

18TH

INTERNATIONAL SYMPOSIUM

Water Management & Hydraulic Engineering



SYMPOSIUM PROGRAMME



FACULTY OF CIVIL ENGINEERING
"Ss. Cyril and Methodius University"



**SLOVAK UNIVERSITY OF
TECHNOLOGY IN BRATISLAVA**
FACULTY OF CIVIL ENGINEERING



**BRNO
UNIVERSITY
OF TECHNOLOGY**

10TH – 14TH SEPTEMBER 2024, ŠTRBSKÉ PLESO, SLOVAKIA

18TH

INTERNATIONAL SYMPOSIUM

Water Management & Hydraulic Engineering



Symposium Programme

**10th – 14th September 2024, Štrbské Pleso,
Slovakia**

18th International Symposium

WATER MANAGEMENT & HYDRAULIC ENGINEERING WMHE 2024

10th – 14th September 2024, Štrbské Pleso, Slovakia

SYMPOSIUM PROGRAMME

Editors	Michaela Červeňanská, Andrej Šoltész
Published by	Slovak University of Technology in Bratislava
Cover Design	Michaela Červeňanská
Web site	https://wmhe2024.hydrotechnika.sk/

ORGANIZED BY

Slovak University of Technology in Bratislava

Faculty of Civil Engineering, Bratislava, Slovak Republic

IN COLLABORATION WITH

University of Zagreb

Faculty of Civil Engineering, Zagreb, Croatia

Gdańsk University of Technology

Faculty of Civil and Environmental Engineering, Gdańsk, Poland

Ss. Cyril and Methodius University in Skopje

Faculty of Civil Engineering, Skopje, Republic of North Macedonia

Brno University of Technology

Faculty of Civil Engineering, Brno, Czech Republic

SYMPOSIUM CHAIRMEN**Eva Ocvirk**

University of Zagreb, Faculty of Civil Engineering, Zagreb, Croatia

Michał Szydłowski

Gdańsk University of Technology, Faculty of Civil and Environmental Engineering,
Gdańsk, Poland

Andrej Šoltész

Slovak University of Technology in Bratislava, Faculty of Civil Engineering,
Bratislava, Slovak Republic

Josif Josifovski

Ss. Cyril and Methodius University in Skopje, Faculty of Civil Engineering, Skopje,
Republic of North Macedonia

Jaromír Říha

Brno University of Technology, Faculty of Civil Engineering, Brno, Czech Republic

SCIENTIFIC ADVISORY COMMITTEE**Eva Ocvirk, Dalibor Carević, Ivan Halkijević, Kristina Potočki**

University of Zagreb, Faculty of Civil Engineering, Zagreb, Croatia

Michał Szydłowski

Gdańsk University of Technology, Faculty of Civil and Environmental
Engineering, Gdańsk, Poland

Andrej Šoltész, Silvia Kohnová, Štefan Stanko, Jana Frankovská

Slovak University of Technology in Bratislava, Faculty of Civil Engineering,
Bratislava, Slovak Republic

Josif Josifovski

Ss. Cyril and Methodius University in Skopje, Faculty of Civil Engineering, Skopje,
Republic of North Macedonia

Jaromír Říha

Brno University of Technology, Faculty of Civil Engineering, Brno, Czech Republic

ORGANIZING COMMITTEE**Gordon Gilja, Domagoj Nakić, Damjan Bujak**

University of Zagreb, Faculty of Civil Engineering, Zagreb, Croatia

Piotr Zima

Gdańsk University of Technology, Faculty of Civil and Environmental
Engineering, Gdańsk, Poland

**Michaela Červeňanská, Alexandra Vidová, Adela Rutzká, Natália Bilčíková,
Réka Wittmanová, Jana Lehotová Nôtová**

Slovak University of Technology in Bratislava, Faculty of Civil Engineering,
Bratislava, Slovak Republic

Violeta Gjesovska

Ss. Cyril and Methodius University in Skopje, Faculty of Civil Engineering, Skopje,
Republic of North Macedonia

Tomáš Julínek

Brno University of Technology, Faculty of Civil Engineering, Brno, Czech Republic

PREFACE

The 18th International Symposium on Water Management and Hydraulic Engineering (WMHE 2024) is organized by the Faculty of Civil Engineering at the Slovak University of Technology in Bratislava from 10–14 September 2024 in Štrbské Pleso – the heart of the beautiful nature of the High Tatras in Slovakia. The WMHE 2024 Symposium is the next in the series of International Symposiums in the field of Water Management and Hydraulic Engineering, organized with the participation of the University of Zagreb (Croatia), Gdańsk University of Technology (Poland), Slovak University of Technology in Bratislava (Slovak Republic), Ss. Cyril and Methodius University in Skopje (North Macedonia), University of Natural Resources and Applied Life Sciences in Vienna (Austria) as well as Brno University of Technology (Czech Republic).

The main goal of the conference is to share transboundary and interdisciplinary knowledge and experience between scientists and experts from Central Europe, from older and new EU member states as well as from South-East European candidate countries.

The first Symposium of this type was organized as a bilateral activity between the faculties of Gdańsk University of Technology and Zagreb University. Since 1998 (in Dubrovnik), the Slovak University of Technology, the Ss. Cyril and Methodius University in Skopje and BOKU University of Natural Resources and Applied Life Sciences in Vienna have joined this biannual symposium series. In 2013 Brno University of Technology, Czech Republic, joined the steering group of WMHE too. The aim of the Symposium is to encourage and facilitate communication and exchange of experience from recent research work between scientists, engineers and professionals on different aspects of water and environmental management and hydraulic engineering, including physical and mathematical modelling. Topics of the symposium have been chosen to cover the main elements of integrated water resources management, hydraulic engineering, sanitary engineering and sustainable water use, hydrology, hydraulics, geotechnical engineering as well as environmental engineering, climate change and flood risk management. This successful series started in 1984 and is now regularly organized as a two-annual symposium meeting. During the symposium, two lectures will be given by invited internationally renowned scientists Prof. Hans – Peter Nachtnebel from BOKU University in Vienna and Prof. Jan Szolgay from STU in Bratislava.

The Symposium is co-organized by the Slovak Society of Environmental Technology under the auspices of Prof. Dušan Petráš.

We are honoured and delighted to invite you to enjoy the symposium in the beautiful nature of the High Tatras in Slovakia.

Andrej Šoltész

SYMPOSIUM AGENDA*Tuesday, September 10th, 2024*

	from	14:00	Arrival	
	17:00	- 19:00	Registration of Participants	
	18:00	- 22:00	Icebreaker	* The hotel bar closes at 22:00.

Wednesday, September 11th, 2024

	8:00	- 9:00	Registration of participants	
	9:00	- 9:30	Opening Ceremony	
Bystrá Congress Hall	9:30	- 10:30	Keynote Lectures (prof. Nachtnebel, prof. Szolgay)	
	10:30	- 11:00	Coffee Break	
Solisko Congress Hall	11:00	- 12:30	Session 02 Water Resources Management and Hydrology	
	11:00	- 12:30	Session 03 Sanitary and Environmental Engineering, Sustainable Water Use	
	12:30	- 13:30	Lunch	
Bystrá Congress Hall	13:30	- 15:30	Session 02 Water Resources Management and Hydrology	
Solisko Congress Hall	13:30	- 15:30	Session 03 Sanitary and Environmental Engineering, Sustainable Water Use	
	15:30	- 16:00	Coffee Break	
Bystrá Congress Hall	16:00	- 18:00	Session 05 Climate Change and Flood Risk Management	
	18:30	- 22:00*	Dinner	* The hotel bar closes at 22:00.

Thursday, September 12th, 2024

Bystrá Congress Hall	8:30	-	10:00	Sessions 01 Hydraulics and Hydraulic Structures
	10:00	-	10:30	Coffee Break
	10:30	-	12:00	Sessions 01, 04 Hydraulics and Hydraulic Structures, Geotechnical Engineering
	12:00	-	13:00	Lunch
Solisko Congress Hall	13:00	-	15:00	Poster Session
	15:00	-	15:30	Coffee Break
	16:00	-	18:00	Excursion of the Water Reservoir and Water Treatment Plant Štrbské Pleso
	19:00	-	01:00	Gala Dinner

Friday, September 13th, 2024

	08:00	-	08:15	Departure for Excursions
Group 1	9:00	-	10:30	Tour of the historical centre of Kežmarok
	11:00	-	12:00	Excursion of the Turbína Small Hydro Power Plant
Group 2	9:00	-	10:00	Excursion of the Turbína Small Hydro Power Plant
	10:30	-	12:00	Tour of the historical centre of Kežmarok
	13:00	-		Dunajec Wood Rafting with Late Lunch

SYMPOSIUM PROGRAMME

Wednesday, September 11th, 2024**Keynote Lectures**

Bystrá Congress Hall

Chairmen: Ocvirk, Szydłowski, Šoltész, Julínek

Time	Title	Authors
9:30 - 10:00	<i>Anticipating Emerging Flood Risks</i>	Hans-Peter Nachtnebel
10:00 - 10:30	<i>A Look at the Potential of Regional Process-Oriented Look at Bivariate Flood Frequency Analysis from the Perspectives of Engineering and Comparative Hydrology</i>	Ján Szolgay

Session 02 Water Resources Management and Hydrology

Bystrá Congress Hall

Chairmen: Zeleňáková, Carević

Time	Title	Authors
11:00 - 11:15	<i>Possibilities of Water Regime Improvement in the Klátov Branch National Nature Reserve</i>	Šoltész, Orfánus, Baroková, Mydla
11:15 - 11:30	<i>Concept of the Water Management and Technical Solutions of Selected Reservoirs in the Morava River Basin the Dyje and Morava Basin</i>	Grmelová, Říha, Kotaška
11:30 - 11:45	<i>Balancing Water Flows in the Rye Island for the Purpose of Supplying Water to Irrigation Pumping Stations</i>	Šoltész, Červeňanská, Mydla, Baroková
11:45 - 12:00	<i>Water Crisis of the Ponds in Kopački Rit Wetland</i>	Maričić, Šreng
12:00 - 12:15	<i>Monte Carlo Approach to Local Scour: The Sava River Bridge, Zagreb Case Study</i>	Lacko, Potočki, Adžaga, Gilja

Session 02 Water Resources Management and Hydrology

Bystrá Congress Hall

Chairmen: Potočki, Šoltész

Time	Title	Authors
13:30 - 13:45	<i>Problems of Hydrometric Approach to Determine the Thermal Mineral Water Flow to the Bečva River in the Teplice Spa</i>	Julínek, Říha, Špano, Kotaška
13:45 - 14:00	<i>E-Flow Holistic Assessment in Data-Limited River Basin Under Climate Change Impact</i>	Čosić-Flajsig, Karleuša, Vučković, Glavan
14:00 - 14:15	<i>Analysis of Annual and Seasonal Precipitation of Three Representative Croatian Regions</i>	Tadić, Janjić, Brleković
14:15 - 14:30	<i>A Precipitation Trend Investigation Research of Humenne, Slovakia</i>	Kaya, Zeleňáková
14:30 - 14:45	<i>Investigation of Changes in the Rainfall-Runoff Modeling Caused by Climate Change</i>	Tanhapour, Sleziak, Hlavčová, Kohnová, Szolgay
14:45 - 15:00	<i>Estimation of Flash Drought Events Characteristics in the Southwestern Lowlands of Slovakia using remote sensing</i>	Leivadiotis, Kohnová

Session 03 Sanitary and Environmental Engineering, Sustainable Water Use

Solisko Congress Hall

Chairmen: Barloková, Halkijević

Time	Title	Authors
11:00 - 11:15	<i>Evaluating the Effectiveness of Rainwater Management Measures in Urban Networks: A Comprehensive Review</i>	Wittmanová, Hrudka , Stanko, Meliška
11:15 - 11:30	<i>Urban Surface Runoff as a Potential Source of Environmental Pollution</i>	Hrudka , Stanko, Škultétyová, Wittmanová, Kollár
11:30 - 11:45	<i>Prediction of E. coli Bacteria on Drinking Water Treatment Facility Butoniga</i>	Volf, Sušanj Čule , Žic, Zorko
11:45 - 12:00	<i>Anthropological Impact on Small Natural Water Resources on Pag Island</i>	Sušanj Čule , Kalafatovic, Volf, Janković, Atanasova, Karleuša, Ožanić

Session 03 Sanitary and Environmental Engineering, Sustainable Water Use

Solisko Congress Hall

Chairmen: Vouk, Sokáč

Time	Title	Authors
13:30 - 13:45	<i>Water Treatment Pathway from Slow Filtration to Membrane Processes</i>	Barloková, Ilavský
13:45 - 14:00	<i>Application of the AHP Method to the Selection of Sewage System Type</i>	Šperac, Mijušković Svetinović, Miličević
14:00 - 14:15	<i>The Potential of Using Residue from Sewage Sludge Gasification in an Experimental Plant</i>	Nakić, Posavčić, Licht, Vouk, Halkijević
14:15 - 14:30	<i>Electrochemical Removal of Pesticide Acetamiprid</i>	Licht, Matančević, Vouk, Halkijević
14:30 - 14:45	<i>Ammunition Factory Wastewater Treatment by Electrocoagulation</i>	Licht, Glavaš, Halkijević, Vouk, Bolanča, Crnogaj
14:45 - 15:00	<i>The Effects of Ultrasound on Oily Wastewater Treatment</i>	Posavčić, Halkijević, Vouk, Nakić

Session 05 Climate Change and Flood Risk Management

Bystrá Congress Hall

Chairmen: Tadić, Szydłowski

Time	Title	Authors
16:00 - 16:15	<i>Impact of Climate Change on Rainwater Management in the City of Gdańsk (Poland)</i>	Szydłowski, Gulshad, Szpakowski
16:15 - 16:30	<i>Uneven Shifts: How Climate Change Alters Seasonal Discharge Patterns in Slovak Rivers</i>	Almikaeel
16:30 - 16:45	<i>Effect Evaluation of Different Adaptation Measures Applied on Urban Catchment</i>	Sokáč, Velísková, Koczka Bara
16:45 - 17:00	<i>Process of Washout of the Geotechnical Embankment due to Overflow of Water Above the Crest Based on Physical Tests</i>	Urbaniak, Zamiar, Kostecki
17:00 - 17:15	<i>Research of the influence of flood flows on the area between the Antošov irrigation channel and the Lamačský stream</i>	Orfánus, Čubanová, Rumann
17:15 - 17:30	<i>Proposal of Water Retention Measures in Hodkovce Village</i>	Nagy, Dobranský, Zeleňáková
17:30 - 17:45	<i>Proposal of Water Retention Measures in Turany nad Ondavou Village</i>	Fijko, Dobranský, Zeleňáková
17:45 - 18:00	<i>Improving Coastal Flood Assessment through the Use of LiDAR Data - A Case Study of Rovinj City</i>	Krvavica, Bujak, Lončar, Bilić

*Thursday, September 12th, 2024***Session 01 Hydraulics and Hydraulic Structures**

Bystrá Congress Hall

Chairmen: Čubanová, Gilja

Time	Title	Authors
8:30 - 8:45	<i>Experimental and Numerical Model for Analysis of the Water Hammer in Pump Water Supply System</i>	Taseski, Krstovski
8:45 - 9:00	<i>Effective Methods for the Hydraulic Assessment of Combined Functional Structures Involving Small Water and Dry Reservoirs</i>	Skokan, Dráb
9:00 - 9:15	<i>Analysis of the 2D Hydraulic Equations for the Fish Pass Modeling</i>	Vidová, Čubanová
9:15 - 9:30	<i>Effect of Different Methods on the Manning's Roughness Coefficient Determination for the Close to Nature Fish Pass</i>	Čubanová, Rumann, Dušička
9:30 - 9:45	<i>Calibration of the Xbeach-Gravel Model</i>	Miličević, Carević, Bujak
9:45 - 10:00	<i>Numerical Study of the Sea Wave Loading on a Vertical Parapet Wall and Overtopping</i>	Carević, Lončar, Bujak, Vidojević

Session 01, 04 Hydraulics and Hydraulic Structures, Geotechnical Engineering

Bystrá Congress Hall

Chairmen: Ocvirk, Julínek

Time	Title	Authors
10:30 - 10:45	<i>The Use of Terrestrial and Airborne Laser Scanning in the Geometrization of a 3D Numerical Model of Geotechnical Objects</i>	Bodlak
10:45 - 11:00	<i>Measuring Filtration Velocities in the Observation Wells of Dam and Their Time Development</i>	Škvarka
11:00 - 11:15	<i>Comprehensive Analysis of River Velocity Data and Prediction Model Evaluation</i>	Durín , Svrta, Bahmanpouri, Barbeta, Moramarco
11:15 - 11:30	<i>Assessment of Velocity Distribution and Kinetic Turbine Power Output in Water Courses</i>	Durín , Svrta, Rossi, Šrajbek
11:30 - 11:45	<i>Estimation of the Transmission Coefficient for a π-Type Floating Breakwater in the Presence of Spectral Waves and Variable Depth</i>	Bujak , Topić, Carević, Miličević

Poster Session

Solisko Congress Hall

Chairmen: Červeňanská, Šoltész

Authors	Title
Akmalov, Kaletova	Water Management in Arid Regions under Climate Change
Bajkovičová, Kelčík	Water Scarcity Management in Slovakia – Current State
Berbić, Ocvirk	Prediction of Monthly Flow by Supervised Learning Ensemble Chain Models
Gilja, Opačak, Harasti, Valyrakis	Analysis of Experimental Flow Velocity Data under Mobile Bed Conditions next to Bridge Pier
Gomboš, Kandra, Pavelková, Tall	Hydrological Processes in the Water Unsaturated Soil Environment on the East Slovak Lowland in the Extremely Dry Growing Season of 2022
Halkijević, Licht, Posavčić, Nakić	Mathematical Modelling of the Batch Reactor for Water pH Control
Harasti, Gilja, Adžaga, Žic	Numerical Study of Scour Hole Development Downstream of Riprap-Protected Bridge Piers
Hulla, Brček, Kučová	Stability of Structures During Floods
Kandra, Tall, Gomboš, Pavelková	Analysis of Selected Soil Water Balance Members Obtained by Calculation and Lysimetric Measurement
Okhravi, Sočuvka, Schügerl, Sokáč, Dulovičová, Velísková	Vegetation effects on flow characteristics and sediment storage in a lowland stream channel over time
Pavelková, Kandra, Tall, Hlavatá, Gomboš	Analysis of Two Normal Periods in Terms of Basic Hydrometeorological Elements
Šrajbek, Kovač, Đurin, Gilja	<i>Trend and Correlation Analysis of Groundwater Quality at the Bartolovec Wellfield in Croatia</i>

Šulek	A Water Flow Models Calibration Using Heuristic Methods
Tall, Kandra, Pavelková, Gomboš	Reliability of Standard Rain Gauge Precipitation Measurements in Relation to Lysimeter Observations
Taseski, Krstovski	Mathematical Model for the Analysis of Unsteady Flow during a Pressure Pipeline Break Using the Method of Characteristics
Velísková, Sočuvka, Sokáč, Koczka Bara, Okhravi	Changes of Thermocline in Two Different Reservoirs for Drinking Water Supply in Slovakia
Vranovská, Vrábliková	EU Strategy for Danubian Region - Prosperity through Diversity
Zima	Testing the Parameters of Two-Dimensional Horizontal Dispersion Phenomenon in the Coastal Zone

NOTES

NOTES

NOTES

NOTES

PARTNERS AND SPONSORS



SLOVAK UNIVERSITY OF
TECHNOLOGY IN BRATISLAVA
FACULTY OF CIVIL ENGINEERING



member of

