

Slovak Republic:
Catching-up Regions Initiative 4

Košice Self-Governing Region Year II
UNLOCKING REGIONAL SPATIAL
DATA INFRASTRUCTURE

October 2023



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ACKNOWLEDGEMENT

This report was prepared by a World Bank team composed of Iveta Hupková (Consultant and main author of the report) with contributions from the other Consultants of the GIS Component including Miloslav Michalko, Peter Hanečák, Jean Pommier, Florent Gravin and under the supervision of Pierre Chrzanowski (GIS Component Lead).

This report is part of the second phase of the Slovakia Catching-up Regions Initiative in Košice (CuRI Košice II) and as such benefited from the guidance and support of the WB CuRI Program team, including Ellen Hamilton (Lead Urban Specialist and CuRI Lead) Grzegorz Wolszczak (Urban Development Specialist), Vladimír Benč (Local WB Coordinator), Veronika Zimanová, and Andrea Millington (Consultants).

The WB team would like to thank the European Commission for initiating the Catching-up Regions Initiative in Slovakia with a special thanks to Pascal Boijmans, Eva Wenigová, Katarína Prokopič, and Andrej Mikyška for their feedback and assistance during the project.

The team would also like to thank Mr. Rastislav Trnka, President of the KSK for his leadership and commitment to the project implementation. The team is also thankful to the Ministry of Investments, Regional Development and Informatization of the Slovak Republic for their collaboration. Special thanks goes to Peter Balík, Dominika Forgáčová, Karol Schmuck, Ján Stano and their colleagues at the Ministry.

Last but not least, the team would like to thank the Self-Governing Region of Košice (KSK) and the Pavol Jozef Šafárik University (UPJŠ) for their excellent collaboration, and their commitment to develop spatial data infrastructure that contributes to the better decision making in the whole region. Special thanks go to Ľubomír Gerda, Martin Pukančík, Oliver Siksa, Vanesa Fedorková, Peter Serfözö, as well as Jaroslav Hofierka and Ondrej Tokarčík from UPJŠ.

The report was completed in October 2023.

ABBREVIATIONS AND ACRONYMS

ACSP: Authority for Construction and Spatial Planning

CuRI: Catching-up Regions Initiative

GIS: Geographic Information System

KSK: Self-Governing Region of Košice or the Košice Region

MIRDI: Ministry of Investment, Regional Development and Informatization of the Slovak Republic

OSS: Open Source Software

P2P: Peer-to-peer (knowledge exchanges)

PSK: Self-Governing Region of Prešov or the Prešov Region

SDI: Spatial Data Infrastructure

SWE: Slovak Water-management Enterprise

SO: Statistical Office of Slovak republic

TUKE: Technical University in Košice

UNIPO: University of Prešov

UPJŠ: Pavol Jozef Šafárik University

WB: The World Bank

EXECUTIVE SUMMARY

This report summarizes the activity of the World Bank support to the establishment of a Regional Spatial Infrastructure for the self-governing region of Košice (KSK) in the Slovak Republic. The project was part of the Catching-up Regions Initiative 4 (CuRI) initiated by the European Commission (EC) and was implemented from April 2022 to December 2023.

The project focused on supporting operationalization of the spatial data infrastructure and included three sub- components: i) technical support and capacity building; ii) cooperation with partners and government; iii) creation of thematic maps and datasets.

In terms of technical support and capacity building, the project provided assistance to KSK in maintaining and operating the KSK Geoportal. This included ongoing updates to ensure long-term stability and the addition of new features. The focus was on handing over the platform to KSK in December 2023. The project also provided technical assistance for harvesting open data at the national level, working with organizations such as the Statistical Office SR and the Slovak Labour Office.

In terms of cooperation with partners and governments, the project had ongoing collaboration with the Agency for the Support of Regional Development Košice and presented KSK Geoportal map applications at a conference on climate change in Ukraine¹. The project also worked with universities, including the University of Pavel Jozef Šafarik and the Technical University of Košice, where personnel were involved in the GIS unit work. The KSK GIS team was also involved in the national project "Participation in KSK" with a focus on data in space, and conducted a survey to assess GIS awareness and needs in the region.

In terms of the creation of thematic maps and datasets, the project added 235 new datasets, including data from the Water Research Institute on wastewater treatment plants, public sewers, and water supply systems. 15 new map applications were also created, including KSK basins, cycling destinations in the Gemer region, and tourism infrastructure in the Košice region.

Overall, the project made significant progress in providing technical support, building administrative capacity, and creating valuable datasets and map applications for KSK and its partners. Moving forward, the GIS unit will enter in a new phase of its development, where the focus will be on making sure it can continue to respond to demand for priority GIS data and analytics while maintaining a talented in-house team and growing capabilities in new GIS technologies or services.

¹ The conference in Ukraine was organized as a part of the project CLIMADAM implemented by The Agency for the Support of Regional Development Košice. See more information on conference and outputs at <https://www.arr.sk/stretnutie-na-ukrajine/>

REPORT CONTEXT

This report gives an overview of activities in year two of the Slovakia Catching-up Regions Initiative (CuRI) in the Self-Governing Region of Košice. This second phase supported the establishment of a dedicated GIS Unit, the initiation of a spatial and open data infrastructure as well as related capacity building. The report outlines key steps, skills, technologies, and processes that were implemented, and draws conclusions and lessons learned from a second year of WB support.

One of the key responsibilities of a self-governing region in Slovakia is to promote regional development. Public authority needs access to accurate, actual, machine readable and high quality data in order to make well designed public policies and decisions. The lack of data at KSK - especially geospatial data, was one of the identified barriers that limited capacities of self-governing region to tackle regional discrepancies. This has led to the concrete steps in terms of building a comprehensive regional spatial data infrastructure (SDI) for the whole region.

Thanks to the determination to address this issue and following the successful example of PSK, KSK became the second regional authority to establish and manage its own spatial data infrastructure in the country, complying with national and European-level geospatial and open data standards with the usage of open source software solutions (see Box 1). KSK established a dedicated GIS Unit and put a lot of effort into training activities to build capacities and to increase uptake of the KSK Geoportal among its departments. This second year was dedicated to broaden initial efforts made in launching the GIS unit and ensuring its long term stability.

PROJECT ACHIEVEMENTS AND OUTCOMES

Activity 5.1: Technical support and building capacities of the GIS unit and KSK departments

Building capacities

In year two, the GIS Unit.² at the KSK was reinforced with Vanesa Fedorková who has expertise in applied geoinformatics. GIS Unit now consists of four fully qualified persons - Martin Pukančík, Head of GIS Unit, Oliver Siksa, GIS specialist, Vanesa Fedorková, junior GIS specialist and Ondrej Tokarčík, GIS expert from UPJŠ. Both Mrs. Fedorková and Mr. Tokarčík cooperate with KSK on an external contract.

Members of the GIS team continued with improving their technical skills by participation in virtual trainings delivered by the WB. GIS Unit gained new knowledge and skills in the following domains - Mviewer (Advanced), SQL (Basics), Data Harvesting. The WB team also conducted two workshops for KSK on how to publish territorial development plans data on the portal including two data sprints.³ The GIS team is now able to publish data and create tailor-made and demand-oriented web applications almost independently due to its good data analyst skills and digital competencies enhanced during trainings.

GIS Unit attended a global event on geospatial open source software FOSS4G 2022⁴ in Italy. FOSS4G connects data producers and software developers with the users to exchange experiences and best practice from EU region and beyond and encouraged KSK to follow up new trends in technologies (e.g. GeoNetwork, GeoServer, OpenLayers, PostGis, QGIS, SQL, etc.). In the domestic environment, KSK continued with peer-to-peer exchange with Self-Governing Region of Prešov (PSK) in the areas of INSPIRE, Spatial Information Registry, Mviewer, Mapstore and sustainability of the platform.

Box 1: Open data and Open Source Software

Open data is data that anyone can reuse for any purpose. This means technically open (available online in open, machine-readable format), legally open (open license), and provided free of charge.

Open data is considered to benefit from innovation, transparency, and accountability, as well as the performance of public services. One of the first beneficiaries of open data are the administrations themselves, who too often waste time and money finding and using other public sector information that they could actually get for free. Acknowledging the benefits of a proactive disclosure of government data for the society and the economy, the European Union integrated open data principles into the new Directive on open data and the re-use of public sector information.

² The GIS Unit at the KSK was formally established in September 2021 during the year one of CuRI Košice.

³ As a result webmap of urbanism, energy, weather management and nature protection layers were published. See <https://www.geoportalksk.sk/mapstore/#/viewer/openlayers/4216>

⁴ See https://2022.foss4g.org/schedule_workshop.php#

Open Source Software (OSS) is widely used in free or commercial software products and is a core element of internet infrastructures. OSS is a type of software in which a source code is released under a license that grants anyone the rights to view, change, copy, or distribute the source code to anyone else, for any purpose.

QGIS, geOrchestra, and Geonode are examples of OSS to manage spatial data. QGIS is a free software used to view, edit or analyze geospatial data. GeOrchestra and Geonode are used to deploy a KSK Geoportal, or even a complete SDI.



Figure: Members of the GIS team at the FOSS4G conference from left: Martin Pukančík (KSK), Jean Pommier (WB), Oliver Siksa (KSK), Ondrej Tokarčík (UPJŠ), Miloslav Michalko (WB) and Pierre Chrzanowski (WB).
Source: Facebook Geoportal Košického samosprávneho kraja.

In year two, GIS Unit also started to play an active role in administrative capacity building by providing several in-house trainings for colleagues at KSK. More than 10 KSK employees from various fields and departments were trained (GeoNetwork, Mapstore) with the aim to support them to use KSK Geoportal and datasets in their work on a daily basis.

Sustainability and technical support

While year one focused on deployment of KSK Geoportal, year two focused on the maintenance, improvement, operation and the need for ensuring its sustainability.

With the aim to ensure sustainability of the KSK Geoportal, the KSK launched the process of the selection and contracting of a company to take over system administration. In this process, WB provided assistance, guidance and inputs necessary to smooth handover such as consultations with potential companies, detailed technical documentation of the platform, technical requirements and discussion of potential solutions.

Box 2: What is a Geoportal?

A Geoportal is a GIS that focuses on sharing data on the web. It should not be confused with another type of GIS software that is more oriented towards production and analysis of the data. In the case of the KSK, the need was to establish the whole spatial data infrastructure (SDI), including data collection, analysis, and the sharing of geospatial data internally, with different departments, and also with external stakeholders.

In more technical terms, a Geoportal is a suite of software combining different components: a metadata catalog for the discovery, browsing and querying of metadata or spatial datasets, spatial services and other resources (for example, GeoNetwork); a spatial data service, serving geospatial data on the web from different sources (for example, GeoServer); a spatial database, to host and link different layers of spatial information (for example, PostGIS); and a web-map viewer, to visualize and interact with geospatial data online (for example, Mviewer, MapStore). Software like geOrchestra combines all these different components into one package, making it easier to deploy and manage them all together.

In order to ensure long-term sustainability and facilitate the handing-over to the future system administrators, a complete refactoring of the infrastructure's code has been undertaken to

- rely on geOrchestra official setup
- add the non-core components separately, as distinct modules grouped by topic (harvesters, database, Mviewer, CMS etc.)

These implemented steps make maintenance easier. The documentation has been updated accordingly and completed where necessary.

The WB team also provided technical assistance to the KSK and cross-support to PSK on maintenance and operation of the two KSK Geoportals that are based on the same OSS. The WB team implemented following Geoportal technical enhancement:

- The backups were moved from a temporary solution to a stable storage service rented in the same datacenters as the platform's servers.
- Work was done to fully integrate the data harvesters (Statistical Office of the Slovak republic /SO/, Central Office of Labour, Social Affairs and Family, e-vuc) in the platform's infrastructure.
- Harvester for data from Statistical Office was improved based on consultation with the Office, to increase efficiency at both ends
- Health monitoring tool has been added to ensure proper functioning of harvesters.

- geOrchestra platform has been upgraded to the latest version which also ensures better sustainability.

Better land use planning

Successful implementation of the KSK Geoportal into business operations showed the importance of changing the way KSK develops its regional land use plan to ensure data compatibility with KSK Geoportal. KSK expressed willingness to increase the quality of the process and the land use plan itself by introduction of open data, open data policy and open standards.⁵

Given this, the WB delivered a Technical note on Open Data in Regional Land Use Planning and opened discussion on findings and recommendations. The technical note provides an overview of current and upcoming legislation and practical examples from EU regions. The note concludes with suggestions for improving land use planning at the KSK through better data management. These include conducting a detailed inventory of GIS layers, analyzing and extending copyright and license terms, ensuring technical interoperability through data standards, developing in-house databases, and incorporating open data and standard clauses into procurement contracts.

During the process of development of the Technical note, the WB team also conducted an assessment on data quality of existing land use plan data stored in the prior KSK GIS solution and discussed with KSK its retrieval and re-use. The conclusion of the discussion was that it is possible to use the PDF outputs and generate raster layers out of it but the vector data would require a lot of work to retrieve.

Given this, KSK plans to optimize the processes of obtaining new regional land use plan and data to ensure its further re-use and compatibility with KSK Geoportal.

Activity 5.2: Cooperation with partners and government

Academia

The GIS Unit still benefits from the ongoing cooperation with students and professionals from universities based in the region - UPJŠ and University of Prešov (UNIPO). These strong data partnerships resulted in the expanding of data catalogue, the list of created map applications and the transfer of technologies, knowledge and talent between universities and self-governing region.

KSK launched an internship program dedicated to the geoinformatics students and professionals from the Department of Geography and Applied Geoinformatics of PU. The group of students visited GIS Unit for 2 weeks' time and after training and mentoring under the leadership of GIS team, students were able to publish updated spatial datasets and map applications related to their diploma theses at KSK Geoportal. As a result of the professional

⁵ KSK needs to set up and start the process of procuring a new land use plan, which will be governed by the newly approved Act on Land Use Planning of April 2022.

internship, the following map applications⁶ were published at KSK Geoportal: SNP trail, Cyclo Tourism in Slovak Carst region, Geology, Cultural monuments in KSK.

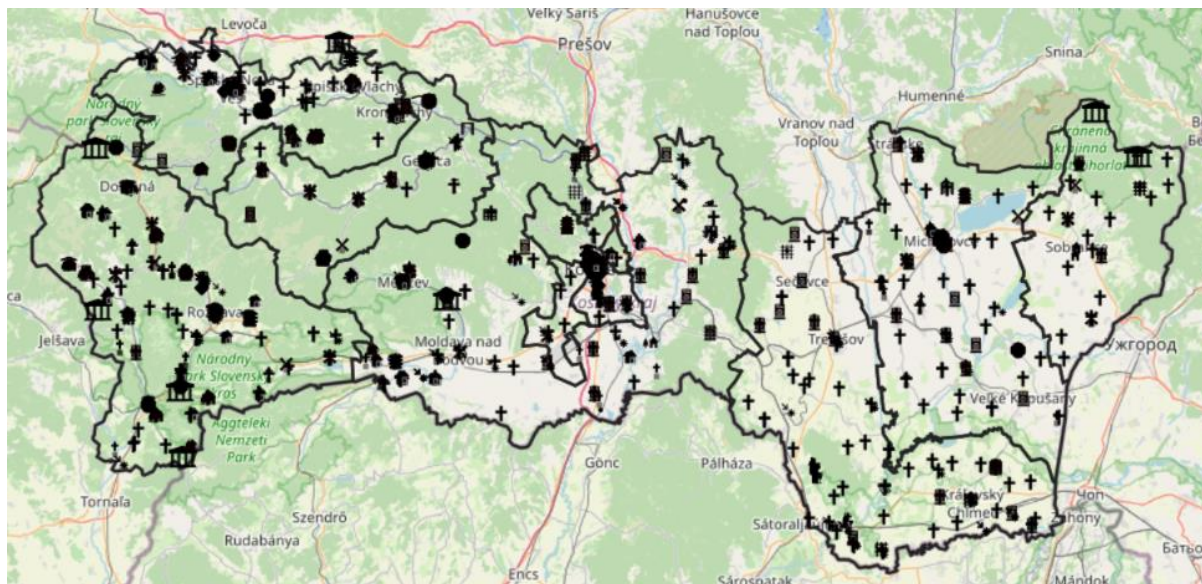


Image 1: Student map application: Cultural monuments in KSK.

KSK also continued its fruitful cooperation with UPJŠ. Knowledge sharing between university and GIS Unit is present also in the process of teaching students – Mr. Tokarčík, PhD student from UPJŠ, who also collaborates with GIS Unit on external contract, uses of KSK Geoportal in teaching at the Institute of Geography PF UPJŠ. These are the map applications developed by students during studies⁷: Railways in KSK, Number of vehicles in KSK by district, Flora and fauna in KSK, Groundwater, National cultural heritage in KSK, Environmental burden in KSK.

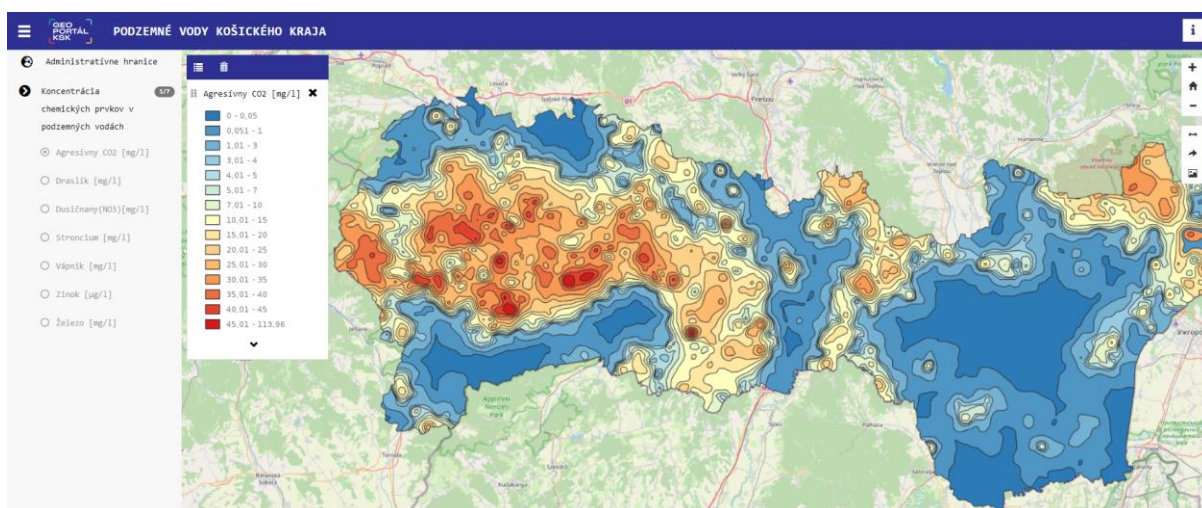


Image 2: Student map application: Groundwater (concentration of chemical elements in groundwater in the territory of KSK)

⁶ Links to all map applications are available at this webpage <https://www.geoportalsk.sk/home/odborna-prax-studentov-katedry-geografie-a-aplikovanej-geoinformatiky-presovskej-univerzity/>

⁷ Links to all map applications are available at this webpage <https://www.geoportalsk.sk/home/vyuzitie-geoportalu-ksk-vo-vyucbe-na-ustave-geografie-pf-upjs/>

KSK would like to continue with engaging academia into data activities and potential platform development, and therefore plans to sign probably a Memorandum of Cooperation with Technical University in Košice (TUKE), another strong partner in the field and region. So far, TUKE has become an official partner of the upcoming EastGIS 2023 conference⁸, organized by the KSK. Besides organization support, professionals from TUKE will contribute with presentations and lead some of the workshops.

Public sector and Government

In year two, KSK GIS Unit continued in cooperation with internal and external partners and provided them with technical support mostly via creating datasets and map applications on demand. Such activities contribute to data-driven decision making and help to understand territorial problems in their complexity.

GIS Unit collaborated with departments involved in the implementation of the CuRI Components. After a series of meetings with MRC Component, GIS Unit created a map application „Roma communities”⁹ that presents the numbers and shares of Roma communities in the municipalities of the Košice self-governing region for the years 2004, 2013 and 2019. Map application is based on data collected by the Plenipotentiary of the Government of the Slovak Republic for Roma communities (Atlas of Roma Communities). The GIS team also prepared a map application showing the cycling paths in the Gemer region¹⁰ for the Tourism component.

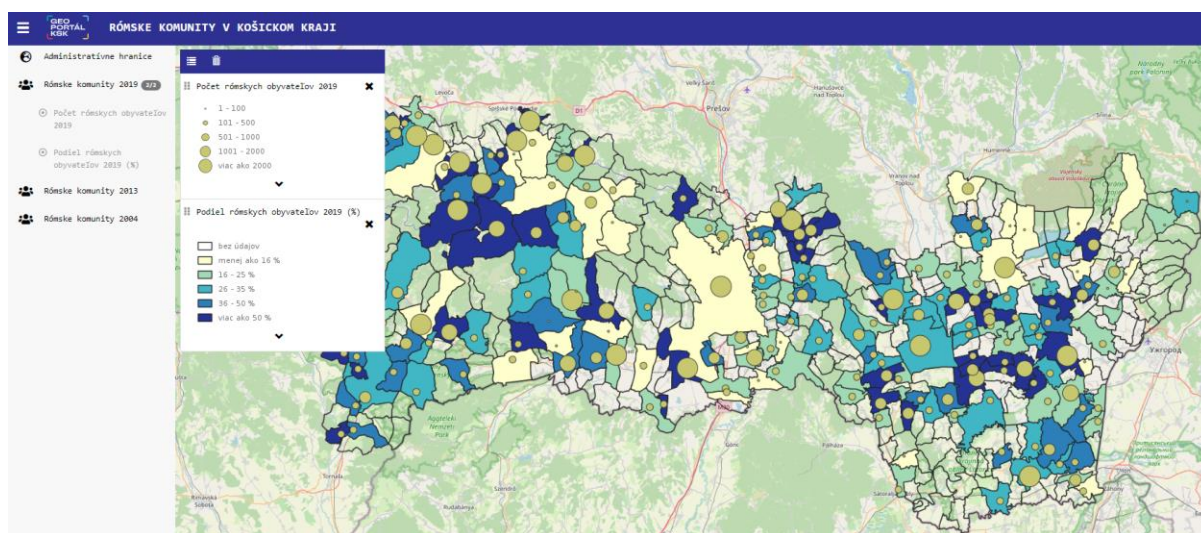


Image 3: Roma communities in the KSK.

One of the aims of the GIS Unit this year was introducing KSK Geoportal and its role to public servants, especially to municipalities in the region. Beyond the CuRI, the national project “Participation in KSK” with the component “Data in space” served the GIS Unit for engaging with these data users. Within the project, GIS Unit organized a round table

⁸ Conference EastGIS 2023 will take place on 2023, November, 30 – December, 1 in Košice. See more information in the section “Conference EastGIS 2023” of this report.

⁹ See https://www.geoportalsk.sk/mviewer/?lang=sk&config=apps/romske_komunity/rk.xml

¹⁰ See <https://www.geoportalsk.sk/mviewer/?lang=sk&config=apps/gemer/gemer.xml#>

with representatives of the KSK office departments, organizations and municipalities with the aim to find out their insights on available and needed datasets. GIS Unit also prepared survey dedicated to the municipalities in the region in order to better understand current use and needs related to the KSK Geoportal usage with following results (80 respondents):

- While **awareness** is high (53% of municipalities are aware of its existence), its features like WebMapServices and map content personalization remain underutilized.
- A significant number of respondents (56) **regularly use data** from the KSK KSK Geoportal (Figure X), with a strong preference for cadastral, cycling routes, administrative boundaries, statistical data, and the road network.
- Despite a **reluctance to contribute** with their own datasets (75 responses) for several possible reasons such as ignorance, incompetence or fear, there's a strong interest in GIS-centric topics, particularly **spatial planning** and environmental issues.
- By addressing these barriers and promoting key datasets the KSK team could maximize the GIS potential for regional development.

Feedback from municipalities is important for KSK in further portal development and planning other activities for municipalities in the region.

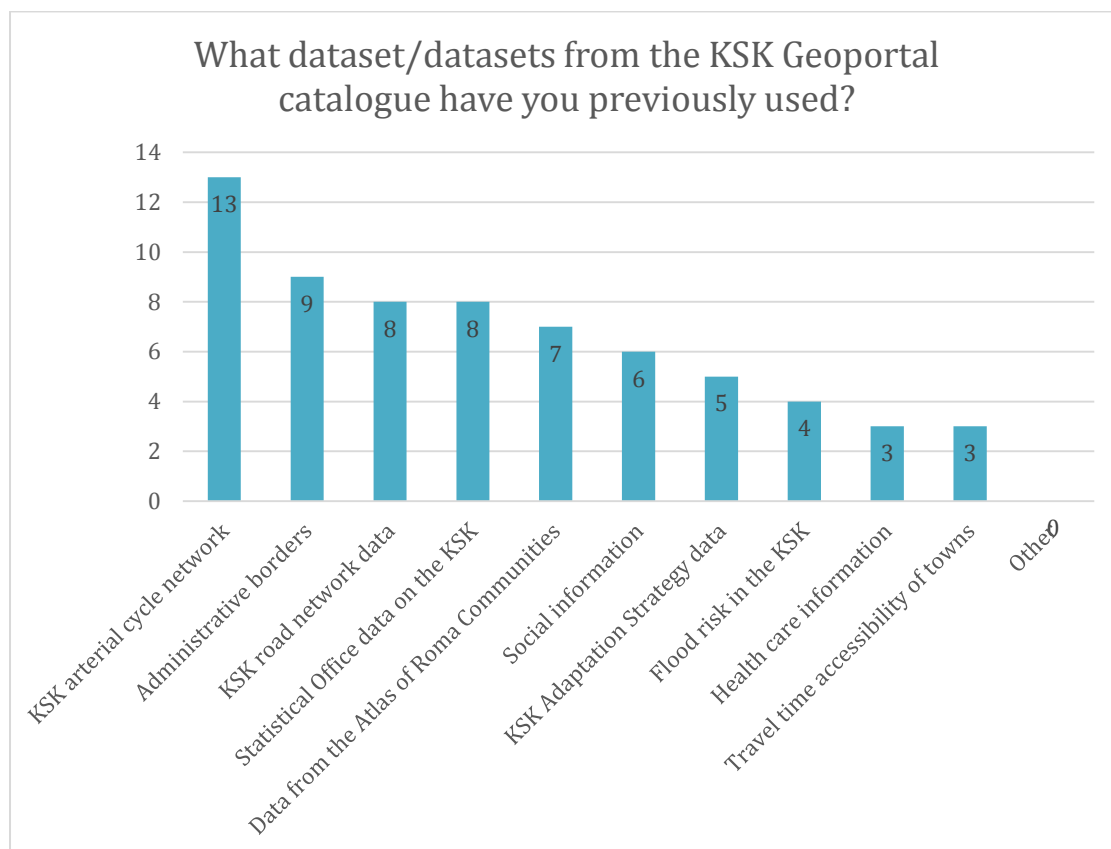


Figure 1: The results of the KSK survey regarding the question: What dataset/dataset from the KSK Geoportal catalog did you use so far?

GIS Unit collaborated with The Agency for the Support of Regional Development Košice (ASRD)¹¹ within the CLIMADAM project that focuses on adaptation strategy

¹¹ ASRD is a non-profit organization established by KSK self-governing region. The mission of the ASRD is to contribute to a more effective and dynamic sustainable development of the KSK.

for climate change and mitigation for the Slovak – Ukraine border region¹². As a result of the collaboration, the GIS Unit published 35 new datasets including new map applications like flood exposure map of Kosice¹³, The impact of the climate change in KSK¹⁴, Ecological quality of the land¹⁵ and Roňava micro-basin map¹⁶. In order to support collaboration and synergies between various data activities, KSK also had meeting with other partners, e.g. Slovak road administration, the City of Košice and the organization running regional integrated transport system named IDS Východ.

NGOs

GIS Unit collaborated with NGO Creative Industry Košice and IT Valley that are considered to be innovative hubs in the Košice region. GIS Unit also collaborated with NGO Alvaria that focuses on open data awareness raising at the regional and local level.

Conference EastGIS 2023

In year two, GIS Unit together with the partners and WB team is organizing a two-day conference EastGIS 2023 dedicated to the municipalities, professionals, public and private sector. The aim is to foster understanding and support of usage of GIS technology and geodata in decision-making, land use planning, and environmental, climate challenges at both local and regional levels.

The program of the conference is designed to engage relevant authorities from all levels of government including the newly formed Authority for spatial planning and construction (ASPC), MIRDI or PSK. Focus on land use planning and engagement of ASPC shows KSK's effort to keep up with changes in legislation, methodologies and technical environment to meet new requirements. The list of workshops will be adapted based on the interest of municipalities, which can be seen in the results of the survey.

¹² See more about the CLIMADAM project at <https://www.arr.sk/en/climadam/>

¹³ See <https://www.geoportalksk.sk/mapstore/#/viewer/openlayers/4502>

¹⁴ See <https://www.geoportalksk.sk/mapstore/#/viewer/openlayers/3171>

¹⁵ See <https://www.geoportalksk.sk/mapstore/#/viewer/openlayers/3292>

¹⁶ See <https://www.geoportalksk.sk/mapstore/#/viewer/openlayers/6157>

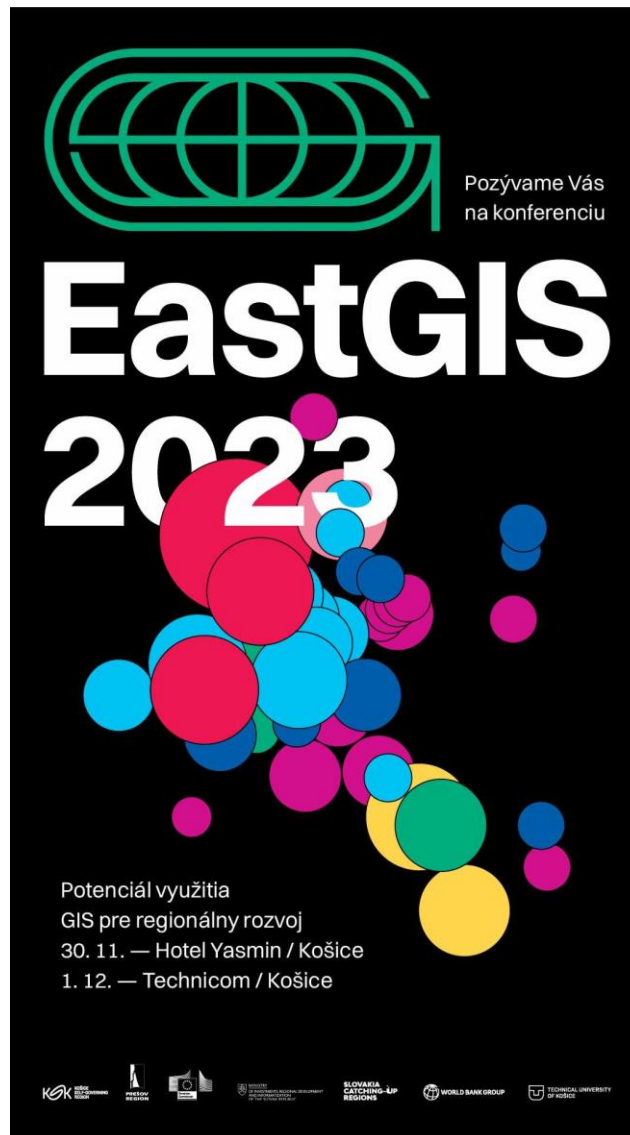


Image 4: The invitation to the EastGIS 2023 conference organized by KSK in cooperation with partners.

The EastGIS will connect data producers and users and create great space for networking and knowledge exchange. GIS Unit will also have an opportunity to promote KSK Geoportal and available datasets in front of a large audience with the potential to increase the number of users and data producers.

Instead of outsourcing the organization of the conference, GIS Unit decided to allocate its own resources to organize the conference and has an ambition to organize it annually. This decision contributes to the capacity building, creates internal know-how, organization memory and supports collaboration among partners (UPJŠ, TUKE, UNIPO).

Participation in other conferences

The GIS and WB teams actively participated in the following conferences to promote KSK Geoportal and its technical solutions:

- **Citython – July, 2022¹⁷** – Presentation on KSK Geoportal and its use by Martin Pukančík, Head of GIS Unit.
- **geOcom, France – May, 2023¹⁸** – Presentation on Opening geOrchestra to the international; Improving usage statistics by Jean Pommier, WB, including speech of the GIS Component leader Pierre Chrzanowski.
- **Conference in Ukraine within the project CLIMADAM¹⁹ – July, 2023** – Presentation of the Visualization of the KSK Adaptation Strategy data by Martin Pukančík, Head of GIS Unit.

Activity 5.3: The creation of thematic maps of priority datasets and newly selected spatial and statistical datasets

Expansion of the data inventory

KSK Geoportal became an integral part of the daily operations at the KSK very quickly. After deployment and delivery of the first package of the trainings, GIS Unit started publishing datasets systematically and increased them to a number of 235 available.

In order to allocate resources wisely, GIS Unit focused on publication of the priority datasets with high potential of re-use. The list of priority datasets was defined in the KSK CuRI Action plan and based on that, GIS Unit published following datasets in various thematic categories:

Box 3: Priority datasets that are available on the KSK Geoportal

- **Transport:** Suburban bus stops²⁰, Railway stops and railway network in the region²¹, Accessibility of district towns in the region²², etc.
- **Tourism:** Tourist trails in the KSK²³, Tourist information centers in the KSK²⁴, Caves in the KSK²⁵, National Cultural Monuments²⁶, etc.
- **Population:** Natural increase in the population of the districts in the KSK²⁷, Migration balance in the KSK²⁸, etc.

¹⁷ See <https://www.citython.sk/2022kosice/>

¹⁸ See <https://www.georchestra.org/blog/2023/04/06/geocom-2023-en/>

¹⁹ See <https://www.arr.sk/stretnutie-na-ukrajine/>

²⁰ See <https://www.geoportalksk.sk/geonetwork/srv/slo/catalog.search#/metadata/d9e92de5-67a0-4010-9724-ded11907bfbf>

²¹ See <https://www.geoportalksk.sk/geonetwork/srv/slo/catalog.search#/metadata/5a3c9827-2fb1-484c-a263-80fa37e645ef>

²² See

https://www.geoportalksk.sk/geonetwork/srv/slo/catalog.search#/search?resultType=details&sortBy=relevance&from=1&to=20&fast=index&content_type=json&any=%C4%8Dasov%C3%A1%20dostupnos%C5%A5

²³ See <https://www.geoportalksk.sk/geonetwork/srv/slo/catalog.search#/metadata/86634e9e-7ced-4d63-a29f-9a68572b711b>

²⁴ See <https://www.geoportalksk.sk/geonetwork/srv/slo/catalog.search#/metadata/ce1d094f-2ad1-419e-95a6-4c97373ee9d7>

²⁵ See <https://www.geoportalksk.sk/geonetwork/srv/slo/catalog.search#/metadata/ca53025e-6df2-4078-8640-b832902e336c>

²⁶ See <https://www.geoportalksk.sk/geonetwork/srv/slo/catalog.search#/metadata/a7cde315-41c2-4f5f-91f3-99b0ea580a4e>

²⁷ See <https://www.geoportalksk.sk/geonetwork/srv/slo/catalog.search#/metadata/46dc01b2-5a94-4c91-80b4-558d2318279a>

- **Healthcare:** Medical facilities owned by the KSK²⁹, Hospitals in the KSK³⁰, General outpatient medical facilities³¹, etc.

The KSK should continue with the focus on publication of the priority datasets in the future as well. It can lead to the creation of innovative products and services in the region based on the data with high potential of re-use. It also contributes to the better management of human and technical resources at the KSK.

Despite the GIS Unit's autonomy in publishing datasets the WB team still provided some technical assistance for harvesting open data from the SO and Central Office of Labour, Social Affairs and Family. The WB team developed another harvester to obtain open data for bridge infrastructures that are held by Slovak road administration (SSC). WB team provided support for the digitization of datasets for the KSK Geoportal, e.g. for the publication of 3D layers (Digital Elevation Model), raster files from land use plan, demographic data, climate data, etc.

Currently, the GIS Unit faces the important challenge of ensuring that available datasets are up-to-date. This requires some research on what portion of the datasets needs to be updated and how frequently, setting up procedures and allocating resources. Implemented harvesters update data automatically.

Statistics on KSK Geoportal Usage

Statistical data on KSK Geoportal usage indicate that the portal has been adopted by external users and its use is increasing. Data extracted from the analytics tool (OGS statistics table) for the period of September 2022 – September 2023 show:

- a significant increase in the use of the map services (+30%),
- a huge increase in WFS requests which mostly translates into downloaded datasets (+278,4 %),
- a strong increase in the percentage of unauthenticated access (78,35%), which can be considered as strong adoption of the KSK Geoportal services by the “outside world”.

The interest of data users in a series of datasets varies in time. For example, -90% for e-vuc.sk³² and almost no usage of data from the Central Office of Labour, Social Affairs and Family. Steady increase is visible also on other data series and big success on Slovak Watermanagement Enterprise (SWE) data.

²⁸ <https://www.geoportalsk.sk/geonetwork/srv/slo/catalog.search#/metadata/1926fc3d-acbe-4a59-ad2f-53b2a44a6de1>

²⁹ See <https://www.geoportalsk.sk/geonetwork/srv/slo/catalog.search#/metadata/399ddd4a-8a4d-4a95-9aba-634516c3fc5f>

³⁰ See <https://www.geoportalsk.sk/geonetwork/srv/slo/catalog.search#/metadata/788b0b96-ce5e-4b17-865d-9842c7f7a17d>

³¹ See <https://www.geoportalsk.sk/geonetwork/srv/slo/catalog.search#/metadata/4ad916ea-de1d-4ae7-81b8-d8fa0593cc07>

³² Harvested data from the portal e-vuc.sk. The portal provides single access to the information collected by self-governing regions in areas such as health care, social affairs and transport in some cases. See <https://www.e-vuc.sk/>

By the time of writing this report, GIS Unit also had available limited³³ statistics for WordPress usage that is implemented in the KSK Geoportal. For period of 12 September – 12 October, statistics shows:

- the total number of users is 387, which is a 61% increase compared to the previous month,
- the number of sessions is 885, which is a 54% increase compared to the previous month,
- the second most visited pages after Home (501) are pages dedicated to the Applications (335), Catalog and Mapstore (297), and Tools (84),
- In the top 10 most visited pages are articles about developed map applications Flood risk of the land (54), Map outputs based on Atlas of Roma Communities in KSK.

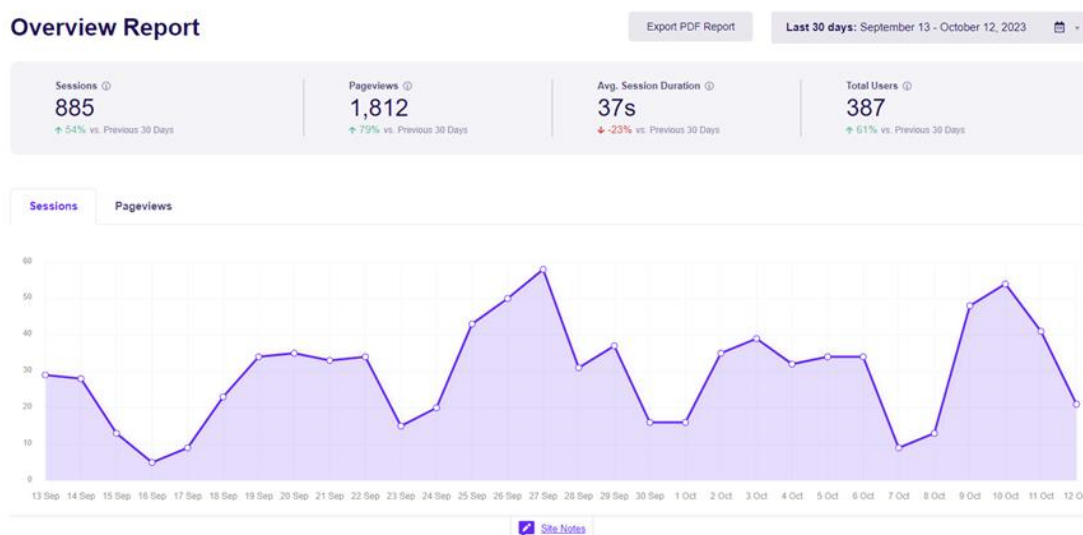


Figure 2: WordPress statistics on KSK Geoportal usage

Due to the limited statistics from WordPress (only for the last month) we cannot assess it deeper and only state it in the report for illustration.

Web map application expansion

Visualization and interactivity unlocks the power of geospatial data for decision makers. To facilitate this for the KSK, the GIS unit has developed the following 15 web map applications³⁴ that are accessible via the KSK Geoportal:

- Tourism
- Cycle routes
- Subsidies 2022
- Ecology
- Population – Demography
- Population – Work
- Waste Management
- Social services
- Land use plan of the region
- Water pipes and

³³ KSK has statistics on WordPress usage only for the last month.

³⁴ A web map application is an application accessible online that is based on enabling users to interact easily with the geospatial data.

- Climate change
- Air quality
- Flood risk
- Job offers
- sewers
- Healthcare

In year two, GIS Unit was quite independent while creating map applications also due to its acquired skills via trainings, e.g. on Mviewer and Mapstore. Majority of created map applications by the GIS team is based on these tools. Despite this, the WB team provided to GIS Unit ad hoc support when technical issues during development occurred.

Some examples of the created map applications with the description we show bellow:

Medical facilities in the Košice region: The map application shows detailed information (address, contact, opening hours, contracted insurance providers, absences and representation of doctors, etc.) on medical facilities in the KSK. Data is updated daily thanks to the harvesting of data from the e-VÚC portal.

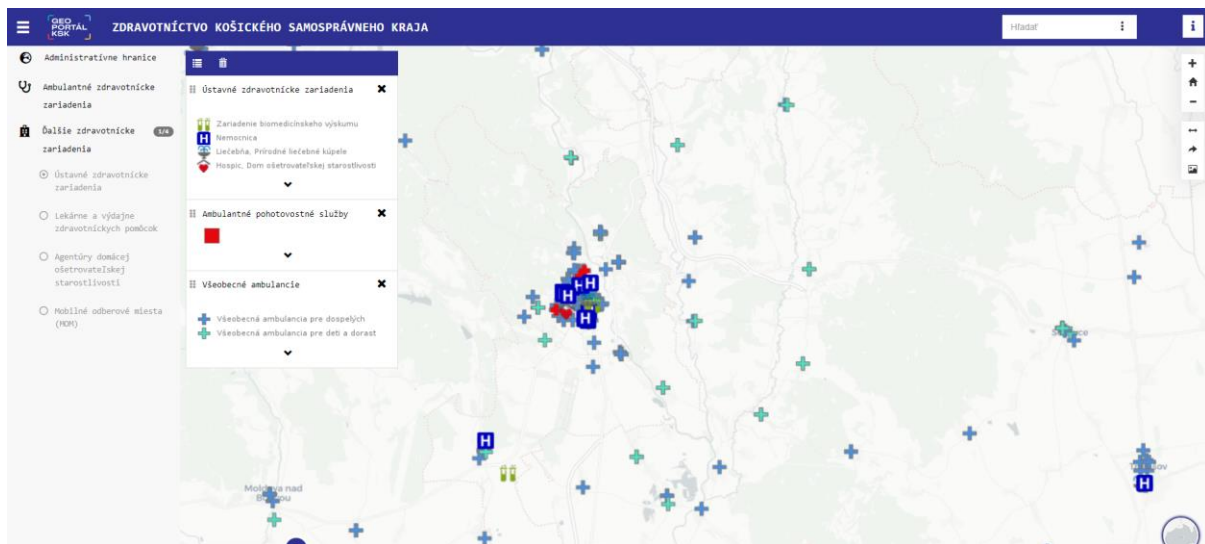


Image 5: Map application developed by KSK – Medical facilities in the Košice region

Economic activity of the population³⁵: GIS Unit developed the map application that shows spatial visualization of the statistics on unemployment (statistics on registered job seekers), vacancies and economic statistics (average wages, entrepreneurs, self-employed people) in the KSK region. Map application is based on the open data provided by the SO and Central Office of Labour, Social Affairs and Family monthly.

³⁵ See https://www.geoportalsk.sk/mviewer/?lang=sk&config=apps/ludia_praca/ludia_praca.xml#

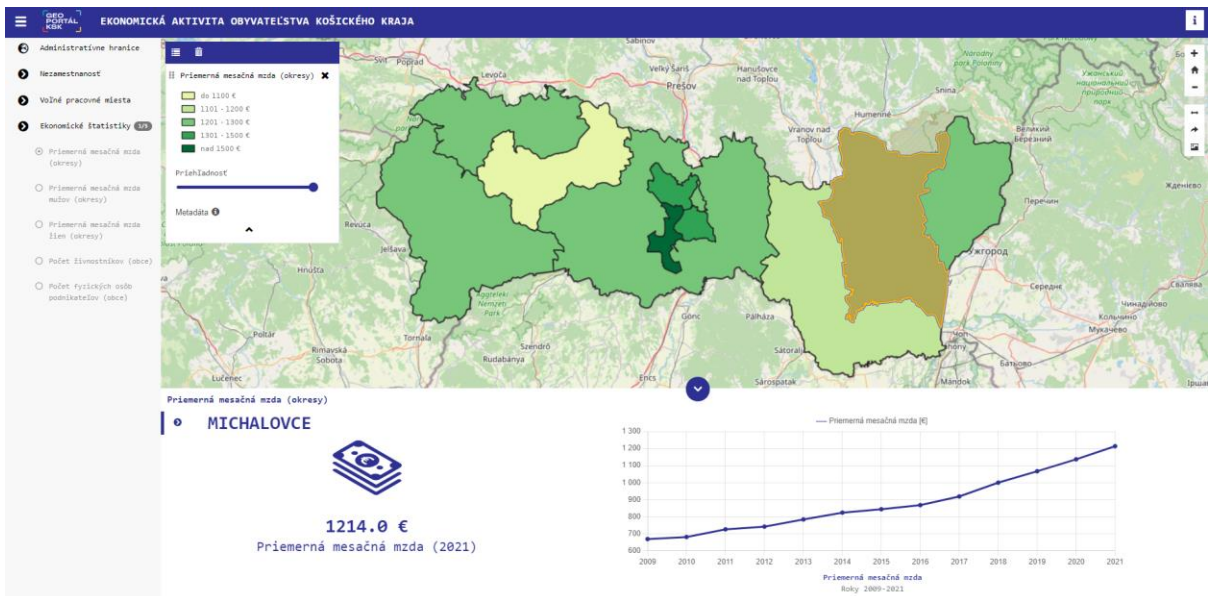


Image 6: Map application developed by KSK – Economic activity of the population

Flood risk in the KSK³⁶: The Banská Bystrica branch of the Slovak Watermanagement Enterprise, s. e. (SWE) created a simulation of steady uneven water flow with the MIKE Flood mathematical hydrodynamic model, which shows the extent of flooding (flood line) that would result from floods with an average recurrence period of once every 5, 10, 50, 100 and 1000 years. Using data from the SWE, the KSK developed the map application 'Flood risk in the KSK'.

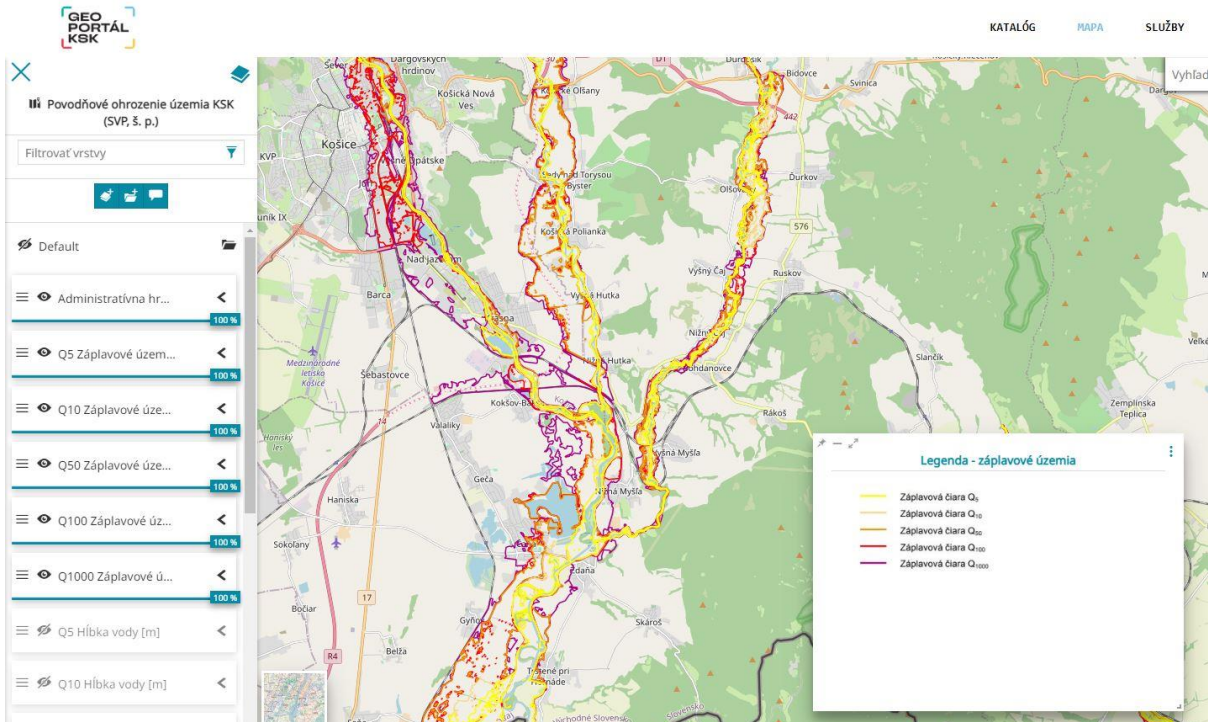


Image 7: Map application developed by KSK – Flood risk in KSK.

³⁶ See <https://www.geoportalksk.sk/mapstore/#/viewer/openlayers/4502>

Water pipes and sewers³⁷: The map shows a simple division of the municipalities in the KSK based on the availability of basic infrastructure (public water supply, public sewerage) as it was in 31 December 2018.

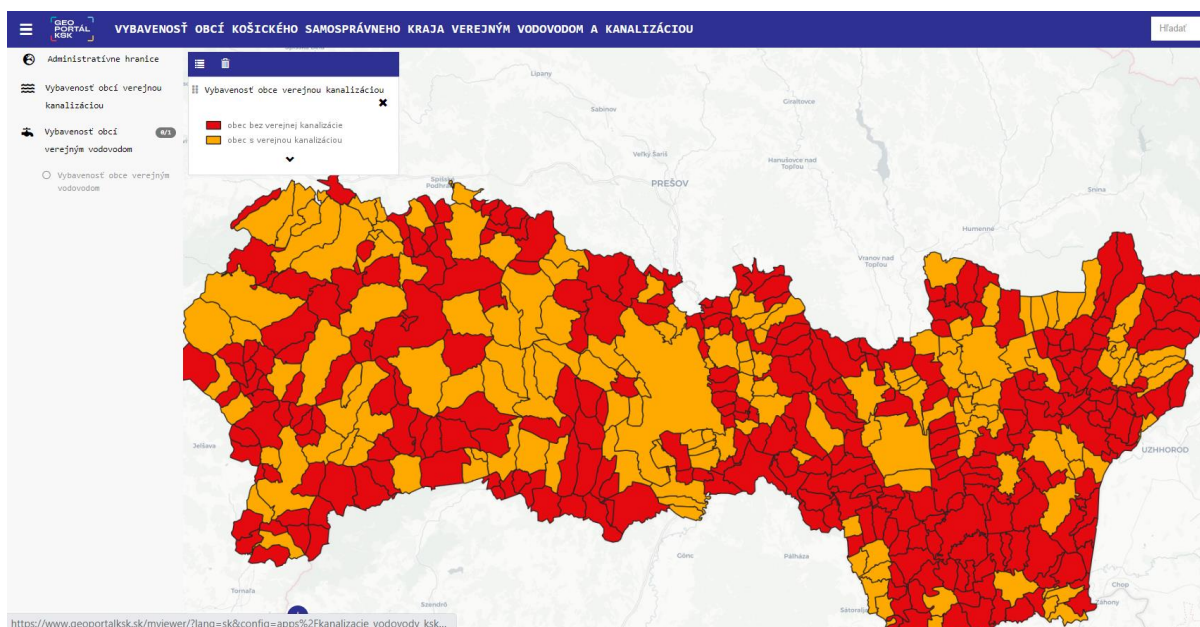


Image 8: Map application developed by KSK – Water pipes and sewers.

Land use plan of the region³⁸: This map application contains a selection from the graphic part of the regional land use plan of KSK, as amended. It contains Comprehensive urban design, Energy, Water management and Nature protection and Territorial System of Ecological Stability.

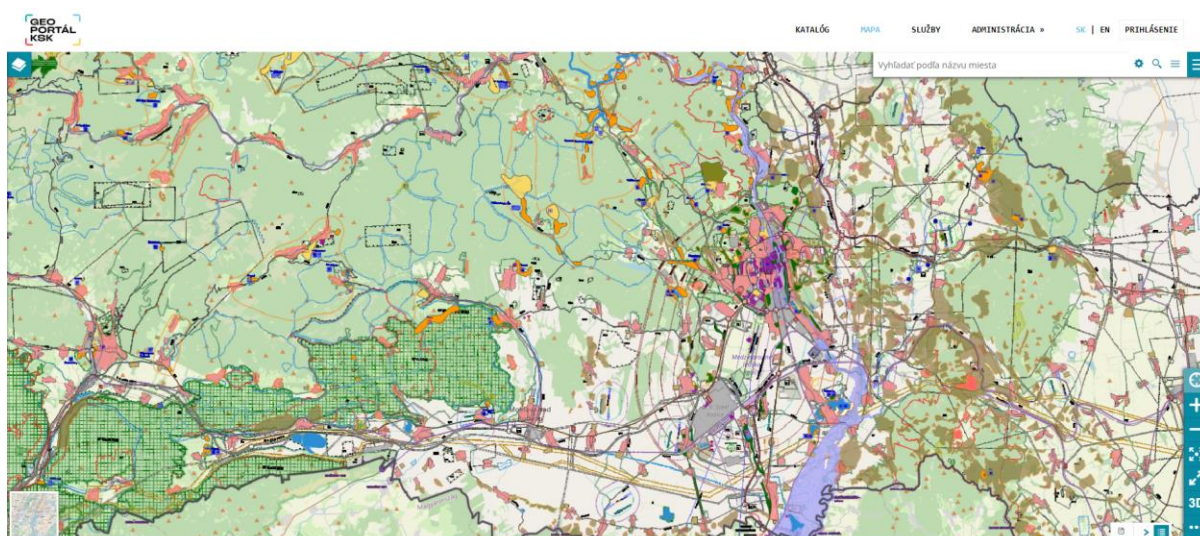


Image 9: Map application developed by KSK – Land use plan of the region.

³⁷ See

https://www.geoportalsk.sk/mviewer/?lang=sk&config=apps%2Fkanalizacie_vodovody_ksk%2Fkanalizacie_vodovody_ksk.xml#

³⁸ See <https://www.geoportalsk.sk/mapstore/#/viewer/openlayers/4216>

Subsidies 2022³⁹: This map application shows subsidies provided by the KSK to organizations in the whole of the region in 2022. The application shows key information such as the name of the supported organization, the name and the aim of the project and the amount of approved funding.

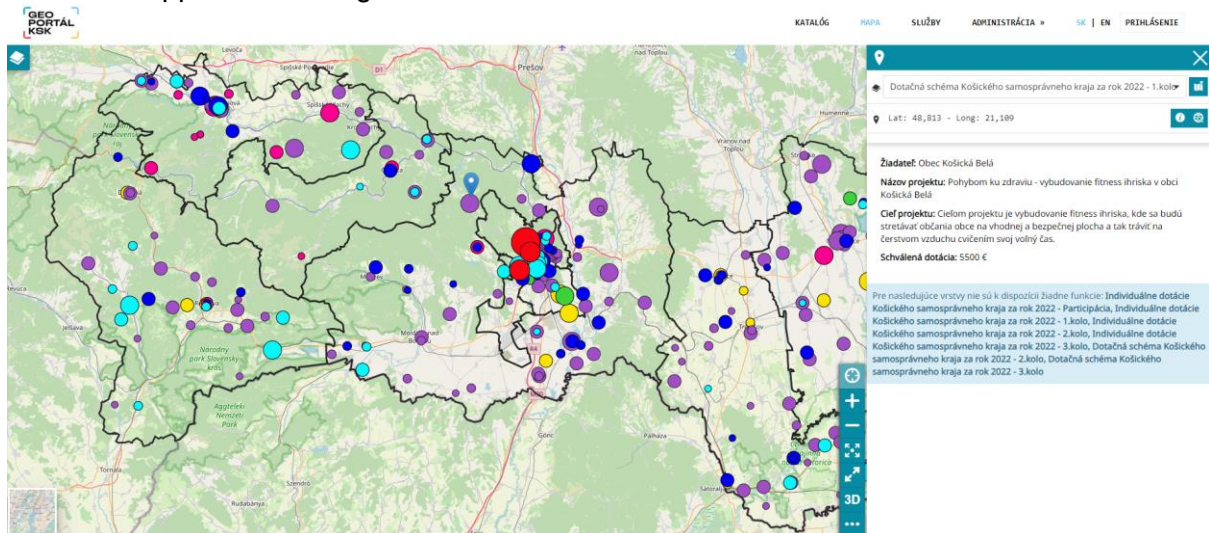


Image 10: Map application developed by KSK – Subsidies 2022.

³⁹ See <https://www.geoportalsk.sk/mapstore/#/viewer/openlayers/578>

PROJECT ACTIVITIES AND ASSOCIATED DELIVERABLES

The World Bank team undertook a number of activities that generated deliverables in the following categories: technical support, capacity building and partnership building. These activities are described below.

- **Technical assistance:** During this phase, the WB team provided technical support to the GIS unit in using and enhancing the KSK Geoportal. This support included the following activities:
 - The WB team continued with providing system administration support to the KSK in order to ensure smooth platform operation.
 - The WB team provided support to the KSK on handing over the system administration (sysadmin) activities to an external company and writing related documentation. Given this, complete refactoring of the infrastructure's code has been undertaken and also other platform enhancements.
 - GeOrchestra was upgraded to the latest version and also infrastructure improvements were done.
 - The WB team improved the harvester for obtaining data from the SO. The WB team was developing another harvester to obtain data held by SSC but it has not been deployed so far.
 - Analytical tool of geOrchestra was deployed to collect usage statistics on published datasets.
 - The map printer of the Mapviewer has been fixed to allow the printing of any KSK data.
 - The Mapviewer has been upgraded to handle 3D relief of Kosice Region. It enabled processing of the DEM file of the region and extracting the 3D terrain tiles out of it.
 - SSL certificate upgrade was implemented to use a higher grade certificate provided by the KSK.
 - The WB team conducted assessment of the available land use plan data and the options to retrieve it.
 - The WB team delivered Technical note on Open data in Regional Land Use Planning. Technical note provides an overview of current and upcoming legislation and practical examples from EU regions. The note concludes with suggestions for improving land use planning at the KSK through better data management.

 - **Administrative capacity building**
 - The WB team delivered a series of trainings to the GIS unit of KSK on data visualization and analytics:
 - Mviewer training (January 13th, May 13th 2022)
 - Harvesters (April 6th, April 8th 2022)
 - Raster workshop (May 11th 2022)
 - SQL training (July 4th 2022)
- Trainings were provided by WB staff, consultants.

- The WB team supported KSK with organizing the EastGIS 2023 conference by facilitating virtual meetings, providing feedback on the agenda, conference set up and on other conference outputs. The WB team participated in regular virtual meetings with KSK and its partners to track and discuss the progress of the conference.
 - The WB team provided to the KSK feedback on the survey dedicated to the municipalities in the region with the aim to introduce KSK Geoportal and understand their needs and KSK Geoportal usage more in depth.
 - The WB team also facilitated knowledge exchange with CuRI Poland dedicated to the Spatial Planning Experience (June 29th, 2023). Also, the WB team supported and provided technical assistance to the KSK when organizing travel to the FOSS4G conference in Italy.
-
- **Partnerships building:** The WB team facilitated and/or provided support to the KSK in building partnerships with strategic organizations. These included:
 - P2P exchange with PSK: sustainability of KSK Geoportal, system administrator
 - Consultations on transition of the system administrator
 - Participation of the WB team on virtual meetings with stakeholders – uzemneplany.sk, CURI components, etc.

MAIN IMPLEMENTATION CHALLENGES AND MITIGATION MEASURES

There are no major implementation challenges to mention for the second phase. The GIS unit at KSK has been able to adapt to the growing demand for GIS and was also able to quickly respond to emergency requests such as when the war in the bordering country Ukraine broke out and the KSK was asked to identify properties that might be used as shelters.

LOOKING FORWARD

The main objectives of the technical assistance have been achieved. The GIS unit at KSK is now fully autonomous and equipped with the necessary staff to continue operating and managing the platform. The last step to ensure full autonomy of KSK is the signing of a contract with a local firm for system administration to ensure high reliability and availability of the platform.

The establishment of the regional spatial infrastructure at KSK went successfully from the investment phase partly supported through the CURI technical assistance project (investments in people, system, data, infrastructures) to the operationalization phase where the Self-Governing Region is fully taking over.

Moving forward, the GIS unit will enter a new phase of its development, where the focus will be on making sure it can continue to respond to demand for priority GIS data and analytics while maintaining a talented in-house team and growing capabilities in new technologies or services.