

HARMONIA



MANUAL

HARMONIA DSS's Visualization Tool

3rd Edition



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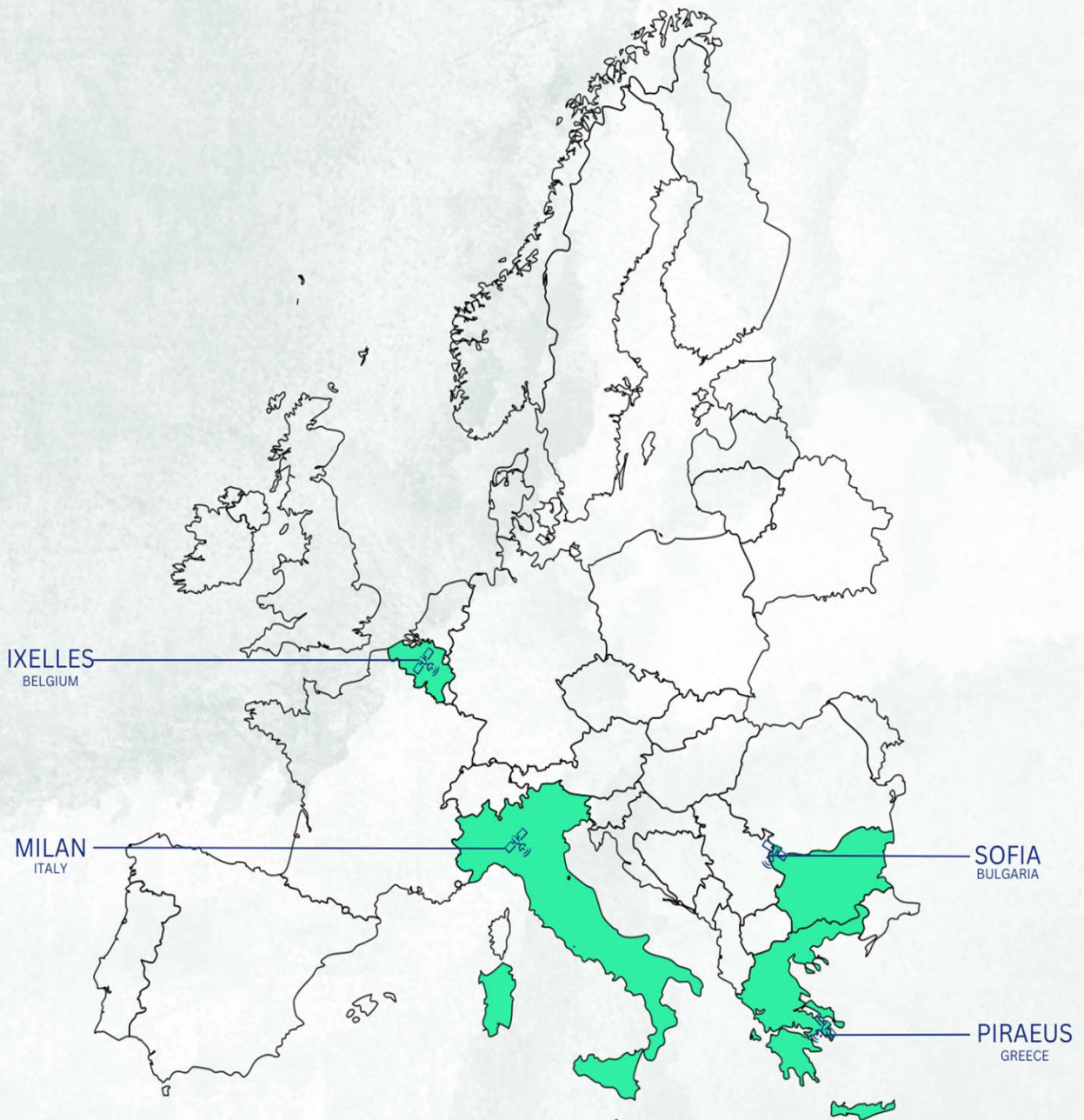
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PILOT CITIES

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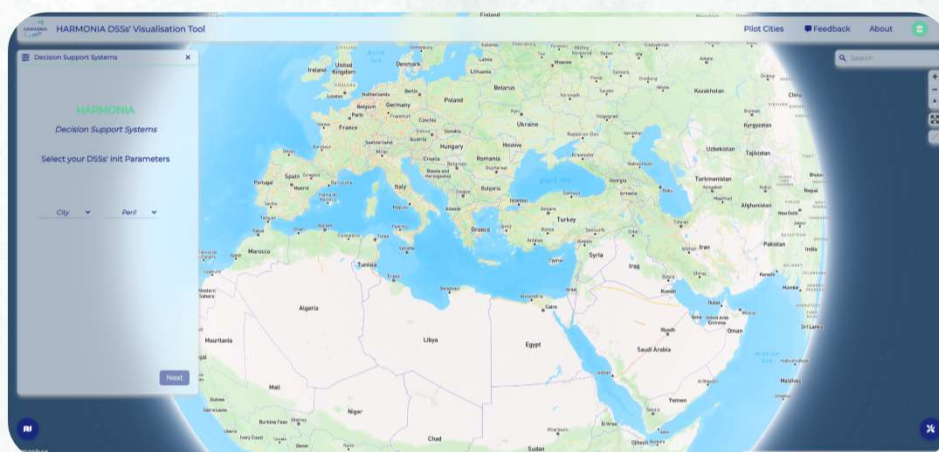
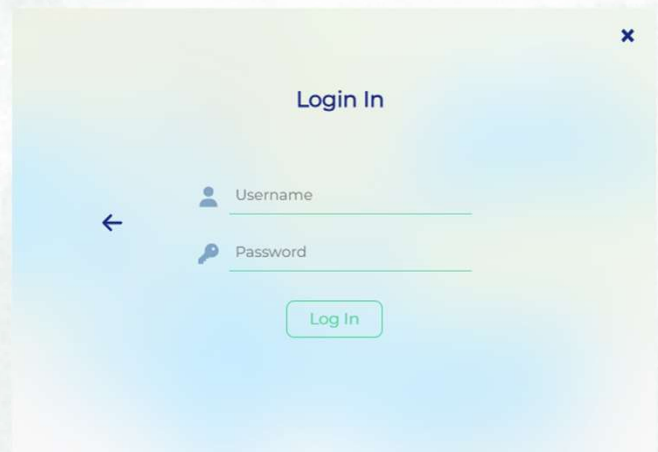
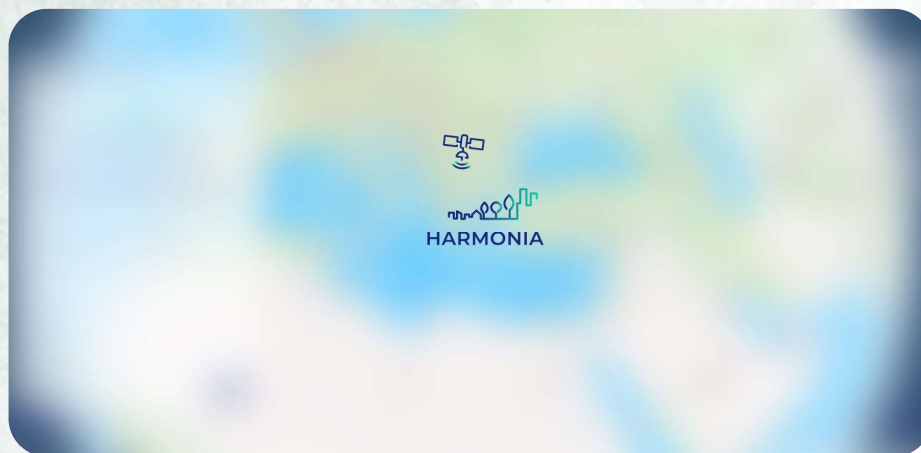
1

General Features of HARMONIA DSS's
Visualization Tool

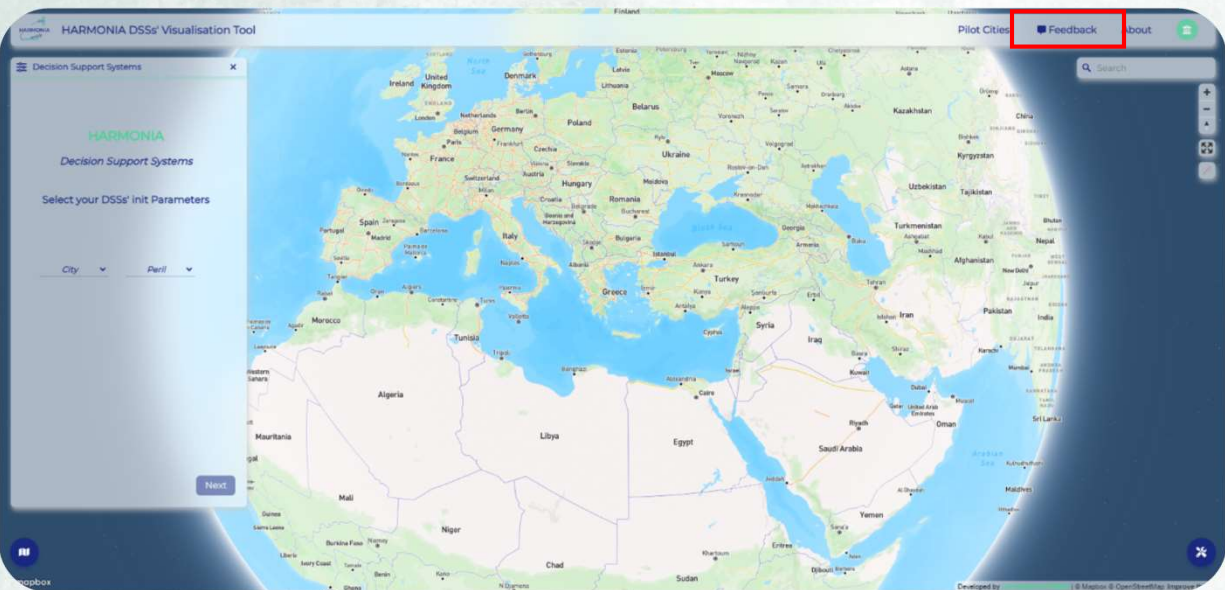
How to Use the Vis. Tool

Once entering the **Harmonia DSS's Visualization Tool** :

- ✚ The loading screen appears
- ✚ The **login in** tab is available to select user's role and then login with username and password
- ✚ The main interface of the **Tool** is accessible



The user can also submit **feedback** regarding any errors encountered on the platform or provide suggestions for improvement



Feedback Form

Email

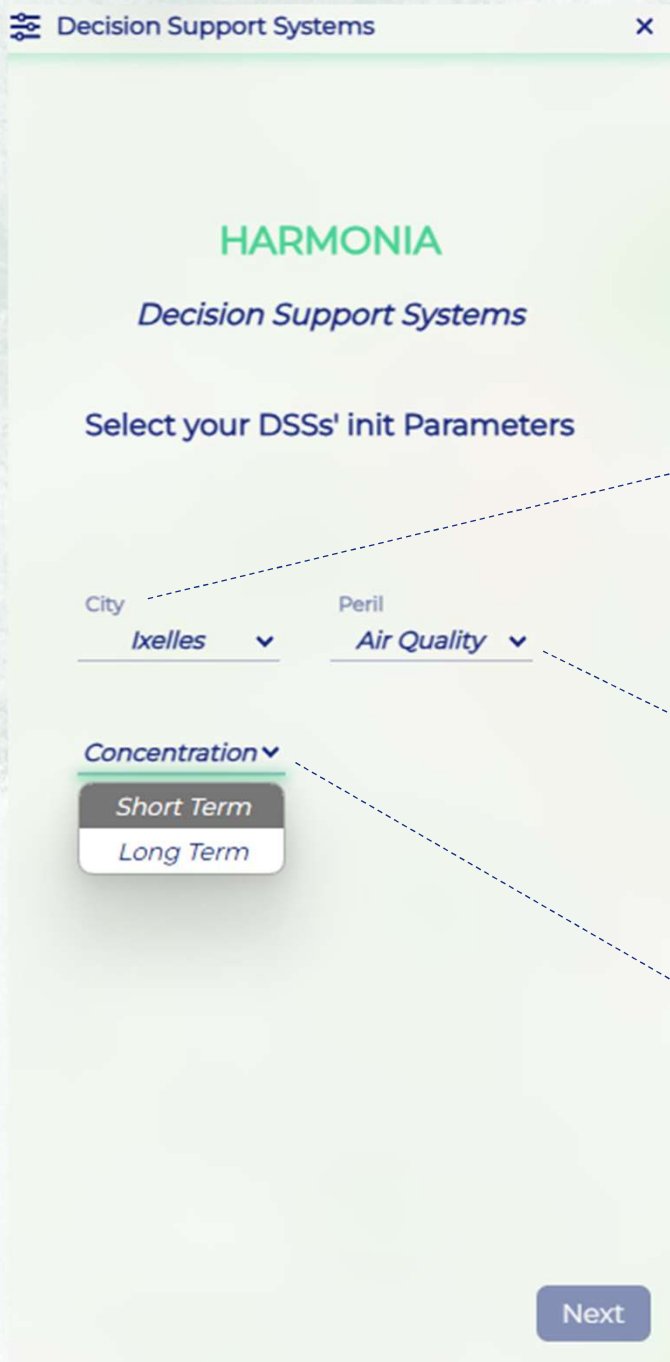
Job Title

Organization

Issue

The user can easily navigate within the [Harmonia Visualization Module](#).

- First step is to select initial parameters for the Decision Support Systems: **Pilot city, peril and the scenario for examination**



The screenshot shows the 'Decision Support Systems' window with the HARMONIA logo and the text 'Decision Support Systems'. Below this, it says 'Select your DSSs' init Parameters'. There are three dropdown menus: 'City' with 'Ixelles' selected, 'Peril' with 'Air Quality' selected, and 'Concentration' with 'Short Term' selected. A 'Next' button is at the bottom right.

Milan, Piraeus, Ixelles, Sofia

Urban Heat Islands, Flash Floodings, Air Quality, Climate Index, Geohazards

Selection of available scenarios

The user can explore the **HARMONIA** geospatial layers provided by IRAP, visualize them on the map and export them for further use.

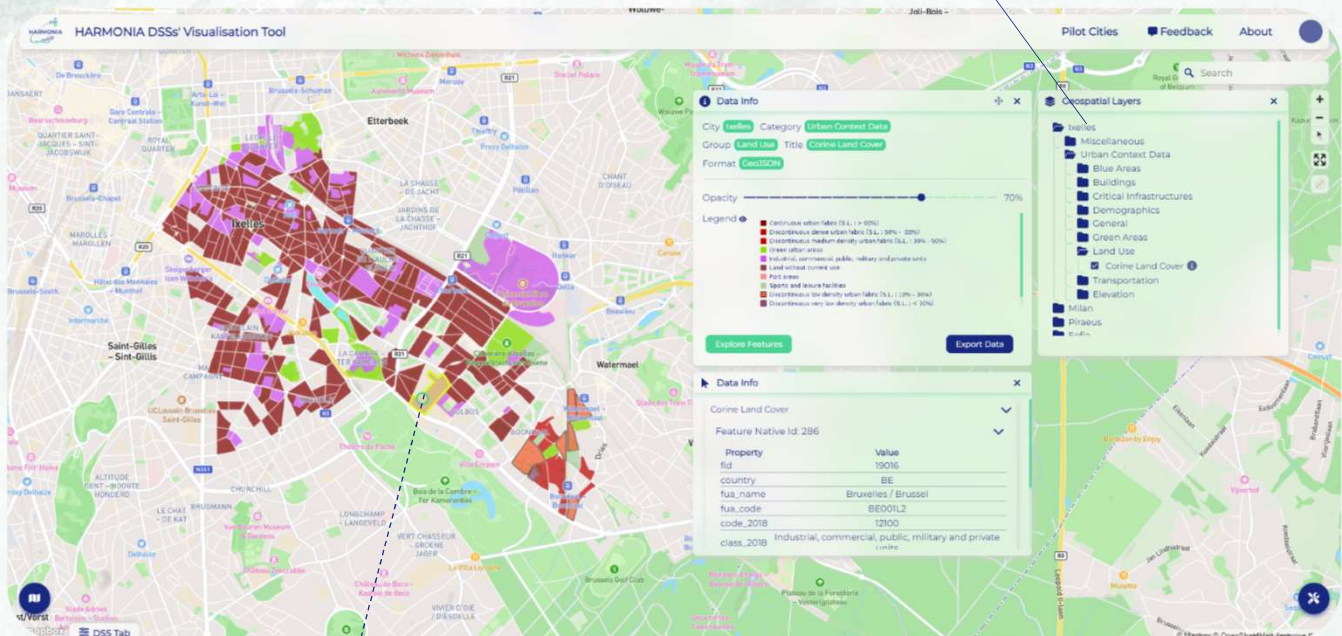


Main Categories:

 Miscellaneous

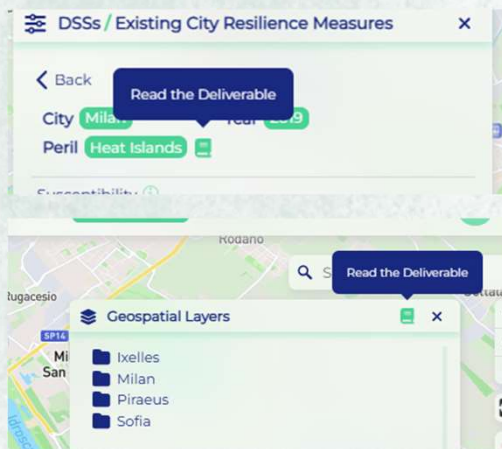
 Urban Context Data

By clicking the **info** icon, you can change layers' opacity and be informed about the layer features

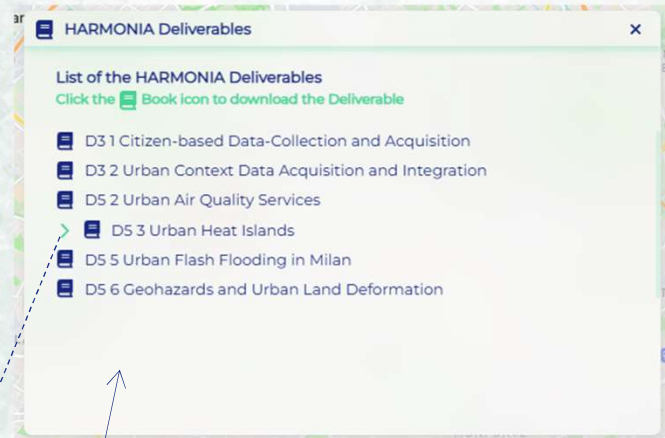


Click a feature to open its info table

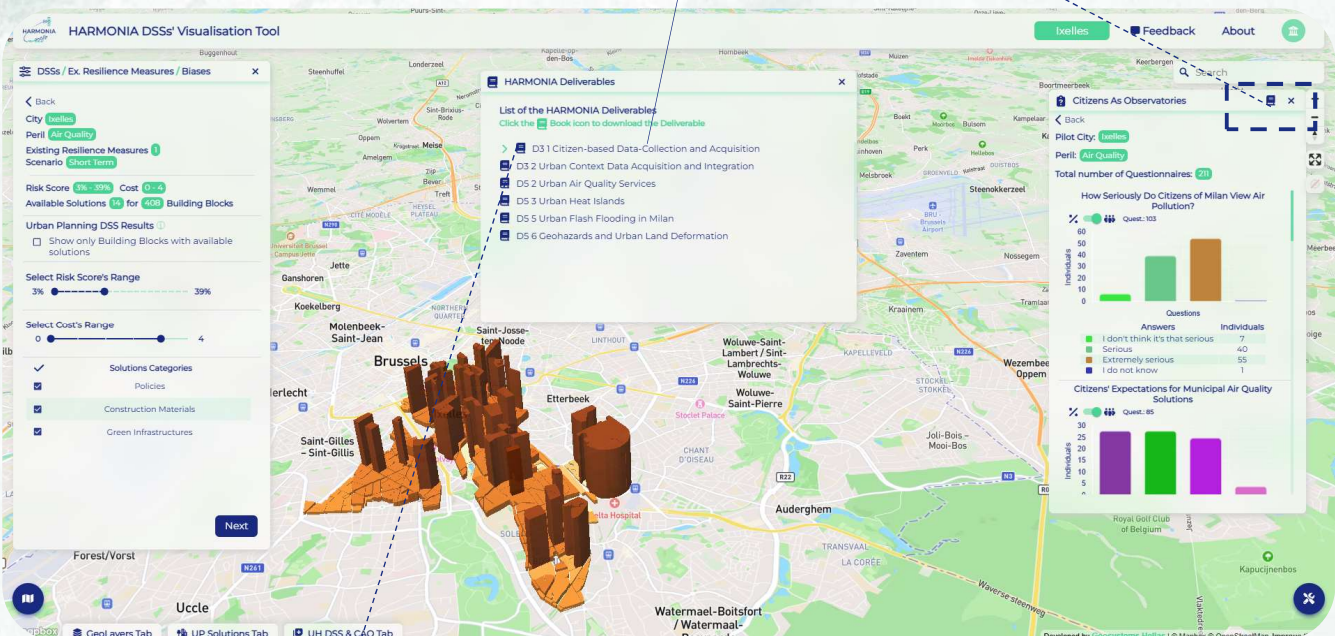
The user can open, read and download the submitted **HARMONIA** deliverables.



The animated arrow points to the corresponding deliverable



By clicking the **Read the Deliverable** icon, the available HARMONIA deliverables are listed in a popup tab



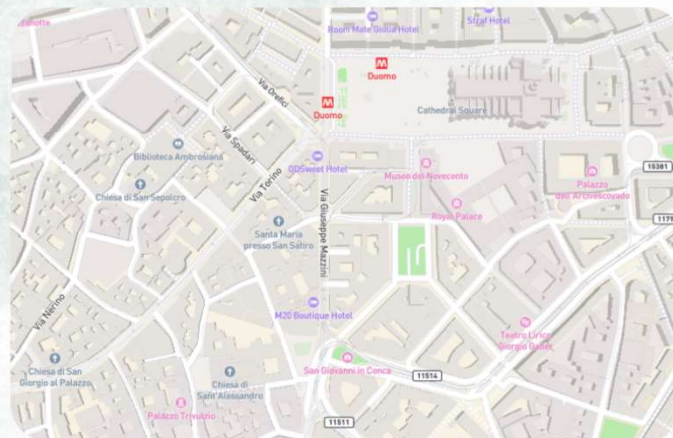
Click the Deliverable to download the full document

The user can seamlessly switch between different **3D basemaps**, customizing the main workspace of the visualization tool. The tool offers three distinct basemaps: **Street Style**, **Satellite**, and **Navigation**. Each basemap provides unique insights, with Street Style focusing on land use and points of interest, Satellite offering true-color imagery, and Navigation highlighting near-real-time traffic conditions.



Basemaps Menu

Street



Satellite Imagery



Navigation



Component/Tool	Ixelles	Milan	Sofia	Piraeus
Urban Flash Floods		✓		
Urban Heat Islands		✓	✓	
Air Quality	✓	✓	✓	✓
Climate Index	✓	✓		
Geohazards		✓	✓	✓
Urban Planning DSS	✓	✓	✓	✓
Multi-hazard mitigation & adaptation measures DSS	✓	✓	✓	✓
Urban Health & Well Being DSS		✓		✓
Citizens As Observatory (CAO) Data	✓	✓	✓	✓
Urban Statistics	✓	✓	✓	✓

*The faded check icons indicate features that are not included in this version

CHAPTER

2

Baseline Stage

In the **Baseline** stage, the user selects Resilience Measures that **HARMONIA** provides and displays their ID card to be informed about them. The user also parameterizes the Baseline scenario by stating the existing experience and the resilience measures of the city and adjusting the **Physical** and **Social** dimensions of **Susceptibility** and **Exposure**.

i Social susceptibility is the extent to which an individual's or community's exposure to hazards is shaped by social factors like socioeconomic status, education, and social networks. For instance, people in poverty may lack resources to prepare for or recover from disasters, increasing their vulnerability.

i Physical susceptibility pertains to the inherent vulnerabilities in an environment or infrastructure, such as buildings in flood-prone areas or regions with unstable soil, which are more prone to damage from natural hazards.

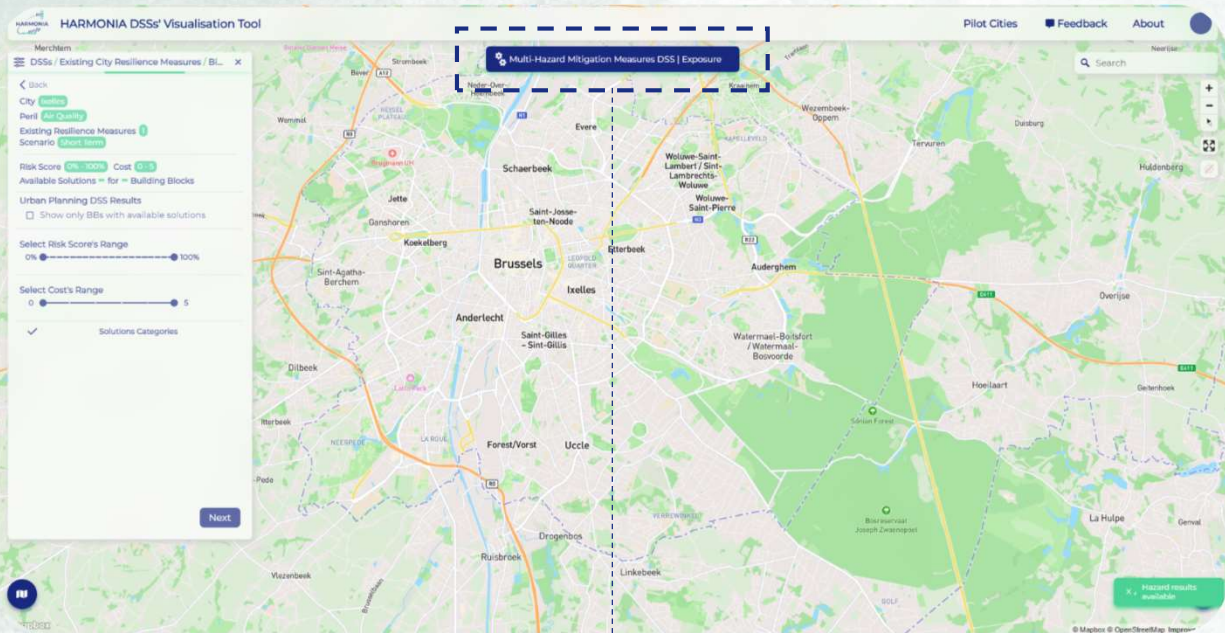
i Social exposure refers to the degree to which individuals or communities are exposed to hazards based on their social context, such as population density, occupation, or reliance on shared resources. For example, densely populated urban areas or marginalized communities may face greater exposure to hazards like disease outbreaks or pollution.

i Physical exposure focuses on the geographical and structural elements that put people or assets in harm's way, such as living in coastal areas vulnerable to storms or infrastructure located near fault lines prone to earthquakes.

ID card example

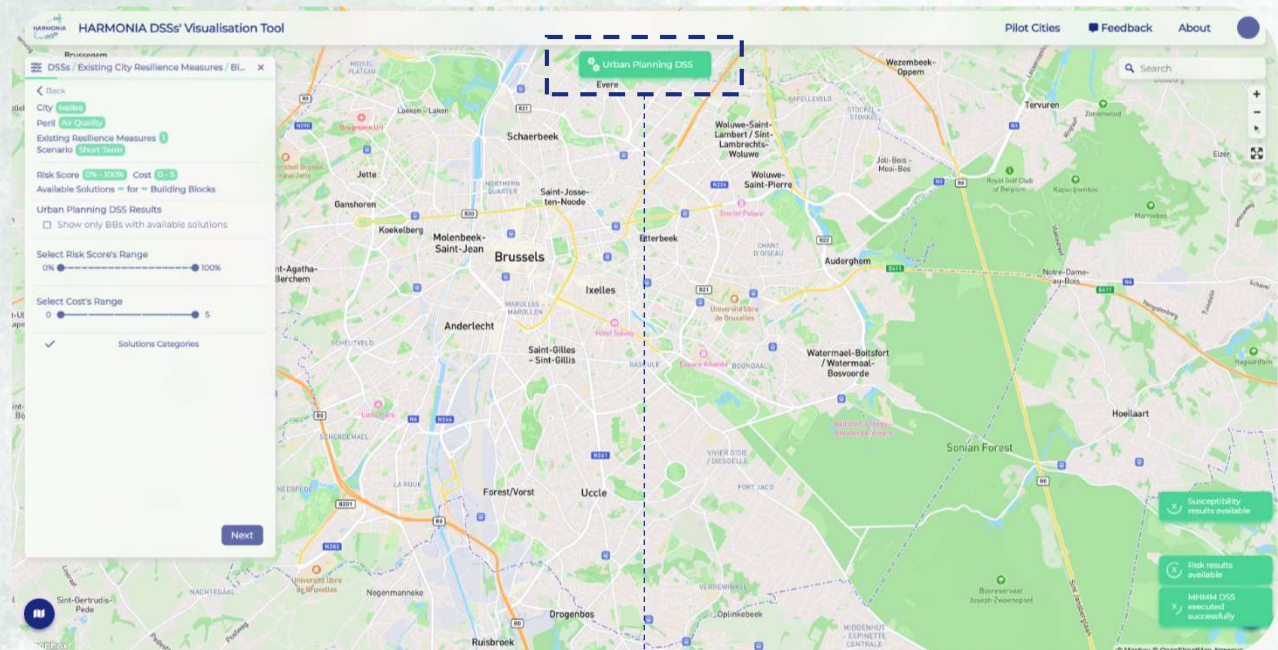
Multi-Hazard Mitigation Measures (MHMM) DSS

Following, the **Multi-Hazard Mitigation Measures (MHMM) DSS** is executed for the Baseline Scenario to assess the current **Peril Risk** of the selected scenario, calculating the hazard, exposure, susceptibility, vulnerability and finally the risk score.



Multi-Hazard Mitigation Measures DSS | Exposure ..

The **Urban Planning (UP) DSS** runs automatically after the execution of the MHMM DSS to find the urban planning recommendations/interventions that befit the criteria for each building block, based on its special characteristics.

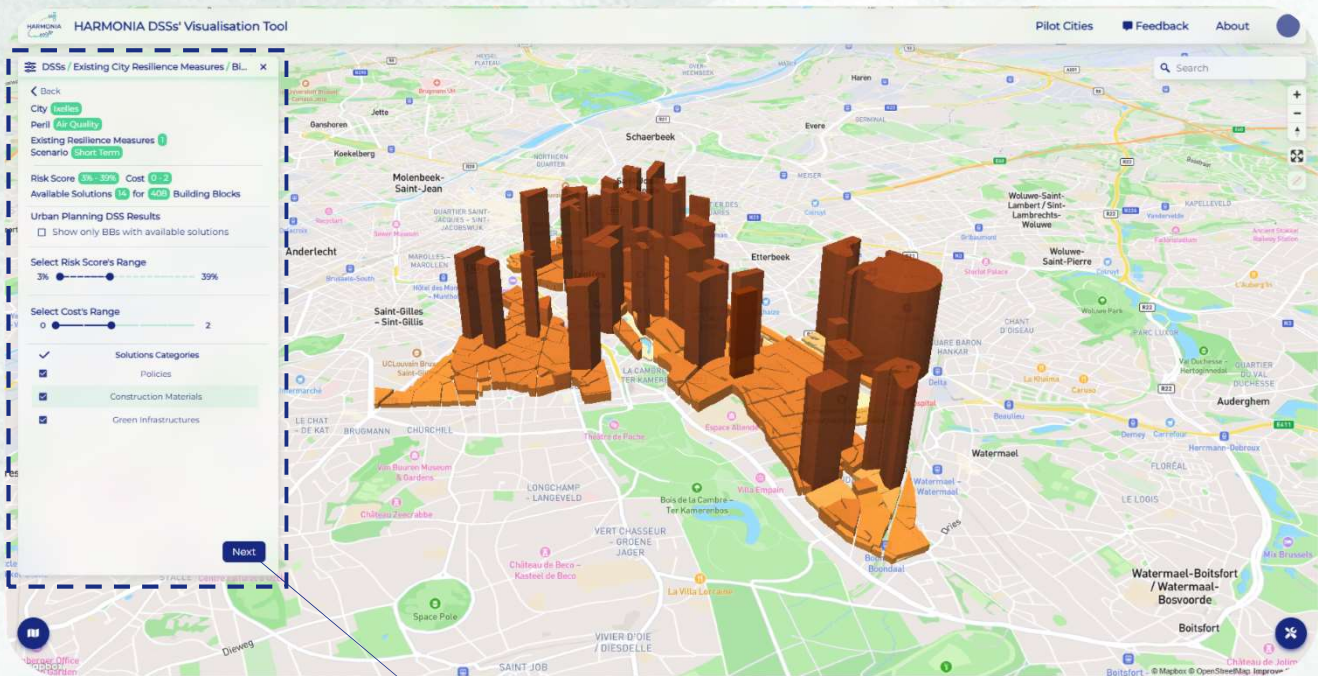


 Urban Planning DSS..



The Urban Planning DSS, developed by Geosystems Hellas, is a tool for providing tangible urban planning recommendations taking into consideration the special characteristics of each building block as well as the implementation criteria of each specific urban solution. The recommendations have been analyzed and categorized based on specific properties like area of effect, mitigation performance for each peril, cost, etc.

The Risk Scores are displayed on the map at the building block level. Higher and darker extruded building blocks correspond to higher risk score levels. The user interacts with the UP parameterization tab to adjust the biases of the DSS based on its needs, the Risk score of the building block, the cost and the category of the recommendations. Each adjustment invokes again the UP DSS.



By clicking the **check box**, you can highlight the Building Blocks for which UP recommendations are provided

Urban Planning DSS Results

Show only Building Blocks with available solutions

Select Risk Score's Range: 3% — 39%

Select Cost's Range: 0 — 4

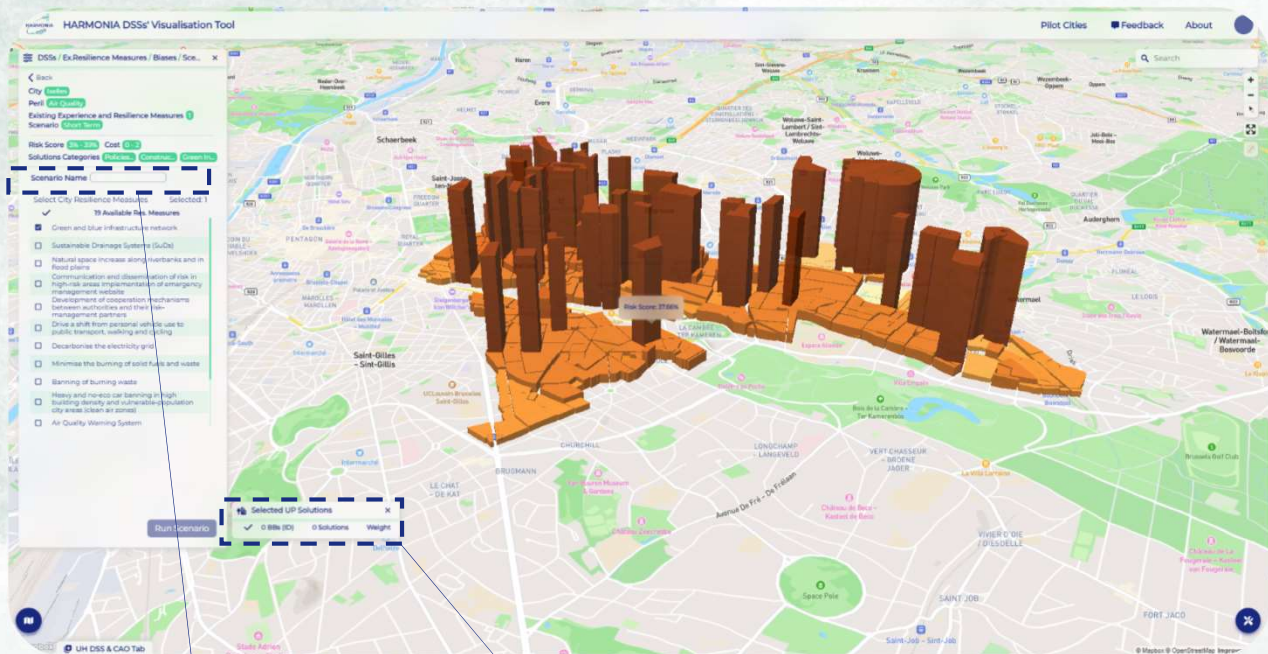
- Solutions Categories
- Construction Materials
- Policies
- Green Infrastructures

CHAPTER

3

Mitigation Scenario Stage

The user proceeds with the **mitigation scenario-building** option, where they can name the scenario, select city mitigation measures by **checking the box** for each intervention and execute the MHMM DSS for the developed mitigation scenario, including vulnerability and risk assessment. The execution of MHMM follows the UP DSS and finally the visualization of the **new risk scores** derived from the new **mitigation scenario**.

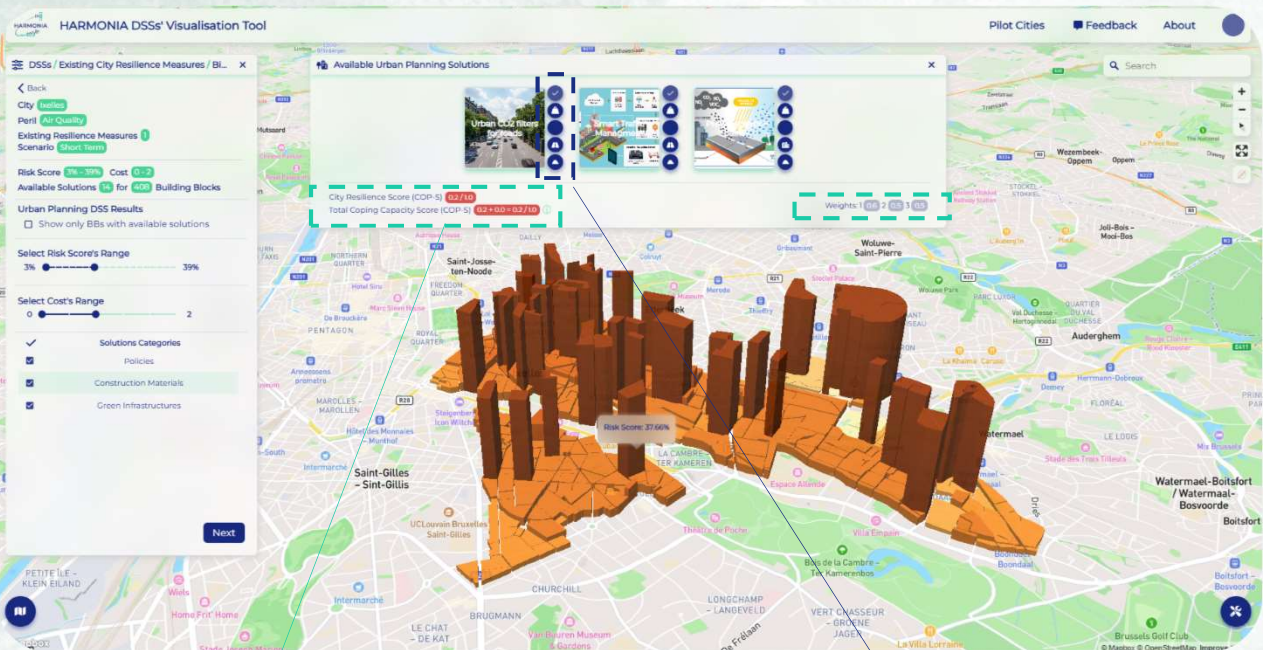


Scenario Name

Selected UP Solutions			
	BBs (ID)	Solutions	Weight
✓	1 BBs (ID)	3 Solutions	Weight
✗	58513	Urban CO2 filters for buildings	0.5
✗	58513	Woonerf solution	0.3
✗	58513	Green pergolas	0.3

- BBs (ID): The unique ID of each building block
- Solution: The title of the selected solution
- Weight: The 0-1 weight/performance of the solution

The user proceeds with the **mitigation scenario-building option**. By clicking each building block the risk score and the befitted UP recommendations are displayed along with their **performance weights**. The user can display the ID card of each UP intervention, informed about its weight, cost, area of application and category, as well as add it to the list of the selected mitigation measures. The adjustment of the performance weight is enabled for incorporating the “expert judgment” of the user.



i **City Resilience Score:** The total sum of the weights assigned to the **existing** solutions of the city selected by the user.

i **Total Coping Capacity Score:** The City Resilience Score plus the scores (weights) of the suggested interventions selected by the user.

i The user is able to **adjust the weight** based on the experience and the current state of the City, Economy and other parameters that contribute to the formation of the present state

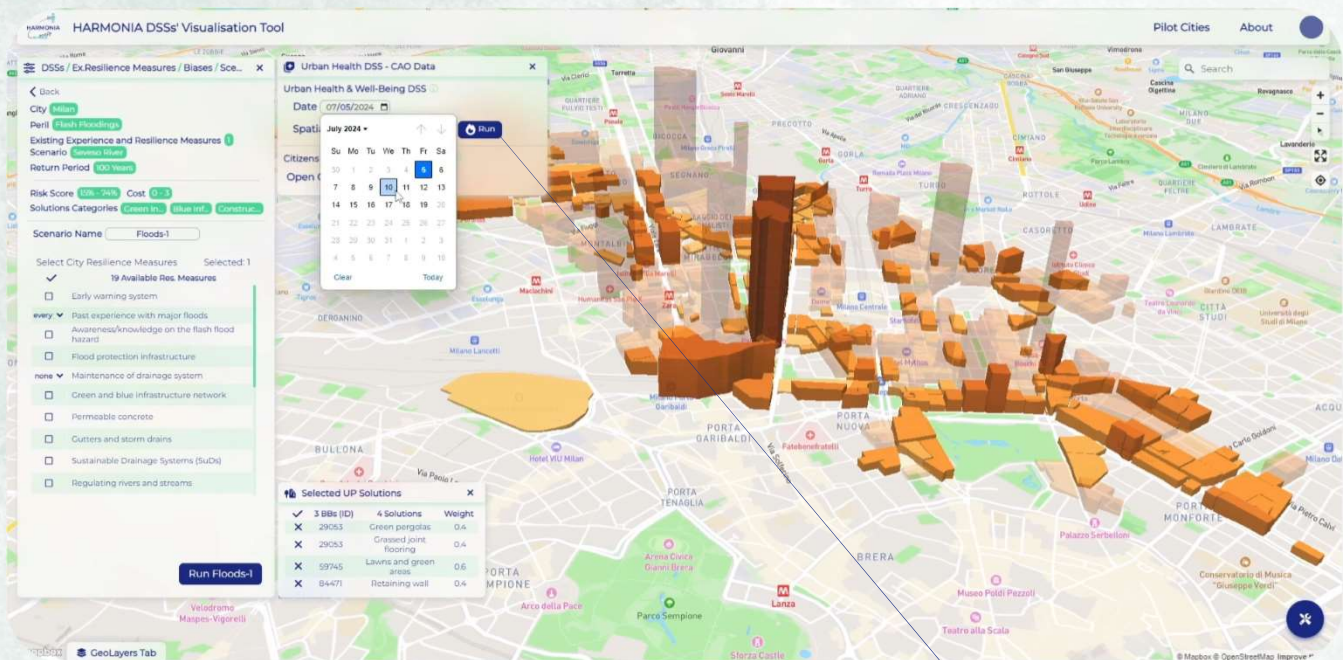
- Add to List -
- Default Weight -
- Cost -
- Display Road Network -
- Construction Materials -

CHAPTER

4

Urban Health & Well-being DSS

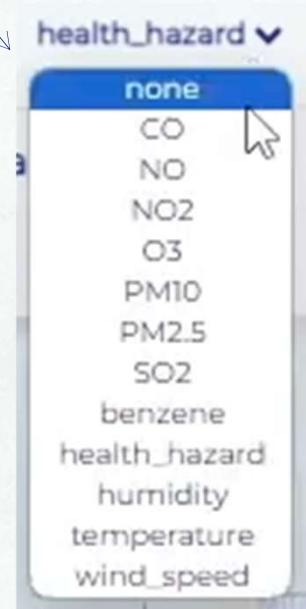
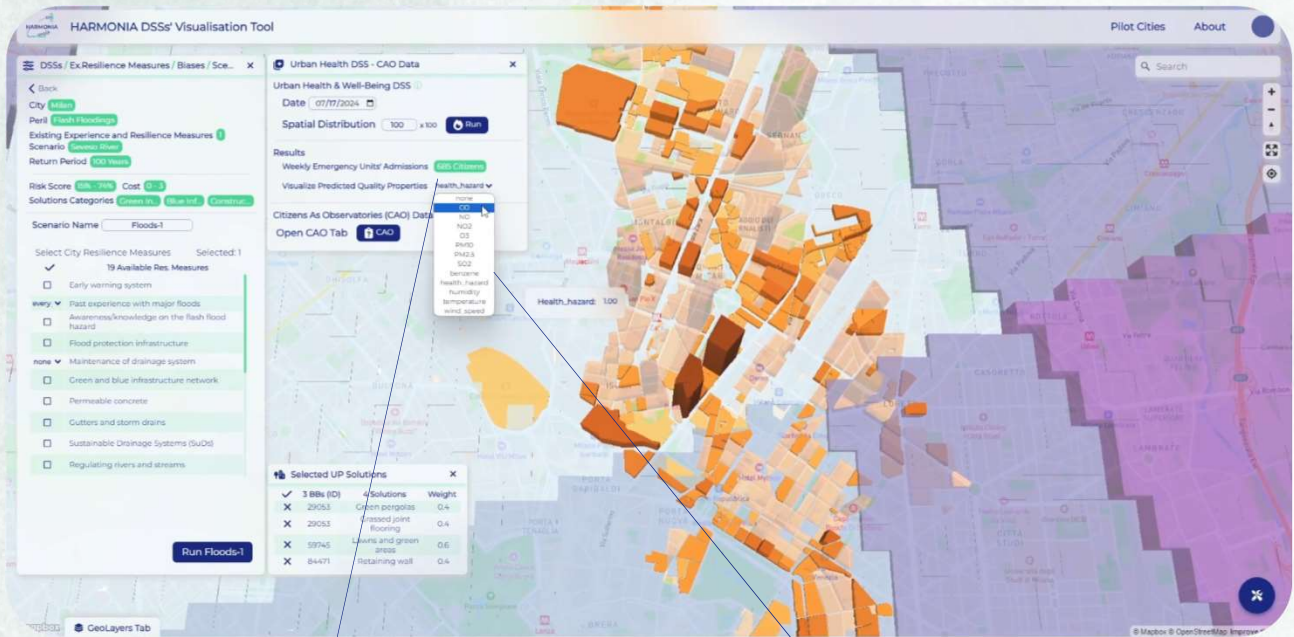
Right after the mitigation scenario building option, the user can parameterize the **Urban Health & Well-being DSS** by selecting the future date and the spatial distribution matrix of the prediction.



The Urban Health & Well-being DSS, led by HUMANITAS, is a tool for assessing the correlation between chronic diseases in urban populations and specific air pollution thresholds under different climate change scenarios. Focusing on atmospheric particulate matter (PM) and elevated temperatures, the DSS employs Vulnerability Assessment and Risk Management principles. It provides policymakers with hazard indicators for timely evaluation of short-term health risks associated with high air pollution levels. Incorporating machine learning/deep learning techniques, HARMONIA aims to enhance the accuracy of health forecasts, contributing to the continuous improvement of risk assessments. The application is part of the HARMONIA urban health & well-being initiative, spearheaded by HUMANITAS.

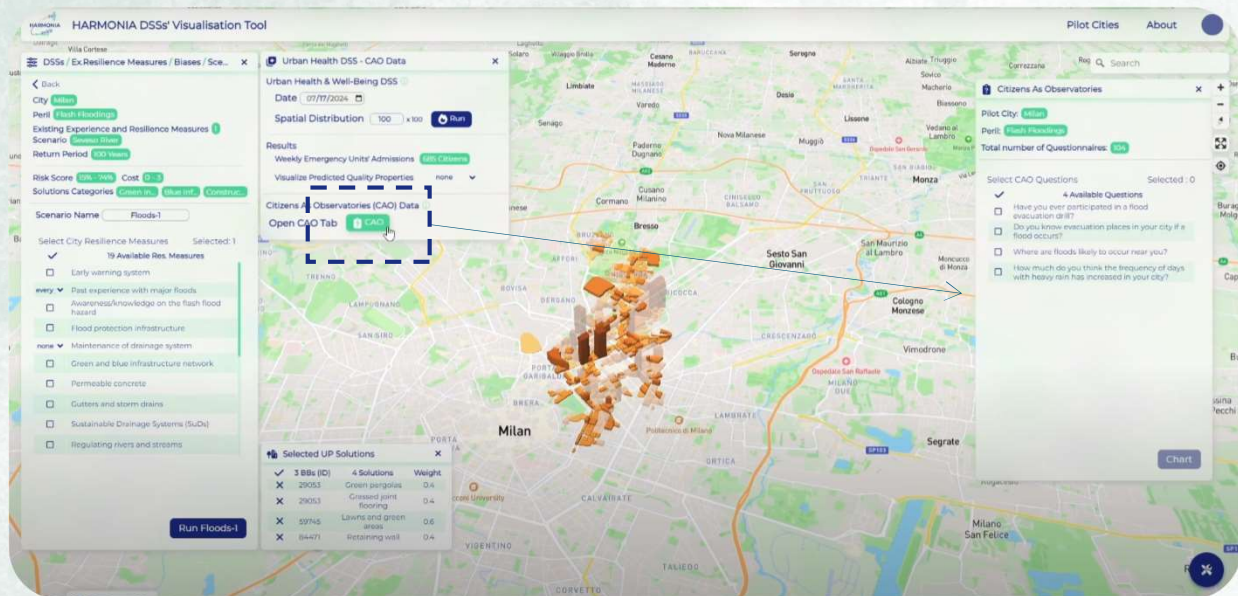


By clicking the “Run” button the DSS runs and the predicted weekly emergency unit admissions are displayed on the tab. The user can select which DSS-provided property (e.g., health hazard) wants to visualize on the map.

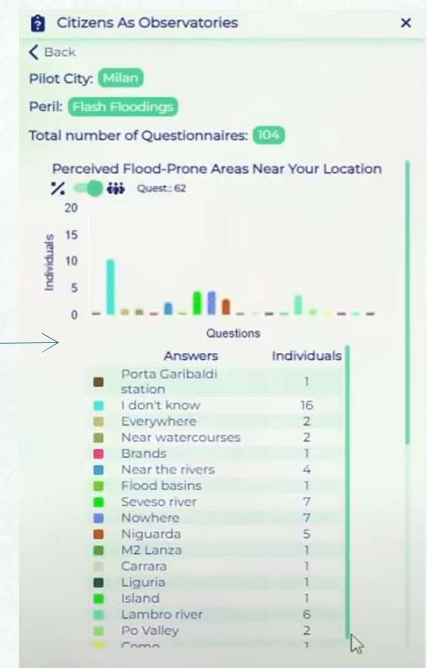
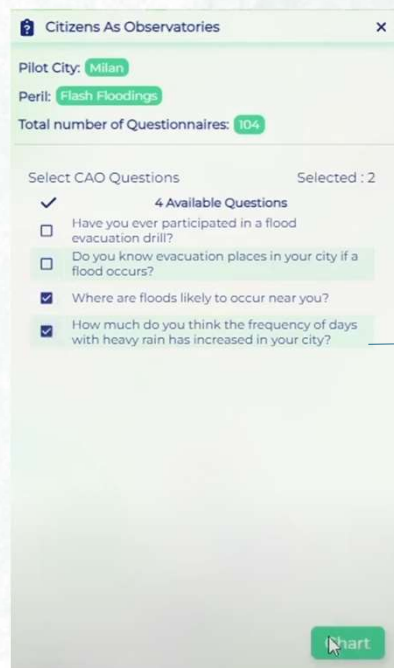


Predicted Weekly Emergency Unit Admissions

The user can activate the Citizens As Observatory (CAO) feature. The corresponding tab is displayed listing the Questions addressed to the citizens of the Pilot city, related to the selected peril. By selecting them and clicking the “Chart” button the statistics of the questionnaires are displayed through interactive and dynamic charts.



i CAO (Citizens as Observatories) is a vital component of the HARMONIA project, empowering citizens to actively contribute to climate change assessment at the local level. Led by CAO, the initiative leverages existing technologies and the 'Citizens as Observatories' tool, engaging citizens in collecting valuable data on air and water quality, land use, and more. By capitalizing on past successful initiatives and projects, CAO ensures a comprehensive understanding of climate change impacts. The collected citizens-based data enriches the overall IRAP dataset, enhancing the accuracy and inclusivity of environmental monitoring. CAO adopts a participatory perspective, encouraging citizens to actively participate in data collection, co-monitoring, and co-assessment processes, fostering a collaborative and citizen-friendly approach to environmental stewardship.



CHAPTER

5

Geohazards Analysis

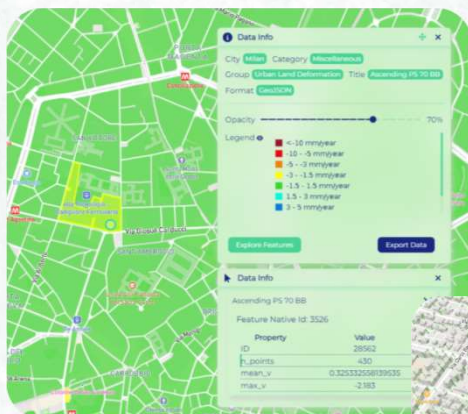
Geohazards Analysis

The user is able to proceed with a geohazards analysis by selecting the “Geohazards” peril. The HARMONIA inSAR Urban Land Deformation service provides a catalog with the inSAR products in **Building Block** level, **Points** and spatially **Interpolated**.

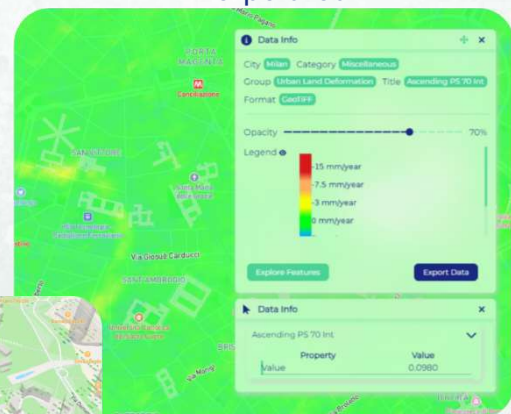
InSAR Products Catalog



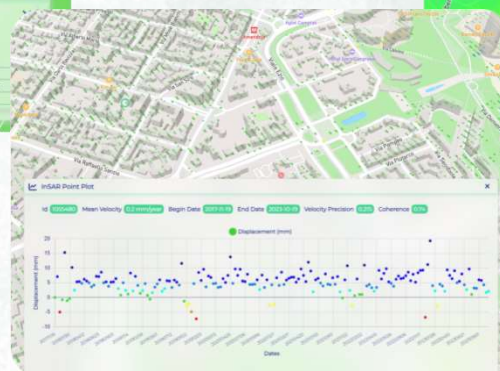
Building Blocks - Aggregated



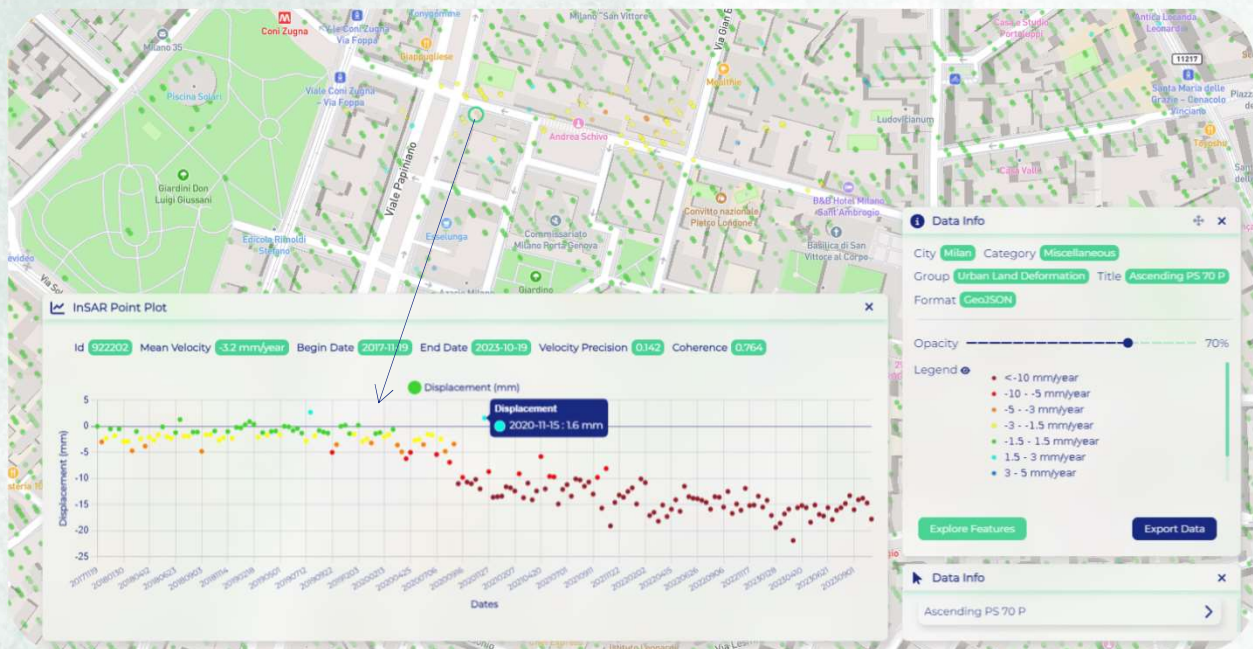
Interpolated



inSAR Points



The **inSAR Points Plot** Tab enables time series analysis of deformation for each unique point. By clicking on a specific point on the map, users can visualize the corresponding spatiotemporal data in an interactive dynamic chart.



i

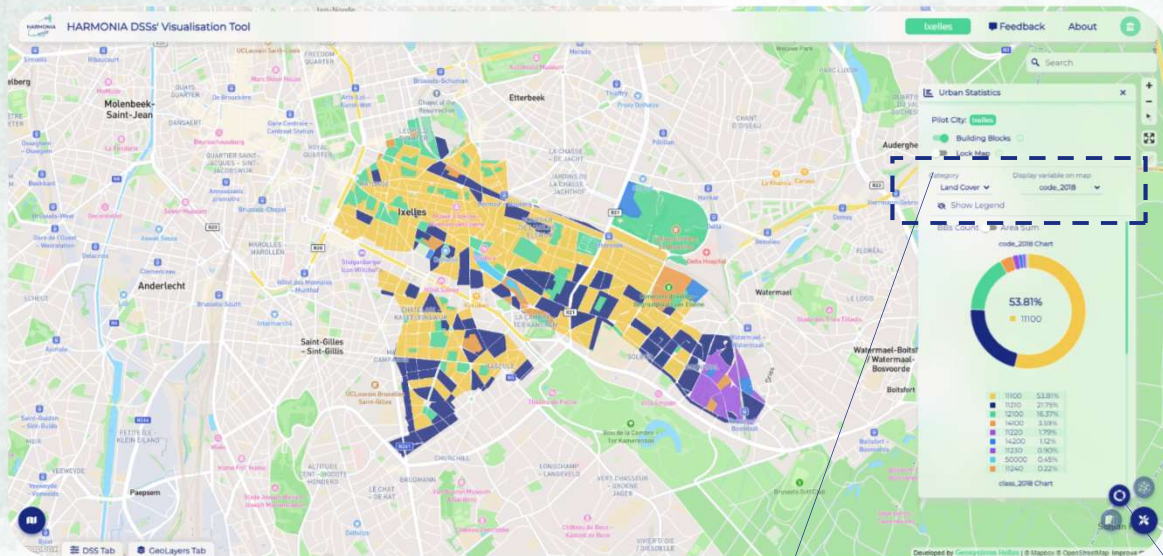
Each point in the chart is color-coded using the inSAR palette, ensuring consistent visual representation of the value range across the data.

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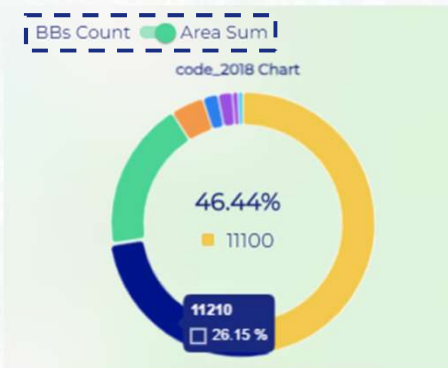
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Additional Features of the HARMONIA DSS's Visualization Tool

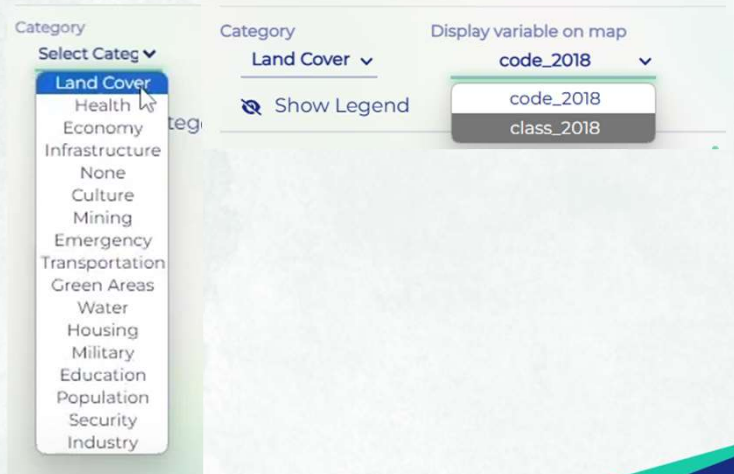
The user can activate the “Urban Statistics” tool. By selecting an urban context data category and zooming in on a smaller area of the selected Pilot city, the chart of the category’s variables is displayed. Users can further explore these variables by selecting their preferred option from a dropdown menu to visualize them directly on the map. The charts offer a percentage-based breakdown, giving a clear overview of the distribution of the various classes within the current map frame.



Switch between the actual number of Building Block (BBs count) and the Total area of each category (Area Sum)

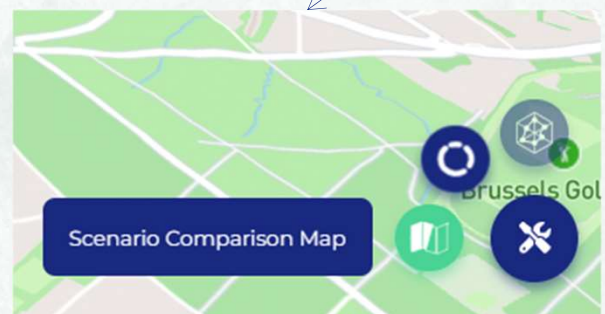
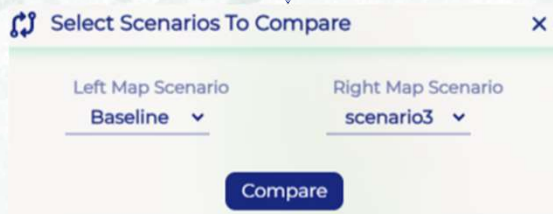
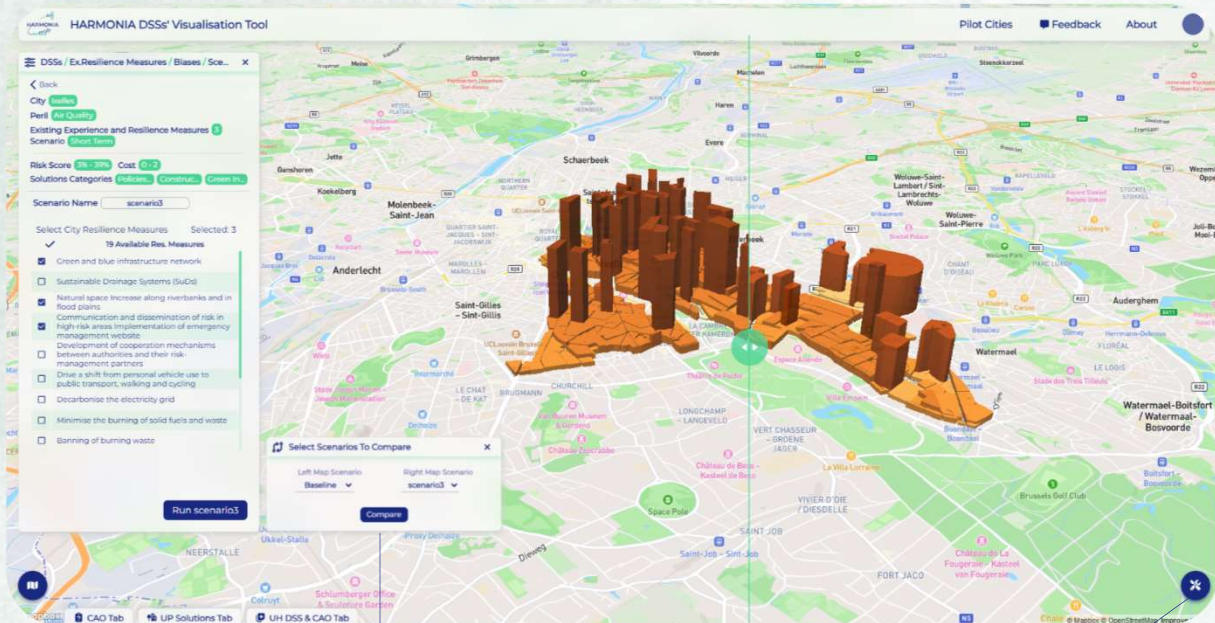


Select a category and variable to display



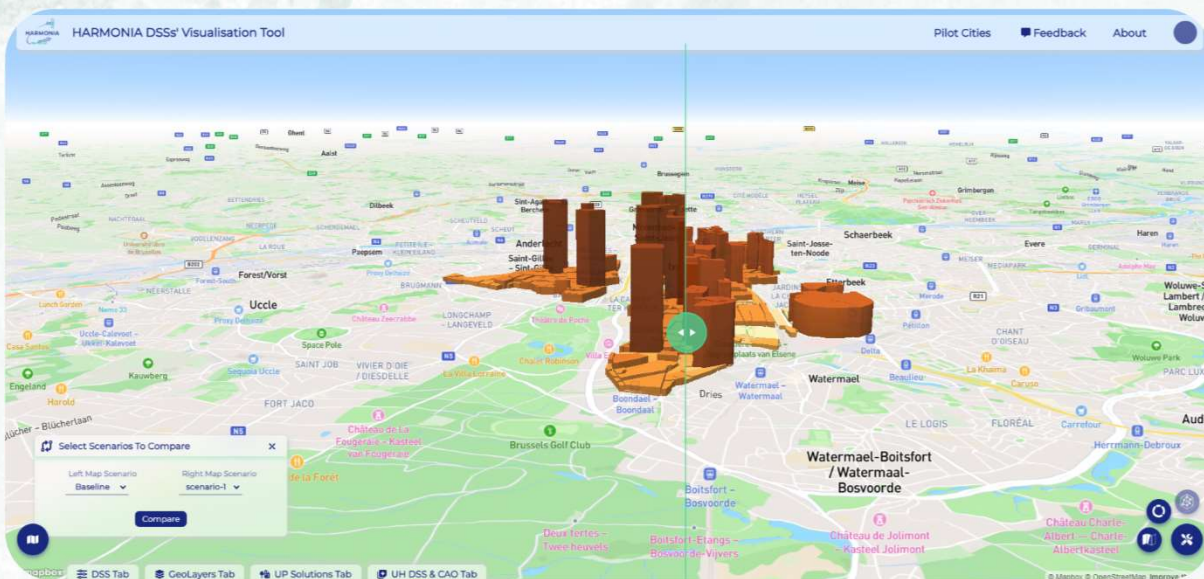
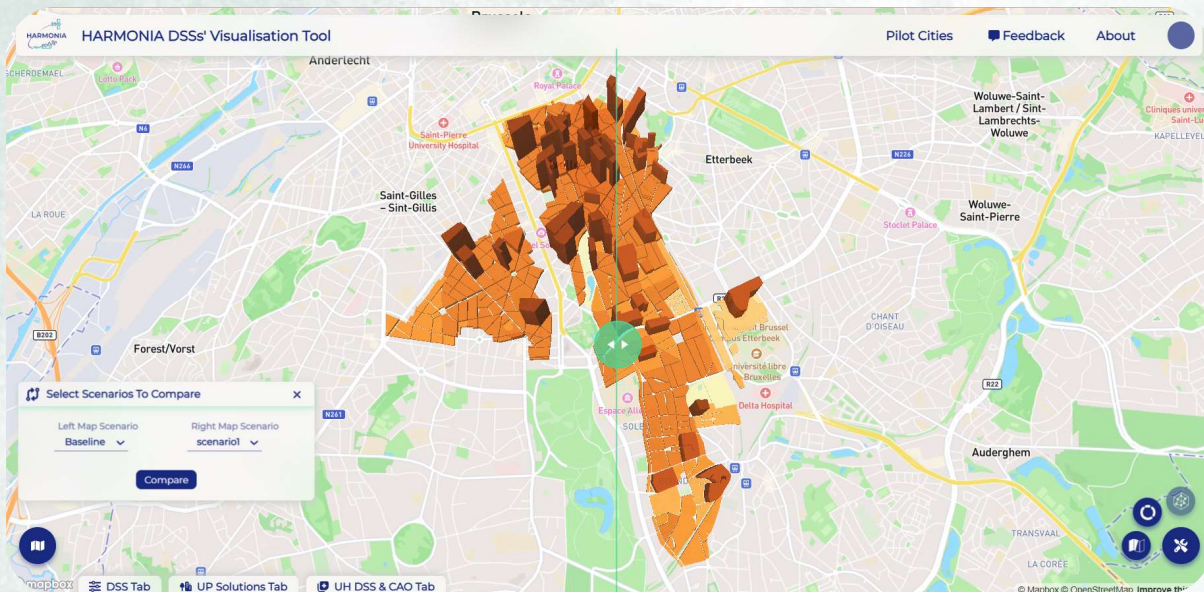
Compare Scenarios

The user can activate the “Scenario Comparison Map” tool to compare two different scenarios directly on the map.

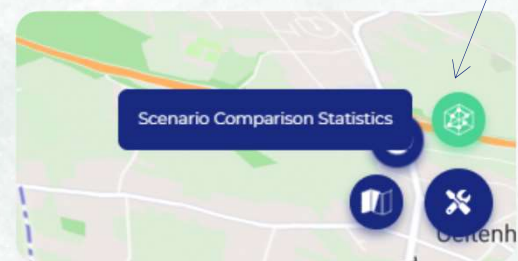
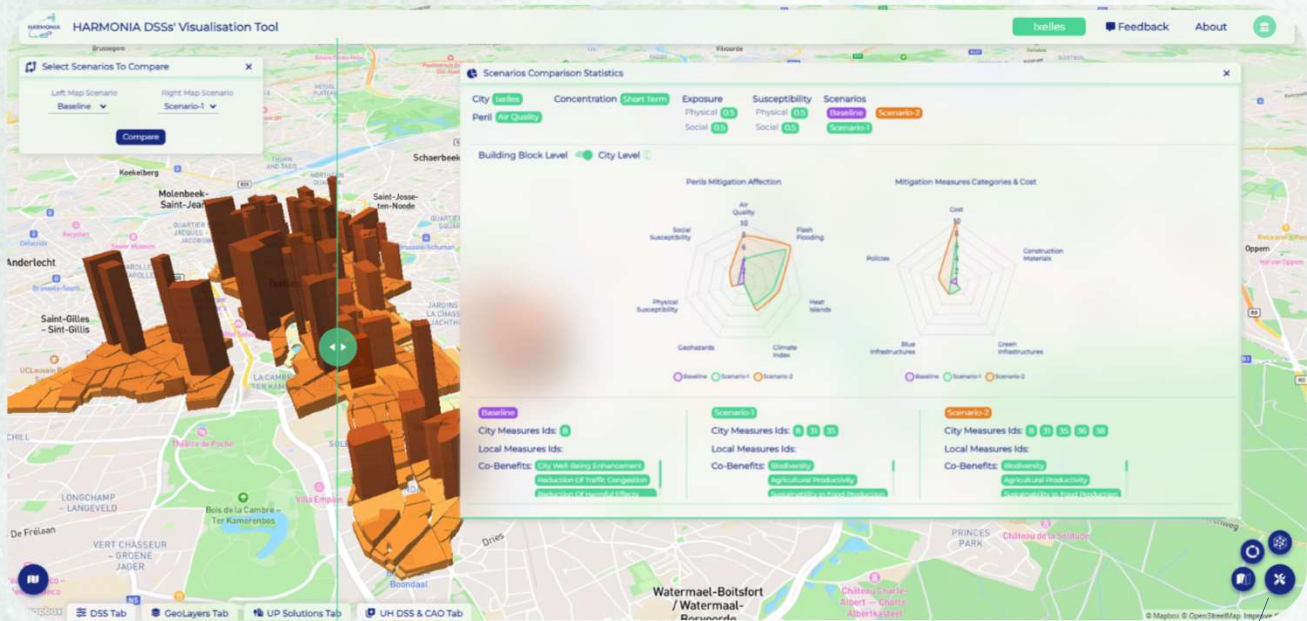


Compare Scenarios

The user can further **interact** with the **dynamic vertical bar** to adjust the width of each map. By selecting the map on which each scenario will be visualized can easily compare the cartographic representation of each scenario's risk scores, before and after the incorporation of the user-selected UP recommendations and resilience measures.

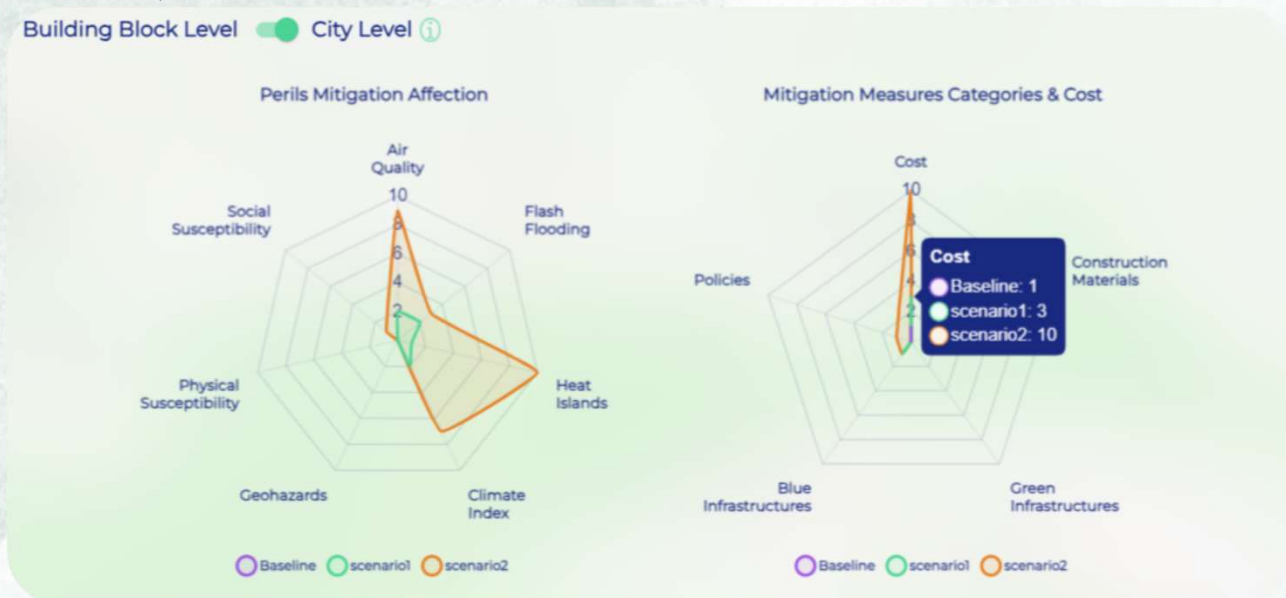


The user can activate the “Scenario Comparison Statistics” tool to compare the created scenarios. The tool provides two spider charts that offer a clear overview of the different aspects of each scenario.



The two spider charts aim to provide a comprehensive overview of the scenario's key characteristics and be a useful tool for the comparison of the different created scenarios.

i The switcher allows the user to switch between city-level and building-block-level analysis. The City level analysis provides an overview of the city's selected Mitigation Measures Formula: $\sum(\text{Mitigation Measure Score} * \text{BB-area} / \text{City-total-area})$. On the other hand, the Building Block level analysis focuses on the examined building blocks without considering them as part of the whole city. Formula: $\sum(\text{Mitigation Measures Score})$



The **Perils Mitigation Affection** chart provides an overview of the coping capabilities of each scenario for the different perils

The **Mitigation Measures Categories & Cost** chart provides an overview of the selected Mitigation measures and the cost level for the different scenarios

The tool 's last section provides a summary of the selected UP and Resilience solutions and their co-benefits for each of the created scenarios

Baseline	Scenario1	Scenario2
City Measures Ids: 8	City Measures Ids: 8 31	City Measures Ids: 8 31 35 36
Local Measures Ids:	Local Measures Ids: 11	Local Measures Ids: 11 7 6 16
Co-Benefits: Transparency In Roles Of Agencies In Flood Risk Management	Co-Benefits: Air Quality Improvement, Health	Co-Benefits: Air Quality Improvement, Health Improvement, Air Exchange

End of Document