

Annex 1: Land Use Change Analysis

The Compensation Task Force and RSPO are currently updating this guidance to provide more details and geospatial references in line with the coefficients. This Annex is therefore a work in progress and is only intended to support the core procedures document. See explanatory notes on Section 7 for more details.

Remote Sensing Background Information

Remote sensing generally refers to the acquiring, analysis, and interpretation of satellite imagery or aerial photographs. This information is typically in the form of electromagnetic radiation that has either been reflected or emitted from the earth surface. Remote sensing technology has proven especially important for obtaining information in remote, inaccessible, or very large areas and therefore has a long history of use for weather, oceanography, and land use issues.

Remote sensing technology is constantly developing. From its origins with black and white aerial photography at the end of 19th century, current technology can now utilize satellites that capture imagery of the earth with more than 20 spectral bands in coarse (around 1 km), medium (around few hundred meters), high (tens of meters) or very high resolution (few meters to less than a meter) modes covering hundreds of kilometers at a time. Using current multispectral high resolution imagery can provide accurate overviews of vegetation cover and over time can give estimates of change in vegetation cover.

Remote sensing imagery does show vegetation cover **but does not identify the specific type of vegetation** or land use (e.g. remote sensing can identify and give the extent of an arable land, when on the ground this land could be characterized as a corn field). The type of cover that can be identified depends heavily on the interaction between resolution and spectral bands (e.g. MODIS 1 km resolution data has 20 spectral bands and is mainly used in forestry because of its coarse resolution to differentiate forest and non-forest; RapidEye 5 m resolution data has 6 spectral bands and can be used to detect different types of forest and different types of degradation; Ikonos 1 meter resolution data is only black and white, but is so detailed that spectral bands are not needed to identify species composition). It is therefore important to choose the satellite that has the right combination of resolution and spectral bands for the intended purpose

In order to convert vegetation cover data to land use or on-the-ground specific vegetation or species information, analysis and interpretation using resolution and spectral bands is required. The interpretation of images is conducted via algorithms that use several spectral bands (e.g. green vegetation reflects most in the near infrared spectral area and differences in vegetation can therefore be easily detected in this spectral band) or via visual interpretation of the images.

Another issue with remote sensing is that imagery cannot always be found at the time that the interpreter would like or, especially in the wet tropics, clouds hinder the view of the earth.

Land Use Change Analysis for the RSPO Compensation Procedures

For the purposes of the RSPO Compensation Process, a land use change (LUC) analysis shall be conducted to determine vegetation status in November 2005 (or as close to this time as possible), based on interpretation of remote sensing data. This will serve as a proxy for the potential loss of HCV 1-3, and ecological aspects of HCV 4, in all areas cleared without prior HCV assessment after November 2005.

For this kind of analysis there are numerous satellites with the right combination of resolution and spectral bands available. This guidance does not dictate use of particular satellite or interpretation approach, other than a **minimum imagery requirement of 30 meter resolution**. However, to distinguish different types of forest, high resolution to very high resolution data will likely be necessary. Possible satellites include Landsat (30m), SPOT (10 m), or RapidEye (5m), among others. Given the potential variability of the images available for a specific location and time, this guidance highly recommends use of multiple data sources, (e.g. a combination of high and very high resolution imagery,) in order to facilitate the most accurate interpretation possible. It is also recommended that groundtruthing be used to further validate the image interpretation process.

In some cases, challenges to the remote sensing data and land use change analysis may come from the grower, the compensation panel or other stakeholders. In such cases, the Compensation Panel can require the grower to provide additional information to be incorporated into the analysis, or accept such additional information from the grower, such as environmental impact assessment reports, historical land use maps, interviews with local community members, etc.¹ The final decision on the coefficients is taken by the compensation panel.

Vegetation Coefficients

Areas cleared without prior HCV assessment shall be classified into four categories. These are representative of the forest/habitat types and likely land uses present in areas suitable for the commercial cultivation of oil palms – and that, in most situations, can be readily identified using satellite imagery. The four categories essentially represent a sliding scale of habitat quality, ecological and conservation value – and will be used in the form of coefficients (i.e. a multiplier) in the calculation of compensation liability (please refer to the relevant section in the RSPO Compensation Procedures).

Coefficient 1²

Structurally complex forest (including primary forest), regenerating, selectively logged forests with elements of high canopy

¹ This should be included in TOR of the Compensation Panel

² This coefficient also includes other undisturbed or minimally disturbed natural habitats including natural wetlands, savannahs and other grasslands.

This category relates to forest that is either in pristine condition, has been subject to only minimal disturbance and/or is at a late stage of recovery. It will comprise many of the features associated with primary forest including a high, mostly intact canopy. Ecological functioning, conservation values and biodiversity levels will be similarly intact.

Coefficient 0.7

Structurally degraded but ecologically functional natural forest (includes other degraded but still functional low-canopy secondary forest and pioneer-dominated, heavily and/or repeatedly logged or previously burned forest and regenerating forest)

Forests in this category will have been subject to considerable disturbance including, one or more rounds of heavy and/or recent industrial logging, severe edge effects, wind and/or fire damage (or some combination of these factors) and show limited regeneration. Such forest will have a generally low, pioneer tree dominated canopy often interspersed with more open areas (e.g. old log landing areas, skid tracks, roads) crowded with climbers, vines or herbaceous plants and/or grasses. However, in most cases these degraded forests would have retained considerable ecological value, functionality and biodiversity levels – and retain the potential for restoration.

Coefficient 0.4

Multi-species agroforestry

Agroforestry plantations, comprising a multi-species ‘mosaic’ largely dominated by mature tree crops which retain some complexity, elements of the ecological and conservation values associated with natural forests and that support levels of biodiversity greater than would be expected either in monocultures or on degraded, un-cropped open land.

Coefficient 0

Monoculture tree and non-tree plantations; other permanently cultivated, developed or open degraded land

Highly modified and/or degraded areas retaining little or no natural, structurally intact vegetation and which support few or none of the ecological, biodiversity or other conservation values associated with natural systems or more structurally complex habitats. It should be noted that natural savannahs, natural grasslands, and natural wetlands are not specifically addressed by the categories above. Such areas were not described in the original HCV toolkit, which focused primarily on forests; however, they were described in later versions (year 2006). Therefore, such areas must be identified and for any clearance occurring after 2006. Compensation for such areas will be determined on a case by case basis.

The resultant LUCC analysis shall be reported to the Compensation Panel for review. This panel will determine whether or not the analysis is sufficient. The results of the LUC analysis should also be incorporated into the separate analysis to determine loss of HCV 4-6.

Overall Flowchart for Land Cover Analysis Using Remote Sensing and Verification

