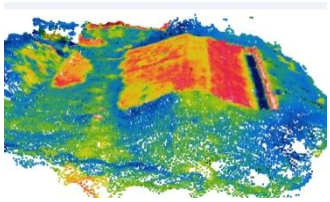
EurCOLD - Working Group
"Levees & Flood Defences"

EurCOLD
EUROPEAN
CLUB of ICOLD

Webinar

"Monitoring of Levees & Flood Defences"



Infrared measurements on a levee
(Didro Project / Cerema)

Introduction

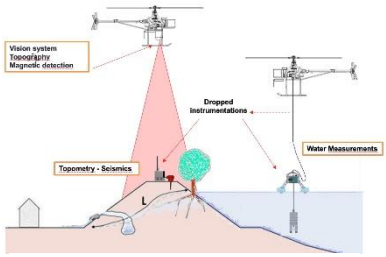
The EurCOLD Working Group on Levees and Flood Defences organizes a webinar on monitoring of these structures. Monitoring of dams is a regular activity and is considered as a classical and necessary activity in relation to dam safety. On the other hand, for different reasons, monitoring of levees is not systematically organized. It also requires new developments and guidance, either by adapting dam approaches or by developing new ones, given their specificities: long length, occasional loading, heterogeneity and lack of information on the structures. During the webinar different approaches, experiences and techniques will be presented, in terms of both instrumentation, analysis of the measurements and decision making.

When ?

- Tuesday, December 8th, 2026
- 03:00 to 05:00 PM (CET- Paris time)

Mandatory registration before December 6th: Link for registration

The link to join the webinar with MS Teams will be sent on Monday, December 7th to registered persons.



Didro project concept

Agenda

3:00	Opening session by Maxime Vesin (ICOLD Young Professional Forum) : instructions about recording, muted microphones, questions in the chat, presentation of speakers, etc.
3:01	introduction and welcome (Arjan Jovani, president of EurCOLD)
3:06	General overview and purpose of Levee Monitoring (Rémy Tourment, Chair of EurCOLD LFD WG)
3:11	Use of the observational method for levee construction (Anne Bäcker & Werner Halter; Fugro)
3:21	Lessons learned from asset management of levees (Emilio Tena, ISL)
3:31	Levee desiccation: In Situ Water Retention Monitoring and Crack Detections (Zsombor Illés; OVF/BME)
3:41	Optimising Levee Design Through Monitoring Data and Enhanced Groundwater Modelling (Albert Wiggers, Ron Stroet, Tom de Wit; Haskoning)
3:51	A future handbook for levees' monitoring (proposed by the French TC Levee) (Yasmina Boussafir, Univ.Eiffel)
4:01	Wawrzeńczyce Levee as a Field Laboratory – Investigations and Thermal Monitoring System (Krzysztof Radzicki, Cracow Univ.)
4:11	Various experiences in monitoring of river banks (Simonetta Cola, Univ. of Padova)
4:21	Predicting and Monitoring Climate Impacts on Levees in the UK (Matt Brooks, Environment Agency)
4:31	20 minutes Q&A (Rémy Tourment)
4:51	Short Conclusion (Rémy Tourment)
4:56	End of the webinar (Maxime Vesin)

Country		Time	Title	Speaker
Opening	1 min	02:58 pm (Paris Time)	Welcome & Instructions	Maxime Vesin (YPF)
Welcome	5 min	03:01	Opening session	Arjan Jovani, (EurCOLD)
Keynote	5 min	03:06	General purpose - overview of Levee Monitoring	Rémy Tourment, (EurCOLD)
Netherlands	10 min	03:11	Use of the observational method for levee construction	Anne Bäcker and/or Werner Halter (Fugro)
France	10 min	03:21	Lessons learned from asset management of levees	Emilio Tena (ISL)
Hungary	10 min	03:31	Dyke/Levee desiccation: In Situ Water Retention Monitoring and Crack Detections	Zsombor Illés (OVF/BME)
Netherlands	10 min	03:41	Optimising Levee Design Through Monitoring Data and Enhanced Groundwater Modelling	Albert Wiggers, Ron Stroet, Tom de Wit (Haskoning)
France	10 min	03:51	A future handbook for levees' monitoring (proposed by the French mirror group of the ICOLD TC on Levees)	Yasmina Boussafir (Univ.Eiffel)
Poland	10 min	04:01	Wawrzeńczyce Levee as a Field Laboratory – Investigations and Thermal Monitoring System	Krzysztof Radzicki (Cracow Univ.)
Italy	10 min	04:11	Various experiences in monitoring of river banks	Simonetta Cola (Univ. of Padova)
UK	10 min	04:21	Predicting and Monitoring Climate Impacts on Levees in the UK	Matt Brooks (Environment Agency)
Q&A	20 min	04:31	20 minutes Q&A	Yasmina Boussafir and Rémy Tourment
Short Conclusion	5 minutes	04:51	needs and perspectives	Rémy Tourment
Closure	1 min	04:56	Details about the recording, availability, website, etc.	Maxime Vesin (YPF)

Volumetric water content and succion probes in La Riche's levee (France)
(Source : Yasmina Boussafir, UGE)

Optical fiber installation in a levee toe
(Source : Thibaut Mallet, SYMADREM)

Short summary of the presentations

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Anne Bäcker, Werner Halter, Fugro, Nederland

Title : Use of the observational method for levee construction

Old levees along rivers are frequently lined with historic buildings on soft soils, making the preservation of these buildings during levee reinforcement both a priority and a challenge. The Dutch Hoogwaterbeschermingsprogramma is preparing a study that, based on practical experience and the latest academic insights, will offer guidance on predicting and managing damage risks to buildings in projects to come. The central thesis of this presentation is that damage risks to these structures can be effectively managed and minimized by applying the observational method. This approach involves risk-based monitoring before, and during the levee construction works, allowing both the design and execution to be adapted in response to real-time data. The benefit is twofold: it not only prevents damage but also avoids unnecessary conservatism in engineering decisions. Drawing from two recent projects, we will illustrate how monitoring, design, and execution can be aligned using the observational method

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Emilio Tena (ISL, France)
Title : Lessons learned from asset management of levees

For several years now, ISL has been working with the CAPB (Basque Country Urban Community) to manage its assets of levees. The presentation will provide an update on their experience and will be structured around three points:
• Overview of the assets and management resources
• Lessons learnt: management of log jams at Lurberria, vortex issues at Larraldia that may skew measurements, monitoring of structures showing signs of deterioration, etc.
• Case study: Operational management of Lurberria / Focus on the energy dissipation basin: Energy dissipation structure + Sediment continuity + Ecological continuity

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Zsombor Illés (from the General Directorate of Water Management –*OVF *& the Budapest University of Technology and Economics –*BME*, Hungary)
Title: D**yke desiccation: In Situ Water Retention Monitoring and Crack Detections**

The presentation will summarise the investigations carried out on a flood protection embankment along the River Tisza. A representative dyke cross-section was instrumented with a unique water retention monitoring system comprising 17 sensors, including 14 soil moisture sensors and three water potential sensors. Since the installation of the monitoring system, geophysical investigations, specifically electric resistivity tomography (ERT), have also been conducted to assess moisture distribution and detect desiccation-induced cracking within the embankment body.
The following articles form the basis of the planned presentation:
https://www.emerald.com/jgeot/article-abstract/75/7/927/1266677/In-situ-water-retention-monitoring-system-of-an?redirectedFrom=fulltext
https://www.taylorfrancis.com/chapters/oa-edit/10.1201/9781003431749-583/moisture-content-distribution-dike-cross-section-case-study-geophysical-investigation-ill%C3%A9s-nagy-nagy-kov%C3%A1cs

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Albert Wiggers, Ron Stroet & Tom de Wit (Hastoning, Nederland)
Title: **Optimising Levee Design Through Monitoring Data and Enhanced Groundwater Modelling**

In the Rhine delta, the geotechnical stability of a 20 km section of dike must be improved to comply with the required safety standards. An extensive network of standpipe piezometers was installed to monitor hydraulic heads during high water periods. At the start of the project, measurements were obtained under conditions where the floodplain was not inundated. Extrapolation of these measured hydraulic heads to design water levels initially indicated a strong response of the groundwater head on the landward side of the dike. This elevated groundwater response had a significant impact on landside stability, primarily due to the increased risk of uplift of the cover layer and the reduction of effective stresses in the underlying soil. As a result, the preliminary designs required substantial stability berms to satisfy stability requirements.
During the winter of 2018, the river experienced a prolonged period of relatively high water levels, causing the floodplain to remain fully inundated for an extended time. The monitoring data collected during this period clearly reflected the hydraulic resistance of both the foreland and hinterland, resulting in a markedly reduced groundwater head response compared with earlier assumptions. These observations enabled a more reliable assessment of hydraulic head behaviour under high-water conditions. Following the identification of this optimisation potential, a regional groundwater model was developed and calibrated against the measured hydraulic head data. Application of the calibrated model across the entire project led to a substantial reduction in the predicted groundwater response, which in turn allowed a significant decrease in the required dimensions of the stability berms.
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Rémy Tourment (Chair of EurCOLD Levee & Flood Defences Working Group) & Yasmina Boussafir (Gustave Eiffel University, France)
Title: A Future handbook about levees' monitoring (proposed by the French TC Levee)?

T*he French committee on levees decided to write a handbook about monitoring of Levees. This document should draft best practices on monitoring, either in case of flooding and in the frame of regular surveillance. The purpose of the work will be presented, detailing the chapters and the expected content, expecting feedbacks from the participant.*

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Krzysztof Radzicki (Cracow University of Technology, Poland)

Title: Wawrzeńczyce Levee as a Field Laboratory – Investigations and Thermal Monitoring System

The presentation will summarize a broad range of investigations carried out on the existing Wawrzeńczyce levee near Kraków, Poland included particularly a thermal seepage monitoring system based on a network of driven MPoint

sensors. Conclusions concerning a proposed methodology for the investigation/monitoring and assessment of levees will also be presented.
Paper about it : "A new levee control system based on geotechnical and geophysical surveys including active thermal sensing: A case study from Poland" (https://www.sciencedirect.com/science/article/abs/pii/S0013795221003276)

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Simonetta Cola (University of Padova, Italy)
Title (to be confirmed): Various experience in monitoring of river banks

In recent years our research group has gained experience in monitoring river banks with distributed fiber optic sensors specialized for temperature measurement (DTS). Furthermore, more recently, we have obtained some interesting results thanks to the monitoring of the water pressure regime in the embankments in the presence of new and relatively old diaphragms, the laters also characterized through the ERT survey.

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Matt Brooks (Environment Agency, UK)
Title: Predicting and Monitoring Climate Impacts on Levees in the UK

Over recent years, prolonged dry weather and drought has created new challenges for levee managers in the UK. Long, dry summers have become more commonplace as a result of climate change, and the Environment Agency in England is trying to adapt to these new threats and new failure modes. Levees present different challenges to dams in that they don't generally retain water for most of the year, and so are susceptible to drying out in warm dry weather, and they are also formed in long linear lengths that take more effort and resource to inspect and monitor for the impacts from dry weather. The Environment Agency are developing a Dry Weather Risk Tool, to give a weekly forecast of risks to levees from prolonged dry weather. This will allow inspections and monitoring to be targeted and adapted to ensure those areas at higher risk are subject to greater surveillance. There is also work underway to find new remote monitoring technologies that can support the identification of dry weather issues on long linear, and often remote, levees. At the same time, the Environment Agency is developing it's monitoring and defect recording processes to ensure that dry weather impacts are identified, properly reported and collated at a National level, so that the impacts and actions can be monitored and assessed to ensure that the Agency can react and adapt the management of it's levees to the changing climate.