IUEMS

A CAS product for

Mapping Urban Ecosystem Services

online

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Which kind of visualization meets the needs of URBAN ECOLOGY?

Monitoring data

- Ecosystem components
- Science popularization
- Stakeholder participation

Calculate EASILY

Analytical results

+ Ecosystem phenomena
+ Scientific research
+ Scientists

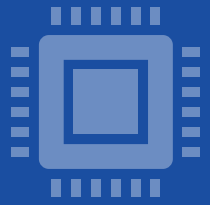
Understand EASILY

Decision-making outputs

+ Ecosystem forecasting
+ Scientific research
+ Scientists

The modules of IUEMS (Intelligent Urban Ecosystem Management System)

- Heat mitigation
- Climate adjustment
- Water purification
- Noise Abatement
- Gross Ecosystem Product
- Eco-asset Index
- Coupled-Ecosystem Index
- Eco-services tradeoff
- Storm runoff regulation
- Sedimentation retention
- Non-point pollution retention
- Mental health
- Human activity boundary
- Population distribution
- Runoff analysis
- Raster data resolution booster
- Carbon Sequestration (NPP)
- Carbon Sequestration (Annal difference)
- Carbon Sequestration (Coefficient)
- Air Purification
- Geo-data reprojection
- Zonal Statistic
- Geo-data Clip
- Raster resample
- Coastline protection
- Animal habitat
- Daily recreation
- Runoff retention
- Zonal assignment
- Excel to raster
- Landscape premium
- Landscape tourism



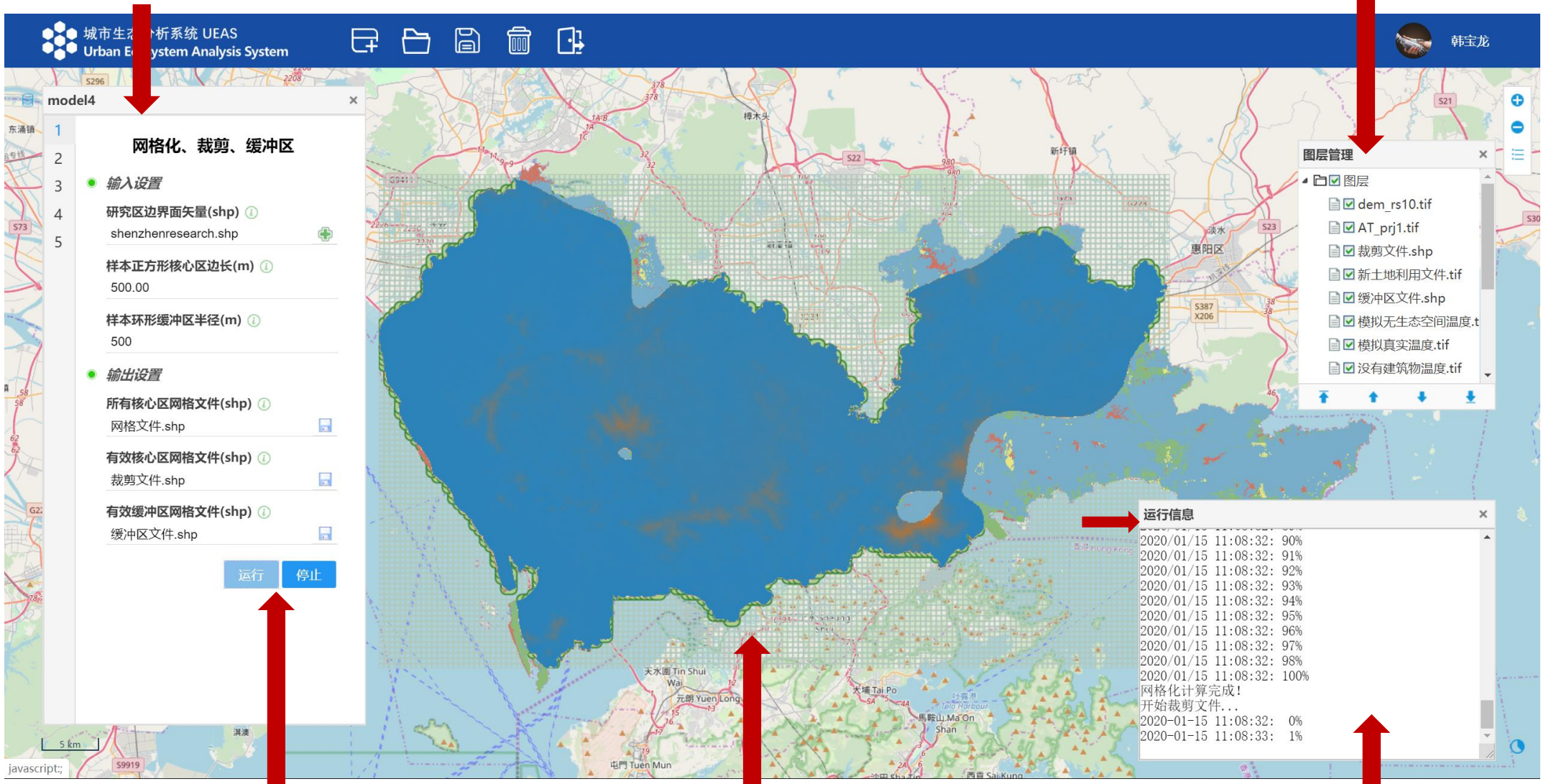
Calculating

Drawing

Decision making

- Monitoring data & analysis
- 3D visualization
- Big data

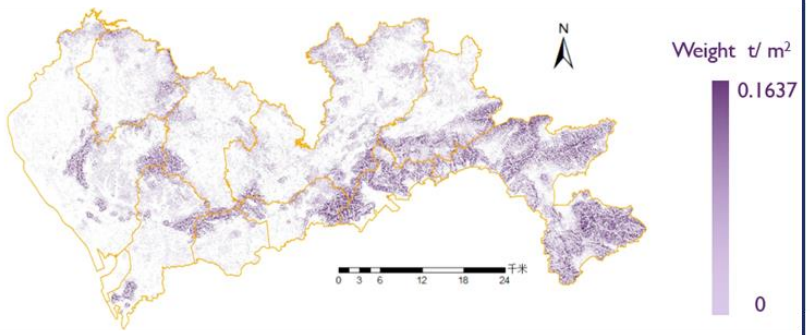
Upload & calculate your data visually



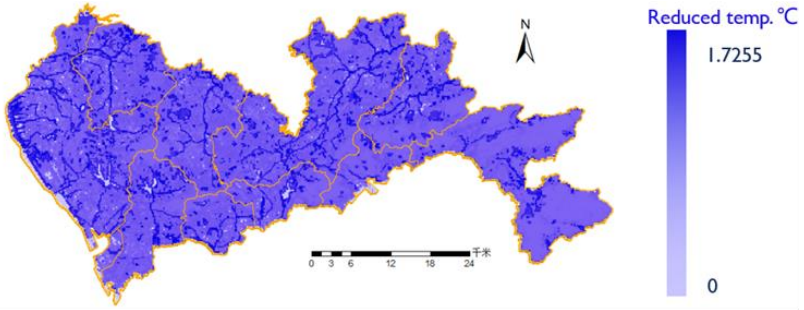
Visualizing at the urban level

Shenzhen ecosystem analysis

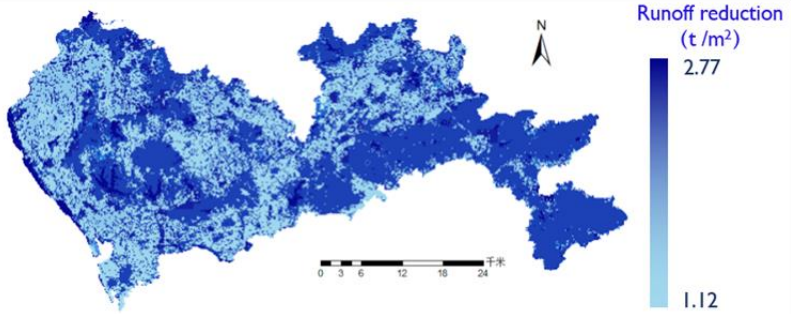
Sedimentation retention
2.82 million t soil in total



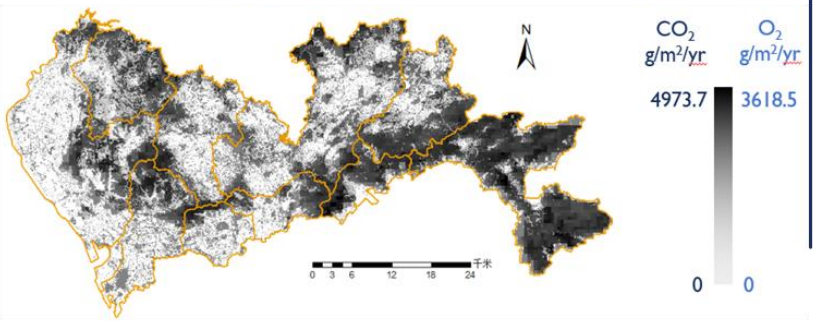
Heat mitigation
Cooling 1.99 ℃ in average



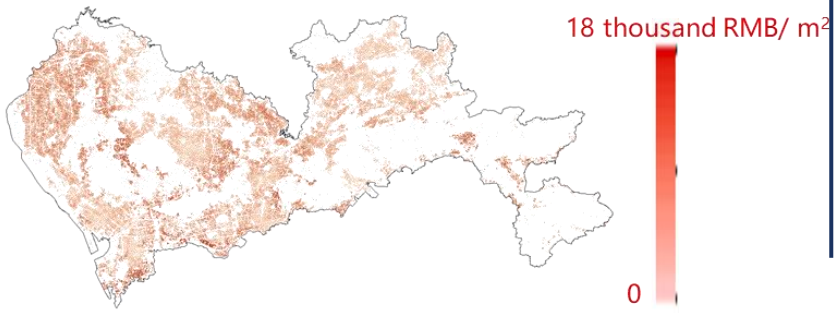
Storm runoff regulation
Reduce 662 million t runoff in total



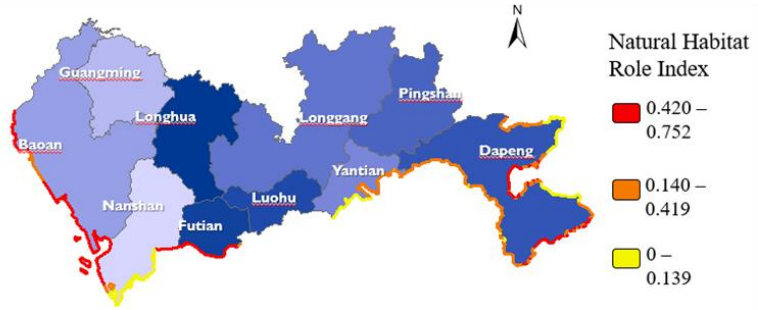
Carbon sequestration
Sequestrate 300 thousand t CO_2
Release 220 thousand t O_2 in total



Real estate landscape premium
Reduce 16 billion t RMB in total

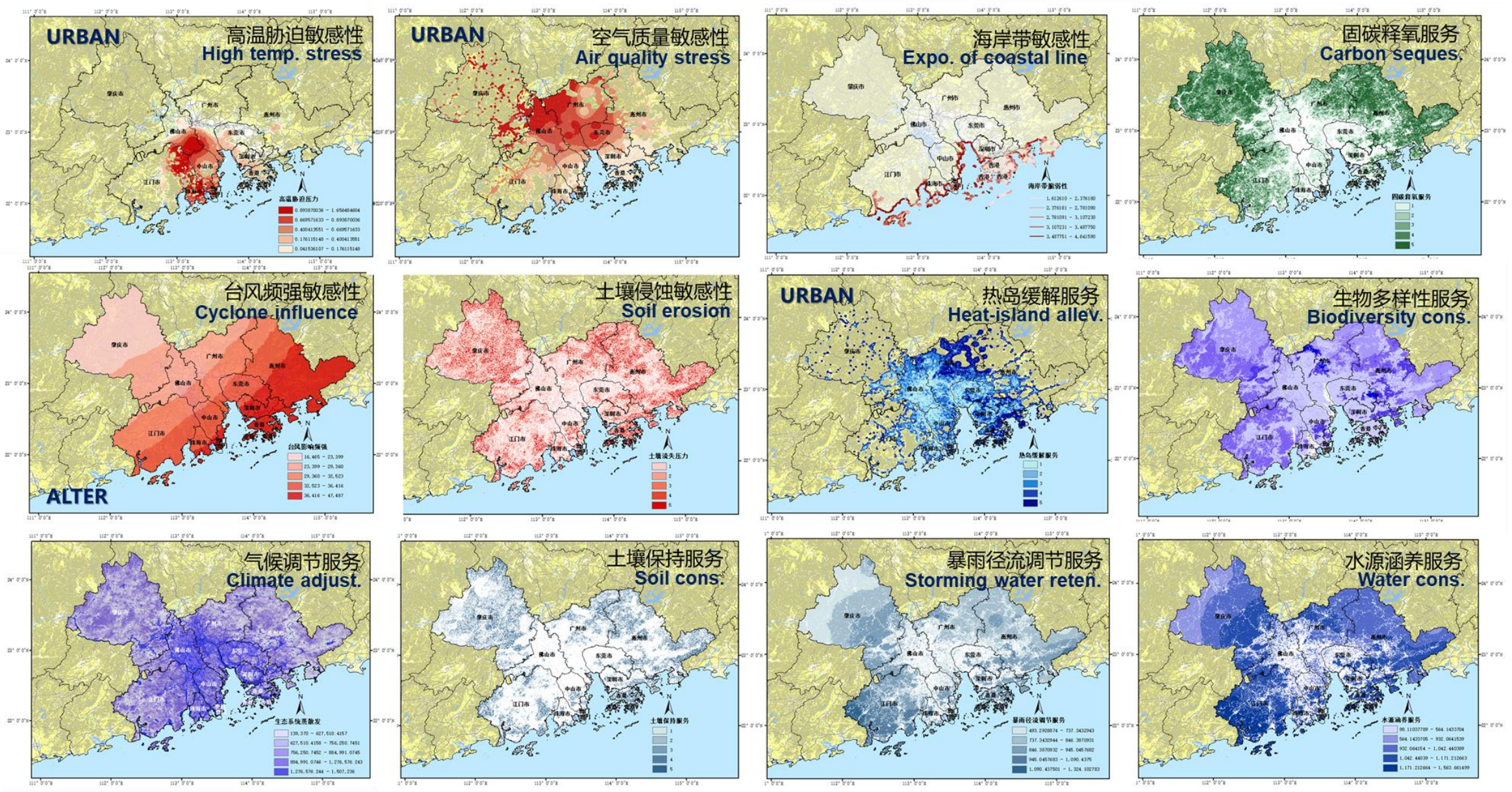


Coastline protection
Protect 38%(88.9 km) coastline

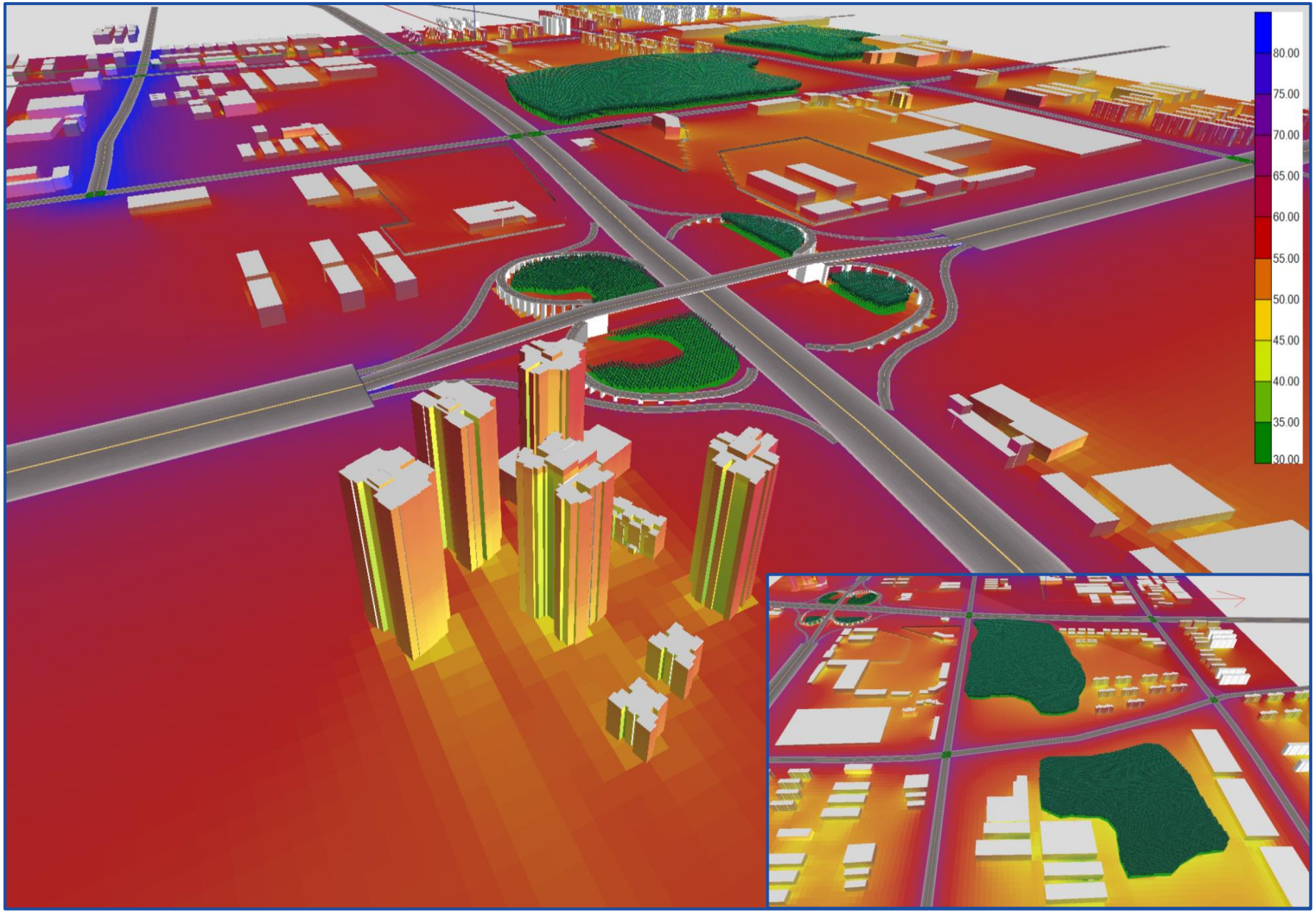


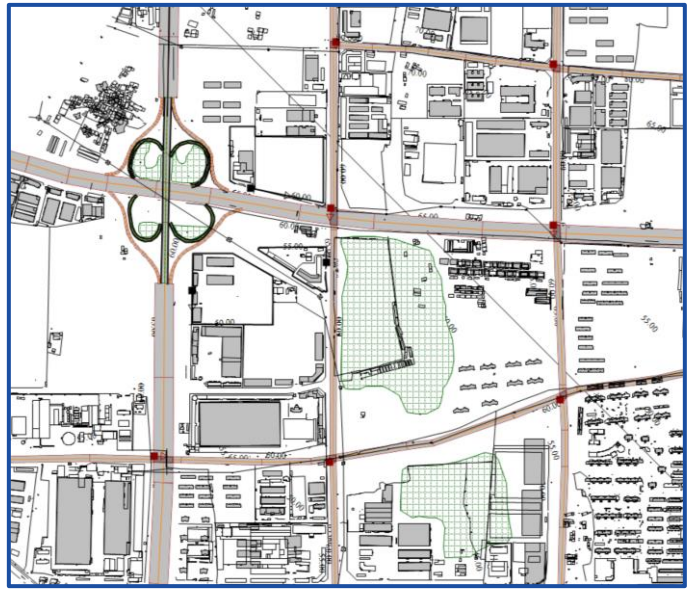
Visualization at the megalopolis level

G-H-M Great Bay Area ecosystem analysis

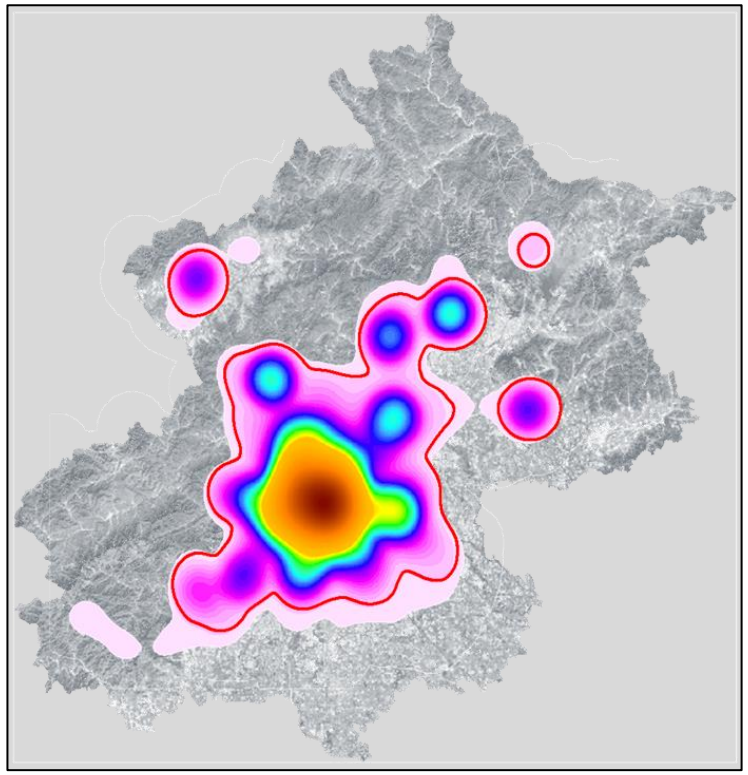


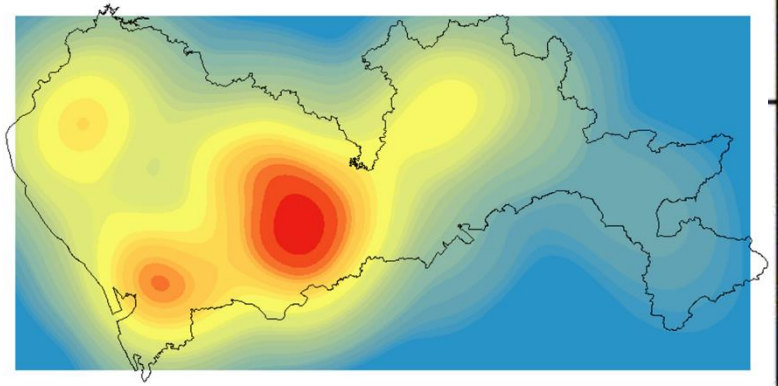
3D visualization: Noise abatement map (under ß-testing)

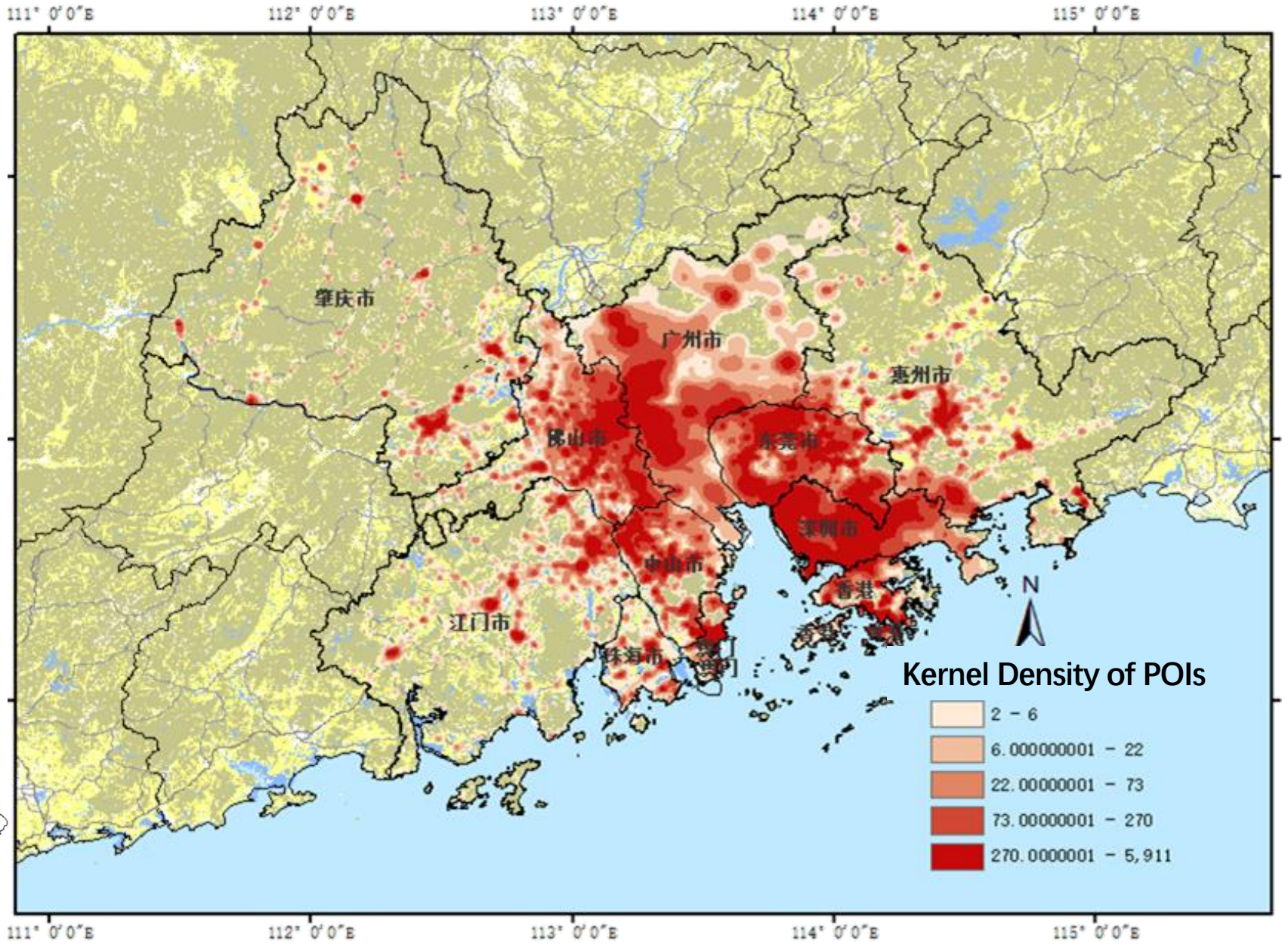




Big data analysis: Demarcating the urban boundaries of human activity

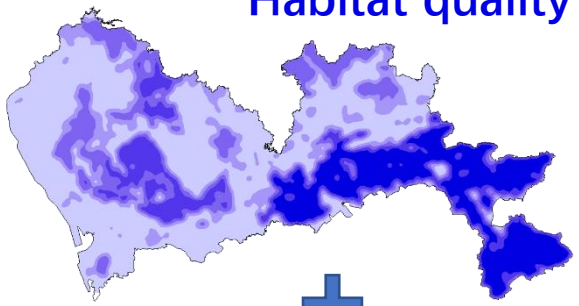




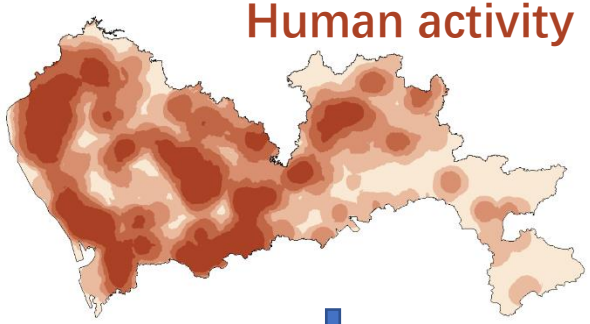


Big data analysis: Human-bat contact probability map (under ß-testing)

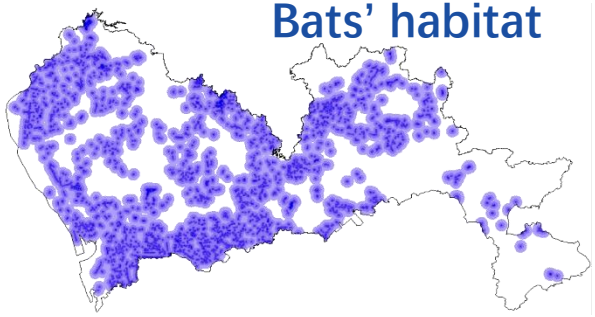
Habitat quality



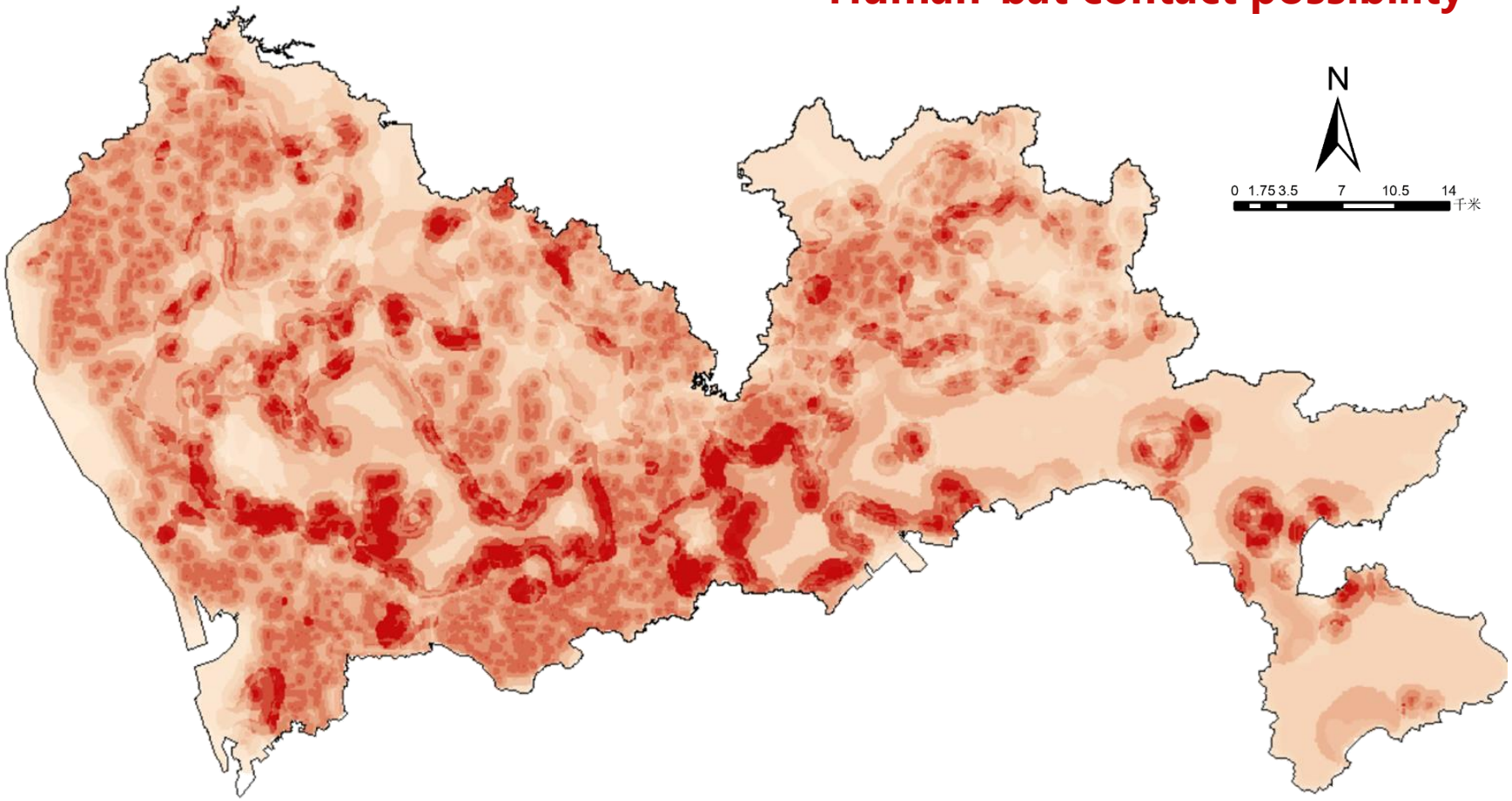
Human activity



Bats' habitat

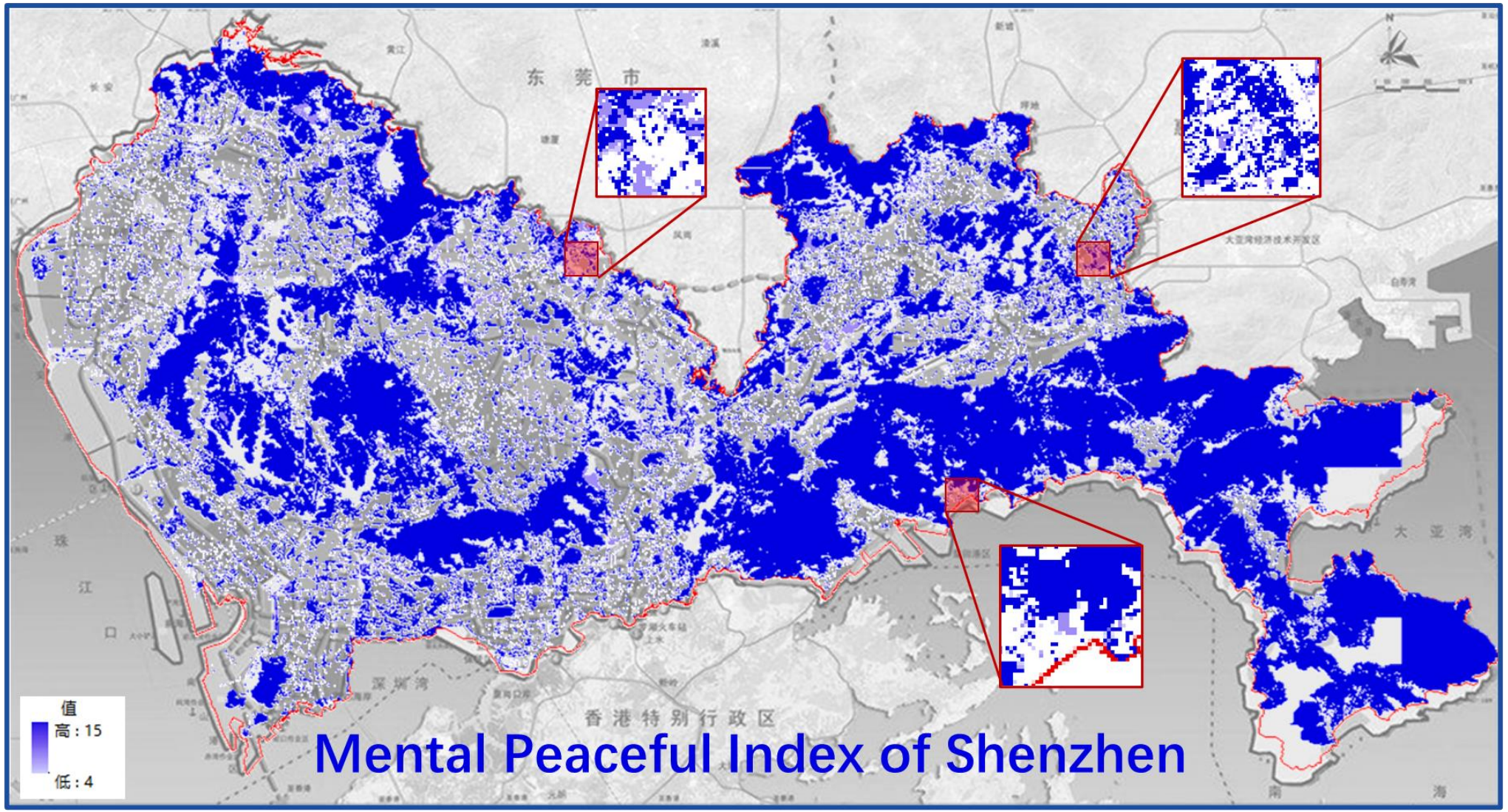


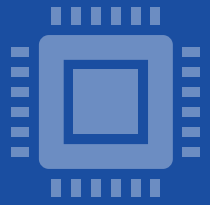
Human-bat contact possibility



Big data analysis: Ecosystem mental health service (under ß-test)

Electroencephalogram(EEG) test for various vegetation cluster structures





Calculating

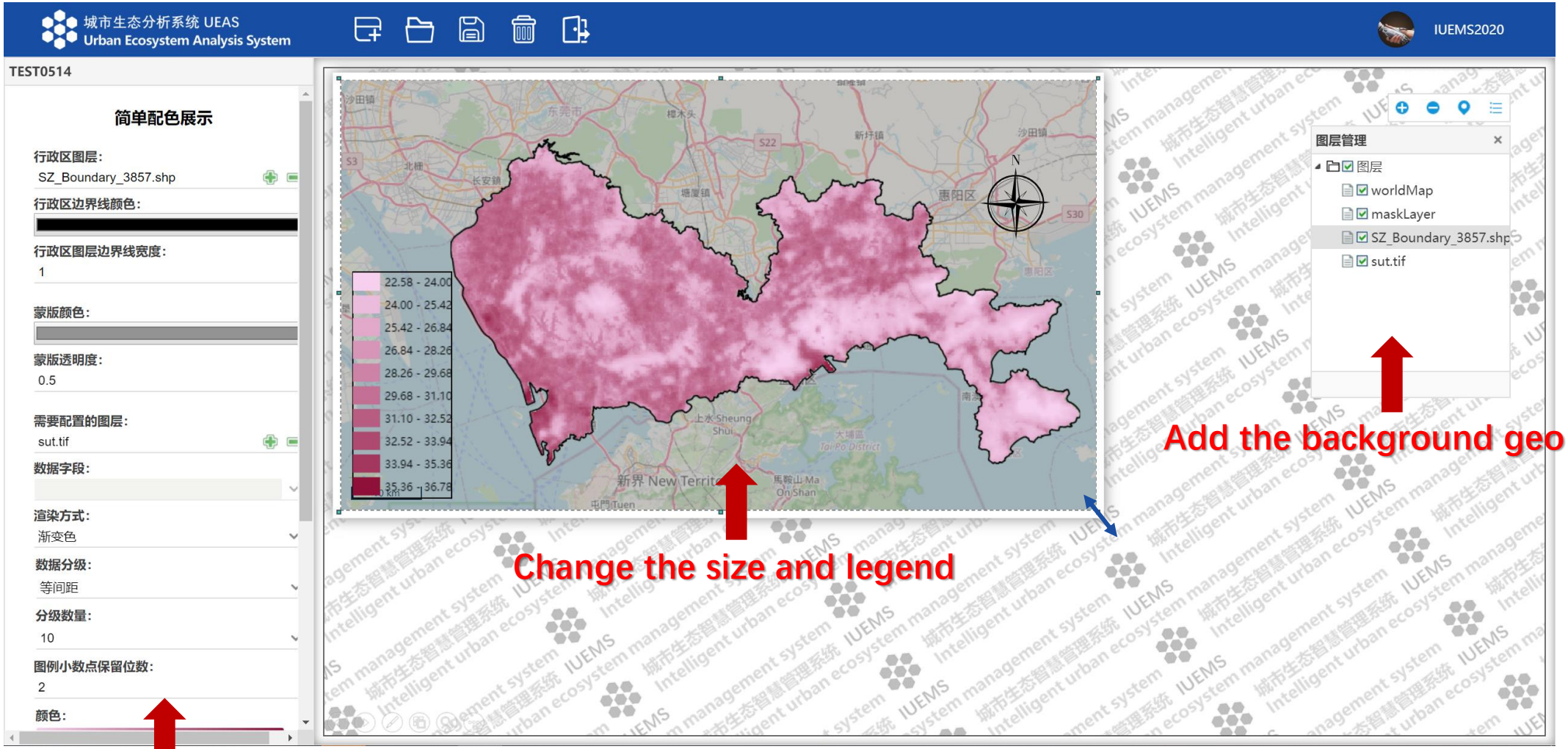
Drawing

Decision making

- for engineers
- for managers

Output with customized layout

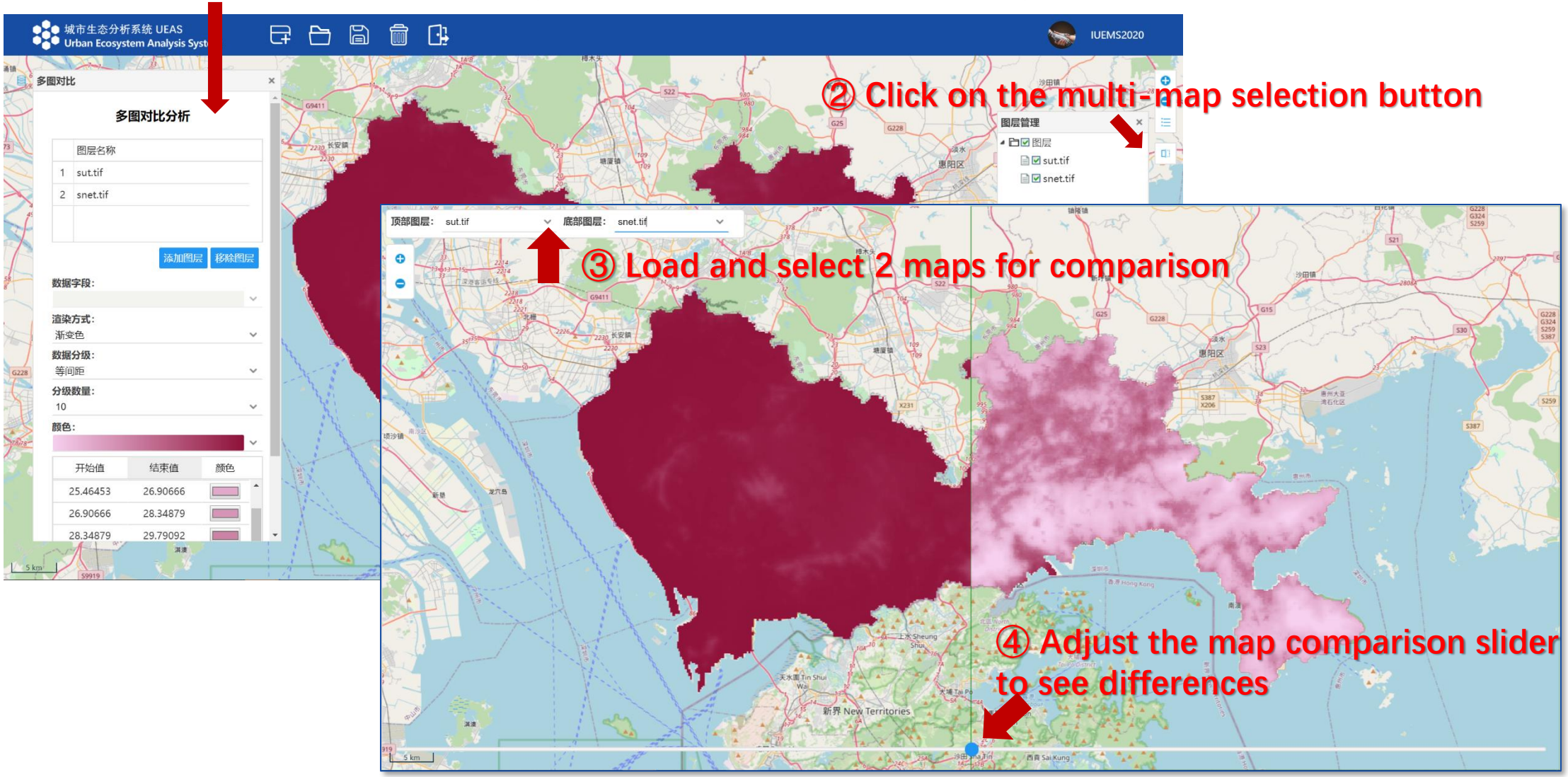
Drawing for engineer

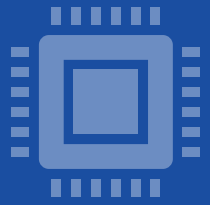


Output for scenario comparison

Drawing for decision maker

① Load 2 or more maps (different land-use scenarios) and then choose the color scheme





Calculating

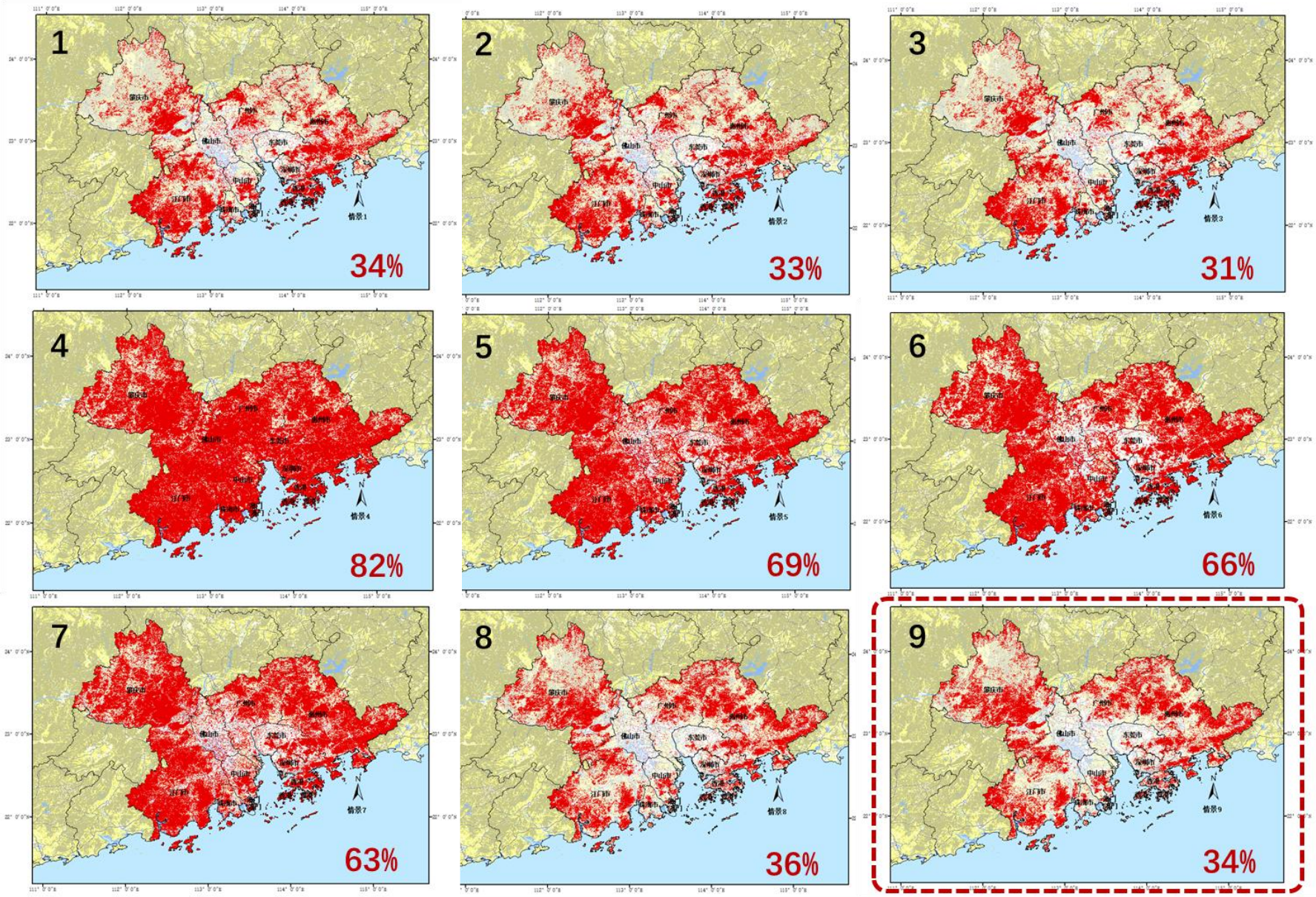
Drawing

Decision making

- Marginal benefit analysis
- Scenario comparisons
- One-click version for government

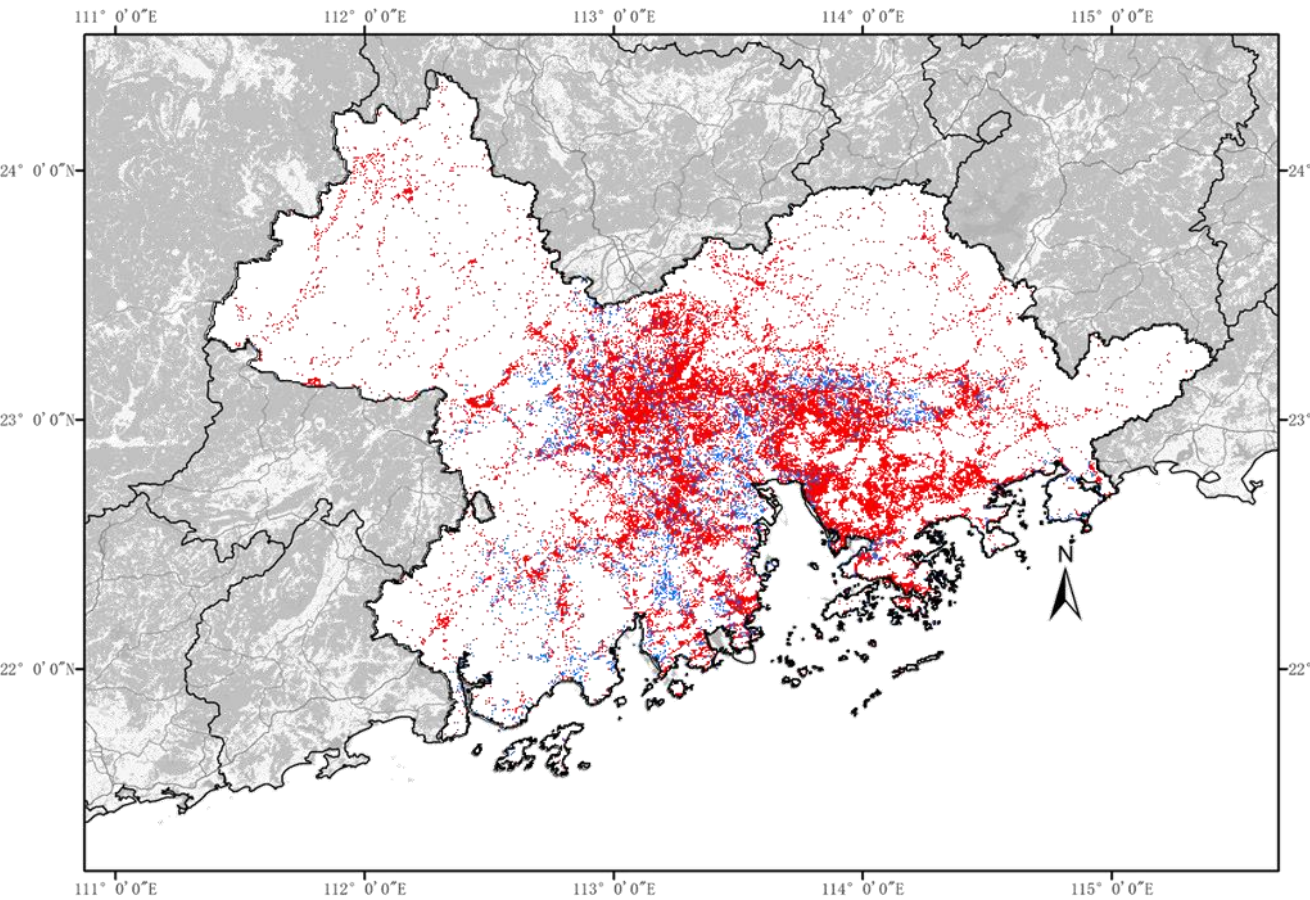
Software platform application – Selecting ecological protection spaces for optimal benefits

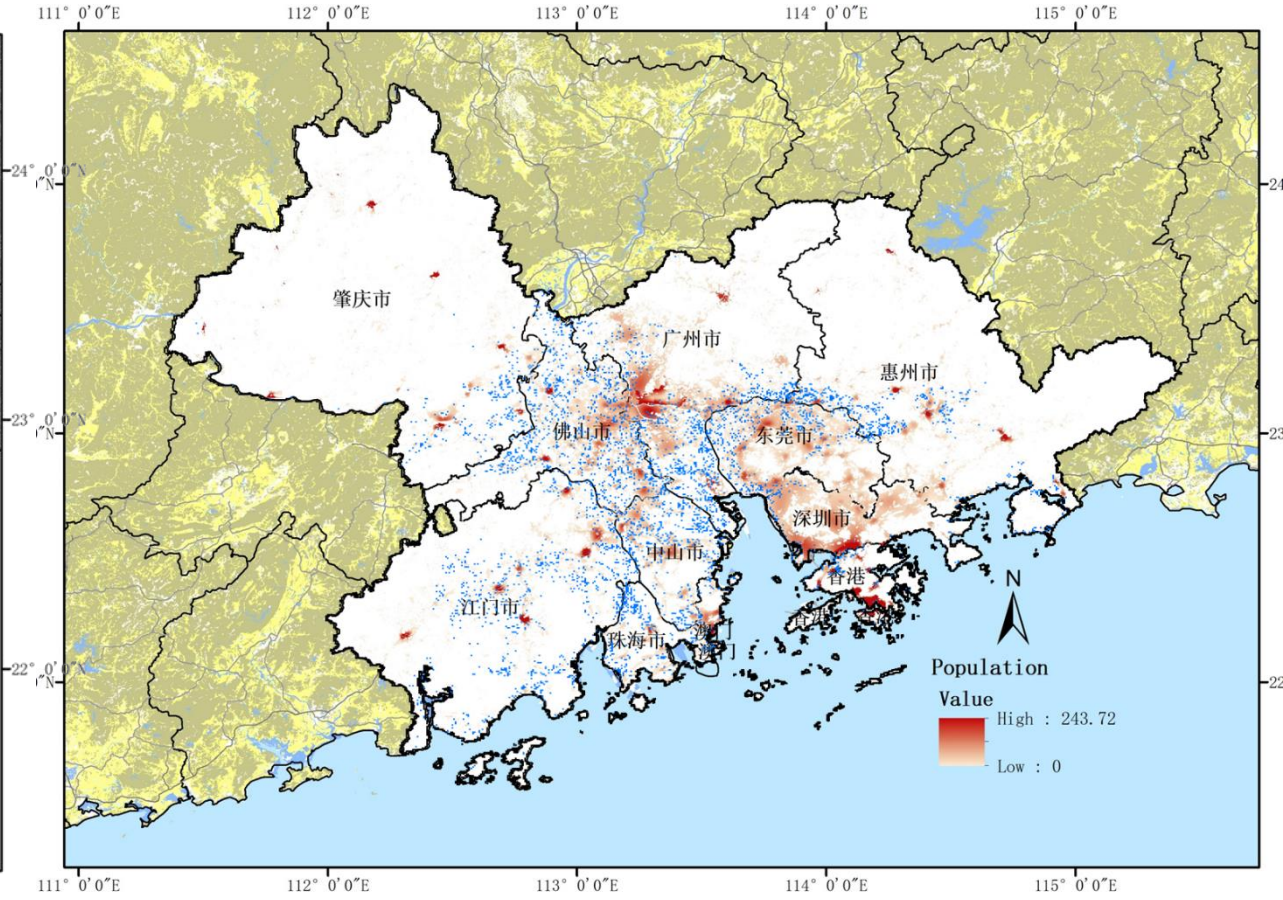
Scenarios	Description
Scen. 1	**Intersection of each ES's first 30% part (cumulative)**
Scen. 2	First 30% of ES (cumulative) take out built-up area, **Take out patch < 1 ha**
Scen. 3	First 30% of ES (cumulative) take out built-up area, **Take out least important 5%**
Scen. 4	**First 50% of ES (cumulative)**
Scen. 5	First 50% of ES (cumulative) take out built-up area, **Take out patch < 1 ha**
Scen. 6	First 50% of ES (cumulative) c take out built-up area, **Take out least important 5%**
Scen. 7	First 50% of ES (cumulative) **2 ESs elasticity > 1** take out built-up area, Take out patch < 1 ha.
Scen. 8	First 50% of ES (cumulative) **3 ESs elasticity > 1** take out built-up area, Take out patch < 1 ha.
Scen. 9	First 50% of ES (cumulative) **3 ESs elasticity > 1** take out built-up area, **Take out least important 5%**



Software platform application – Assessing ecological engineering benefits

Scenario: Under a 120-mm rainfall situation, 48-mm depth of runoff could be reduced through a nature-based solution.





Save:

Flood-covered built-up area: 2.8 thousand km²

(Total built-up area: 9.1 thousand km²)

Save:

Flood-affected population: 20.2 million

(Total population: 68 million)

One-Click version for government use

Select 1

3 Upload

2 Assign

4 Click

Applications & Practices

- **Beijing** ecosystem restoration performance evaluation
- **Macao** ecological protection zoning
- **Shenzhen** GEP (Gross Ecosystem Product) evaluation
- **Guangdong-Hongkong- Macao** bay area ecosystem restoration plan
- JTP (Joint test platform) with InVEST (**Stanford University**) team
- **WWF** (World Wildlife Fund) training for urban research

Authorship & Partnership

Founder
RCEES,
CAS

11 U: university & research institute 7 C: consulting companies & NGOs 1 G: government

Thanks

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