

Gender Enabling Environments Spatial Tool (GEEST) User Manual

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This tool employs a multicriteria evaluation (MCE) framework to spatially describe womens' access to formal employment and business opportunities in the renewable energy sector in Small Island Developing States (SIDS). The MCE framework allows for the incorporation and assessment of dimensions, factors, and indicators to identify where the enabling environments (or lack thereof) are located for women to secure employment opportunities in SIDS.

- The spatial GDBs for all SIDS can be accessed [here](#).
- The methodology report can be accessed [here](#).

User Manual

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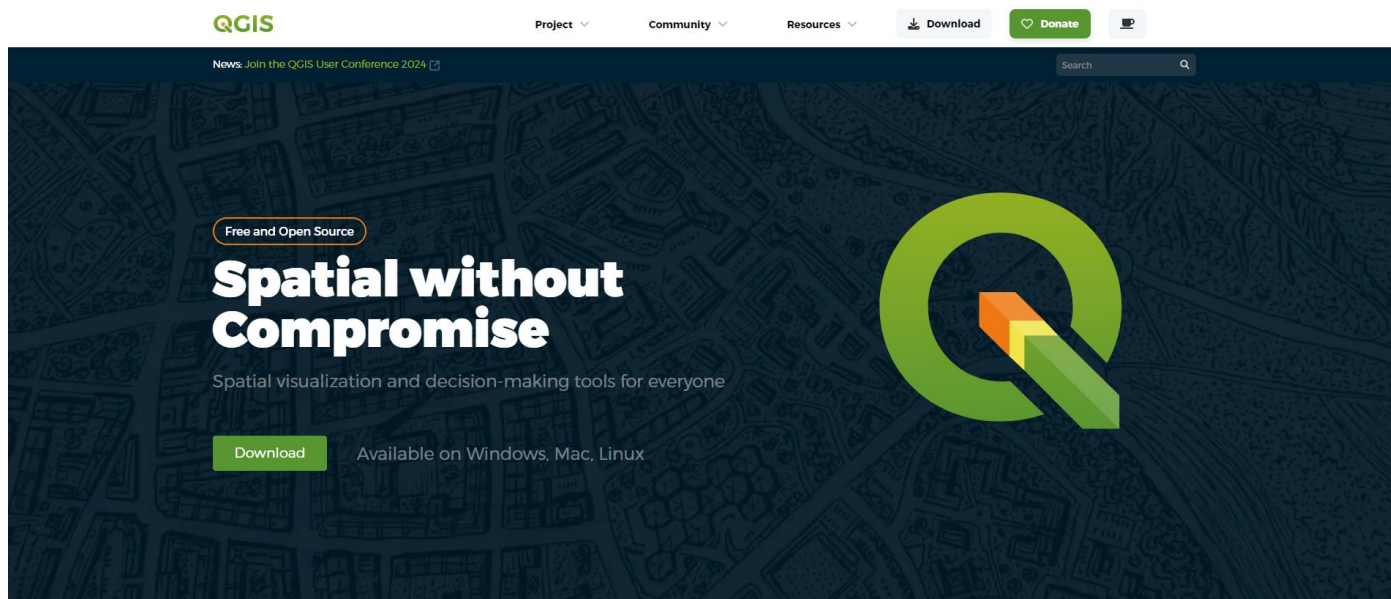
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AND SCALED INCORRECTLY

- 5.3. RASTER OUTPUTS NOT BEING LOADED AND DISPLAYING CORRECTLY
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1 Install QGIS

1. The link below will take you to the QGIS website where you will be able to download the QGIS installation file. Note that it is possible to use older versions of QGIS, e.g. Version 3.32 - Lima. QGIS website: <https://www.qgis.org/en/site/>



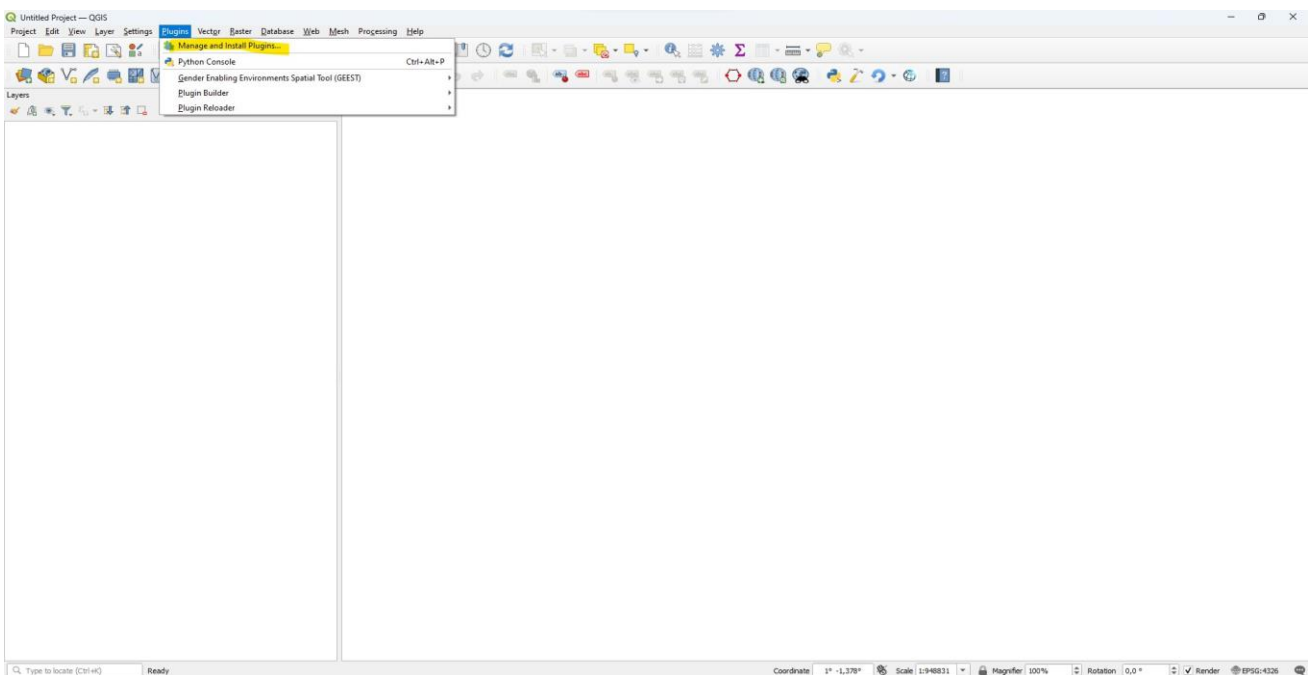
2. Once the installation file is downloaded run the installation file.

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3. A pop-up window as seen in the image below should show up. Follow the prompts and leave all settings on default.



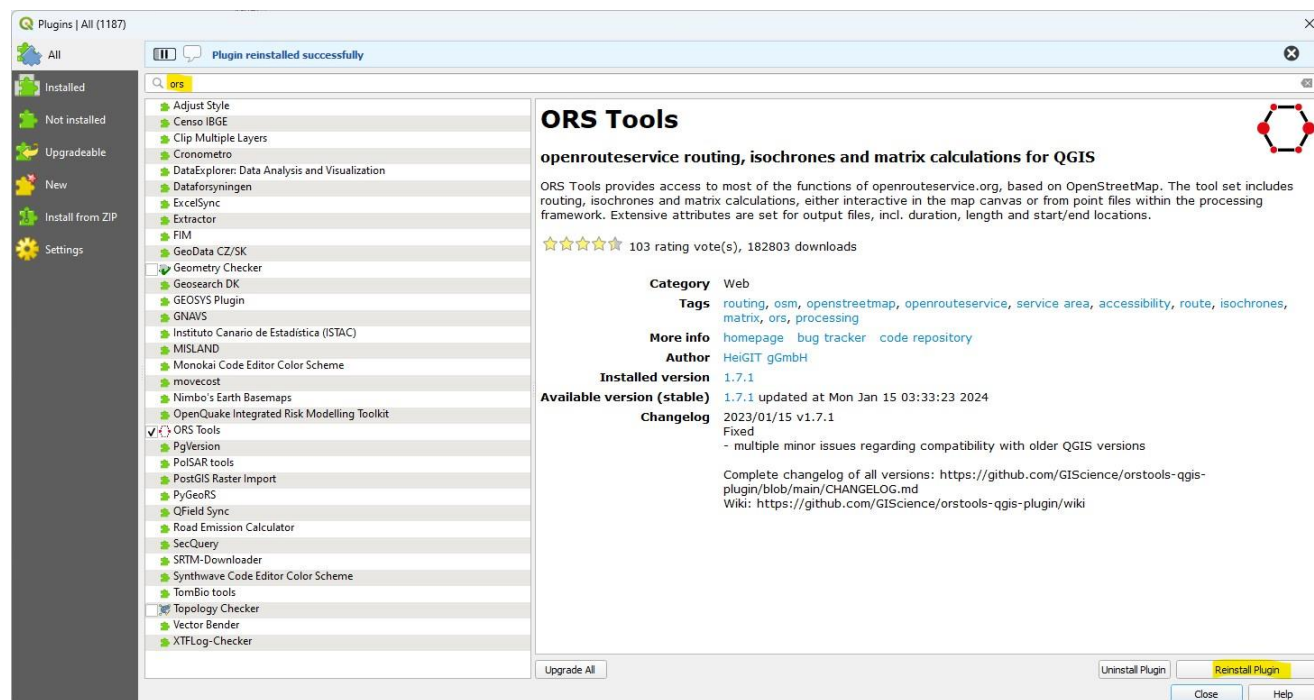
2 Install Open Route Service (ORS) plugin



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1. Open QGIS, navigate to the "Plugins" tab and select the "Manage and Install Plugins..." option from the drop-down menu.

The "Plugins" pop-up window should appear as seen in the image below. In the search bar type "ORS", select the "ORS Tool" from the list of plugins, and select the install button to install the plugin.



2. You will now have to set up an account on the Open Route Service website which can be accessed by clicking the link below.

ORS website: <https://openrouteservice.org/>

ORS Sign up: <https://openrouteservice.org/dev/#/signup>

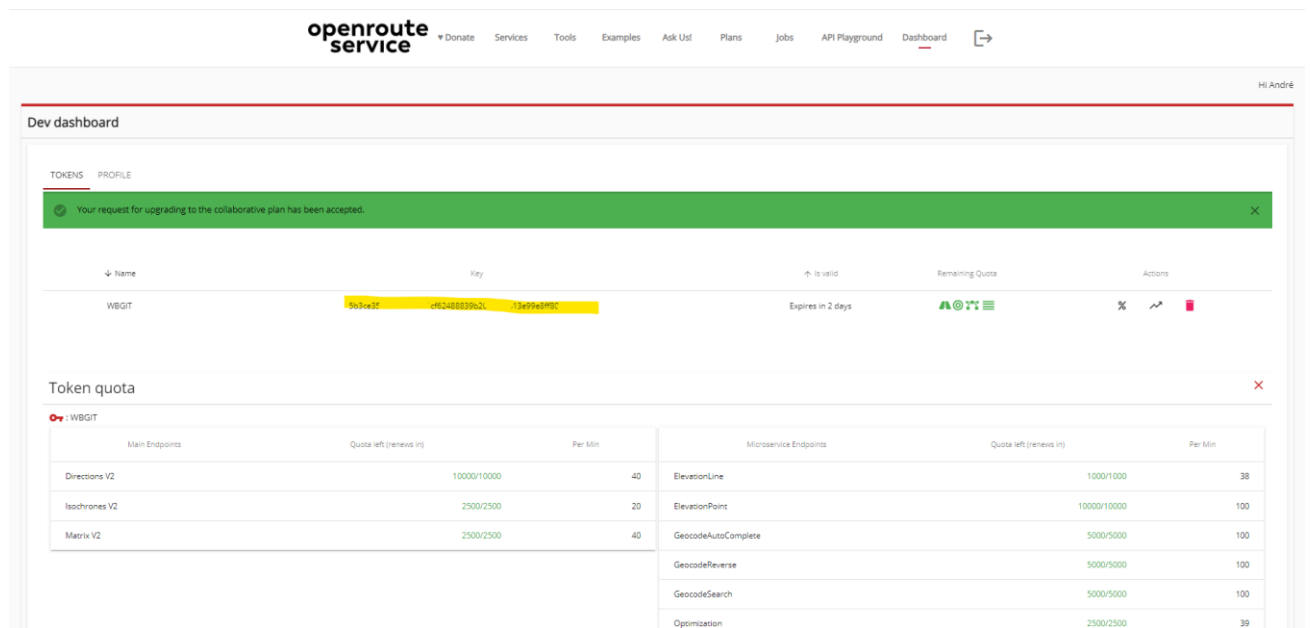
The screenshot shows the 'CREATE AN ACCOUNT' form on the OpenRoute Service website. The form includes a 'SIGN UP WITH GITHUB' button, a 'or' separator, and input fields for Username, Email*, First name*, Last name*, Sector, Website, New password*, and Confirm new password*. There are also checkboxes for 'Subscribe to newsletter' and 'I accept the terms of service'. A 'Please note:' section is at the bottom.

3. Fill in all the necessary fields to sign up and then log into your account.
4. Request a standard token and provide a name for the Token.

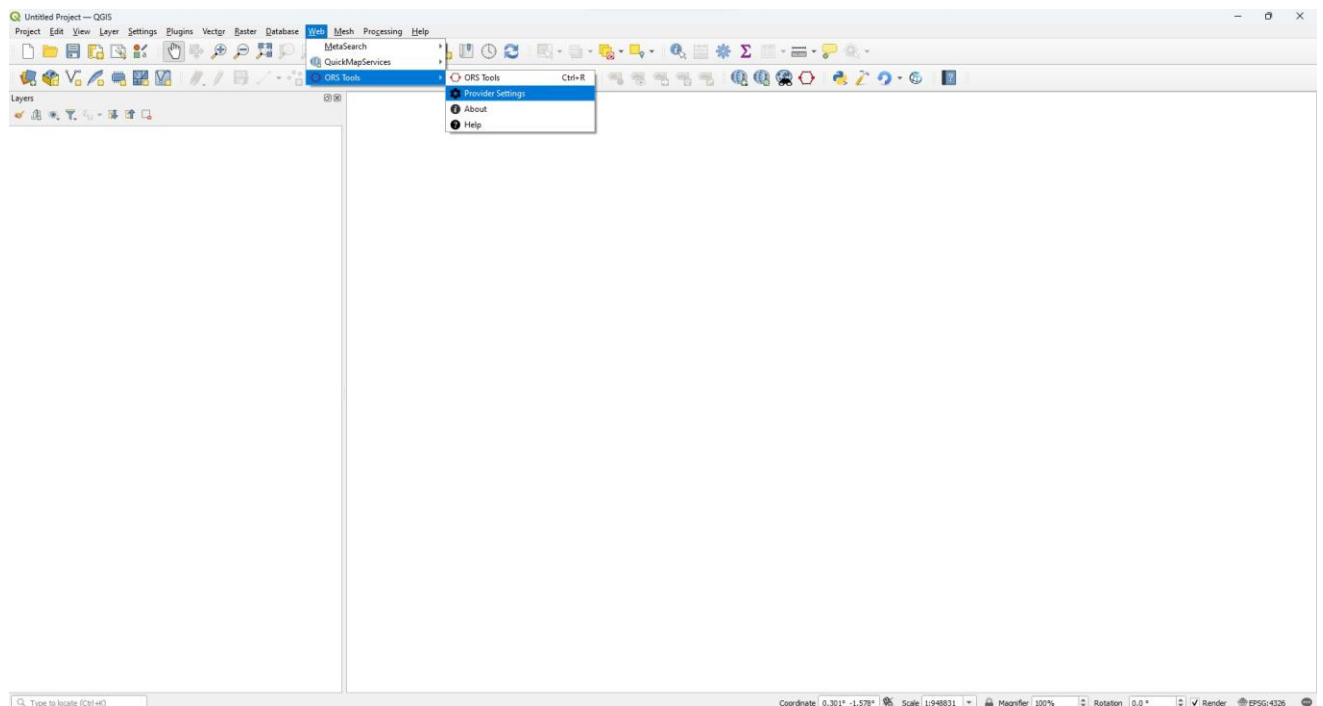
The screenshot shows the 'Dev dashboard' on the OpenRoute Service website. The 'TOKENS' tab is selected, and the 'Request a token' form is visible. The form has a dropdown for 'Token name*' with 'Test' selected, and a 'CREATE TOKEN' button. The dashboard also shows a table with columns: Name, Key, Is valid, Remaining Quota, and Actions.

5. Once the token has been created, navigate to the Dashboard tab and click on the API key as seen in the image below. The API key should now be copied to the clipboard.

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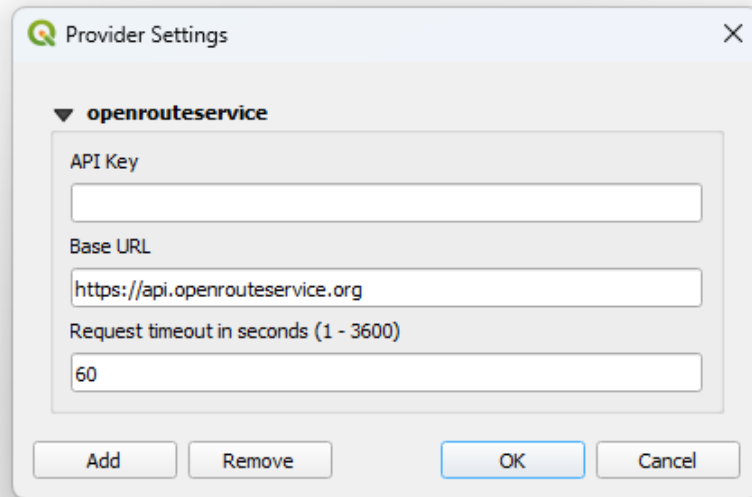
6. In the QGIS window navigate the ORS tool and select "Provider Settings".



7. The provider settings pop-up window should now appear as seen in the image below.

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8. Paste the API key that has been copied to the clipboard into the API Key field and press "OK".

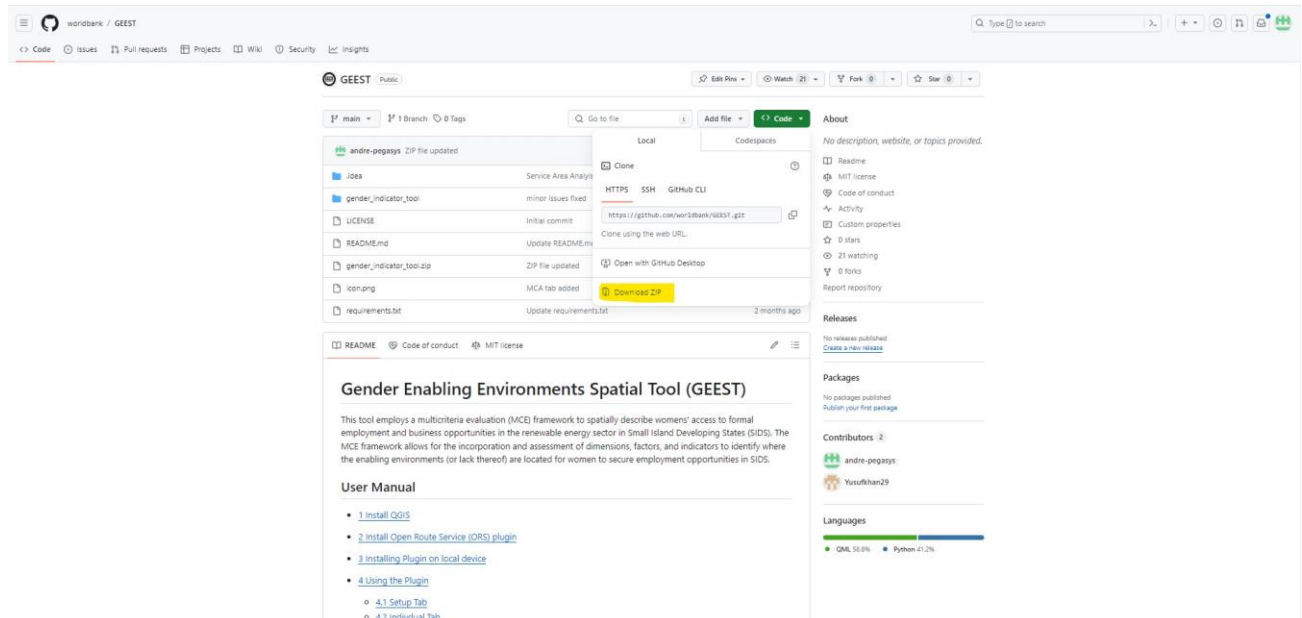


The image shows a 'Provider Settings' dialog box with a close button (X) in the top right corner. The dialog is titled 'openrouteservice' with a dropdown arrow. It contains three input fields: 'API Key' (empty), 'Base URL' (containing 'https://api.openrouteservice.org'), and 'Request timeout in seconds (1 - 3600)' (containing '60'). At the bottom, there are four buttons: 'Add', 'Remove', 'OK' (highlighted with a blue border), and 'Cancel'.

N.B. Additional credits can be requested on the ORS site by applying for the collaborative plan as described [here](#). You will have to provide a brief motivation, however, if your application is in a humanitarian, academic, governmental, or not-for-profit organization, you should be eligible for the collaborative plan. This email address can also be used for further assistance: support@openrouteservice.heigit.org

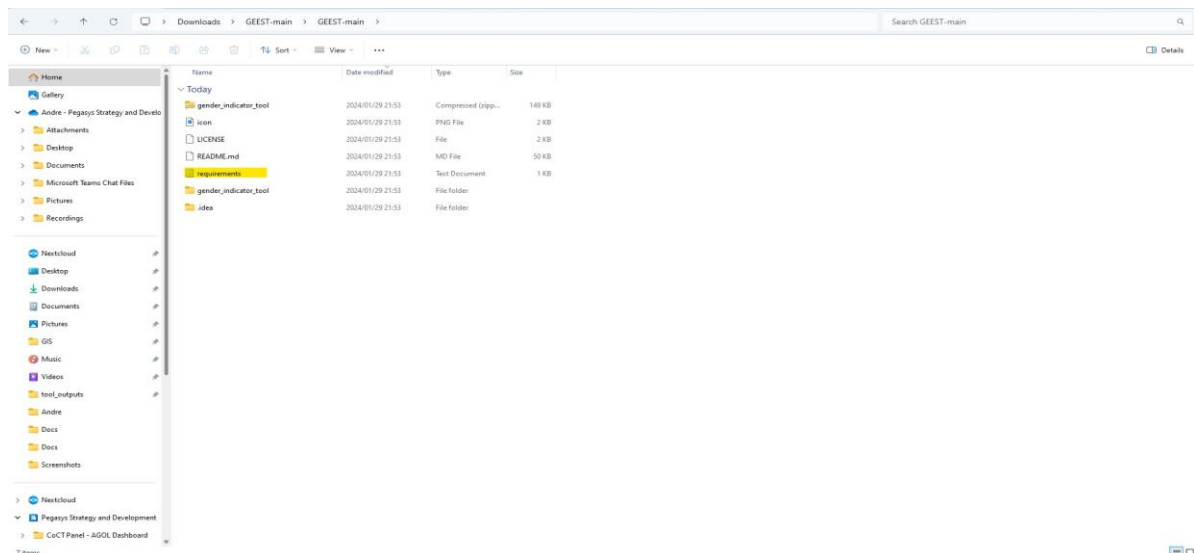
3 Installing Plugin on local device

1. Click on the green “Code” button and select the “Download ZIP” option.



2. Once the download has been completed extract the contents of the ZIP file.

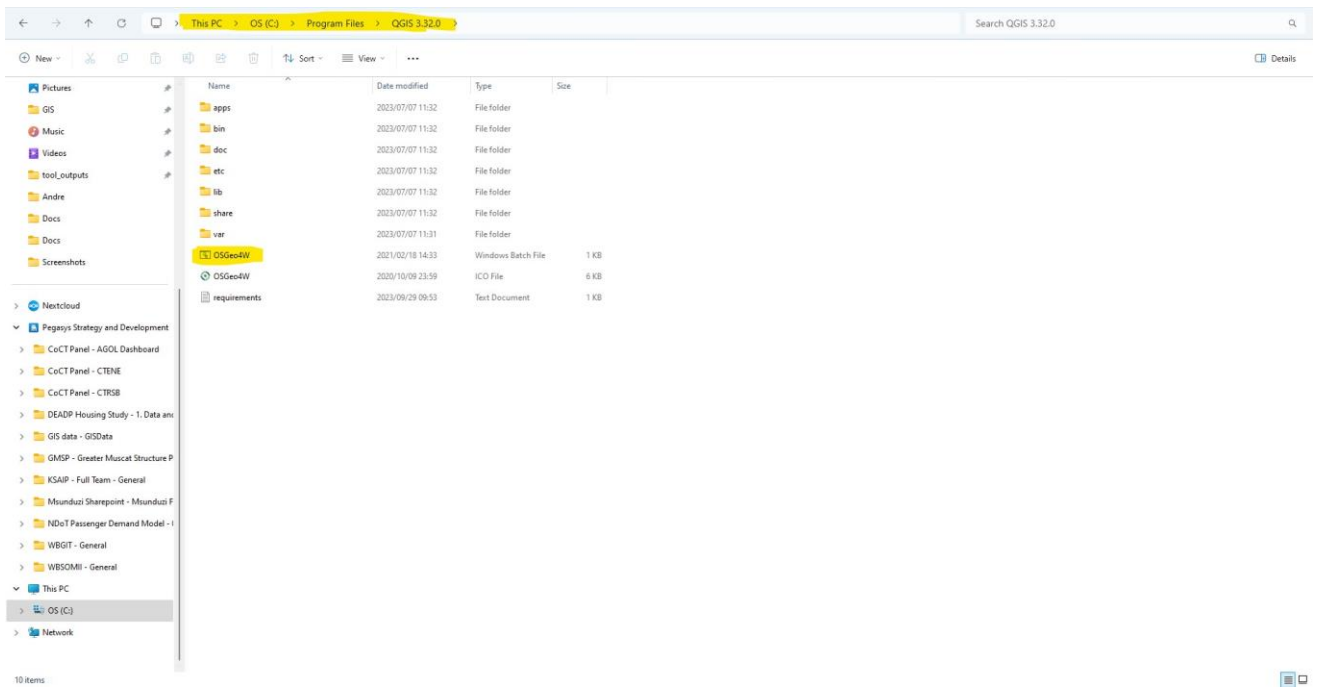
3. Navigate to your extracted ZIP folder and copy the *requirements.txt* file.



4. Navigate to the QGIS program folder and paste the *requirements.txt* file into it. The file path would be like this: *C:\Program Files\QGIS 3.32.0* as seen in the image under **step 5**.

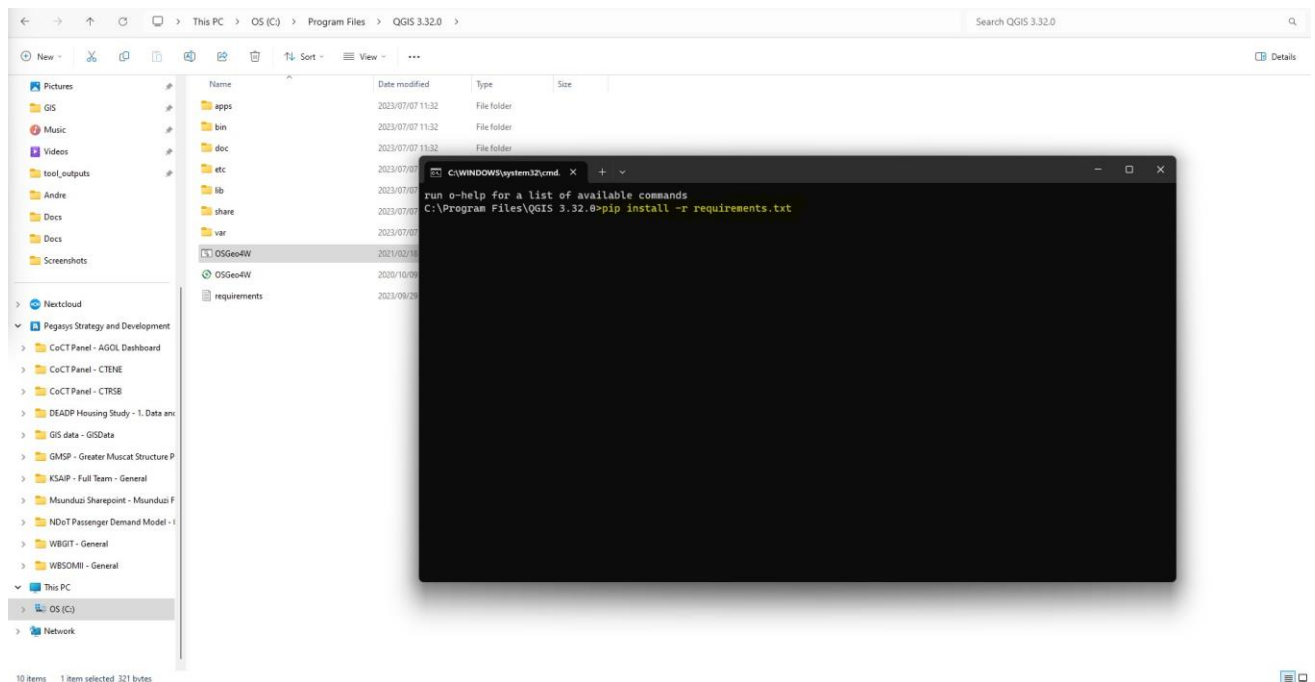
5. Run the OSGeo4W batch file.

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6. A command line pop-up window will appear as seen in the image below.

7. Type the following into it and press Enter: `pip install -r requirements.txt`

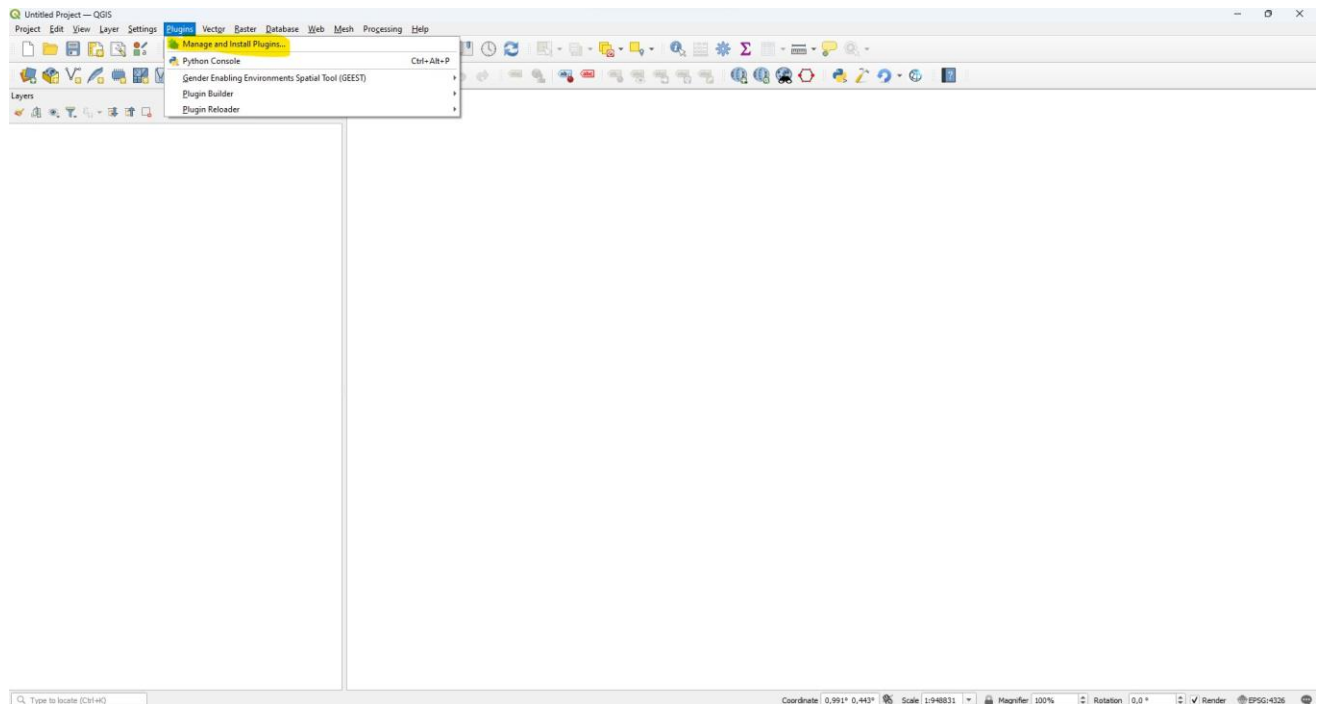


8. All the Python libraries that the Plugin is dependent on will now be installed. This can take a few minutes to install.

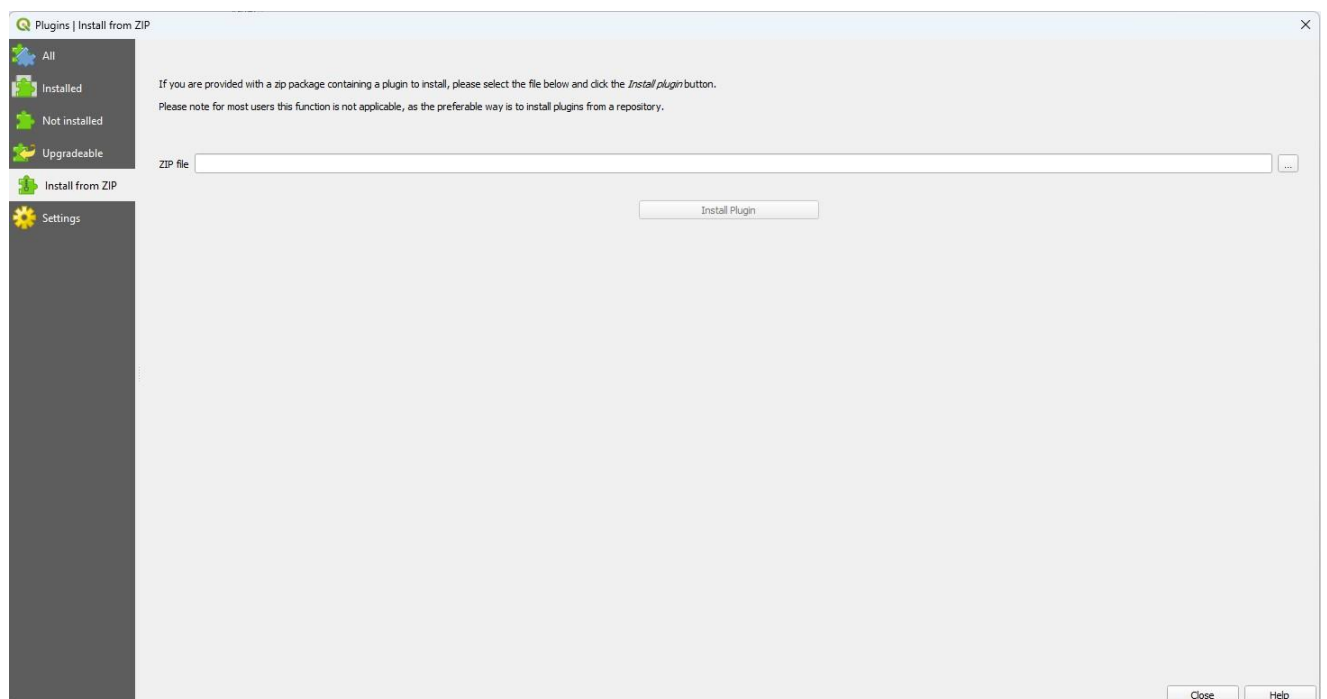
9. Once the installations are complete you can close the command line pop-up window.

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10. Open QGIS, navigate to the “Plugins” tab and select the “Manage and Install Plugins...” option from the drop-down menu.



11. In the plugin pop-up window navigate to the “Install from ZIP” tab.



12. From the “Install from ZIP” tab navigate back to your extracted ZIP folder and select the “gender_indicator_tool” compressed (zipped) folder as seen in the image below.

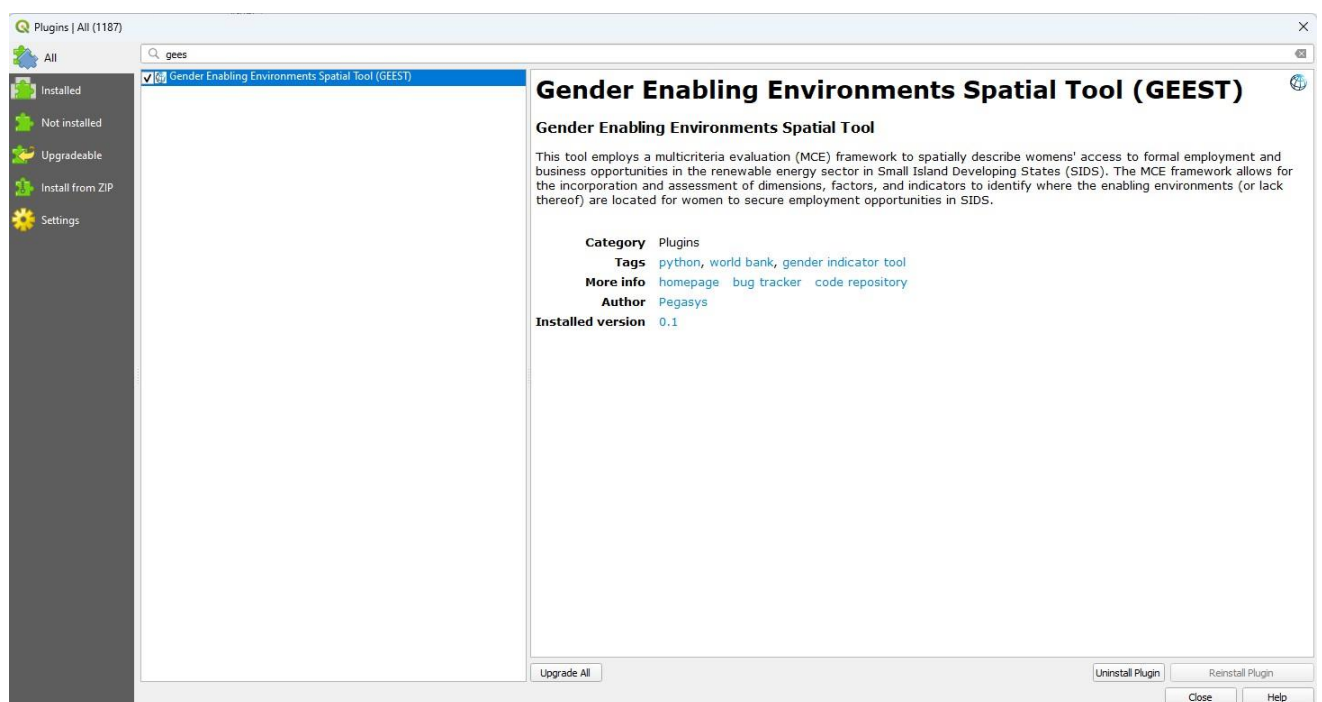
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Name	Date modified	Type	Size
▼ Today			
gender_indicator_tool	2024/01/29 21:53	Compressed (zipp...	149 KB
icon	2024/01/29 21:53	PNG File	2 KB
LICENSE	2024/01/29 21:53	File	2 KB
README.md	2024/01/29 21:53	MD File	50 KB
requirements	2024/01/29 21:53	Text Document	1 KB
gender_indicator_tool	2024/01/29 21:53	File folder	
.idea	2024/01/29 21:53	File folder	

13. Once the ZIP file has been selected click on "Install Plugin".

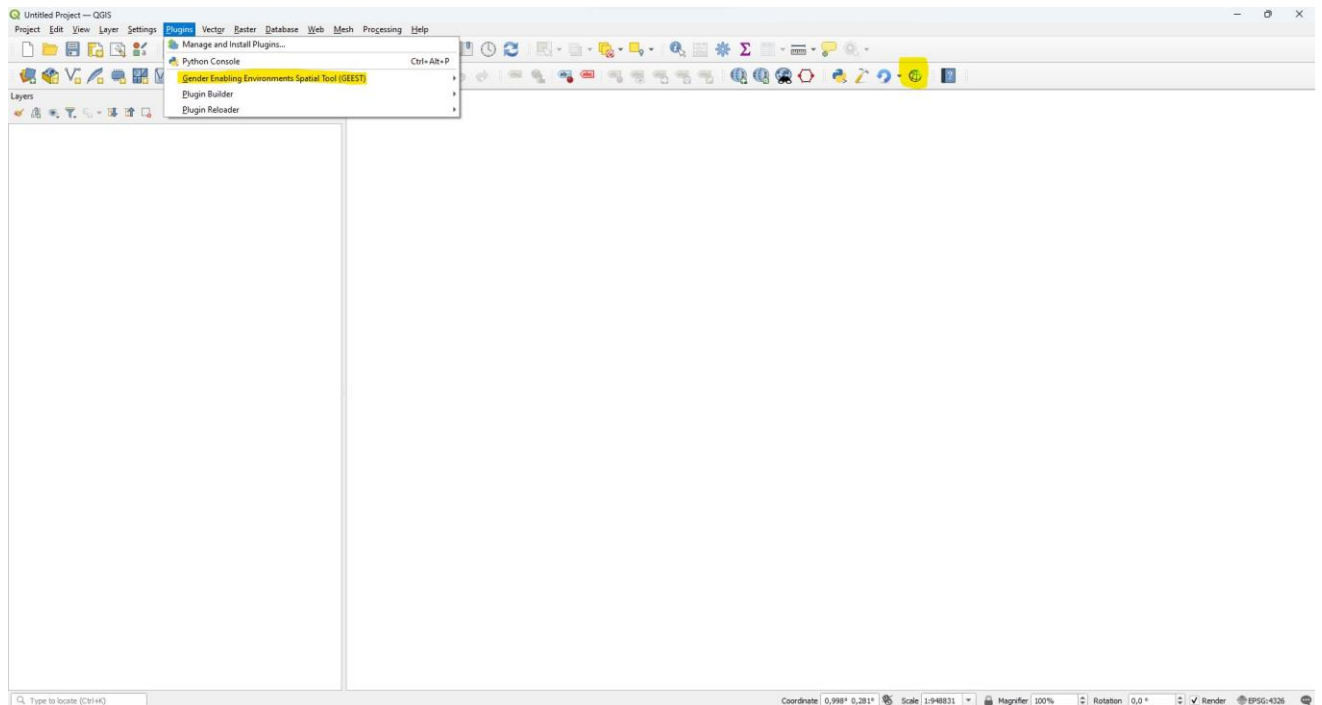
14. Once the plugin has been installed navigate to the "All" tab.

15. In the search bar type "GEEST" and click the check box next to the "Gender Enabling Environments Spatial Tool (GEEST)" to install the plugin.



16. The plugin is now installed, and you should now be able to access it in your toolbar or under the Plugin's tab as seen in the image below.

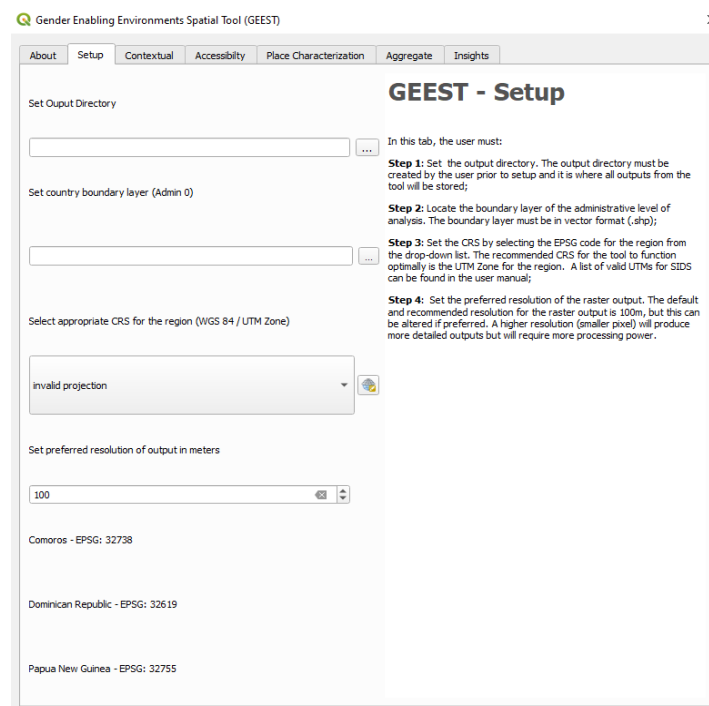
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4 Using the Plugin

Examples of files that can be used as input at a particular step as per the Pilot Country Database will be indicated at the end of the step.

4.1 SETUP TAB



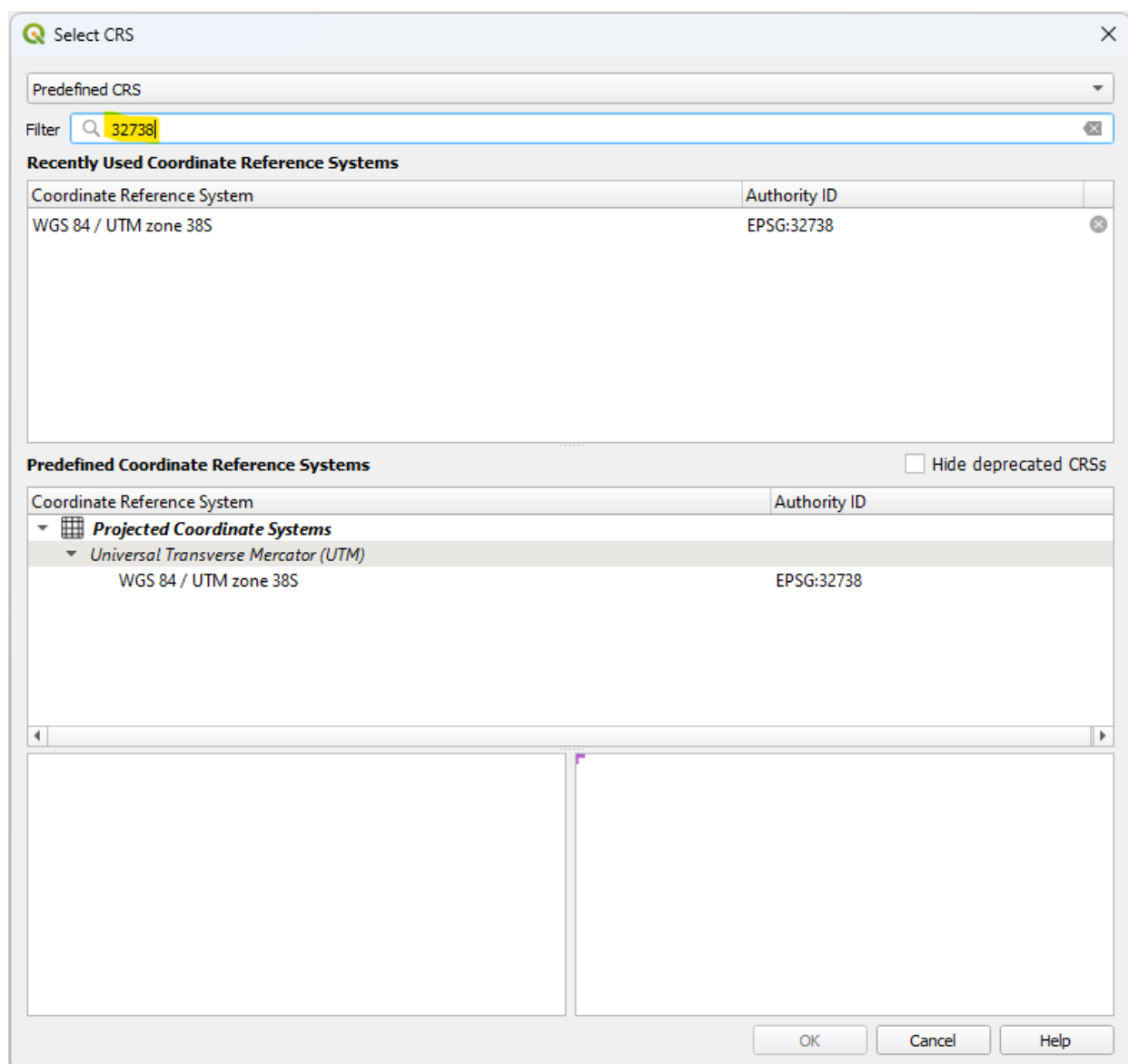
1. Create a project folder that will be used to store all tool outputs.

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2. Set the output directory to the project folder created in the previous step.
3. Set the country boundary layer by navigating to and selecting the **Admin0** country boundary polygon shapefile for the country you want to analyze.

Input File: *AdminBoundaries/Admin0.shp*

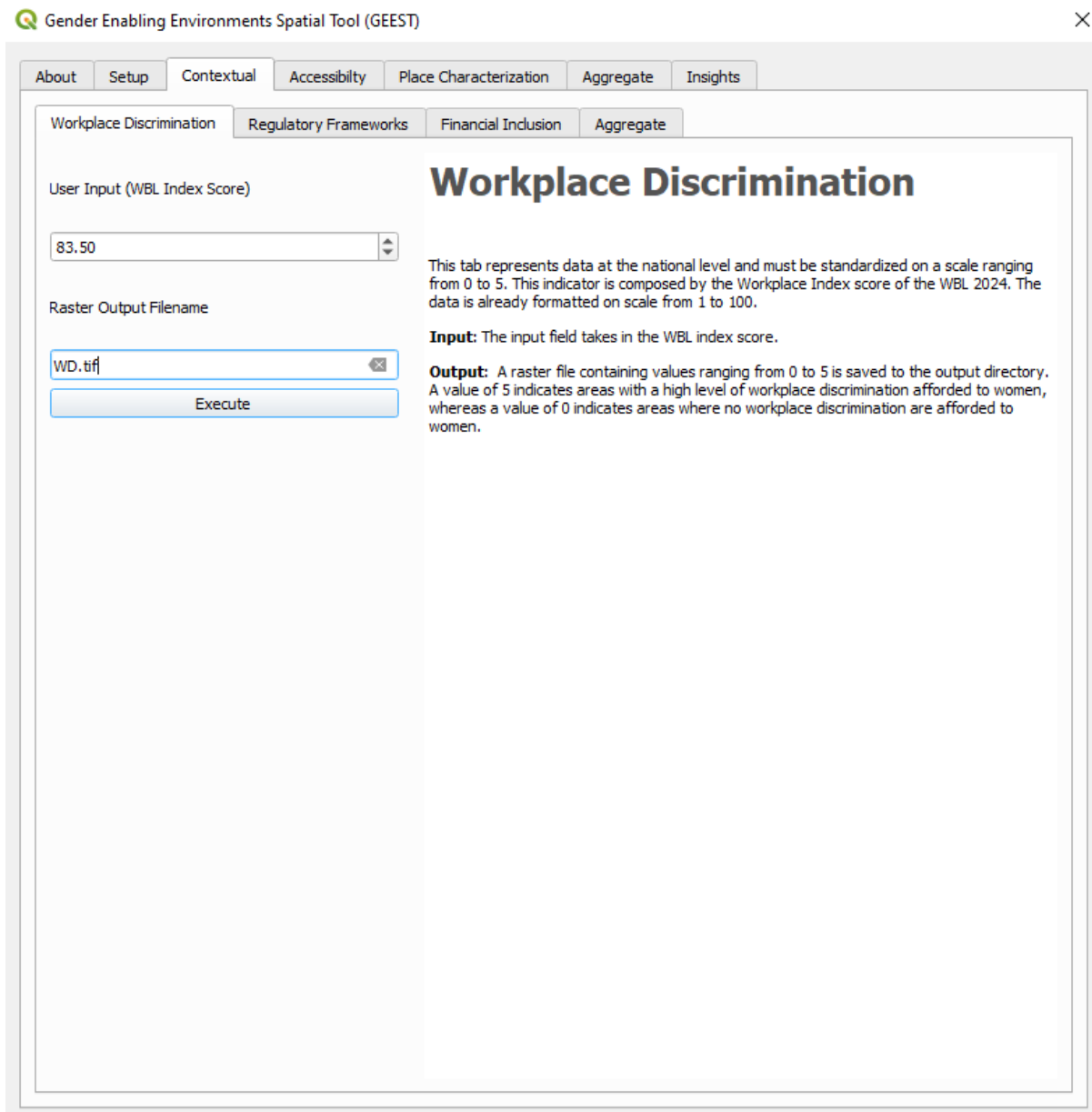
4. Select the appropriate coordinate reference system (CRS) from the QGIS CRS database. **Appendix A** lists all the CRS to be used for the SIDS countries.
5. Copy and paste the EPSG code for your specific country and paste it in the Filter bar as seen in the image below.



6. Select the CRS from the list and click "OK".
7. Set your preferred output raster output resolution in meters squared.

4.2 CONTEXTUAL TAB

4.2.1 Workplace Discrimination



The screenshot shows the Gender Enabling Environments Spatial Tool (GEEST) interface. The main window has a title bar with a green icon and the text "Gender Enabling Environments Spatial Tool (GEEST)". Below the title bar is a menu bar with tabs: "About", "Setup", "Contextual", "Accessibility", "Place Characterization", "Aggregate", and "Insights". The "Contextual" tab is selected, and within it, the "Workplace Discrimination" sub-tab is active. The interface is divided into two main sections. On the left, there is a form with two input fields: "User Input (WBL Index Score)" with a value of "83.50" and "Raster Output Filename" with a value of "WD.tif". Below these fields is an "Execute" button. On the right, there is a text area with the title "Workplace Discrimination" in bold. The text explains that this tab represents data at the national level, standardized on a scale from 0 to 5, based on the Workplace Index score of the WBL 2024. It also provides input and output instructions: "Input: The input field takes in the WBL index score." and "Output: A raster file containing values ranging from 0 to 5 is saved to the output directory. A value of 5 indicates areas with a high level of workplace discrimination afforded to women, whereas a value of 0 indicates areas where no workplace discrimination are afforded to women."

Gender Enabling Environments Spatial Tool (GEEST)

About Setup Contextual Accessibility Place Characterization Aggregate Insights

Workplace Discrimination Regulatory Frameworks Financial Inclusion Aggregate

User Input (WBL Index Score)

83.50

Raster Output Filename

WD.tif

Execute

Workplace Discrimination

This tab represents data at the national level and must be standardized on a scale ranging from 0 to 5. This indicator is composed by the Workplace Index score of the WBL 2024. The data is already formatted on scale from 1 to 100.

Input: The input field takes in the WBL index score.

Output: A raster file containing values ranging from 0 to 5 is saved to the output directory. A value of 5 indicates areas with a high level of workplace discrimination afforded to women, whereas a value of 0 indicates areas where no workplace discrimination are afforded to women.

1. Navigate to the WBL (Women, Business and the Law) report and input the *WBL index score* representing the value from 0 to 100. This value represents data at the national level and must be standardized on a scale ranging from 0 to 5. This indicator is composed by the Workplace Index score of the WBL. The data is already formatted on a scale from 1 to 100.
2. Click the "Execute" button to run the algorithm.
3. Status text next to the "Execute" button will appear and let you know once processing is complete.
4. The output raster file will be stored in the project folder specified in the "Setup" tab, under the "Contextual" folder. (*Project_Folder/Contextual/WD.tif*). The user can rename the output file to preferred filename.

4.2.2 Regulatory Frameworks

Gender Enabling Environments Spatial Tool (GEEST) ×

About Setup Contextual Accessibility Place Characterization Aggregate Insights

Workplace Discrimination Regulatory Frameworks Financial Inclusion Aggregate

Regulatory Frameworks

User Input (WBL Pay)

100.00

User Input (Parenthood Index Score)

40.00

Raster Output Filename

RF.tif

Execute

This tab computes a raster containing a standardized measure of the regulatory frameworks afforded to women in the country of interest.

Input: The input fields take in the WBL Pay and Parenthood Index Scores percentage that represents the level of protective policies afforded to women. The calculation of this percentage is described in detail in the methodological framework document.

Output: A raster file containing values ranging from 0 to 5 is saved to the output directory. A value of 5 indicates areas with a high level of protective policies afforded to women, whereas a value of 0 indicates areas where no protective policies are afforded to women.

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1. Navigate to the WBL (Women, Business and the Law) report and input the *WBL Pay and Parenthood index scores*, values ranging from 0 to 100. This value represents data at the national level and must be standardized on a scale ranging from 0 to 5. This indicator is composed by aggregating the Parenthood and Pay Index scores of the WBL. The data is already formatted on a scale from 1 to 100.
2. Click the "Execute" button to run the algorithm.
3. Status text next to the "Execute" button will appear and let you know once processing is complete.
4. The output raster file will be stored in the project folder specified in the "Setup" tab, under the "Contextual" folder (*Project_Folder/Contextual/RF.tif*). The user can rename the output file to preferred filename.

4.2.3 Financial Inclusion

Gender Enabling Environments Spatial Tool (GEEST) ×

About Setup Contextual Accessibility Place Characterization Aggregate Insights

Workplace Discrimination Regulatory Frameworks Financial Inclusion Aggregate

User Input (WBL Entrepreneurship Index Score)

75.00

Raster Output Filename

FIN.tif

Execute

Financial Inclusion

This tab computes a raster containing a standardized measure of the percentage of women who have a bank account or have borrowed from a formal financial institution.

Input: The input field takes in the percentage of women who have a bank account (WBL Entrepreneurship Index Score).

Output: A raster file containing values ranging from 0 to 5 is saved to the output directory. A value of 5 signifies areas where all women possess a bank account or have borrowed from a formal financial institution, whereas a value of 0 represents areas where no women have a bank account or have borrowed from a formal institution.

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1. Navigate to the WBL (Women, Business and the Law) report and input the *WBL Entrepreneurship index score*, value ranging from 0 to 100. This value represents data at the national level and must be standardized on a scale ranging from 0 to 5. The data is already formatted on a scale from 1 to 100. It comes from the Entrepreneurship rating of the WBL Index.
2. Click the "Execute" button to run the algorithm.
3. Status text next to the "Execute" button will appear and let you know once processing is complete.
4. The output raster file will be stored in the project folder specified in the "Setup" tab, under the "Contextual" folder (*Project_Folder/Contextual/FIN.tif*). The user can rename the output file to preferred filename.

4.2.4 Aggregate

Gender Enabling Environments Spatial Tool (GEEST) X

About Setup Contextual Accessibility Place Characterization **Aggregate** Insights

Workplace Discrimination Regulatory Frameworks Financial Inclusion **Aggregate**

Factors		Weight %
Workplace Discrimination (WD)	D:/Testing/12082024/Contextual/WD.tif	33.34
Regulatory Frameworks (RF)	D:/Testing/12082024/Contextual/RF.tif	33.33
Financial Inclusion (FIN)	D:/Testing/12082024/Contextual/FIN.tif	33.33

Output Aggregate Raster Filename

Contextual_score.tif

Execute

Contextual Factor Aggregation

This tab aggregates the raster outputs of all available factors within the contextual dimension by assuming equal weighting of all factors within the dimension. If equal weights are not appropriate for the specific context of the analysis, the user can adjust weights as necessary provided all weights still sum to 100%. If a factor was not calculated (perhaps due to missing data, or because it was deemed to be unimportant) that factor should be assigned a weight of 0%, and the remaining factor weights adjusted such that they add up to 100%.

Factor outputs that are created during the current working session are automatically loaded. Users can choose to load previously generated factor outputs from the output directory set up at tool initiation.

Output: A raster file containing values ranging from 0 to 5 is saved to the output directory and loaded into the workspace. Scores should be interpreted as outlined in the "About" tab.

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1. Load the raster outputs generated in each of the previous factor tabs for the Contextual Dimension.

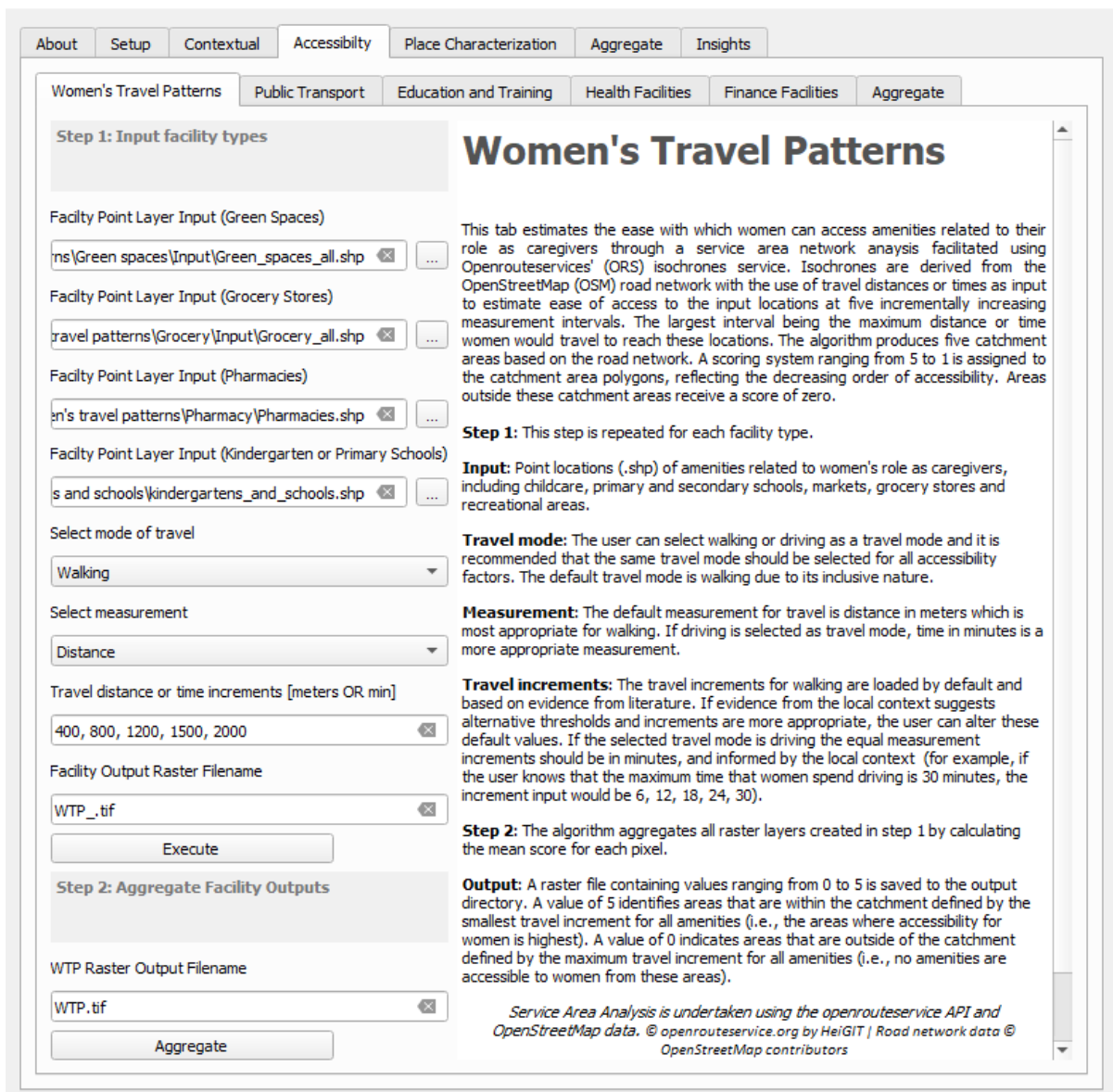
If a factor was executed in the same work session, its file path will automatically be populated after execution.

2. If factors are missing adjust the weighting percentage accordingly and ensure it totals to 100%.
3. If a factor is missing it needs to be given a weighting of 0%. All factors should have equal weights.
4. Enter an alternate aggregated raster output file name if desired. The standard output file name is *Contextual_score.tif*
5. Click the "Execute" button to run the algorithm.
6. Status text next to the "Execute" button will appear and let you know once processing is complete.
7. The aggregated layer will be loaded to the QGIS and appear in the table of contents.
8. The aggregated output raster file will be stored in the project folder specified in the "Setup" tab, under the "Contextual" folder. (*Project_Folder/Contextual/Contextual_score.tif*). The user can rename the output file to preferred filename.

4.3 ACCESSIBILITY TAB

4.3.1 Women's Travel Patterns

 Gender Enabling Environments Spatial Tool (GEEST)



The screenshot shows the 'Accessibility' tab in the GEEST application, specifically the 'Women's Travel Patterns' sub-tab. The interface is divided into two main sections: 'Step 1: Input facility types' and 'Step 2: Aggregate Facility Outputs'. In Step 1, users are prompted to provide point layer inputs for Green Spaces, Grocery Stores, Pharmacies, and Kindergartens or Primary Schools. Each input field has a file selection button. Below these, users can select a travel mode (Walking or Driving) and a measurement method (Distance or Time). They also specify travel distance or time increments. In Step 2, users provide an output raster filename and click the 'Execute' button. The right side of the interface contains explanatory text about the tool's methodology, including a description of the 'Travel mode' and 'Measurement' options, and a list of 'Travel increments'. At the bottom, there is a copyright notice for the service area analysis.

Women's Travel Patterns

This tab estimates the ease with which women can access amenities related to their role as caregivers through a service area network analysis facilitated using Openrouteservice' (ORS) isochrones service. Isochrones are derived from the OpenStreetMap (OSM) road network with the use of travel distances or times as input to estimate ease of access to the input locations at five incrementally increasing measurement intervals. The largest interval being the maximum distance or time women would travel to reach these locations. The algorithm produces five catchment areas based on the road network. A scoring system ranging from 5 to 1 is assigned to the catchment area polygons, reflecting the decreasing order of accessibility. Areas outside these catchment areas receive a score of zero.

Step 1: This step is repeated for each facility type.

Input: Point locations (.shp) of amenities related to women's role as caregivers, including childcare, primary and secondary schools, markets, grocery stores and recreational areas.

Travel mode: The user can select walking or driving as a travel mode and it is recommended that the same travel mode should be selected for all accessibility factors. The default travel mode is walking due to its inclusive nature.

Measurement: The default measurement for travel is distance in meters which is most appropriate for walking. If driving is selected as travel mode, time in minutes is a more appropriate measurement.

Travel increments: The travel increments for walking are loaded by default and based on evidence from literature. If evidence from the local context suggests alternative thresholds and increments are more appropriate, the user can alter these default values. If the selected travel mode is driving the equal measurement increments should be in minutes, and informed by the local context (for example, if the user knows that the maximum time that women spend driving is 30 minutes, the increment input would be 6, 12, 18, 24, 30).

Step 2: The algorithm aggregates all raster layers created in step 1 by calculating the mean score for each pixel.

Output: A raster file containing values ranging from 0 to 5 is saved to the output directory. A value of 5 identifies areas that are within the catchment defined by the smallest travel increment for all amenities (i.e., the areas where accessibility for women is highest). A value of 0 indicates areas that are outside of the catchment defined by the maximum travel increment for all amenities (i.e., no amenities are accessible to women from these areas).

Service Area Analysis is undertaken using the openrouteservice API and OpenStreetMap data. © openrouteservice.org by HeiGIT | Road network data © OpenStreetMap contributors

1. Navigate to and select point shapefile input of facilities related to women's role as caregivers. This includes green spaces, grocery stores, pharmacies, kindergartens and schools.
2. Select the mode of travel (Walking OR Driving).
3. Select the method of measurement (Distance OR Time).
4. Specify travel distance or time increments in meters or time respectively using comma delimitation.

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5. Click the "Execute" button to run the algorithm.
6. Status text next to the "Execute" button will appear and let you know once processing is complete.
7. Each output factor will be stored in the project folder specified in the "Setup" tab, in the "WTP" folder under the "Accessibility" folder and have the following names *WTP_Walking_Green_spaces.tif*, *WTP_Walking_Groceries.tif*, *WTP_Walking_Pharmacies.tif* and *WTP_Walking_Kindergartens_and_Schools.tif*. The user can rename the output file to preferred filename.
8. Click the "Aggregate" button to run the algorithm.
9. Status text next to the "Execute" button will appear and let you know once processing is complete.
10. The output raster file will be stored in the project folder specified in the "Setup" tab, under the "Accessibility" folder. (*Project_Folder/Accessibility/WTP.tif*). The user can rename the output file to preferred filename.

4.3.2 Access to Public Transport

Transport Stops Input Layer (Point)

t:\input\public_transport_stops_all.shp

Select mode of travel

Walking

Select measurement

Distance

Travel distance or time increments [meters OR min]

250, 500, 750, 1000, 1250

Raster Output Filename

PBT.tif

Execute

Access to Public Transport

This tab estimates the ease with which women can access public transport stops through a service area network analysis facilitated using Openrouteservices' (ORS) isochrones service. Isochrones are derived from the OpenStreetMap (OSM) road network with the use of travel distances or times as input to estimate ease of access to the public transport stops at five incrementally increasing measurement intervals. The largest interval being the maximum distance or time women would travel to reach these locations. The algorithm produces five catchment areas based on the road network. A scoring system ranging from 5 to 1 is assigned to the catchment area polygons, reflecting the decreasing order of accessibility. Areas outside these catchment areas receive a score of zero.

Input: Point locations (.shp) of public transport stops.

Travel mode: The user can select walking or driving as a travel mode and it is recommended that the same travel mode should be selected for all accessibility factors. The default travel mode is walking due to its inclusive nature.

Measurement: The default measurement for travel is distance in meters which is most appropriate for walking. If driving is selected as travel mode, time in minutes is a more appropriate measurement.

Travel increments: The travel increments for walking are loaded by default and based on evidence from literature. If evidence from the local context suggests alternative thresholds and increments are more appropriate, the user can alter these default values. If the selected travel mode is driving the equal measurement increments should be in minutes, and informed by the local context (for example, if the user knows that the maximum time that women spend driving is 30 minutes, the increment input would be 6, 12, 18, 24, 30).

Output: A raster file containing values ranging from 0 to 5 is saved to the output directory. A value of 5 identifies areas that are within the catchment defined by the smallest travel increment for transport stops (i.e., the areas where transport accessibility for women is highest). A value of 0 indicates areas that are outside of the catchment defined by the maximum travel increment for transport stops (i.e., no transport stops are accessible to women from these areas).

*Service Area Analysis is undertaken using the openrouteservice API and OpenStreetMap data.
© openrouteservice.org by HeiGIT | Road network data © OpenStreetMap contributors*

1. Navigate to and select point shapefile input for public transport stops, including both land and maritime stops.
2. Select the mode of travel (Walking OR Driving).
3. Select the method of measurement (Distance OR Time).
4. Specify travel distance or time increments in meters or time respectively using comma delimitation.
5. Click the "Execute" button to run the algorithm.
6. Status text next to the "Execute" button will appear and let you know once processing is complete.

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- The output raster file will be stored in the project folder set in the “Setup” tab, under the “Accessibility” folder (*Project_Folder/Accessibility/PBT.tif*). The user can rename the output file to preferred filename.

4.3.3 Access to Education and Training Facilities

Gender Enabling Environments Spatial Tool (GEEST)

[About](#)
[Setup](#)
[Contextual](#)
[Accessibility](#)
[Place Characterization](#)
[Aggregate](#)
[Insights](#)

[Women's Travel Patterns](#)
[Public Transport](#)
[Education and Training](#)
[Health Facilities](#)
[Finance Facilities](#)
[Aggregate](#)

Education and Training Facilities

Education Facilities Input Layer (Point)

data\input\College_universities_all.shp

Select mode of travel

Walking

Select measurement

Distance

Travel distance or time increments [meters OR min]

2000, 4000, 6000, 8000, 10000

Raster Output Filename

ETF.tif

Execute

This tab estimates the ease with which women can access universities and technical training facilities through a service area network analysis facilitated using Openrouteservices' (ORS) isochrones service. Isochrones are derived from the OpenStreetMap (OSM) road network with the use of travel distances or times as input to estimate ease of access to the education facilities at five incrementally increasing measurement intervals. The largest interval being the maximum distance or time women would travel to reach these locations. The algorithm produces five catchment areas based on the road network. A scoring system ranging from 5 to 1 is assigned to the catchment area polygons, reflecting the decreasing order of accessibility. Areas outside these catchment areas receive a score of zero.

Input: Point locations (.shp) of universities and technical training facilities.

Travel mode: The user can select walking or driving as a travel mode and it is recommended that the same travel mode should be selected for all accessibility factors. The default travel mode is walking due to its inclusive nature.

Measurement: The default measurement for travel is distance in meters which is most appropriate for walking. If driving is selected as travel mode, time in minutes is a more appropriate measurement.

Travel increments: The travel increments for walking are loaded by default and based on evidence from literature. If evidence from the local context suggests alternative thresholds and increments are more appropriate, the user can alter these default values. If the selected travel mode is driving the equal measurement increments should be in minutes, and informed by the local context (for example, if the user knows that the maximum time that women spend driving is 30 minutes, the increment input would be 6, 12, 18, 24, 30).

Output: A raster file containing values ranging from 0 to 5 is saved to the output directory. A value of 5 identifies areas that are within the catchment defined by the smallest travel increment for an education facility (i.e., the areas where access to education facilities for women is highest). A value of 0 indicates areas that are outside of the catchment defined by the maximum travel increment for education facilities (i.e., no education facilities are accessible to women from these areas).


*Service Area Analysis is undertaken using the openrouteservice API and OpenStreetMap data.
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- Navigate to and select point shapefile input of education and training facilities (colleges, training facilities and universities).
- Select the mode of travel (Walking OR Driving).
- Select the method of measurement (Distance OR Time).
- Specify travel distance or time increments in meters or time respectively using comma delimitation.
- Click the “Execute” button to run the algorithm.

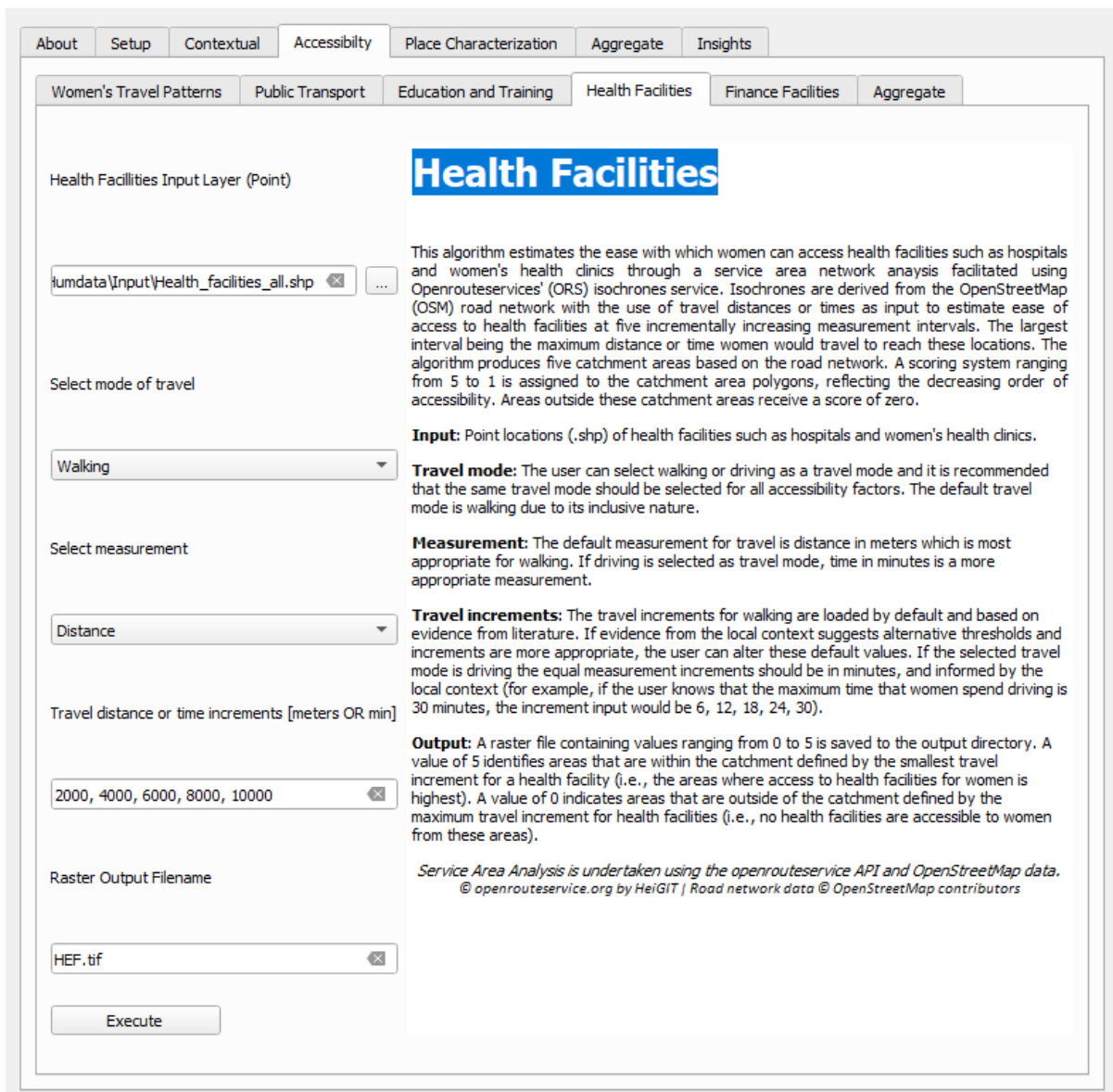
[Go to top](#)

- Status text next to the “Execute” button will appear and let you know once processing is complete.
- The output raster file will be stored in the project folder specified in the “Setup” tab, under the “Accessibility” folder (*Project_Folder/Accessibility/ETF.tif*). The user can rename the output file to preferred filename.

4.3.4. Access to Health Facilities

 Gender Enabling Environments Spatial Tool (GEEST)

×



Health Facilities

This algorithm estimates the ease with which women can access health facilities such as hospitals and women's health clinics through a service area network analysis facilitated using OpenRouteService's (ORS) isochrones service. Isochrones are derived from the OpenStreetMap (OSM) road network with the use of travel distances or times as input to estimate ease of access to health facilities at five incrementally increasing measurement intervals. The largest interval being the maximum distance or time women would travel to reach these locations. The algorithm produces five catchment areas based on the road network. A scoring system ranging from 5 to 1 is assigned to the catchment area polygons, reflecting the decreasing order of accessibility. Areas outside these catchment areas receive a score of zero.

Input: Point locations (.shp) of health facilities such as hospitals and women's health clinics.

Travel mode: The user can select walking or driving as a travel mode and it is recommended that the same travel mode should be selected for all accessibility factors. The default travel mode is walking due to its inclusive nature.

Measurement: The default measurement for travel is distance in meters which is most appropriate for walking. If driving is selected as travel mode, time in minutes is a more appropriate measurement.

Travel increments: The travel increments for walking are loaded by default and based on evidence from literature. If evidence from the local context suggests alternative thresholds and increments are more appropriate, the user can alter these default values. If the selected travel mode is driving the equal measurement increments should be in minutes, and informed by the local context (for example, if the user knows that the maximum time that women spend driving is 30 minutes, the increment input would be 6, 12, 18, 24, 30).

Output: A raster file containing values ranging from 0 to 5 is saved to the output directory. A value of 5 identifies areas that are within the catchment defined by the smallest travel increment for a health facility (i.e., the areas where access to health facilities for women is highest). A value of 0 indicates areas that are outside of the catchment defined by the maximum travel increment for health facilities (i.e., no health facilities are accessible to women from these areas).


*Service Area Analysis is undertaken using the openrouteservice API and OpenStreetMap data.
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- Navigate to and select point shapefile input of health facilities (hospitals and clinics as the points of interest).
- Select the mode of travel (Walking OR Driving).

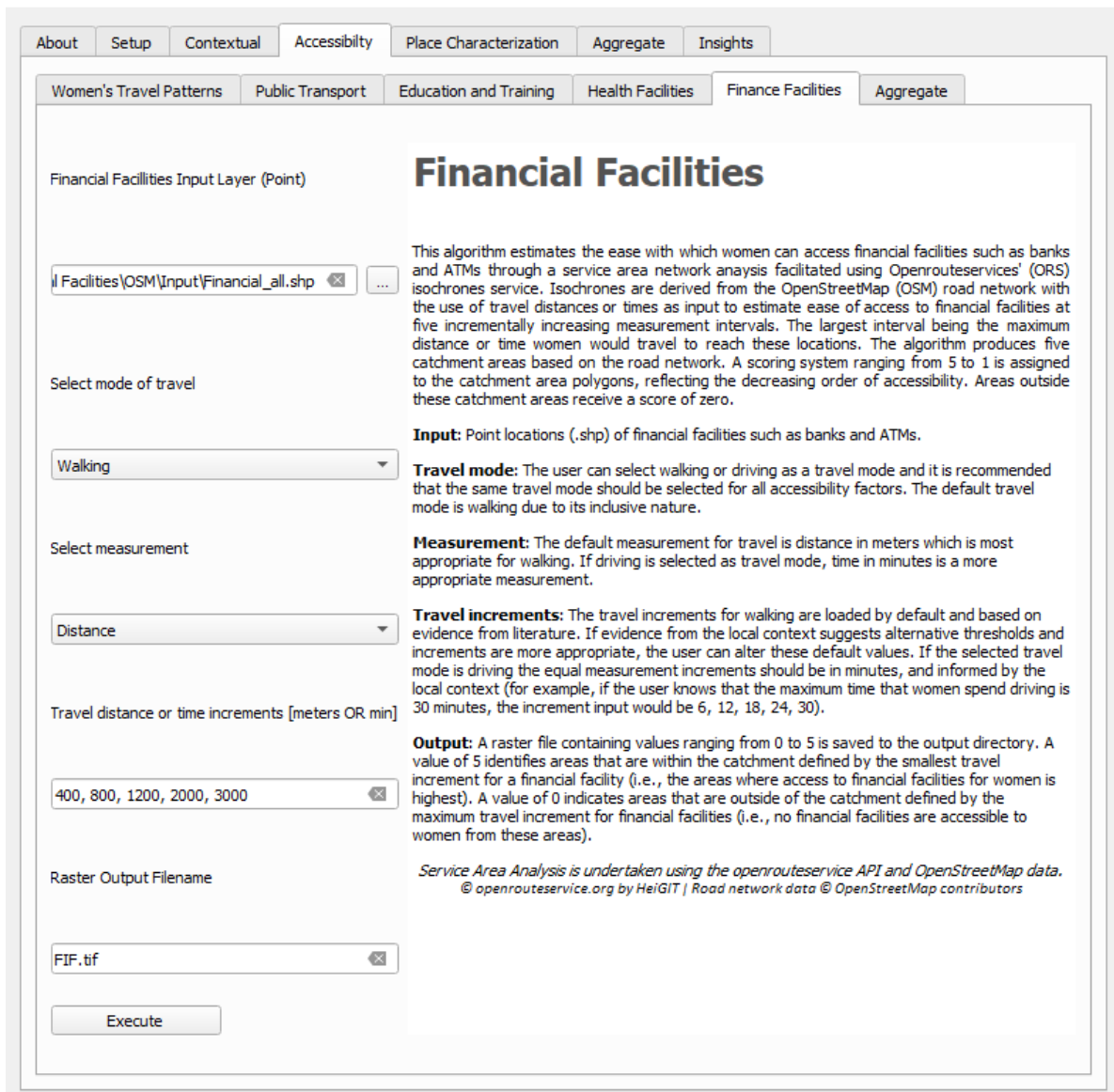
[Go to top](#)

3. Select the method of measurement (Distance OR Time).
4. Specify travel distance or time increments in meters or time respectively using comma delamination.
5. Click the "Execute" button to run the algorithm.
6. Status text next to the "Execute" button will appear and let you know once processing is complete.
7. The output raster file will be stored in the project folder specified in the "Setup" tab, under the "Accessibility" folder (*Project_Folder/Accessibility/HEF.tif*). The user can rename the output file to preferred filename.

4.3.5. Access to Financial Facilities

 Gender Enabling Environments Spatial Tool (GEEST)

×



Financial Facilities

Financial Facilities Input Layer (Point)

\\Facilities\OSM\input\Financial_all.shp

Select mode of travel

Walking

Select measurement

Distance

Travel distance or time increments [meters OR min]

400, 800, 1200, 2000, 3000

Raster Output Filename

FIF.tif

Execute

This algorithm estimates the ease with which women can access financial facilities such as banks and ATMs through a service area network analysis facilitated using Openrouteservices' (ORS) isochrones service. Isochrones are derived from the OpenStreetMap (OSM) road network with the use of travel distances or times as input to estimate ease of access to financial facilities at five incrementally increasing measurement intervals. The largest interval being the maximum distance or time women would travel to reach these locations. The algorithm produces five catchment areas based on the road network. A scoring system ranging from 5 to 1 is assigned to the catchment area polygons, reflecting the decreasing order of accessibility. Areas outside these catchment areas receive a score of zero.

Input: Point locations (.shp) of financial facilities such as banks and ATMs.

Travel mode: The user can select walking or driving as a travel mode and it is recommended that the same travel mode should be selected for all accessibility factors. The default travel mode is walking due to its inclusive nature.

Measurement: The default measurement for travel is distance in meters which is most appropriate for walking. If driving is selected as travel mode, time in minutes is a more appropriate measurement.

Travel increments: The travel increments for walking are loaded by default and based on evidence from literature. If evidence from the local context suggests alternative thresholds and increments are more appropriate, the user can alter these default values. If the selected travel mode is driving the equal measurement increments should be in minutes, and informed by the local context (for example, if the user knows that the maximum time that women spend driving is 30 minutes, the increment input would be 6, 12, 18, 24, 30).

Output: A raster file containing values ranging from 0 to 5 is saved to the output directory. A value of 5 identifies areas that are within the catchment defined by the smallest travel increment for a financial facility (i.e., the areas where access to financial facilities for women is highest). A value of 0 indicates areas that are outside of the catchment defined by the maximum travel increment for financial facilities (i.e., no financial facilities are accessible to women from these areas).

*Service Area Analysis is undertaken using the openrouteservice API and OpenStreetMap data.
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1. Navigate to and select point shapefile input of financial facilities (location of banks and other financial facilities except for ATMs).
2. Select the mode of travel (Walking OR Driving).
3. Select the method of measurement (Distance OR Time).
4. Specify travel distance or time increments in meters or time respectively using comma delimitation.
5. Click the "Execute" button to run the algorithm.
6. Status text next to the "Execute" button will appear and let you know once processing is complete.
7. The output raster file will be stored in the project folder specified in the "Setup" tab, under the "Accessibility" folder. (*Project_Folder/Accessibility/FIF.tif*). The user can rename the output file to preferred filename.

4.3.6.Aggregate

Gender Enabling Environments Spatial Tool (GEEST)

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The screenshot shows the 'Aggregate' tab in the GEEST software. The 'Accessibility' dimension is selected, and the 'Aggregate' sub-tab is active. A table lists five factors: Women's Travel Patterns (WTP), Public Transport (PBT), Education and Training (ETF), Health Facilities (HEA), and Financial Facilities (FIF). Each factor has a file path and a weight of 20.00%. Below the table is a field for the 'Output Aggregate Raster Filename' set to 'Accessibility_score.tif'. An 'Execute' button is present. The lower section, titled 'Accessibility Factor Aggregation', explains that the tool aggregates raster outputs with equal weighting (or user-defined weights summing to 100%) to produce a final raster file containing values from 0 to 5.

Factors	Weight %
Women's Travel Patterns (WTP)	20.00
Public Transport (PBT)	20.00
Education and Training (ETF)	20.00
Health Facilities (HEA)	20.00
Financial Facilities (FIF)	20.00

Output Aggregate Raster Filename: Accessibility_score.tif

Execute

Accessibility Factor Aggregation

This tab aggregates the raster outputs of all available factors within the accessibility dimension by assuming equal weighting of all factors within the dimension. If equal weights are not appropriate for the specific context of the analysis, the user can adjust weights as necessary provided all weights still sum to 100%. If a factor was not calculated (perhaps due to missing data, or because it was deemed to be unimportant) that factor should be assigned a weight of 0%, and the remaining factor weights adjusted such that they add up to 100%.

Factor outputs that are created during the current working session are automatically loaded. Users can choose to load previously generated factor outputs from the output directory set up at tool initiation.

Output: A raster file containing values ranging from 0 to 5 is saved to the output directory and loaded into the workspace. Scores should be interpreted as outlined in the "About" tab.

1. Load the raster outputs generated in each of the previous factor tabs for the Accessibility Dimension.

If a factor was executed in the same work session, the file path will automatically be populated after execution.

2. If factors are missing, adjust the weighting percentage accordingly and ensure it totals to 100%.

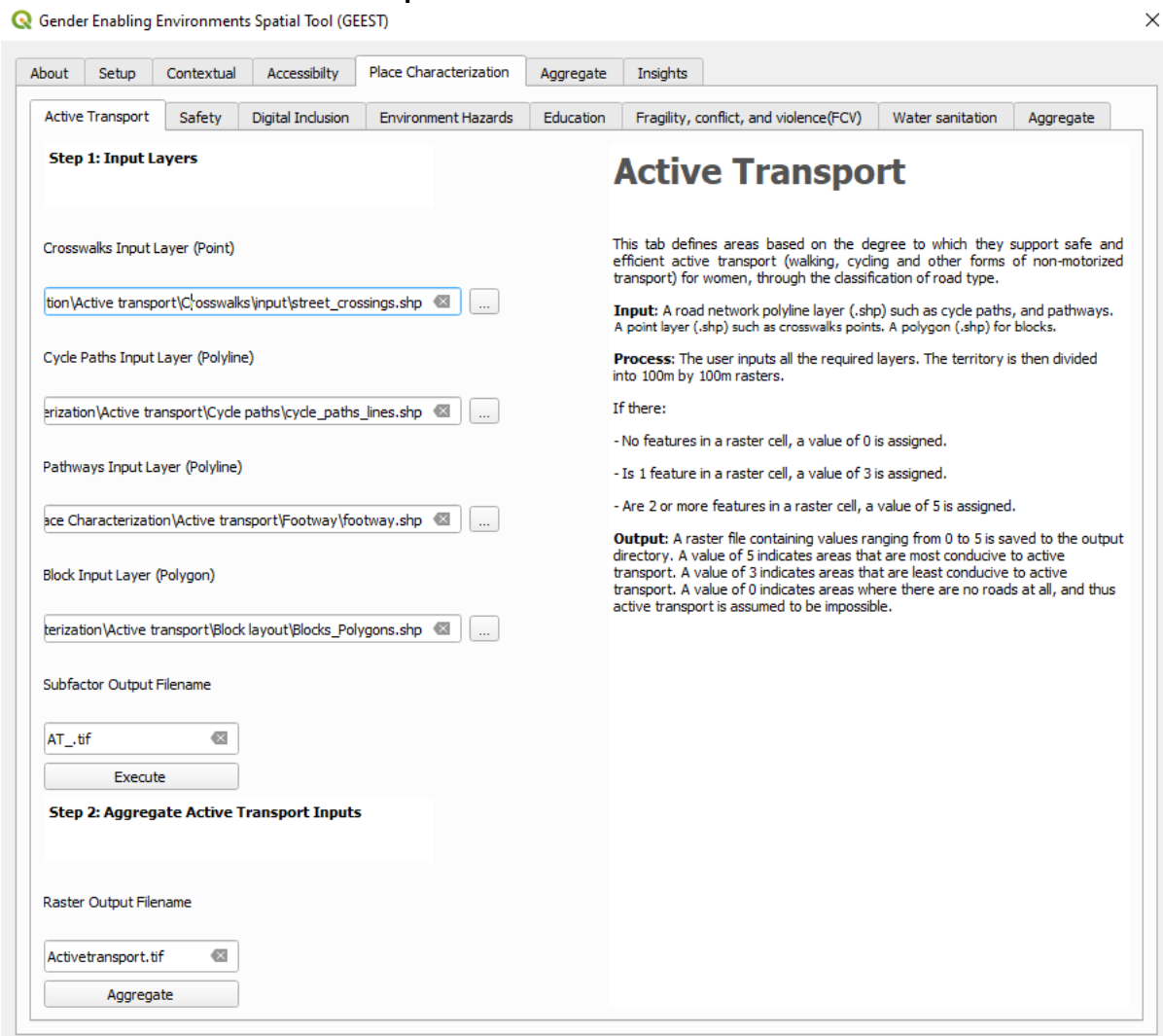
If a factor is missing it needs to be given a weighting of 0%. All factors should have equal weighting within a dimension.

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3. Enter alternate aggregated raster output file name if desired.
4. Enter an alternate aggregated raster output file name if desired. The standard output file name is *Accessibility_score.tif*.
5. Click the "Execute" button to run the algorithm.
6. Status text next to the "Execute" button will appear and let you know once processing is complete.
7. The aggregated layer will be loaded to the QGIS and appear in the table of contents.
8. The aggregated output raster file will be stored in the project folder specified in the "Setup" tab, under the "Accessibility" folder (*Project_Folder/Accessibility/Accessibility_score.tif*). The user can rename the output file to preferred filename.

4.4 PLACE CHARACTERIZATION TAB

4.4.1 Active Transport



1. Navigate to and select point shapefile for crosswalks, polyline shapefiles for cycle paths and for footpaths and polygon shapefile for block lengths.
2. Click the "Execute" button to run the algorithm.
3. Status text next to the "Execute" button will appear and let you know once processing is complete.
4. Each output factor will be stored in the project folder specified in the "Setup" tab, in the "AT" folder under the "Place Characterization" folder and have the following names *AT_street_crossings.tif*, *AT_cycle_paths.tif*, *AT_footway.tif* and *AT_blocks.tif*. The user can rename the output file to preferred filename.
5. Click the "Aggregate" button to run the algorithm.

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6. Status text next to the “Execute” button will appear and let you know once processing is complete.
7. The output raster file will be stored in the project folder specified in the “Setup” tab, under the “Place Characterization” folder (*Project_Folder/Place Characterization/Activetransport.tif*). The user can rename the output file to preferred filename.

4.4.2 Safety

 Gender Enabling Environments Spatial Tool (GEEST) ✕

AboutSetupContextualAccessibilityPlace CharacterizationAggregateInsights

Active TransportSafetyDigital InclusionEnvironment HazardsEducationFragility, conflict, and violence

Input Layer (Point, Polygon or Raster)

mapillary\street_lights.shp

Field of interest in polygon layer

Score level (0-5)

Perceived Safety Value

0.00

Raster Output Filename

SAF.tif

Execute

Safe Urban Design

This tab defines areas based on how brightly lit they are and assumes that brightly lit areas are safer than areas with no lights.

Input: Streetlight Locations (.shp, Point) or, if unavailable, VIIRS Nighttime Lights dataset (.tif) may be used as proxy data for streetlight locations. Alternatively, Perceived Safety data (.shp, Polygon) can be used if other data is unavailable. (**Important note:** If used for assessing safe urban design, nighttime lights should be excluded from the calculation of Electrical access.)

Output: A raster file containing values ranging from 0 to 5 is saved to the output directory. A value of 5 indicates the most brightly lit areas and by assumption the safest areas. 0 represents areas with no nighttime lights and by assumption the least safe areas.

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1. Navigate to and select

- streetlight Locations (point shapefile)
- or, if unavailable, VIIRS Nighttime Lights dataset (.tif) may be used as proxy data for streetlight locations
- alternatively, Perceived Safety data (polygon shapefile) can be used if other data is unavailable; select the field containing the numeric value representing data on women's perceived safety at the municipal, district, state, or any other required level. The tool would then standardize these scores, percentages, or statistics on a scale from 0 to 5, where 5 indicates the lowest level of violence or the highest level of perceived safety. Example:

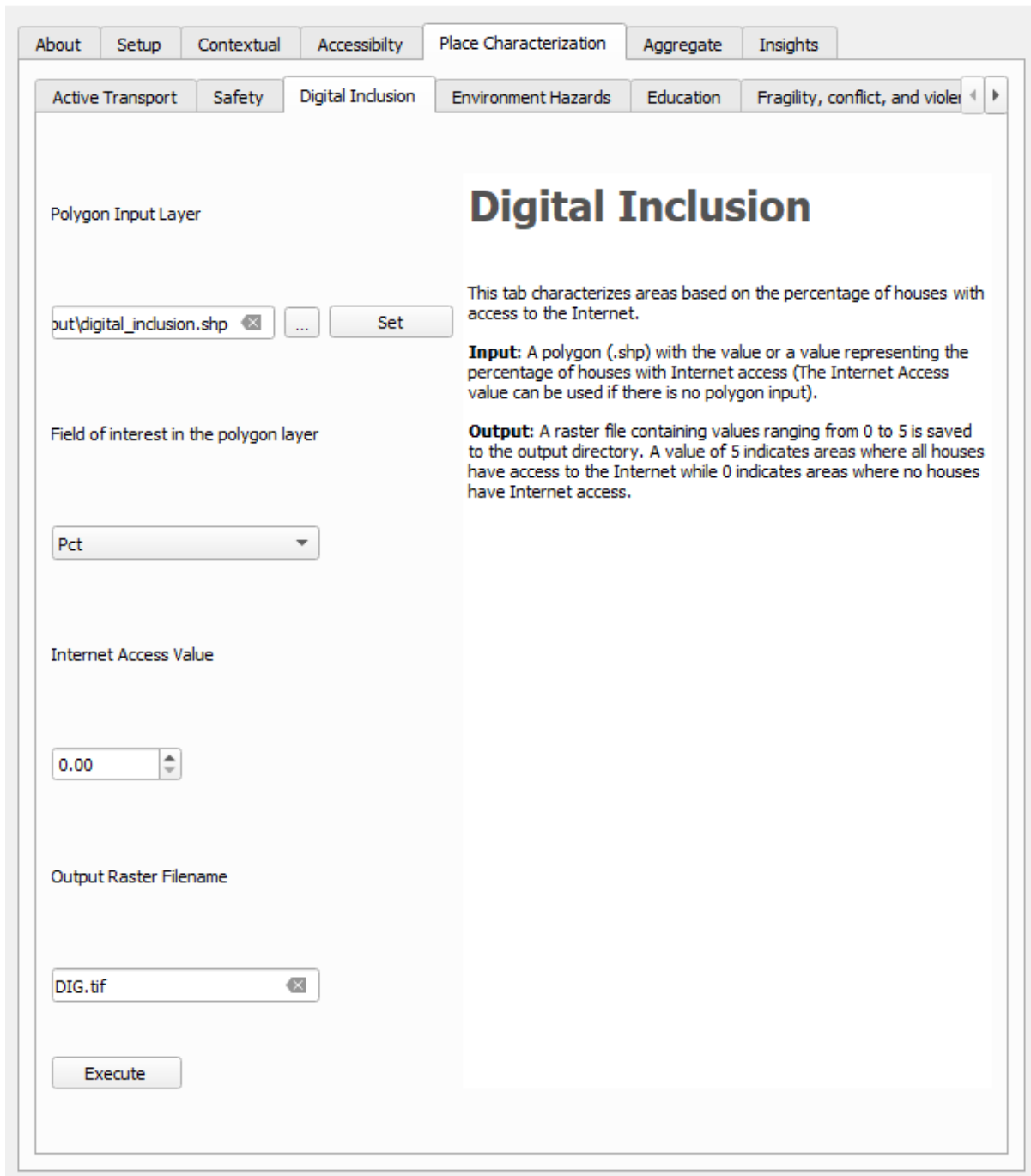
Score 5 (Safest): 0 to 1 homicide per 100,000 people
Score 4: 1.1 to 3 homicides per 100,000 people
Score 3: 3.1 to 6 homicides per 100,000 people
Score 2: 6.1 to 10 homicides per 100,000 people
Score 1: 10.1 to 15 homicides per 100,000 people
Score 0 (Least Safe): More than 15 homicides per 100,000 people

2. Click the "Execute" button to run the algorithm.
3. Status text next to the "Execute" button will appear and let you know once processing is complete.
4. The output raster file will be stored in the project folder set in the "Setup" tab, under the "Place Characterization" folder (*Project_Folder/PlaceCharacterization/SAF.tif*). The user can rename the output file to preferred filename.

4.4.3 Digital Inclusion

 Gender Enabling Environments Spatial Tool (GEEST)

×



The screenshot shows the 'Digital Inclusion' tab of the GEEST tool. The interface includes a top menu bar with tabs: About, Setup, Contextual, Accessibility, Place Characterization (selected), Aggregate, and Insights. Below this is a sub-menu bar with tabs: Active Transport, Safety, Digital Inclusion (selected), Environment Hazards, Education, and Fragility, conflict, and violence. The main content area is titled 'Digital Inclusion' and contains the following sections:

- Polygon Input Layer:** A text box containing 'out\digital_inclusion.shp', a close button (X), an ellipsis button (...), and a 'Set' button.
- Field of interest in the polygon layer:** A dropdown menu currently showing 'Pct'.
- Internet Access Value:** A text box containing '0.00' and a vertical spinner button.
- Output Raster Filename:** A text box containing 'DIG.tif' and a close button (X).
- Execute:** A button at the bottom left.

On the right side of the main content area, there is explanatory text:

This tab characterizes areas based on the percentage of houses with access to the Internet.

Input: A polygon (.shp) with the value or a value representing the percentage of houses with Internet access (The Internet Access value can be used if there is no polygon input).

Output: A raster file containing values ranging from 0 to 5 is saved to the output directory. A value of 5 indicates areas where all houses have access to the Internet while 0 indicates areas where no houses have Internet access.

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1. Navigate to and select

- the polygon input shapefile containing a field indicating the percentage of houses with internet access with disaggregated scores at, for example, the municipal or district level; select the field containing the numeric value representing data on houses with internet access.
- or a score at the country level as "Internet Access Value"

2. Click the "Execute" button to run the algorithm.

3. Status text next to the "Execute" button will appear and let you know once processing is complete.

4. The output raster file will be stored in the project folder specified in the "Setup" tab, under the "Place Characterization" folder (*Project_Folder/Place Characterization/DIG.tif*). The user can rename the output file to preferred filename.

4.4.4 Environmental Hazards

AboutSetupContextualAccessibilityPlace CharacterizationAggregateInsights

Active TransportSafetyDigital InclusionEnvironment HazardsEducationFragility, conflict, and violence

Step 1: Repeat for all available disaster risk types

Fire Hazard Input Layer (Raster)
 ...

Flood Hazard Input Layer (Raster)
 ...

Landslide Input Layer (Raster)
 ...

Tropical cyclone Input Layer (Raster)
 ...

Drought Input Layer (Raster)
 ...

Hazard Type Output Raster Filename
 ...

Execute

Step 2: Aggregate Natural Disaster Risk

Aggregated Hazard Raster Output Filename
 ...

Aggregate

Environmental Hazards

This tab characterizes areas based on their vulnerability to natural disasters.

Input: One or many polygon layers (.shp) which contain a field representing the level of risk of natural disasters. Risk should be classed as either low, medium or high. Different classes of natural disasters (such as landslide risk or flood risk) are often represented by separate input layers, and so each type of natural disaster is processed individually in step 1, before aggregating outputs in step 2.

Step 1

For each layer representing a different class of natural disaster, the input layer is set, and the user selects the field containing the level of risk from the drop-down list. In each layer, areas are classified as having either low, medium, or high risk. The algorithm reclassifies the input field such that low-risk areas are assigned a score of 5, medium-risk areas are assigned a score of 2, and high-risk areas are assigned a score of 0. The reclassified data are rasterized.

Step 2

The algorithm identifies all raster layers created in step 1 and aggregates them by calculating the mean score for each pixel. The default raster output filename does not need to be altered unless the user wishes.

Output: A raster file containing values ranging from 0 to 5 is saved to the output directory. A value of 5 indicates areas where natural disaster risk is lowest. A value of 0 indicates areas where natural disaster risk is highest.

1. Navigate to and select raster hazard event.

Forest Fire: Active Fires Density

Flood: Flood Hazard

Landslide: Landslide Susceptibility

Tropical Cyclone: Frequency of Tropical Cyclones

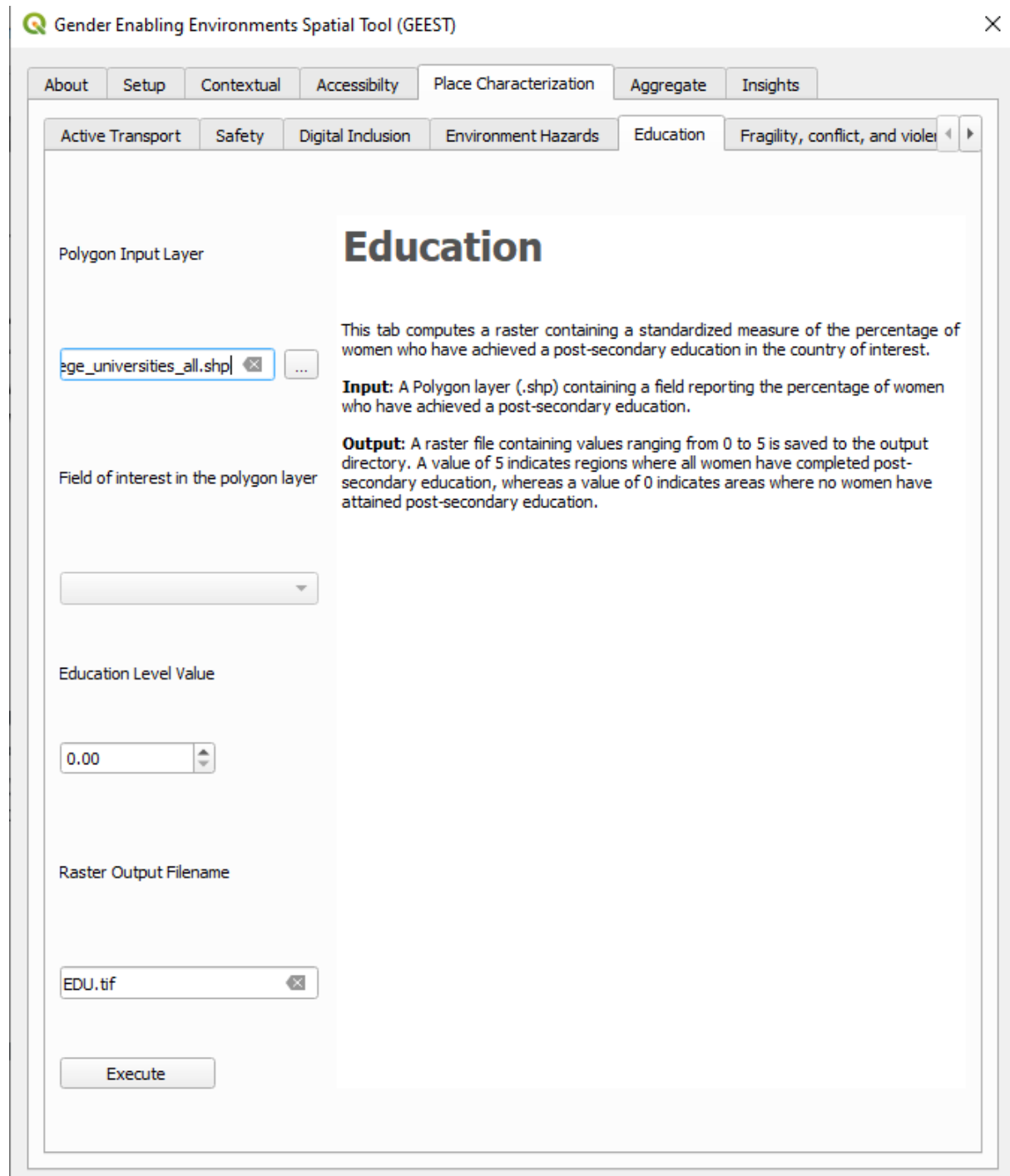
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Drought: Global Drought Hazard based on the Standardized Precipitation Evapotranspiration Index (SPEI)

Users should be able to select between 1 to 3 of these hazards that are most relevant to their specific context. For each selected hazard, the tool will generate raster cells of 100m x 100m and assign a score ranging from 0 to 5, standardized according to the hazard's scale. A score of 5 represents no hazard, while a score of 0 indicates areas at the highest risk. The final score will be the average of the scores from the selected hazards.

2. Click the "Execute" button to run the algorithm.
3. Status text next to the "Execute" button will appear and let you know once processing is complete.
4. Each output factor will be stored in the project folder specified in the "Setup" tab, in the "ENV" folder under the "Place Characterization" folder and have the following names *Hazard_Landslide.tif*, *Hazard_Fires.tif*, *Hazard_Floods_100_yrp.tif*, *Hazard_Tropical_Cyclone.tif* and *Hazard_Drought.tif*. The user can rename the output file to preferred filename.
5. Click the "Aggregate" button to run the algorithm.
6. Status text next to the "Execute" button will appear and let you know once processing is complete.
7. The output raster file will be stored in the project folder specified in the "Setup" tab, under the "Place Characterization" folder (*Project_Folder/Place Characterization/ENV.tif*). The user can rename the output file to preferred filename.

4.4.5 Education



1. Navigate to and select

- the polygon input shapefile containing a field indicating the percentage of women who have achieved a post-secondary education with disaggregated scores at, for example, the municipal or district level; select the field containing the

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numeric value representing the above percentage.

- or a score at the country level as “percentage of the labor force comprising women with university degrees in specified” in Education Level Value.

2. Click the “Execute” button to run the algorithm.
3. Status text next to the “Execute” button will appear and let you know once processing is complete.
4. The output raster file will be stored in the project folder specified in the “Setup” tab, under the “Place Characterization” folder (*Project_Folder/Place Characterization/EDU.tif*). The user can rename the output file to preferred filename.

4.4.6 Fragility, conflict, and violence (FCV)

About
Setup
Contextual
Accessibility
Place Characterization
Aggregate
Insights

Transport
Safety
Digital Inclusion
Environment Hazards
Education
Fragility, conflict, and violence(FCV)

Input CSV File

Fragility, conflict, and violence

This indicator is structured by assigning scores to rasters based on their overlap with buffers indicating different types of events.

Input: ACLED data as a csv file (.csv). If the impact radius of an event is known, it should be used instead.

Output: A raster file containing values ranging from 0 to 5 is saved to the output directory. Regions with score of 0 overlap with buffers of serious events. Regions with a score of 5 do not overlap with buffers of any event/s.

Warning: The processing may take a very long time to complete, during which the interface might become unresponsive.

Impact Radius in Metres (Optional)

0.00

Raster Output Filename

FCV.tif

Execute

1. Navigate to and select the csv data for Fragility, conflict and violence (FCV-ACLED data).
2. The default radius of 5km circular buffer can be changed from "Impact Radius in Meters (Optional)" if the impact radius of an event is known.
3. Click the "Execute" button to run the algorithm.
4. Status text next to the "Execute" button will appear and let you know once processing is complete.

5. The output raster file will be stored in the project folder specified in the "Setup" tab, under the "Place Characterization" folder (*Project_Folder/Place Characterization/FCV.tif*). The user can rename the output file to preferred filename.

4.4.7 Water sanitation

Gender Enabling Environments Spatial Tool (GEEST) ×

About Setup Contextual Accessibility Place Characterization Aggregate Insights

Digital Inclusion Environment Hazards Education Fragility, conflict, and violence(FCV) Water sanitation

Point Input Layer

Water Sanitation

This tab computes a raster containing a standardized measure of the percentage of women who have achieved water and sanitation services in the country of interest.

Input: A Point layer (.shp).

Process: The user inputs the water point layers. The territory is then divided into 100m by 100m rasters.

If there:

- No features in a raster cell, a value of 0 is assigned.
- Is 1 feature in a raster cell, a value of 3 is assigned.
- Are 2 or more features in a raster cell, a value of 5 is assigned.

Output: A raster file containing values ranging from 0 to 5 is saved to the output directory. Regions with no water points will have a value of 0, regions with one water point will have a value of 3, while regions with two or more water points will have a value of 5.

Raster Output Filename

WAS.tif

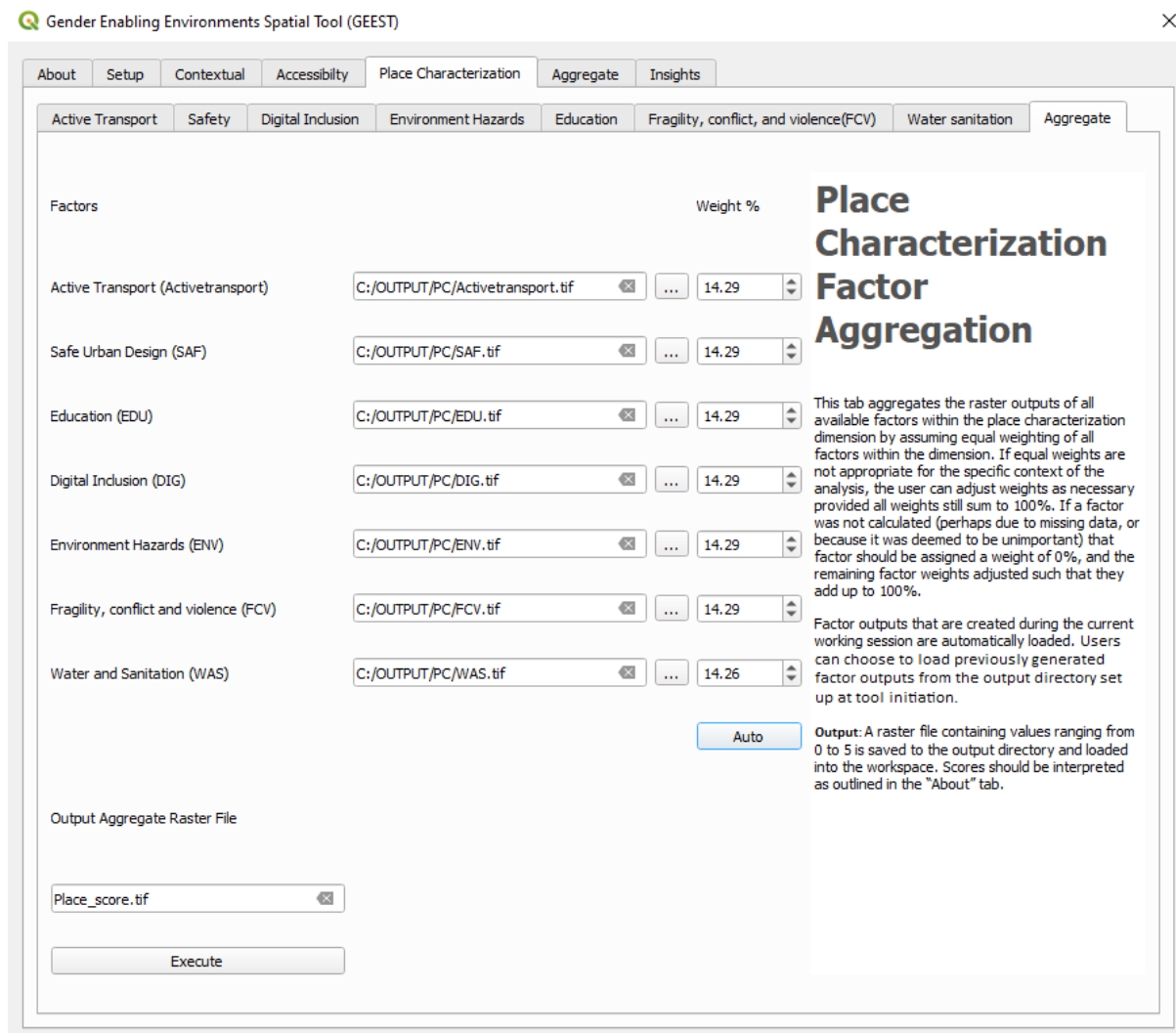
Execute

1. Navigate to and select point shapefile for water points, catch basins, water valves and fire hydrants.
2. Click the "Execute" button to run the algorithm.

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3. Status text next to the “Execute” button will appear and let you know once processing is complete.
4. The output raster file will be stored in the project folder specified in the “Setup” tab, under the “Place Characterization” folder (*Project_Folder/Place Characterization/WAS.tif*). The user can rename the output file to preferred filename.

4.4.8 Aggregate



1. Load the raster outputs generated in each of the previous factor tabs for the Place Characterization Dimension.

If a factor was executed in the same work session, the file path will automatically be populated after execution.

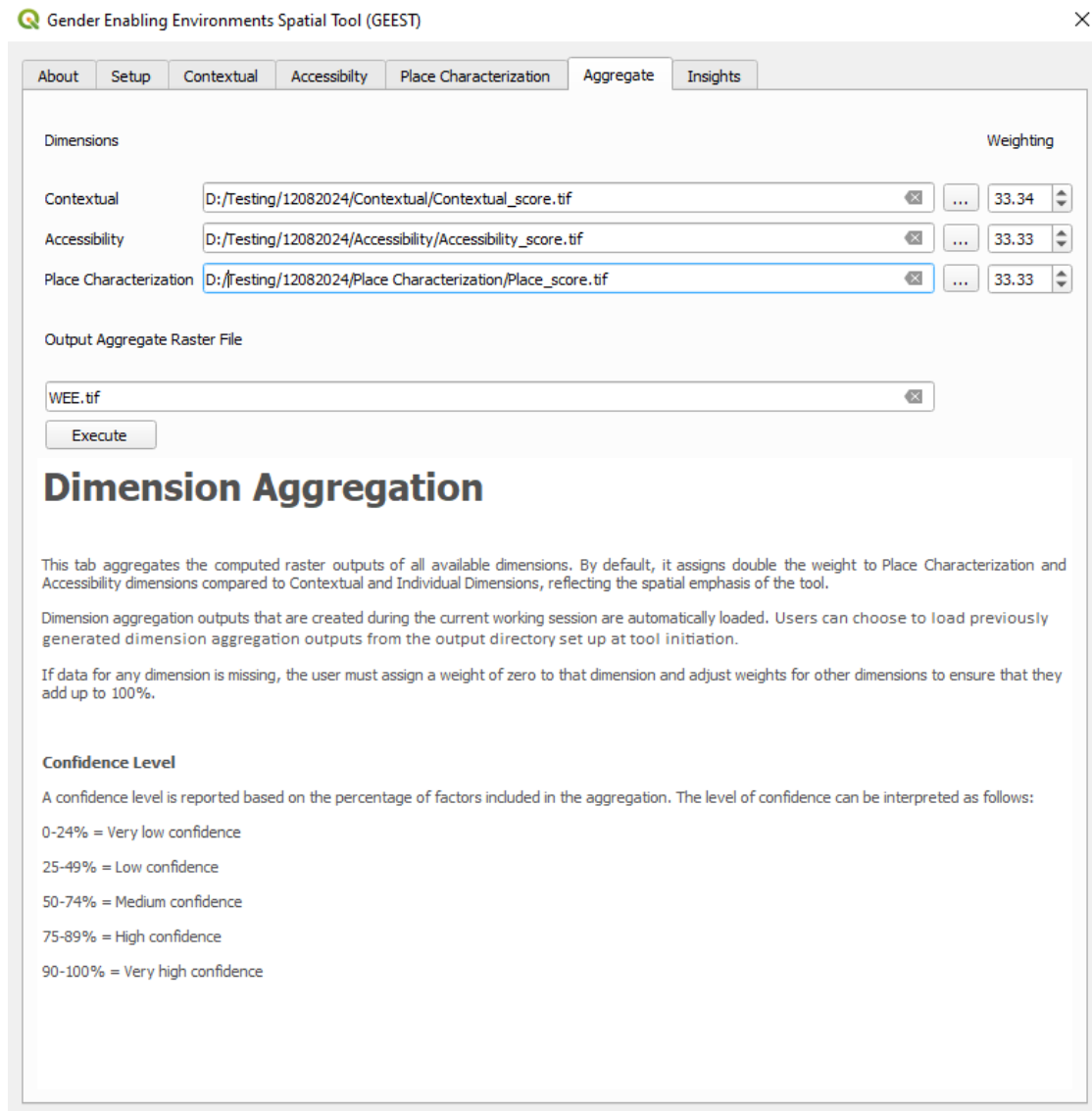
2. If factors are missing, adjust the weighting percentage accordingly and ensure it totals to 100%.

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If a factor is missing it needs to be given a weighting of 0%. All factors should have equal weighting within a dimension. The Auto button will automatically adjust the weights to ensure they sum to 100.

3. Enter alternate aggregated raster output file name if desired.
4. Enter an alternate aggregated raster output file name if desired. The standard output file name is *Place_score.tif*.
5. Click the "Execute" button to run the algorithm.
6. Status text next to the "Execute" button will appear and let you know once processing is complete.
7. The aggregated layer will be loaded to the QGIS and appear in the table of contents.
8. The aggregated output raster file will be stored in the project folder specified in the "Setup" tab, under the "Place Characterization" folder (*Project_Folder/Place Characterization/Place_score.tif*). The user can rename the output file to preferred filename.

4.5 DIMENSION AGGREGATION TAB



1. Load each dimension's aggregated raster outputs of previous domains (Contextual, Accessibility and Place Characterization).

If a dimension's factor aggregation was executed in the same work session, its file path will automatically be populated after execution.

2. If dimensions are missing, adjust the weighting percentage accordingly and ensure it totals up to 100%.

If a dimension is missing it needs to be given a weighting of 0%. All domains should have equal weighting within the aggregation tab.

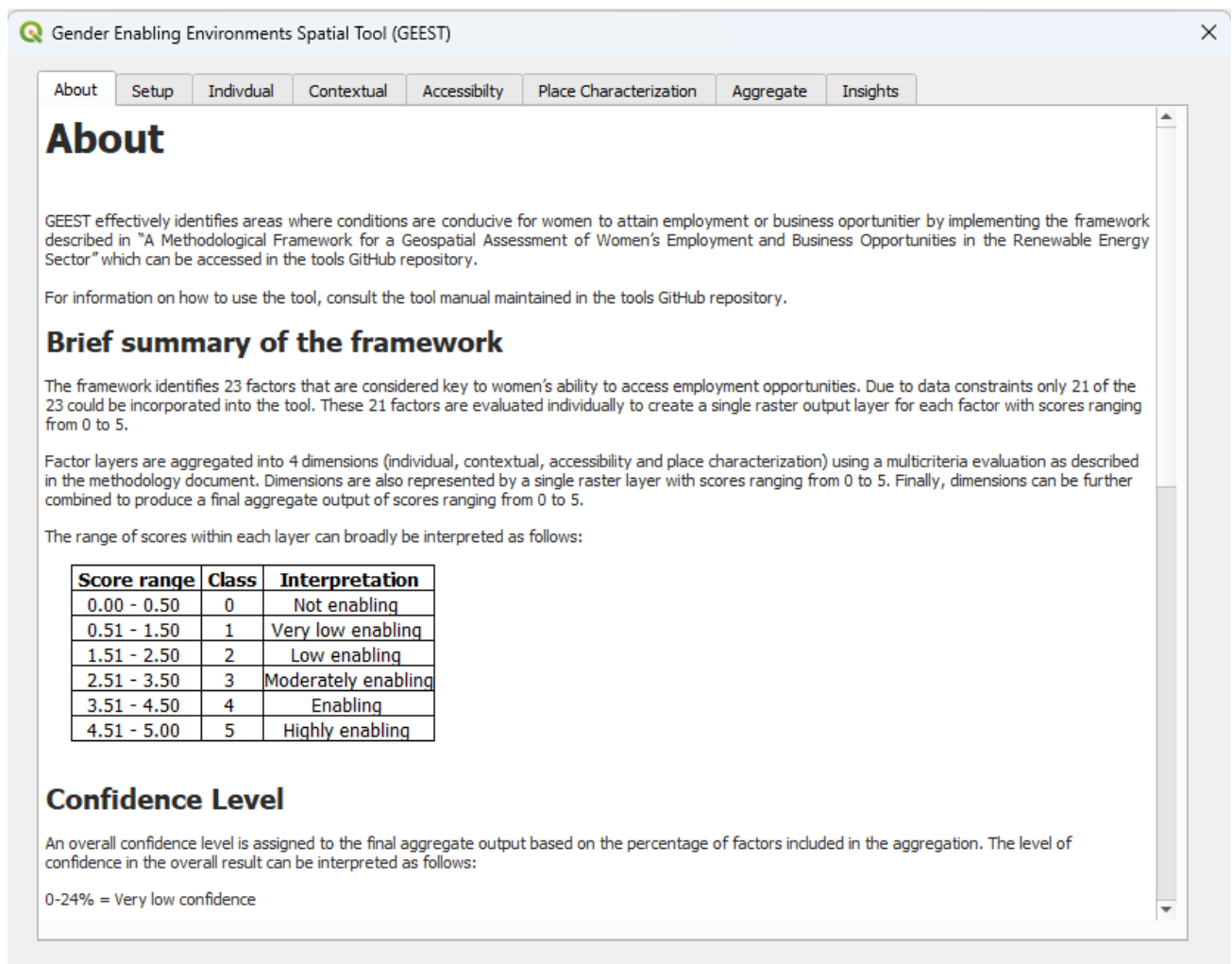
3. Enter aggregated dimensions raster output file name.
4. Click the "Execute" button to run the algorithm.
5. Status text next to the "Execute" button will appear and let you know once

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processing is complete.

6. The aggregated dimensional layer will be loaded to the QGIS and appear in the table of contents.
7. The aggregated output raster file will be stored in the project folder specified in the "Setup" tab, under the "Final_output" folder (*Project_Folder/Final_Output/WEE.tif). The user can rename the output file to preferred filename.

4.6 ABOUT TAB



About

GEEST effectively identifies areas where conditions are conducive for women to attain employment or business opportunities by implementing the framework described in "A Methodological Framework for a Geospatial Assessment of Women's Employment and Business Opportunities in the Renewable Energy Sector" which can be accessed in the tools GitHub repository.

For information on how to use the tool, consult the tool manual maintained in the tools GitHub repository.

Brief summary of the framework

The framework identifies 23 factors that are considered key to women's ability to access employment opportunities. Due to data constraints only 21 of the 23 could be incorporated into the tool. These 21 factors are evaluated individually to create a single raster output layer for each factor with scores ranging from 0 to 5.

Factor layers are aggregated into 4 dimensions (individual, contextual, accessibility and place characterization) using a multicriteria evaluation as described in the methodology document. Dimensions are also represented by a single raster layer with scores ranging from 0 to 5. Finally, dimensions can be further combined to produce a final aggregate output of scores ranging from 0 to 5.

The range of scores within each layer can broadly be interpreted as follows:

Score range	Class	Interpretation
0.00 - 0.50	0	Not enabling
0.51 - 1.50	1	Very low enabling
1.51 - 2.50	2	Low enabling
2.51 - 3.50	3	Moderately enabling
3.51 - 4.50	4	Enabling
4.51 - 5.00	5	Highly enabling

Confidence Level

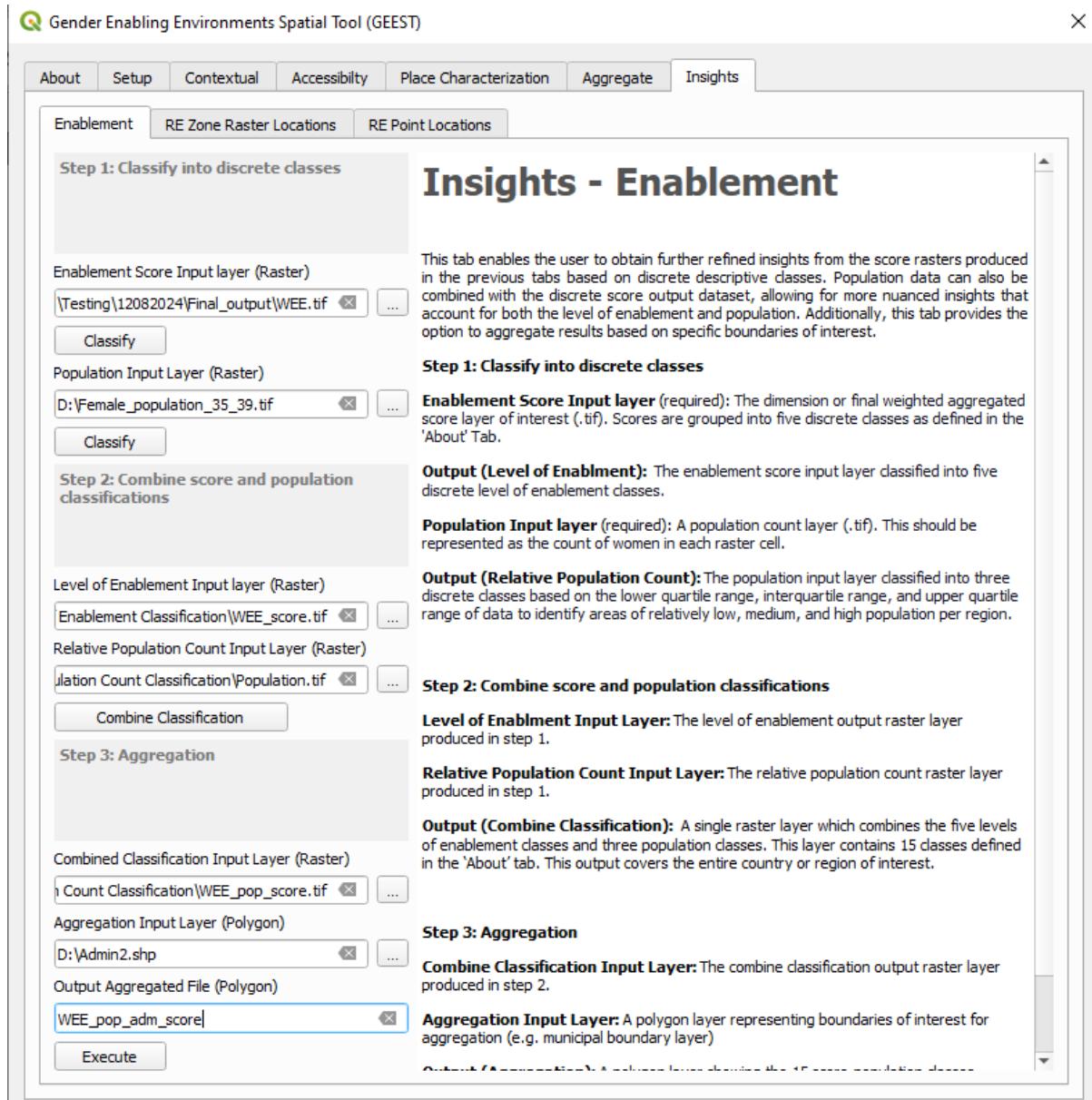
An overall confidence level is assigned to the final aggregate output based on the percentage of factors included in the aggregation. The level of confidence in the overall result can be interpreted as follows:

0-24% = Very low confidence

Information on the tool its framework, scoring system, and how results should or can be interpreted.

4.7 INSIGHTS TAB

4.7.1 Enablement



Step 1 Classify into discrete classes

- 1.1 Navigate to and select the enablement score input raster file. This can be the final aggregate score (WEE.tif), a dimension aggregate score, or even a single factor output layer.
- 1.2 Click the "Classify" button under the "Enablement Score Input layer" field to run the algorithm.
- 1.3 The output raster file will be stored in the project folder specified in the "Setup" tab,

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under the “Insights” 1) Level of Enablement Classification” folder. (*Project_Folder/Insights/1) Level of Enablement Classification/WEE_score.tif*). The user can rename the output file to preferred filename.

1.4 Navigate to and select the population input raster file.

E.g. Input File: *Population/Female_population_35_39.tif* (**Any of the age ranges can be used as input**).

1.5 Click the “Classify” button under the “Population Input layer” field to run the algorithm.

1.6 The output raster file will be stored in the project folder specified in the “Setup” tab, under the “Insights/ 2) Relative Population Count Classification” folder. (*Project_Folder/Insights/2) Relative Population Count Classification/Population.tif*). The user can rename the output file to preferred filename.

Step 2 Combine score and population classifications

2.1 Navigate to and select the “Level of Enablement” output raster file produced in **step 1.2** (*WEE_score.tif*). This file path will be automatically populated if **step 1.2** was executed in the same work session.

2.2 Navigate to and select the “Relative Population Count” output raster file produced in **step 1.5** (*Population.tif*). This file path will be automatically populated if **step 1.5** was executed in the same work session.

2.3 Click the “Combine Classification” button to run the algorithm combining the “Level of Enablement” and “Relative Population Count” raster layers.

2.4 The output raster file will be stored in the project folder specified in the “Setup” tab, under the “Insights/ 3) Combined Level of Enablement & Relative Population Count Classification” folder. (*Project_Folder/Insights/3) Combined Level of Enablement & Relative Population Count Classification/WEE_pop_score.tif*). The user can rename the output file to preferred filename.

Step 3 Aggregation

3.1 Navigate to and select the “Combine Classification” output raster file produced in **step 2.3**. This file path will be automatically populated if **step 2.3** was executed in the same work session.

3.2 Navigate to and select the aggregation input shapefile. This can be any polygon layer representing boundaries of interest for aggregation (e.g. municipal

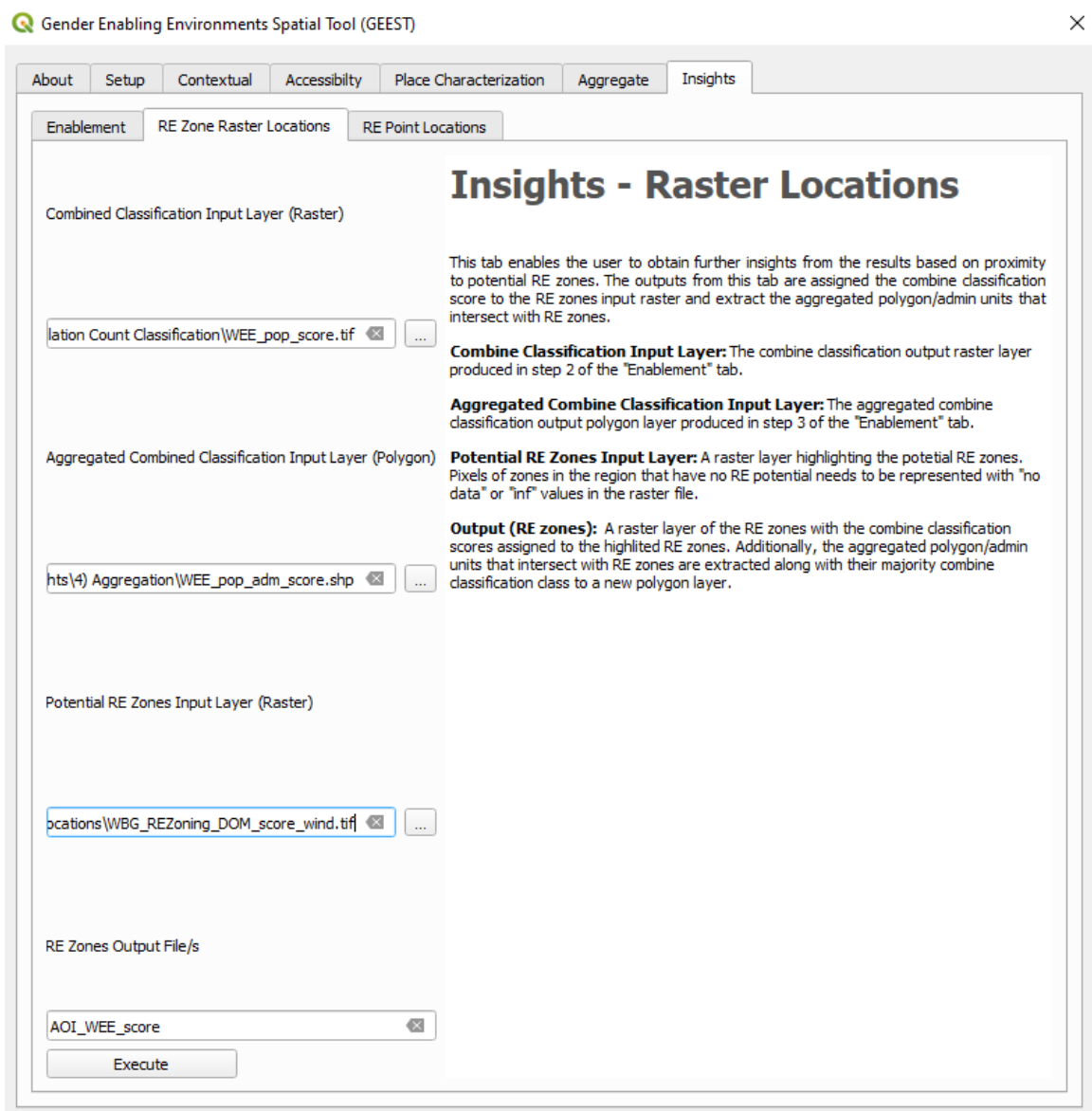
boundary layer).

E.G. Input File: *AdminBoundaries/Admin2.shp* (Any admin level can be used as input)

3.3 Click the "Execute" button to run the algorithm.

3.4 The output raster file will be stored in the project folder specified in the "Setup" tab, under the "Insights/4) Aggregation" folder. (*Project_Folder/Insights/4) Aggregation/ WEE_pop_adm_score.shp*). The user can rename the output file to preferred filename.

4.7.2 RE Raster Locations



1. Navigate to and select the combined classification input file produced in **step 2.3** of the "Enablement" tab (*WEE_pop_score.tif*). This file path will be automatically

populated if **step 2.3** of the "Enablement" tab was executed in the same work session.

2. Navigate to and select the aggregated combined classification input file produced in **step 3.3** of the "Enablement" tab (*WEE_pop_adm_score.shp*). This file path will be automatically populated if **step 3.3** of the "Enablement" tab was executed in the same work session.
3. Navigate to and select the potential RE zones input raster file. (Zones in the region that have no RE potential need to be represented with "no data" or "inf" values in the raster file).

E.G. Input File: *RE/WBG_REZoning_DOM_score_wind.tif*

E.G. Input File: *RE/WBG_REZoning_DOM_score_solar.tif*

4. Click the "Execute" button to run the algorithm.
5. The 2 output files will be stored in the project folder specified in the "Setup" tab, under *Raster Locations/AOI_WEE_score.tif* & *Project_Folder/Insights/5) RE Zone Raster Locations/AOI_WEE_score.shp*. The user can rename the output file to preferred filename.

4.7.3 RE Point Locations

Gender Enabling Environments Spatial Tool (GEEST) ×

About Setup Contextual Accessibility Place Characterization Aggregate **Insights**

Enablement RE Zone Raster Locations **RE Point Locations**

Insights - Point Locations

This tab enables the user to obtain further insights from the results based on proximity to RE point locations. The first output from this tab aggregates the combine classification score based on the majority class that falls within the RE point location buffers. The second output extracts the aggregated polygon/admin units that intersect with RE point location buffers. The majority class extraction for the buffers is conducted using the original combine classification raster produced in step 2 of the "Enablement" tab.

Combine Classification Input Layer: The combine classification output raster layer produced in step 2 of the "Enablement" tab.

Aggregated Combine Classification Input Layer: The aggregated combine classification output polygon layer produced in step 3 of the "Enablement" tab.

RE Point Location Input Layer: Point locations of interest (.shp). This could be existing RE job locations or other points of interest.

Buffer Distance: Maximum radial distance of circular buffer from point location in meters.

Output (RE Point): A polygon layer showing the 15 score-population classes aggregated to the RE point buffers scale using the majority class that fall within the buffers. Additionally, the aggregated polygon/admin units that intersect with RE point location buffers are extracted along with their majority class to a new polygon layer.

Combined Classification Layer (Raster)

D:\WEE_pop_score.tif

Aggregated Combined Classification Layer (Polygon)

D:\WEE_pop_adm_score.shp

RE Point Location Input Layer (Point)

er Locations\RE_points_of_interest.shp

Set buffer distance in meters

10000

RE Point Location Output File/s

POI_WEE_score

Execute

1. Navigate to and select the combined classification input file produced in **step 2.3** of the "Enablement" tab (WEE_pop_score.tif). This file path will be automatically populated if **step 2.3** of the "Enablement" tab was executed in the same work session.
2. Navigate to and select the aggregated combined classification input file produced in **step 3.3** of the "Enablement" tab (WEE_pop_adm_score.shp). This file path will be automatically populated if **step 3.3** of the "Enablement" tab was executed in the same work session.
3. Navigate to and select the RE point locations input shapefile of interest. (These could be existing RE job locations or other points of interest)
4. Set radial buffer distance in meters.
5. Click the "Execute" button to run the algorithm.

6. The 2 output shapefiles will be stored in the project folder specified in the "Setup" tab, *Locations/POI_WEE_score.shp* & *Project_Folder/Insights/6) RE Point Locations/POI_WEE_score.shp*). The user can rename the output file to preferred filename.

5 Troubleshooting

5.1 ACCESSIBILITY TABS PERMISSIONS ERROR

```
2023-10-23T16:15:36 WARNING Traceback (most recent call last):
File
"C:\Users\cmayenh\AppData\Roaming\QGIS\QGIS3\profiles\default\python\plugins\gender_indicator_tool\gender_indicator_tool.py", line 268, in
self.dlg.WTP_Execute_PB.clicked.connect(lambda: self.ServiceArea(5))
File
"C:\Users\cmayenh\AppData\Roaming\QGIS\QGIS3\profiles\default\python\plugins\gender_indicator_tool\gender_indicator_tool.py", line 1293, in ServiceArea
shutil.rmtree(tempDir)
File "C:\PROGRAM FILES (x86)\Python39\lib\shutil.py", line 740, in rmtree
return _rmtree_unsafe(path, onerror)
File "C:\PROGRAM FILES (x86)\Python39\lib\shutil.py", line 618, in _rmtree_unsafe
onerror(os.unlink, fullname, sys.exc_info())
File "C:\PROGRAM FILES (x86)\Python39\lib\shutil.py", line 616, in _rmtree_unsafe
os.unlink(fullname)
PermissionError: [WinError 32] The process cannot access the file because it is being used by another process:
'temp\SA_subset_15.dbf'
```

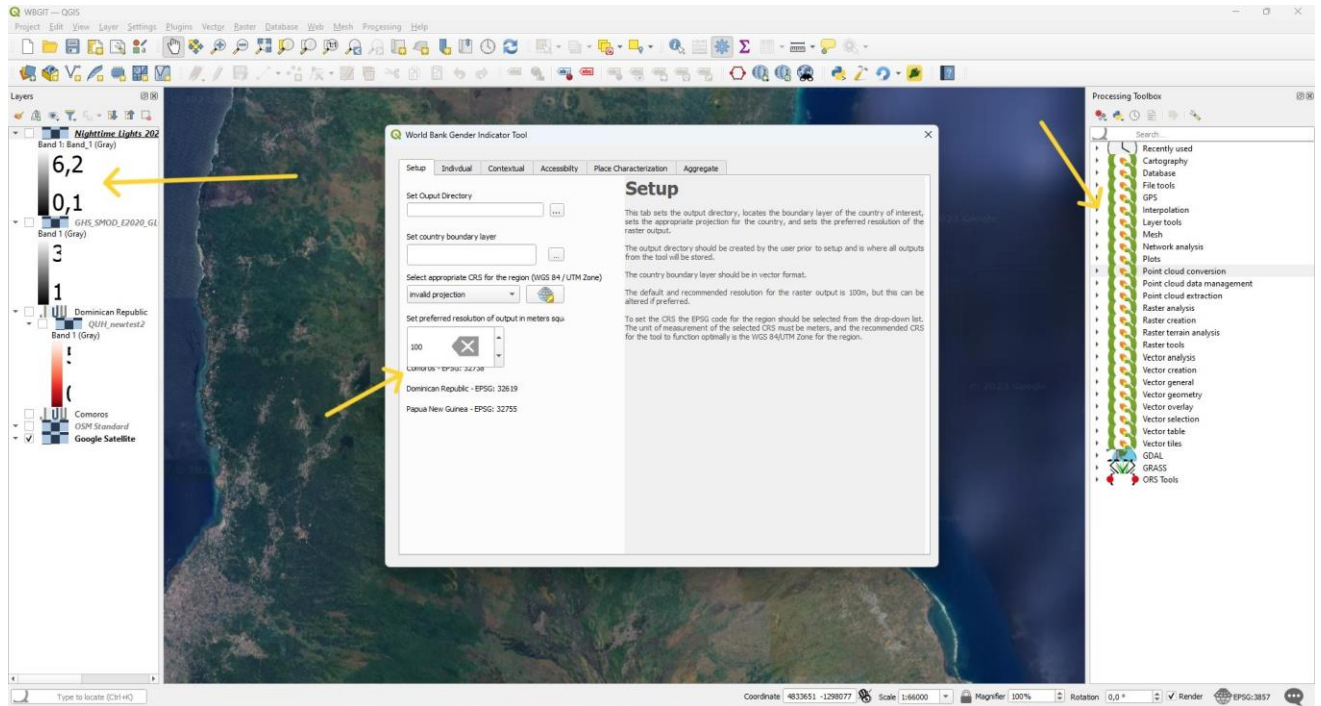
This error occurs when some of the shapefiles produced in the temp folder of the working directory are trying to be overwritten or deleted but can't because it's still being stored in QGIS's memory. This can occur even when the layer is removed from the QGIS table of contents.

This error may also occur when the tool runs correctly so first check if the desired output file was produced in the working directory.

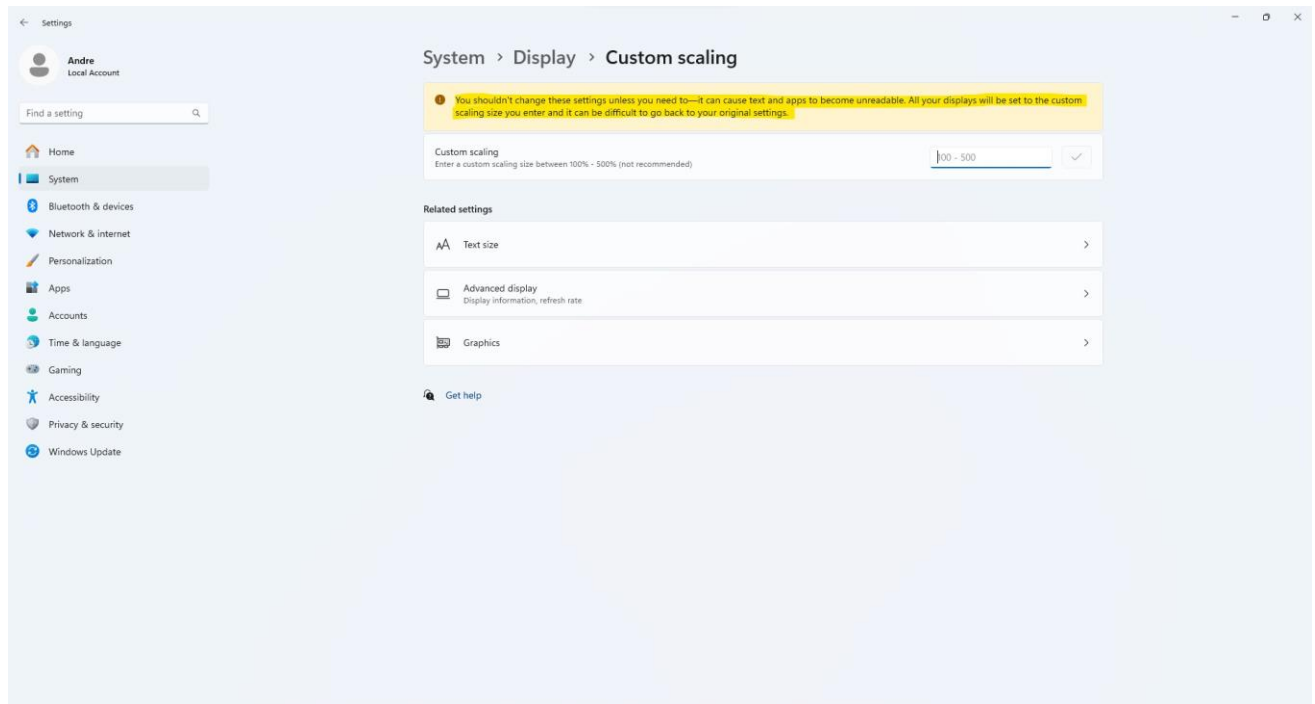
If the file is not produced, you can try the following:

- Delete the *temp* folder in the working directory
- If you cannot delete the *temp* folder you will have to close QGIS and open it again, complete the setup tab, go back to the tab where the error occurred and re-run the tab again.

5.2 QGIS PLUGIN/INTERFACE WIDGETS AND TEXT ARE DISTORTED AND SCALED INCORRECTLY

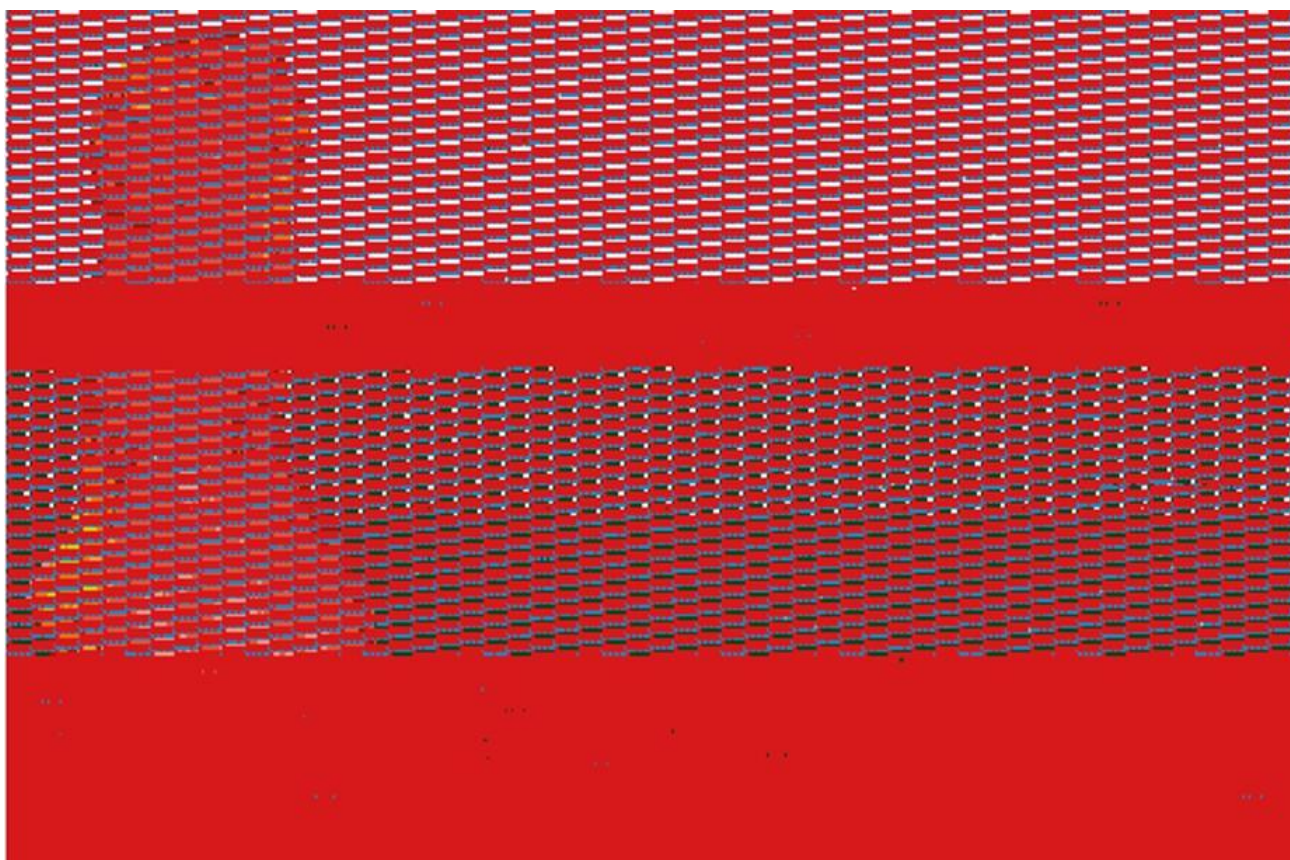


This is a problem linked to display settings caused by the connection of multiple monitors and/or varying display scales and resolutions, rather than a QGIS or plugin-related issue. This is backed by a Microsoft support post, linked [here](#), highlighting the issues that may be experienced when using a high-DPI device, such as a 4k monitor. Additionally, in the scaling display setting, Microsoft indicates that entering a custom scaling size between 100% - 500% is not recommended as "...it can cause text and apps to become unreadable."



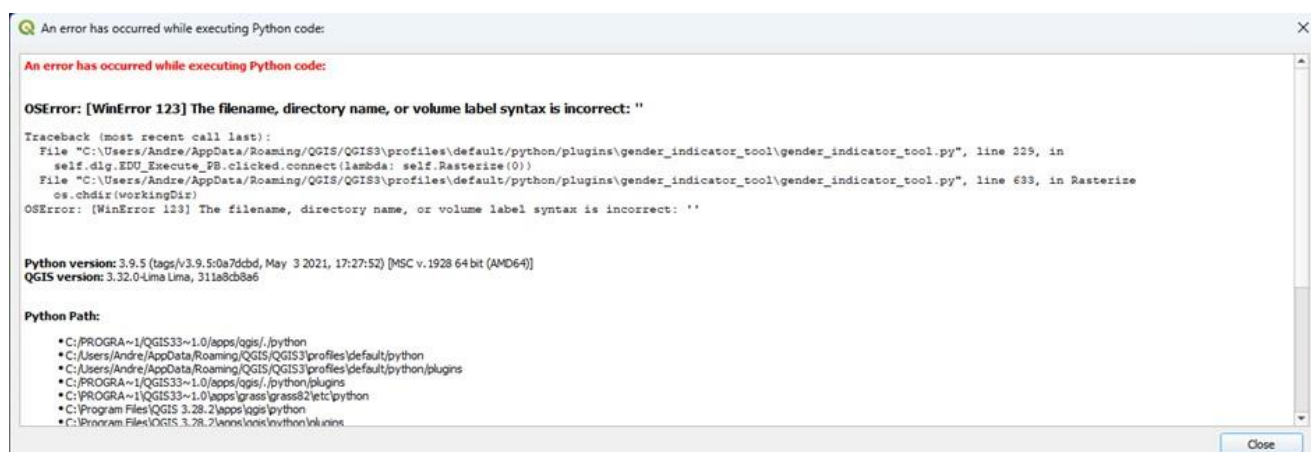
Possible solutions to this are: adjust the scale for all monitors to 100% or ensure that the display resolution is the same for both monitors. i.e. If the smallest monitor is set to 1920 x 1080 set the 4k monitor to this display resolution as well.

5.3 RASTER OUTPUTS NOT BEING LOADED AND DISPLAYING CORRECTLY



Occasionally, some of the outputs automatically loaded to the QGIS table of contents do not display correctly. To correct this, try removing the layer that is displayed incorrectly and add it again to QGIS.

5.4 ERROR: OUTPUT DIRECTORY NOT SET



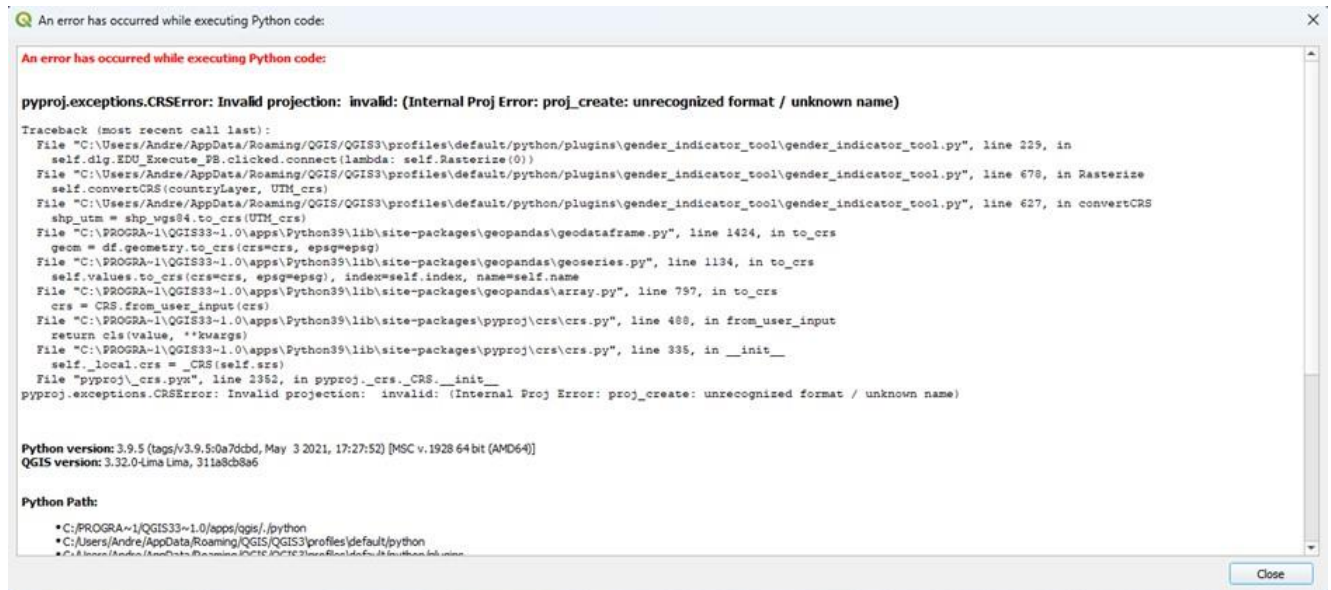
If you see the following error message, please check if your output directory has been set in the "Setup" tab.

5.5 ERROR: COUNTRY BOUNDARY POLYGON NOT SET



If you see the following error message, please check if your country boundary polygon layer has been set in the "Setup" tab.

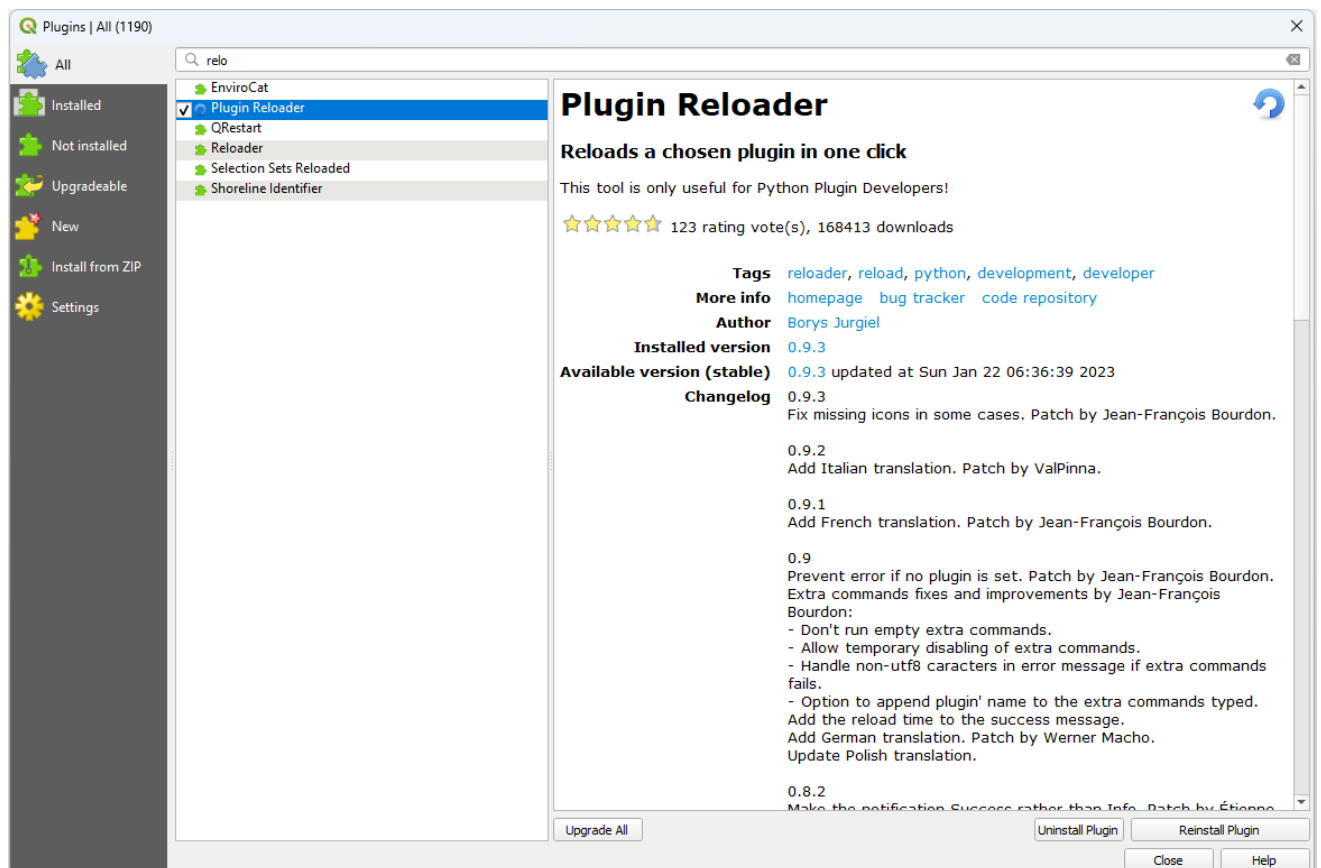
5.6 ERROR: COORDINATE REFERENCE SYSTEM (CRS) NOT SET



If you see the following error message, please check if your CRS has been set in the "Setup" tab.

5.7 ALTERNATIVE WAY TO REFRESH THE PLUGIN IF IT FREEZES OR DOES NOT RUN AS EXPECTED

1. Install the "Plugin Reloader" plugin.
2. Navigate to and open "Manage and Install Plugins..." under the plugins tab in QGIS.
3. In the search bar type "plugin reloader".
4. Select the "Plugin Reloader" plugin and click on the install button.

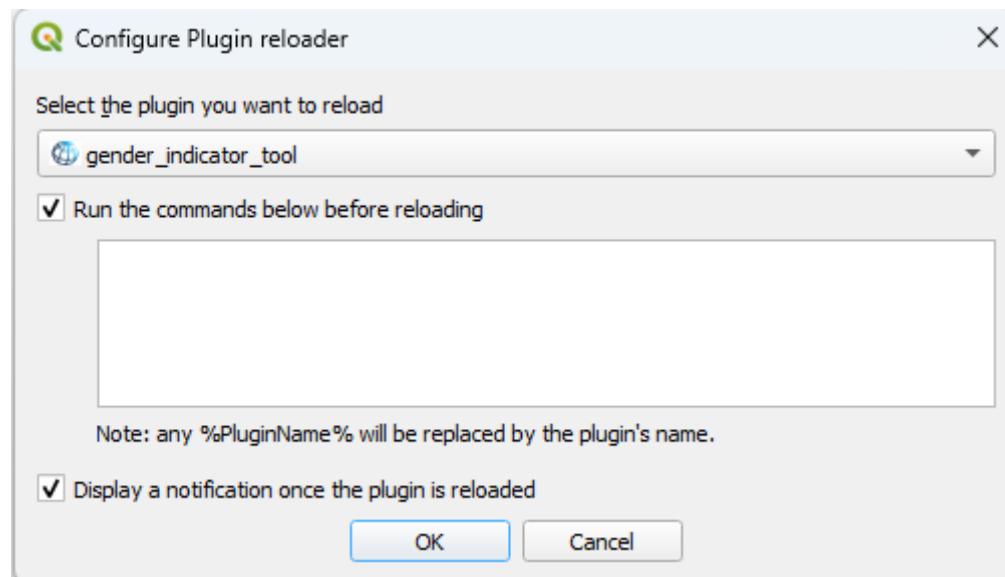


5. Navigate to the "Plugin Reloader" configuration window under the Plugins tab.

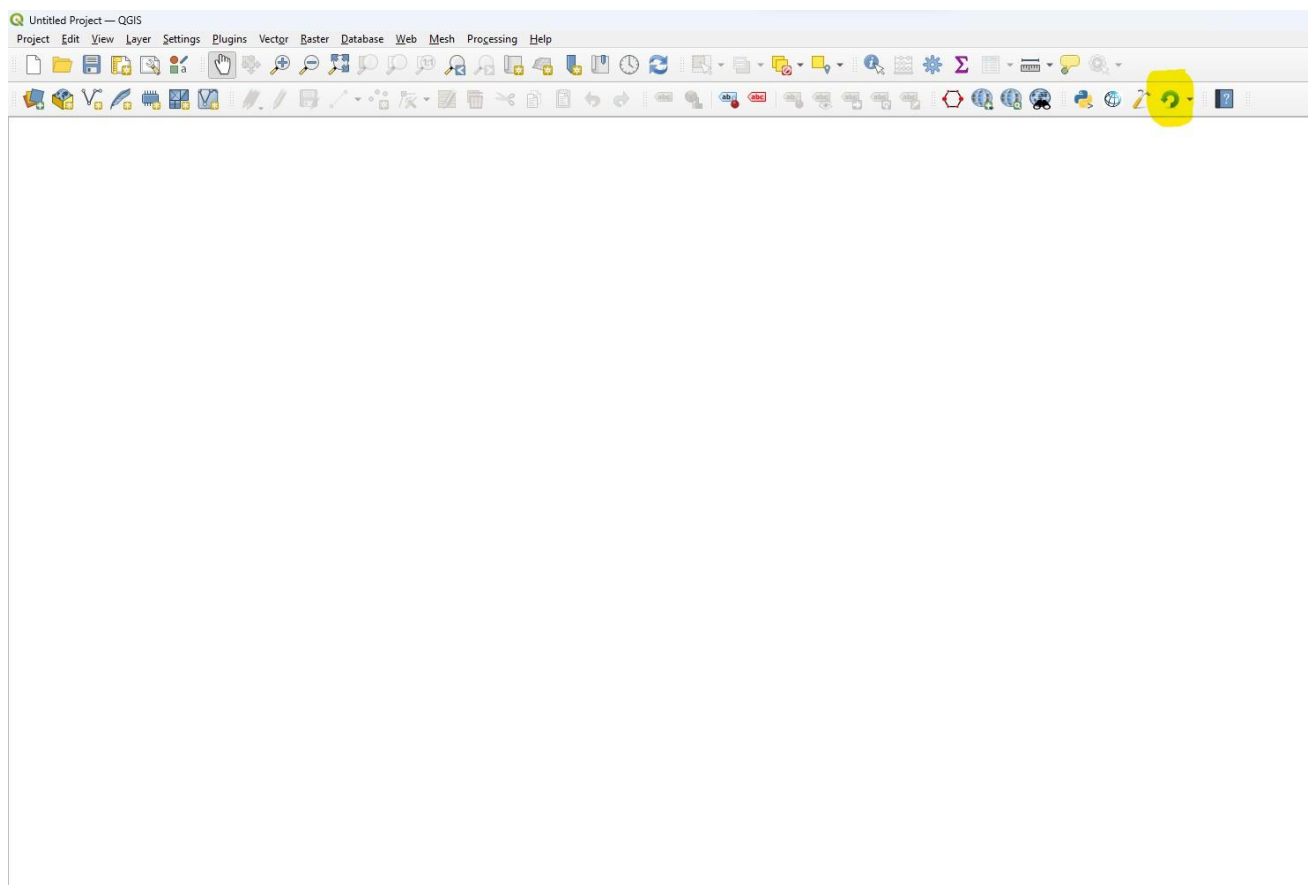
Plugins → Plugin Reloader → Configure

6. From the drop-down list select the "gender_indicator_tool" plugin and press "OK".

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7. If you encounter an unexpected error in the tool that has not been mentioned in any of the previous troubleshooting sections, you can try running the “plugin reload” tool



OR

If the “Plugin Reloader” does not resolve the error close QGIS, restart it again,

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and re- run the process you were trying to execute.

List of CRSs for SIDS

Country	WGS84 / UTM CRS	EPSG
Antigua and Barbuda	WGS 84 / UTM zone 20N	32620
Belize	WGS 84 / UTM zone 16N	32616
Cabo Verde	WGS 84 / UTM zone 26N	32626
Comoros	WGS 84 / UTM zone 38S	32738
Dominica	WGS 84 / UTM zone 20N	32620
Dominican Republic	WGS 84 / UTM zone 19N	32619
Fiji	WGS 84 / UTM zone 60S	32760
Grenada	WGS 84 / UTM zone 20N	32620
Guinea-Bissau	WGS 84 / UTM zone 28N	32628
Guyana	WGS 84 / UTM zone 21N	32621
Haiti	WGS 84 / UTM zone 18N	32618
Jamaica	WGS 84 / UTM zone 17N	32617
Kiribati	WGS 84 / UTM zone 1N	32601
Maldives	WGS 84 / UTM zone 43N	32643
Marshall Islands	WGS 84 / UTM zone 58N	32658
Mauritius	WGS 84 / UTM zone 40S	32740
Micronesia (Federated States of)	WGS 84 / UTM zone 57N	32657
Nauru	WGS 84 / UTM zone 58N	32658
Niue	WGS 84 / UTM zone 1S	32701
Palau	WGS 84 / UTM zone 53N	32653
Papua New Guinea	WGS 84 / UTM zone 55S	32755
Samoa	WGS 84 / UTM zone 2S	32702
Sao Tomé and Príncipe	WGS 84 / UTM zone 32N	32632
Solomon Islands	WGS 84 / UTM zone 57S	32757
St. Lucia	WGS 84 / UTM zone 20N	32620
St. Vincent and the Grenadines	WGS 84 / UTM zone 20N	32620
Suriname	WGS 84 / UTM zone 21N	32621
Timor-Leste	WGS 84 / UTM zone 52S	32752
Tonga	WGS 84 / UTM zone 60S	32760
Tuvalu	WGS 84 / UTM zone 60S	32760
Vanuatu	WGS 84 / UTM zone 59S	32759

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