

**Interreg**



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LATVIJAS VIDES, ĢEOLOĢIJAS  
UN METEOROLOĢIJAS CENTRS

Latvia – Lithuania

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**ICEREG**

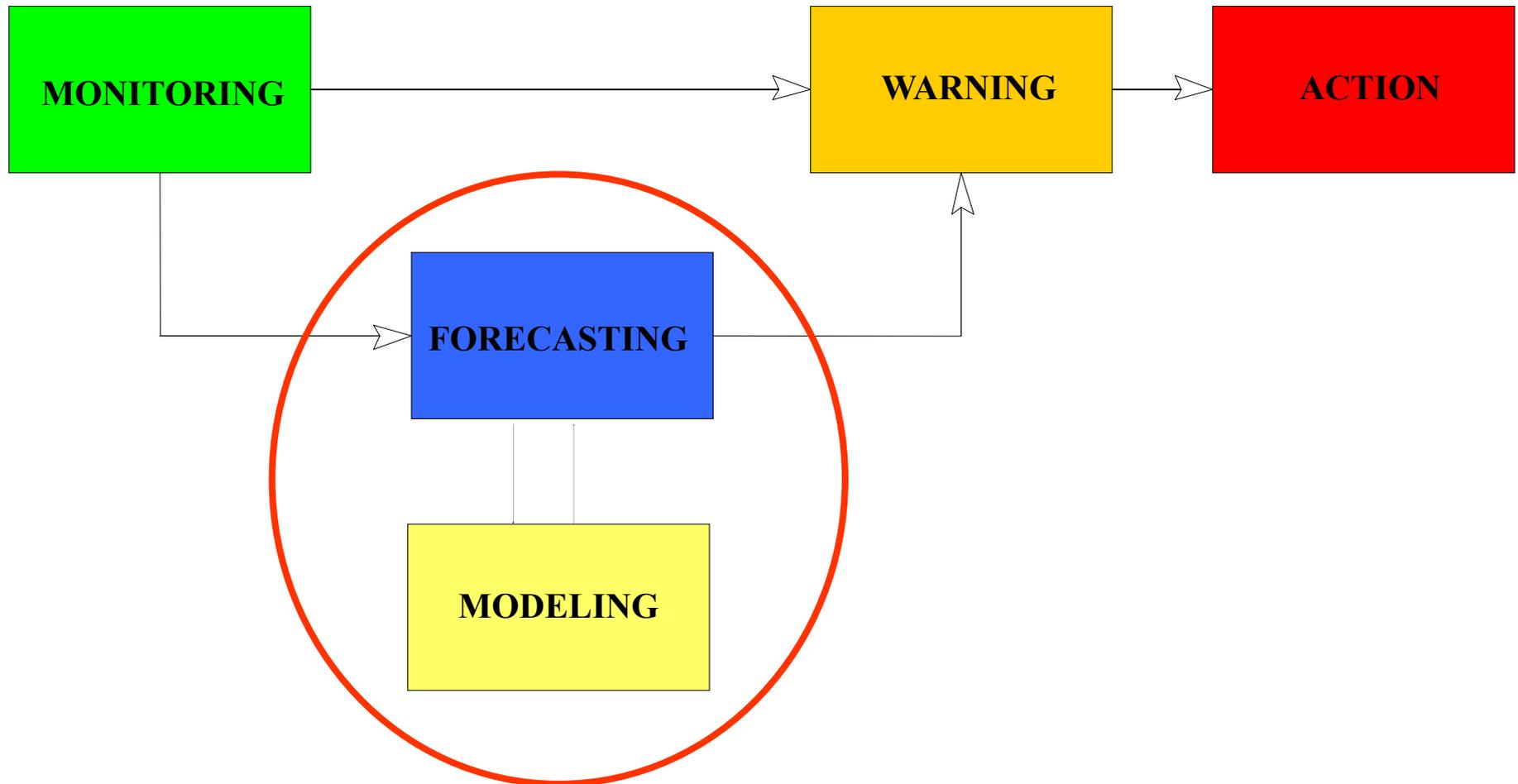
# GUIDELINES FOR THE ICE-JAM FLOOD EARLY WARNING

**LATVIA**

LĪGA KLINTS | HYDROLOGICAL FORECASTING EXPERT  
PROJECT “ICEREG” FINAL CONFERENCE

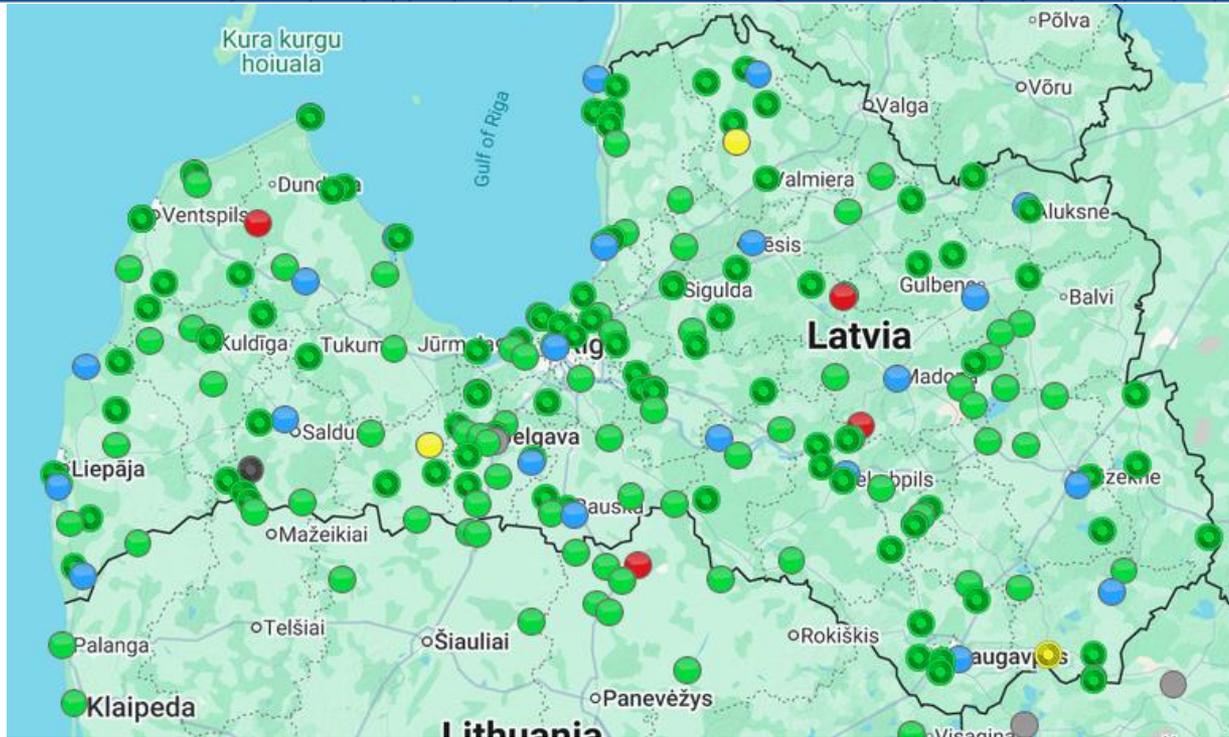
21.01.2026

# HYDROLOGICAL INFORMATION FROM OBSERVATION TO WARNING





# MONITORING NETWORK



- A monitoring network has been established for identifying flood risks, timely forecasting, and issuing warnings.
- Water level, water temperature, discharge, river condition observations, etc.
- Hydrological models, flood risk maps.
- The period from autumn to spring is when ice jams may form during freeze-up or break-up, often several times within a single season.

# MONITORING NETWORK

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AHS Zelki-Daugava

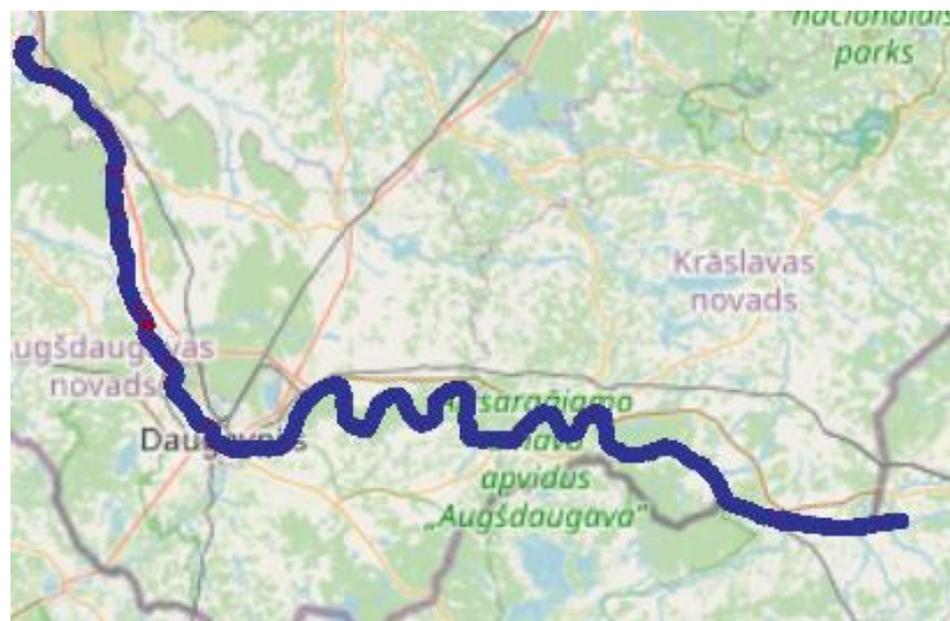


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AHS Zelki-Daugava



# MONITORING. SATELLITE PRODUCTS



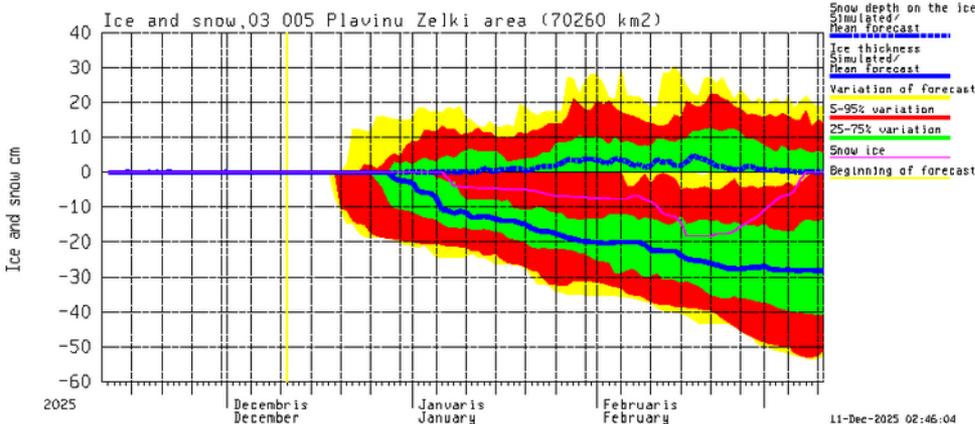
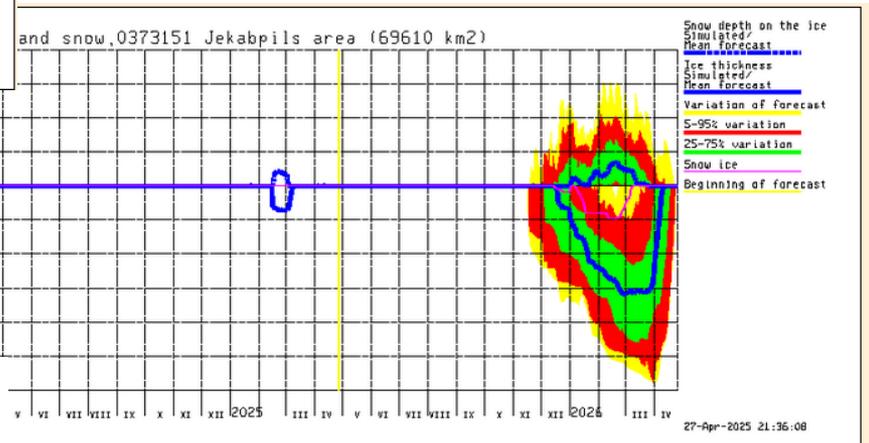
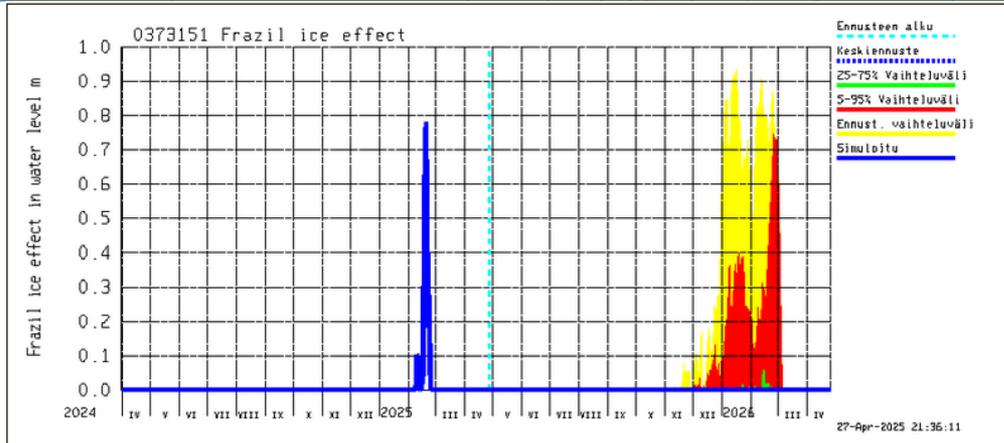
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# ICE THICKNESS AND ICE JAM MODELLING



- **WSFS MODEL**
- **CONCEPTUAL MODEL**

# ICE FORECASTS WSFS MODEL

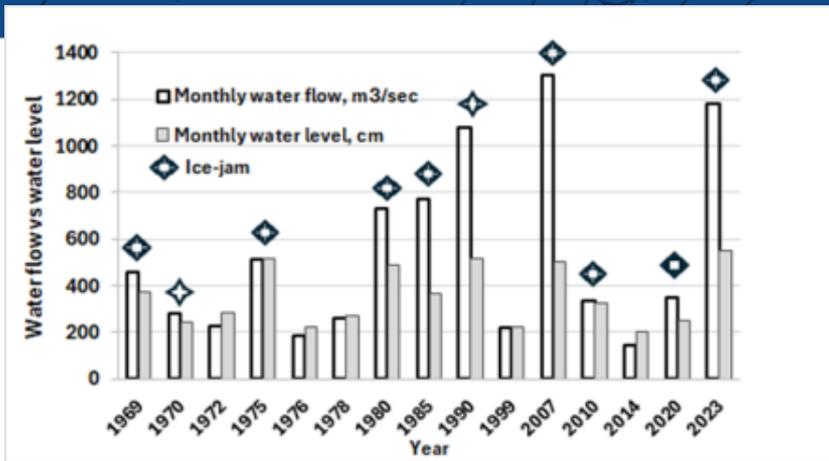


# CONCEPTUAL MODEL

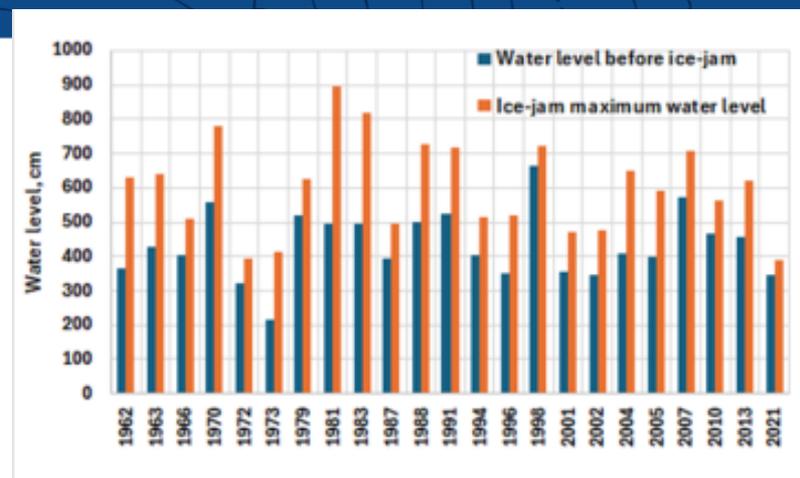


- Historical observations and the existing monitoring network – the basis for developing the conceptual model
- Correlation matrix method for analysing ice-jam events in the Lielupe and Daugava rivers. The maximum water level observed during an ice jam was used as the dependent variable.
- For forecasts, it is important to use parameters that are operationally available in real time:
  - Water level prior to the ice jam
  - Water level rise
  - Sum of Negative Degree Days (NDD) prior to the ice jam
  - Sum of Positive Degree Days (PDD) prior to the ice jam
  - Precipitation amount prior to the ice jam

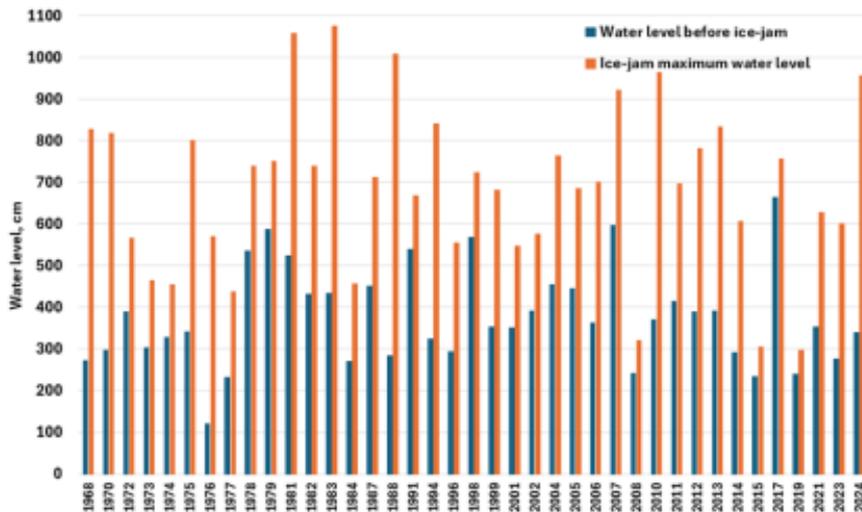
# CONCEPTUAL MODEL. Daugava



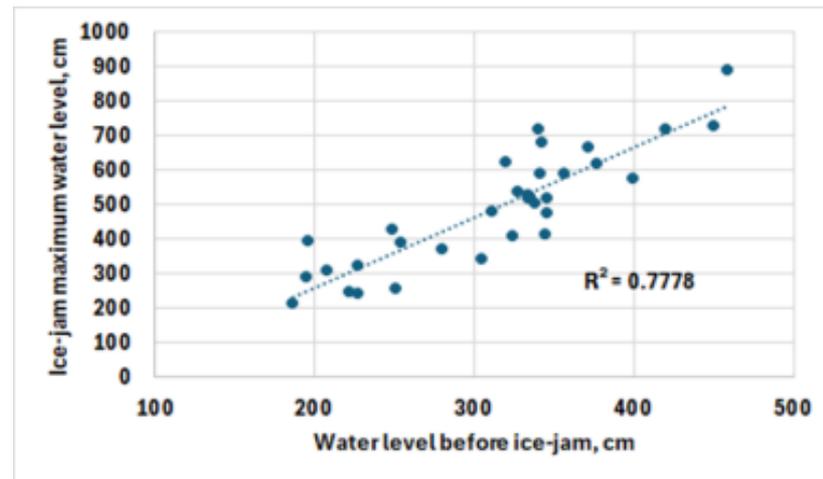
Jēkabpils



Jēkabpils

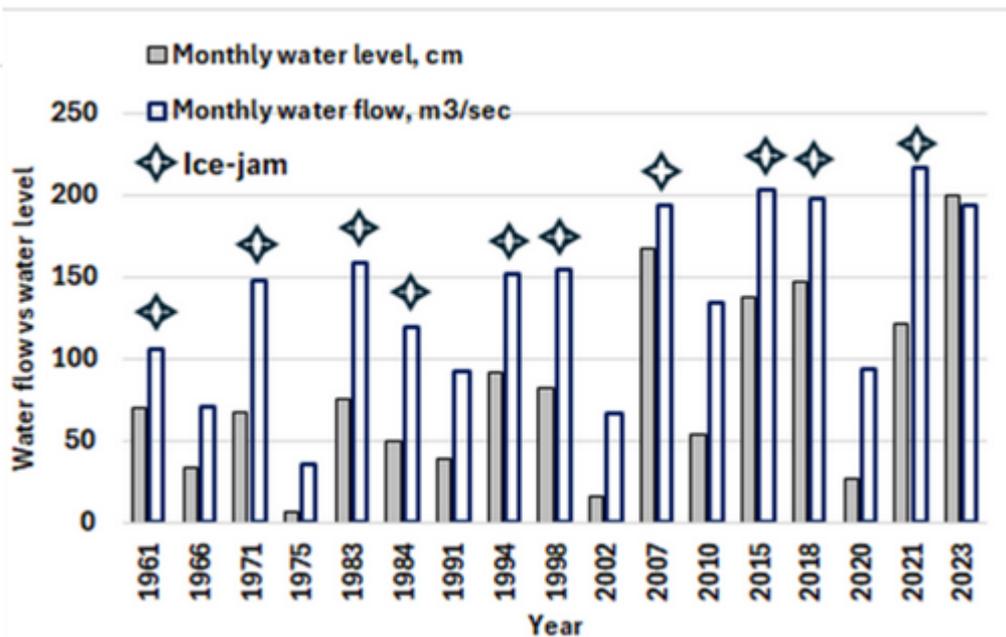
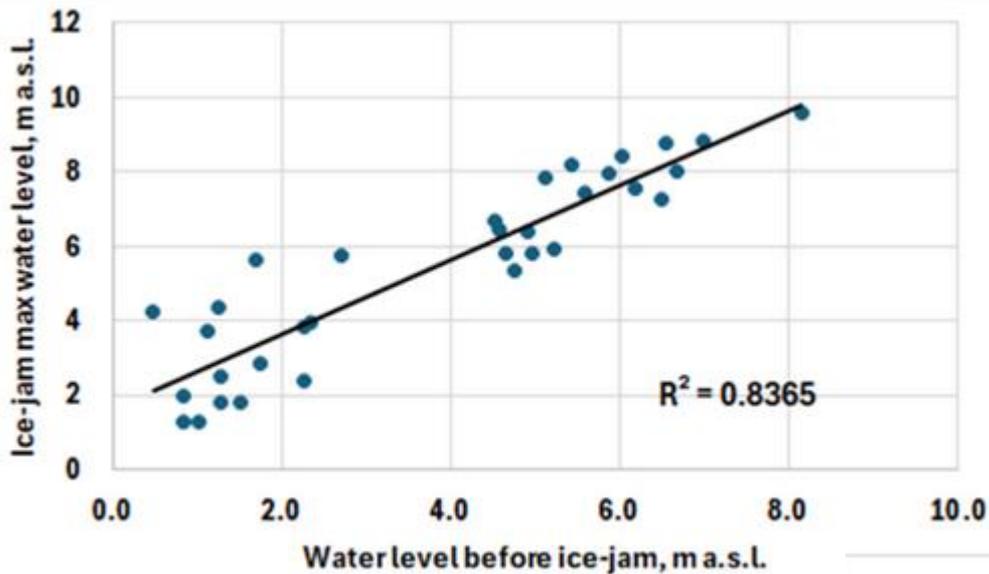


Zeļķi



Jēkabpils

# CONCEPTUAL MODEL. Lielupe



# ICE-JAM FLOOD FORECASTING TOOLS



## Excel-based tools

relationship between the water level before an ice jam and the maximum water level during the ice jam.

	A	B	C
1	Ievadiet sākuma ūdens līmeni (cm):	508	
2	Prognozētais sastrēguma max līmenis (cm):	736.32	
3	Brīdinājuma līmenis:	0	
4			
5			
-			

Navigation: < > Data ForecastTool +



# ICE-JAM FLOOD FORECASTING TOOLS



## Excel-based tools

Tool for river stretch, combined

	A	B	C
1	Zeļķi & Jēkabpils Prediction Tool		
2	Start level Zeļķi (cm):	500	
3	Start level Jēkabpils (cm):	450	
4	Predicted Max level Zeļķi (cm):	800.6092	
5	Predicted Max level Jēkabpils (cm):	643.5001	
6			
7			
8			
9			
10			



# GUIDELINES FOR ICE-JAM FORECASTING



**II. Conditions for different situations have been compiled as decision-support tools for forecasting.**

## Example

Daugava River at Jēkabpils – conditions linked with thresholds

< 300 cm: No cases recorded where the water level exceeds .

300–400 cm: In approximately 31% of cases, water level exceeds.

≥ 400 cm: The probability of exceeding the flood threshold is ≥ 70%.

≥ 500 cm: In all cases, water level exceeds → very high-risk zone.

Practical Interpretation:

If the water level is ≥ 400 cm, then the ice jam level is highly likely to exceed

At ≥ 500 cm, it is safe to forecast that the flood threshold will be exceeded.



# HYDROLOGICAL WARNINGS

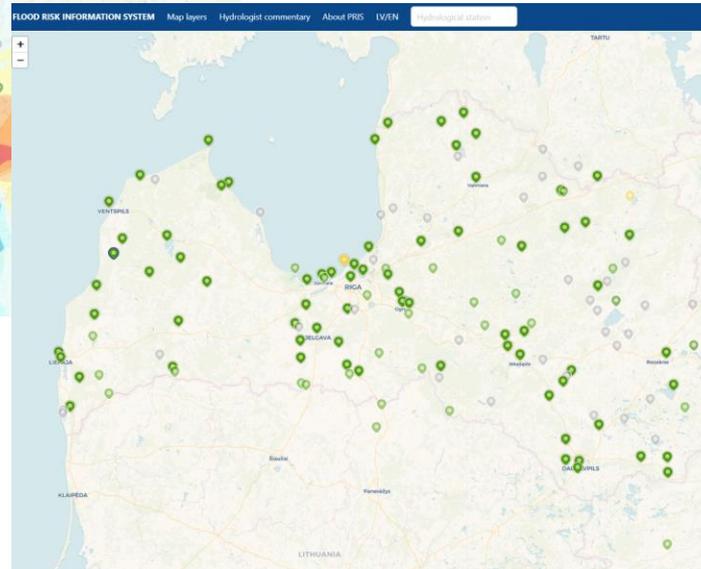
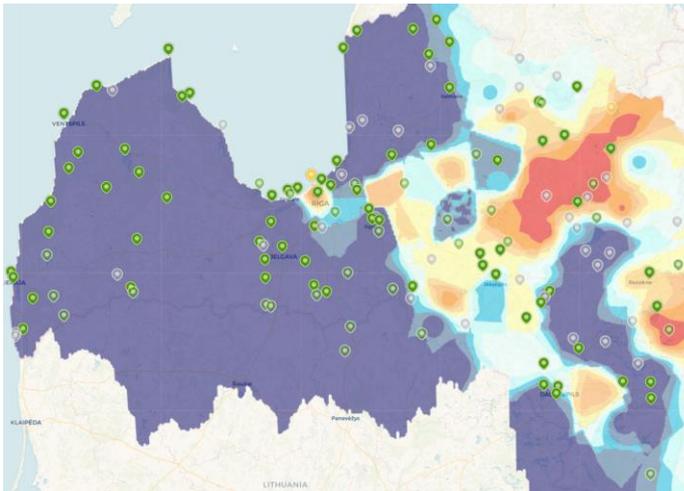
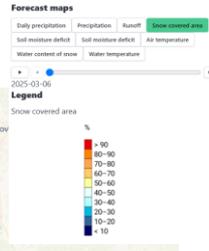


# FLOOD RISK INFORMATION SYSTEM

<https://hidro.meteo.lv/>



- Automatic warnings
- Additional information 
- Extended information for authorized users
- Flood risk maps



# WARNING SYSTEM

<https://bridinajumi.meteo.lv/>



- Water level rise during floods, ice jams and rain, as well as during storm surge

**SIGNIFICANT  
INCREASE IN THE  
WATER LEVEL**

**FLOODING OF  
TERRITORIES**

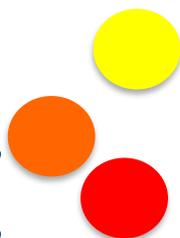
**FLOOD**

- Warning levels are based on reaching a specified water level or on the return period

– Yellow - 2-5 years

– Orange – 10 years

– Red – 50 years





# HYDROMETEOROLOGICAL WARNINGS



## SAGAIĀMĀ IETEKME



APPLŪŠANAS RISKS



KOMUNIKĀCIJU TRAUČĒJUMI



LEDUS SASTRĒGUMI

## TERITORIJU APPLŪŠANA



NO 7. JANVĀRA PLKST. 18:30

BRĪDINĀJUMS SPĒKĀ

LĪDZ 8. JANVĀRIM PLKST. 12:00

Iespējama īpašumu un transporta infrastruktūras applūšana. Iespējama nepieciešama evakuācija.

Var tikt traucēta elektroenerģijas piegāde, telekomunikāciju sakari.

Var veidoties ledus sastrēgumi, paaugstināties ūdens līmenis.



## SAGAIĀMĀ IETEKME



APPLŪŠANAS RISKS



KOMUNIKĀCIJU TRAUČĒJUMI



LEDUS SASTRĒGUMI

## PLŪDI



NO 7. JŪLIJA PLKST. 12:00

BRĪDINĀJUMS SPĒKĀ

LĪDZ 10. JŪLIJA PLKST. 21:00

Gaidāma plaša īpašumu applūšana, kas apdraud dzīvību. Iedzīvotāji tiek aicināti pamest apdraudētās piekrastes teritorijas un sekot visiem atbildīgo institūciju norādījumiem.

Ļoti apgrūtināta pārvietošanās un traucēta elektroenerģijas un ūdens apgāde, telekomunikāciju sakari.

Var veidoties ledus sastrēgumi, un ļoti strauji paaugstināties ūdens līmenis.



## SAGAIĀMĀ IETEKME



APPLŪŠANAS RISKS



LEDUS SASTRĒGUMI

## ŪDENS LĪMENIS



NO 21.

BRĪDINĀJUMS SPĒKĀ

LĪDZ 21.

Pastāv risks, ka atsevišķās vietās applūdis palienes un zemākās vietas. Pārvietojoties plūdu apdraudētajās teritorijās, ir jābūt piesardzīgam.

Ledus un vižņu iešanas laikā izveidojies sastrēgums.



High-quality historical data is essential

Simple tools allow rapid early-warning decisions

Monitoring + modelling + real-time communication reduce risk



**THANKS FOR YOUR ATTENTION!**



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