GUIDANCE D

Geolocation Data Requirements and Risk Maps

Version 1.1

RAINFOREST ALLIANCE

Translation Disclaimer

For any question related to the precise meaning of the information contained in the translation, please refer to the official English version for clarification. Any discrepancies or differences in meaning due to translation are not binding and have no effect for auditing or certification purposes.

More information?

For more information about the Rainforest Alliance, visit www.rainforest-alliance.org or contact info@ra.org

Document Name:		**Document Code:**	**Version:**
Guidance D: Geolocation Data Requirements and Risk Maps		SA-G-SD-5-V1.1	V1.1
Date of first publication:	**Date of revision:**	**Valid From:**	**Expires by:**
December 31, 2020	June 30, 2021	N/A	Until further notice
Developed by:		**Approved by:**	
Rainforest Alliance Department Standards and Assurance		Director of Standards and Assurance	
Linked to:			
SA-S-SD-1-V1.1 Rainforest Alliance 2020 Sustainable Agriculture Standard, Farm requirements (1.2.12. 1.2.13. 1.2.14. 1.2.15. and 6.1.1. 6.1.2) SA-S-SD-13-V1 Annex S12: Additional Details on requirements for no-conversion SA-S-SD-18-V1.1 Annex S17: Collection of Geolocation Data			
Replaces:			
SA-G-SD-5-V1.1 Guidance Document D: Geolocation and Risk Maps			
Applicable to:			
Farm Certificate holders, Certification Bodies			
Country/Region:			
All			
Crop:		**Type of Certification:**	
All crops in the scope of the Rainforest Alliance certification system; please see Certification Rules.		Farm Certification	

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

1. PURPOSE

Accurate geolocation data is essential to ensure compliance with the 2020 Rainforest Alliance Sustainable Agricultural Standard (referred to as "the standard" in this document). Deforestation and production in Protected Areas are important risk topics for many stakeholders in the Rainforest Alliance certification system, and appropriate assurance mechanisms are necessary to meet this need. Mapping the boundaries of farms is also the best way to obtain an accurate measurement of the farm area, which is the basis for estimating certified yield and appropriate quantities of agrochemicals.

The inclusion of a more geodata-driven decision-making process requires Rainforest Alliance to provide options and guidance to collect this data.

This document clarifies geolocation data requirements and provides a set of guidelines to assist Certificate Holders (CHs) in recording such information according to the Standard's requirements. It also provides guidelines for Certification Bodies (CBs) on how to verify this data during the audit process.

The applications/devices mentioned in this guidance have been included because they are accessible, easy-to-use, affordable, and will enable users to gather the required data. Mapping devices or GPS handhelds have many forms and prices, depending on features and accuracy. The ones listed herein have been considered based on this as well as post-processing features. As this is only a guide, CHs are also free to choose other applications/devices available to them, as long as they can meet the data requirements of the Standard.

Please note that some of the tools and IT systems used for geospatial data collection and analysis are still under development. Further guidance will be provided as soon as these are ready to be used.

2. ABBREVIATIONS

CB	Certification Body
CH	Certificate Holder
CGLC	Copernicus Global Land Cover
CRS	Coordinate Reference System
CSV	Comma-Separated Values
DMS	Decimal Minutes Seconds
GIS	Geographical Information System
GMR	Group Member Registry
GPS	Global Positioning System
GPX	GPS Exchange Format
IUCN	International Union for Conservation of Nature and Natural Resources
KML	Key Markup Language
KMZ	Key Markup Zipped
PA	Protected Areas
RACP	Rainforest Alliance Certification Platform
TCL	Tree Cover Loss
WDPA	World Database of Protected Areas

3. DEFINITIONS

"Go" protected area: Protected areas where certain regulated economic and agricultural activities area allowed under specific conditions (specified in applicable law) and in correspondence with categories IV, V, and VI of the IUCN classification for protected areas.

"No-go" protected area: Protected areas with high conservation priority, with a strictly protected regulation. Agricultural production is not allowed under applicable law and in correspondence with category Ia, Ib, II, III, Not Reported, Not Applicable, Not Assigned of the IUCN classification for protected areas.

Farm unit: A piece of continuous land that is part of a farm. A farm unit can include both agricultural and non-agricultural land with buildings, facilities, water bodies, and other features. See figure below for the illustration of this explanation.

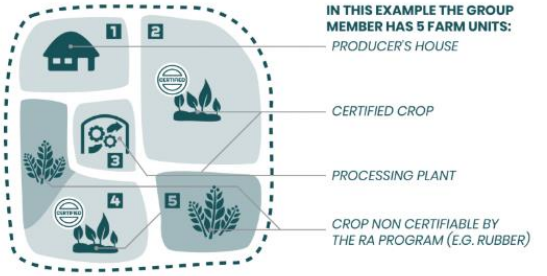


Figure 1. Graphic representation of a farm unit

Farm: All land and facilities used for agricultural production and processing activities under the geographical scope of the farm applicable for Rainforest Alliance certification. A farm may be composed of several neighboring or geographically separate farm units within one country, provided that they are under a common management body. All farms and farm units falling within this geographical scope must comply with the 2020 Rainforest Alliance Sustainable Agriculture Standard, even when a different crop from the certified one is also cultivated (e.g. farm/farm unit with a plantation of rice belonging to a producer who is part of a certified group for coffee that falls within the same geographical scope). A farm may be composed of several neighboring or geographically separate units of land within one country if they are under a common management body.

Geolocation data: Data that identifies the geographic location of farms and boundaries of farms, farm units, and other facilities of the Rainforest Alliance certificate holders. Geolocation data is represented by coordinates generally collected through Geopositioning Systems (GPS) mapping using either individual location points (including envelopes) or polygons which define the full boundaries of the relevant area.

Location point: A pair of latitude/longitude coordinates collected through Geographic Information Systems (*GIS*) Data. The location point is a single data point. It can be used to represent the location of a farm/farm unit when no polygon information is available. Location points should be taken at the center of the farm unit. If a farm consists of multiple farm units, the location point should be taken at the center of the largest farm unit.

Forest: Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10%, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or other land use.

Polygon (geographic polygons): A geographic boundary that encloses an area representing a farm/farm unit. Such polygons can be mapped and coded with essential data about the farm (referred to as attributes), such as farm ID, farm area (hectares), production area, crop, owner, certification status.

Protected areas: An area of land declared or designated by relevant authorities as protected because of its recognized natural, ecological and/or cultural values to achieve the long-term conservation of nature with associated ecosystem assets and cultural values. Examples include national parks, wildlife refuges, biological or forestry reserves, private reserves, and areas within UNESCO Biosphere reserves or World Heritage Sites. Production might be allowed in a protected under applicable law, which can constitute a certain zoning in a management plan (multi-use zones), a certain category of protected areas (IUCN categories V, VI), or permits (for example, admitted farms).

Risk maps: Maps showing the risk indication levels of countries, CHs and/or farm/farm units for key topics part of the certification program (e.g. deforestation and encroachment in protected areas, child labor and forced labor). These are made by combining external data sources with location data.

Way point(s): Intermediate point(s) on a route. It refers to coordinate(s) which specify one's position on the globe.

4. APPLICABILITY AND RESPONSIBILITY

Certificate Holders:
CHs are required to provide geolocation data to the Rainforest Alliance Certification Platform (RACP) as described in ***Annex S17. Collecting Geolocation Data*** and in compliance with the Standard requirements and Certification and Auditing Rules.

CHs are also required to use the risk maps as indicated in the **Certification and Auditing Rules AR5 and AR6** and **Chapter** 5.3 of this document.

CHs need to collect accurate information. Internal inspectors must review and verify geolocation data, which will also be checked during the external audit process.

Certification Bodies:
CBs are required to review and verify geolocation data provided by the CH during the audit process.

CBs are also required to use the risk maps as indicated in the **Certification and Auditing Rules AR5 and AR6** and **Chapter** 5.3 of this document.

5. RAINFOREST ALLIANCE CERTIFICATION PLATFORM

The Rainforest Alliance Certification platform (RACP) requires CHs to upload the Group Member Registry (***Annex S13***) and other documents as required by the Certification Program. The RACP will conduct two validation checks on the data uploaded through the GMR to ensure data quality. If there are no errors in the GMR, the data will be approved. If errors are found, CHs will be required to correct these before approval. Once the data is approved, the platform will conduct the geodata risk assessment and share the results of this with the CH as well as the CB, who will be conducting the audit.

5.1. DATA QUALITY VALIDATION

Before creating the risk maps, the RACP will validate the data provided by the user. The first validation will include the validation of the geodata provided in the GMR. This data must be correct before the second (geodata) validation can be conducted. Therefore, the following checks are conducted, and this is the minimum quality required before the second validation can proceed:

i. Coordinates with non-numerical values:
   a) It cannot include the units, north, south, east, west
   b) Decimal numbers must be separated from integer numbers
   c) Example of a correct coordinate: “4.1230 or “-3.1230”.
ii. Location points with sufficient decimal places:
   a) A minimal requirement is 4 decimals, except if the last digit is 0.
   b) Example of a correct location point: “4.12301” or “-3.12301”
iii. The geometry of the provided polygons is correct
iv. No repetition of coordinates
v. No location points/polygons that land outside of the extent of the geographical area of possible certified crop, e.g. those that show in the ocean or a different country.
vi. No location points that show at the same location (i.e. all points must have a unique location).
vii. Farm polygons have been reviewed to ensure no overlap and that the area size reflects the reported farm area.

Two common mistakes to avoid:

- Misplaced signs
- Switched/transposed latitude/longitude values. This can be avoided by directly transferring (electronically via USB) the latitude/longitude values from the Global Positioning System (GPS) to the computer and inserted digitally into the GMR.

5.2. GEODATA VALIDATION

The Geospatial Platform works with algorithms and several sets of rules that analyze the quality of the geodata. This platform determines whether there are issues that must be corrected by the CH and/or further analyzed during the audit. This analysis will be provided to both the CHs and CBs

The geodata validation consists of the following three checks:

1. Country check: validates whether or not the point provided is in the correct country
2. Waterbody check: validates whether or not the point provided is located on an actual landmass or in a waterbody
3. Overlap check: validates whether or not the geodata (point/polygon) provided overlaps with others provided **within the same CH**.

Over time, the system will be able to perform an additional check which is an overlap of geodata (point/polygon) between certified CHs.

CHs are responsible for correcting the errors identified by the RACP validations. The CH will not be able to continue with the certification process until all errors are corrected. Not all issues will be able to be identified by the RACP and will thus require CB verification during the audit process. This is further explained in ***AR 5 of the Certification and Auditing rules***.

5.3. RISK ASSESSMENT AND OUTPUTS

The outcome of the geodata quality validation and the risk assessment will be shared with the CHs in the RACP. This data should be shared by the CH with their CB after the contract is signed.

The Risk assessment will provide the following outputs for each individual CH:

I. Deforestation risk map
II. Encroachment into a Protected Areas risk map
III. Geodata risk table

These outputs will give an overview of possible non-compliance with Standard requirements 6.1.1 and 6.1.2 and must be corrected by the CHs and verified by the CBs during the audit process. In addition, the geodata risk table provides information on the farm unit and the levels of risk for both deforestation and encroachment into Protected Areas. These risk maps are further explained below.

The user will see the color-coded indication of risk level for each farm unit in the certification scope for which geolocation data was provided. The legend included in the maps will explain the meaning of the 3 risk levels used:

- High (red)
- Medium (orange)
- Low (green)

In the case of deforestation, farm units indicated as high risk are those that overlap with the intersection of the "Rainforest Alliance Forest" layer **or** the "Copernicus Global Land Cover" layer (CGLC[1]) **and** Tree Cover Loss (TCL[2]).

In the case of Protected Areas, farm units indicated as high risk are those that overlap with Protected Areas classified as "No-go." Farm units indicated as a medium risk for encroachment into Protected Areas are those in overlap with Protected Areas classified as "Go". Production in these areas is allowed under certain conditions (refer to **Chapter 0** for the definitions). This will be verified during the audit by the CB.

When one of the risk maps indicates a high risk for deforestation or encroachment into Protected Areas, the CH and CB must take appropriate steps to address the issues. These are prescribed in ***Annexes AR1, AR5 and AR6 of the Certification and Auditing rules.*** The risk maps will be provided in a GeoPDF format. Please see Guidance: ***GeoPDF user guidance*** for more information on how to use the GeoPDF.

Each time the CH updates geolocation data, they can ask Rainforest Alliance to updated their risk maps (deforestation and/or encroachment into Protected Areas). The better the geolocation data provided (e.g. polygons instead of location points), the more accurate the risk maps and, therefore, the easier it will be to implement the Certification Program requirements correctly.

[1] Copernicus program – European Space Agency

[2] Hansen/UMD/Google/USGS/NASA

5.4. Deforestation risk map

The deforestation risk map is created by overlaying the geolocation data provided by the CH with the Rainforest Alliance Forest Layer **or** CGLC and TCL. The overlap of these layers with the specific location of farm units will provide an indication of deforestation that has occurred since the cut-off date of 2014. This data will show the current deforestation risk of each farm unit.

The Rainforest Alliance Forest Layer is used for countries identified as high risk for deforestation. The CGLC is used for countries identified as medium or low risk for deforestation. The TCL is used to detect the areas with forest loss inside the forest cover. The table below shows the specifications and definitions used for these layers.

Dataset	Specifications	Definition
Rainforest Alliance Forest Layer	Forest layer for countries identified as high risk for deforestation. Spatial resolution: 10m.	Forest: land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10%, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or other land use.[3]
Copernicus Forest Layer	Forest layer for countries identified as medium or low risk for deforestation. Spatial resolution: 100m. Version: 3.0	Forest; Based on the Forest Type layer. Using at least 10% tree cover density and using Dominant Leaf Type (DLT) layer together with FAO's forest definition to exclude and include areas. For more information, please check this link.
Tree Cover Loss layer (TCL)	Hansen UMD Tree Cover Loss Spatial resolution: 30m. Version: 2.0.7	Tree cover: all vegetation greater than 5 meters in height and may take the form of natural forests or plantations across a range of canopy densities. Tree cover loss: defined as "stand replacement disturbance", or the complete removal of tree cover canopy.

Table 1. Relevant definitions for deforestation risk

[3] For risky countries: If there is a national forest definition in the country with a clear minimum forest size threshold, this definition will be used as long as the size threshold is < 0.5 ha, otherwise the forest definition described will be implemented.

5.4.1. Encroachment into Protected Areas map

The encroachment into the Protected Area risk map is created by overlapping the proximity of farms to either the Protected Areas information provided by the government or the World Database on Protected Areas (WDPA). The overlap will indicate whether CHs are producing inside Protected Areas and whether or not such production is allowed according to applicable law.

The following table shows the categorization of Protected Areas in "go" and "no-go" areas following the International Union for Conservation of Nature (IUCN) standards.

IUCN Category	Name	Rainforest Alliance Classification
Ia	Strict nature reserve	No-go
Ib	Wilderness area	
II	National Park	
III	Natural monument	
IV	Habitat/species management area	Go
V	Protected landscape	
VI	Protected area with sustainable use of resources	
Not Reported	For protected areas where an IUCN category is unknown and/or the data, the provider has not provided any related information.	No-go
Not Applicable	The IUCN Management Categories do not apply to a specific designation type. This currently applies to World Heritage Sites and UNESCO MAB Reserves. Not Applicable also applies to a site that does not fit the standard definition of a protected area (PA_DEF field = 0).	
Not Assigned	The protected area meets the standard definition of protected areas (PAF_DEF = 1) but the data provider has chosen not to use the IUCN Protected Area Management Categories.	

Table 2. Classification of "Go" and "No-Go" Protected Areas

The last three categories in the table above (Not Reported, Not Applicable & Not Assigned) will be classified as No-Go Protected Areas by the Rainforest Alliance unless data/evidence can be provided which proves otherwise. This will be analyzed per country on a case-by-case basis.

5.4.2. Geodata Risk table

The Geodata risk table contains the results from the risk assessment and will be provided to the CHs together with the risk maps. The tables indicate the risk level for deforestation and encroachment into protected areas for each farm unit. In addition, this table provides the following information:

- Percentage of overlap of the farm unit with any deforested area,
- Whether the unit is located in a 'Go or No-Go area
- The size of the farm unit
- The owner of the farm unit.

5.4.3. Use of Risk Maps

As required in ***Annex S17: Collecting geolocation data***, CHs have to provide/update geolocation data upon registration and ensure all data has geolocation data has been registered before the audit takes place. This data will be used to produce the audit risk maps for deforestation and encroachment into Protected Areas.

Based on the results of the registration risk map, the CH shall assess the indication of risk levels of:

1) The farm units regarding conversion of natural forests and other natural ecosystems (standard requirement 6.1.1),
2) Production and/or processing in Protected Areas and the designated buffer zones (standard requirement 6.1.2).

Furthermore, the CH should adapt the management plan accordingly and implement the appropriate risk mitigation measures as indicated in the **Certification Rules.** CHs can also consult **Guidance M: Natural ecosystems and vegetation, Section** 1 for ideas on potential actions which can be included in the management plan. Finally, the CH is responsible for providing any requested evidence of compliance to the CB.

6. GEODATA COLLECTION

6.1. COLLECTION DEVICES

There are two ways to collect geospatial data:

- **Option 1: Using mapping-handheld devices (GPS/GNSS device)**

Handheld or GPS devices are specifically designed to work with coordinates, have high precision and accuracy, and can collect coordinates stored as waypoints.

There are many different brands of mapping handhelds e.g. Garmin, Magellan, Topcon, and Trimble. Basic models can do the job and are not expensive. These devices also come with guidance documents on collecting and exporting the data from the device to the computer.

Some more advanced models include aerial imagery and touch screens. The inclusion of aerial imagery is useful for hilly and very densely forested locations.

Advantages of handheld devices: batteries last longer, antenna are stronger, more resilient to rain, efficient and complementary software allows the conversion of the data to different formats.

- **Option 2: Using mapping applications on mobile devices (smartphones, tablets)**

Smartphones and tablets can collect locations points using several apps. The precision of these applications depends on the antenna in your mobile device, the weather, and the time given to collect the geolocations.

A good paid example is the ESRI software (ArcGIS), but this is not accessible for all. Examples of free tools which work on both desktop and mobile are Google my Maps and Google Earth. More step-by-step information on how to use these applications can be found in ***Guidance: Google My Maps*** and ***Guidance: Google Earth*** available on the website.If mobile devices are used, make sure to take them fully charged when beginning the mapping. The process will discharge batteries extremely fast. Therefore it is recommended to bring a fully charged powerbank/portable charger if available.

The Farm Intelligence App, being developed by Rainforest Alliance, will be an additional tool CHs can use for location point data collection. Most smartphones do not need an internet connection or cellular data coverage to collect location data. CHs may also consult with local government agencies and land registries for geolocation data.

CHs and CBs are free to use any application or devices (e.g. Garmin, drone) available, as long the data provided to the Rainforest Alliance meets the requirements of ***Annex S17. Collecting Geolocation Data***

6.2. COLLECTION METHODS

The Standard requires the collection of both points and polygons. Below is further guidance on how to collect these two different data sets.

- **Collecting points**

Most smartphones and tablets have a GPS receiver built-in to estimate the current location, and many apps are available for these devices to the user with mapping. The examples of apps mentioned below are free, easy to use and work offline. It is important to configure the settings in the apps to report the location in decimal degrees. The location coordinates can either be saved as "waypoints" within the app and transferred digitally to a computer or retrieved from an app display and then transferred.

- **Collecting polygons**

There are several methods to create polygons, one of which is to draw them by using reference location points that define the boundaries of the farm(s)/farm unit(s). These points should be collected at the corners or along the edges of the farm(s)/farm unit(s). Once you have these points, a polygon boundary can be drawn using Google My Maps, Google Earth, Basecamp (Garmin free software), or any standard Geographical Information System (GIS), provided the boundaries can be seen on satellite imagery. There are numerous GIS, Web-mapping computer programs, and mobile applications that can be used to draw farm polygons.

Another method is to track your movement and walk around the borders of the farm, but this can be challenging when obstacles on the border are found. Instead of using the "tracking" method, collecting reference points makes it easier to manage and edit the data later.

Google Earth or Google My Maps are programs that enable the user to import points collected in the field and draw a polygon. Google my maps is a mobile app that cannot collect lines and polygons but that can collect reference points in the field. Using such a tool, the collector can record points from all the corners of the farm(s)/farm unit(s) unit by first

collecting a waypoint in one location, naming this point (e.g. "southeast corner" or "Point1") and then move to the next location on the farm to collect the second point. At the second point create a new waypoint and give this point a name (e.g. "northeast corner" or "Point2"). Ensure to collect these points along the edges of the farm. Once the reference points of the unit are collected, a polygon can be drawn and saved as a spatial KML file. Distinctive features such as roads, rivers, clearings, forest patches, fences, or large buildings can provide landmarks that help identify the site and fine-tune the digitized boundaries.

Data collection tips

- When collecting geolocation data ensure that the Coordinate Reference System (CRS) is set to "EPSG:4326 – WGS 84". This will improve the data quality. ***Guidance: Converting Geospatial files*** (available on the website) explains how to do so using QGIS.

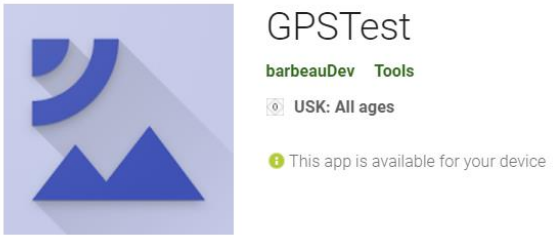
- It is important to note that the software which runs the risk analysis uses the projection EPSG:4326. Therefore, if data is provided in a different coordinate system or projection, the location of farms could show up incorrectly, and the CH be automatically classified as high risk.

6.3. GOOD GEODATA COLLECTION PRACTICES

Nowadays, most of the chips found in smartphones are multi-Global Navigation Satellite System (GNSS), meaning they use data from more than one GNSS constellation. It has been reported that GPS-enabled smartphones are typically accurate within a 4.9[4]m radius under open sky conditions. However, the accuracy of your GNSS device can be impacted by many factors, including satellite geometry, signal blockage due to buildings or trees, and atmospheric conditions. CHs can improve the accuracy of data collection in the field in these ways:

- Wait at least 60 seconds in 1 spot before collecting the geolocation. This is because the GPS receiver of your device needs time to connect to the GNSS satellite constellation and find the current location. Doing this will increase the accuracy of the receiver.
- Collect the data when the sky is as clear as possible, as clouds disrupt the signal and reduce the precision/accuracy.
- Collect the data in an open area if possible. Tree cover, buildings, and other (metal) objects disrupt the signal and reduce the precision/accuracy.
- Check the accuracy of your device and verify the number of satellites connected to your device by using an additional app.

Several apps can help you improve/check the accuracy of your geolocation collection by looking at the number of satellites connected to your mobile device. One of these which can be downloaded on Android is GPSTest.



[4] van Diggelen, Frank, Enge, Per, "The World's first GPS MOOC and Worldwide Laboratory using Smartphones," *Proceedings of the 28th International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2015)*, Tampa, Florida, September 2015, pp. 361-369. (https://www.ion.org/publications/abstract.cfm?articleID=13079)