9 – 11 MAY 2023
KRAKÓW, POLAND

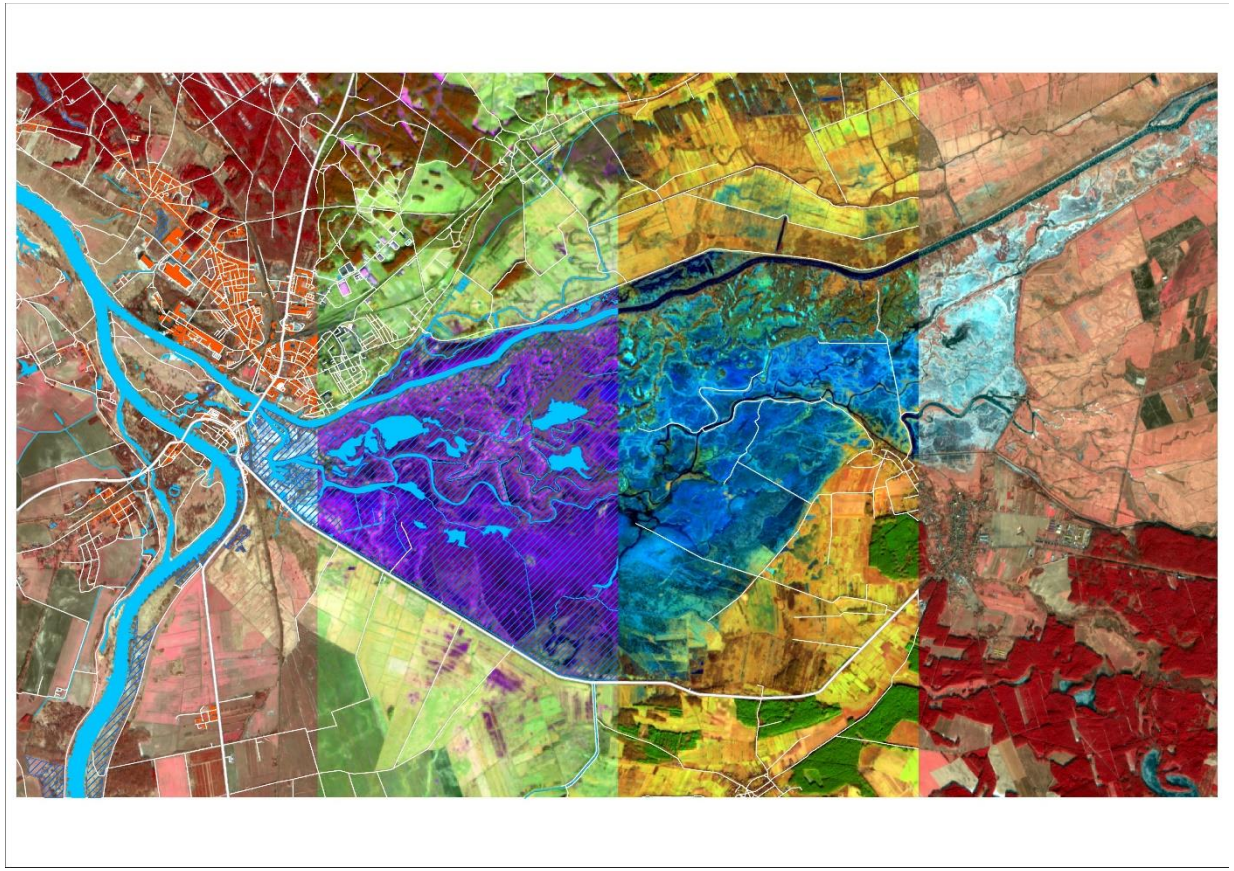
Iceland Liechtenstein Norway grants

Norway grants

INNOVATION IN DISASTER PREVENTION

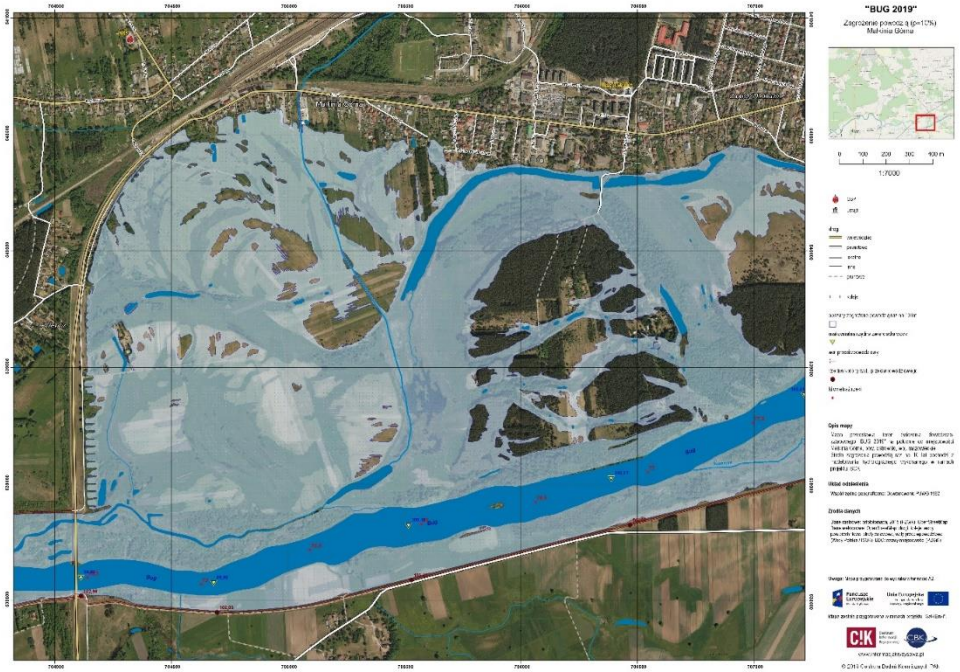
CHALLENGES
SOLUTIONS
AND OPPORTUNITIES

Geoinformation for crisis management – guidelines and examples



Geoinformation for crisis management - introduction

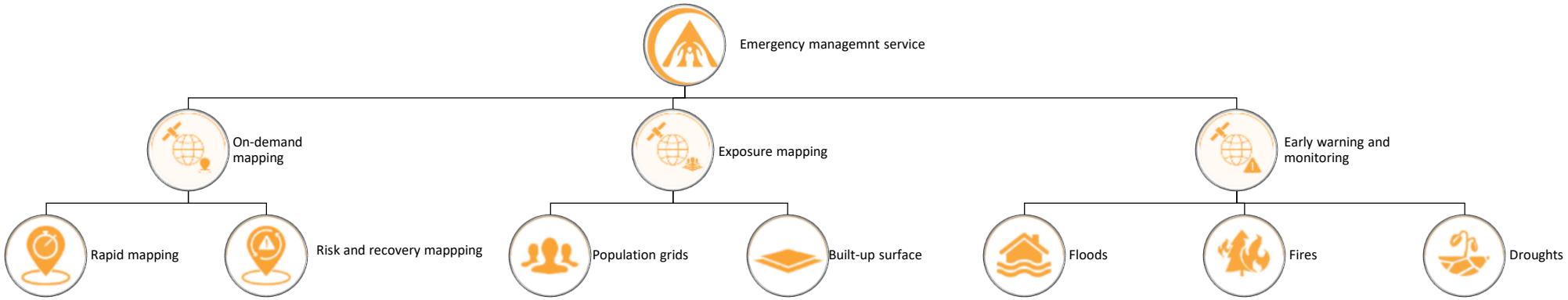
- Geoinformation - information that describes the location and characteristics of phenomena, natural or human made, related to the Earth's surface.
- Different data sources – satellite imagery, aerial photos, data obtained from drones with various sensors, geodetic databases, satellite navigation, meteorological data, LIDAR and radar measurements, in-situ sensors, even social media information.
- Various products - detailed maps and 3D models of areas of interest, risk and vulnerability assessments, crisis situation monitoring, evacuation plans, damage assesments, recovery plans…



Copernicus System – a wealth of data and geoinformation services

- Flagship programme of European space policy – cooperation of the EU, ESA, EUMETSAT, ECMWF), EU Agencies and Mercator Océan.
- Free and open data access policy + value-added services (data processing and analysis).
- Six thematic streams of Copernicus services: Marine, Atmosphere, Land, Climate Change, Security, Emergency (+ Copernicus service catalogue – a comprehensive list of information products).
- Various areas of application: urban area management, sustainable development and nature protection, regional and local planning, agriculture, forestry and fisheries, health, civil protection, infrastructure, transport and mobility, tourism…

Copernicus Emergency Management Service



- On-demand mapping – activated only by authorised users
- All the maps and information products delivered by CEMS are publicly available on the programme website and dedicated geoportals for each subservice
- Products generated by the service can be either used as supplied (e.g. as digital or printed map outputs) or they may also be combined with other data sources (e.g. as digital feature sets in a geographic information system) to support geospatial analysis and decision making processes of emergency managers.

EU Disaster Risk Management Knowledge Centre Risk Data Hub

- GIS web platform providing access to data and methods for Risk and Impact assessment in a multi-hazard context.
- Decision support system that integrates spatial data (usually based on Copernicus services) along with statistical analysis.
- 3 main areas: risk analysis, disaster loss data, facts and figures.
- 8 classes of hazards: geophysical, hydrological, meteorological, climatological, technological, biological, transportation and malicious and their impact on 4 categories of assets: population, buildings, critical services and environment.
- Authorised users can create their private "User corner" to upload their own data to run customised assessments.

EO Toolkit for Sustainable Cities and Human Settlements

- Joint initiative of UN HABITAT, GEO (Group on Earth Observations) and EO4SDG.
- Aim: achieving Sustainable Development Goal 11 (make cities and human settlements inclusive, safe, resilient and sustainable).
- Provides practical guidance and examples of EO data, tools, and use cases in support of sustainable urbanization and resilience.
- Online knowledge resource with more than a dozen examples of complete set of tools available for download, with necessary documentation, user guide, links to relevant EOdata sets, training materials and several use cases.

GIS for crisis management – success stories

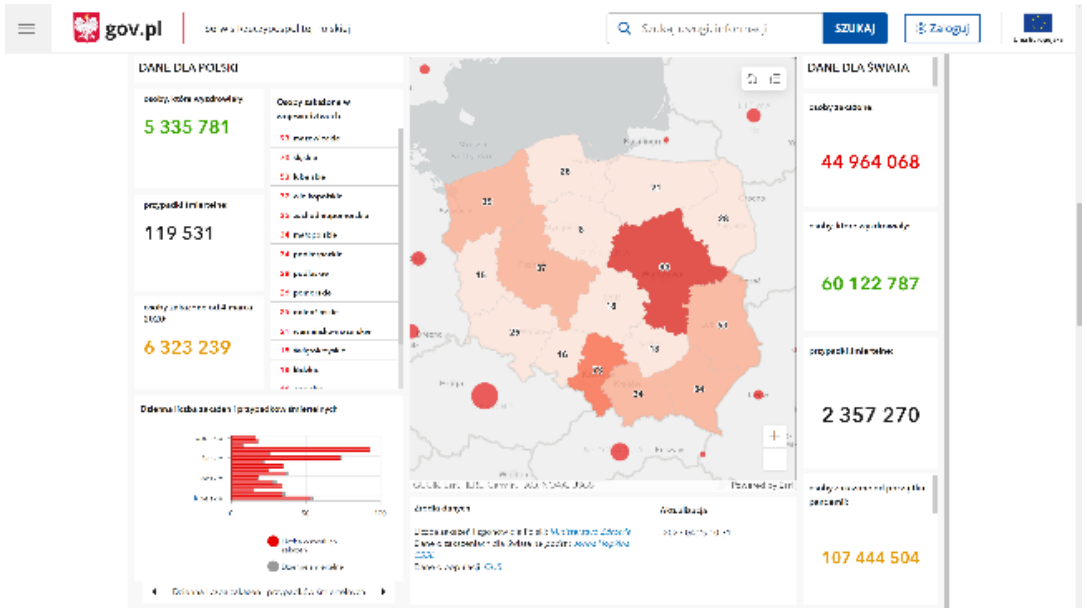
- GIS in support of government administration in crisis management activities
- Integration of UAV mapping within Norwegian 110 centres (112 centres)
- Czech Republic: Fighting Climate Change
- Portugal: Accelerating Disaster Response
- Area-based Risk Assessment for Donetsk Oblast - Mariupolskyi Raion
- Tackling Stubble Burning: Towards a Safer and Healthier Environment in Serbia
- Reducing flood risk through GIS: the results of the Danube Floodplain Project
- Evaluate natural hazard risk with FEMA's National Risk Index
- Satellite-based monitoring of water resources - an Odra River case
- Actionable Natural Catastrophes Intelligence to transform Government Response, Recovery & Resilience
- Rock the Alps – monitoring rockfall risk and protection forest mapping

GISCOVID-19 system

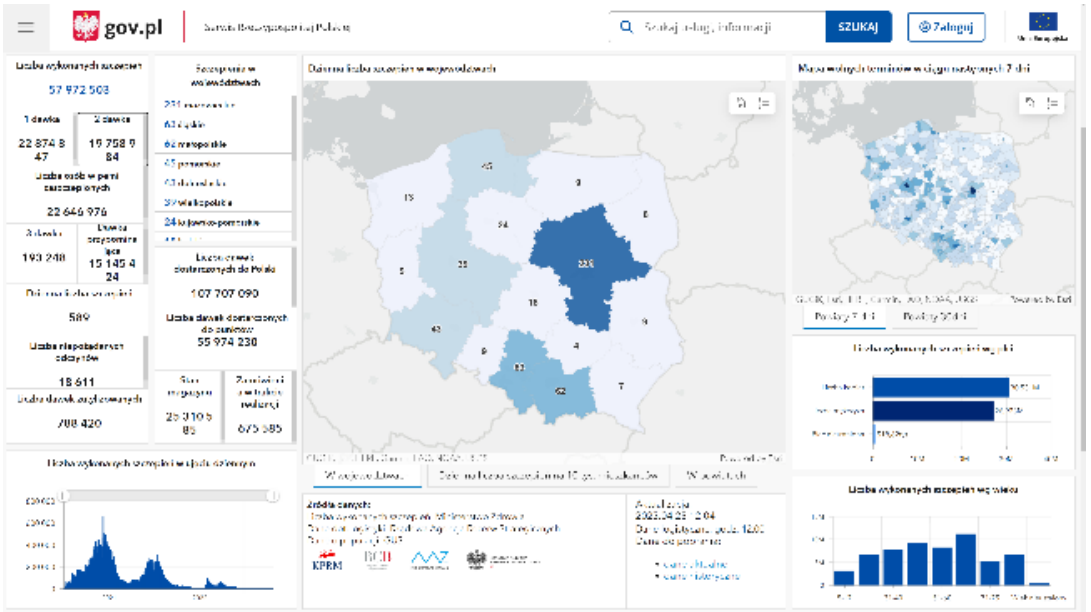
- The platform which integrated epidemic data using ArcGIS family software
- The aim was to present the situation in the country broken down by voivodships on the basis of data from the Ministry of Health in relation to selected indicators: new cases, recoveries, cumulative number of illnesses, availability of beds in hospitals, people in quarantine or deaths.
- Two subsystems: one for informing the public, which is available on the website and implemented in the cloud solutions of ArcGIS Online; and another dedicated to a specific and defined group of users, e.g. decision-makers and representatives of institutions, ministries, and public services.
- It has helped to build situational awareness, improve decision-making, and respond more effectively to the crisis

GISCOVID-19 system

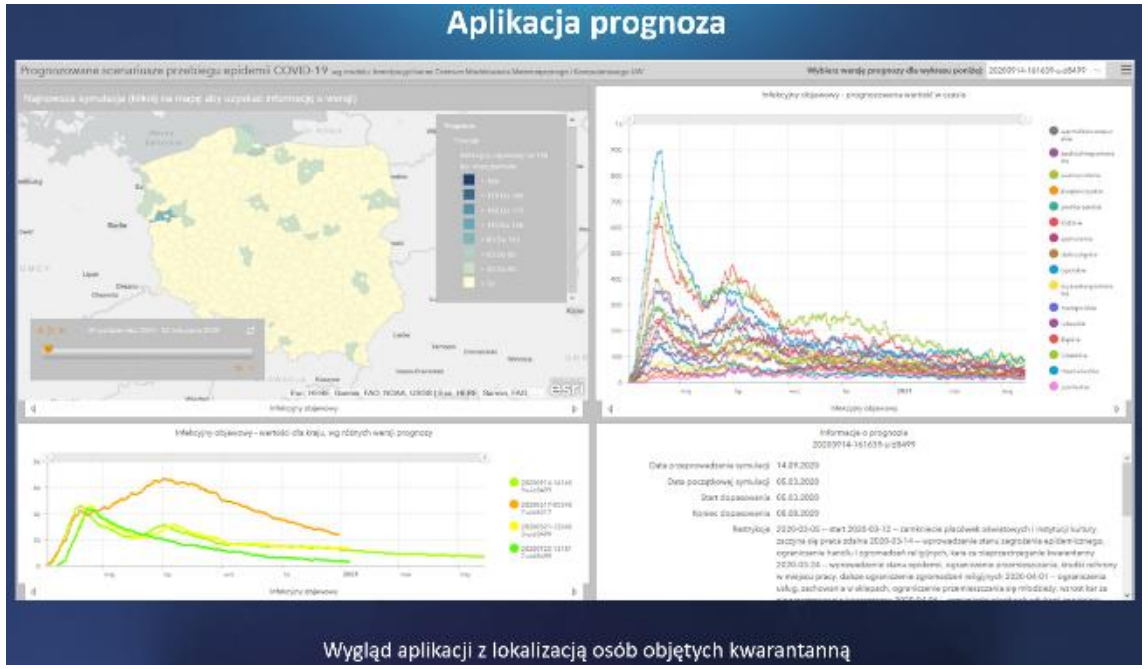
- COVID-19 infection report



- COVID-19 vaccination report



GISCOVID-19 system



GISCOVID-19 system has been an important tool in Poland's response to the COVID-19 pandemic. It has helped to build situational awareness, improve decision-making, and respond more effectively to the crisis.

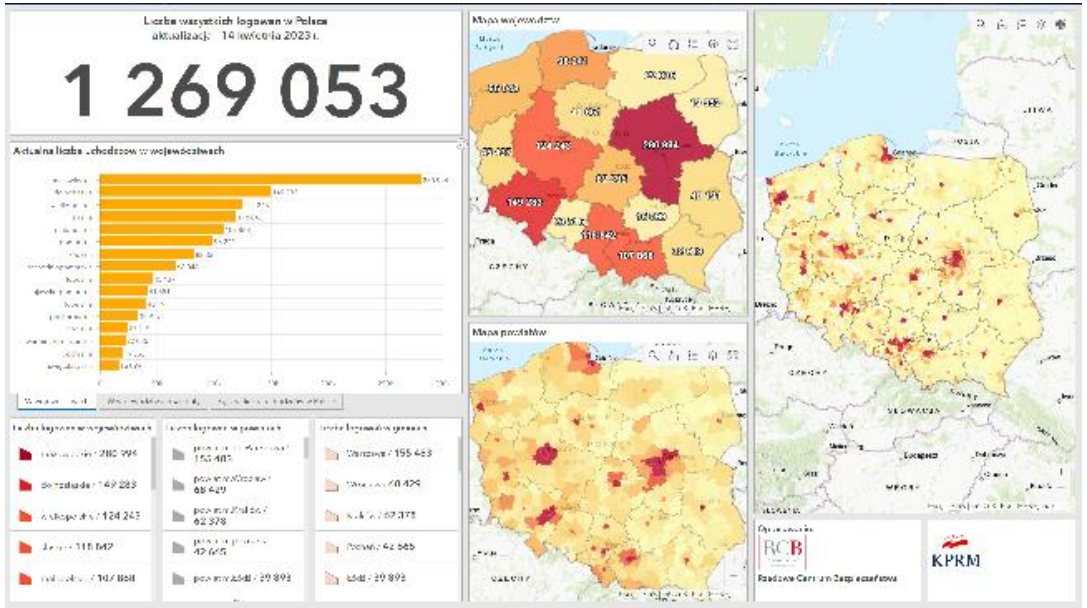
GISBN National Security system – aims and functionalities

Aim: to establish a platform integrating different services in one place – satellite imagery, data collected by drones, and other map tools – to improve our early warning system and build situational awareness among decision-makers by mapping, monitoring, and providing risk assessment, in order to achieve the following goals:

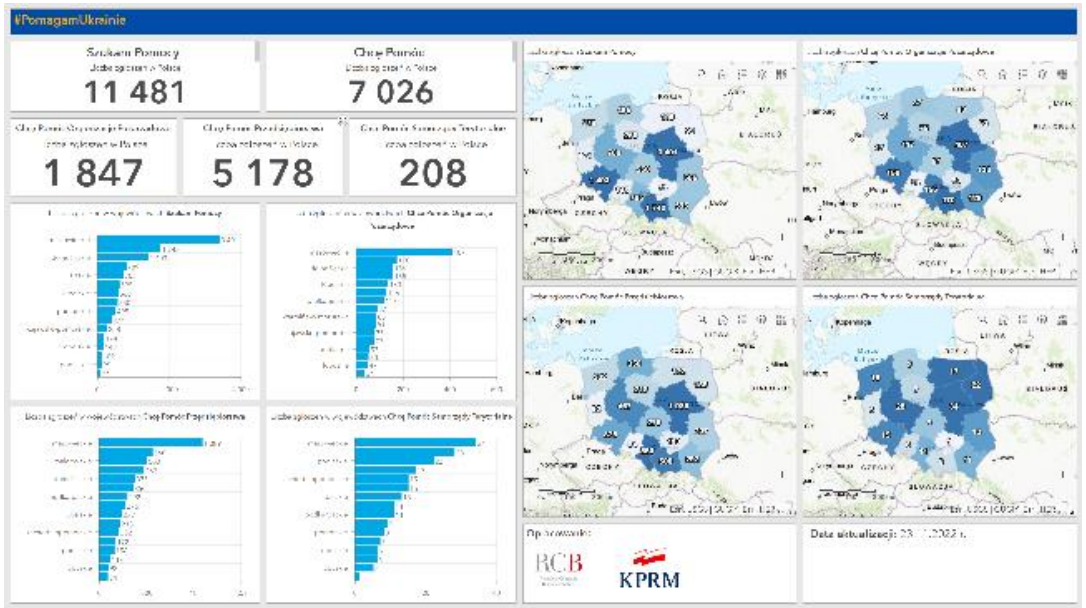
- create epidemic threat maps for different diseases;
- create a disease spread prognosis map;
- identify sensitive and vulnerable areas;
- build sitautional awareness and operational map of the region and the country and neighboring countries ;
- monitor and analyse of selected threats relevant to national security;
- coordinate the process of collecting data.

GISBN National Security system – examples

Localization of the Ukrainian refugees in Poland



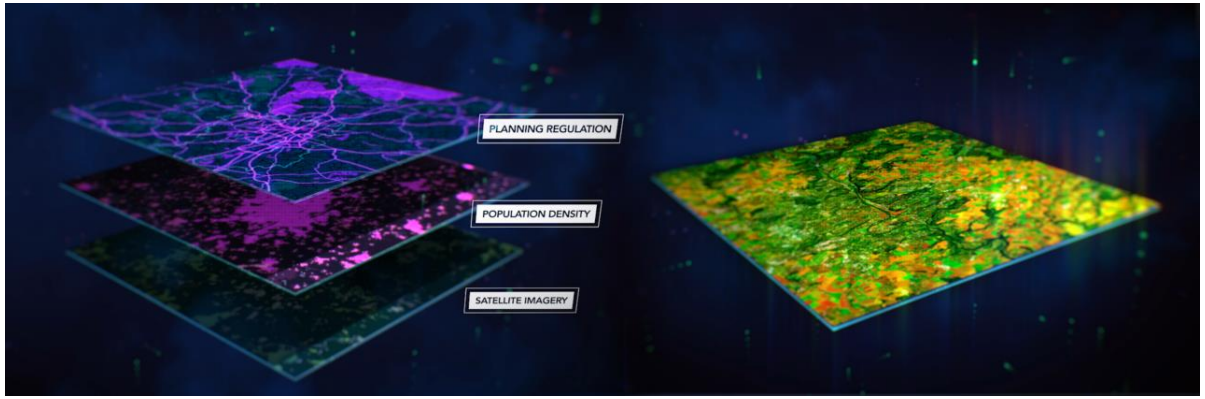
Involvement of the Polish society in organizing aid



Czech Republic: Fighting Climate Change

Prague Institute of Planning and Development combined three layers of geospatial data onto a single map:

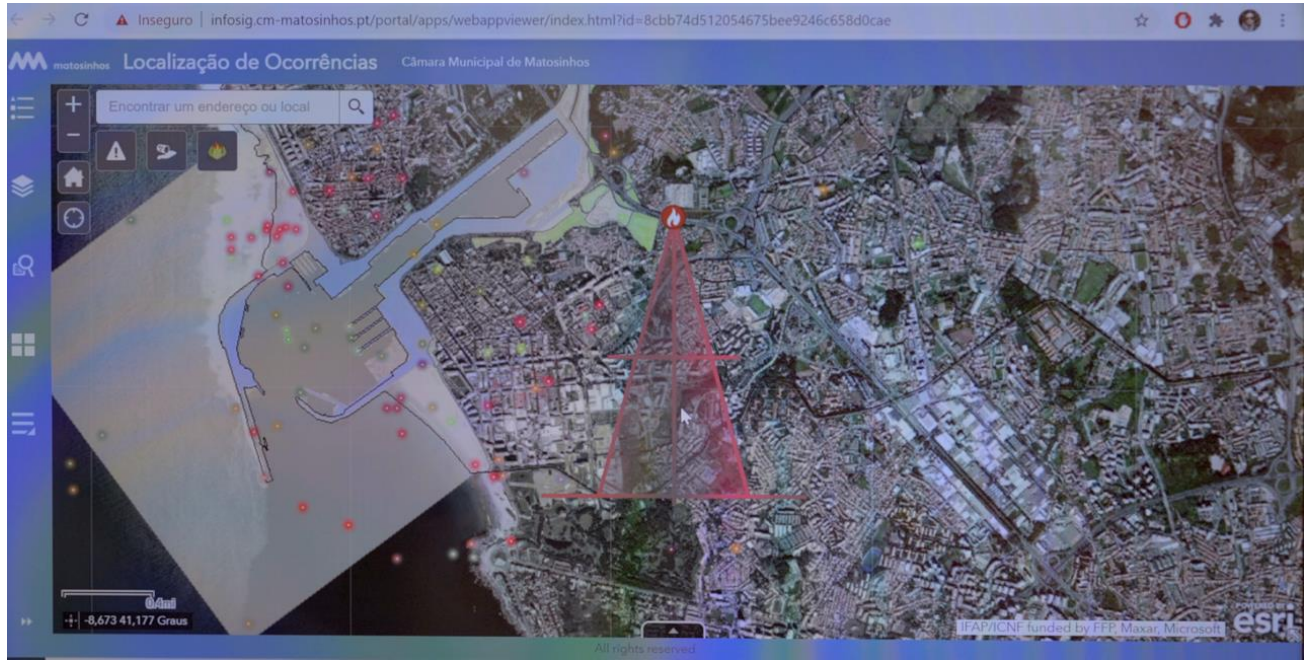
- satellite imaging to identify heat islands, areas with lots of pavement and industrial infrastructure that are especially prone to temperature increases;
- precise data on the city's population density;
- layer representing municipal regulations with which it needed to comply.



End result: cooling down of discovered hot spots by planting new vegetation and installing water features on rooftops, beneath train tracks, and in other places that never would have been considered without layered spatial analysis.

Portugal: Accelerating Disaster Response

- 36.15 % of Portugal territory covered by forests in 2020, with peak fire season typically beginnning in late June and lasting around 14weeks. Wildfires in 2017 resulted in 111 victims in Portugal, 4 in Spain.
- Matosinhos adopted integrated GIS system, providing maps, graphs, and charts—updated in real time—that fit on a single screen. Dashboards created with ArcGIS are customized to meet each team's needs.
- System enables also to run scenarios for better decision-making, combining robust data handling and visualization. Decision-makers can instantly see the consequences of changing variables on a map.



Area-based Risk Assessment for Donetsk Oblast – Mariupolskyi Raion

Aim: to assist communities, local government and industries with a granular and comprehensive risk data to better predict, prepare for and respond to current and future risks in the city, to support implementation of risk reduction programmes and resilience-building activities.

3 main information gaps identified on the way to inform decision-making process for localized disaster risk reduction activities:

- 1) localization and extend of the main natural and anthropogenic hazards in the targeted areas of Eastern Ukraine,
- 2) the level of exposure of populations to such hazards, and
- 3) the extent to which certain populations would be more vulnerable or resilient to hazards.

Apart from the data gaps, institutional settings also posed a challenge, as there was still no functional platform for open geospatial data access and most of relevant vulnerability data were dispersed among various stakeholders on different levels.

Area-based Risk Assessment for Donetsk Oblast – Mariupolskyi Raion

Figure 1. Air pollution

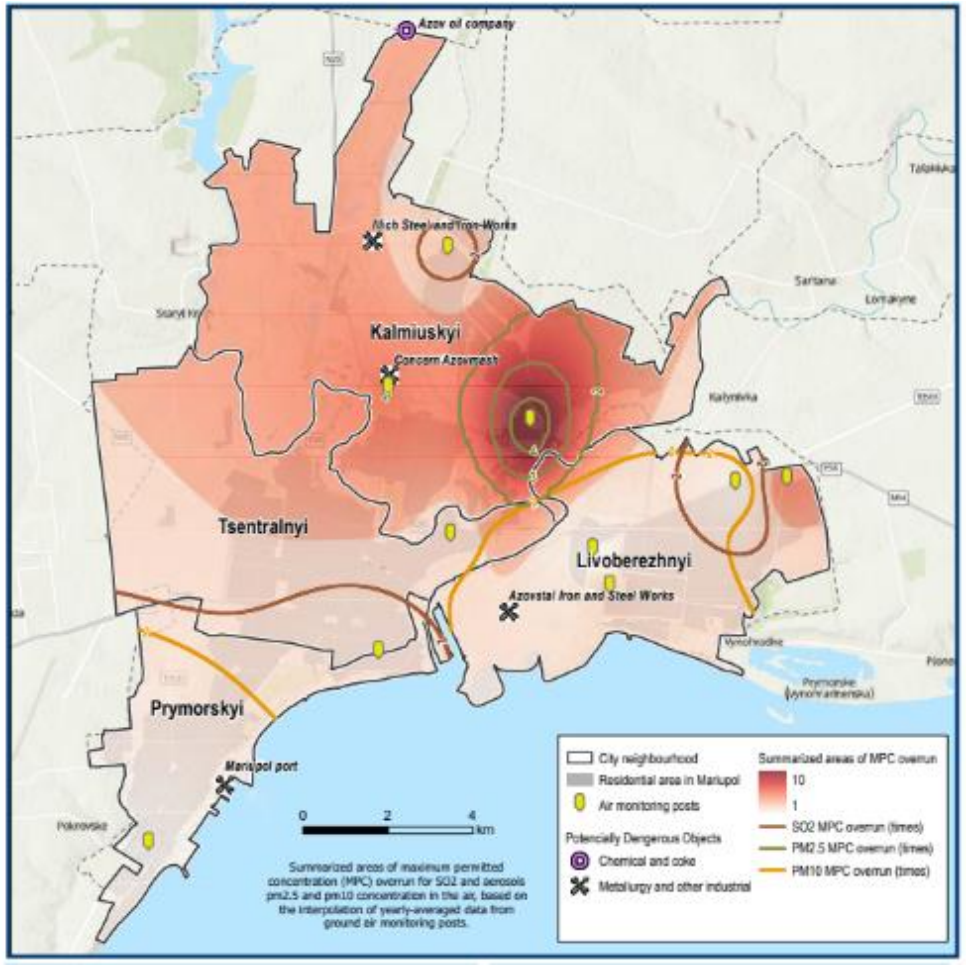
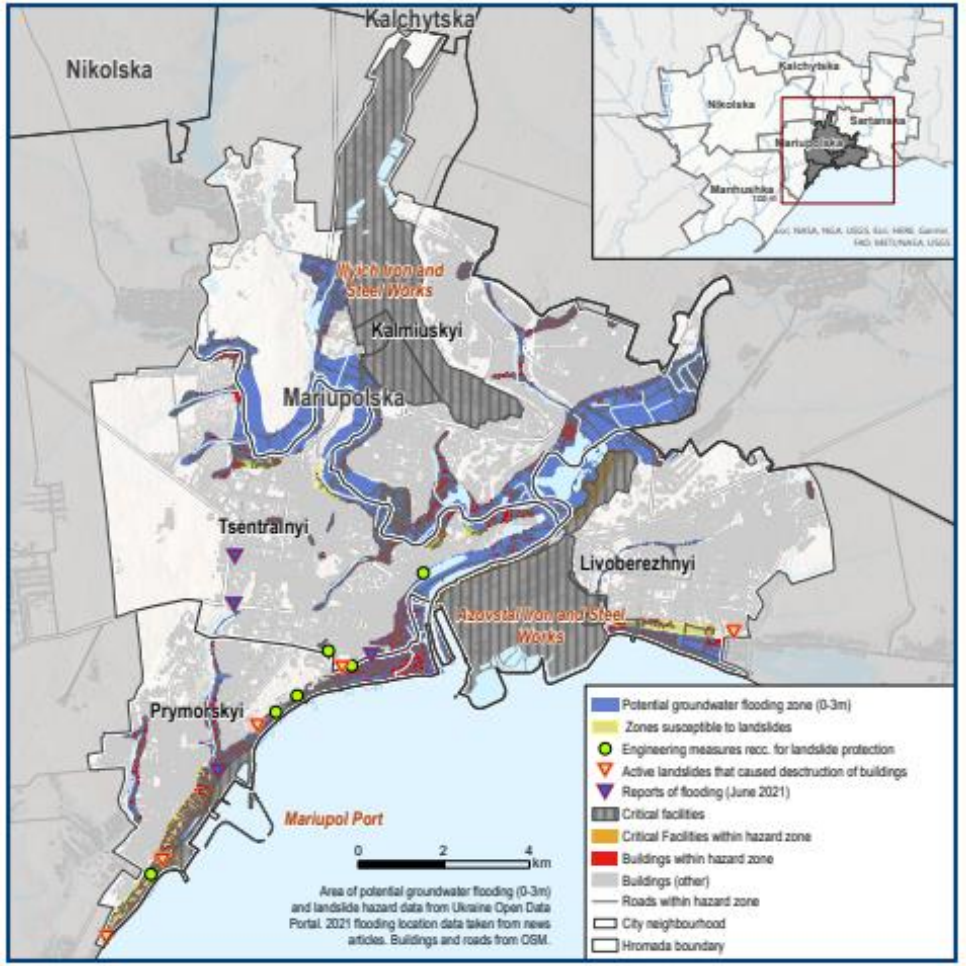


Figure 2. Floods and landslide exposure



Area-based Risk Assessment for Donetsk Oblast – Mariupolskyi Raion

Figure 3. Urban heat islands, 2020

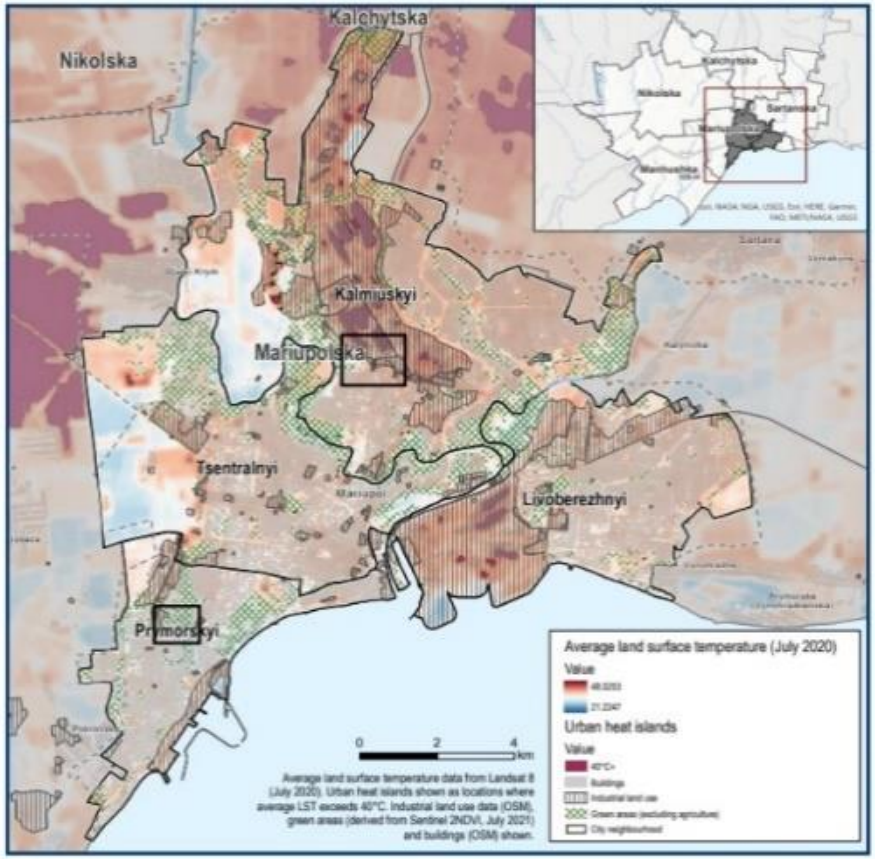
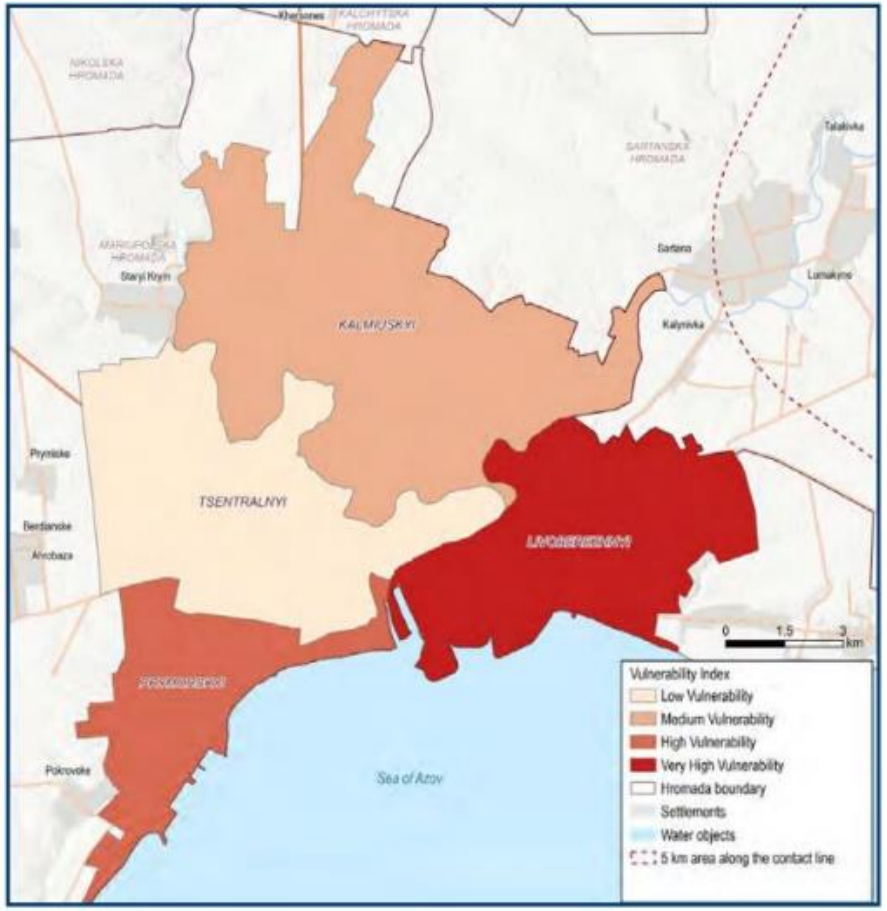


Figure 4. Vulnerability profile by district



Area-based Risk Assessment for Donetsk Oblast – Mariupolskyi Raion

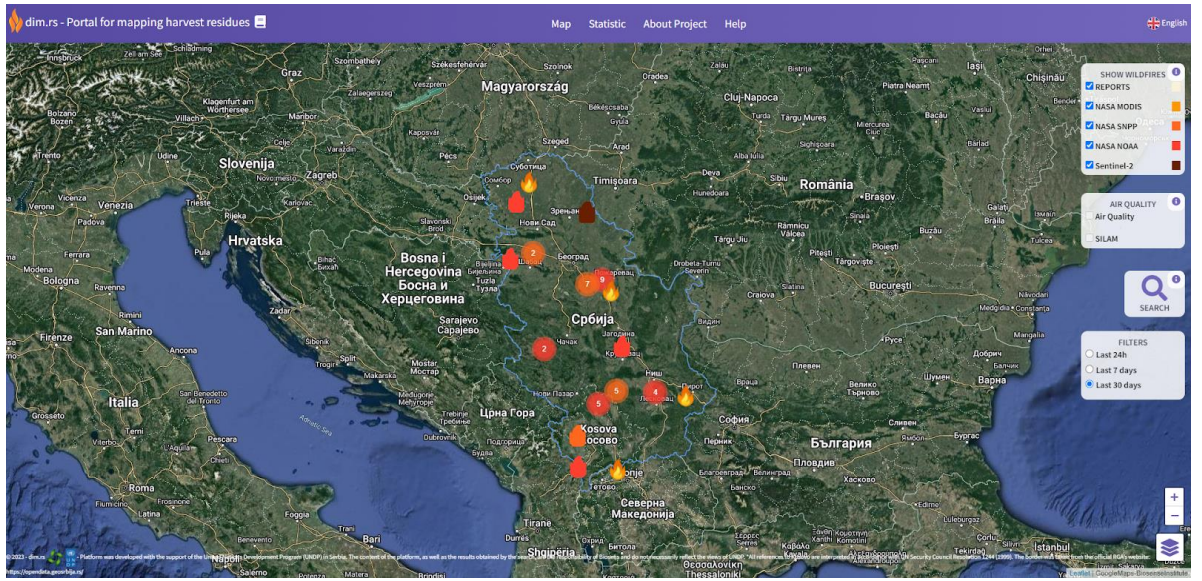
Lessons learnt – with geospatial analysis it is possible to identify hazards that are not obvious for the local population:

- lack of awareness of heat island effect – it was considered as a “normal” phenomenon during the summertime.
- Underestimating the extent of groundwater flooding, local actors didn’t consider it may cause damage in the future.

Recommendation: need to conduct local-level risk assessments for disaster risk management, anticipatory actions and conventional humanitarian response programming, especially in conflict and fragile settings, with utilization of granular geospatial datasets and locally collected vulnerability data to ensure evidence-based disaster risk planning is available.

Tackling Stubble Burning: Towards a Safer and Healthier Environment in Serbia

GIS portal with data from several satellites MODIS, SNPP, NOAA and Sentinel-2.



Key functionalities:

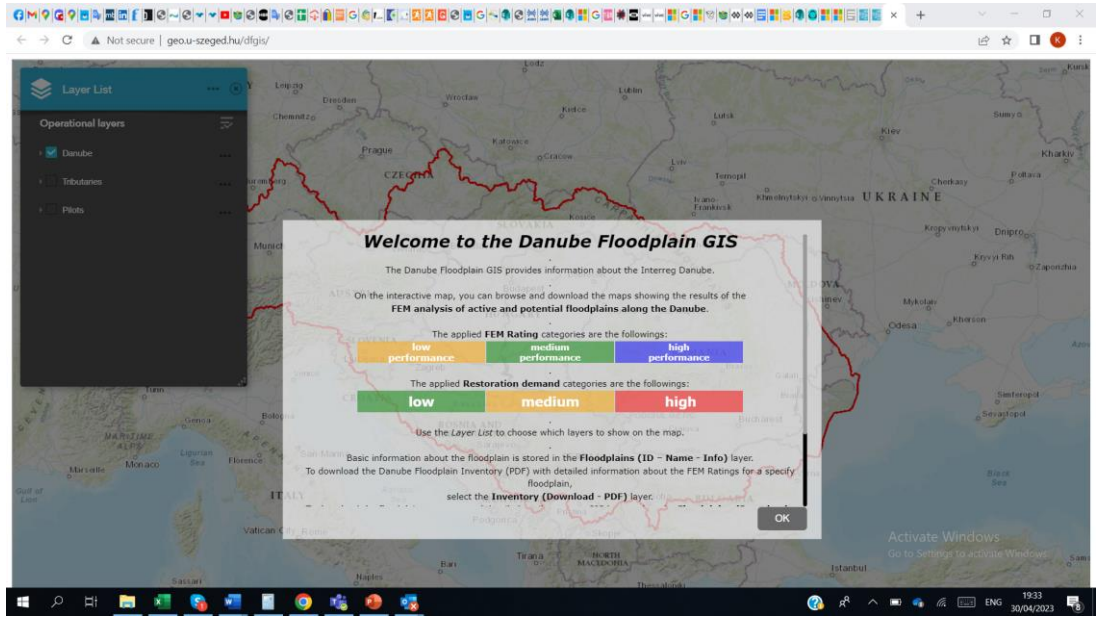
- exploring fire records through various filtering options (specific time period, municipality, and burn type of interest);
- information on air quality, including a 5-day forecast of fine smoke particles from land fires;
- identification of trends and areas more susceptible to burning;
- data download in various formats including images (png, jpg, pdf) and tabular data (csv, xlsx, json, pdf, html);
- mobile application encouraging individuals to contribute auxiliary data for future updates and promoting the solution.

Reducing flood risk through GIS:
The results of the Danube Floodplain Project

Aim: to reduce flood risk through floodplain restoration along the Danube River and its tributaries

Danube Floodplain GIS:

- Floodplain Evaluation Matrix (FEM) modelling for active and potential floodplains of the Danube and tributary rivers;
- results of the ecosystem services (ESS), habitat provision and biodiversity analysis of the pilot areas;
- identification of hydraulically active floodplains, determining the need for preservation and restoration demand of them;
- hydrological, hydraulic, ecological and socio-economics parameters to assess the effects of the floodplain on flood risk reduction, ecology and socio-economics;
- public web-based interface, data available in the form of interactive maps.



Evaluate natural hazard risk with FEMA's National Risk Index

Expected Annual Loss

is a *natural hazards component* that represents the average economic loss in dollars resulting from natural hazards each year.

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Social Vulnerability

is a *consequence enhancing risk component and community risk factor* that represents the susceptibility of social groups to the adverse impacts of natural hazards.

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Community Resilience

is a *consequence reduction risk component and community risk factor* that represents the ability of a community to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.

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NRI

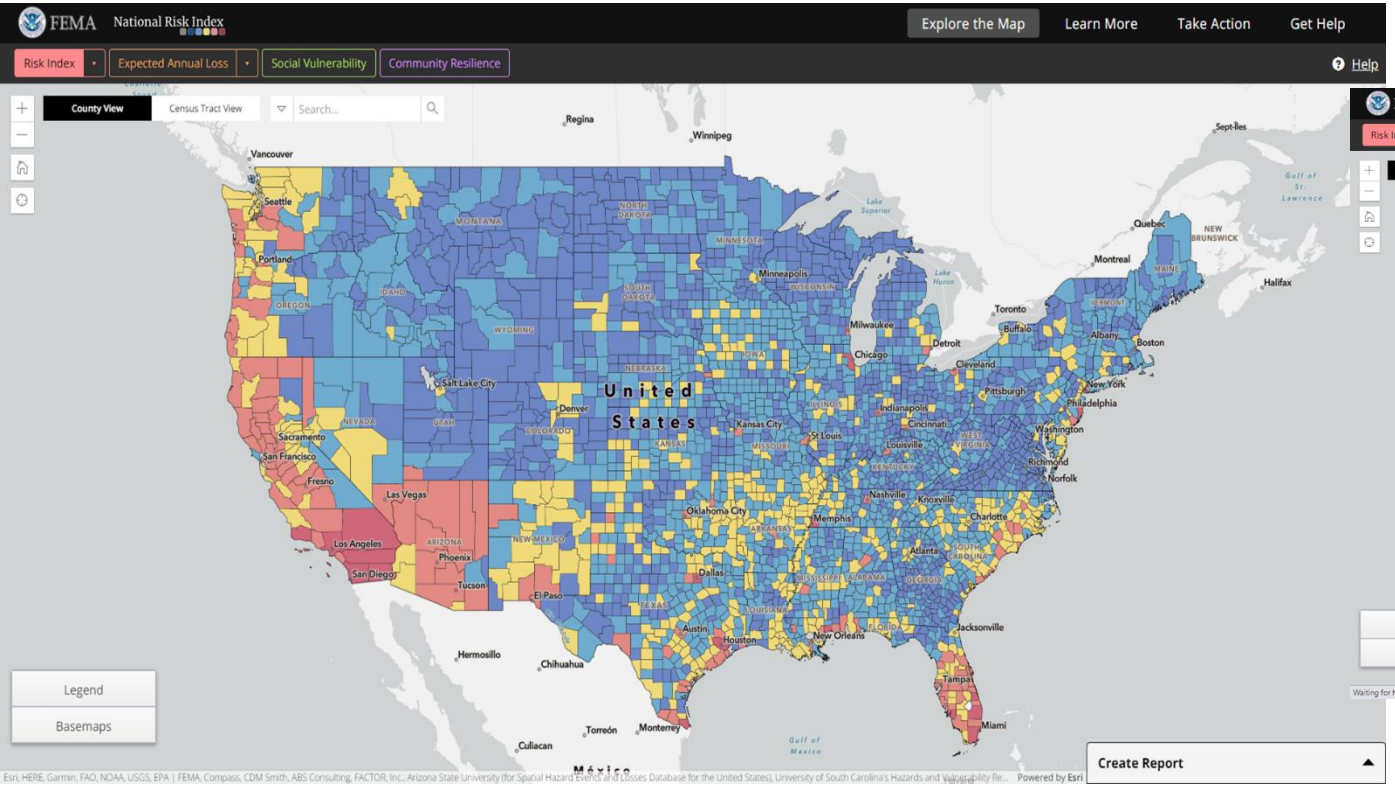
Risk Index

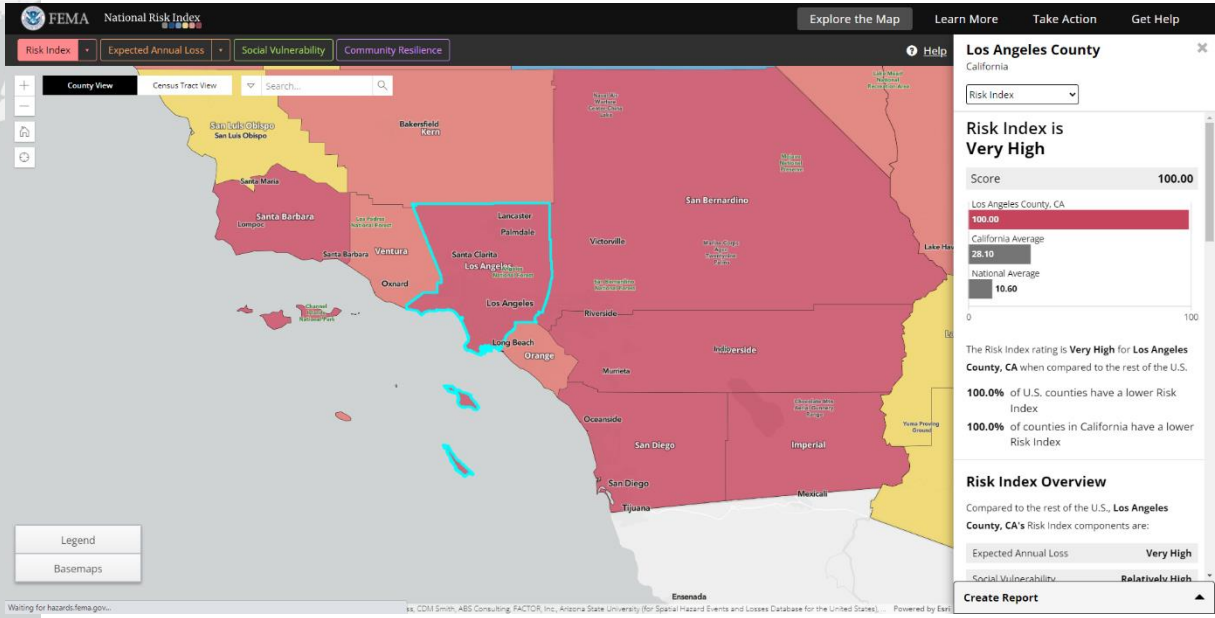
represents the potential for negative impacts resulting from natural hazards.

Evaluate natural hazard risk with FEMA's National Risk Index

- Online mapping application that visualizes natural hazard risk metrics based on 18 natural hazards, expected annual losses from natural hazards, social vulnerability, and community resilience.
- Available layers include: National Risk Index Counties, National Risk Index Census Tracts, National Risk Index States Expected Annual Loss.
- A composite Risk Index score measures the relative risk of a community based on all 18 natural hazards included in the Index, while a hazard type Risk Index score measures the relative risk of a community for a specific hazard type.
- A „Create Report” function, that prepares a neatly designed, yet detailed report of your selected geography, full of charts, maps, and tables.

Evaluate natural hazard risk with FEMA's National Risk Index

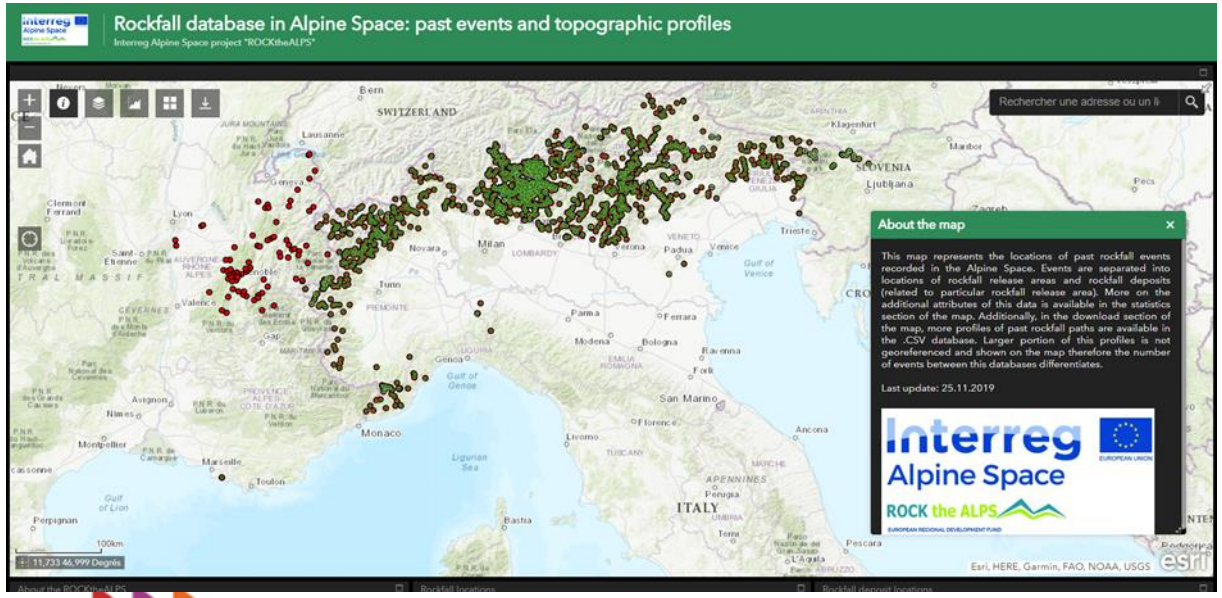




- Forests cover 40% of the Alpine Space. They can lead to increase slope stability and reduce the risk to an acceptable level in many locations and prevent the release of snow avalanches instead of expensive snow racks.
- Researchers gathered data of 10.620 rock falls in the Alps and beyond, calculated a rock fall and a protection model and used them to map protection forests across the 400.000 km^2 of the Alps.
- The past event data base collected are currently used for developing a new innovative rockfall propagation model ROCKAVELA.
- The new database contains 21118 past events topographic profiles, and is now international with data coming from countries all over the word.

Rock the Alps – monitoring rockfall risk and protection forest mapping

Rockfall past events map and database



The first Alpine Space harmonized rockfall risk and protection forest webmap