

User Manual

Vista Saga Plugin 1.6.1 for QGIS 4

Geoprocessing inspired by Vista SAGA/UFRJ

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Contents

1. Introduction 4

Who this manual is for 4

Plugin principles 4

Quick reference 5

2. Installation and first steps 6

Installation 6

What is the same in every module 6

3. Concepts used throughout this manual 8

4. Signature 9

What it is for 9

How it differs from similar routines 9

Ease of use 10

The window 10

Correct way to use it 13

Results and how to interpret them 13

Common mistakes and how to avoid them 14

5. Monitoring 15

What it is for 15

How it differs from similar routines 15

Ease of use 15

The window 16

Correct way to use it 17

Results and how to interpret them 18

Common mistakes and how to avoid them 18

6. Evaluation 19

What it is for 19

How it differs from similar routines 19

Ease of use 19

The window 20

Correct way to use it 23

Results and how to interpret them 23

Common mistakes and how to avoid them 24

7. Voronoi Analyses 25

What it is for 25

How it differs from similar routines 25

Ease of use 25

The window 26

Correct way to use it 28

Results and how to interpret them 29

Common mistakes and how to avoid them 29

8. Map Combination 30
What it is for 30
How it differs from similar routines 30
Ease of use 30
The window 31
Correct way to use it 32
Results and how to interpret them 32
Common mistakes and how to avoid them 33

9. Format Converter 34
What it is for 34
How it differs from similar routines 34
Ease of use 34
The window 35
Correct way to use it 37
Results and how to interpret them 38
Common mistakes and how to avoid them 38

10. Map Sequencer 39
What it is for 39
How it differs from similar routines 39
Ease of use 39
The window 40
Correct way to use it 41
Results and how to interpret them 42
Common mistakes and how to avoid them 42

11. Troubleshooting 43

12. Glossary 43

1. Introduction

Vista Saga Plugin is an independent plugin for **QGIS 4** that brings together, in seven modules, geographic analysis procedures inspired by **Vista SAGA**, the environmental analysis system created at the Geoprocessing Laboratory of UFRJ (Brazil). The plugin uses no code from the original program: the methods were reimplemented and, in the modules that produce comparable numbers, **validated against the original Vista SAGA**, cell by cell.

The goal is to let you follow the same reasoning as Vista SAGA (signatures, monitoring, evaluation by weights and scores, influence areas) inside QGIS, with the data you already use, without manual conversions and with reports ready for spreadsheets and technical texts.

For each module, this manual explains **what it is for**, **how it differs from similar routines** in QGIS and other plugins, **every field of the window**, the **correct way to use it**, **how to read the results** and the **tips that do not show on screen**.

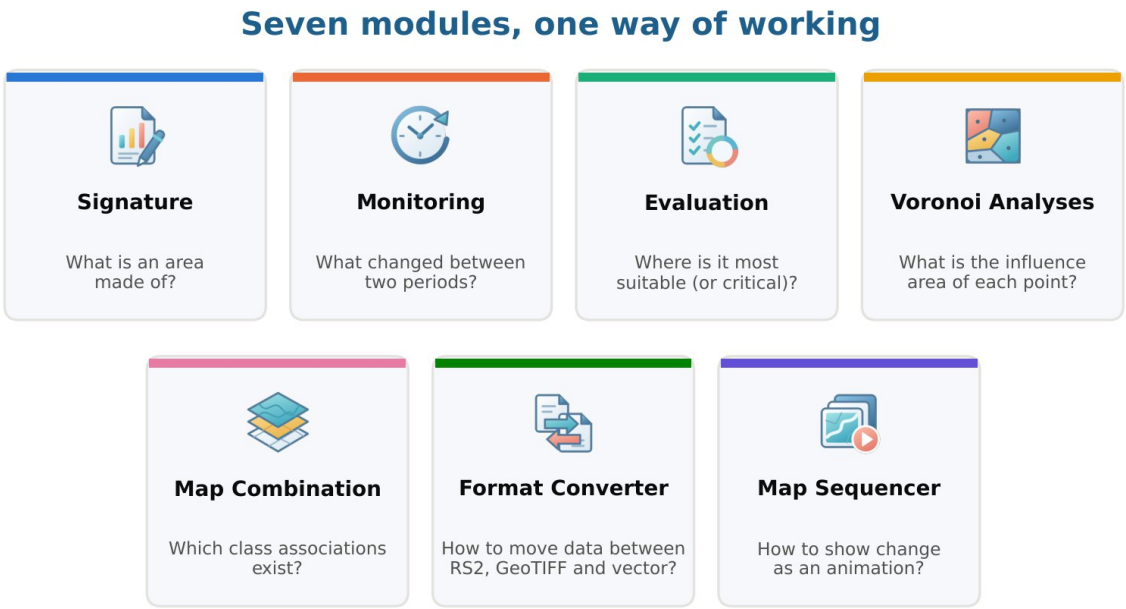


Figure 1 - Vista Saga Plugin 1.6.0 for QGIS 4

Who this manual is for

- People working on environmental diagnosis, urban or regional planning, watershed and land-use studies.
- Former Vista SAGA users who want to reproduce the same analyses in QGIS.
- Students and teachers of Geography, Ecology, Engineering and related fields who need explainable geographic analyses with auditable reports.

Plugin principles

- **Method fidelity:** when there is a Vista SAGA model, the plugin follows it and states where it differs.
- **Nothing is done behind your back:** the plugin does not reproject maps silently, does not assume scores, does not drop classes on its own and never changes the input data.

- **Auditable reports:** every result comes with a readable TXT and a CSV for spreadsheets, always in Portuguese, whatever the interface language.
- **One way of working:** the seven modules share the same window layout, buttons and results.

Quick reference

I want to…	Module	Main output
know what an area is made of	Signature	TXT and CSV with % signed area and % category
see what changed between two dates	Monitoring	Transition map and matrix
find the most suitable areas	Evaluation	Map with the weighted mean
outline influence areas	Voronoi Analyses	Region map and _centros.csv
discover class associations	Map Combination	Combined map and _combinacoes.csv
move data to/from Vista SAGA	Format Converter	RS2, GeoTIFF or vector
show change as an animation	Map Sequencer	Animated GIF and PNGs

2. Installation and first steps

Installation

1. Download **Vista_Saga_Plugin_QGIS4_v1.6.0.zip** (the installation ZIP, not the GitHub source code).
2. In QGIS 4, open **Plugins > Manage and Install Plugins > Install from ZIP**.
3. Choose the ZIP, click **Install Plugin** and restart QGIS.
4. The **Vista Saga Plugin** button appears on its own toolbar; clicking it opens the menu with the seven modules. They are also under **Raster > Vista Saga Plugin**.

> **Warning**
>
> The installed folder is called **geosaga** on purpose. Do not rename it: older models and projects depend on that name and on the **geosaga:*** processing identifiers.

What is the same in every module



Figure 2 - What is the same in every module

- **Language:** the interface follows the QGIS language (Portuguese, English or Spanish; English for the others). CSV and TXT reports are always written in Portuguese.
- **Tooltips:** hover over any button, field, check box or list to see a yellow box explaining what it does.
- **Standard footer: [Run]** and **[Close]** in every window; Evaluation also has **[Validate]**.
- **Non-modal window:** the module window can stay open while you work on the QGIS map (select features, change styles, open layers).
- **Progress:** while running, a progress window with **Cancel** appears; the outcome (finished, cancelled) is shown in the QGIS message bar.
- **Temporary or saved result:** an empty **Save to** field gives a temporary result named "Module - operation" (for example, "Análises Voronoi - Com Atrito"); when filled in, the result is saved to the chosen file and loaded with that file name.
- **Input data untouched:** no module changes the input layers.

> **Warning**
>
> Temporary results live in the QGIS temporary folder and **disappear when QGIS closes**. Save them (right-click the layer > Export) before quitting, or fill in **Save to** from the start.

3. Concepts used throughout this manual

Categorical (thematic) map	A map in which each cell or polygon belongs to a **class** (land use, soil type, district). Most modules use this kind of map. Continuous values (elevation, temperature) must be classified first.
Class, code and label	Each class has a **code** (an integer in rasters; a field value in vectors) and a **name** (the label). The plugin reads names from the file (RS2 legend, GeoTIFF category names, .rs2.json file) or, in Signature, from the layer style in QGIS.
BACKGROUND (FUNDO) and NoData	**FUNDO** is the background class of the RS2 format (usually code 0). **NoData** is the "no data" value of a GeoTIFF. Each module states how it handles them; in Signature, for example, both count as a class, as in Vista SAGA.
CRS (reference system)	Defines the map coordinates. To measure areas and distances, use a **projected CRS in meters** (for example, UTM SIRGAS 2000). The plugin **does not reproject silently**: maps analysed together must share the same CRS.
Grid (raster)	Cell size, extent and alignment of a raster. Modules that compare rasters cell by cell require **the same grid** for all maps.
RS2	The Vista SAGA raster format (a .rs2 file). It does not store the CRS: the plugin records it in a side file (**.rs2.json**) or asks you to confirm it. The Format Converter moves data between RS2, GeoTIFF and vector.
Sliver	A very thin overlap or gap between neighbouring polygons, caused by coordinate imprecision. In vector Combination and Signature, slivers with a **mean width below 1 cm** are tolerated and recorded in the report.

4. Signature

What it is for

Signature answers the question **"what is this area made of?"**. You choose a **reference map** (for example, districts), select one or more of its classes or features (for example, two districts) and the plugin measures, **within that boundary**, how much each class of each map in the list occupies: land use, soils, education level, slope.

It is the Vista SAGA model: the reference is at the top of the list, its selection sets the boundary and **every map is signed, including the reference**. The result comes for the **union** of the selection and, if you want, **per feature** (one block for each selected district).

For each class, the report gives the area in the whole map, the area within the boundary and two percentages: **% signed area** (what the place is made of) and **% category** (how much of the class is concentrated there).

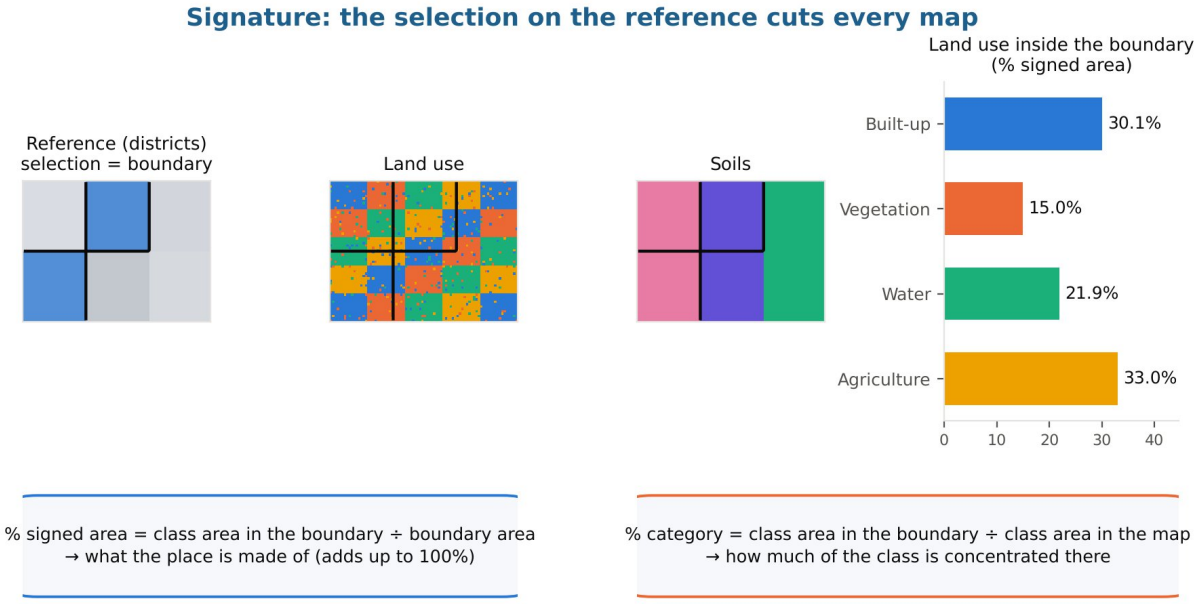


Figure 3 - Signature: the selection on the reference map cuts every map in the list

How it differs from similar routines

Similar routine	What changes in Vista Saga Plugin
Zonal statistics and Zonal histogram (QGIS Processing)	They count raster pixels per polygon. Signature signs **several maps at once**, uses the **selection** on the reference map as the boundary, computes the **union** and each feature, and delivers the two Vista SAGA percentages ready to use.
Vector intersection followed by a pivot table	Several manual steps that do not handle overlaps. The Vector tab performs an exact intersection, **dissolves** polygons of the same class, separates the **overlap** between classes and shows what was left **without class**.
Original Vista SAGA Signature	Same columns and logic. Selection is by **whole class** (Vista SAGA's bucket marks a contiguous region); class names may come from QGIS; reports are written as TXT and CSV.

Ease of use

- The order of the list says it all: **the first map is the reference**.
- In raster, just check the classes; "Check all" equals "Sign the whole map".
- In vector, selection is done with QGIS itself, through the **Select on map** button.
- The **Results** tab shows the table and lets you switch between the union and each feature.

The window

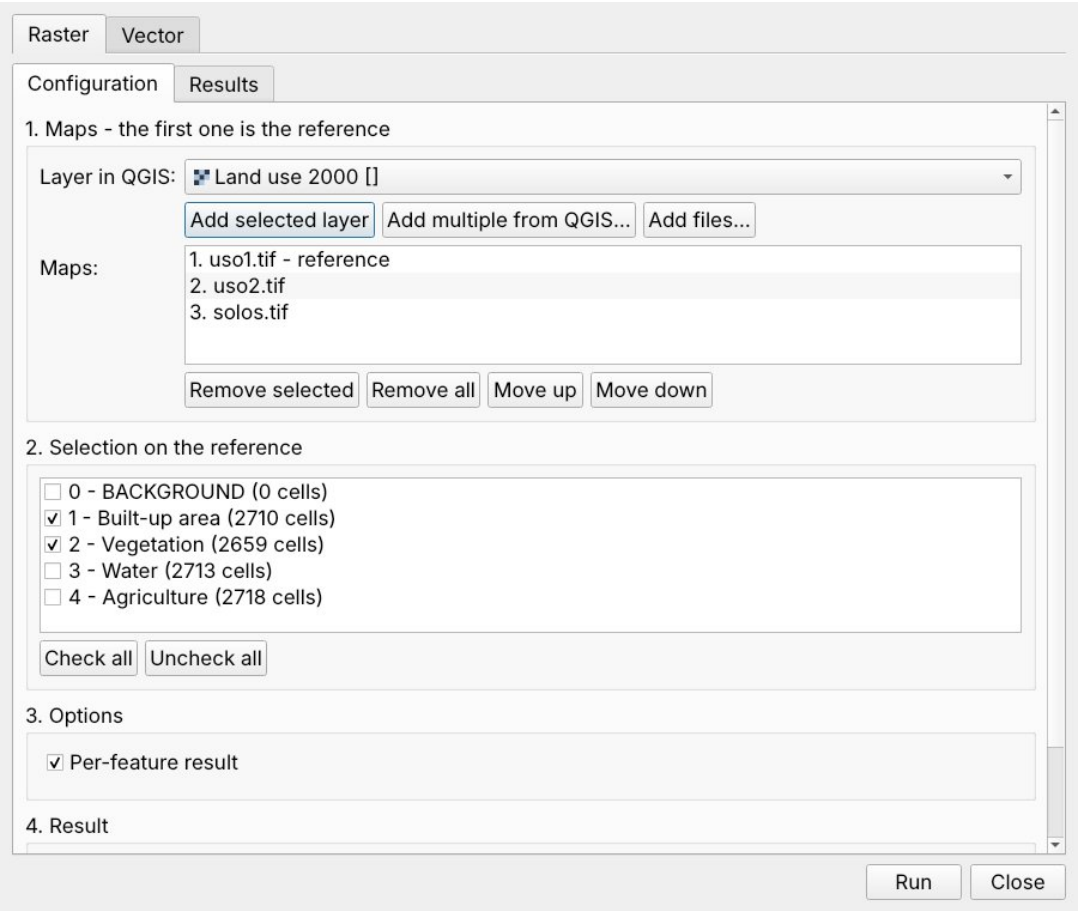


Figure 4 - Signature, Raster tab: maps, reference classes, options and result

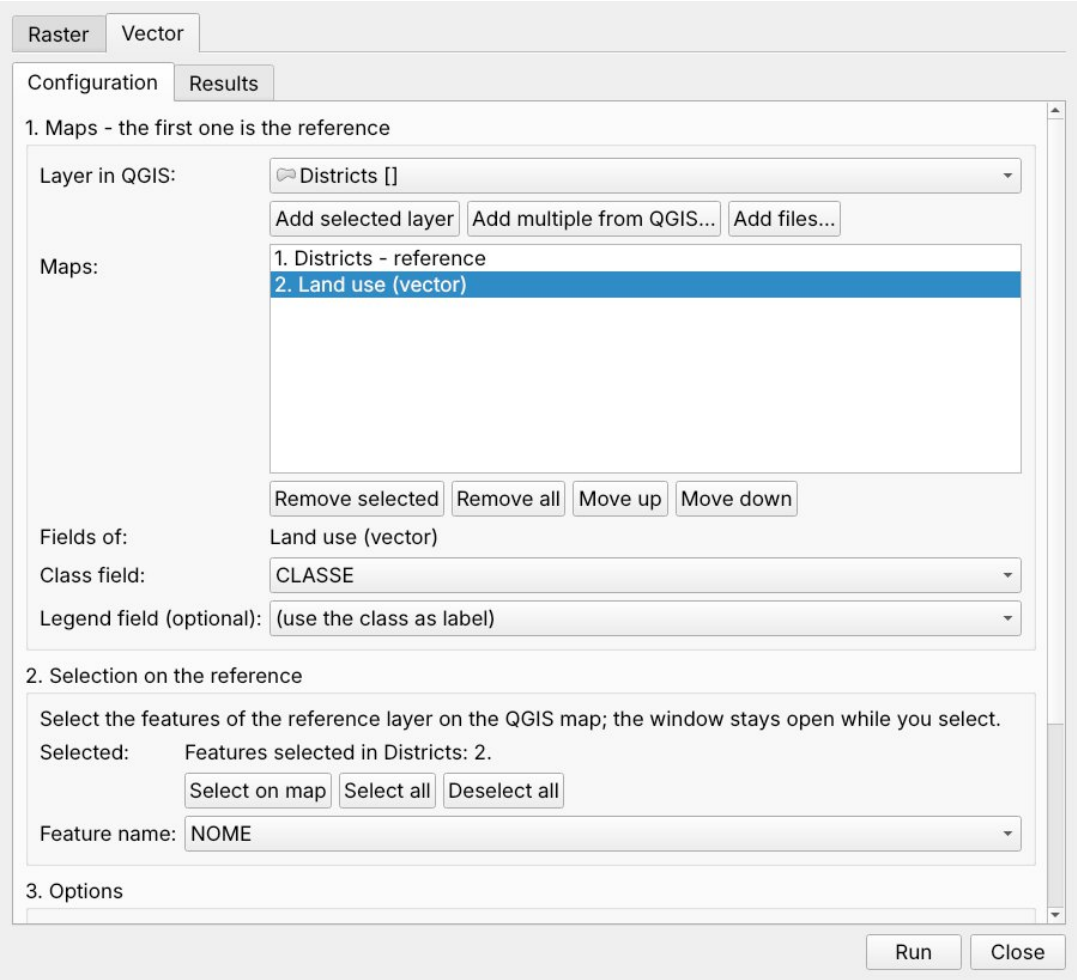


Figure 5 - Signature, Vector tab: class fields and selection made on the QGIS map

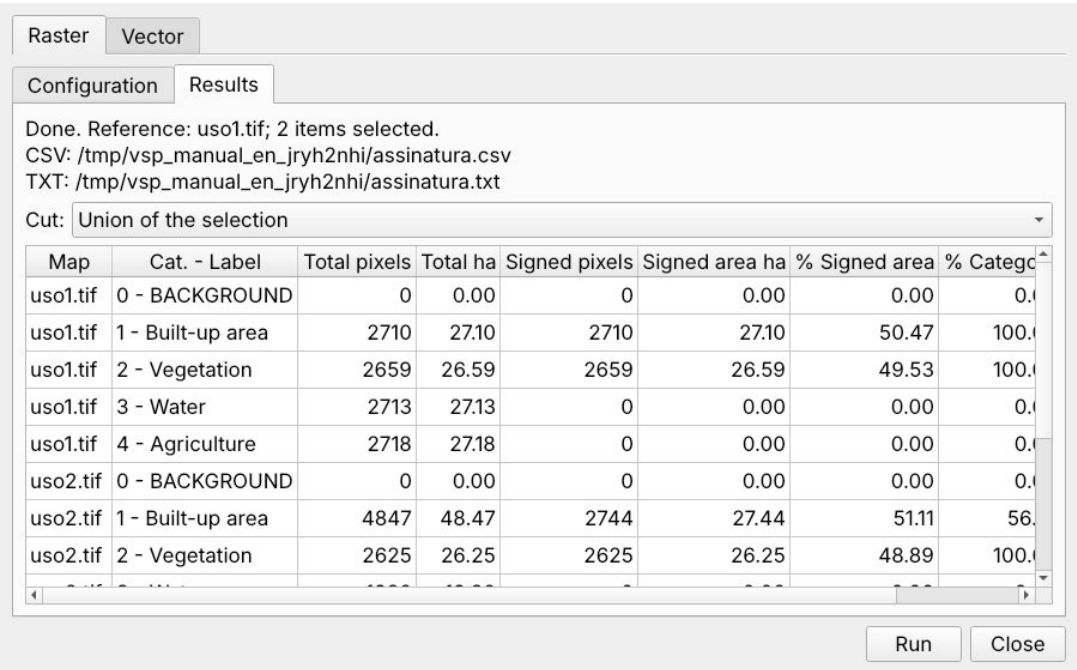


Figure 6 - Signature, Results tab: cut (union or feature) and table

Window fields and buttons

Section	Element	Type	What it does
1. Maps - the first one is the reference	Layer in QGIS	QGIS layer	Layer loaded in QGIS to add to the list.
	Add selected layer	button	Adds the layer chosen above to the list.
	Add multiple from QGIS…	button	Chooses several layers loaded in QGIS at once.
	Add files…	button	Adds maps from files. The Raster tab accepts GeoTIFF and other GDAL formats, and RS2 as well.
	Maps	list	Signed maps, in report order. The first one is the reference.
	Remove selected	button	Removes the selected maps from the list (the QGIS project is not changed).
	Remove all	button	Empties the map list of this tab (the QGIS project is not changed).
	Move up	button	Moves the selected map up; the top map is the reference.
	Move down	button	Moves the selected map down the list.
	Add files…	button	Adds maps from files; they are loaded into QGIS, where the selection is made.
	Class field	drop-down list	Field with the class of each polygon of the map selected in the list.
	Legend field (optional)	drop-down list	Optional field with the class name; without it, the class is used as label.
2. Selection on the reference	(list)	list	Classes of the reference map, with their number of cells.
	Check all	button	Checks every class of the reference (the whole map).
	Uncheck all	button	Unchecks every class of the reference.
	Select on map	button	Makes the reference layer the active layer and turns on the QGIS selection tool: click the features on the map (Ctrl+click adds or removes a feature).
	Select all	button	Selects every feature of the reference layer (the whole map).
	Deselect all	button	Clears the selection of the reference layer.
	Feature name	drop-down list	Field that names each feature in the per-feature result.
3. Options	Per-feature result	check box	Besides the union of the selection, computes a result for each selected feature (in raster, for each checked class).
	Overlap between classes	drop-down list	When different classes of the same map occupy the same place. Overlapping polygons of the same class always count once.
4. Result	Title	text field	Optional title, written in the TXT report.
	Save to	text field	CSV report; the TXT is written next to it with the same name. If blank, both go to the QGIS temporary folder.
	Save as…	button	Chooses where to write the reports.

Section	Element	Type	What it does
Results	(list)	drop-down list	Union of the selection or one feature (class, in raster).
Footer and auxiliary windows	Run	button	Computes the signature of every map in the list within the selection made on the reference map and writes the TXT and CSV reports.
	Close (auxiliary window)	button	Closes the window. Reports already written are kept.

Correct way to use it

1. Choose the **Raster** or **Vector** tab (formats are not mixed: raster only with raster, vector only with vector).
2. In **1. Maps**, add the maps. **The first one in the list is the reference**; use **Move up/down** to change the order. All of them must share the **same projected CRS in meters**; in raster, also the **same grid**. An RS2 without .rs2.json asks for its CRS when added.
3. In vector, select each map in the list and check the **Class field** and the **Legend field**.
4. In **2. Selection on the reference**: in raster, check the classes; in vector, click **Select on map** and click the features on the QGIS map (Ctrl+click adds or removes). The counter shows how many are selected.
5. In **3. Options**, keep **Per-feature result** on if you want a block for each feature; in vector, choose how to treat overlaps between classes.
6. In **4. Result**, enter a title (optional) and choose where to save the CSV (the TXT goes next to it). Click **Run**.
7. Check the **Results** tab and open the TXT for the full reading.

Results and how to interpret them

File or output	Content and how to read it
TXT report	A header with maps, CRS, selection, method and warnings; then a block for the **union of the selection** and one block for each feature (or class, in raster). Each block has one table per map.
CSV report	One row per cut, map and class. Columns: RECORTE (UNIAO or FEICAO), ID_FEICAO, NOME_FEICAO, MAPA, CODIGO, CLASSE, TOTAL_PIXELS, TOTAL_HA, PIXELS_ASN, AREA_ASN_HA, PCT_AREA_ASN, PCT_CATEGORIA. ";" separator and UTF-8: opens directly in Excel or LibreOffice.
% signed area	Class area in the boundary ÷ boundary area. **Characterizes the place**; adds up to 100% in each map.
% category	Class area in the boundary ÷ class area in the whole map. **Measures concentration**; does not add up to 100% and must not be summed.
Special rows	BACKGROUND and NoData count as classes. In vector: **No class** (part of the boundary without a polygon in the map) and **Excluded overlap** (region where different classes overlap).

Tips only the manual tells you

- The table of the reference itself always shows 100% for the selected classes: it is there to **check the exact size of the boundary**, which is the base of all other maps.
- Raster class names come from the **layer style in QGIS** (Paletted/Unique values symbology) when the map was added from the project: rename the classes in the symbology and run again.
- With many selected features, **turn off "Per-feature result"**: the TXT gets huge and the union is still there.
- **Do not add up the per-feature blocks** to get the union: if two features overlap, the union counts the common area only once. Use the union block.
- In the CSV, filter the **RECORTE** column and build pivot tables by MAPA and CLASSE.
- The **Sliver tolerance** section of the TXT (vector) lists gaps and overlaps thinner than 1 cm: it is for auditing, not for interpretation.
- Raster and vector give slightly different numbers (cells × exact polygon). To compare places or dates, always use the same format and the same grid.

Common mistakes and how to avoid them

- **"Map X is in a different CRS":** reproject it beforehand in QGIS (the plugin does not reproject).
- **"Map X is not on the same grid":** align the rasters first (same cell size, extent and origin).
- **"No feature selected":** use **Select on map** and click the features, or **Select all**. The QGIS selection tool acts on the active layer; the button makes the reference active for you.
- Classes shown as "Class 7": the file has no stored names; name them in the QGIS symbology.

5. Monitoring

What it is for

Monitoring answers the question **"what changed between two periods?"**. It compares an initial and a final map of the same area and finds, for each cell (raster) or piece of polygon (vector), whether the class **stayed the same** or **changed** and into which class.

The result is a **transition map**, a **transition table** and a **transition matrix** (initial class in rows, final class in columns), with areas and percentages.

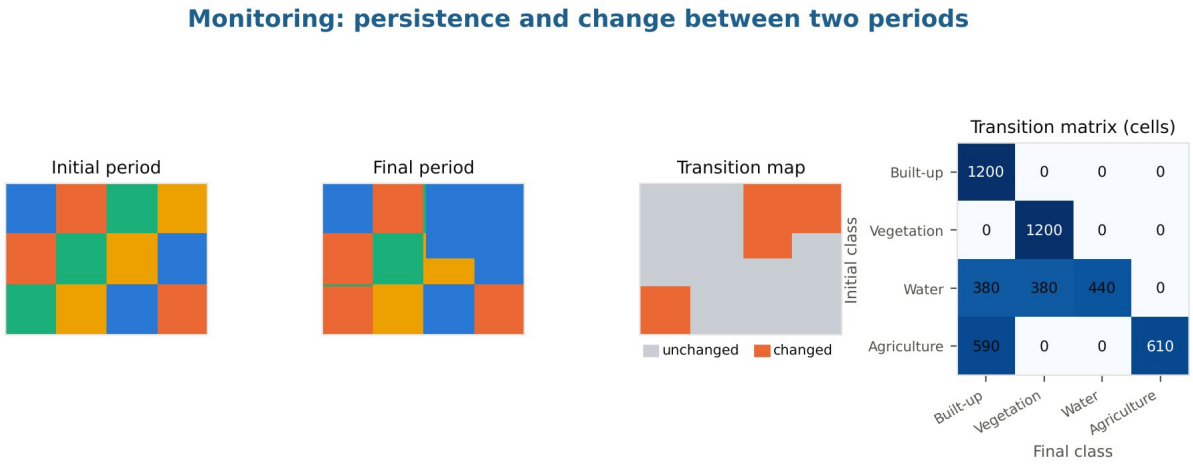


Figure 7 - Monitoring: two periods, the transition map and the transition matrix

How it differs from similar routines

Similar routine	What changes in Vista Saga Plugin
Raster calculator and hand-made cross tabulation	They require coding the transitions and counting separately. Monitoring produces the map, the table and the matrix in one run, with a descriptive legend ("Remained", "Ceased to be … → Became …").
Change tools of classification plugins	Usually raster only. Monitoring also has a **Vector** tab that compares polygons by exact overlay, in hectares.
Vista SAGA Monitoring	Same reasoning of transition map and matrix; here with a legend in words or codes, a copyable table and the result loaded in QGIS.

Ease of use

- Two maps, two periods, one button: the transition map is loaded with colours and legend.
- Persistence in grey and changes in distinct colours, for immediate reading.
- Results tables copyable to spreadsheets (Ctrl+A, Ctrl+C).

The window

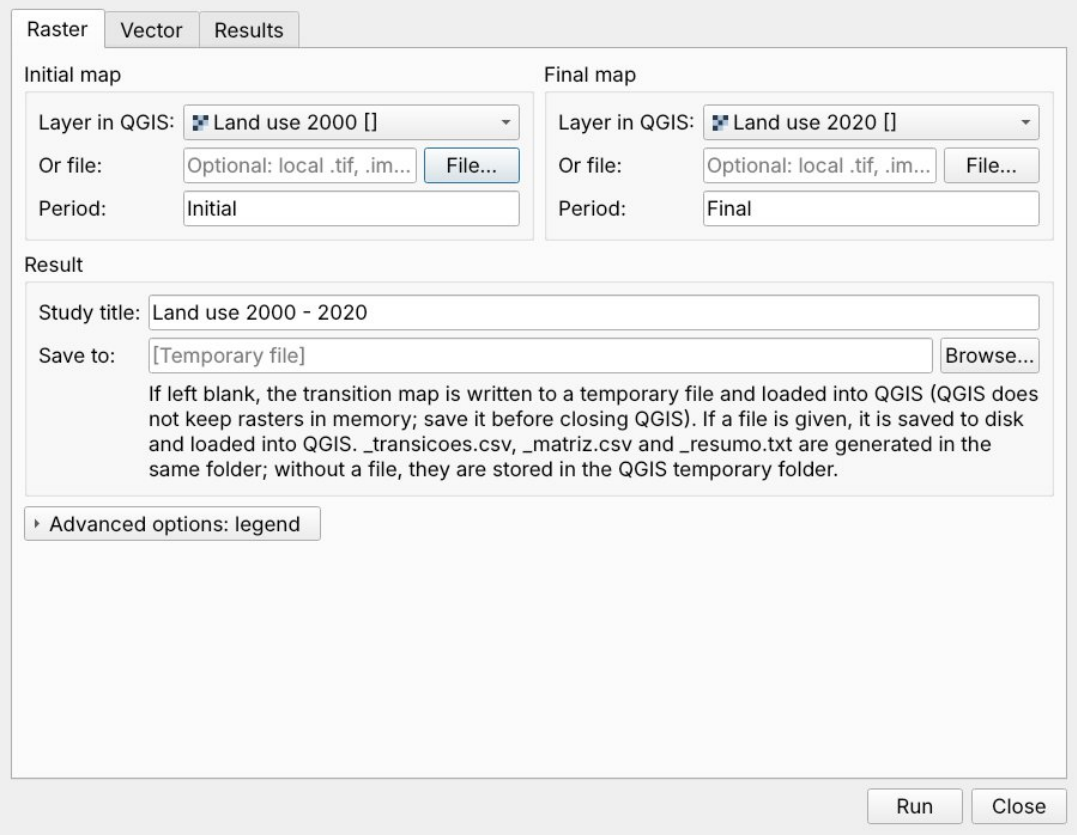


Figure 8 - Monitoring, Raster tab: initial map, final map and result

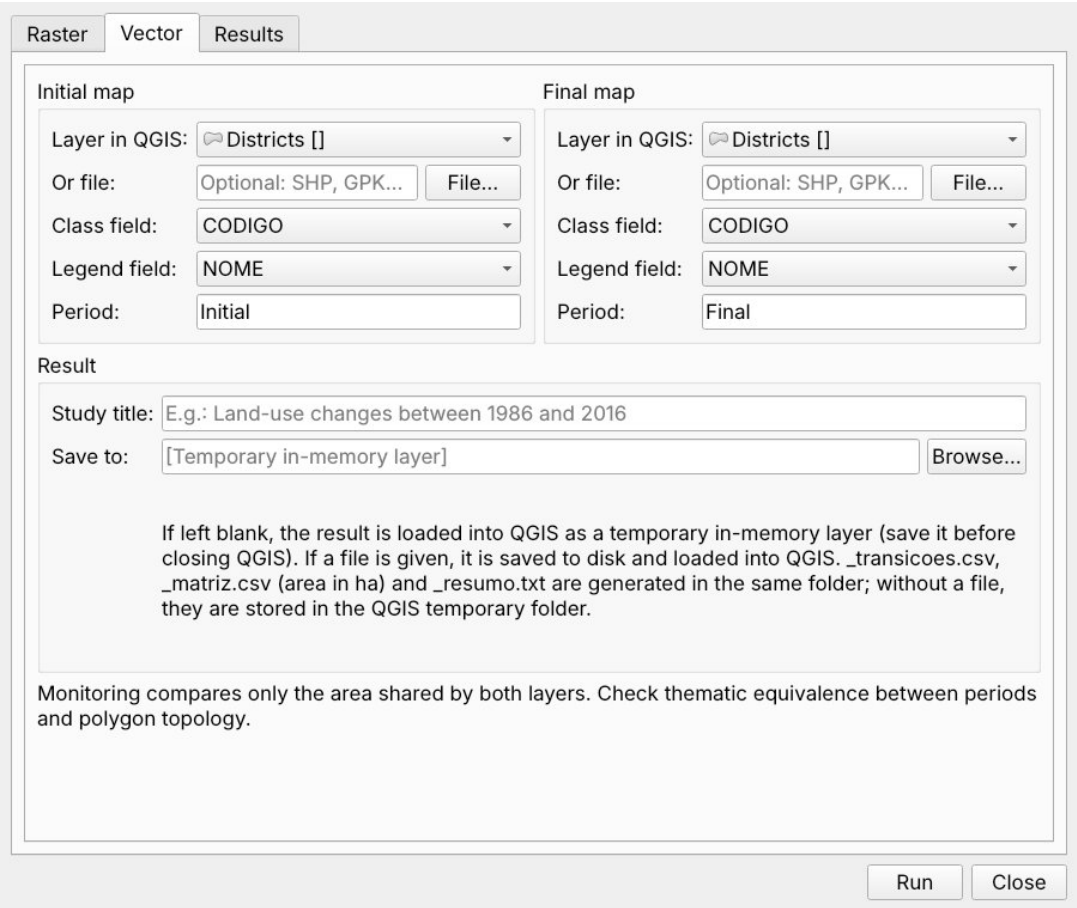


Figure 9 - Monitoring, Vector tab: layers, class fields and period

Window fields and buttons

Section	Element	Type	What it does
Initial map	Layer in QGIS	QGIS layer	Raster of this period loaded in QGIS.
	Or file	text field	When specified, the file path takes priority over the selected layer.
	File…	button	Chooses a raster file for this period.
	Period	text field	Name of the period (e.g., the year), used in the legend and in the reports.
	Layer in QGIS	QGIS layer	Polygon layer of this period loaded in QGIS.
	File…	button	Chooses a polygon layer file for this period.
	Class field	drop-down list	Field with the class of each polygon in this period.
	Legend field	drop-down list	Optional field with the class name, used in the legend.
Raster	Advanced options: legend	button	Shows or hides the legend options of the transition map.
Transition legend	Transition legend	drop-down list	How transitions appear in the legend: in words (remained, ceased to be, became) or by the class codes.
	Class names	text field	Optional CSV table (PERIODO;CODIGO;CLASSE) with the class names of each period.
	CSV…	button	Chooses the CSV table with the class names.
Vector	Close (auxiliary window)	button	Closes the Monitoring window.
Result	Study title	text field	Optional study title, written in the reports.
	Save to	text field	Transition map file (GeoTIFF). If blank, it is temporary and is loaded into QGIS.
	Browse…	button	Chooses where to save the transition map.
	Save to	text field	Transition map GeoPackage. If blank, it stays as a temporary in-memory layer, loaded into QGIS.
Footer and auxiliary windows	Run	button	Runs the monitoring and writes the transition map and the reports.

Correct way to use it

1. Choose the **Raster** tab (categorical maps on the same grid) or **Vector** (polygon layers).
2. Set the **initial map** and the **final map** (QGIS layer or file) and the name of each **period** (for example, the year).
3. In vector, choose the **class field** of each period and, if available, the **legend field**.
4. Enter a **title** and, if you wish, where to save. In raster, open **Advanced options: legend** to choose a legend in words or codes and, optionally, a CSV table with the class names.
5. Click **Run** and check the transition map and the **Results** tab.

Results and how to interpret them

File or output	Content and how to read it
Transition map	GeoTIFF (raster) or GeoPackage (vector) with one code per transition, loaded with a legend: persistence in grey, changes in colours.
_transicoes.csv	One row per transition: initial class, final class, situation (persistence or change), area (cells or ha) and percentage.
_matriz.csv	Transition matrix: rows = initial class, columns = final class. The diagonal is persistence; off the diagonal, change.
_resumo.txt	Summary: total area, evaluated area, main persistence and changes.

Tips only the manual tells you

- In the Vector tab, **only the area common to both layers** is compared: check that both periods cover the same area and use equivalent classes.
- The class-name table (raster) uses the **PERIODO;CODIGO;CLASSE** format: useful when rasters have no stored names or classes were renamed between periods.
- The matrix is quicker to read by **rows**: each row shows where each class of the initial period went.
- When the file field is filled in, it takes **priority** over the layer chosen in the list.

Common mistakes and how to avoid them

- Rasters on different grids: align them first.
- Classes with different codes between periods (for example, 3 = Water in one and 3 = Forest in the other) produce false changes: standardize the legend first.
- Mann–Kendall (trend in long series) was removed from Monitoring and will return as a module of its own in version 2.0.

6. Evaluation

What it is for

Evaluation answers the question **"where is it most suitable (or most critical)?"**. It is Vista SAGA's multicriteria evaluation: each map is a **criterion** with a **weight** (in %), and each class gets a **score** (0 to 10 or 0 to 100). The result is the **weighted mean** of the scores at each place.

There are three tabs with the same layout: **Raster** (categorical maps on the same grid), **Vector (Attributes)** (several fields of one polygon layer) and **Vector (Overlay)** (several polygon layers overlaid; only the area common to all of them is evaluated).

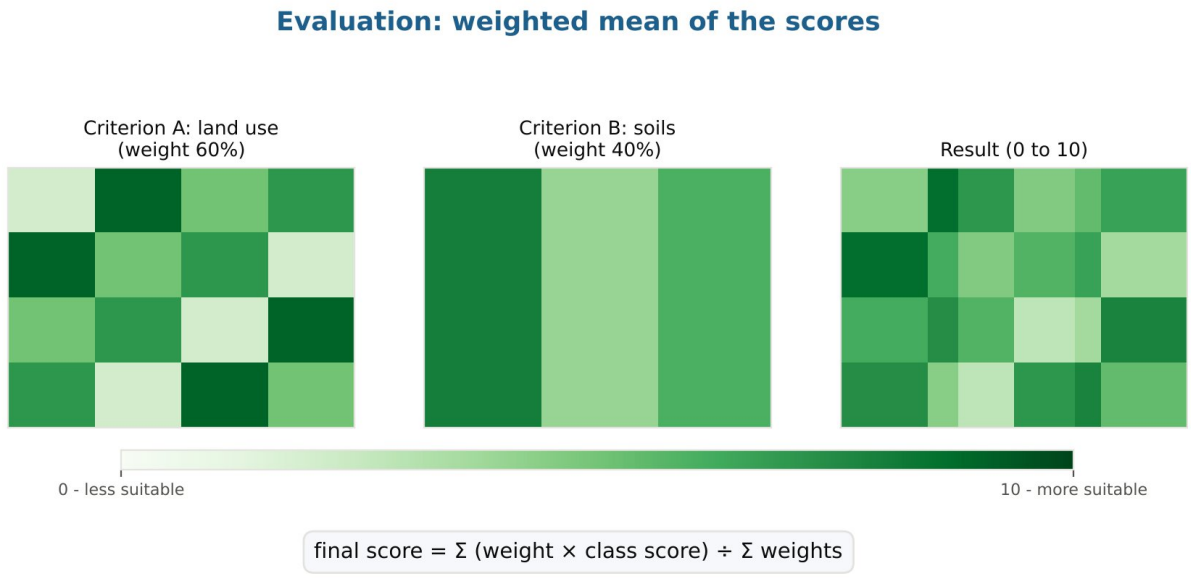


Figure 10 - Evaluation: scores by class, weights by criterion and the weighted mean

How it differs from similar routines

Similar routine	What changes in Vista Saga Plugin
Raster calculator with reclassification	You must reclassify each map and type the formula. Evaluation builds the weighted mean from tables of scores and weights, and **blocks the run** while any class has no score.
Weighted overlay in other programs	Usually raster only. Here, vector tabs **preserve the geometry** of the features (Attributes) or overlay layers (Overlay).
Vista SAGA Evaluation	Same method of weights and scores, with "round half to even" as in the original; the weights and scores used are saved in a reusable project file.

Ease of use

- Classes without a score are **highlighted** and counted; **Validate** lists every pending item.
- The **Tab** key jumps from weight to weight and from score to score.
- Click the header of the class table to sort.

- Each run saves the weights and scores so you can reopen them later.

The window

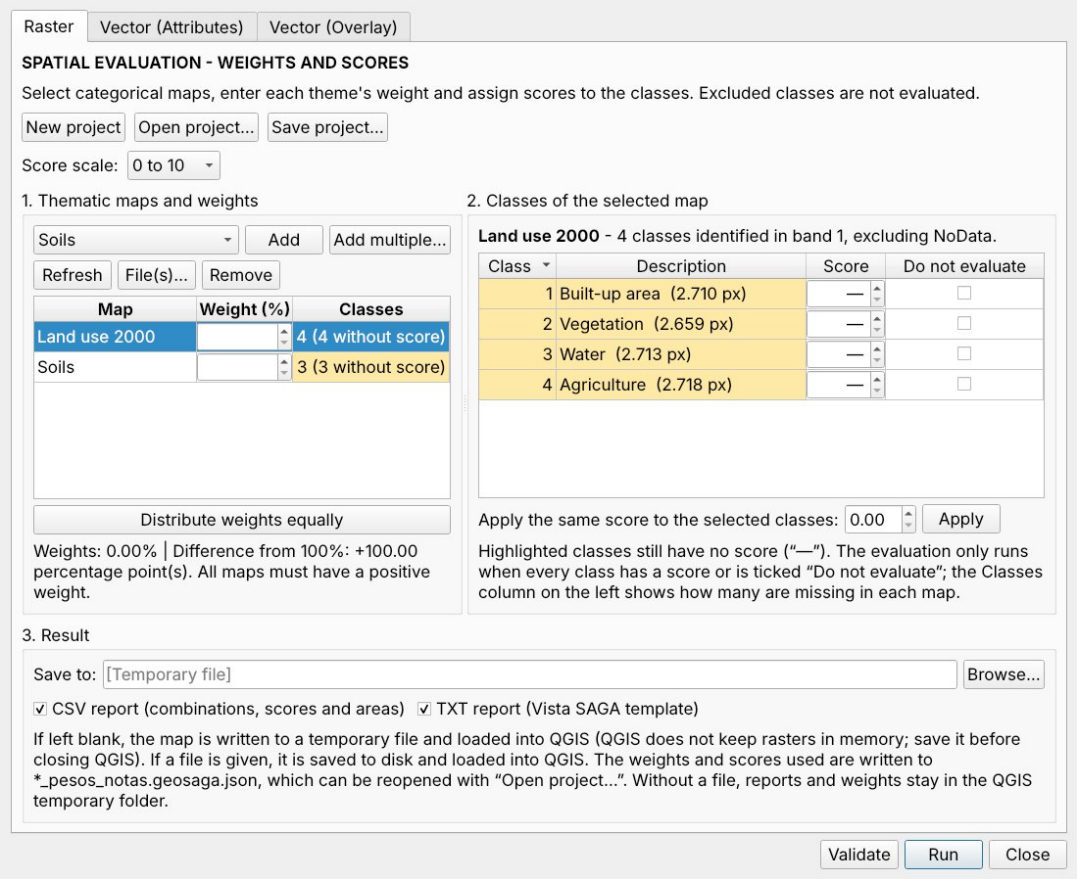


Figure 11 - Evaluation, Raster tab: maps and weights, classes and scores, result

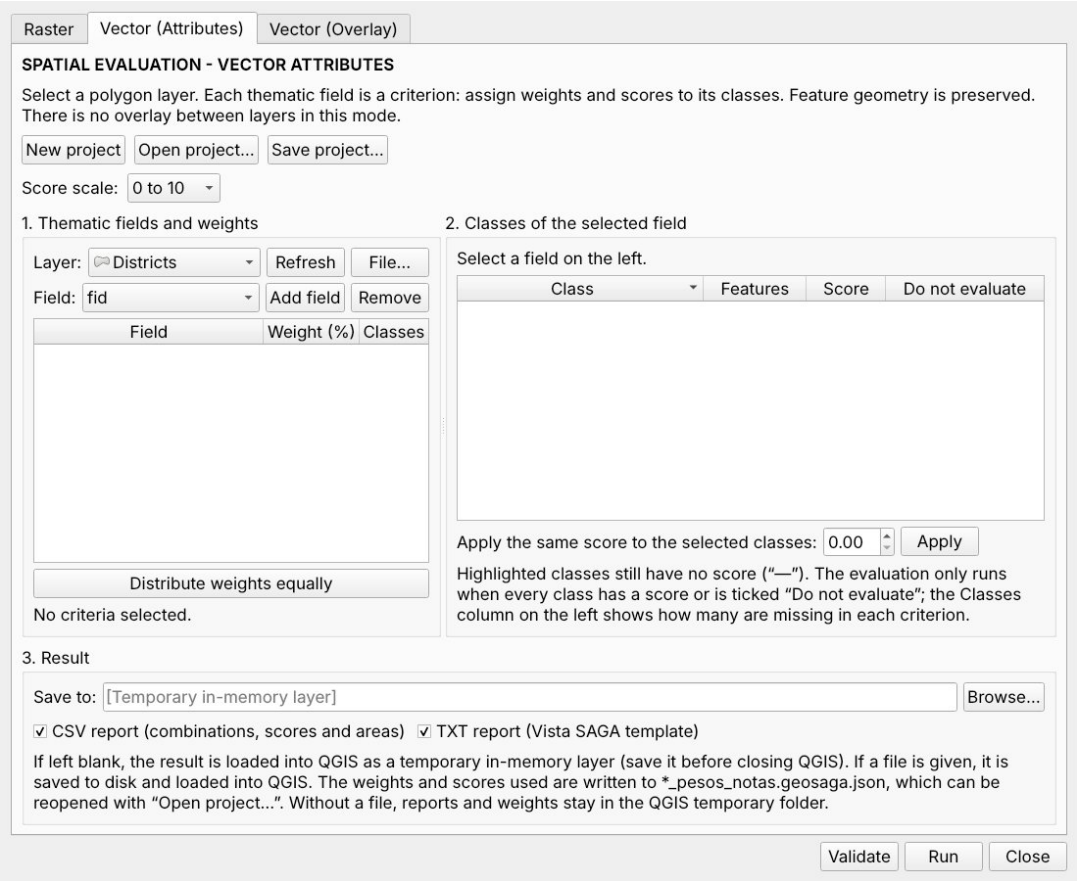


Figure 12 - Evaluation, Vector (Attributes) tab: fields of one layer as criteria

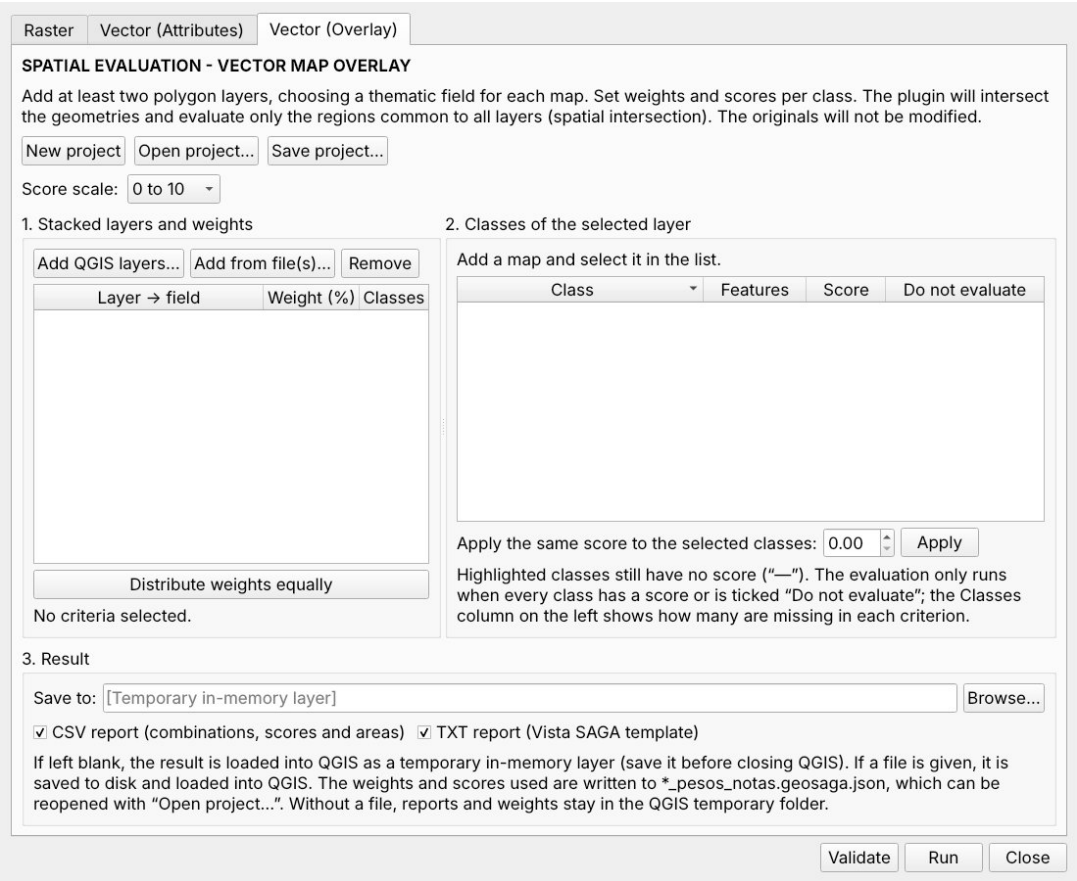


Figure 13 - Evaluation, Vector (Overlay) tab: stacked layers

Window fields and buttons

Section	Element	Type	What it does
1. Thematic maps and weights	(list)	number field	Weight in the evaluation, in %. The weights add up to 100%.
	(list)	drop-down list	Rasters loaded in QGIS that can enter the evaluation.
	Add	button	Adds the raster chosen beside it to the evaluation.
	Add multiple…	button	Chooses several rasters loaded in QGIS at once.
	Refresh	button	Refreshes the list of raster layers loaded in QGIS.
	File(s)…	button	Loads a raster file into the QGIS project and adds it to the evaluation.
	Remove	button	Removes the maps selected in the table from the evaluation.
	Distribute weights equally	button	Splits 100% equally among the maps, replacing the typed weights. New maps start with a blank weight.
Raster	New project	button	Clears the maps, weights and scores to start a new evaluation.
	Open project…	button	Reopens a saved evaluation project (*.geosaga.json), with maps, weights and scores.
	Save project…	button	Saves maps, weights and scores in a project (*.geosaga.json) to reuse them.
	(list)	drop-down list	Scale of the class scores: 0 to 10 or 0 to 100.
2. Classes of the selected map	(list)	number field	Class score. Without a score, the run is blocked.
		check box	Excludes the pixels of this class from the evaluation (they become NoData).
	(list)	number field	Score to repeat on the classes selected in the table, with the Apply button.
	Apply	button	Gives the score beside it to every class selected in the table.
Vector (Attributes)	New project	button	Clears the criteria, weights and scores to start a new evaluation.
	Open project…	button	Reopens weights, scores and non-evaluated classes from a previous evaluation.
	Save project…	button	Saves weights, scores and non-evaluated classes for reuse.
	Close (auxiliary window)	button	Closes the Evaluation window.
1. Thematic fields and weights	(list)	QGIS layer	Polygon layer whose fields will be the evaluation criteria.
	Refresh	button	Refreshes the field list of the selected layer.
	File…	button	Opens a polygon layer from a file, adds it to the QGIS project and selects it.
	(list)	drop-down list	Layer field to add as a criterion.
	Add field	button	Adds the chosen field as an evaluation criterion.

Section	Element	Type	What it does
	Remove	button	Removes the criteria selected in the table from the evaluation.
	Distribute weights equally	button	Splits 100% equally among the criteria, replacing the typed weights. New criteria start with a blank weight.
1. Stacked layers and weights	Add QGIS layers…	button	Choose one or more polygon layers already loaded in QGIS.
	Add from file(s)…	button	Opens polygon layers from files, starting in the folder of the layers already loaded in QGIS, and adds them to the project.
3. Result	[Temporary file]	text field	Result file. If blank, the result is temporary and is loaded into QGIS.
	Browse…	button	Chooses where to save the result.
	CSV report (combinations, scores and areas)	check box	Writes the CSV report next to the result.
	TXT report (Vista SAGA template)	check box	Writes the TXT report next to the result.
	[Temporary in-memory layer]	text field	Result file. If blank, the result is temporary and is loaded into QGIS.
Footer and auxiliary windows	Validate	button	Checks weights, scores and pending classes without running the evaluation.
	Run	button	Runs the evaluation and writes the map and the reports.

Correct way to use it

1. Choose the tab according to your data: **Raster**, **Vector (Attributes)** or **Vector (Overlay)**.
2. Choose the **score scale** (0 to 10 or 0 to 100).
3. Add the criteria (maps, fields or layers) and type each **weight**. New weights start blank; **Distribute weights equally** divides 100% among all of them.
4. Select a criterion and give a **score** to each class. For several classes with the same score, select them and use **Apply**. Check **Do not evaluate** for classes that must be left out.
5. Click **Validate** to see what is missing. Fix it until nothing is pending.
6. In **3. Result**, choose where to save (or keep it temporary) and keep the CSV and TXT reports checked. Click **Run**.

Results and how to interpret them

File or output	Content and how to read it
Evaluation map	GeoTIFF (Raster) or GeoPackage (vector tabs) with the final score of each place.
_relatorio.csv	Class combinations found, scores, final score and areas.
_relatorio.txt	Report in the Vista SAGA template: criteria, weights, scores and result distribution.

File or output	Content and how to read it
*_pesos_notas.geosaga.json	The weights and scores used, to reopen with **Open project…** and repeat or adjust the evaluation.

Tips only the manual tells you

- The score **"—"** means "no score" and **prevents the run**: the plugin never assumes a score of 0 nor drops classes on its own.
- **Do not evaluate** turns the class into NoData in the result; use it for areas that should not be classified (for example, water bodies).
- New weights start **blank** on purpose: the equal split only happens through the button.
- The project file stores paths relative to its own folder: you can move the whole study folder.
- In the Overlay tab, **only the area common to all layers** is evaluated; check coverage first.
- Tables accept Ctrl+A and Ctrl+C to copy to spreadsheets, with the decimal separator of your language.

Common mistakes and how to avoid them

- Weights not adding up to 100%: the line below the table shows how much is missing.
- Rasters on different grids are not accepted in the Raster tab.
- Scores planned on 0 to 100 typed with the 0 to 10 scale: choose the scale before scoring.

7. Voronoi Analyses

What it is for

Voronoi analyses answer the question **"what is the influence area of each point?"**. From generating points (schools, health centres, offices), each place is assigned to the point that "attracts" it the most.

There are four modes, all following the Vista SAGA model and validated against it: **Simple** (shortest distance), **With mass** (largest M/d^2, where M is the mass of the point), **With friction** (lowest cost accumulated along the straight line between the point and the place, over a friction surface) and **Mass and friction** (lowest cost ÷ M).

The friction cost is the sum, over the cells of the line between the point and the place, of **distance to the point × friction rating × step**. The rating is the cost itself (rating 1 = base cost). It is not a least-cost path: the line does not detour around obstacles, it "pays" for them.

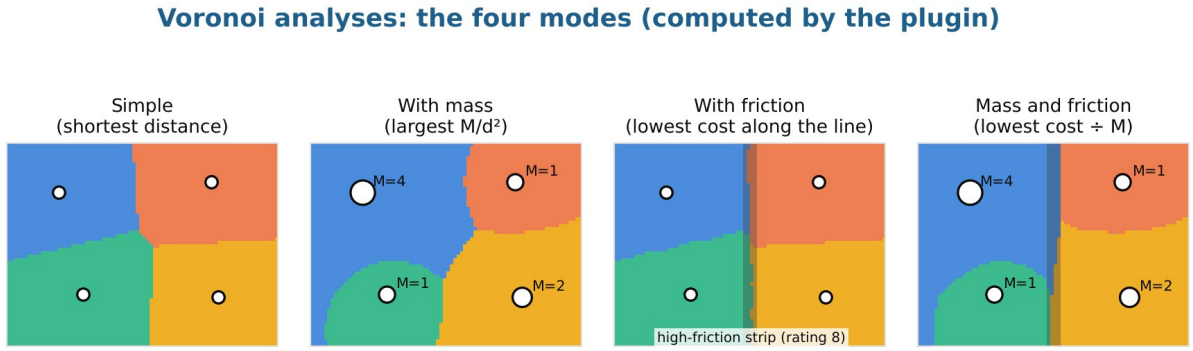


Figure 14 - Voronoi analyses: the four modes computed by the plugin itself

How it differs from similar routines

Similar routine	What changes in Vista Saga Plugin
Voronoi polygons (QGIS Processing)	Only the Simple mode, in vector. The plugin adds **mass**, **friction** (raster or polygons), combination of several surfaces and raster or vector output.
Cost distance (r.cost and similar)	They compute the **least-cost path**, which goes around obstacles. The Vista SAGA model uses the **straight line** between the point and the place; the results differ and the plugin reproduces Vista SAGA's.
Vista SAGA Voronoi	Same method (Simple and Mass 100% identical; friction 99.4% to 99.7% of cells). Adds the vector friction surface and exact vector output.

Ease of use

- Choose the mode and the plugin shows only the fields it needs.
- Raster and Vector tabs share the same input data.
- Mass as M/d^2: a mass of 9 reaches 3 times farther than a mass of 1, not 9 times.

The window

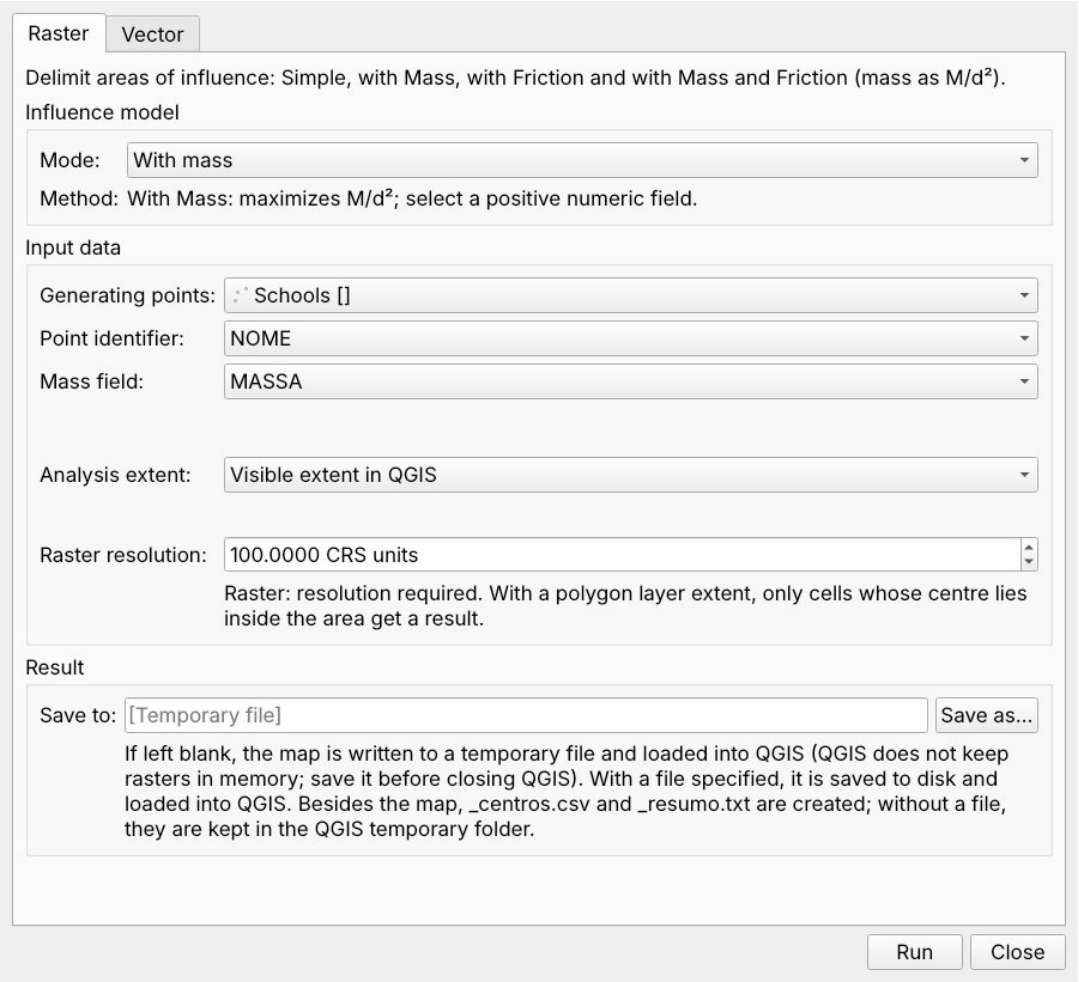


Figure 15 - Voronoi analyses, Raster tab: mode, input data and result

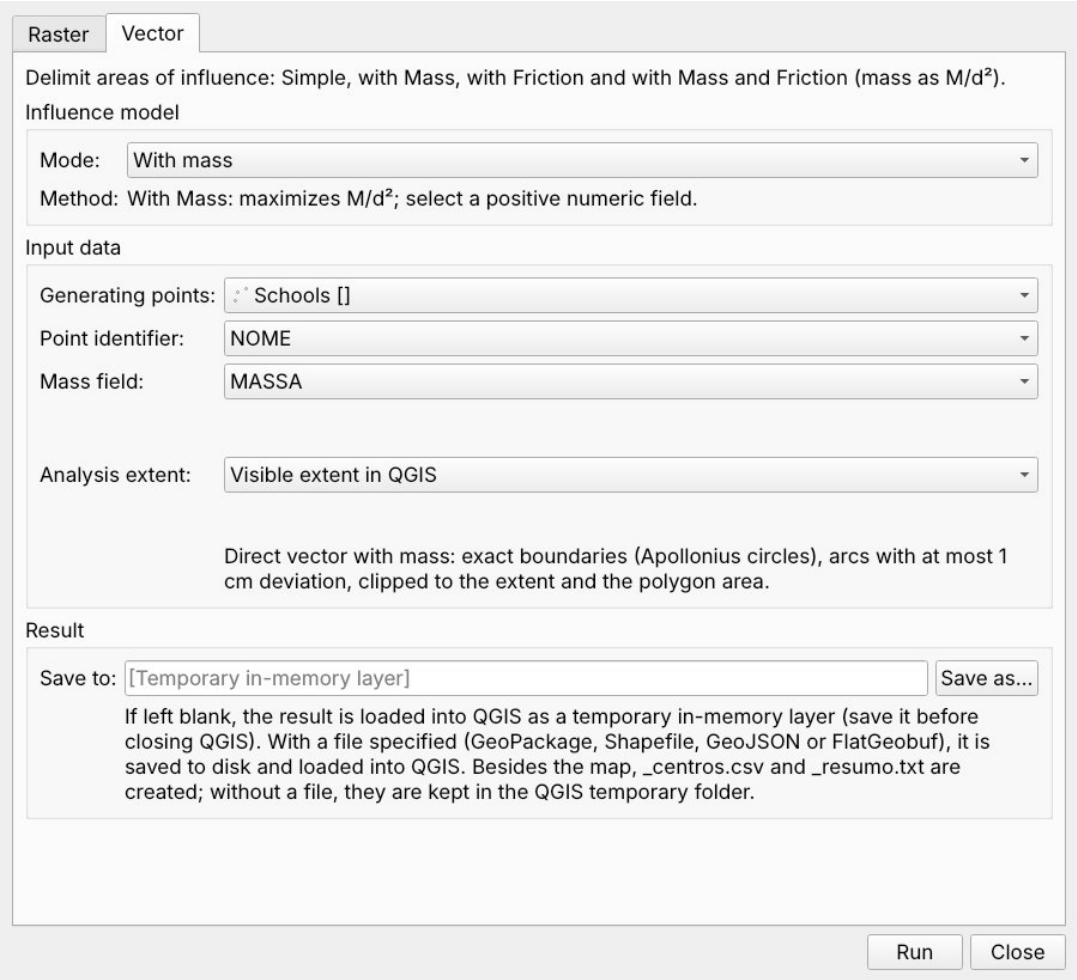


Figure 16 - Voronoi analyses, Vector tab

Window fields and buttons

Section	Element	Type	What it does
Influence model	Mode	drop-down list	Influence model: Simple (distance), With mass (M/d²), With Friction (cost over the friction surface) or With Mass and Friction.
Input data	Generating points	QGIS layer	Point layer that generates the influence regions.
	Point identifier	drop-down list	Field that names each point in the result.
	Mass field	drop-down list	Numeric field with the mass (weight) of each point, in the mass modes.
	Reference raster	QGIS layer	Optional: use the extent, resolution and CRS of a reference raster.
	Surface type	drop-down list	Friction surface as raster (rating in each cell) or as polygons (rating in a column).
	Friction surface	QGIS layer	Single-band GeoTIFF: each cell value is the friction rating (> 0); NoData gets no result and is crossed with rating 1.
	Friction polygons	QGIS layer	Polygon layer with the friction rating of each area.
	Friction column	drop-down list	Numeric column with the friction rating of each polygon (> 0). Areas without polygon and features with an empty column get no result and are crossed with rating 1.

Section	Element	Type	What it does
	Combine multiple friction surfaces (weights and scores)	check box	Combines several friction rasters into a single surface, with weights and, if needed, ratings by class.
	Analysis extent	drop-down list	Area in which the regions are computed.
	Polygon area	QGIS layer	Polygon layer that defines the analysis area.
	Minimum X	number field	Limit of the manual extent, in the coordinates of the points CRS.
	Minimum Y	number field	Limit of the manual extent, in the coordinates of the points CRS.
	Maximum X	number field	Limit of the manual extent, in the coordinates of the points CRS.
	Maximum Y	number field	Limit of the manual extent, in the coordinates of the points CRS.
	Raster resolution	number field	Cell size of the raster grid, in CRS units.
Integrated surfaces	Select and configure surfaces…	button	Opens the window to choose the friction surfaces and their weights.
Result	Save to	text field	Result file. If blank, the result is temporary and is loaded into QGIS.
	Save as…	button	Chooses where to save the result and its format.
Footer and auxiliary windows	Close (auxiliary window)	button	Closes the surfaces window; the selection is kept.
	Add QGIS layers…	button	Adds friction rasters loaded in QGIS.
	Add GeoTIFF files…	button	Adds friction rasters from GeoTIFF files.
	Remove selected	button	Removes the selected surfaces from the list.
	Run	button	Computes the influence regions and writes the result and the reports.
	Close (auxiliary window)	button	Closes the Voronoi Analyses window.

Correct way to use it

1. Choose the **Raster** tab (cell grid) or **Vector** (polygons with exact boundaries).
2. Choose the **mode**.
3. Set the **generating points** layer, the **identifier** field and, in the mass modes, the **mass field** (positive).
4. With friction, choose the **surface type**: raster (rating in each cell) or polygons (rating in a column); for several surfaces, check **Combine multiple friction surfaces** and set weights and ratings.
5. Set the **analysis extent** (visible in QGIS, polygon layer, manual, points + margin or reference raster) and, in raster, the **resolution**.
6. Choose where to save (or keep it temporary) and click **Run**.

Results and how to interpret them

File or output	Content and how to read it
Region map	Raster or vector layer with the region of each point, loaded with colours and the point name.
_centros.csv	One row per point: identifier, mass, cells, area (m² and ha) and % of the evaluated area.
_resumo.txt	Mode, criterion used, cell size, clipping and the same table per point.

Tips only the manual tells you

- Ties between points: the **first one in the list** (the layer order) wins, as in Vista SAGA.
- **A friction rating of 0 is refused**; for "almost no friction" use a small value, such as 0.1.
- NoData in the friction raster, areas without polygons and empty column values **get no result** but are **crossed with rating 1** (base cost).
- The **reference raster** fixes the extent, resolution and CRS of the grid: use it to match the result to other rasters of the study.
- With a polygon-layer extent, only cells whose **centre lies inside the area** get a result.
- The Vector tab with friction traces boundaries with a 0.5 m tolerance, without rasterizing.

Common mistakes and how to avoid them

- Geographic CRS (degrees): use a projected CRS in meters, because distances and masses depend on meters.
- Zero or negative masses are refused.
- Old friction rasters containing 0 must be revised (rating 0 is not accepted).

8. Map Combination

What it is for

Combination answers the question **"which class associations exist and how much do they occupy?"**. It overlays two or more categorical maps and gives a **code to each observed association** (for example, "Agriculture on Argisol"), without weights or scores.

The result is the **combined map** and the **combination table**, with the area and percentage of each one. It is the basis for discovering patterns before an evaluation.

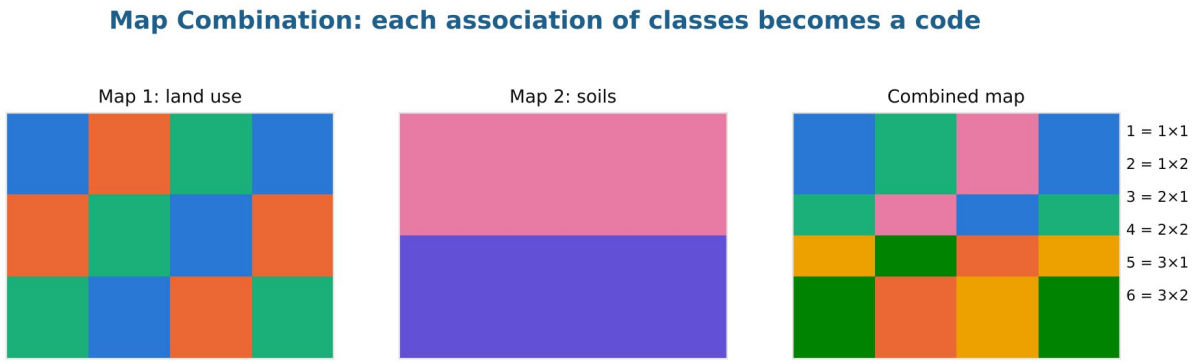


Figure 17 - Map Combination: each association of classes gets a code

How it differs from similar routines

Similar routine	What changes in Vista Saga Plugin
Vector Intersection and Union (QGIS)	They overlay geometries but do not code the associations nor handle slivers. Combination creates the **COD_nn/LEG_nn** fields, tolerates slivers thinner than 1 cm and merges crossing residues into the neighbour.
r.cross (GRASS)	Overlays rasters, but the combination legend is coded. Here the table brings the class names of each map and the areas.

Ease of use

- The list order is the combination order, adjusted with Move up/down.
- Result loaded in QGIS with colours and legend (up to 75 combinations).
- Works with raster or vector.

The window

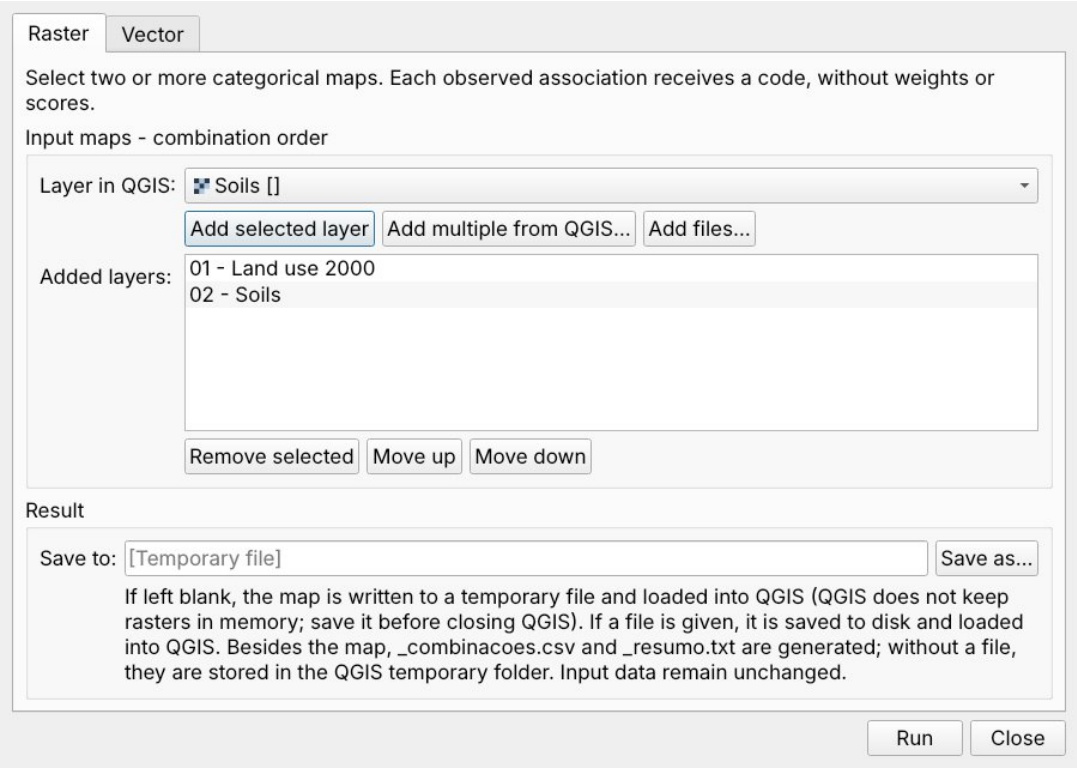


Figure 18 - Map Combination, Raster tab: maps in combination order

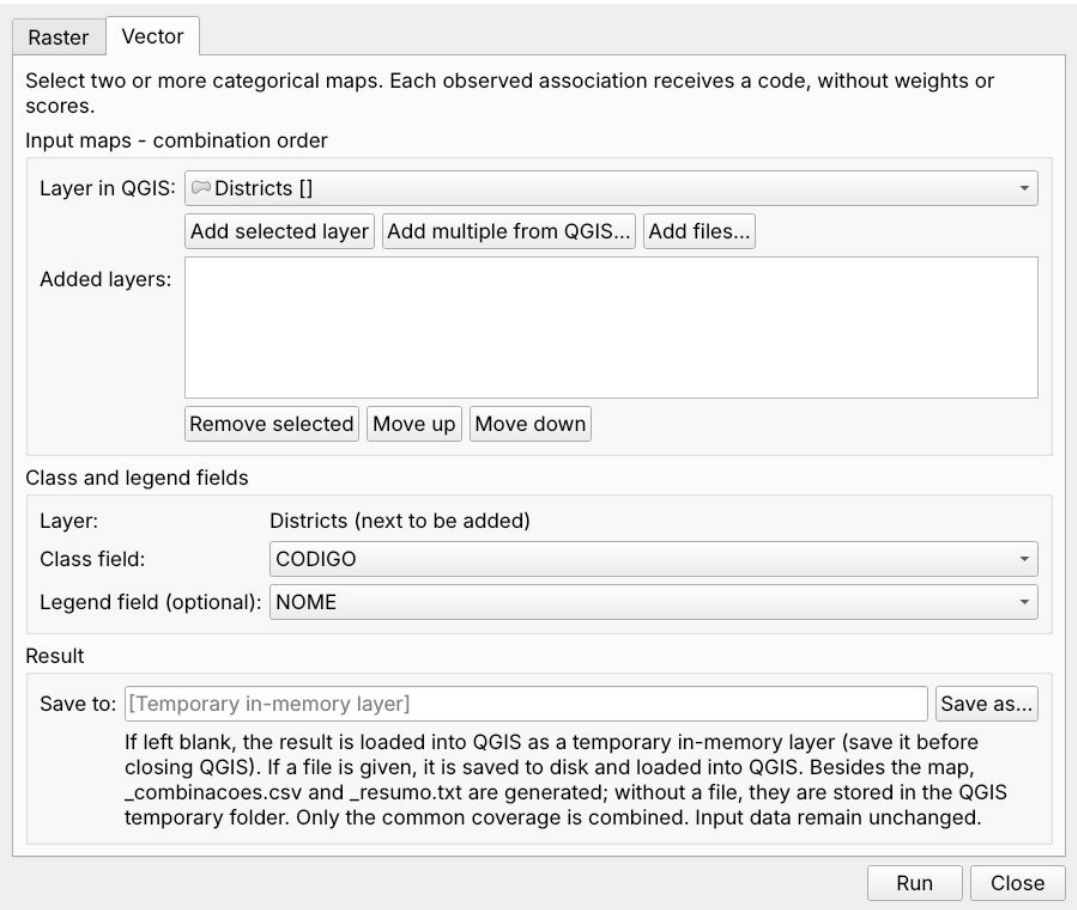


Figure 19 - Map Combination, Vector tab: class field and legend field

Window fields and buttons

Section	Element	Type	What it does
Input maps - combination order	Layer in QGIS	QGIS layer	Layer loaded in QGIS to add to the list.
	Add selected layer	button	Adds the layer chosen above to the list.
	Add multiple from QGIS…	button	Chooses several layers loaded in QGIS at once.
	Add files…	button	Adds raster maps from files.
	Added layers	list	Maps to combine, in combination order.
	Remove selected	button	Removes the selected maps from the list.
	Move up	button	Moves the selected map up in the combination order.
	Move down	button	Moves the selected map down in the combination order.
	Add files…	button	Adds vector maps from files.
	(list)	list	Maps to combine, in combination order.
Class and legend fields	Class field	drop-down list	Field with the class of each polygon of the layer.
	Legend field (optional)	drop-down list	Optional field with the class name, used in the legend.
Result	Save to	text field	Result file. If blank, the result is temporary and is loaded into QGIS.
	Save as…	button	Chooses where to save the result.
Footer and auxiliary windows	Run	button	Combines the maps and writes the combined map and the reports.
	Close (auxiliary window)	button	Closes the Map Combination window.

Correct way to use it

1. Choose the **Raster** or **Vector** tab.
2. Add **two or more maps** (selected layer, several from QGIS or files).
3. In vector, select each layer in the list and check the **class field** and the **legend field**.
4. Adjust the order with **Move up/down**: it sets the order of the columns in the table.
5. Choose where to save (or keep it temporary) and click **Run**.

Results and how to interpret them

File or output	Content and how to read it
Combined map	GeoTIFF or GeoPackage with one code per association (vector: fields COD_01/LEG_01, COD_02/LEG_02…).
_combinacoes.csv	One row per combination: code, classes of each map, area and percentage.
_resumo.txt	Summary, tolerated slivers and merged residues (vector).

Tips only the manual tells you

- In vector, overlaps within the same layer with a **mean width below 1 cm** are tolerated and recorded in the summary; above that, the run stops and lists the pairs.
- Thin crossing residues (below 1 cm) are merged into the neighbour with the **longest common boundary**, removing false combinations without changing the total area.
- Only the **area common to all maps** is combined (vector).

Common mistakes and how to avoid them

- Many classes in many maps produce thousands of combinations: start with few maps.
- Rasters on different grids are not combined: align them first.

9. Format Converter

What it is for

The Converter moves data between Vista SAGA's **RS2** format, **GeoTIFF** and **vector** (GeoPackage, Shapefile, GeoJSON, FlatGeobuf), in six operations: RS2 → GeoTIFF, GeoTIFF → RS2, RS2 → Vector, GeoTIFF → Vector, Vector → GeoTIFF and Vector → RS2.

It preserves class **codes, names and colours**, records the RS2 CRS in the **.rs2.json** file and can convert **many files in batch**.

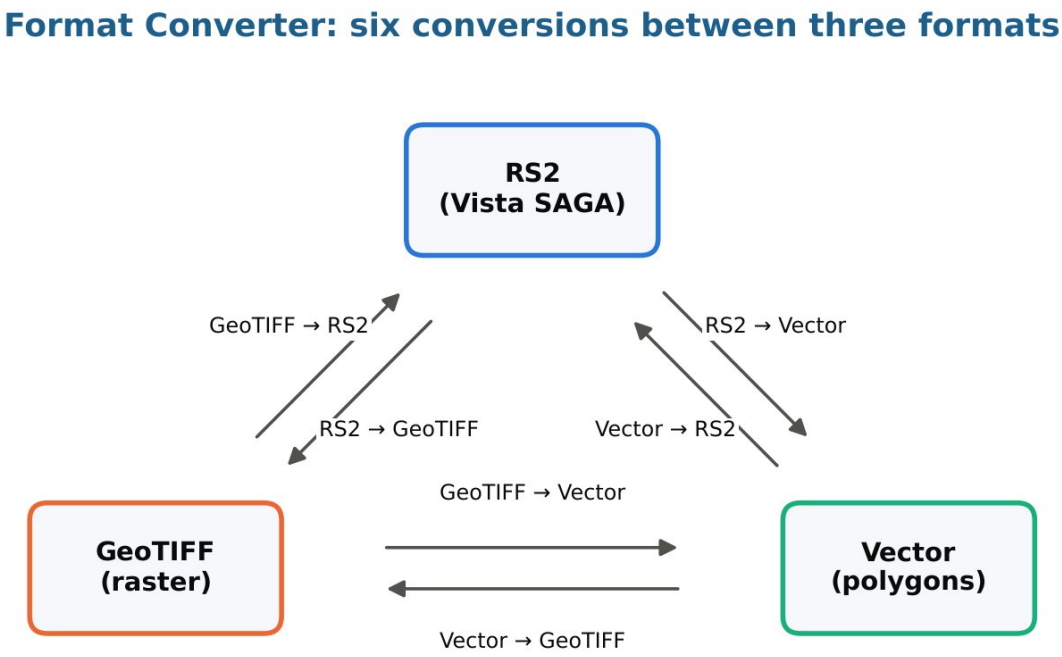


Figure 20 - Format Converter: six conversions between RS2, GeoTIFF and vector

How it differs from similar routines

Similar routine	What changes in Vista Saga Plugin
Rasterize, Polygonize and Translate (QGIS/GDAL)	They neither read nor write RS2 and do not carry the class legend. The Converter keeps codes, names and palette and writes a **.qml** style with the real classes.
Vista SAGA export	RS2 does not store a CRS; the Converter records it in .rs2.json, so the other modules can find it.

Ease of use

- Choose the operation and the window shows only what it needs.
- **RS2 properties…** shows header, legend and grid before converting.
- Batch: the same operation for many files at once.

The window

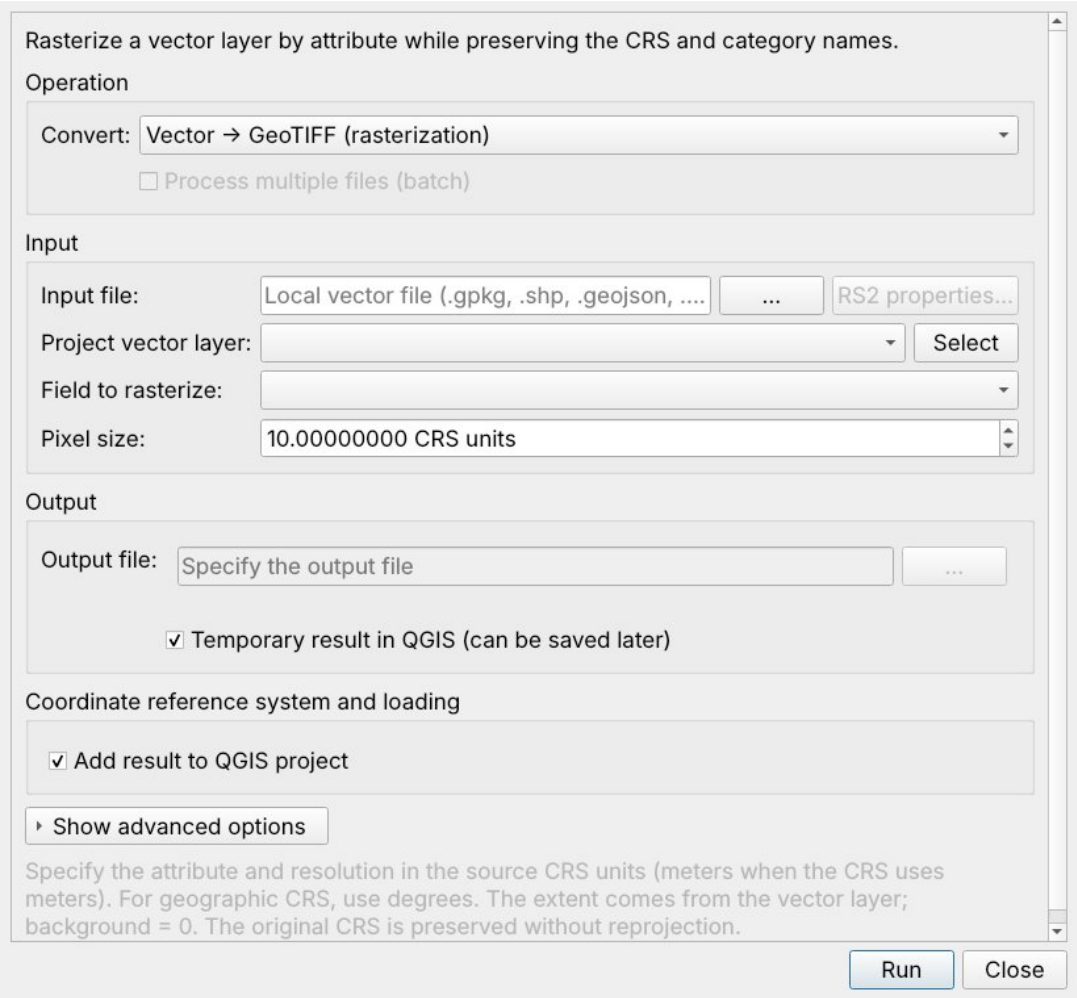


Figure 21 - Format Converter: Vector → GeoTIFF operation

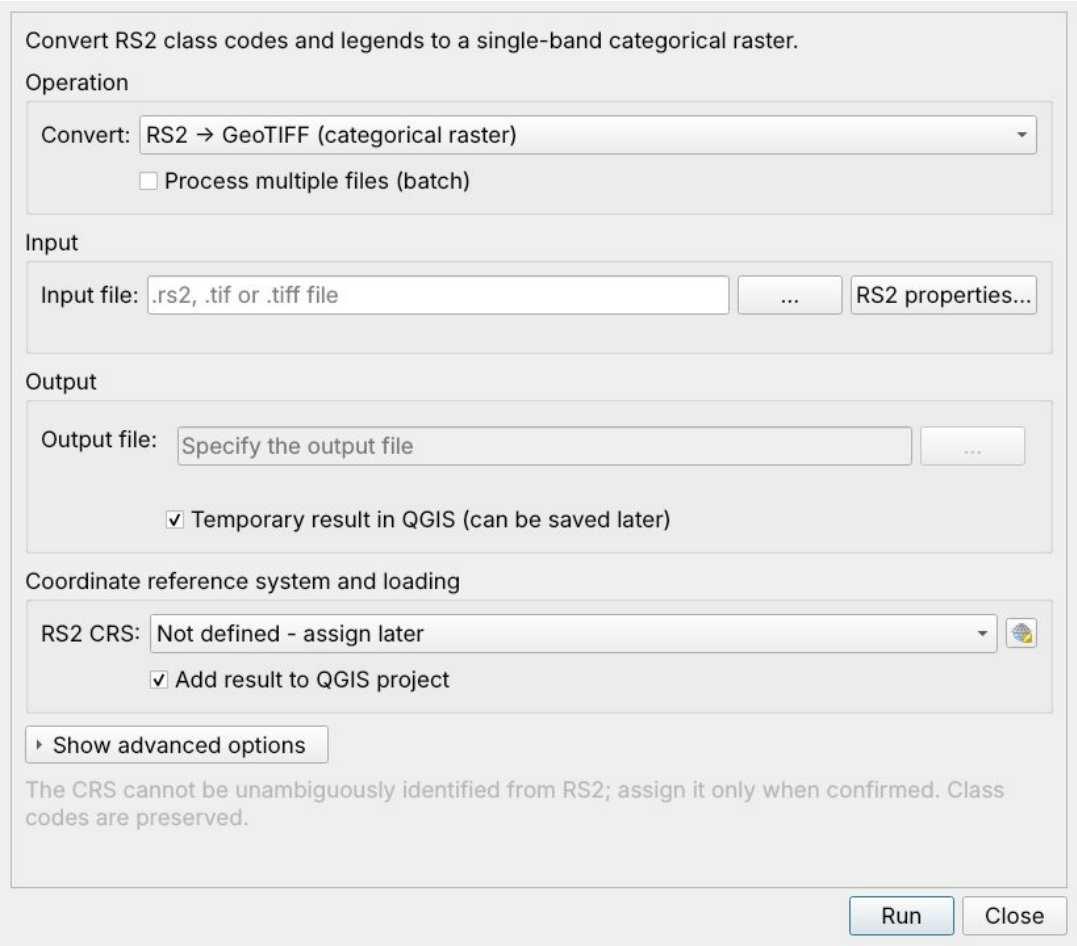


Figure 22 - Format Converter: RS2 → GeoTIFF operation, with the RS2 CRS

Window fields and buttons

Section	Element	Type	What it does
Operation	Convert	drop-down list	Type of conversion between RS2, GeoTIFF and vector.
	Process multiple files (batch)	check box	Converts several files at once, with the same operation.
Input	Input file	text field	File to convert.
	...	button	Select file from computer
	RS2 properties...	button	Shows the header, legend and grid of the RS2 file.
	Project vector layer	QGIS layer	Layer loaded in QGIS to use as input.
	Select	button	Uses the layer chosen beside it as input.
	(list)	drop-down list	Attribute whose values will be written to GeoTIFF cells.
	Pixel size	number field	Pixel size in vector CRS units; in meters if using a metric CRS.
Batch files	(list)	list	One file per line. Select to remove.
	Add files...	button	Adds files to the batch.
	Remove selected	button	Removes the selected files from the batch.
	(list)	QGIS layer	Layer loaded in QGIS to add to the batch.

Section	Element	Type	What it does
	Add layer	button	Adds the layer chosen beside it to the batch.
	Add multiple from QGIS…	button	Chooses several layers loaded in QGIS at once.
Coordinate reference system and loading	Add result to QGIS project	check box	Loads the result into the QGIS project when finished.
Advanced options	Optional: recover classes from legacy RGB TIFF	text field	Optional reference RS2: recovers the classes of an old RGB TIFF or, in Vector to RS2, sets the grid.
	…	button	Chooses the reference RS2.
	Manual extent	text field	Only when TIFF is not georeferenced.
	Treat class 0 as NoData	check box	In the generated GeoTIFF, class 0 (background) becomes NoData.
	Do not create polygons for class 0 (BACKGROUND)	check box	For continuous Float rasters, valid zeros are preserved; only NoData is excluded.
	Rasterize all cells touched by features (ALL_TOUCHED)	check box	Marks every cell touched by a feature, not only those whose centre lies inside it.
	RS2 codes	drop-down list	Integer fields: RS2 requires consecutive codes starting at 0 (BACKGROUND). The mapping between original and RS2 codes is stored in the .rs2.json file.
	Classes for continuous TIFF	number field	For Float32/Float64 GeoTIFF only: equal-width intervals. NoData cells are excluded. The original TIFF is not modified.
	Connectivity	drop-down list	How cells are joined into polygons: only by their sides (4 neighbours) or also by the diagonals (8 neighbours).
Output	Specify the output file	text field	Output file of the conversion.
	…	button	Select destination
	Output folder for converted files	text field	Folder where the converted files are written.
	…	button	Chooses the output folder of the batch.
	Vector format	drop-down list	Format of the output vector file.
	Temporary result in QGIS (can be saved later)	check box	Writes the result to a temporary file and loads it into QGIS; it can be saved later.
Footer and auxiliary windows	Hide advanced options	button	Shows or hides the advanced conversion options.
	Run	button	Runs the conversion.
	Close (auxiliary window)	button	Closes the Format Converter window.

Correct way to use it

1. Choose the operation in **Convert**. For several files, check **Process multiple files (batch)**.
2. Set the input file (or a project layer). For an RS2, use **RS2 properties…** to check the legend and grid.

3. When rasterizing (Vector → GeoTIFF/RS2), choose the **field** and the **pixel size**; to align an RS2 with another, set the **reference RS2** in the advanced options.
4. Confirm the **CRS** when the input or output is RS2.
5. Set the output (or keep **Temporary result** checked) and click **Run**.

Results and how to interpret them

File or output	Content and how to read it
Class GeoTIFF	Class codes, palette, names (in .aux.xml) and a **<name>.qml** style that QGIS loads by itself, with only the real classes in the legend.
RS2 + .rs2.json	The Vista SAGA file and the side file with CRS, legend and code mapping.
Vector	Polygons with the class code and name (BACKGROUND optional).

Tips only the manual tells you

- When copying a class GeoTIFF to another folder, **take the .aux.xml and the .qml along**: they hold the class names and the style.
- RS2 requires codes from 0 (BACKGROUND) upwards; the **RS2 codes** option chooses between preserving and renumbering, and the mapping is kept in .rs2.json.
- **ALL_TOUCHED** marks every cell touched by a feature; without it, only cells whose centre lies inside it.
- When vectorizing, **8 neighbours** joins cells connected diagonally; **4 neighbours**, only by their sides.
- An old Vista SAGA RGB TIFF can have its classes recovered with the **reference RS2**.

Common mistakes and how to avoid them

- Geographic CRS when rasterizing: the pixel size ends up in degrees; use a projected CRS.
- Output over an existing file: the Converter also replaces the auxiliary files with the same name.

10. Map Sequencer

What it is for

The Sequencer answers the question **"how do I show change over time?"**. It builds an animated **GIF** (and, if you want, the frames as **PNG**) from maps in order, with date, name and legend on each frame.

There are three tabs: **Raster** (one raster per frame), **Vector** (one layer per frame, or frames generated from a date field) and **Mixed** (a vector over a background raster).

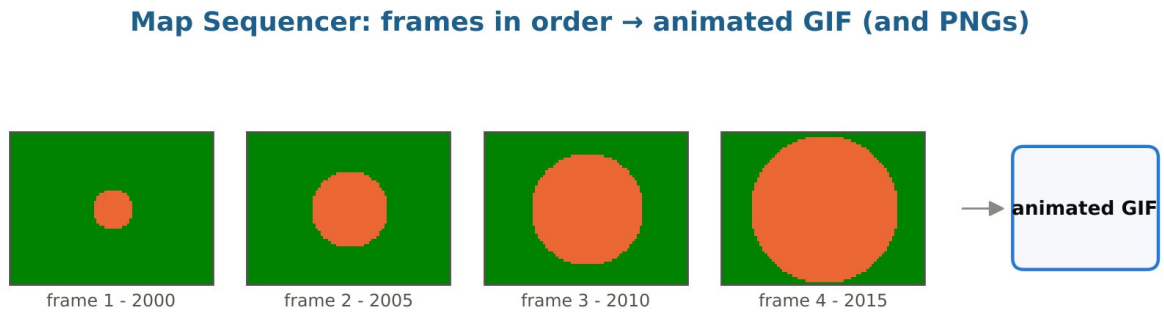


Figure 23 - Map Sequencer: ordered frames become an animated GIF

How it differs from similar routines

Similar routine	What changes in Vista Saga Plugin
QGIS Temporal Controller	Exports frames, but the GIF must be assembled elsewhere. The Sequencer builds the GIF directly, with labels and legend, and accepts mixed frames.
Manual image editing	Requires exporting each map and building the animation in another program. Here the frames use the QGIS symbology and the order can be adjusted by date.

Ease of use

- Frames use the symbology you already set in QGIS.
- The order can be set by hand or by date, and dates can be edited.
- The source layers are not changed.

The window

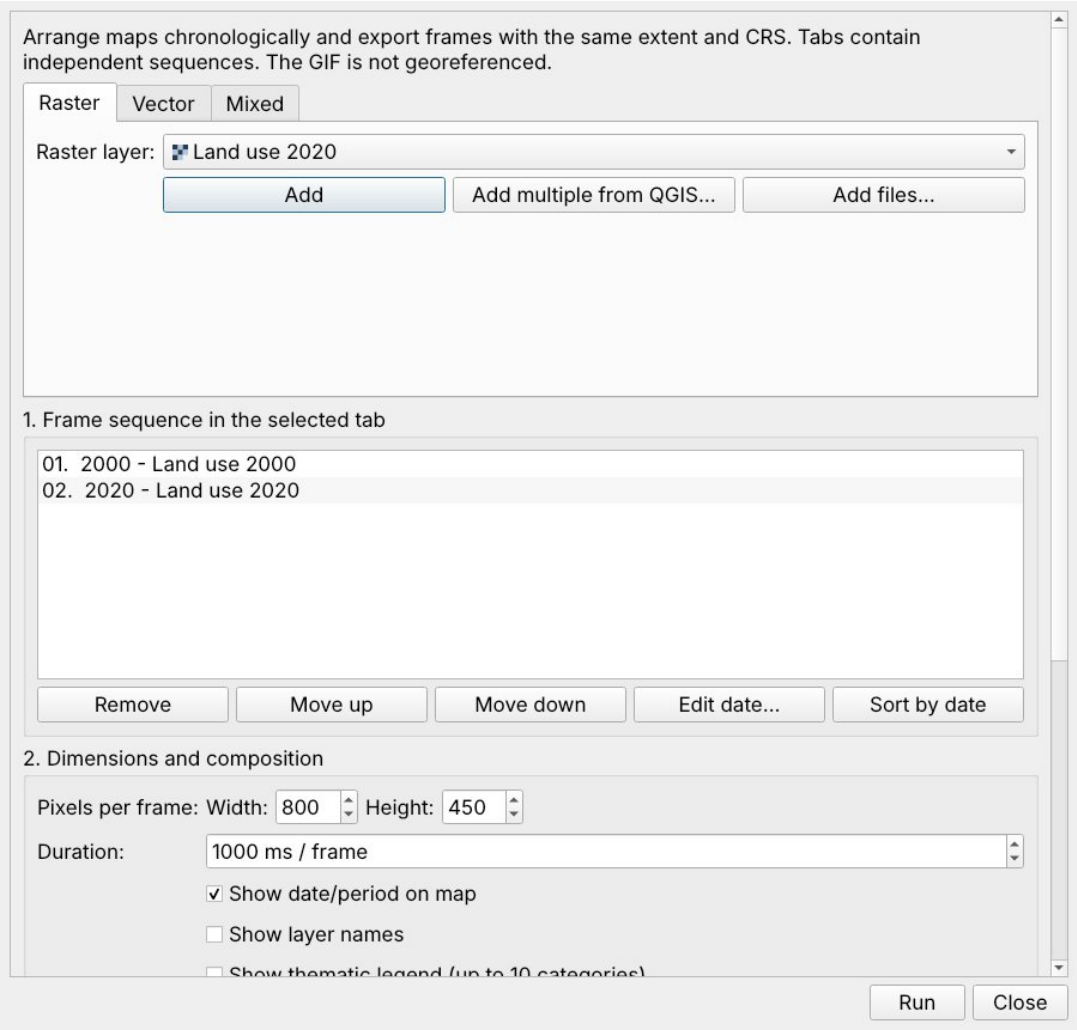


Figure 24 - Map Sequencer: frame sequence, dimensions and outputs

Window fields and buttons

Section	Element	Type	What it does
Raster	Raster layer	QGIS layer	Raster loaded in QGIS to add as a frame.
	Add	button	Adds a frame with the layer chosen above.
	Add multiple from QGIS…	button	Adds a frame for each layer chosen in QGIS.
	Add files…	button	Adds a frame for each chosen file.
Vector	Vector layer	QGIS layer	Vector layer loaded in QGIS to add as a frame.
	Temporal field	drop-down list	Date or period field used to generate frames from the layer.
	Show features from all earlier periods (cumulative)	check box	Each frame also shows the features of earlier periods.
	Generate frames from temporal-field values	button	The temporal option creates frames from a single vector layer without changing the original layer or its filters in the project.
Mixed	Background raster	QGIS layer	Background raster of the mixed frame.

Section	Element	Type	What it does
	Overlay vector	QGIS layer	Vector drawn over the background raster.
	Add mixed frame (raster + vector)	button	Mixed frames overlay the vector on the raster. You can build a manual sequence with different pairs or use a fixed raster and a vector filtered by date.
	Vector temporal field	drop-down list	Date or period field of the vector, used to generate frames.
	Keep vectors from earlier periods (cumulative)	check box	Each frame also keeps the vectors of earlier periods.
	Generate frames by temporal field + fixed background raster	button	Mixed frames overlay the vector on the raster. You can build a manual sequence with different pairs or use a fixed raster and a vector filtered by date.
1. Frame sequence in the selected tab	(list)	list	Animation frames, in display order.
	Remove	button	Removes the selected frames.
	Move up	button	Moves the selected frame up in the sequence.
	Move down	button	Moves the selected frame down in the sequence.
	Edit date…	button	Changes the date or period of the selected frame.
	Sort by date	button	Sorts the frames by date.
2. Dimensions and composition	Pixels per frame	number field	Width of each frame, in pixels.
	Pixels per frame	number field	Height of each frame, in pixels.
	Duration	number field	Display time of each frame in the GIF.
	Show date/period on map	check box	Writes the date or period on each frame.
	Show layer names	check box	Writes the layer names on each frame.
	Show thematic legend (up to 10 categories)	check box	Draws the class legend (up to 10) on each frame.
3. Outputs and preview	Animated GIF	text field	Output animated GIF file.
	Save as…	button	Chooses where to save the GIF.
	Also export individual PNG frames	check box	Also writes each frame as a PNG image.
	PNG folder	text field	PNG folder; if blank, a folder next to the GIF.
	Folder…	button	Chooses the PNG folder.
Footer and auxiliary windows	Run	button	Generates the animated GIF and, if checked, the PNGs.
	Close (auxiliary window)	button	Closes the Map Sequencer window.

Correct way to use it

1. Choose the **Raster**, **Vector** or **Mixed** tab and add the frames.

2. Check the order; use **Edit date…** and **Sort by date** when needed.
3. In **2. Dimensions and composition**, set the width, height and duration of each frame, and what to write on the map (date, layer names, legend).
4. In **3. Outputs and preview**, set the GIF and, if you wish, the PNGs. Click **Run**.

Results and how to interpret them

File or output	Content and how to read it
Animated GIF	The animation with frames in list order; a preview appears in the window itself.
PNGs (optional)	One full-colour PNG per frame, in a folder next to the GIF (or the chosen one).

Tips only the manual tells you

- A GIF has at most **256 colours**; very colourful scenes are quantized. For exact colours, use the **PNGs**.
- The thematic legend shows up to **10 categories** per frame.
- The **cumulative** option shows, in each frame, the features of earlier periods: ideal for urban growth.
- Frames from a temporal field filter the layer **without changing the original layer or its filters** in the project.

Common mistakes and how to avoid them

- Frames with very different extents: put the layers on the same area first.
- A very short duration makes the animation unreadable; 800 to 1500 ms per frame usually works.

11. Troubleshooting

I cannot find the plugin after installing it.

Restart QGIS. If the button does not appear, enable the toolbar in View > Toolbars > Vista Saga Plugin, or use Raster > Vista Saga Plugin.

The message says the maps are in different CRSs.

Reproject the layers to the same projected CRS (Vector > Data Management Tools > Reproject Layer; Raster > Projections > Warp).

The message says the rasters are not on the same grid.

Use Raster > Align Rasters with the same cell size, extent and origin.

The temporary result disappeared.

Temporary results vanish when QGIS closes. Fill in Save to or export the layer before closing.

Classes show up as "Class 1", "Class 2".

The file has no stored names. In Signature, name them in the layer symbology; in the Converter, keep the .aux.xml and the .qml next to the GeoTIFF.

QGIS became slow during the run.

Use Cancel in the progress window, reduce the extent or increase the cell size, and run again.

Where do I see details of an unexpected error?

In View > Panels > Log Messages, Vista Saga Plugin tab: the plugin records the technical details there.

13. Glossary

Signed area	Area of a class within the Signature boundary.
Friction	Resistance to movement used in Voronoi; the rating is the cost per unit of distance.
Criterion	Map or field used in Evaluation, with a weight.
Feature	A polygon (or point) of a vector layer; in Signature raster, a checked class.
BACKGROUND (FUNDO)	Background class of the RS2 format.
Sliver	A very thin overlap or gap between polygons; tolerated below a 1 cm mean width.
Mass	Weight of a generating point in Voronoi (M in M/d^2).
NoData	"No data" value of a raster.
RS2	Vista SAGA raster format.
CRS	Coordinate reference system.
Transition	Initial class → final class pair in Monitoring.