RAINFOREST ALLIANCE QGIS RA RISK ASSESSMENT

GUIDANCE ON THE QGIS RA RISK ASSESSMENT TOOLS

Version 1.0

Translation Disclaimer

For any question related to the precise meaning of the information contained in the translation, please refer to the English official 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?

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1. Introduction

The new Rainforest Alliance standard introduces risk as a key component of the certification process. Identifying and understanding local risks in agricultural supply chains can provide guidance to producers and supply chain actors as to where they should focus their improvements for maximum positive impact and minimum environmental effect. Incorporating environmental risks into the assurance process can equip auditors with more effective knowledge when carrying out checks and help them target the risky areas where agricultural practices are provoking negative environmental impacts. Rainforest Alliance has developed a QGIS risk assessment plugin to identify the risk of deforestation and encroachment into Protected Areas (PA), which in turn, could jeopardize compliance with the standard requirements and the expected sustainability outcomes.

The QGIS RA risk assessment plugin consists of two components, namely;

- A. Validation tool
- B. Risk tool

1.1. Validation tool

The validation tool will detect certain "errors", enabling the process to continue with the risk assessment tool and ensuring a certain level of data quality. The validation tool evaluates the following:

- Farm unit IDs:
 - Missing check All farm units must have a farm unit ID
 - Duplicate check All farm unit ids must be unique and cannot be duplicated.

The validation tool also evaluates the geolocation of the farm units, this consist of:

- Waterbody check Farm unit cannot be in water.
- Country check Farm unit must be in the right country (China).
- Overlap check Overlap check between farm unit geolocations.

1.2. Risk tool

- Deforestation risk
 - Evaluates whether a farm unit is located within areas where deforestation has been detected from 2014 onwards.
- Encroachment into Protected Areas
 - Evaluates whether a farm unit is located within Go and No-go protected areas.

2. Installing the QGIS RA risk assessment components

Install the validation component and the risk assessment component. To install the QGIS RA risk assessment plugin, download the following zip files:

- Geodata_RiskAssessment.zip
- validation_tool.zip
- ra_risk_tool.zip

These files can be shared with you by the Rainforest Alliance, when you do not have the files, you can always contact Rainforest alliance and request the files. The Rainforest Alliance advises storing the data on your C-drive to reduce the risk of technical problems.

2.1. Geodata_RiskAssessment folder

The first folder is the Geoda_RiskAssessment folder and contains all the data (layers) needed as input and the folder structure for the results. After downloading it, unzipped it and store it on C:\ drive (Figure 1). Please find below the folder structure detailed explanation:

This PC → Win	dows (C:) Name	
* * * *	Geodata_RiskAssessment OSGeo4W Program Files Program Files (x86) RAScripts SWsetup Users Windows	 This PC > Windows (C:) > Geodata_RiskAssessment Name 1_Geodatabase 2_CH_RiskAnalysis
	Figure 1. Fol	der structure

Geodata_RiskAssessment folder structure

• 1_Geodatabase (Folder 1)

Contains the data layers that are needed to conduct the validation and risk assessment.

- CountryBoundary (Folder 1.1)
 - Contains the Chinese country boundaries layer
- Deforestation layer
 - Contains deforested areas layer (Forest cover TCL)
- ProtectedAreas (Folder 1.2)
 - Contains protected areas from the WDPA, including RA Go/No-Go classification.
- Waterbodies (Folder 1.3)
 - Contains inland waterbodies (lakes) bigger than 10ha.
- 2_CH_RiskAnalysis (Folder 2)

In here the tools will store the input data and the results. It stores the CH input data per CH ID.

- RA_ChinaExample1 (Folder 2.1)
 - 1_input_data (Folder 2.1.1)
 - It stores the input data (GMR, KML or SHP) with a timestamp ().

> This PC > Windows (C:) > Geodata_RiskAssessment > 2_CH_RiskAnalysis > RA_ChinaExample1 > 1_input_data			
Name	Date modified	Туре	Size
RA_ChinaExample1_04_07_22-1516_43	6/24/2022 11:52 AM	Microsoft Excel W	117 KB
RA_ChinaExample1_24_06_22-1152_35	6/24/2022 11:52 AM	Microsoft Excel W	117 KB
RA_ChinaExample1_24_06_22-1156_17	6/24/2022 11:52 AM	Microsoft Excel W	117 KB
RA_ChinaExample1_24_06_22-1159_36	6/24/2022 11:52 AM	Microsoft Excel W	117 KB

Figure 2. Input files for "Example CH".

- 2_secondary_outputs (Folder 2.1.2)
 - GMR_to_csv contains an excel csv which is used by the plugins to conduct the validation and risk assessment, this folder is only meant for the plugin.

- 3_results (Folder 2.1.3)
 - 1_validation (Folder 2.1.3.1) Contains the "Geodata validation table" which contains the results of the validation tool per farm unit ID.
 - 2_riskassessment (Folder 2.1.3.2) Contains the "Geodata risk table" which contains the results of the risk assessment per farm unit ID.

2.2. Installation of the plugins

After downloading the zipped files, open QGIS. To open QGIS go to "Windows start" and search for a folder called OSGeo4W, there you will find QGIS Desktop. In the example given in Figure 3 below you see the QGIS Desktop 3.24.3 in the red box.



Figure 3. QGIS location on computer

Opening QGIS you can now install the Plugins you have downloaded and are stored in the local drive. In QGIS go to "Plugins" > "Manage and install plugins..." to open the plugin window, see Figure 4 below.



Figure 4. The plugin location in QGIS

• Once the Plugin window is open (Figure 5), select **install from ZIP** and look for the "ra_risk_tool.zip" and click on **Install plugin**, repeat the steps "validation_tool.zip". If a window pops up asking to trust the plugin source, click on yes. Once you install the plugins you will see the message "Plugin installed successfully".

Q Plugins Install from ZIP		×
촕 All	Plugin installed successfully	٢
🤷 Installed		
🍅 Not installed	If you are provided with a zip package containing a plugin to install, please select the file below click the <i>Install plugin</i> button.	r and
(1) Install from ZIP	Please note for most users this function is not applicable, as the preferable way is to install plu a repository.	gins from
🜞 Settings		
	ZIP file:	
	1 - 1 10 - 1	7
	Instal Plugn	look
	for the 2	ZIP
	Close	Help

Figure 5. Install the Plugin from the zipped file on the local drive

• After installing the plugins, you will see that the "validation_tool" and "ra_risk_tool" plugins have been added to the QGIS toolbar.



Figure 6. The location of the newly installed plugins

The tool is periodically updated, so when requested please uninstall both plugins and download and install the new version. In QGIS go to "Plugins" > "Manage and install plugins..." > "Installed" and select the plugin and click on "Uninstall Plugin".



Figure 7. Uninstalling a plugin

2.3. Activation of the plugins

The "Python console" in QGIS must be activated before running both the Validation & Risk assessment plugins. The Python console will show the status, error messages, and results of the plugin tools. If you run across issues with running one of the plugins it indicates which issue you run into and where this occurred, and it also shows the results of the validation check. The validation plugin should be run always before starting the risk assessment plugin.

As shown in Figure 8, you can activate the python console indicated in box 1. The activated python console will appear at the bottom of the screen as indicated in box 2.



Figure 8. Activate the python console

2.4. Validation plugin

To start the validation plugin, select the validation icon \bigcirc . When the validation icon is pressed the validation tool window appears, see Figure 9 below. In the left top of the window, you can read that the validation tool window is open.

In this window you can select:

- 1. A GMR file to validate point data.
- 2. A KML or SHP file to validate polygon data.
- 3. Both a Point and Polygon file to validate both polygons and points at the same time.
- 4. After you have selected the file(s), select OK.

Note: The input files should be renamed after the CH id. An example is "RA_00123456789".

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Q Validation Tool		×
Select a GMR file	2. Select GMR file	
Select a KML/SHP file	3. Select polygon file	
	OK Cancel	

Figure 9. Validation tool window

To successfully conduct the validation tool, the provided data must comply with the technical requirements.

Points and polygons are different geometries and are provided in different file formats therefore, the requirements are different for points and polygons.

2.4.1. Geodata requirements for point

The point data provided should comply with the requirements documented in Table 1 to prevent errors that enable the validation tool to be conducted successfully.

Note: point data should be provided via the third sheet "3. Farm unit" of the GMR (annex S13).

Column	Column name	Column Format	Guidance
A	Internal Farm ID	Text	No empty cells
В	Farm unit ID	Text	No empty cells
			No duplicates
			Farm unit IDs must be unique
С	Farm unit area (ha)	Number	No text
			No empty cells
			• One type of decimal separator (dot or comma)
D & E	Latitude & Longitude	Number	No text
			No duplicates
			At least 4 decimals
			Decimal Degrees format
			• One type of decimal separator (dot or comma)

Table 1. Requirements for points (Sheet "3. farm unit" of the GMR)

2.4.2. Geodata requirements for polygons

The Polygons that are submitted should comply with the following requirements to prevent errors that enable the validation tool to be conducted:

- 1. The polygon data <u>must</u> be in one of the following two formats:
 - a. KML/KMZ
 - b. Shapefile
- 2. The file may only **include** polygons of the farm units representing the boundaries and no points or line data should be included. Avoid including the following:
 - a. Polygons of farm infrastructure (House, office, plant, etc)
 - b. (Poly)Lines of e.g., rivers, streets, and/or roads.
 - c. Points of the farm units
 - d. GPS tracklog
 - e. Other information different from the farm unit polygons.
 - f. Polylines
- 3. The name of the polygon <u>must</u> be unique and represent the Farm unit ID
- 4. All the polygon data must be provided in 1 file (either KML or SHP)
- 5. In case the file is a SHP, the file must have the attribute "farmunitid" containing the unique farm unit IDs.
- 6. Each polygon (farm unit) in the file <u>must contain the unique</u> farm unit ID.
- The Farm unit ID provided in the polygon file must be 100% the same as the farm unit ID registered in column B of sheet "3. Farm unit" of the GMR for that farm unit. (More information in topic 3 below).

2.4.3. Validation tool results

The validation tool will provide the results inside the validation table and saves that table in the "1_validation" folder of the result folder explained in the

Geodata_RiskAssessment folder chapter.

The validation table shows for each farm unit a "Pass" or "Fail" on each check conducted. If a farm unit has a "Fail" on the first or second check, the other results will not be available because these will not be valid.

The validation table contains the following information columns:

InternalGroupMemberId	Internal Group member ID is linked to the unique farm unit ID.
Farmunitid	The unique farm unit ID of this location
Latitude (points)	Latitude coordinate of the location
Longitude (points)	Longitude coordinate of the location
GeometryType	Indicates whether it is a point or a polygon
CHnumber	Certificate Holder Organization number

The validation tool conducts the following check divided into three different categories:

1. data checks:	
farmunitID	Whether a farm unit ID has been provided, if not "Fail"
duplicates	Whether the Farm unit ID is duplicated, if duplicated (not unique) "Fail"

Note: To avoid duplicate fails when providing polygons and points. Provide only 1 type of geometry for each farm unit. Meaning: when a point and polygon for a specific farm unit is available, only provide the polygon.

2. Geolocation che	ecks:
incountry	Whether the farm unit is in the country of CH, if not "Fail"
inwater	Whether the farm unit is located in a waterbody, if so "Fail" $% \left({{{\rm{A}}}_{{\rm{A}}}} \right)$

3. Overlap checks:

point_vs_pointWhether points are located within 20m of another point, if so "Fail"polygon_vs_polygonWhether a polygon is overlapping >20% with another polygon, if so "Fail"point_vs_polygonWhether a point is within a polygon, if so, both point & polygon "Fail"

2.5. Risk assessment plugin

To start the risk assessment plugin, select the tree icon \clubsuit . When the tree icon is pressed the RA risk tool window appears, see Figure 10. In the left top of the window, you can read that the RA risk tool window is open.



Figure 10. Risk Assessment tool window

In this window you can select:

- 1. A GMR file to validate point data.
- 2. A KML or SHP file to validate polygon data.
- 3. Both a Point and Polygon file to validate both polygons and points at the same time.

After you have selected the file(s), select OK.

Note i: The input files should be renamed after the CH id. An example is "RA_00123456789". Note ii: The Validation tool must be conducted first.

To start and conduct the RA risk tool, the validation tool must have been conducted successfully meaning that all the checks for each farm unit should have scored a pass.

The RA Risk tool will provide the results inside the Geodata risk table and saves that table in the "2_riskassessment" folder of the result folder explained in the Geodata_RiskAssessment folder chapter.

2.5.1. Risk assessment results

The Geodata risk table contains the following information:

CHnumber	>	Certificate Holder Organizational ID
InternalGr	>	Internal Group member ID linked to the unique farm unit ID
farmunitid	>	The unique farm unit ID of this location
Area_(ha)	>	Farm units' area in hectares
Latitude	>	Latitude coordinate of the location
Longitude	>	Longitude coordinate of the location
Risk_PA	>	The farm unit's encroachment into protected area risk level
Risk_def	>	The farm unit's deforestation risk level

At the end of the risk assessment, you can add the data layers used the tool in QGIS. The data layers are stored in the "1_Geodatabase" folder explained in Chapter 2 Geodata RiskAssessment folder.

The tool will automatically add the farm unit location layer in QGIS.

2.5.2. Deforestation Risk Map

The deforestation risk assesses the possible non-compliance with Standard requirement 6.1.1. The risk assessment tool uses 3 different data layers namely:

- 1. Farm location layers
 - a. Point data
 - b. Polygon data
- 2. Forest cover layer (ESA satellites Copernicus project data)
- 3. Tree Cover Loss layer (Global Forest Watch, the Hansen dataset)

The Risk tool will first look where the forest cover is located according to the Copernicus data, then the tool will overlay the forest cover data with tree cover loss data and extract the area where both layers overlaying with each other, this area is detected as deforestation and exported as a new deforestation layer.

Secondly, the tool will now use the farm locations and see where the farm locations overlap with the deforestation layer and calculate how many percentages of the farm (unit) area is overlapping with deforested area. Based on the percentage, 3 risk levels will be assigned to the farm unit.

- 1) Low risk 0%
- 2) Medium risk more than 0% and 1.2%
- 3) High risk more than 1.2%

2.5.3. Encroachment into Protected Areas (PAs) Risk Map

The encroachment risk assesses the possible non-compliance with Standard requirement 6.1.2 (production inside a PA). There are three risk categories:

- 1) High the farm unit (point) is located inside a classified No-go PA.
- 2) Medium the farm unit (point) is located inside a classified Go PA.
- 3) Low the farm unit (point) is not located inside a PA.

The data used for this part of the risk assessment are the following datasets:

- 1) Farm location data
 - a. Point data
 - b. Polygon data
- 2) Protected areas (WDPA)

The protected areas from the World Database of Protected Areas (WDPA) are assigned into two categories based on the IUCN classification given in the attribute table. The following two categories are created by RA:

- No-Go area
- Go area

More information on the Protected area classification can be found in Guidance D. Geolocation Data Requirements and Risk Maps.

3. Annex working with QGIS

3.1. Adding a base map to QGIS

It is possible to add a base map to QGIS to give a better spatial context to the farm layers added by the validation and risk assessment tool, to do this:

1. Click on Plugins and select "Manage and Install Plugins" to open the install manager.

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2. Click on "Not installed" and search for QuickMapServices and click on "Install Plugin"

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installed	s MapTher	Not installed plugins
Not installed		Here you see the list of all plugins available in the repositories,
A Harman da a bela		Click on the name to see details.
		You can change the sorting via the context menu (right click).
11 Install from ZIP		plugin' button.

3. Once is installed, the icon of the plugin will be added to the toolbar. To activate the base map, click on the left icon > OSM > OSM Standard.

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3.2. Adding the deforestation and Protected Areas to QGIS

It is possible to add the layers that are used by the Risk Assessment tool. This can be done by loading the Deforestation layer and/or the Protected Area layer into QGIS. In step 2 a reference is made to the name and the storage location of the layer.

Deforestation layer:

Name: Defo_layer_fixed.shp Location: C:\Geodata_RiskAssessment\1_Geodatabase\Deforestation

Protected area layer

Name: ProtectedAreas_Apr2022_projected_fixed.shp Location: C:\Geodata_RiskAssessment\1_Geodatabase\ProtectedAreas

To load the layer into QGIS follow the following steps:

1. Select Layer > Add Layer > Add Vector Layer

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8	Add Layer 🔸	V Add Vector Layer Ctrl+Shift+V
	Embed Layers and Groups	Roger Add Raster Layer Ctrl+Shift+R
	Add from Layer Definition File	🛃 Add Mesh Layer
na	📄 Copy Style	Po Add Delimited Text Layer Ctrl+Shift+T
	Paste Style	Reference Ctrl+Shift+D

Figure 11. Add Vector layer

- 2. The data source manager will be opened, in the search section, search for the layer's location in the "C:\Geodata_RiskAssessment\1_Geodatabase" and
- 3. Select the file you want to add either:
 - ProtectedAreas_Apr2022_projected_fixed.shp

• D	efo_layer_fixes.shp	
Recent Projects		Proc
Q Data Source Man	iager Vector	×
🚞 Browser	A Source Type	-
V Vector	File Directory Database Protocol: HTTP(S), cloud, etc.	4
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Figure 12. Opening the file location and selecting the shp file.

4. Once the document is selected click on Add.

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Oracle	DBF_EOF_CF	<default></default>		*
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🚓 wcs			Close	Add Help

Figure 13. Adding the file to QGIS