that an environmental impact assessment should be carried out prior to the building of new roads (Principle 5.1).

Following a study of sediment production from roads and skid trails in a logged forest, Sidle et al. (2004) identified a number of actions to minimise erosion including: locating roads along ridgelines, placing rock blankets along roads to limit the formation of rills and gullies, drainage systems should be incorporated but should not drain onto disturbed soils or erodible slopes, avoiding deep cuts into soils in mid-slope roads and maintaining the road surface and drainage system. Many of these actions have been shown to significantly reduce erosion rates. For example, the establishment of cross drains leading to an erosion resistant ditch was shown to provide a 70% reduction in erosion rate from unpaved roads in the US Virgin Islands (Ramos-Scharŕon, 2012). Sidle et al. (2004) also highlighted the importance of protecting the points where roads cross streams and rivers. Most sediment released from the road surface is stored on hill slopes or on the trail surface, and only where roads and trails connect with watercourses do large volumes of sediment enter streams.

In order to maintain operational efficiency as well as preventing erosion it is important that both roads and harvesting pathways are well maintained, but when loose material is used to fill ruts and gullies this material can be easily washed out during the next storm adding to the sediment load (Douglas, 1999). Road drainage and culverts must also be well constructed and maintained (Douglas et al. 1999). As recommended in Indicator 4.3.3 it is therefore important that a road maintenance program is in place. Adams and Andrus (1990) concluded that this program should include regular inspection, especially during wet weather with any maintenance of roads, drainage ditches or culverts required rapidly carried out. A record should be kept of any maintenance made so that road sections and culverts which regularly fail can be identified and corrective action taken.

While the RSPO guidelines recommend road maintenance and the development of an environmental impact assessment prior to construction of new roads, guidance is not provided as to the location and construction of roads. Comparable documents, for example, the Malaysian Criteria and Indicators for forest management certification (Natural Forest) (MTCC, 2011) provide links to national and regional guidelines such as the Code of Practice for Forestry Harvesting in Sabah, Malaysia (Sabah Forestry Department, 2009) which provide detailed road construction and maintenance guidelines.

The RSPO's guidelines on soil erosion could be strengthened significantly by highlighting these measures, potentially in a best management practices style document, or, as in the case of the Malaysian forestry guidelines, providing a link to suitable guidelines, such as those provided by the Sabah Forestry Department (2009) or FAO (1977) which describe the appropriate design and placement of forest roads.

A typical unpaved road in an oil palm plantation

Protecting riparian buffer zones

Vegetation and rough ground within riparian buffer zones can act as a sediment trap and prevents sediment from upslope zones and themselves from entering the waterway, thus protecting water quality and reducing sediment transport and flooding and sediment problems downstream.

Ziegler et al. (2006a) investigated the effect of sediment loss from roads on stream suspended sediment concentrations within a multi-use tropical catchment in the presence and absence of riparian buffers and found that buffers reduced sediment concentrations by 34-87% in the storm events studied. For riparian buffers to effectively reduce the level of sediment entering waterways the road run-off must arrive as overland flow. In areas where run-off flows along road drains it will bypass the riparian buffer zone and enter the waterway directly.

Soil disturbance within a few metres of the channel is far more likely to result in sediment entering the river channel than disturbance further away (Chappell et al., 2008), therefore action taken to prevent disturbance in this area is likely to have the greatest impact on sediment loads. As well as sediment delivery from the surrounding landscape, erosion of stream and river banks may also make a significant contribution to the total suspended sediment in the waterway. For example in undisturbed forest Douglas et al. (1999) estimated that bank erosion accounted for 50% of the sediment supply. Maintaining natural vegetation along river banks stabilises these areas and prevents mechanical damage to the channel bank, helping to limit sediment levels in waterways.

The RSPO Principles and Criteria (RSPO, 2013) recommend that all permanent watercourses (strictly 'perennial channels'), wetlands and water bodies shall have buffers consisting of naturally occurring local vegetation (Principle 4.4.2). The recommended buffer strip widths in the absence of national guidelines are shown in the table below (RSPO). For comparison, the buffer area widths recommended by the FAO Code of Practice for Forest Harvesting (FAO, 1999), the Sabah Forestry Department (SFD, Sabah Forestry Department, 2009) and the Malaysian Criteria and Indicators (MC&I) for forest management certification (Natural Forest) (MTCC, 2011) in Peninsular Malaysia are also shown.

River width (m)	Minimum width of river reserve (m)			
	RSPO	FAO	SFD	MC&I (peninsular Malaysia)
1-5	5	10	30	5
5 – 10	10	10	30	5
10 – 20	20	20	30	5
20 – 40	40	30	30	5
40 – 50	50	30	30	5
>50	100	30	30	5

As the table shows, the recommended width for buffer strips in logged forest varies significantly between regulatory areas with the MC&I recommending a minimum width of 5 m in Peninsular Malaysia and the Sabah Forestry Department recommending a minimum buffer width of 30 m alongside permanent streams. This may in part be as a result of specific local conditions and may also be caused by differing objectives, e.g. maintaining biodiversity or preventing bank erosion. There have been few scientific studies into the effectiveness of riparian buffer zones with regards to preventing sediment transport into streams and rivers in the tropics, though a major project is underway in Sabah which will investigate this (Ewers et al., 2011). The Sungai Tekam Experimental Basin project investigated the effect of buffer strips on soil loss and water run off finding that buffers strips reduced both run off and soil erosion (Bahaglan Pengairan dan Saliran Kementerian Pertanian, Malaysia, 1989). Research by Ziegler et al. (2006b) on the slope lengths required for buffering overland flow from upslope areas in Vietnam predicted required buffer widths in the range 30 to 100 m for slope gradients ranging from 1-100 % but far greater buffer lengths would be necessary for large storms.

In addition to the guidance provided with the RSPO's Principles and Criteria, the RSPO is also preparing a manual on BMPs for the management and rehabilitation of riparian reserves (Barclay et al., 2016). This document, while currently in draft form, offers a detailed guide for the maintenance and rehabilitation of riparian areas and highlights the importance of locating roads as far as possible from streams and rivers. The report makes use of case studies to demonstrate BMPs for the establishment of riparian buffer zones in areas where buffer zones have been lost, for example leaving mature oil palms in place during the establishment of buffer zone vegetation to limit erosion from exposed soils. The report also directs the reader to the Sabah Environment Protection Department guidelines for minimising impacts of oil palm plantations and mills on quality of rivers in Sabah which provides extensive guidance on erosion control (Environment Protection Department, 2011).

Prevention of the erosion and degradation of fragile soils

The protection of fragile soils within oil palm plantations has to date predominantly related to peat soils (histosols). This focus stems from the ecological significance of peat forests, the climatic impact of greenhouse gas emissions from degraded peat and the rapid expansion of oil palm into peatlands in South-East Asia (Miettinen et al., 2012).

The current RSPO Principles and Criteria (RSPO, 2013), however, highlight the need to identify and protect all fragile soils from erosion and degradation (Principle and Criteria 4.3, 7.2 and 7.4) though they too mainly focus on the protection of peat soils (see Principles and Criteria 4.3, 7.4). The protection of peat soils is discussed in detail in the RSPO manual on best management practices (BMPs) for management and rehabilitation of natural vegetation associated with oil palm cultivation on peat (RSPO, 2012). These focus on the prevention of peat degradation rather than erosion and state that the water table should be maintained at an average depth of 50 cm below the soil surface and that fires are prevented (in line with the ASEAN policy on zero burning, ASEAN, 2003). This best management practices document also thoroughly addresses the rehabilitation of forests in degraded sites and is well supported by current scientific research.

RSPO guidelines and both the Malaysian and Indonesian national interpretations of these guidelines recommend that extensive planting on peatland is avoided (Principle and Criteria 7.4). Within new developments in Malaysia this is interpreted as meaning that (1) there should be no new development on peat deeper than 3 m and (2) replanting should be avoided where drainability assessments have identified areas as unsuitable for oil palm production.

The RSPO Principles and Criteria and the Indonesian national interpretation of this document (RSPO INA-NIWG, 2008) also highlight sandy soils, low organic content soils, and potential or actual acid sulphate soils as fragile soils. The Malaysian national interpretation of the RSPO Principles and Criteria includes peat soils and mangrove sites within the definition of fragile soils (RSPO MYNI-TF, 2015). The identification of sandy (due to their low cohesiveness) and acidic sulphate soils as fragile, requiring unique management strategies, is supported by Paramananthan (2013), who also identified highly weathered soils, lateritic soils and saline soils as in need of special management techniques. For peat soils detailed management strategies are provided, requiring the water table to be maintained at an average of 50 cm below ground level. In contrast to peat the RSPO Principles and Criteria state only that other fragile soils must be identified and mapped within the plantation (4.3.1) and that management strategies should be in place for these soils (4.3.6).

The identification of fragile soils (and rocks) is clearly a challenging area with the suitability of soil for oil palm production dependent on factors such as rainfall, terrain and current management practices as well as soil type. The RSPO guidelines on the protection of fragile soils would be further strengthened (and the auditing process simplified) by providing a more concrete definition of what constitutes a fragile soil and how these soils should be managed in order to protect the soil and thereby maximise productivity and prevent sediment entering waterways.

Preparation of Environmental Impact Assessments (EIAs)

The RSPO's Principles and Criteria (RSPO, 2013) for the prevention of soil erosion in new plantings and following replanting are predominantly based upon the completion of a thorough EIA (Principles 5.1 and 7.1).

According to these criteria the EIA should be carried out by an independent and accredited expert and should include:

- Assessment of the impacts of all major planned activities, including roads and other infrastructure;
- Identification of watercourses and wetlands, and assessment of potential effects on hydrology and land subsidence of planned developments. Measures should be planned and implemented to maintain the quantity, quality and access to water and land resources;
- Baseline soil surveys and topographic information, including the identification of steep slopes, marginal and fragile soils, areas prone to erosion, degradation, subsidence, and flooding;

This recommendation is particularly important as an EIA covering the points listed above should provide the evidence base for the implementation of the measures discussed throughout this report. As well as on-site impacts the EIA should consider off-site impacts, particularly the downstream and offshore effects of agrochemicals and sediments. The national interpretations of the RSPO's Principles and Criteria refer the reader to national and regional requirements for the development of EIA's.

To ensure transparency, all EIAs should be available for independent review.

Landslide in an oil palm plantation

Glossary

ASEAN - Association of South East Asian Nations
BMP – Best Management Practices
EIA – Environmental Impact Assessment
INA-NIWG – Indonesian National Interpretation Working Group
MC&I - Malaysian Criteria and Indicators
MTCC - Malaysian Timber Certification Council
MYNI-TF – Malaysian National Interpretation Task Force
NGO - Non-Governmental Organization
RSPO - Roundtable on Sustainable Palm Oil

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Appendix 2: Soil erosion

Soil erosion occurs through the detachment of soil particles from the soil mass followed by their transport by wind or water and deposition (Morgan, 2005; Sidle et al., 2006). The dominant detaching agent is rainsplash in which soil particles are washed from bare ground following the impact of a rain droplet. The detachment of soil particles also occurs through weathering, exposure to running water, wind, livestock trampling and through direct anthropogenic actions such as tilling. Once loosened, sediment is then transported by running water and wind eventually entering waterways. Within tropical agricultural systems, plantations and logged forest the main sediment sources are thought to be unpaved roads, agricultural and mechanical activity on steeply sloping ground and activity close to rivers and other natural waterways. Mass transport of soil also occurs following landslides.

In oil palm soil is lost from cleared areas around trees exposing roots which then die back inhibiting water and nutrient uptake by trees (Hartemink, 2006) thereby reducing yield. Rates of surface erosion and the frequency of landslides within oil palm plantations are dependent upon a number of factors including rainfall, terrain, soil type and management practices and as such can be expected to vary significantly between estates.

Appendix 3: RSPO Principles and Criteria relating to the prevention of soil erosion and degradation (RSPO, 2013)

Principle 4: Use of appropriate best practices by growers and millers

4.3 Practices minimise and control erosion and degradation of soils.

Indicators:

4.3.1 Maps of any fragile soils shall be available.

4.3.2 A management strategy shall be in place for plantings on slopes above a certain limit (this needs to be soil and climate specific).

4.3.3 A road maintenance programme shall be in place.

4.3.4 Subsidence of peat soils shall be minimised and monitored. A documented water and ground cover management programme shall be in place.

4.3.5 Drainability assessments shall be required prior to replanting on peat to determine the longterm viability of the necessary drainage for oil palm growing.

4.3.6 A management strategy shall be in place for other fragile and problem soils (e.g. sandy, low organic matter, acid sulphate soils).

Specific guidance:

For 4.3.4: For existing plantings on peat, the water table should be maintained at an average of 50cm (between 40 - 60cm) below ground surface measured with groundwater piezometer readings, or an average of 60cm (between 50 - 70cm) below ground surface as measured in water collection drains, through a network of appropriate water control structures e.g. weirs, sandbags, etc. in fields, and watergates at the discharge points of main drains (Criteria 4.4 and 7.4).

For 4.3.5: Where drainability assessments have identified areas unsuitable for oil palm replanting, plans should be in place for appropriate rehabilitation or alternative use of such areas. If the assessment indicates high risk of serious flooding and/or salt water intrusion within two crop cycles, growers and planters should consider ceasing replanting and implementing rehabilitation.

Guidance:

Plantations on peat should be managed at least to the standard set out in the 'RSPO Manual on Best Management Practices (BMPs) for existing oil palm cultivation on peat', June 2012 (especially water management, fire avoidance, fertiliser use, subsidence and vegetation cover).

Techniques that minimise soil erosion are well known and should be adopted, where appropriate. These should include practices such as ground cover management, biomass recycling, terracing, and natural regeneration or restoration instead of replanting.

For National Interpretation:

National Interpretation (or an RSPO recognised parallel means) will refer to national guidance, and identify the best management practices and appropriate techniques for maintaining soil quality in local conditions, including guidance on soil types, and any appropriate performance thresholds such as maximum acceptable slope gradient for planting.

4.4 Practices maintain the quality and availability of surface and ground water.

Relevant Indicators:

4.4.2 Protection of water courses and wetlands, including maintaining and restoring appropriate riparian and other buffer zones (refer to national best practice and national guidelines) shall be demonstrated.

Guidance:

For 4.4.2: Refer to the 'RSPO Manual On Best Management Practices (BMP) for management and rehabilitation of natural vegetation associated with oil palm cultivation on peat', July 2012.

For National Interpretation:

National Interpretation will refer to national guidelines or best practice and where appropriate include performance thresholds for requirements such as the size and location and methods of restoration of riparian strips or acceptable maximum run-off levels.

Principle 5: Environmental responsibility and conservation of natural resources and biodiversity

5.1 Aspects of plantation and mill management, including replanting, that have environmental impacts are identified, and plans to mitigate the negative impacts and promote the positive ones are made, implemented and monitored, to demonstrate continual improvement.

Indicators:

5.1.1 An environmental impact assessment (EIA) shall be documented.

5.1.2 Where the identification of impacts requires changes in current practices, in order to mitigate negative effects, a timetable for change shall be developed and implemented

within a comprehensive management plan. The management plan shall identify the responsible person/persons.

5.1.3 This plan shall incorporate a monitoring protocol, adaptive to operational changes, which shall be implemented to monitor the effectiveness of the mitigation measures. The plan shall be reviewed as a minimum every two years to reflect the results of monitoring and where there are operational changes that may have positive and negative environmental impacts.

Guidance:

The EIA should cover the following activities, where they are undertaken:

- Building new roads, processing mills or other infrastructure;
- Putting in drainage or irrigation systems;
- Replanting and/or expansion of planting areas;
- Management of mill effluents (Criterion 4.4);
- Clearing of remaining natural vegetation;
- Management of pests and diseased palms by controlled burning (Criteria 5.5 and 7.7).

Impact assessment can be a non-restrictive format e.g. ISO 14001 EMS and/or EIA report incorporating elements spelt out in this Criterion and raised through stakeholder consultation.

Environmental impacts should be identified on soil and water resources (Criteria 4.3 and 4.4), air quality, greenhouse gases (Criterion 5.6), biodiversity and ecosystems, and people's amenity (Criterion 6.1), both on and off-site.

Stakeholder consultation has a key role in identifying environmental impacts. The inclusion of consultation should result in improved processes to identify impacts and to develop any required mitigation measures.

For smallholder schemes, the scheme management has the responsibility to undertake impact assessment and to plan and operate in accordance with the results (refer to 'Guidance for Independent Smallholders under Group Certification', June 2010, and 'Guidance on Scheme Smallholders', July 2009).

For National Interpretation:

National Interpretation will consider any national legal requirements together with any other issues that are not required by law but are nevertheless important, e.g. independent social and environmental impact assessment (SEIA) for replanting may be desirable under specific situations.

Principle 7: Responsible development of new plantings

7.1 A comprehensive and participatory independent social and environmental impact assessment is undertaken prior to establishing new plantings or operations, or expanding existing ones, and the results incorporated into planning, management and operations.

Indicators:

7.1.1 An independent social and environmental impact assessment (SEIA), undertaken through a participatory methodology including the relevant affected stakeholders, shall be documented.

7.1.2 Appropriate management planning and operational procedures shall be developed and implemented to avoid or mitigate identified potential negative impacts.

7.1.3 Where the development includes an outgrower scheme, the impacts of the scheme and the implications of the way it is managed shall be given particular attention.

Guidance:

See also Criteria 5.1 and 6.1.

The terms of reference should be defined and impact assessment should be carried out by accredited independent experts, in order to ensure an objective process. Both should not be done by the same body. A participatory methodology including external stakeholder groups is essential to the identification of impacts, particularly social impacts. Stakeholders such as local communities, government departments and NGOs should be involved through the use of interviews and meetings, and by reviewing findings and plans for mitigation.

It is recognised that oil palm development can cause both positive and negative impacts. These developments can lead to some indirect/secondary impacts which are not under the control of individual growers and millers. To this end, growers and millers should seek to identify the indirect/secondary impacts within the SEIA, and where possible work with partners to explore mechanisms to mitigate the negative indirect impacts and enhance the positive impacts.

The potential impacts of all major proposed activities should be assessed in a participatory way prior to development. The assessment should include, in no order of preference and as a minimum:

- Assessment of the impacts of all major planned activities, including planting, mill operations, roads and other infrastructure;
- Assessment, including stakeholder consultation, of High Conservation Values (see Criterion 7.3) that could be negatively affected;
- Assessment of potential effects on adjacent natural ecosystems of planned developments, including whether development or expansion will increase pressure on nearby natural ecosystems;
- Identification of watercourses and wetlands and assessment of potential effects on hydrology and land subsidence of planned developments. Measures should be planned and implemented to maintain the quantity, quality and access to water and land resources;

- Baseline soil surveys and topographic information, including the identification of steep slopes, marginal and fragile soils, areas prone to erosion, degradation, subsidence, and flooding;
- Analysis of type of land to be used (forest, degraded forest, cleared land);
- Analysis of land ownership and user rights;
- Analysis of current land use patterns;
- Assessment of potential social impacts on surrounding communities of a plantation, including an analysis of potential effects on livelihoods, and differential effects on women versus men, ethnic communities, and migrant versus long-term residents;
- Identification of activities which may generate significant GHG emissions.

Plans and field operations should be developed and implemented to incorporate the results of the assessment. One potential outcome of the assessment process is that the development may not proceed because of the magnitude of potential impacts.

For smallholder schemes, the scheme management should address this Criterion. For individual smallholders, this Criterion does not apply.

Where there is no National Interpretation, for land areas greater than 500ha, a full independent assessment will be required. For land areas less than 500ha, an internal assessment using selected components of SEIA and HCV assessments can be used. Where such internal assessments identify significant environmentally or socially sensitive areas or issues, an independent assessment will be undertaken.

For National Interpretation:

National Interpretation will identify the relevant accreditations for independent experts.
National Interpretation will consider setting an appropriate threshold for the size of new plantings, below which an internal assessment is allowed, and above which an independent SEIA is required. This will list negative social impacts (e.g. displacement, loss of the livelihoods of local peoples, etc.) in the national context.

7.2 Soil surveys and topographic information are used for site planning in the establishment of new plantings, and the results are incorporated into plans and operations.

Indicators:

7.2.1 Soil suitability maps or soil surveys adequate to establish the long-term suitability of land for oil palm cultivation shall be available and taken into account in plans and operations.

7.2.2 Topographic information adequate to guide the planning of drainage and irrigation systems, roads and other infrastructure shall be available and taken into account in plans and operations.

Guidance:

These activities can be linked to the Social and Environmental Impact Assessment (SEIA) (see Criterion

7.1) but need not be done by independent experts.

Soil suitability maps or soil surveys should be appropriate to the scale of operation and should include information on soil types, topography, hydrology, rooting depth, moisture availability, stoniness and fertility to ensure long-term sustainability of the development. Soils requiring appropriate practices should be identified (see Criteria 4.3 and 7.4). This information should be used to plan planting programmes, etc. Measures should be planned to minimise erosion through appropriate use of heavy machinery, terracing on slopes, appropriate road construction, rapid establishment of cover, protection of riverbanks, etc. Areas located within the plantation perimeters that are considered unsuitable for long-term oil palm cultivation will be delineated in plans and included in operations for conservation or rehabilitation as appropriate (see Criterion 7.4).

Assessing soil suitability is also important for smallholders, particularly where there are significant numbers operating in a particular location. Information should be collected on soil suitability by companies planning to purchase Fresh Fruit Bunches (FFB) from potential developments of independent smallholders in a particular location. Companies should assess this information and provide information to independent smallholders on soil suitability, and/or in conjunction with relevant government/public institutions and other organisations (including NGOs) provide information in order to assist independent smallholders to grow oil palm sustainably.

For National Interpretation:

National Interpretation will specify the local or national code of practice or other guidelines that should be followed, or set out what 'good practice' constitutes within the local and national context.

7.4 Extensive planting on steep terrain, and/or marginal and fragile soils, including peat, is avoided.

Indicators

7.4.1 Maps identifying marginal and fragile soils, including excessive gradients and peat soils, shall be available and used to identify areas to be avoided

7.4.2 Where limited planting on fragile and marginal soils, including peat, is proposed, plans shall be developed and implemented to protect them without incurring adverse impacts.

Guidance:

This activity should be integrated with the social and environmental impact assessment (SEIA) required by Criterion 7.1.

Planting on extensive areas of peat soils and other fragile soils should be avoided (see Criterion 4.3). Adverse impacts may include hydrological risks or significantly increased risks (e.g. fire risk) in areas outside the plantation (see Criterion 5.5).

For National Interpretation:

National Interpretation will determine specific controls and thresholds, such as slope limits, listing soil types on which planting should be avoided (especially peat soils), the proportion of plantation area that can include marginal/fragile soils, and definitions of 'extensive', 'marginal', 'fragile', and 'excessive'.

Principle 8: Commitment to continual improvement in key areas of activity

8.1 Growers and millers regularly monitor and review their activities, and develop and implement action plans that allow demonstrable continual improvement in key operations.

Indicators:

8.1.1 The action plan for continual improvement shall be implemented, based on a consideration of the main social and environmental impacts and opportunities of the grower/mill, and shall include a range of Indicators covered by these Principles and Criteria.

As a minimum, these shall include, but are not necessarily be limited to:

- Reduction in use of pesticides(Criterion 4.6);
- Environmental impacts (Criteria 4.3, 5.1 and 5.2);
- Waste reduction (Criterion 5.3);
- Pollution and greenhouse gas (GHG) emissions (Criteria 5.6 and 7.8);
- Social impacts (Criterion 6.1);
- Optimising the yield of the supply base.

Guidance:

Growers should have a system to improve practices in line with new information and techniques, and a mechanism for disseminating this information throughout the workforce. For smallholders, there should be systematic guidance and training for continual improvement.

For National Interpretation:

National Interpretation will include specific minimum performance thresholds for key indicators (Criteria 4.2, 4.3, 4.4, and 4.5).