

The Fourth International Workshop
on GIS Technology and Application

GIS Technology for Land Use Evaluation

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PART 1

Case

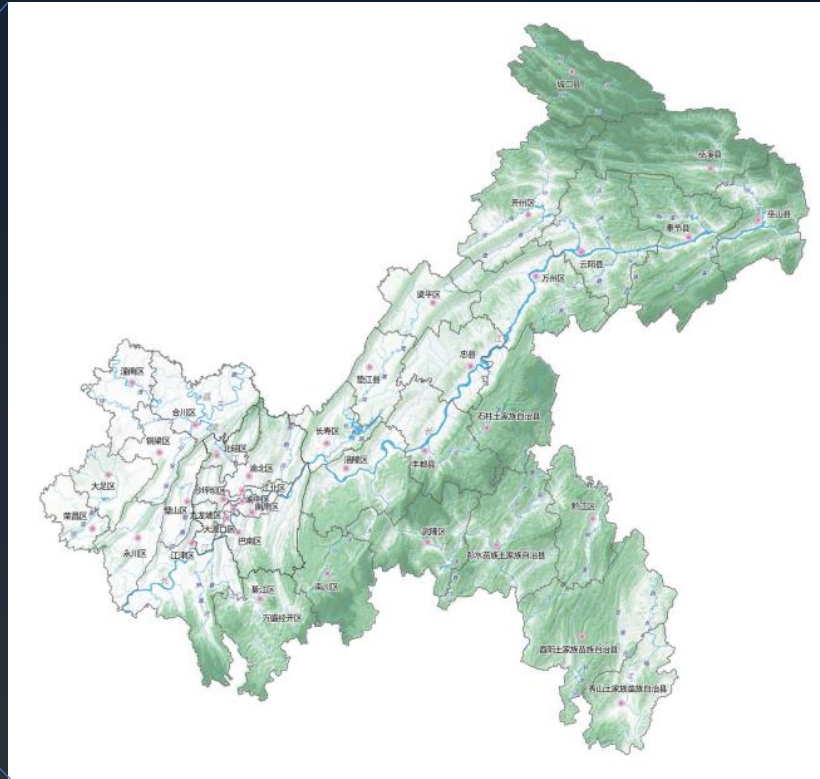
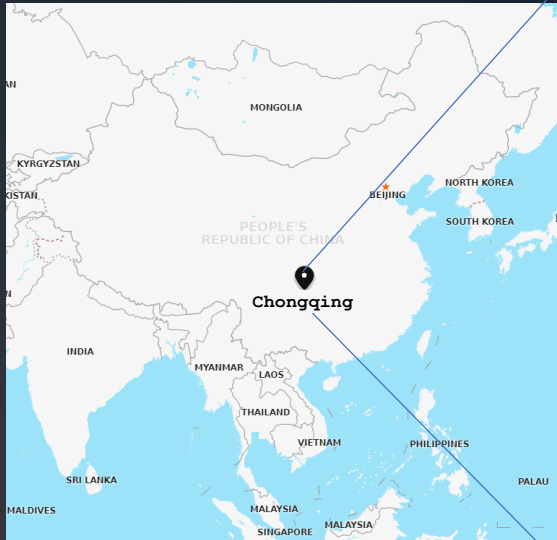
Introduction





PART 1 Case Introduction

Study Area



- Chongqing is an economically important municipality in West China and is the biggest inland municipality of the country with plans for even more massive growth.





PART 1 Case Introduction

Problems in Land Use

- Poor quality of agricultural land
- Decrease in agricultural area
- Unbalanced expansion of urban land





PART 1 Case Introduction

Aims for Agricultural Land Use Evaluation

Protect Agricultural Land

Planning Based on Suitability

Sustainable Development





PART 2

Evaluation Framework

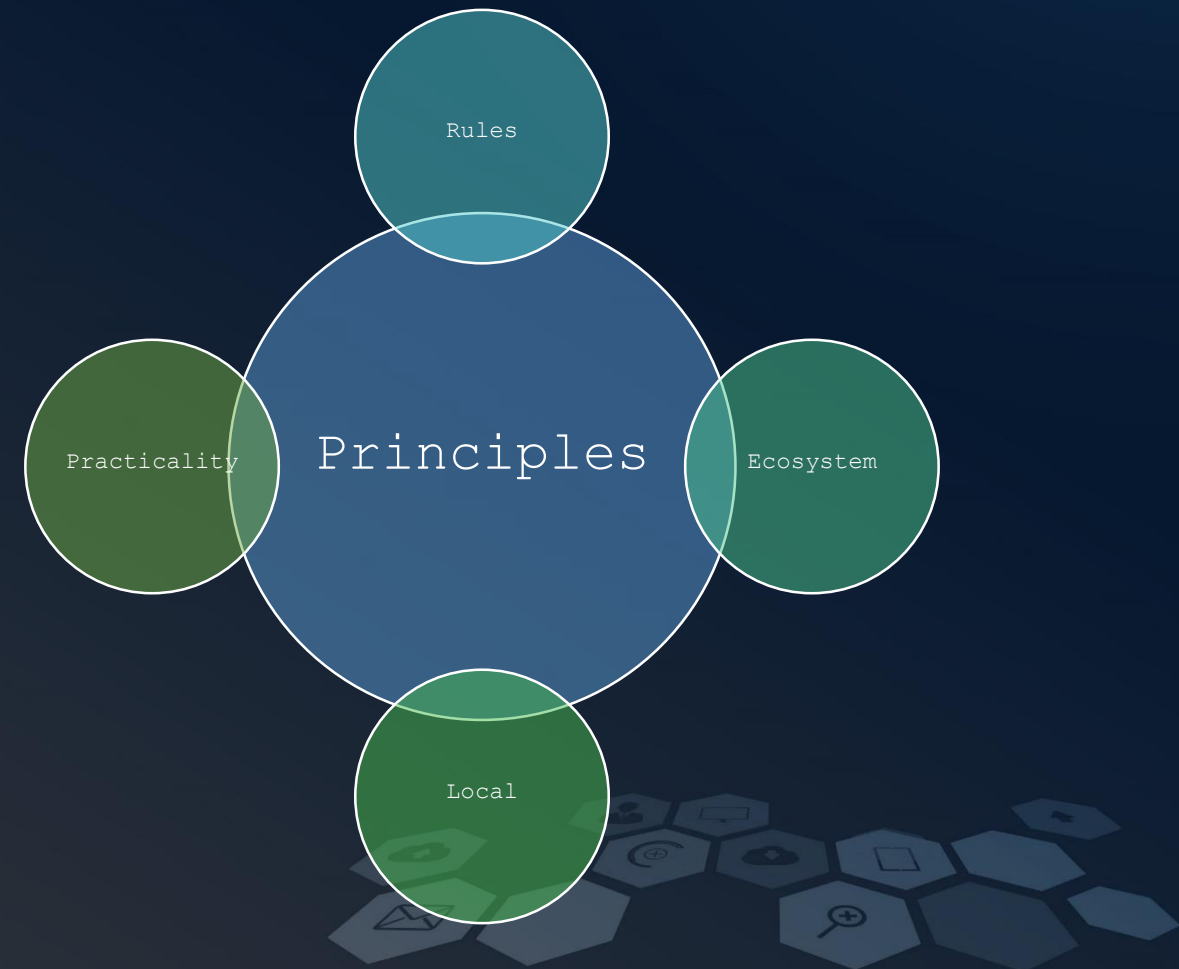




PART 2 Evaluation Framework

Two-criteria Land Use Evaluation

- According to *Evaluation Guide on Environmental Resource Capability and Spatial Planning Suitability*, land evaluation at town and larger scale will be based on a two-criteria system considering resource capability and spatial suitability equivalently.





PART 2 Evaluation Framework

Environmental Resource Capability



- It refers to the capability of certain land space to support human activities, based on its natural, environmental and ecological resources comprehensively.





PART 2 Evaluation Framework

Spatial Planning Suitability

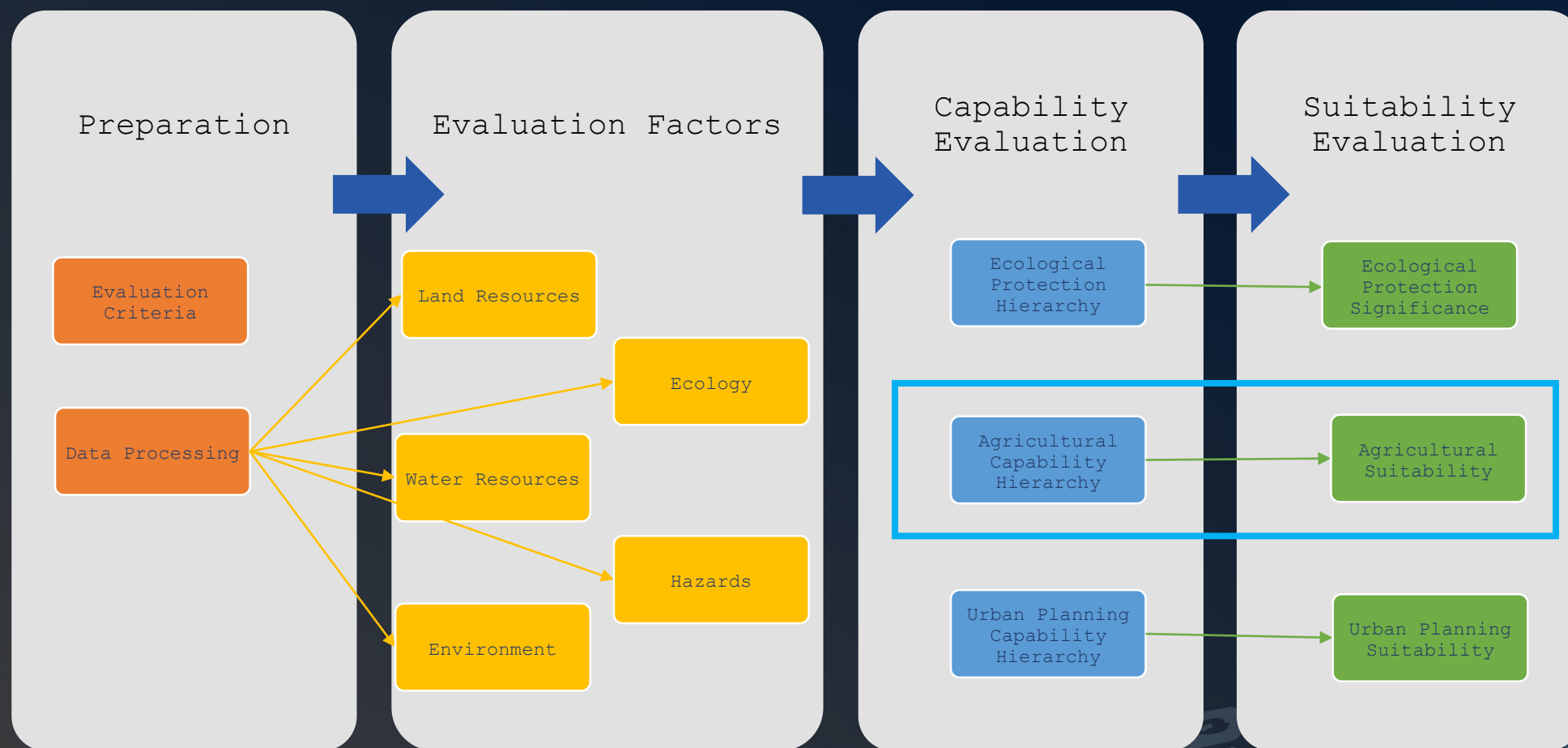
- It is the suitability of certain land space for varied land use types, including ecosystem protection, agriculture and urban planning.





PART 2 Evaluation Framework

Evaluation Framework





PART 2 Evaluation Framework

Evaluation Factors

Land Use Type	Land Resources	Water Resources	Ocean Resources	Environment	Ecosystem	Hazards
Natural Reserve					Water Quality Biodiversity Erosion	
Agriculture	Slope Height Soil Composition	Precipitation Amount of Water	Productivity	Temperature Energy Soil Capability	Salinization	Drought Flood Wildfire
Urban Planning	Slope Height Terrain	Precipitation Amount of Water	Coastal Line Depth Wind Speed Flow Velocity	Air Quality Water Capability		Earthquake Landslide Tsunami



PART 3

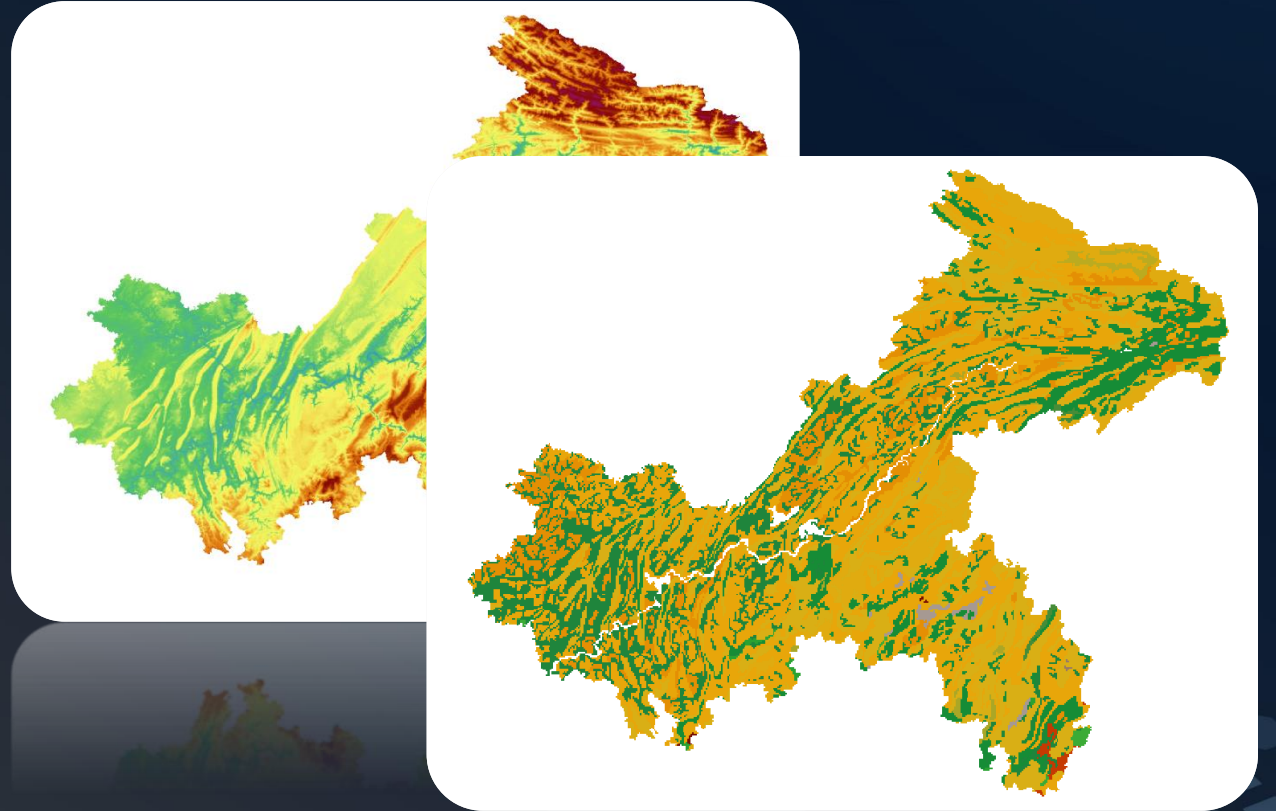
Application





PART 3 Application

Data





PART 3 Application

Evaluation Criteria

- Agricultural land resource evaluation is based on the value of slope

Slope (degree)	<3	3-8	8-15	15-25	>=25
Hierarchy	1	2	3	4	5

- Hierarchy of the region will be degraded based on the height and percentage of sand in soil

Height (m)	<2000	2000-3000	3000-4900	>=4900	% Sand	<45	>=45	>=60
Hierarchy	0	+1	+2	+5	Hierarchy	0	+1	+2

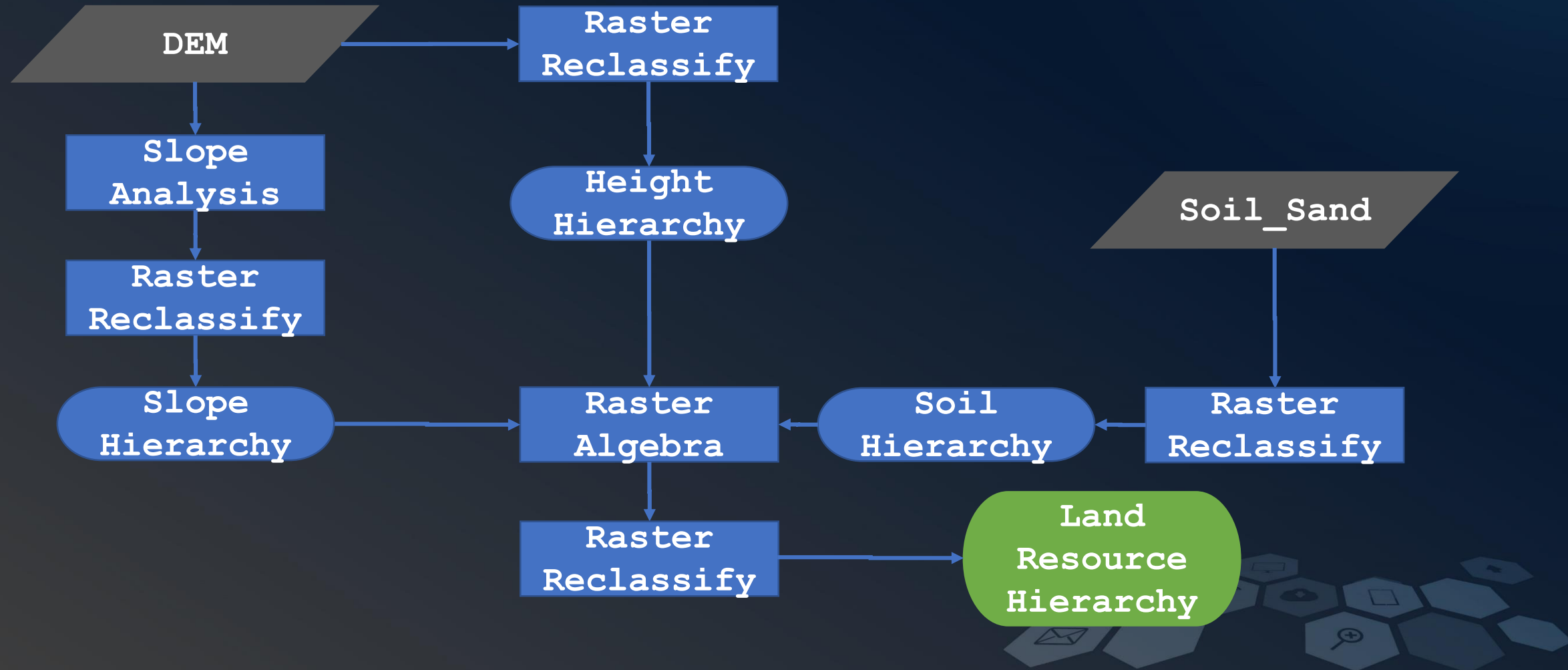
- Hierarchy larger than 5 should be regarded as 5, 1 is the highest hierarchy in evaluation





PART 3 Application

Workflow

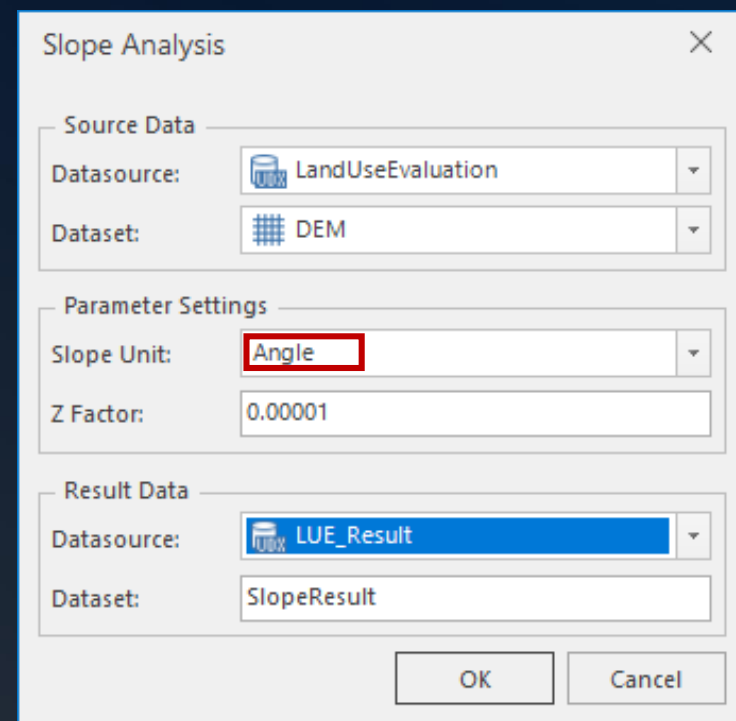
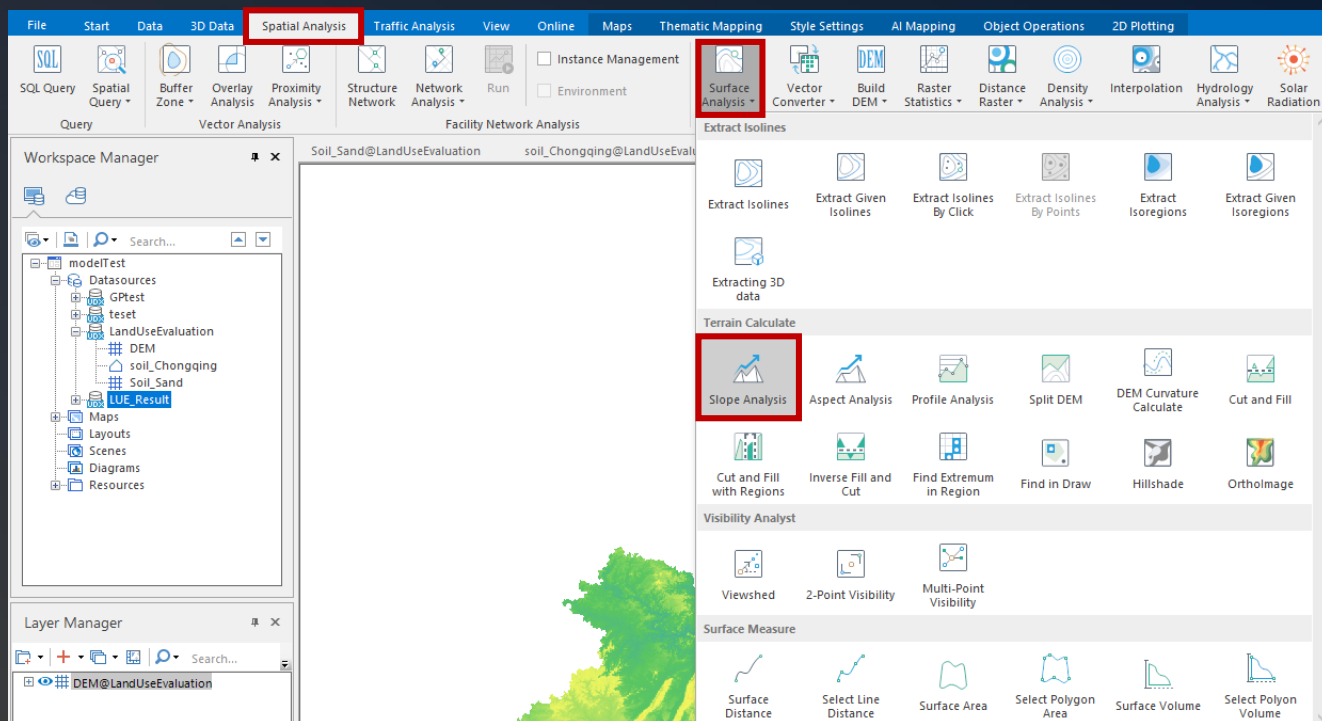




PART 3 Evaluation Case

Slope Analysis

- Spatial Analysis -> Raster Analysis -> Surface Analysis -> Slope Analysis





PART 3 Evaluation Case

Slope Raster Reclassify

- Data -> Data Processing -> Raster Reclassify

The screenshot shows the QGIS interface with the 'Data' menu highlighted in the top menu bar. The 'Raster Reclassifying' dialog box is open, displaying a table of values to be reclassified. The 'Source Data' is 'LUE_Result' and the 'Dataset' is 'SlopeResult'. The 'Result Data' is also 'LUE_Result' and the 'Dataset' is 'SlopeReclass'. The 'Pixel Format' is set to 'Single'. The 'Range' is set to 'Left Close Rig...'. The 'Level Setting' is set to 'Ranges' with a value of '5'. The 'Custom Target Value' section has 'Null' set to '-9,999' and 'Unrated Units' set to '0'. The 'Environment' button is highlighted.

	Lower Value	Upper Value	Target Value
1	0	3	1
2	3	8	2
3	8	15	3
4	15	25	4
5	25	90	5



PART 3 Evaluation Case

Height Raster Reclassify

- Data -> Data Processing -> Raster Reclassify

The screenshot shows the QGIS interface with the 'Raster Reclassifying' dialog box open. The 'Data' menu is highlighted in the top menu bar. The 'Raster Reclassifying' dialog box has the following settings:

- Source Data:**
 - Datasource: LandUseEvaluation
 - Dataset: DEM
- Result Data:**
 - Datasource: LUE_Result
 - Dataset: HeightReclass
 - Pixel Format: Single
- Range:**
 - ☒ Left Close Rig... ☐ Left Open Rig...
- Level Setting:**
 - ☒ Ranges: 4
 - ☐ Interval: 690.5
- Custom Target Value:**
 - ☐ Null: -32,768
 - ☐ Unrated Units: 0

The 'Raster Reclassifying' dialog box also contains a table with the following data:

	Lower Value	Upper Value	Target Value
1	0	2,000	0
2	2,000	3,000	1
3	3,000	4,900	2
4	4,900	9,000	5



PART 3 Evaluation Case

Soil Raster Reclassify

- Data -> Data Processing -> Raster Reclassify

The screenshot shows the QGIS interface with the 'Data' menu highlighted in the top menu bar. The 'Raster Reclassifying' dialog box is open, displaying the following settings:

- Source Data:**
 - Datasource: LandUseEvaluation
 - Dataset: Soil_Sand
- Result Data:**
 - Datasource: LUE_Result
 - Dataset: SoilReclass
 - Pixel Format: Single
- Range:**
 - ☒ Left Close Rig... ☐ Left Open Rig...
- Level Setting:**
 - ☒ Ranges: 3
 - ☐ Interval: 27.333333
- Custom Target Value:**
 - ☐ Null: -9,999
 - ☐ Unrated Units: 0

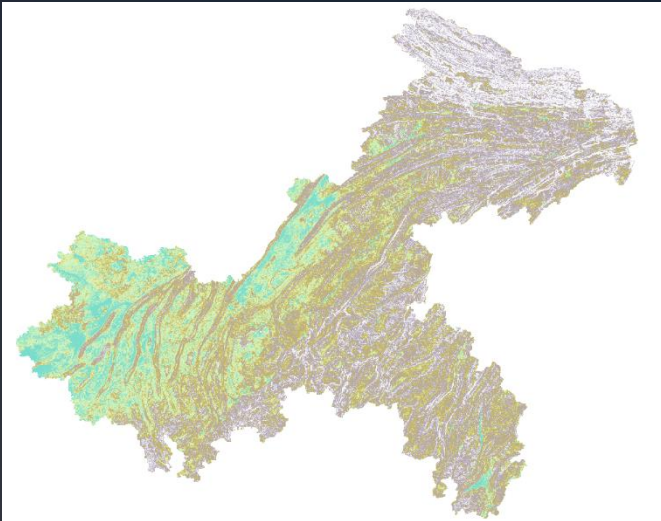
The dialog box also features a table for defining reclassification rules:

	Lower Value	Upper Value	Target Value
1	0	45	0
2	45	60	1
3	60	100	2

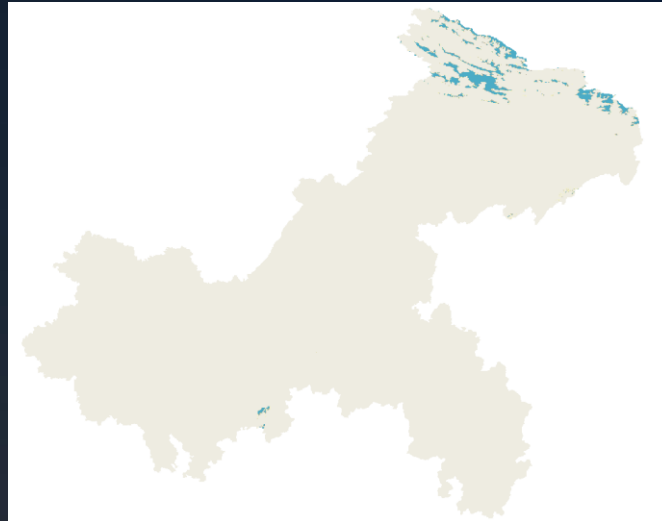


PART 3 Evaluation Case

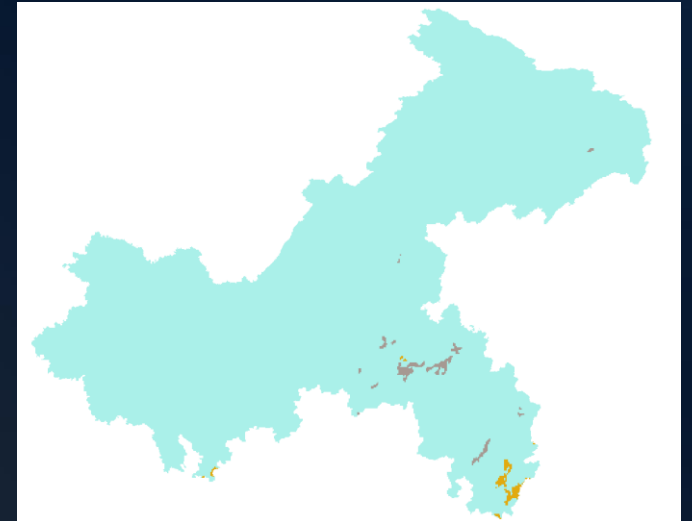
Factor Calculation Results



Slope
Hierarchy



Height
Hierarchy



Soil
Hierarchy





PART 3 Evaluation Case

Combine Factors

- Data -> Data Processing -> Algebraic Operation

The screenshot displays the QGIS software interface with the 'Data' menu highlighted. The 'Raster Algebraic Operation' dialog box is open, showing the following components:

- Workspace Manager:** Lists the project structure, including 'modelTest', 'GPtest', 'testet', 'LandUseEvaluation', 'DEM', 'soil_Chongqing', 'Soil_Sand', 'LUE_Result', 'SlopeResult', 'SlopeReclass', 'HeightReclass', 'SoilReclass', and 'SoilReclass_1'.
- Raster Algebraic Operation Dialog:**
 - Expression:** $[LUE_Result.SlopeReclass] + [LUE_Result.HeightReclass] + [LUE_Result.SoilReclass]$
 - Common Functions:** Math (abs(), sin(), exp(), Con()), Triangle, Exp/Log, Other.
 - Operators:** +, -, *, /, >, <, >=, <=, ==, <>, (,), And, Xor, Or, Not.
 - Result Data:** Datasource: LUE_Result, Dataset: Combined, Pixel Format: Single, Compress Dataset: unchecked, Ignore NoValue Cells: checked.



PART 3 Evaluation Case

Hierarchy Reclassify

- Data -> Data Processing -> Raster Reclassify

The screenshot shows the QGIS interface with the 'Data' menu highlighted in the top menu bar. The 'Raster Reclassifying' dialog box is open, displaying a table of values to be reclassified. The 'Source Data' is 'LUE_Result' and the 'Dataset' is 'Combined'. The 'Result Data' is also 'LUE_Result' with 'Dataset' set to 'Result' and 'Pixel Format' set to 'Single'. The 'Range' is set to 'Left Open Rig...'. The 'Level Setting' is set to 'Ranges' with a value of '5'. The 'Custom Target Value' section is empty.

	Lower Value	Upper Value	Target Value
1	0	1	1
2	1	2	2
3	2	3	3
4	3	4	4
5	4	7.000001	5

Source Data
Datasource: LUE_Result
Dataset: Combined

Result Data
Datasource: LUE_Result
Dataset: Result
Pixel Format: Single

Range: ☐ Left Close Rig... ☒ Left Open Rig...

Level Setting
☒ Ranges: 5
☐ Interval: 1.2

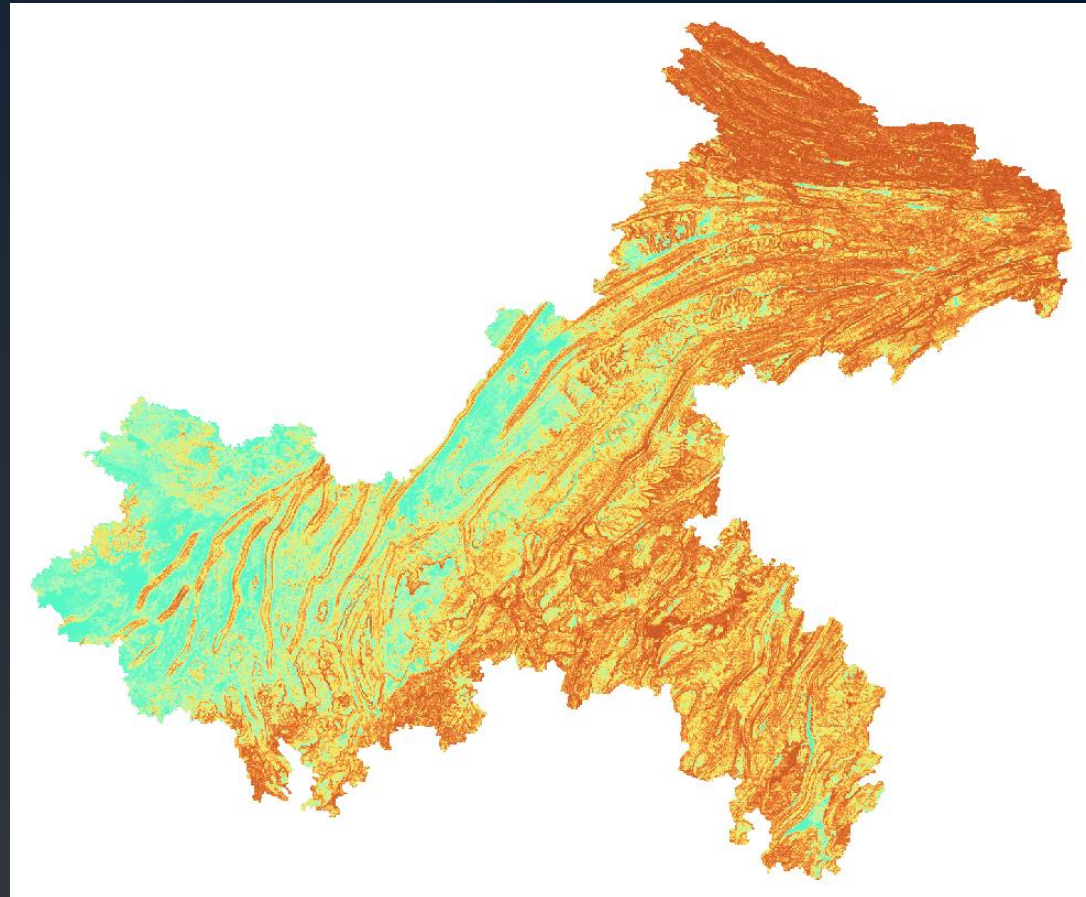
Custom Target Value
☐ Null: -9,999
☐ Unrated Units: 0

Environment OK Cancel



PART 3 Evaluation Case

Agricultural Land Resources Evaluation Result





PART 4

GeoProcessing Automation

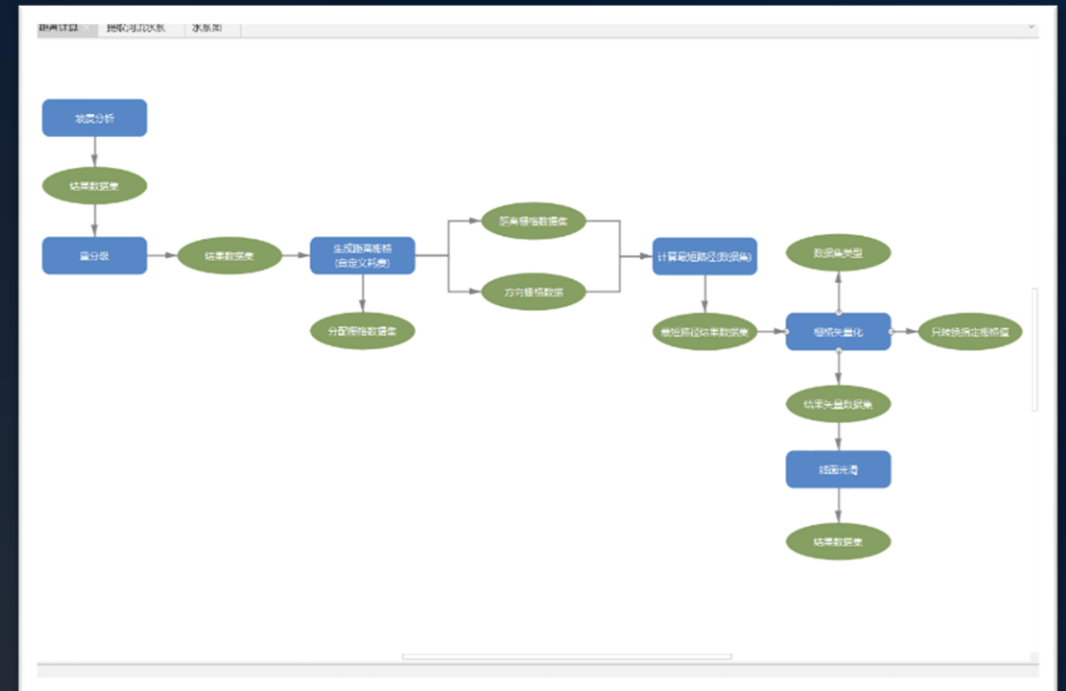




PART 4 GeoProcessing Automation

GeoProcessing Automation

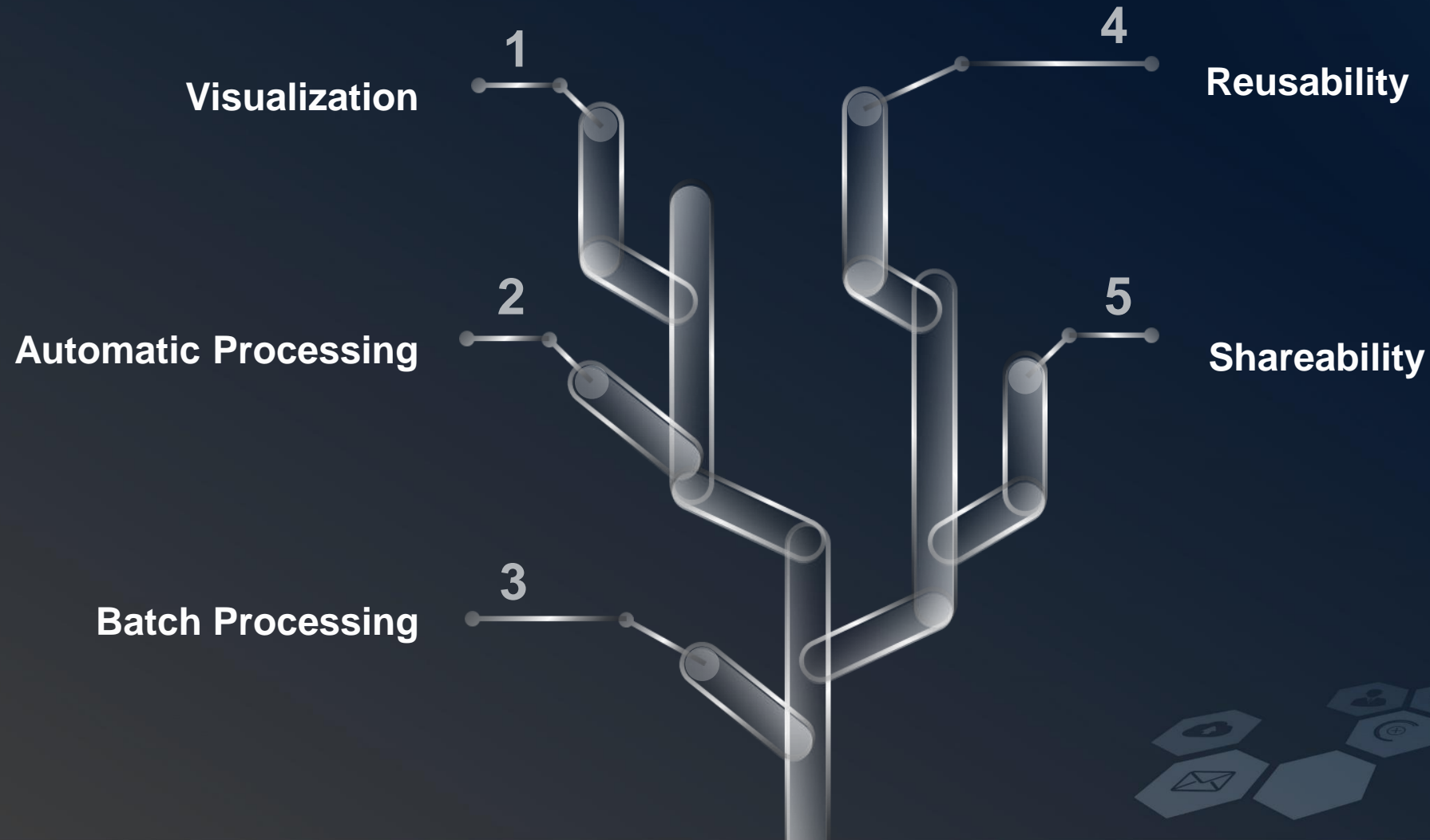
- A model connects GIS processing and analysis tools based on logic, which can automatically work as the workflow designed.
- When two (or more) tools are connected in the model, the later could take the output of the former as input.





PART 4 GeoProcessing Automation

GPA Features





PART 4 GeoProcessing Automation

GPA in SuperMap Products

SuperMap iDesktopX

- For data scientists and researchers
- Data in local storage
- Model built and tested at local
- Analysis of relatively small-size data
- C/S, complicated processing

Geo Processing Automation

SuperMap iServer

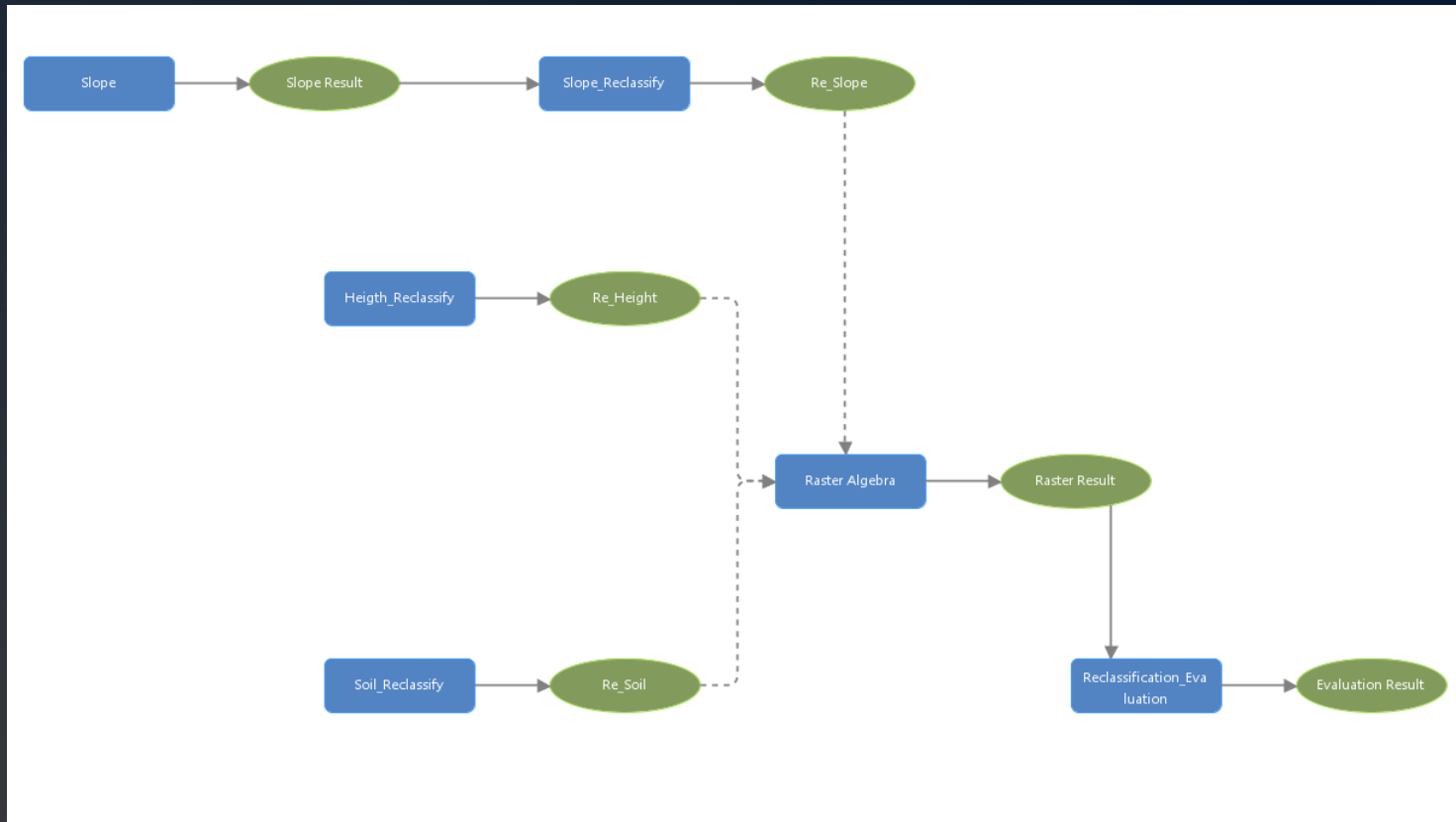
- For user from varied fields
- Data in server storage
- Analysis of big data
- Model built and tested in server





PART 4 GeoProcessing Automation

GPA Model for Chongqing Case



THANK YOU

