CASE STUDY

Managing river flood risks in Romania and Bulgaria

Calarasi County Council, Polski Trambesh Municipality

Industry

- Government & Public Sector

Solutions

- Octave GeoMedia, Octave Imagine, Octave Alto Data Management, Octave Alto Server, Octave Alto Enterprise

Challenges

- Frequent flooding with severe impacts
- Lack of predictive capabilities
- Insufficient crisis coordination / communication

Results

- Improved planning / response
- Proactive forecasting
- Reduced reaction times

Floods can be unpredictable and hazardous to the property and people in an affected area. Located in southeast Romania on the left bank of the Danube River, Calarasi County is at an elevated risk of flooding. In the past 10 years, more than 1,000 flood-related emergency events have occurred, and the overall damage caused by floods in the region amounts to millions of euros. Likewise, Polski Trambesh, Bulgaria, is situated near the Yantra River and is prone to flooding.

Without a flood forecasting and early warning system in place, the **Calarasi County Council** and the **Polski Trambesh Municipality** were unable to mitigate flood risks or effectively respond to events. Both governments needed a modern system and solutions to predict and prevent floods, equip crisis coordination centers to communicate quickly and easily with local disaster response teams and residents and ensure overall disaster resilience in their cross-border area.

To address shared flooding risks and disaster management needs, Calarasi County Council and the Polski Trambesh Municipality joined forces and secured financing from the European Regional Development Fund. Both governments partnered with Intergraph Computer Services (ICS) Romania, a longtime Octave partner, and leveraged Octave's geospatial technologies to build a solution. In 2019, they implemented the Risk Management IT System for forecasting floods and responding to other crisis events.

"The IT System is a collaborative platform that provides integrated interinstitutional management across the region, uniting all information necessary for decision making and providing an overview for each collaborative institution," said Elena Comsa of the Calarasi County Council. "Following implementation, the citizens benefit from risk prevention and management actions, prevention measures and protection against floods through high-precision 3D simulations."

ICS Romania worked to make the Risk Management IT System a reality. The integrated information system includes both hardware and software and features a variety of Octave technologies: Octave GeoMedia (formerly GeoMedia) for data collection and analysis, Octave Imagine (formerly ERDAS IMAGINE) for change detection through imagery analysis,

Octave Alto Data Management (formerly ERDAS APOLLO) for data management and delivery, Octave Alto Server (formerly LuciadFusion) and extensions to create 3D flood simulations and Octave Alto Enterprise (formerly M.App Enterprise) to create workflows and 2D and 3D dashboards.

Creating a flood forecasting system

Because of the heightened risk of flooding, the two municipalities needed to focus on predicting floods. The Risk Management IT System provides 3D flood forecasting based on a blend of historical information and live sensor data, then creates simulations involving digital reality in target areas. These 3D digital models of land, houses, forests, infrastructure and other elements of interest allow users to simulate rising river levels and visualize the impact of floods. Officials can see not only the locations of structures and natural landscape elements, but also a map of the area's population, which allows them to quickly assess the potential danger of a flood.

Once officials have seen how a flood might impact residents' lives and critical infrastructure, they can decide on appropriate precautions and create more robust and efficient response plans. The Risk Management IT System keeps track of the weather and information collected from water level sensors and displays it on a map. To provide decision-makers with context and a complete picture of flooding possibilities, it also features a module that shows flood-affected areas on maps in three scenarios: 10-year flood, 100-year flood and 1,000-year flood.

While the odds of these events occurring may seem low, climate change and an unusual propensity to flood have rendered Calarasi County and Polski Trambesh at particular risk of such catastrophes. The Risk Management IT System is designed to handle massive amounts of data and analysis, so calculating a variety of flooding simulations is a benefit with no downside. Once officials understand different flood event scenarios, they can confidently create specific evacuation and response plans to ensure each flood event results in as little destruction as possible.

A 3D flood simulation calculated based on Danube River water levels

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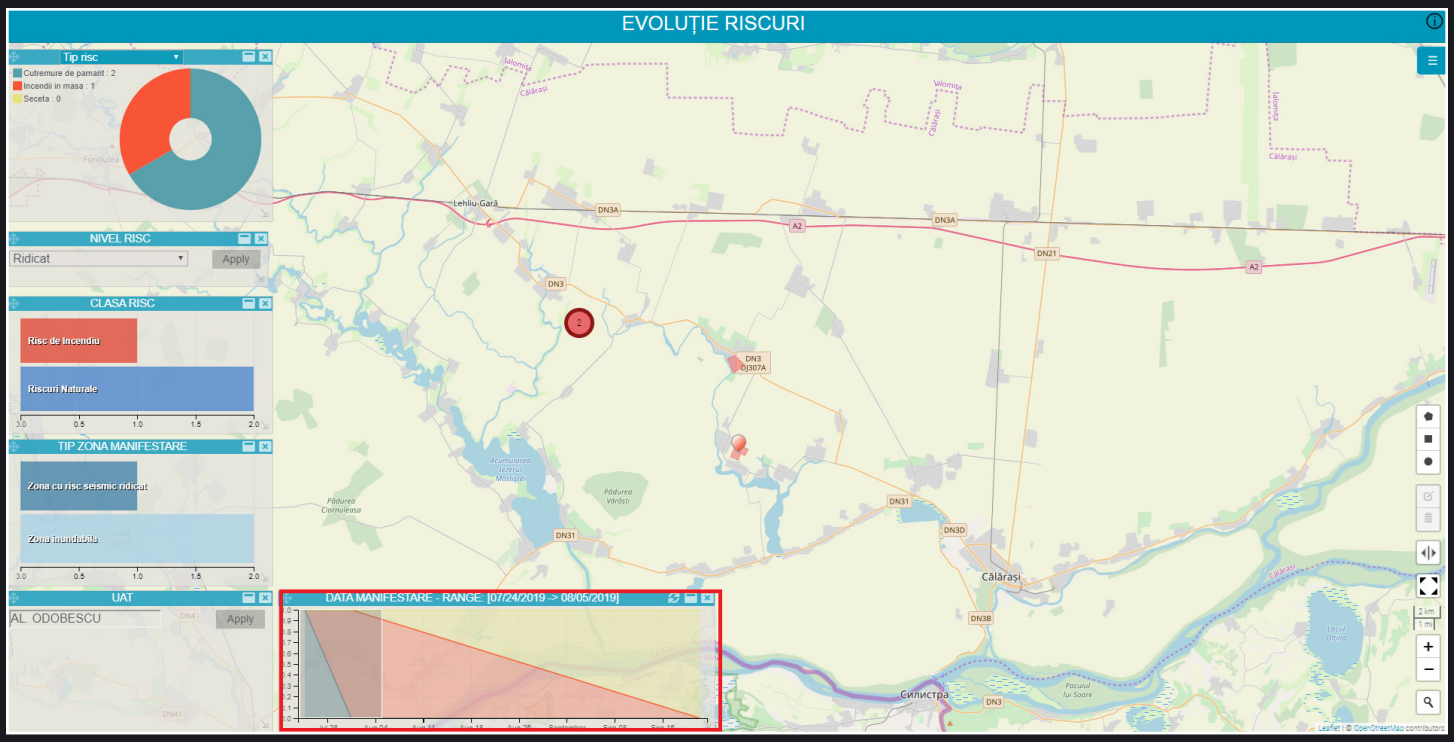
Elena Comsa
Calarasi County Council

Improving flood event reaction times

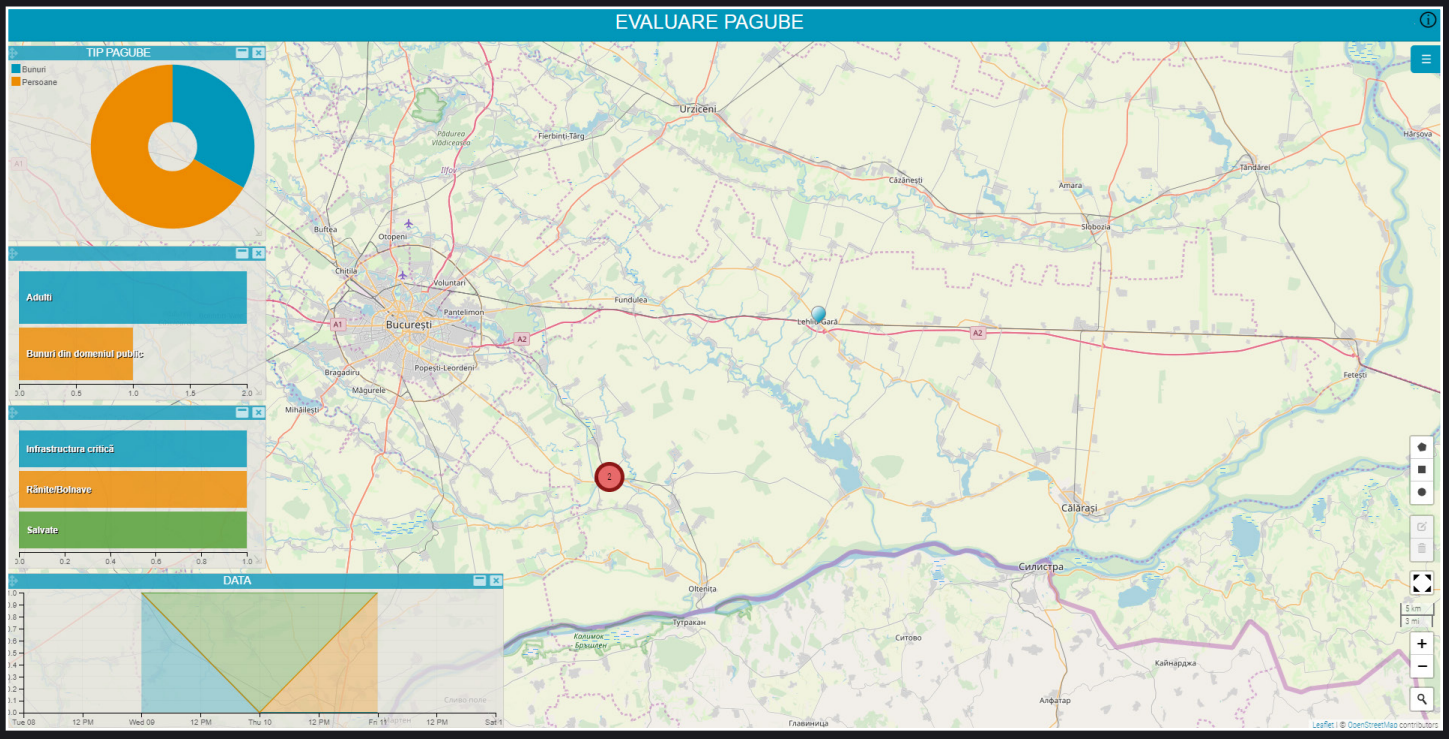
The key to saving lives and property during a flood is early warning. The Risk Management IT System keeps a unified record of all types of risks along with descriptive attributes, classifications and geographical location and areas of interest. The system then performs change detection analysis and automatically assesses the evolution of risks. When a risk is trending high, officials can take measures such as evacuating residents, preparing emergency response personnel and deploying preventative techniques such as sandbags.

But floods can't always be thwarted or controlled, so the Risk Management IT System also facilitates the planning of reconstruction measures. Users can manage information including institutional managers, dispositive and action devices and escape routes. The system also works to help officials predict and model other types of risks, including dangerous weather phenomena, seismic hazards, technological risks like nuclear failure, transport accidents, water pollution and biological risks like epidemics. It can help leaders across departments and agencies identify illegal buildings or morphological changes in the terrain of risk areas through comparative monitoring of satellite images.

Another important capability the system provides government officials is the ability to track risk factor indicators, reference historic events, issue alerts at predetermined risk thresholds and display spatial information about risks. The system can also perform complex, specialized analysis and serve as a planning base for action plans in three phases: before an event takes place, while the event is occurring to minimize its impact and after the event has concluded to repair the resulting situation. These plans can be shared among municipalities, empowering them to perform interagency collaboration and maximize the effective use of their personnel and resources during an event.



The risk evolution monitoring dashboard is designed to predict risks in a certain area. This is an example of the evolution in one location over a period of one week.



An example of a post-event dashboard showing the damage done in a certain area

Working together across multiple agencies and organizations

Floods and other natural disasters are not confined to one jurisdiction, nor do they impact just one piece of critical infrastructure. Adequate response to these events requires coordination and action from a number of agencies. Government officials, police, utility providers and relief workers are among the many parties who need to be informed of an imminent, current or recent flood event. The Risk Management IT System provides a user-friendly platform for authorities, intervention teams and residents, allowing optimized cooperation among agencies and organizations. Its thematic dashboards allow Calarasi County and Polski Trambesh to achieve an integrated management of the territory in the cross-border area.

The Risk Management IT System optimizes and streamlines workflows, planning and the allocation of resources to improve internal and interagency cooperation, and it facilitates the management of large and varied datasets from many sources, including sensors, geospatial data (numeric or alphanumeric), audio/video (from tablets and the mobile application), satellite imagery, CAD files, documents and more. Even granular details like the lengths of individual roads, the conditions of road signs and the current positions of machinery are covered, so infrastructure can be managed through its full lifecycle.

Officials from both governments can monitor the execution of tasks and interventions, track GPS positions, record resolutions and measures and generate reports. Field crews can share live videos and photos, which continuously improves situational awareness for all involved agencies. By transforming data into actionable information and integrating it into a comprehensive solution, the system manages all aspects of daily activities and all kinds of events, helping authorities anticipate and solve any situation. In addition, information of interest to the public is shared freely, allowing residents to aid in meeting community recovery objectives.

The implementation of this comprehensive and complex solution has led to increased interoperability between public institutions. Residents have benefited from better public services and improved communication. Events can be more efficiently managed thanks to the availability of a common operating picture. Huge amounts of information and processes are shared across systems, and, most importantly, savings have been realized in time, resources, money and human life.

Protecting residents

The Risk Management IT System has revolutionized disaster planning and emergency response in Romania and Bulgaria. By combining multiple Octave technologies, ICS Romania built a customized solution that meets all the municipalities' needs and improved operations. About 300,000 people have benefited from coordinated risk management activities. Around 150,000 have benefited from reduced reaction times in emergency situations because authorities are able to leverage harmonized, integrated tools. In addition, officials have new, advanced capabilities that facilitate institutional and interinstitutional cooperation and a holistic approach to managing territory.

Whether it's forecasting floods and other threats, broadcasting early warnings, generating evacuation routes or monitoring an in-progress mission, the Risk Management IT System is keeping regional residents safer. Officials can see what measures have been taken and the results achieved by those measures, so they can make data-driven decisions in future emergencies and act in concert to mitigate the effects.

About Octave

Octave is a leader in enterprise software, turning data into decisive action and intelligence into your edge. Our software solves for and simplifies complexity, from the design and build to operations and protection of people, property and assets – for any scope, at any scale. For decades, we've partnered with customers to sharpen performance, elevate efficiency and amplify results. From factory floors to entire cities, our solutions are tuned to scale up what's possible from day one onward.

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