MAIN CONCLUSIONS

The ICEREG project provides the first research concerning management of the ice-jam flood affected areas and assessing how future climate change will impact the river ice processes in Latvia and Lithuania.

Modelling results show that climate change can significantly reduce the frequency and severity of ice-jams in the upcoming decades, due to warmer temperatures, fewer freezing days and declining frazil ice formation. However, probability of ice jams under extreme conditions will still exist in the near future.

Ice-jam flood maps for the selected pilot areas were prepared, based on ice-jam modelling results. The developed Conceptual Model of ice-jam formation, as well as data integration in Warning systems in both countries, and a list of ice-jam flood risk mitigation measures, are available for the authorities and the target groups.

The project contributes to a common strategy of the neighboring countries, supporting a coherent and harmonized implementation of the EU Floods Directive 2007/60/EC.

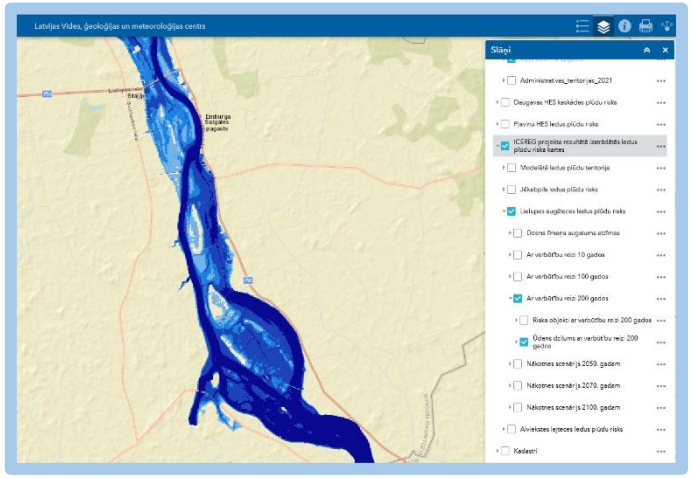
Full set of the ICEREG project deliverables is available on the LEGMC web page.

This document has been produced with the financial support of the European Union. Its contents are the sole responsibility of Latvian Environment, Geology and Meteorology Centre and do not necessarily reflect the views of the European Union.

ABOUT US

The project partner institutions have profound experience in hydrology and climatology, including field measurements and modelling tasks, and thus are involved in the flood risk management under the EU Floods Directive 2007/60/EC.

Project implementation: 01.02.2024 – 31.01.2026.
https://latlit.eu/theprojects/icereg/



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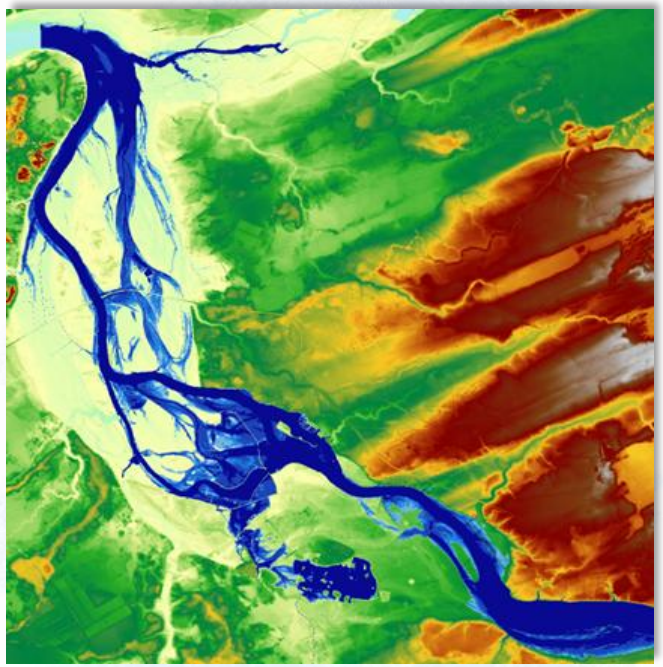
ICEREG



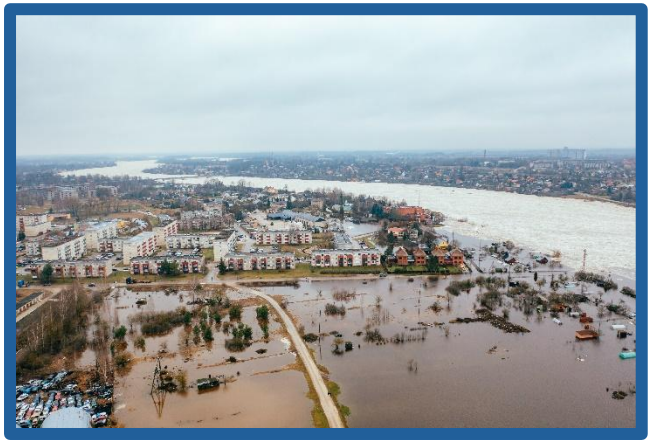
Ice-jam flood risk management in Latvian and Lithuanian regions with respect to climate change

LL-00136

PROJECT IMPORTANCE

An extreme, ice-jam caused flooding in Jēkabpils in the beginning of 2023 has shown how dangerous this nature phenomenon can be, with water level increasing rapidly, threatening broad territories in a densely populated location. To overcome the negative effects of this event, more than 2.8 million euro funding was needed. Losses to private properties were almost 1.5 million euro.

photo by Kaspars Siliņš



A catastrophic ice-jam flood in Kaunas in 1946 resulted in inundation of two-thirds of the city and its suburbs. To prevent such floodings in the future, a hydroelectric power plant was built upstream Kaunas in 1959.

Ice jams as an additional source of flooding pose significant risk, being capable of causing wide inundation and substantial damage to both communities and the economy of the Latvian–Lithuanian border regions. The unpredictability of ice jams adds to the challenge, requiring a better understanding of meteorological and hydrological conditions that lead to ice jam formation.

The aim of the ICEREG project is to enhance the management of ice-jam flood risk by updating the existing early warning systems and elaborating comprehensive ice flood maps – particularly in the context of a changing climate.

PROJECT ACHIEVEMENTS

The research on ice-jam formation has been done for the following pilot river stretches selected by the project:

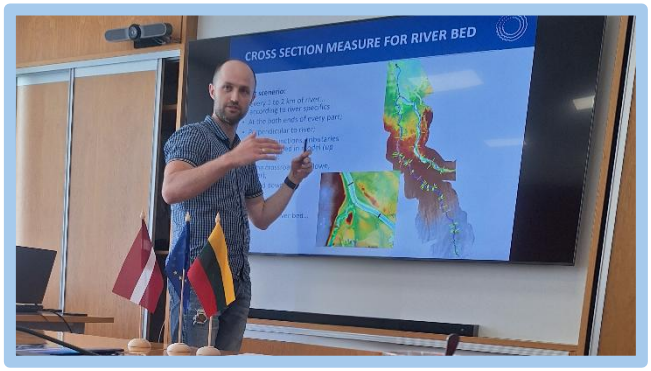
- Latvia: Daugava River between tributaries Nereta and Aiviekste; Lielupe River from the confluence of Mūsa and Mēmele rivers to the Sesava River;
- Lithuania: Mūša River between settlements Gustoniai and Ustukiai; Lėvuo River and Sanžilė Channel from Pamarliškiai to bridge in Skaistgiriai.



Before the ice-jam flood modelling, the river "geometry" was created for the HEC-RAS model. For this task, specialized field measurements were conducted in the pilot rivers, covering in total more than 200 river profile cross-sections.

Two training courses – on the HEC-RAS model and on the "Excel-VBA" tool have been organized, raising capacity for 18 experts from 3 institutions.

More than 100 ice-jam flood events have been analyzed, to define the most significant factors in the occurrence of ice jams. As a result, a Conceptual model of ice-jam formation was created for each pilot territory. This Conceptual model formed the basis of the Guidelines for the Ice-Jam Flood Forecasting and Early Warning that have been developed in the frame of the ICEREG project.



Observed and analyzed ice-jam data were incorporated into the Ice-jam Flood model (a blend of the HEC-RAS model and the "Excel-VBA" tool created by Finnish Environment Institute). Maximum values of the ice thickness, water level, water discharge, and ice volume during the ice-jams have been modelled for each pilot territory.

ICEREG project has also generated ensemble climate simulations of future climate with direct applications to the impacts on river ice regime, namely to the ice jam formation, to inform the local communities and decision-makers in Latvia and Lithuania.

