

Interreg



Co-funded by
the European Union

Latvia – Lithuania

ICEREG

List of ice-jam flood management measures

Project Deliverable D3.2.1



2025



LIETUVOS
ENERGETIKOS
INSTITUTAS



Lietuvos
hidrometeorologijos
tarnyba

Contents

1. Introduction	4
2. Structural measures	5
2.1. Ice control structures	5
2.2. Channel modifications	5
2.3. Flood protection infrastructure	6
3. Non-structural measures	7
3.1. Monitoring and Early Warning	7
3.2. Ice management techniques	8
3.3. Land use planning	9
4. Emergency preparedness	10
4.1. Pre-positioning sandbags and pumps	10
4.2. Training local response teams	10
4.3. Public education on evacuation procedures	12
4.4. Disaster recovery plan and insurance	12
5. Best practices	14
6. Municipal surveys on ice floods	17
6.1. Municipal survey on ice-jam floods in Lithuania	17
6.2. Municipal survey on ice floods in Latvia	17
7. Summary	18
References	19
Annex I	20

Abbreviations

BCWF	British Columbia Wildlife Federation
ESA	Environmental Science Associates (USA)
ESOC	Emergency Operations Center
ICS	Ice control structures
LEGMC	Latvian Environment, Geology and Meteorology Centre
NGO	Non-government organisation
OPG	Ontario Power Generation Inc. (USA)
UAV	Unmanned Aerial Vehicle

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.

1. Introduction

In the frame of the project “Ice-jam flood risk management in Latvian and Lithuanian regions with respect to climate change” (ICEREG, LL-00136) financed by the Interreg V-A Latvia–Lithuania Programme 2021–2027, the most effective measures for the water bodies under ice-jam flood risk have been collected.

Ice-jam floods are a unique hazard in cold-region rivers and managing them requires a mix of structural and non-structural measures. Ice jam management is a critical aspect of flood risk reduction in cold regions, where ice accumulation in rivers can lead to sudden and severe flooding. Ice-jam flood management measures are strategies designed to prevent, reduce, or mitigate flooding caused by ice jams – blockages of river ice that restrict flow and cause upstream water levels to rise rapidly. These measures aim to:

- Reduce the likelihood of ice jams forming;
- Minimize the severity of flooding when jams occur;
- Protect communities and infrastructure.

Ice jam management measures may be categorized by timing (preventive, responsive, and long-term planning strategies) and by type (structural or non-structural).

The present report includes an overview of the protection measures that usually combine prevention, monitoring, and emergency response.

2. Structural measures

Structural measures are physical, engineered interventions designed to control ice formation, regulate flow, or reduce flood risks associated with ice jams and are generally reserved for river reaches with constant or serious flood risk issues related to these extreme phenomena. While these measures can be highly effective, their design and implementation often involve substantial costs and may require environmental permits. Moreover, once in place, they may demand ongoing maintenance. Depending on the type of intervention, they can also have significant ecological impacts on riverine ecosystems.

2.1. Ice control structures

Ice control structures (ICSs) are fixed or removable installations to control ice movement (trap, retain or direct ice to safe disposal areas) such as dams, weirs, ice booms, piers, artificial islands, etc. When properly designed and strategically located, ICSs are considered highly effective mitigation measures. They can be placed exactly where ice problems occur, rather than applying broad measures across an entire river or waterway. ICSs focus on specific locations that consistently cause issues, such as bends, constrictions, shallow areas, etc.

However, their construction, materials, permitting, and maintenance can be costly compared to non-structural ice management approaches. Additionally, introducing a physical structure into a river or waterway can alter flow patterns and velocities, as well as sediment transport and habitat conditions for fish and other aquatic species. Consequently, the design of ICSs must carefully consider multiple factors, including hydrology, ice mechanics, structural loads, sediment dynamics, fish passage, and local environmental constraints. Proper planning ensures both effective ice management and minimal ecological disruption.

2.2. Channel modifications

Channel modifications are engineering interventions that physically reshape sections of a river to improve ice conveyance. Examples include:

- Widening a narrow reach so ice has more room to spread out rather than jam;
- Deepening shallow sections so ice could move more freely and would not ground or pile up;
- Straightening or realigning bends that commonly trap ice;
- Removing obstructions (bars, islands, debris, or accumulated sediment).

The goal is to reduce hydraulic constrictions, eliminate known ice jam points and improve flow capacity, allowing ice to move downstream more smoothly. Once constructed, the benefits of such channel modifications tend to persist.

However, they require high investments and are related to excavation, in-channel work, (potentially) land acquisition and extensive environmental permitting. Since dredged or widened river reaches may reaccumulate sediment, the ongoing

maintenance should be considered. Like ice control structures, such engineering interventions in the river channel may have considerable environmental impacts.

2.3. Flood protection infrastructure

Flood protection infrastructure refers to physical structures and engineered works on riverbanks designed to control water levels, redirect flows, or protect vulnerable adjacent areas during high-water events. Barriers such as earthen embankments (levees, dikes) or concrete/steel structures (floodwalls) along river channels can reduce flood risk and damage for both open-water and ice-jam flood events.

However, constructing earthen embankments involves significant risks. If they are overtopped or breached, flooding can be sudden and severe, and protecting one area may increase flood risk elsewhere. Such barriers also disconnect rivers from their floodplains, disrupting sediment movement and natural channel migration, which can lead to loss of floodplain wetlands and riparian habitats, reduced fish spawning and migration in floodplain systems, etc.

Raising or reinforcing bridges and redesigning culverts to withstand ice forces are also considered effective structural measures for protection from ice-jam floods. Such redesigns increase vertical clearance and/or remove ice-snagging elements, improving hydraulic capacity by creating larger openings to reduce backwater effects during ice runs and breakup periods. Once modified, the structure consistently performs better under ice conditions without requiring seasonal intervention.

Although effective, modifying bridges or culverts often requires significant reconstruction, traffic management, and specialised engineering. This may require permits and careful mitigation of habitat impacts. In addition, it can rise risk of problem displacement: improved conveyance at one crossing can shift ice jam formation downstream if downstream constraints remain unaddressed.

3. Non-structural measures

Non-structural measures can be used in advance of flooding or during an active ice jam flood event. They involve operational, procedural, and planning actions that rely on forecasting, management, and emergency response protocols. Non-structural measures are generally less expensive and may have little to no impact on the surrounding aquatic and terrestrial ecosystems, compared to structural measures. While non-structural measures are increasingly recognised as valuable tools for ice jam flood risk reduction, a significant knowledge gap persists regarding their actual effectiveness.

These measures can be used in conjunction with structural interventions for comprehensive protection.

3.1. Monitoring and Early Warning

Monitoring and early warning are proactive measures of ice-jam management and mitigation, i.e. they are employed to observe, forecast, and prepare for potential ice jams before they occur.

Ice can be monitored by measures of different types and levels of complexity. The ice process can be observed using satellite remote sensing technologies, UAVs, and web cameras (Fig. 3.1.1).

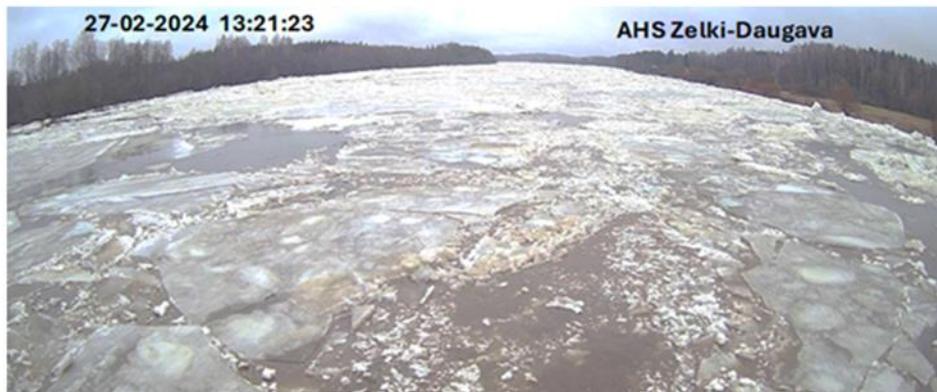


Figure 3.1.1. Ice phenomena monitoring by web camera on LEGMC station Zelki

Assessment of ice thickness and ice conditions can be performed using sonar, ground-penetrating radar, manual measurement or other techniques. Installed tripwire ice motion detectors may provide automated early warnings of ice movement, enabling timely flood response actions. Water level gauges can detect rapid rises in river level, which often occur before ice breakup. Automated temperature sensors help confirm whether conditions are suitable for ice jam formation or breakup. Trained observers, including students and NGOs, could also make valuable on-ground observations and documentation.

All collected information can be used to develop forecasts, operate public alert systems and communication plans, and provide early warnings to local officials and the public about potential ice-jam flooding risks.

3.2. Ice management techniques

Non-structural ice management techniques can be used to weaken ice cover before an ice jam occurs. Mechanically, ice can be broken using icebreaking vessels, amphibious machines, or other heavy equipment to fracture the ice and prevent accumulation. Specialised tools can also be employed for cutting grooves or perforating the ice by drilling holes, which reduces the structural integrity of the ice and promotes controlled breakup.

Another method involves covering the ice surface with dark materials – such as coal dust, fly ash, topsoil, or sand – to increase solar radiation absorption and accelerate melting. Chemical weakening is also possible by spreading salt on the ice surface, which is effective even at sub-zero temperatures. Formation of ice cover at critical locations can be delayed or prevented by discharging warm water upstream. Potential sources of warm water can be industrial cooling ponds, power plant cooling systems, wastewater treatment plants, groundwater wells, or deep lake/reservoir water. In rare cases, explosives may be used to destabilise an ice jam and release floodwaters. However, blasting operations (Fig. 3.2.1) must carefully consider both ecological concerns and safety considerations.



Figure 3.2.1. Blasting ice on the Ogre River

3.3. Land use planning

A proper land-use planning strategy is a critical tool for managing ice-jam flood risk. High-risk areas should be identified using historical flood levels and hydraulic modelling. These analyses enable the delineation of flood-prone zones and associated water depths, supporting the designation of river buffer zones that allow ice and floodwaters to move safely. New development within flood-prone areas should be restricted or prohibited. Where existing properties and infrastructure are already located within hazard zones, appropriate structural flood protection measures should be considered.

4. Emergency preparedness

Emergency preparedness includes several activities that could be subdivided into 4 groups:

- Pre-positioning sandbags and pumps;
- Training local response teams;
- Public education on evacuation procedures;
- Disaster recovery plan and insurance.

4.1. Pre-positioning sandbags and pumps

The use of sandbags is a simple but effective way to prevent or reduce flood water damage. Properly filled and placed sandbags can act as a barrier to divert moving water around, instead of through, buildings. Sandbags are also used successfully to prevent overtopping of streams with levees, and for training current flows to specific areas.

The sandbags should be only 1/2 full to keep them manageable and allow them to stack properly without gaps. Tie them at the top, not the middle, so the sand has room to settle when the bag is stacked. Remove debris from the area and place the half-filled sandbags parallel to the flow of water.

Emergency scenarios call for several types of surface water pumps; each intended for certain conditions and needs. The most often used models – centrifugal pumps, diaphragm pumps and submersible pumps – offer special benefits depending on the need.

Though they technically belong to a different category, submersible pumps are sometimes utilised in conjunction with surface water pumps in an emergency. These pumps are perfect for emptying flooded basements, tunnels, or wells, as they are designed to operate fully submerged. For long-term water removal activities during disaster recovery, highly efficient and running continuously submersible pumps are essential.

4.2. Training local response teams

A local response team for ice-flood emergencies should be multi-disciplinary, combining technical skills, decision-making authority, and local knowledge. There are the key members of a local response team and the role of each member:

1. Local Emergency Management Coordinator (Team Lead).

Role: overall coordination and decision-making; activates emergency plans and resources; interaction with regional and national authorities.

2. Personnel of the Rescue Service.

Role: water and ice rescue; evacuations; life-saving operations.

3. Police.

Role: traffic control and road closures; public safety and security; evacuation enforcement if necessary.

4. Public Works / Infrastructure Staff.

Role: assess roads, bridges, culverts, and utilities; operate heavy equipment (when safe); support ice-jam mitigation under expert guidance.

5. Health Services.

Role: medical response; hypothermia and cold-injury treatment; support vulnerable populations.

6. Volunteer Organizations.

Role: shelter management; food, clothing, and emotional support; volunteer coordination.

7. Communications / Public Information Officer.

Role: issue public alerts and warnings; manage media and social messaging; prevent misinformation.

There are the key concepts involved in training local response teams for ice floods:

- Understanding Ice Flood Hazards

A local team trains to recognize that a sudden temperature rise in spring can break river ice, which then jams at bends, bridges, or narrow channels, causing upstream flooding within hours.

- Early Detection and Monitoring

Training emphasizes identifying early warning signs and monitoring conditions, usage of tools (gauges, drones, etc), coordination with meteorological and hydrological agencies.

- Risk Assessment and Mapping

During training, responders review maps showing past ice-jam floods and learn that a low-lying residential area is the first to flood, making it a top evacuation priority.

- Community Preparedness and Communication

Local responders practice issuing evacuation warnings that explain why residents must leave quickly, even though the river appears frozen.

- Evacuation Planning and Shelter Management

A team conducts a drill where residents are evacuated at night in sub-zero temperatures, ensuring shelters are pre-heated and stocked with winter supplies.

- Ice Jam Mitigation Techniques

Response teams must understand available mitigation options like mechanical breaking (excavators, ice saws), controlled blasting, ice dusting, and their limits. Local responders learn when to call in regional experts for controlled ice breaking rather than attempting unsafe manual removal themselves.

- Safety of Responders

During training, responders practice rescue operations using cold-water survival gear after learning that stepping onto ice near a jam is extremely dangerous.

- Interagency Coordination

Response teams exercise coordination with Rescue Services, police, public works, and national agencies, as well as sharing real-time information.

4.3. Public education on evacuation procedures

Public education before an ice flood should ensure that people:

- Understand the danger;
- Recognize evacuation warnings (difference between evacuation advisory and mandatory evacuation);
- Know where to go and how to get there;
- Are prepared to evacuate quickly in cold conditions.

Important points of education in the cold-weather evacuation safety are:

- Dress in layers and wear waterproof boots;
- Avoid walking or driving through floodwater;
- Beware of unstable ice and fast-moving water.

Public messaging emphasizes that ice-covered floodwater may hide strong currents and should never be crossed.

4.4. Disaster recovery plan and insurance

There are some very important steps that should be included in a Disaster recovery plan.

Immediate actions

1. Ensure safety first to avoid flooded areas with ice or electrical hazards and to shut off electricity and gas if water enters the building.
2. Document everything, taking photos and videos before cleanup and preparing a list of damaged items with estimated values.
3. Prevent further damage making temporary barriers, pumping water (if safe) and keeping receipts for emergency expenses.

Cleanup and restoration steps

4. Water and ice removal (professional water extraction recommended).
5. Drying and mould prevention (dehumidifiers, fans, and professional remediation if needed).
6. Repair and rebuild using licensed contractors.

Insurance and claims

7. Notify insurers immediately including homeowners and flood insurance (if applicable).
8. Mitigation requirements (insurers often require reasonable steps to reduce further loss).
9. Work with adjusters (should be present during inspections and keep written records of all communications).

5. Best practices

Best practice is to use a combined strategy – prevention where possible (ice control, monitoring) and strong emergency readiness in case jams break unpredictably.

1. River ice management

Purpose: Prevent formation of large ice jams that back up water and cause flooding.



Figure 5.1. Ice booms, OPG (<https://www.opg.com/news-and-media/our-stories/story/ice-booms-keep-rivers-flowing/>)

Key practices:

- Ice booms to control where ice accumulates and to reduce large sheet movement.
- Ice breaking with specialized vessels or equipment to relieve jam pressure zones.
- Managed ice cutting in key constrictions to create controlled channels.

Additionally, monitoring river temperature and flow to time interventions correctly.

2. Floodplain and land-use planning

Purpose: Reduce damage by steering development out of high-risk areas.

Key practices:

- Floodplain zoning to limit new construction where ice flooding is hardest.
- Maintain or restore wetlands and riparian buffers to absorb floodwaters.
- Elevated structures and flood-resilient design for essential community infrastructure.

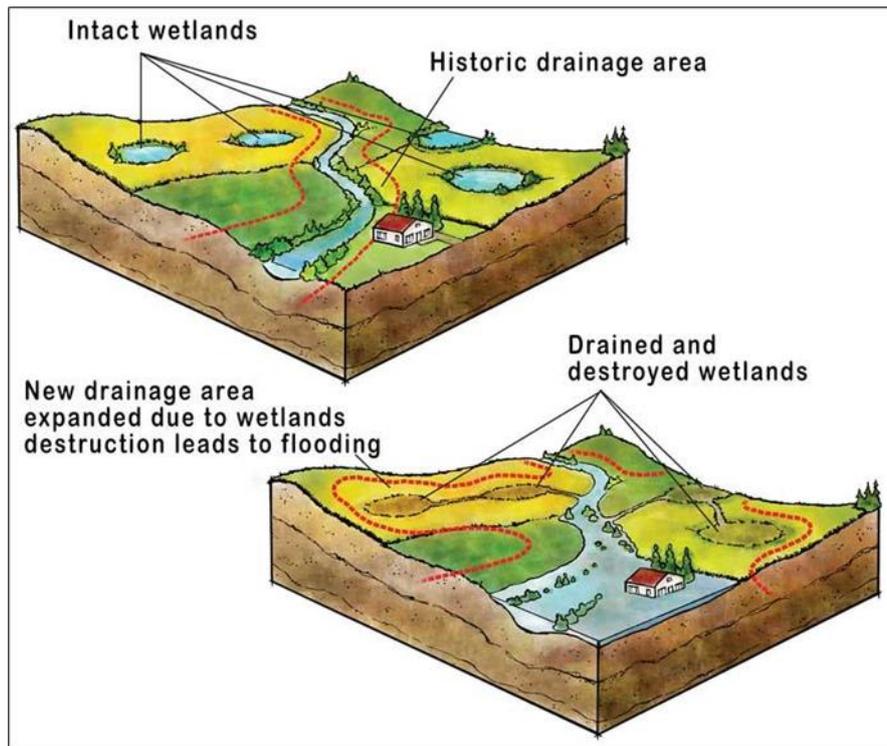


Figure 5.2. Wetlands as a tool for flood control and prevention, BCWF
<https://bcwfbogblog.com/2021/12/15/wetlands-as-a-tool-for-flood-control-and-prevention>

3. Real-time monitoring & Early Warning Systems

Tools:

- Remote sensors and gauges to track river heights and temperature;
- Satellite or aerial imagery to spot developing ice packs;
- Automated alerts to authorities and communities.

Key practices:

- Integrate weather forecasts with hydrologic and ice monitoring data;
- Establish clear escalation protocols when thresholds are exceeded.

4. Ecological and Nature-Based Solutions

Approaches:

Floodplain reconnection: Let rivers access natural storage areas during high flows.

Key practices:

- Set back or remove levees;
- Excavate or regrade the floodplain so it is at a lower elevation relative to the river channel and will flood sooner during ice breakup;
- Reopen historical side channels.



Figure 5.3. River and floodplain restoration, USA
(<https://esassoc.com/services/restoration/river-floodplain-restoration/>)

Urban green infrastructure: Floodable parks and greenways, retention ponds that help manage meltwater.

How do they help?

- Reduce rapid runoff during thaw events;
- Lower river stage during ice-covered conditions.

Living shorelines: Vegetation and natural materials that buffer ice and water energies.

Key practices:

- Plant native trees and shrubs with strong root systems;
- Maintain gradual bank slopes (avoid vertical walls).

6. Municipal surveys on ice floods

6.1. Municipal survey on ice-jam floods in Lithuania

To obtain an overall picture of ice-jam flood risk management and prevention practices applied in Lithuania, a survey was prepared and sent to all 60 municipalities in the country. Although the project analysis focuses on two specific river reaches of the Mūša and Lėvuo rivers, the survey results helped to identify a broader context: the preventive measures applied by different municipalities, the challenges they most frequently face, and the need for existing and additional solutions. The collected information allows for a comparison of applied practices and an assessment of their suitability for the river reaches analysed in this study (Annex I).

Out of the 60 municipalities in Lithuania, 32 participated in the survey, and only 16 of them reported having river sections within their territory where ice jams form.

Survey results:

- Most municipalities implement ice-jam prevention through information dissemination and continuous monitoring rather than through active technical measures.
- Key risk reduction measures would be implemented only if a clear need arises or sufficient funding becomes available.
- Currently, supportive measures prevail, including maintenance activities, continuous monitoring, informing residents and institutions, and discussing preparedness issues at the institutional level.

6.2. Municipal survey on ice floods in Latvia

During the Preliminary Flood Risk Assessment, Latvian Climate and Energy Ministry and LEGMC organise the special survey for gathering information on floods and their consequences in the regions.

To identify the latest information regarding flood risk on local government territories in the period of 2019-2023, a municipal survey was conducted from 2 November to 4 December 2023.

34 municipalities and all 7 State cities participated in the survey. No response was received from 1 municipality. Ice-jam floods with different consequences have been observed in 8 municipal territories.

Detailed information about ice flood in the period 2019-2023 within Latvian territory (subdivided by River Basin Districts) can be found on the LEGMC homepage (https://videscentrs.lv/gmc.lv/files/Udens/SPRN_2025.pdf).

7. Summary

The most effective ice flood mitigation combines prevention, protection and preparedness measures plus flood response and flood resilience.

Prevention measures may reduce the likelihood of ice jam formation (booms, ice cutting).

Protection measures shield infrastructure and people (barriers, zoning).

Preparedness measures are early flood risk detection and readiness (monitoring, plans).

Response means fast, coordinated action during events.

Flood resilience is a long-term adaptation (land use, nature-based solutions).

References

- Barrette P., Ghobrial T. and Kolerski T. (2025). On floods caused by river ice: An overview of mitigation measures. NRC-OCRE-2024-TR-027, National Research Council of Canada, Ottawa, 24 p.
- Das A. & Lindenschmidt K.-E. (2021). Evaluation of the implications of ice-jam flood mitigation measures. *Journal of Flood Risk Management*. 14. 10.1111/jfr3.12697.
- Engel C. Ice Jam Mitigation Techniques (YouTube).
- Giovando J. et al. (2023). Summary of Ice Jams and Mitigation Techniques in Alaska. U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, 102 p.
- Preliminary Flood Risk Assessment 2025-2030 (in Latvian). LEGMC, 2024. https://videscentrs.lv/gmc.lv/files/Udens/SPRN_2025.pdf
- Urbanus J. Alaska Ice Jam Mitigation Experiences (YouTube).
- USACE (US Army Corps of Engineers) (2002). Ice Engineering. CECW-EH EM 1110-2-1612. Washington, DC: Department of the Army–USACE.

Municipal Survey on Ice-Jam-Induced Floods in Lithuania

In order to obtain an overall picture of ice-jam flood risk management and prevention practices applied in Lithuania, a survey was prepared and sent to all 60 municipalities in the country. Although the project analysis focuses on two specific river reaches of the Mūša and Lėvuo rivers, the survey results helped to identify a broader context: the preventive measures applied by different municipalities, the challenges they most frequently face, and the need for existing and additional solutions. The collected information allows for a comparison of applied practices and an assessment of their suitability for the river reaches analyzed in this study.

Out of the 60 municipalities in Lithuania, 32 participated in the survey, and only 16 of them reported having river sections within their territory where ice jams form (Figure 1).

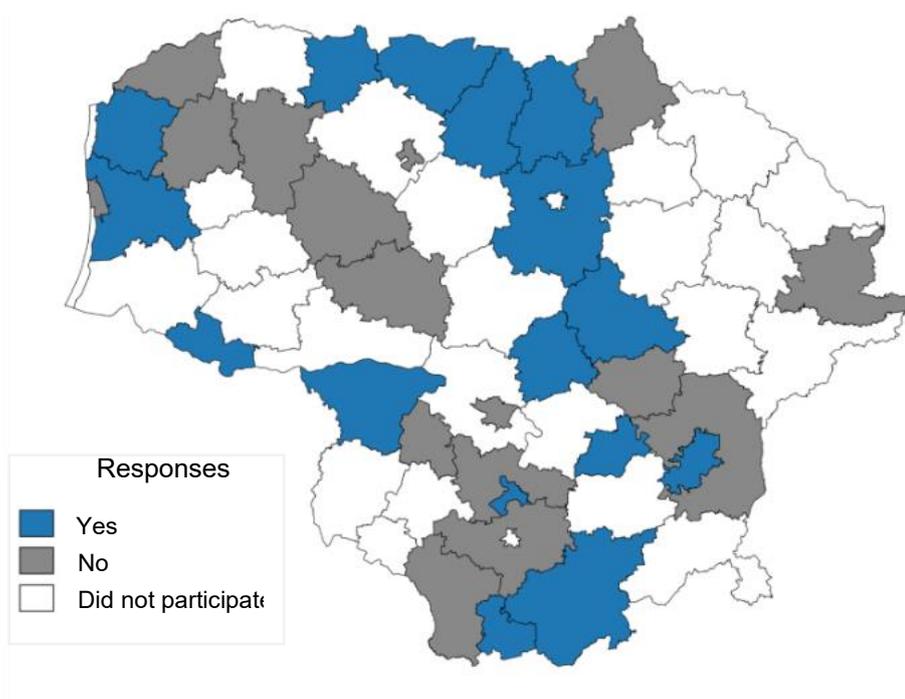


Figure 1. Municipalities that responded to the question of whether river sections with ice-jam formation exist within their territory

The collected information shows that floods or flood-risk situations are most frequently recorded in the country's major rivers (Nemunas, Neris, Šešupė, and Nevėžis), as well as in medium-sized and smaller rivers where ice jams or significant water-level rises often occur (Lėvuo, Sanžilė, Mūša, and Kruoja).

The Nevėžis–Lėvuo–Mūša river basins, located within Panevėžys, Pasvalys, and Pakruojis municipalities, are characterized by medium-sized and smaller rivers, slow

flow velocities, relatively low channel slopes, and locally pronounced channel constrictions. Such hydromorphological conditions create a favorable environment for ice-jam formation, especially during the transitional period before ice drift and during the ice drift itself.

In Panevėžys municipality, the Nevėžis River is of greatest importance, particularly at locations where hydraulic structures (bridges, riverbanks) are present in the channel, as these can promote ice-jam formation. In the Lėvuo River, ice jams most often form due to channel meandering and the presence of bridge structures. In Pakruojis and Pasvalys municipalities, ice-jam risk is more closely associated with the Mūša River and its tributaries, where flooding more frequently affects agricultural land, although in certain locations it approaches residential areas and community gardens.

Scale of Ice-Jam-Induced Floods Over the Past 20 Years

In many municipalities, reported floods are minor and localized. Only a few municipalities indicated that both moderate- and large-scale floods have occurred, for example, in Šakiai, Klaipėda, Kaunas, and Panevėžys (Figure 2).

Pakruojis, Pasvalys, and Panevėžys municipalities are among those where not only minor but also moderate and large ice-jam-induced floods have been recorded over the past 20 years. This distinguishes them from other municipalities in northern Lithuania, where flooding is typically limited to localized and short-term inundation.

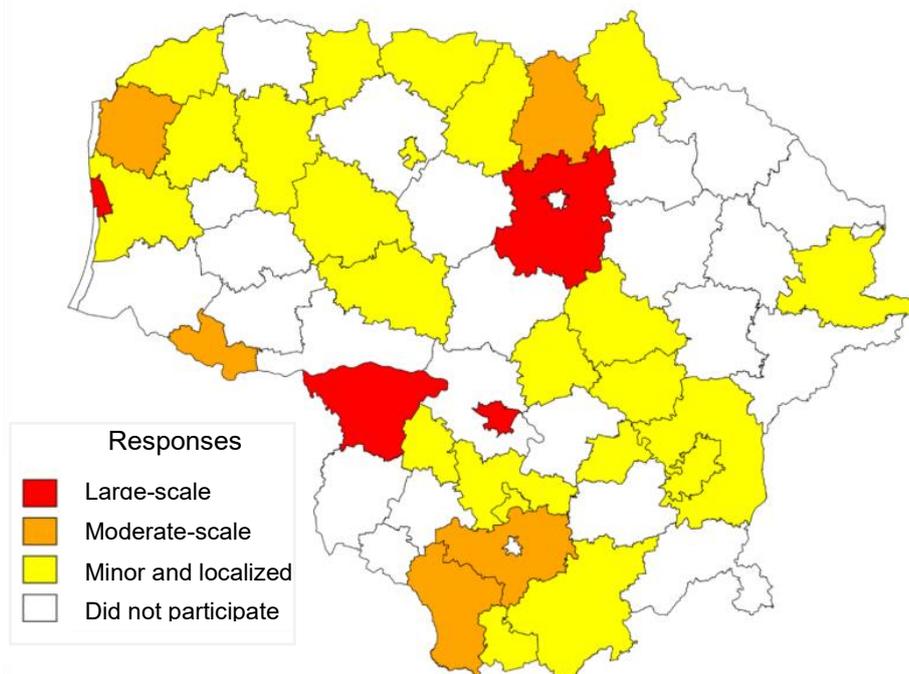


Figure 2. Municipalities responded to the question regarding the scale of ice-jam-induced floods over the past 20 years

The most common damage caused by ice-jam floods is the inundation of areas. Many responses emphasize that meadows, riverbanks, roads, and agricultural land are the first to be flooded. Less frequent but still significant cases include damage to infrastructure, and even more rarely, damage to bridges, riverbanks, recreational areas, community gardens, or beaches. Evacuations have occurred only a few times over the past several decades, with the ice-jam floods of 2010 being particularly notable.

Damage caused by ice jams is usually minor to moderate, resulting more often in social inconvenience or temporary inaccessibility of areas rather than substantial economic losses. In large cities, even small-scale floods carry greater social impact due to higher population density and infrastructure concentration.

However, it should be noted that not all municipalities participated in the survey. A considerable number of non-responding municipalities are located in southwestern Lithuania, where the probability of floods and ice jams is higher. Their responses could significantly influence the overall results.

Measures Applied by Municipalities to Reduce Ice-Jam and Flood Risk

In municipalities, including Panevėžys, Pakruojis, and Pasvalys, informational and monitoring measures dominate:

- continuous monitoring of water levels,
- informing residents about safe behavior,
- discussion of preventive issues at the ESOC level (Figure 3).

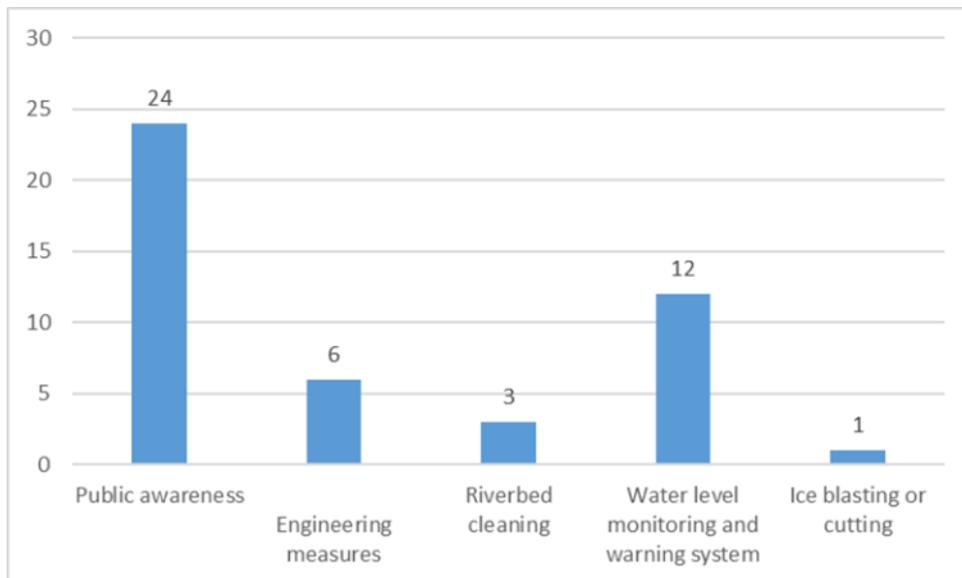


Figure 3. Measures currently applied by municipalities to reduce ice-jams and flood risk

Within the Nevėžis–Lėvuo–Mūša river basin area, active engineering measures (ice cutting, blasting) are applied rarely and only when a real threat exists, most often in Panevėžys municipality, where potential consequences would be more severe. In

Pakruojis and Pasvalys municipalities, the use of such measures is limited due to financial, technical, and cost–benefit considerations.

Main Barriers to More Effective Ice-Jam and Flood Risk Management

The survey revealed that the primary obstacle to effective ice-jam and flood risk management is a lack of financial resources, as indicated by most municipalities. This highlights that without adequate funding; it is difficult to ensure preventive measures and modern monitoring and response systems (Figure 4).

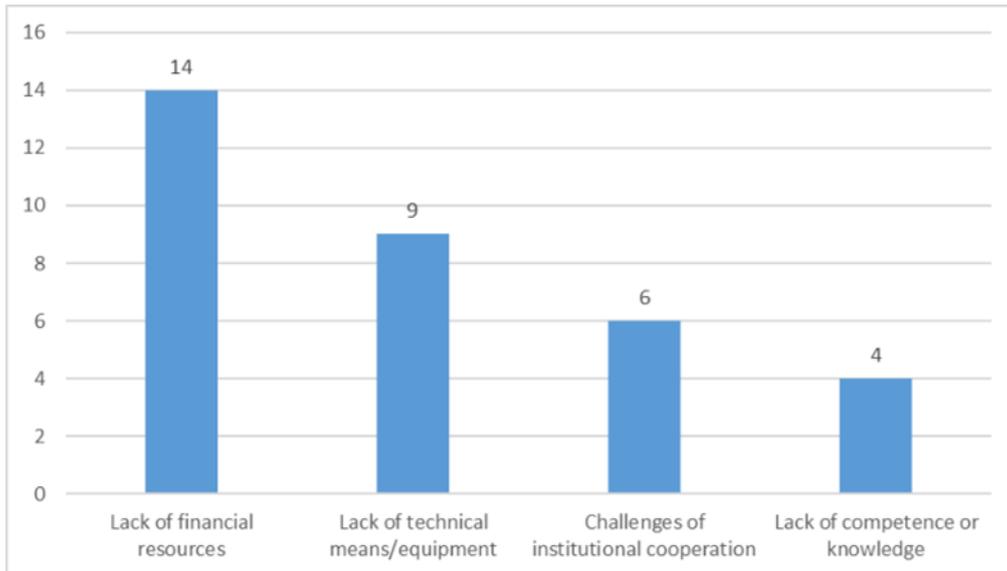


Figure 4. Main barriers to more effective management of ice-jams and flood risk

The lack of technical measures and/or equipment suggests that even when knowledge or institutional mechanisms exist, practical risk management is hindered by insufficient technological capacity. Challenges related to institutional cooperation indicate that risk management still suffers from fragmentation between institutions and insufficiently smooth information exchange processes (Figure 4).

Summary

1. Most municipalities implement ice-jam prevention through information dissemination and continuous monitoring rather than through active technical measures.
2. Key risk reduction measures would be implemented only if a clear need arises or sufficient funding becomes available.
3. Currently, supportive measures prevail, including maintenance activities, continuous monitoring, informing residents and institutions, and discussing preparedness issues at the institutional level.