

40th IAHR World Congress 2023

Rivers – Connecting Mountains and Coasts

Vienna, Austria
21 - 25 August 2023

Volume 1 of 5

Editors:

Helmut Habersack
Michael Tritthart
Lisa Waldenberger

ISBN: 978-1-7138-9716-3

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2023) by International Association for Hydro-Environment Engineering & Research (IAHR)
All rights reserved.

Printed with permission by Curran Associates, Inc. (2025)

For permission requests, please contact International Association for Hydro-Environment Engineering & Research (IAHR) at the address below.

International Association for Hydro-Environment Engineering & Research (IAHR)
Paseo Bajo Virgen del Puerto, 3
28005 Madrid
Spain

Phone: +34 913357908

Fax: +34 913357935

iahr@iahr.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

Table of Contents

Preface	v
Welcome Message	vi
Committees	viii
International Scientific Committee (ISC)	viii
Local Organizing Committee (LOC)	xi
Sponsors & Exhibitors	xii
River processes, monitoring and modelling	
Integral Modelling of Surface Water-Porewater Interactions Induced by Single Cobbles <i>Finn Amann, Jörg Lewandowski, Reinhard Hinkelmann</i>	1
Temporal Analysis of the Braided River Index by Satellite Images <i>Behnam Balouchi, Nils Ruther, Kordula Schwarzwald</i>	11
Recent Changes in Sediment Supply to the Chao Phraya Delta <i>Butsawan Bidorn, Matharit Namsai, Warit Charoenlerkthawin, Komkrit Bidorn</i>	16
Empirical Equation to Estimate Flows in Rivers with Armored Bed <i>Juan Cabrera, Jesús Mejía</i>	26
Development of Kelvin Helmholtz Coherent Structures over a Rough Bed <i>Cerino Bastien, Proust Sébastien, Berni Céline, Nikora Vladimir</i>	33
Improving the Skill of the Chao Phraya Hydrologic Forecasting System Using Pre-Processed Numerical Weather Forecasts <i>Theerapol Charoensuk, Jakob Luchner, Nicola Balbarini, Piyamarn Sisomphon, Peter Bauer-Gottwein</i>	38
Assessing Impacts of Climate Change Scenarios on River Water Temperature <i>AJ Collados-Lara, CL Ramón, F Huertas, D Pulido-Velazquez, FJ Rueda</i>	45
Effect of Geometric Shapes on Vegetated Lateral Cavities <i>Luiz Eduardo Domingos de Oliveira, Carlo Gualtieri, Johannes Géron Janzen</i>	52
Heat-Flux Sensitivity of River Channels Draining Mountains: An Example from American's Northern Great Plains <i>Robert Ettema, Edward W. Kempema</i>	62
Inundation Characteristics of Meandering Rivers in Mountainous Areas in Japan <i>Ryuichi Hirakawa, Terunori Ohmoto</i>	69
A New Monitoring Method of Flow and Scour Around Pier <i>Yoshitaka Hirotsugu, Jin Kashiwada, Takashi Inoue, Yasuo Nihei</i>	78
Travelling Single Waves in Turbulent Open-Channel Flow <i>Richard Jurisits</i>	81
Supercritical Flow Characteristics in a Narrow Channel Bend <i>Subhojit Kadia, I. A. Sofia Larsson, Mats Billstein, Leif Lia, Elena Pummer</i>	87
Three-Dimensional Flood Flow Analysis in a River Bend Confluence <i>Yuki Kajikawa, Yuriko Kameda, Ryuta Ibaraki, Masamitsu Kuroiwa</i>	94
An Optimized Entropy-Based Model for Estimating Velocity Distributions at Confluences <i>Hao Lin, Saiyu Yuan, Hongwu Tang, Kun Li, Xiao Luo, An Wan</i>	101
Turbulence Dissipation Near Water Surface in a Channel Confluence <i>Jiawei Lin, Sauyu Yuan, Yunqiang Zhu, Yuchen Zheng</i>	111
Integrating Water Quality Monitoring with Numerical Modelling in Two Mediterranean Remote Basins <i>Michael Nones, Nena Ioannidou, Achilleas G. Samaras, Dionissis Latinopoulos, Christos S. Akratos, Ifigeneia Kagalou, Panagiotis B. Angelidis</i>	121
Numerical Model of Woody Debris Behavior in Rivers and Floodplains <i>Kengo Osada, Yoshihiko Shimizu, Kenji Kawaike, Mirei Sige-Eda, Shogo Kakehashi</i>	128
Using Smart Sensors to Track Woody Debris in Flume Experiments <i>Alessandro Sgarabotto, Eda Majtan, Irene Manzella, Alison Raby, Georgios Fourtakas, Benedict D. Rogers, Kyle Roskilly, Diego Panici, Georgie L. Bennett, Chunbo Luo, Aldina M. A. Franco</i>	137
Macro-Roughness Elements for River Restoration: Flow Structures <i>Simone Speltini, Isabella Schalko, Volker Weitbrecht, Robert M. Boes</i>	146

Influence of Captured Driftwood on Fluid Force of River Bridge <i>Wataru Ueda, Hiro Szuki, Takashi Inoue, Jin Kashiwada, Yasuo Nihei</i>	151
3-D River Network Extraction Based on Multisource Remote Sensing <i>Yuan Xue, Chao Qin, Baosheng Wu, Dan Li, Xudong Fu</i>	154
Development of Unsteady River Flow Solver Using Hierarchical Cartesian Grids <i>Hideto Yoshimura</i>	164
Formation and Structure of Wake Flows After a Rectangular Vegetation Patch <i>Yuan-Heng Zhang, Huan-Feng Duan, Xu-Feng Yan</i>	168
Experimental Study on River Bank Collapse Under Influencing Factors <i>Yonghui Zhu, Hongyan Yue, Qingbiao Lv, Caiyun Deng</i>	173
Preliminary Results of Vortex Characteristics Within Channel Confluence Shear Layers <i>Yunqiang Zhu, Saiyu Yuan, Lei Xu, Guanghui Yan, Yuchen Zheng</i>	182
A Satellite-Based Analysis of Tiber River Inland-Marine Water Connectivity <i>Rossella Belloni, Jaime Pitarch, Claudia Adduce, Federico Falcini</i>	189
Observations About Hydrodynamics and Sediment Transport in the Congo River <i>Grace Bissemou, Santiago Yopez, Guy D. Moukandi N'kaya, Mauricio Bermudez, Levy Ayissou, Carlo Gualtieri</i>	193
A Field Study About a Diffluence-Confluence Unit in the Amazon River <i>Carlo Gualtieri, Marco Ianniruberto</i>	202
Drought Monitoring in the Catatumbo Watershed – Colombia as a Contribution to Climate Change Management <i>Juan David Herrera Galviz, Olga Lucía Ocampo López, Juan Carlos Hernández Criado</i>	212
Preservation and restoration of rivers	
Reintroduction of Shrimps in the Lifeless Rimac River-Urban Reach <i>Frida Luz Avila Miranda, Marisa Rosana Silva Dávila</i>	218
Typical Layouts of River Widening Projects in Switzerland <i>Paul Demuth, Cristina Rachelly, David F. Vetsch, Robert M. Boes, Volker Weitbrecht</i>	228
Restoration of Yodogawa Riverside Park Through Collaboration Between Citizens and Government <i>Yuko Ishida, Yoshiya Ogawa</i>	234
Resilient Rivers - Interdisciplinary Research on Refugia, Connectivity and Stepping Stones <i>David F. Vetsch, Anna Belser, Giovanni De Cesare, Sabine Fink, Christine Weber</i>	241
An Approach for Water Quality Restoration in Tropical Rivers <i>Adriana Márquez-Romance, Estefania Freytez-Boggio, Julio Maldonado-Maldonado, Samuel Cárdenas-Izaguirre, Manuel Pérez-Rodríguez, Oswaldo Luque-Mirabal, Edilberto Guevara-Pérez, Sergio Pérez-Pacheco, Eduardo Buroz-Castillo</i>	247
Sustainable river management	
Does Sediment Replenishment Downstream of Dams Affect Activities of Bats? <i>Hiroki Aie, Yoichi Kawaguchi, Takahiro Sato, Takumi Akasaka</i>	257
Evaluation of Runoff Change on Land Use Change to Forest Using a Distributed Hydrological Model <i>So Kazama, Kota Chiba</i>	265
Response of Hydrological to Anthropogenic Activities in a Tropical Basin <i>Binh Quang Nguyen, Sameh A. Kantoush, Thanh-Nhan-Duc Tran, Doan Van Binh, Ngoc Duong Vo, Mohamed Saber, Tetsuya Sumi</i>	269
Evaluating the Impact of Reservoir Regulation on Stickiness Spawning Fish Habitat Suitability <i>Xingmin Wang, Yun Deng, Jia Li, Yong Li, Linglei Zhang, Ganggang Bai</i>	279
Transboundary river basin management	
Outlook and Status-Quo on China – Laos in LMC Water Resources Cooperation <i>Hunag Lu, Hao Zhao, Gao Lihong</i>	289
Mitigation of Paddy Field Dam on Flooding in Lake Inba-Numa <i>Ryosuke Yoshimura, Yuki Ogata, Takehiko Ito, Riku Kubota, Yasuo Nihei</i>	294
Innovation in river engineering	
Advancements in the Entropy Concept for Hydraulic and Hydrological Processes <i>Farhad Bahmanpouri, Silvia Barbetta, Tommaso Moramarco</i>	296

Blocking Probability of Individual Logs at Racks in Rivers <i>Riccardo Zaccardi, Michael Pfister</i>	303
A Serre-Like Dispersive Wave Model for Prismatic, Arbitrary Cross-Section Channels <i>Damien Violeau</i>	309
River – estuary – sea interactions	
The Tidal Water Characteristics and the Mangrove Forest Biodiversity <i>Takashi Asaeda, Abner Barnuevo, Mizanur Rahman</i>	315
Laboratory Modelling of Surface Buoyant Plume Interaction with Grid Obstruction <i>Manel Grifoll, Alan Cuthbertson</i>	325
Hypoxia over the Past Two Decades in the Ariake Sea <i>Lin Hao, Ai Sanada, Baixin Chi, Bing Xiong, Yasuyuki Maruya,, Shinichiro Yano</i>	331
Numerical Modelling of Tsunami Propagation in Converging Channels <i>Zhiwen Chen, Valentin Heller, Riccardo Briganti</i>	337
The Selection of Ocean Boundary Conditions on Coastal Hydrodynamic Simulations <i>Chihiro Kashima, Yusuke Nakatani</i>	345
Estuarine Salinity Distribution: The Role of Convergence <i>Guillermo Martín-Llanes, Marta Aragón, Carmen Zarzuelo, Alejandro López-Ruiz</i>	354
Prediction of Hazardous Eddy-Induced Cross-Currents in the Western Scheldt <i>Jeroen Stark, Yves Plancke</i>	360
Feasibility Study of the Agricultural Sectors for the Estuary Restoration <i>Kyonghwan Kwon, KwangSik Yoon</i>	369
Coastal hydraulic engineering structures	
The Adaptation of a Current Flume to a Wave-Current Flume for Coastal Studies <i>Joao Chambel, Tiago Fazeres-Ferradosa, Filipe Miranda, Ana Margarida Bento, Francisco Taveira-Pinto, Paulo Rosa-Santos</i>	379
A Methodology for Harbour Layout Design Based on Machine Learning <i>Achilleas G. Samaras, Lazaros Iliadis, Theophanis V. Karambas</i>	388
Tsunami Impact on Fujairah Port Breakwaters: Small-Scale Experimental Assessment <i>N.A.K. Nandasena</i>	392
The Lake Gatun Water Quality Model for the Panama Canal <i>Erik Ruijgh, Firmijn Zijl, Julio Monroy, Iván Domínguez, Tom O'Mahoney</i>	396
Prediction of Wave Overtopping Rates at Sloping Structures Using Artificial Intelligence <i>M. A. Habib, S. Abolfathi, J.J. O'Sullivan, M. Salauddin</i>	404
Numerical Simulation of High Reynolds Flow Around Structure via Cumulant LBM <i>Enbo Xing, Qinghe Zhang, Jinfeng Zhang, Guangwei Liu</i>	414
Inland and coastal lake management	
Characterization of Gatun Lake's Hydrodynamic Behaviour and Water Quality <i>María G. Castellón, Ioana Popescu</i>	419
A Novel Bacteria Decay Model for a Nearshore Coastal Water <i>Lam, M.Y., Ahmadian, R.</i>	427
River sediment management and morphodynamics	
Morphodynamic Impact of Increasing Diversion Discharge in an Alpine River <i>Jakob Siedersleben, Stefan Jocham, Stefan Achleitner, Markus Aufleger</i>	437
Investigation on Effect of Approach Flow on Bridge Scour <i>Rhythm Bhattarai, Umesh Singh, Pawan Bhattarai</i>	444
Morphological Analysis of Buyuk Menderes River over the Years Using Satellite Imagery <i>Asli Bor, Oguz Hazar, Sebnem Elci</i>	454
Physical Modeling of Sediment Trap for le Bez River, Switzerland <i>Romain N. H. M. Van Mol, Najla Schaller, Azin Amini, Lukas Hunzinger, Giovanni De Cesare</i>	461
Impacts of Seigyu Structure on Riverbeds and Its Geometrical Changes <i>Temma Fujii, Almamari Mahmood, Yasuhiro Takemon, Kantoush Sameh, Tetsuya Sumi</i>	467

Coastal and estuary morphodynamics

Bedload Management on Sava Dolinka River Using Sediment Transport Modelling <i>Luka Javornik, Saso Santl</i>	474
Mountain River Confluence Morphodynamics in Response to Different Tributary Channel Gradients <i>Théo St. Pierre Ostrander, Johannes Holzner, Bruno Mazzorana, Andrea Andreoli, Francesco Comiti, Bernhard Gems</i>	484
Morphological Modelling of Tidal Bathymetry and Bank Erosion in Bangladesh <i>Soren Tjerry, Ranjit Galappatti</i>	494
Wave Schematization for Coastal Morphodynamics: The Role of Wave Chronology <i>Aragón M, Martín-Llanes G, Zarzuelo C, López-Ruiz A, Ortega-Sánchez M</i>	501
Assessment of Fluvial Sediment Supply in Light of Geomorphological Evolution <i>Ryoukei Azuma, Kohei Watanabe</i>	509
Effect of Coastal Protection Structures on Beach Material Transformation <i>Warit Charoenlerkthawin, Komkrit Bidorn, Somboon Otarawanna, Butsawan Bidorn</i>	517
Investigation of Critical Sediment Thickness Above Beachrock and Morphological Impact <i>Sevket Cokgör, Mustafa Selmani özkaya</i>	524
Use of Drone and RTK Technology to Assess Coastal Erosion <i>Victor Gomez, Gisselle Guerra-Chanis</i>	534
Recent Morphological Development of Anabranches on the Elbe Estuary, Germany <i>Diogo Mees Delfes Varela, Edgar Nehlsen, Peter Fröhle</i>	540
Wave and Tidal Hydrodynamics Characterization of Montrose Bay: A Severely-Eroding Coast in East Scotland <i>Munawir Pratama, Vengatesan Venugopal, Jack Poleykett</i>	546

Sediment transport, deposition and remobilisation

The Role of Vegetation on Streambed Instability <i>Francesco Coscarella, Nadia Penna, Roberto Gaudio</i>	554
Turbulence Flow Field and Local Scour Around Three-Pier Group <i>Jennifer G. Duan, Kang Zhou</i>	564
3D Level Set Method-Based Modeling of Local Erosion Under Current <i>Ronja Ehlers, Widar Weizhi Wang, Arun Kamath, Hans Bihs</i>	574
Investigation of Clear-Water Bed Scouring Below Pipelines in Meandering Rivers <i>Mohammadreza Feizi, Soraya Zenhari, Seyed Mehrab Amiri</i>	581
Effect of Grain-Size Distribution Discretization in Morphodynamic Simulations with Mixed-Sized Sediment <i>Seline Frei, Benjamin Hohermuth, Davide Vanzo, David F. Vetsch</i>	591
Methods to Evaluate Sediment-Driftwood Runoff Processes During Heavy Rainfall and Its Application to the Hazard Prediction <i>Harada Daisuke, Egashira Shinji</i>	597
Modelling of Fine Sediment Infiltration into Static Gravel Bed: Binary Mixture Packing Model <i>Atul Jaiswal, Minh Duc Bui, Peter Rutschmann</i>	606
Simulation of Near-Field Tsunami Waves Using an SPH Framework <i>Yunfei Mao, Mingfu Guan</i>	615
Influence of Vegetation Height on Turbulence Structure and Sediment Deposition <i>Kazumasa Matsumoto, Taka-aki Okamoto, Michio Sanjou</i>	625
Sediment Management to Reduce Flooding in the Shabelle River Basin <i>Alexandra M. Murray, Henrik Garsdal</i>	631
Numerical Modelling of a Laboratory Scale Turbidity Current <i>Nils Reidar Boe Olsen</i>	641
Effect of Rigid Vegetation on Equilibrium Bed Morphology <i>Stefano Pagliara, Homayoon Ganji, Michele Palermo</i>	645
Prediction of Maximum Scour Depth Downstream of Ski-Jump Spillways <i>Gustavo Carrasco, Jorge Reyes-Salazar</i>	653
Experimental Investigation of Asymmetric Border Ice Effect on Sediment Transport <i>Mina Rouzegar, Shawn Clark</i>	660
Iflow: Applications of an Idealized Model for Tides and Sediment <i>George P. Schramkowski, Jeroen Stark</i>	668

Bridge Pier Scour Due to Dynamic Debris Jams <i>Wenjun Zhang, Ioan Nistor, Colin D. Rennie</i>	678
Studies on Recirculation Flow and Sediment Transport in Shrimp Farms <i>Hayato Kitamura, Ichiro Kimura, Eizo Nakaza</i>	685
Effects of Vegetation Roughness Ratio on the Spanwise Distribution of Suspended Load <i>Mingyang Wang, Na Li</i>	689
Characterization of the Patzcuaro Lake Basin <i>Jorge Luis Bedolla Cervantes, José Jaime Madrigal Barrera, Sonia Tatiana Sánchez Quispe</i>	697
Sediment management in reservoirs and river basins	
Case Study: Sediment Transport Simulation at Munds Draw Watershed <i>Jennifer G Duan, Kun Qi</i>	704
Impacts of Hydrodynamics and Morphological Evolutions on River Sediment Budget <i>Sameh A. Kantoush, Binh Quang Nguyen, Doan Van Binh, Ngoc Duong Vo, Mohamed Saber, Tetsuya Sumi</i>	714
Desilting Efficiency Improvement Using a Dredged Channel in a Reservoir <i>Fong-Zuo Lee, Siang-Ying Chen, Jih-Sung Lai, Yih-Chi Tan, Hwa-Lung Yu</i>	724
Water Erosion Estimation Through Geospatial Modeling, Huarmey River Basin <i>Lizbeth Rocío Caycho Torres, Néstor Montalvo Arquiniño</i>	729
Comprehensive Detection Technology of Deepwater Channel Sedimentation and Its Application <i>Jianqing Zhang, Peng Li, Zhaofeng Li, Jing Zeng, Jiangping Chen, Jun Yan</i>	735
Rainfall-runoff processes and modelling, remote sensing	
An Improved Fuzzy Time Series Model Based on Weighted Fuzzy Relations and Golden Ratio Algorithm: A Case Study of Forecasting Rainfall in an Eastern Canadian Province <i>Amir Noori, Hossein Bonakdari</i>	742
Improving the Computation of Slope Stability in Distributed Hydrologic Applications <i>Bonomelli Riccardo, Marco Pilotti</i>	753
Flood Risk Management on the French Railway Network <i>Mark Cheetham</i>	760
Numerical Simulation Method of Extreme Rain Flood in Plain Urban <i>Xuan Huang, Guoqing Liu, Sien Liu, Yang Fan, Jingtian Ma, Ziwu Fan</i>	769
Variations of Groundwater-Levels in Bedrock and Surface-Layer on Mountain Slopes <i>Hayato Kotani, Tatsuhiko Uchida, Shinnosuke Sasatani, Takuya Inoue, Misako Hatono, Akihito Kaji, Junji Komori, Hideki Miyata, Masahiro Kaibori</i>	774
Satellite Remote Sensing in Reservoir Level Monitoring and Surface Anomalies Detection <i>John Lioumbas, Aikaterini Christodoulou, Nikoletta Xanthopoulou, Matina Katsiapi, Alexandros Mentes, Panagiota Stournara, Thomas Spahos, Georgia Seretoudi, Nopi Theodoridou</i>	782
Land Use Change and Flood Recurrence in the Grijalva River <i>Alejandro Mendoza, Maritza Arganis Juárez, Maricela Arroyo</i>	790
Pluvial Flooding: Development of a Rain Simulator for Laboratory Studies <i>Miriam Monschein, Gerald Krebs, Gerald Zenz, Josef Schneider</i>	795
Assessment of Future Change Impacts on Flooding in Transboundary River Semliki Catchment <i>Seith N. Mugume, Kato Ronnie, Edgar Atuhairwe, Emmanuel Tumwesigye</i>	800
Modelling of Contaminant Transport Due to Rainfall-Runoff Processes Using SPH <i>Xin Yan Lye, Akihiko Nakayama</i>	810
Comparison of Rainfall-Runoff Models to Assist Hydroelectric Operation Planning <i>Beatriz Sepulveda Pires, Alberto Luiz Francato</i>	819
Uncertainty in the Probable Maximum Flood Determination, Basin Mantaro (PERU) <i>Marisa Rosana Silva Dávila</i>	829
A Deep-Analysis of Soil Moisture, with Remotely Sensed Exogenous Variables, Case Study, Application over Quebec, Canada <i>Mohammad Zeynoddin, Silvio José Gumiere, Hossein Bonakdari</i>	839
Validation of Subsurface Flows with PGR and WEAP Maps <i>Heidy Janette Alcantar Mondragon, María del Mar Navarro Farfán, Sonia Tatiana Sánchez Quispe, Julio César Orantes ávalos</i>	848

Methodology for Surface Runoff Evaluation Using HEC-HMS in Gauged Basins <i>Christopher Daly Franco Navarro, Constantino Domínguez Sánchez, Joel Hernández Bedolla</i>	853
Evaluation of Multi-Satellite Rainfall Measured and Automatic Rain Gauges <i>Claudia Lizeth García Pérez, Joel Hernández Bedolla, Sonia Tatiana Sánchez Quispe</i>	859
Relation Between Potential Groundwater Recharge, DRASTIC, and Arsenic Interpolation Maps <i>María del Mar Navarro-Farfán, Sonia Tatiana Sánchez-Quispe, Marco Antonio Martínez-Cinco, Mario Alberto Hernández-Hernández</i>	866
Calibration and Obtaining Design Floods for the Perros River Basin <i>Mauricio Guillermo Ramírez Ambriz, Maritza Liliana Arganis Juárez, Ramón Domínguez Mora, Alejandro Mendoza Resendiz, Eliseo Carrizosa Elizondo, Eduardo Juan Diego</i>	873
 Integrated flood risk management	
Comparative Analysis of the Machine Learning and Catchment Water Balance Models for Daily Streamflow Simulation <i>Yasaman Afkhami, Isa Ebtehaj, Silvio José Gumiere, Francois Anctil, Hossein Bonakdari</i>	883
Embracing Digital Twin Technology for Railway Flood Risk Management in France <i>Mark Cheetham</i>	893
Two-Dimensional Numerical Modelling of Floods Due to Levee Breaching <i>Kheloui Lydia, Amama Zied, Bourban E. Sébastien, El Kadi Abderrezzak Kamal</i>	900
Temporal Changes in Annual Climatological Series in a Coastal City <i>Luis Angel Espinosa, Maria Manuela Portela, José Pedro Matos</i>	907
Evaluation and Study of Flood Damage Reduction for Future Flood Control Use of Irrigation Reservoirs in the View of Local <i>Atsuya Ikemoto, So Kazama, Takeo Yoshida, Hayata Yanagihara</i>	915
Experiences with Pluvial Flood Risk Mapping in Croatia at Multiple Spatial Scales <i>Nino Kravica, Bojana Horvat, Igor Ruzic, Andrea Tadic, Vlatko Roland, Ante Siljeg, Ivan Maric, Silvija Siljeg, Fran Domazetovic, Lovre Panda, Rina Milosevic, Rajko Marinovic</i>	923
Fragility Curve Between Flood Index and Human Damage <i>Riku Kubota, Takehiko Ito, Jin Kashiwada, Yasuo Nihei</i>	932
Distributed Hydrological Modeling of Suquia's Basin, for Flood Warning System <i>Sebastián López, Daiki Kakinuma, Kentaro Aida, Tomoki Ushiyama, Leandro Kazimierski, Mariano Re, Carlos Catalini, Carlos Marcelo García, Celeste Saulo, Takemasa Miyoshi</i>	935
Strategic Management of Flood Risk in New South Wales, Australia <i>Duncan McLuckie, Angela Toniato</i>	945
Flood Assessment for Sustainable Development: A Case Study of Bandar Abbas, Iran <i>Yaser Rostami, Mohammad J. Ostad Mirza Tehrani, Karim Alizad, Hassan Falahat</i>	955
Decision Support System for Flood Forecasting in Thailand <i>Watin Thanathanphon, Sathit Chantip, Apimook Mooktaree, Theerapol Charoensuk, Narongrit Luangdilok, Ticha Lolupiman, Kachapond Chettanawanit, Piyamarn Sisomphon</i>	963
Inter-Reservoirs Transfer Scheme - Flood Prevention and Water Conservation <i>Antony N. F. Wan, Wilson C. K. Lam, Carmen K. M. Cheuk, Samson H. Y. Lai</i>	970
Areas Susceptible to Flooding in the City of Morelia <i>Israel Alejandro García Ledesma, Sonia Tatiana Sánchez Quispe, Constantino Domínguez Sánchez, Joel Hernández Bedolla, Jesus Pardo Loaiza</i>	978
Multiple Floods Impact on Scour at Structures in River Flow <i>B. Gjunburgs1, O. Lauva, K. Kokina</i>	984
 Drought risk management	
Spatiotemporal Drought Structures and Their Relation to Hydrometeorological Variables <i>Mustafa S. Altinakar, Brandi L. Gamelin, Julie Bessac, Vishwas Rao</i>	989
Water Quality Modeling According to Dam-Operation and Pollution-Load-Management Using EFDC <i>Dong Yeol Lee, Kyong Oh Baek</i>	998
Was the 2019 Drought the Most Extreme in the Last 40 Years in Southern Angola <i>Pedro Anastásio Cumena Lombe, Elsa Maria da Silva Carvalho, Paulo Jorge Rosa Santos</i>	1008
Evolution of Water Resources for Potable Water Supply in the Long-Term: The Case of Mancomunidad de los Canales Del Taibilla (Southeastern Spain) <i>Miguel á. Reyes-Merlo, Pablo Roa-Prieto, Emilio Romero-Jiménez</i>	1018

A Long-Term Analysis of Meteorological and Hydrological Drought Indices for the Eastern Economic Corridor (EEC) Region in Thailand <i>Sasin Jirasirirak, Aksara Putthividhya, Somkiat Prajamwong, Wimolpat Bumbudsanpharoke Kamkanya</i>	1027
Climate change and water management	
Urban Trees and Water Management Towards Climate Change Adaptation <i>Francesco Busca, María Teresa Gómez-Villarino, Roberto Revelli</i>	1036
Improving Adaptive Capacity for Integrated Coastal Safety Management <i>Margaret Chen, Anne-Lise Montreuil</i>	1044
Green Roof Rainfall - Runoff Modelling in Semi-Arid Climates <i>Gianluca Eugenio, Gabriele Freni</i>	1049
Salt Intrusion Around the World Under Influence of Climate Change <i>Wouter Kranenburg, Daan van Keulen, Avelon Gerritsma, Ymkje Huisman</i>	1058
Mitigation and Adaptation to Climate Change in Maryland USA: Opportunities in the Water Sector <i>Kayle Krieg, Lee Curry, Peter Goodwin</i>	1066
Synthetic Events for Flood Risk Studies Including Climate Change Uncertainties <i>Gert Leyssen, Els van Uytven, Frederik Zoeter, Joris Blanckaert, Roeland Adams, Tim Franken, Jiri Nossent, Fernando Pereira</i>	1072
Evaluation of NEX-GDDP-Cmip6 Temperature Projections Across Cork, Ireland <i>Sogol Moradian, Apoorva Bamal, Agnieszka I. Olbert</i>	1082
Implementing Multi-Century-Hourly Stochastic Precipitation Using Cmp6 – a Trade-off Approach <i>Victor Munoz S., Mehmetcan Ozkadioglu</i>	1087
Climate Change and New Zealand Rivers <i>Guinevere Nalder</i>	1093
Impact of Climate Change on Seasonal Operation of Hydropower Dam Reservoir in Heavy Snowfall Area in Japan Using 150-Year Continuous Climate Experiment <i>Daisuke Nohara, Yoshinobu Sato, Tetsuya Sumi</i>	1099
Hydraulic-Hydrologic Invariance Effectiveness of Suds Techniques: Italian Case Study <i>Erica Orsi, Gaetano Crispino, Michele Iervolino, Corrado Gissoni</i>	1106
Semi-Distributed Hydrological Characteristics and Their Sensitivity to Climatic Factors in the Huancane River Basin, Peru <i>Eddy A. Avalos-Alave, Roberto Alfaro-Alejo, Isidro A. Pilaes-Hualpa, Julio Montenegro-Gambini</i>	1116
Sustainability Measurement of Integrated Water Resources Management in East Java Province, Indonesia <i>Annisak Laila Rakhmawati</i>	1126
Return Periods Estimation for Precipitation and Discharge Using ECMWF Reforecasts <i>Daniel E. Villarreal J., Enrique A. Moreno C., Juan C. Salinas L., Eliud R. Fernández E., David C. López P., José L. Bruster F., Adrián L. Ferrino F.</i>	1133
Research on River Temperature in Arid-Hot Valley Under Climate Change <i>Haoyu Wang, Yun Deng, Min Chen, Youcai Tuo, Yanjing Yang, Yunxiao Jia</i>	1140
Evaluation of High-Floor Houses for Pluvial Floods in Japan <i>Hayata Yanagihara, So Kazama, Tsuyoshi Tada</i>	1149
Exhaustive Optimized Machine Learning, Modeling, and Analysis of Evapotranspiration <i>Mohammad Zeynoddin, Silvio José Gumiere, Hossein Bonakdari</i>	1154
Comparative Analysis of Drought Indices Under CORDEX Models <i>Giovanni Carlo Flores Fernández, Sonia Tatiana Sánchez Quispe, Abel Solera Solera, José Jaime Madrigal Barrera</i>	1164
Sediment Load Variation Using Nonoverlapping Time Block Graphical Approach <i>Urvashi Malani, Sanjaykumar M. Yadav</i>	1175
Climate Variability and Water Availability in Ambositra, Amoron I Mania Madagascar <i>Fanambinantsoa Ankasitrahana Randriamifidison Rindramampionona, Malalaniaina Miora Rakotoarivelo, Hristo Popov, Lily Arison Rene De Rolland</i>	1180
Ecohydraulics in rivers and coasts including hydropeaking	
CFD Analysis of Bioenergetics Metric at a Step with Horizontal Cylinder <i>Milad Abdollahpour, Paola Gualtieri, David F. Vetsch, Carlo Gualtieri</i>	1187
Numerical Modelling of River Hydro-Morphology Impact on Plant Seed Dispersal <i>Francesco Caponi, Daniel A.S. Conde, David F. Vetsch</i>	1195

Investigating Safe Fish Travel in Pipe Flows <i>Reilly X. Cox, Stefan Felder</i>	1199
Providing Defined Velocity Fluctuations in Ecohydraulic Flumes Using Rotatable Fins <i>Lina Focht, Patrick Heneka</i>	1208
Experimental and Numerical Investigation of Turbulent Flow over Standard 90 Deg and Modified 45 Deg Spillways Towards Efficient Downstream Fish Passage Conditions <i>Sedem Kumahor, Haitham Ghamry, Christos Katopodis, Mark F. Tachie</i>	1216
An Analytical Approach to Evaluate Local Variation in Transverse Mixing for Regulatory Mixing Zone Analysis <i>Rajib Kamal, Samantha Barnes, Soren Jensen, Christina James</i>	1224
Passage of Downstream Moving Fish at a Bypass Gate with Bottom Opening <i>Maximilian Kastinger, Ismail Albayrak, Luiz G. M. Silva, Robert M. Boes</i>	1232
Numerical Simulation of Vertical Slot-Brush Fish Pass <i>Nika Jahangiri, Cumhur Özbey, Serhat Kucukali</i>	1239
Scale Effects in a Vertical Double Slot Fishway <i>Anne-Fleur Lejeune, Damien Callaud, Laurent David, Gérard Pineau, Jean Carl Rousseau, Richard Tessier, Sylvain Richard, Laurent Dupuis, Olivier Mercier, Pierre Sagnes</i>	1248
Explanation the Role of Fish Lateral-Line System in Migration Behaviors <i>Guangning Li, Shuangke Sun, Haitao Liu, Tiegang Zheng</i>	1254
Remote Sensing Localization of Submerged Groundwater Discharges in Bathing Areas <i>Ivana Lucin, Marta Alvir, Ante Sikirica, Sinisa Druzeta, Vanja Travas, Lado Kranjcevic</i>	1260
Retrofitting Trash Racks with Electricity to Protect Downstream Moving Fish <i>Anita Moldenhauer-Roth1, Oliver M. Selz, Ismail Albayrak, Robert M. Boes</i>	1268
Pressure Regulation Valves for Energy Dissipation and Power Control in a Hydropower Plant Case Study <i>Misagh Moradali, Wolfgang Richter, Gerald Zenz, Kaspar Vereide</i>	1278
Climate Change Impact on Stream Temperature Due to Differences in Geological Conditions <i>Hiroaki Suzuki, Makoto Nakatsugawa, Nobuo Ishiyama</i>	1288
Spatiotemporal Connectivity of Macrozoobenthos Habitat - a Modeling Approach <i>Sengdavanh Thepphachanh, Jurgen Stamm</i>	1292
Providing Alternative Migration Corridors and Micro-Habitat in Pool-Weir Fish Pass <i>Mehmet Salih Turker, Serhat Kucukali</i>	1301
Ecological status and eco-engineering	
Formation of Refuge Able Areas Around Different Gravel Mounts' Designs <i>Pietro Beretta Piccoli, Youichi Yasuda</i>	1310
Offset Discontinuities in Dammed Rivers Due to Tributary: Which Macroinvertebrates Taxa Respond? <i>Izumi Katano, Hideyuki Doi, Naoko Hara, Junjiro N. Negishi, Tomoko Minagawa, Yuichi Kayaba</i>	1317
Estimation of Reaeration Coefficient Based on Hydraulic Parameters in Rivers <i>Sadegh Partani, Fatemeh Omidi, Fatemeh Ezzati, Farshid Bostanmaneshrad</i>	1323
Importance of Dam Reservoirs for Bats as Foraging Habitat <i>Takahiro Sato, Yoichi Kawaguchi, Shin Nakanishi, Takumi Akasaka</i>	1332
Enhancing Coastal Resilience: Applying Decision Support Framework for Nature-Based Solutions <i>Valen Rangga Gerina, Navisa Nurbandika, Ria Verensia</i>	1339
Flow Around Swimming Bionic Robotic Fish in Complex Open-Channel Flow <i>Jingmei Zhang, Hongyu Li, Minne Li, Dongzi Pan, Hang Wang</i>	1349
Analysis of Fish Diversity Characteristics and Its Correlation with the Inland Waterway Transit Capacity <i>Xiao Chu, Zhonglian Jiang, Huan Lei, Jianqun Guo</i>	1358
Improving the Water Quality of the Cengklik Reservoir, Boyolali Regency by Reducing Eutrophication by Improving Activities in Community-Based Water Catchments <i>Adhy Kurniawan, Fatimah Nurul Mahdiyah Jayatri, Pratama Tirza Surya Sembada</i>	1366
Analysis of Water Quality Index in Lake Zirahuen, Michoacan, Mexico <i>Rosalva Mendoza Ramírez, Karina Suárez Alcántara, Rodolfo Silva Casarín, Ramón Domínguez Mora, Aníbal Sol Benítez, Eliseo Carrizosa Elizondo</i>	1372
Plastics and emerging contaminants in waterbodies	
Macro Plastic Modelling in the Scheldt Estuary <i>W.A. Breugem, B. Teunkens, K. Chu, T.I. Koutrouveli, S. Van Damme, B. Decrop</i>	1380

Photoresponsive Surfactant Activated Persulfate Cycle for Remediation of Pahs-Contaminated Groundwater <i>Yueming Han, Chaomeng Dai</i>	1387
Plastics and Micro-Plastics in the Omani Environment <i>Ekkehard Holzbecher, Yathrib Ajaj, Jeanette Martins, Ahmed Hadidi</i>	1396
Experimental Assessment of Microplastic Contaminants in the Hungarian Danube River <i>Pegah Jahanpeyma, Sandor Baranya, Alexander Anatol Ermilov, Flóra Pomázi, Anna Szöllosi, Dániel Gere, Andrea Toldy</i>	1404
Holistic Approach to Manage Emerging Contaminants in Hong Kong's Drinking Water <i>Kim-Chung Lee, Li-Ki Fu, On-Yee Chan, Man-Tat Yu</i>	1414
Health Risks of Pharmaceuticals in China's Five Major River Basins <i>Si Li, Chaomeng Dair</i>	1421
Microplastic Entrainment in Turbulent Flow: A Numerical Study <i>Arefeh Shamskhany, Shooka Karimpour</i>	1431
Water education and innovation	
The Brazilian Groundwater Law <i>Luciana Cordeiro de Souza Fernandes, Alexandre Martins Fernandes, Monise Terra Cerezini, Carlos Hiroo Saito</i>	1441
Leveraging Virtual Reality Technology at the Water Public Education Centre in Hong Kong <i>Tsz Yan Kong</i>	1445
Development of Flood Monitoring System from Social Media in Thailand <i>Watin Thanathanphon, Narongrit Luangdilok, Ticha Lolupiman, Apimook Mooktaree, Sathit Chantip, Theerapol Charoensuk, Kachapond Chettanawanit, Piyamarn Sisomphon</i>	1450
Urban floods and droughts	
Providing Validation Data for Numerical Codes Dealing with Unsteady Urban Flooding <i>Elisa Beteille, Frédérique Larrarte, Sébastien Boyaval, Eric Demay</i>	1456
Effect of Water Gate Barriers to Prevent Underground Flooding <i>Nanako Inokawa, Kenichiro Kobayashi</i>	1465
On Applicability of Dynamic and Local Porous-Swes in Urban Flood <i>Alok Kumar, Gourabananda Pahar</i>	1472
Influence of Staircase Design on Flood Characteristics in Underground Spaces <i>Chen Liang, Mingfu Guan</i>	1480
Effectiveness of Blue-Green Infrastructure for Enhancing Urban Drainage System Resilience <i>Seith N. Mugume, Hilary Kibibi, Milton Wakhata</i>	1488
Experimental Study on Difficulty of Evacuation During Urban Floods <i>Ryuichi Hirakawa, Kojiro Nakamoto, Tomokazu Negishi, Yuya Hoshino</i>	1498
Implementation Strategies of Detention Tanks for Improving Drainage System Resilience <i>Husnain Tansar, Huan-Feng Duan, Feifei Zheng, Ole Mark</i>	1508
Tilting Manhole Covers <i>Niels van de Meulenhof, Arris Tijsseling, Jose Vasconcelos, Qingzhi Hou, Zafer Bozkus</i>	1515
Air Entrainment by Hydraulic Jumps in a Partially-Filled Circular Pipe <i>Di Sun, Yun Liu, Ruidi Bai, Hang Wang</i>	1520
Sanitary engineering	
Simulating Water Tank Drainage Under Different Ventilation Conditions Using Openfoam <i>Jialing Liang, Yuanhao Xiao, Chenhao Yang,, Yiyi Ma</i>	1529
Experimental Study of Flow-Behaviour of Cycle Friendly Stormwater Gratings <i>Induka Werellagama, Harish Painuly, Gregory De Costa</i>	1539
Urban sewer and sediment management	
Laboratory Testing of Engineered Media for Biofiltration Swales to Improve Water Quality <i>Habib Ahmari, Ashish Bhurtyal</i>	1547
Simulation of Temperature Variations in Sewer Systems: Preliminary Results <i>Hossein Alaei Kakhki, Margherita Evangelisti, Marco Maglionico, Vittorio Di Federico</i>	1557
Coupled ML-Optimization Technique for Leak Localization in Water Distribution Networks <i>Ivana Lucin, Sinisa Druzeta, Boze Lucin, Zoran Carija</i>	1563

Recycling Waste Heat from Industrial Wastewater Treatment Processes <i>Madhu K. Murali, Jan Spriet, Aonghus McNabola</i>	1570
Secondary Flow and Residence Times in a Vortex-Type Retention Pond <i>Ajay Shrinivas Muthukumar, Kerry Anne Mazurek</i>	1577
Statistical Analysis of Biogas Production from Wastewater: A Case Study <i>Cumhur özbey, Serhat Kucukali</i>	1586
Urban Storm Water Data Challenges Now and in the Future <i>Adri Verwey</i>	1593
Water and mega cities	
Study of Bubble Mass Transfer in Pipe Flow <i>Linjiang Guo, Nian Ye, Yiyi Ma</i>	1599
Urban Runoff Responses to Construction Works and Blue-Green Infrastructures in Subtropical Climate <i>Xuan Pang, Mingfu Guan</i>	1608
Area Reduction Factor (ARF) for the Mexico Valley Basin <i>González Angón Silvia, Arganis Juárez Maritza Liliana, Domínguez Mora Ramón, Santana Soto Andrés Olaf</i>	1613
Unconventional water resources	
Sustainable Urban Water Management - a Triumph on the Supply of Reclaimed Water in Hong Kong <i>Ricky Chi-Kai Lee, Stephanus W.L. Shou, Glenn T.H. Chan</i>	1619
Sustainable hydropower, navigation and irrigation	
A Comparative Analysis of Hydrokinetic Turbine Performance at Low Chord-Based Reynolds Number <i>Nijmeh Marouf, Stuart Cameron, Vladimir Nikora</i>	1628
Modeling a Historical Lowland Irrigation Channel Network in Northern Italy <i>Gabriele Farina, Marco Pilotti, Luca Milanese</i>	1635
Using PIV to Improve Bar Rack Guidance for Downstream Migrating Fish <i>Xingjun Fang, Mark F. Tachie, Christos Katopodis, Haitham Ghamry</i>	1641
Using a Boussinesq-Type 1-D Model to Simulate Favre Waves <i>Bastien Jouy, D. Violeau, M. Ricchiuto, M. Le, E. Demay</i>	1646
Practical Considerations of Conducting River Hydrokinetic Energy Resource Assessments <i>Katelyn Kirby, Colin D. Rennie, Julien Cousineau, Sean Ferguson, Ioan Nistor</i>	1652
Performance Analysis of a Halved Zuppinger-Waterwheel <i>Julius Maier, Daniel Heim, Kevin Rieger, Martin Weber, Nicole Saenger</i>	1662
Numerical Studies of the Turbine Passage of Fish <i>Josef Schneider, Helmut Benigni</i>	1668
Fish Friendly Micro-Hydropower: Centrifugal Screw Pump-as-Turbines <i>Calvin Stephen, Miguel Crespo-Chacon, Aonghus McNabola</i>	1673
Design and Construction of a Cross-Flow Turbine Rotor Fabricated with Recycled Polymers <i>David Aray, Estefania Tineo</i>	1679
Ecologically Compatible Hydropower Use as Part of a River Restoration <i>Hannes Zöschg, Mario Dax, Johannes Wesemann, Wolfgang Katschnig, Julien Barbier, Markus Aufleger</i>	1690
Reservoir management	
Optimal Hydropower Operation by Varying the Effect of Inflows Autocorrelation <i>Maritza Arganis, Ramón Domínguez, Alejandro Mendoza, Rosa Valencia, Eduardo Juan, Eliseo Carrizosa, Javier Osnaya</i>	1695
Comparing Evaporation Rates from Eddy-Covariance with Traditional Methods in Reservoirs <i>AJ Collados-Lara, CL Ramón, F Huertas, L Rico Jorge, EP Sánchez-Canete, FJ Rueda</i>	1705
Reservoir Inflow Forecasting of the Bhumibol Dam Using XGBOOST Algorithm <i>Pheeranat Dornpunya, Hanisah Musor, Areeya Rittima, Jidapa Kraisingka</i>	1711
Renewable Energy Powered Artificial Mixing of the Reservoirs <i>Oguz Hazar, Sebnem Elci</i>	1720
Factors Influencing the Cyanobacterial Dominance in Lakes: Analysis of Lakes in Central Germany <i>Sebnem Elci, Karsten Rinke</i>	1728

Saltwater Intrusion and Groundwater Rise a Modelling Study <i>Ekkehard Holzbecher</i>	1736
Research on Optimization of Reservoir Stoplog-Operation Based on Spatiotemporal Thermal-Regime <i>Yunxiao Jia, Wu Zhou, Youcai Tuo, Jia Li, Haoyu Wang, Yongao Lu, Yanjing Yang</i>	1745
Computational Study on Submerged Large Wood Behavior in a Reservoir <i>Ichiro Kimura</i>	1755
Numerical Modeling of an Inertial Gravity Current at an Edge Drainage <i>Byungjoo Kim, Hong-Joon Shin, Joongcheol Paik</i>	1763
Determination of Hydrologic Capacity with the Sequent Peak Algorithm for Verde Reservoir <i>Isidro A. Pilares-Hualpa, Roberto Alfaro-Alejo, Carlos A. Pilares-Calla, Robert Pilares-Hualpa</i>	1768
A Siphon-Type Emergency Flood Discharging Technology <i>Yanqiang Wang, Zhigang Wang, Zhuo Yang, Dong Zhang, Jingbo Yu</i>	1776
Daily Scale Rainfall-Runoff Model of the Cuitzeo Lake Basin <i>José Guadalupe García Contreras, Jesús Pardo Loaiza, Sonia Tatiana Sánchez Quispe, Constantino Domínguez Sánchez</i>	1783
Hydraulic structures, machinery and capacity	
Relationship Between Embankment Strength and Soil Properties Using Small Models <i>Durjoy Arzu, Takumi Okamoto, Takao Tamura, Yasunori Muto</i>	1789
Free-Surface Fluctuations Downstream of an a-Type Trapezoidal Piano Key Weir <i>Biruk S. Belay, Xiaoyang Shen, Mario Oertel</i>	1797
Design of a Low Head Hydroturbine for Small Hydrosystems <i>Edward M. Bennett, Artem Ivashchenko</i>	1805
Influence of Non-Linear-Weir Installation on Upstream Floodplains <i>Lisa Besser, Mario Oertel</i>	1813
CFD Shape Optimization of the Hydraulic Structures <i>Jirí Soucek, Eva Bílková, Petr Nowak</i>	1821
Solid-Liquid Pipe Flow Measurement by Venturi Tube. Formula Rationale <i>Stepan Kril, Vyacheslav Berman, Emil Bournaski</i>	1825
Half-Rounded Circular Overflow – on Cavity Transients and Non Linear Instabilities <i>Hubert Chanson</i>	1830
Self-Aeration in Free-Surface Flows at High Reynolds Number (2.6E+6 – 1.1E+8) <i>Hubert Chanson</i>	1837
Drainage Tunnel Performance Review in Hong Kong: A Case Study <i>Jim S. S. Chim, Sylvia S. F. Chan, Harry H. C. Lam, Paul C. K. Chu</i>	1847
Optimal Hydraulic Design of Supercritical Bend Manholes <i>Gaetano Crispino, Davide Dorthé, Corrado Gisonni, Michael Pfister</i>	1857
Hydraulic Jump Loads on Submerged Horizontal Beam of a Flat-Bottom Spillway's Gate <i>Iversom dos Santos Castro, Lucas Ricardo Valentim, Danusa Haick Tavares, Marcos Libert Westphalen, Raquel Sayuri Omoto Takeda</i>	1867
Time-Varying Hydraulic Properties on Grassed Spillways Due to Erosion <i>Hanwen Cui, Stefan Felder, Matthias Kramer</i>	1877
Critical Submergence for Hydraulic Intakes: Experimental and Numerical Modeling <i>Bhagwan Das, Zulfequar Ahmad, Pramod Kumar Sharma</i>	1879
Supported Placed Riprap Exposed to Overtopping: Structure from Motion Study <i>Dezert Théo, Fjóra Guðrún Sigtryggsdóttir</i>	1887
Desirable Vortex Formation and Flow Non-Uniformity at Spillway Entrance <i>Christopher. I Thornton, Faisal A. Alsultan, Robert Ettema, Jeff Ellis, David K. Hughes, Yongqiang Lan, Michael Zusi</i>	1894
Henry Bazin and His Weir Flow Research <i>Willi H. Hager</i>	1902
Fluctuation Analysis for Vertical Slot Passes Using CFD Simulations and Hilbert-Huang Transformation <i>Kimberley Kasischke, Mario Oertel</i>	1908
Optimization of a Small-Scale Tidal Range Schemes in UK <i>Lam M. Y., Guo B., Ahmadian R.</i>	1915
Flow Regime Transition of Rubble Mound Weir During a Flood <i>Kohji Michioku</i>	1925
A Numerical Investigation of Hydrodynamics of Fish-Friendly Fine Screens <i>Cumhur özbey, Serhat Kucukali</i>	1935

Effects of Wall Roughness on Air-Water Flow Properties of Low-Level Outlets <i>Simone Pagliara, Benjamin Hohermuth, Stefan Felder, Robert M. Boes</i>	1945
Analysis of Gap Losses and Flow Through Zuppinger Waterwheels <i>Kevin Rieger, Julius Maier, Martin Weber, Nicole Saenger</i>	1955
Analytical Equations for Depth and Boundary-Layer Development on Stepped Channels <i>Ryugen Satoh, Masayuki Takahashi, Iwao Ohtsu</i>	1962
Influence of Local Submergence on Piano-Key-Weir Side Wall Discharge Efficiency <i>Xiaoyang Shen, Mario Oertel</i>	1971
Modified Guide Walls for Incremental Increase of Spillway Capacity <i>Nils Solheim, Mikael Hedberg, Hanne N. Lunde, Elena Pummer, Leif Lia</i>	1978
Research on Hydraulic and Velocity Distribution Characteristics of Wedge Aerator <i>Tantao Song, Jun Deng, Wangru Wei</i>	1984
The Origin of AWWA C207 Ring Flange Design <i>Chris C. Sundberg, Terri A. Tovey</i>	1993
Code Welding Details for Mitered Elbows <i>Chris C. Sundberg</i>	1998
Application of the Extended Bernoulli Equation with Location-Dependent Correction Coefficients to the Example of the Potential Flow of a Two-Dimensional Dipole <i>Ulf Teschke, Fabian Ruhr</i>	2007
Free-Surface Profile Upstream of a Grid Clogged by Aquatic Plants <i>Damien Violeau, Kamal El Kadi Abderrezzak, Clément Buvat, Nicolas Guéguen, Oscar Castro-Orgaz</i>	2017
Experimental Study of Driftwood Deflectors at Fishway Intakes <i>Veronica Wiering, Patrick Heneka</i>	2023
Effects of Tributary Floodplain on the Flow Structure at Confluences <i>Guanghui Yan, Saiyu Yuan</i>	2030
Refurbishment for Effective Energy Dissipation in a Chute Spillway - Physical and Numerical Modeling <i>James Yang, Shicheng Li, Robin Lindstens</i>	2037
Flow Characteristics Around Consecutively Assembled Boulders at Slit-Type Check Dam <i>Youichi Yasuda, Nozomi Fuchino, Wang Jiayu</i>	2045
Experimental Study on the Characteristics of Air-Water-Sand Jets in Crossflow <i>Huan Zhang, Wenming Zhang</i>	2053
Effects of Floating Rafts as Anti-Vortex Devices at Horizontal Intakes <i>Mustafa Gogus, Serkan Gokmener</i>	2060
The Roughness of the Water Conduction Works Treated by Sargassum <i>De Luna Faustino, Arganis Maritza, Preciado Margarita, Estevez Miriam, Chávez Valeria, Silva Rodolfo, Mendoza Edgar, García Dafne, Lizbeth Rosales, Jorge Segura</i>	2067
Numerical Study on Sediment Erosion Resistivity of Conventional and Optimized Francis Runner in Different Operating Conditions in Sediment-Laden Flow <i>Pawan Lal Bijukchhe, Hari Prasad Neopane, Amul Ghimire, Atmaram Kayastha, Ole Gunnar Dahlhaug, Sailesh Chitrakar</i>	2075
Integrated river and groundwater management	
Interpretation of Aquifer Tests Using the Kalman Filter <i>Maria Ines Rivas-Recendez, Hugo Enrique Júnez-Ferreira</i>	2084
Mathematical Model of the Aguascalientes Valley Aquifer Hydraulic Behaviour <i>Roxana Nichte-Há Hughes-Lomelín, Sonia Tatiana Sánchez Quispe, Mario Alberto Hernández Hernández, Joel Hernández Bedolla</i>	2090
In Situ and Ex Situ Bioremediation Proposal for Aquifer <i>Adriana Márquez-Romance, Estefania Freytez-Boggio, Julio Maldonado-Maldonado, Samuel Cárdenas-Izaguirre, Edilberto Guevara-Pérez, Sergio Pérez-Pacheco, Eduardo Buroz-Castillo</i>	2098
Fluid mechanics	
Large-Eddy Simulation of Flow Around Leaky Barriers in Linear Configurations <i>Fawaz Alzabari, Pablo Ouro, Catherine Wilson</i>	2108
Air-Water Flow Measurements on a Large-Scale Spillway Chute <i>Matthias Burgler, Daniel Valero, David. F. Vetsch, Robert M. Boes, Benjamin Hohermuth</i>	2119
	2128

Development of a Kadomtsev-Petviashvili-Based 2+1 Dimensional Nonlinear Fourier Transform with Application to Landslide-Tsunamis <i>Ben Constance, Valentin Heller</i>	
Hydrodynamic Forces on the Inferior Beam of a Radial Gate <i>Jennifer Pereira da Cruz, Renato Grube, Iversom dos Santos Castro, Lucas Ricardo Valentim, Raquel Sayuri Omoto Takeda</i>	2138
Aerating Turbines: A New Step Towards River Friendly Electricity Production <i>Leila Dhar, Grégoire Recchia, Florentin Anne, Cédric Béguin, Stéphane étienne, Laurent Bornard, Philippe Côté</i>	2147
Two-Layer Radial Gravity Currents Flow in Porous Media <i>Sepideh Majdabadi Farahani, Alessandro Lenci, Vittorio Di Federico</i>	2157
Lock Release Gravity Current Interacting with a Cylindrical Obstacle <i>Giovanni Di Lollo, Claudia Adduce, Moisés Brito, Rui M.L. Ferreira, Ana M. Ricardo</i>	2163
Reduced Entrainment into a Turbulent Jet Due to Turbulence in the Ambient <i>Susan Gaskin, Khashayar F. Kohan, Rana Sahebjam</i>	2170
Enhancing Cavitating Treatment Intensity with Optimized Temperature for Bacterial Removal in Waterbodies <i>Mingming Ge, Joseph H. W. Lee, Ruipeng Li, Dixia Fan</i>	2180
System-Identification for Regular Water Waves <i>Aoming Liang, Kun Zheng, Zhan Wang, Ruipeng Li, Mingming Ge, Dixia Fan</i>	2186
The Flow Characteristic in Channel Bend Downstream of Negative Step <i>Daiuske Kobayashi, Tatsuhiko Uchida</i>	2192
LES of Gravity Current Propagation at the Base of a Linearly Stratified Ambient <i>Angelos Kokkinos, Panagiotis Prinos</i>	2201
Investigation of Colliding Gravity Currents in a Linearly Stratified Ambient <i>Angelos Kokkinos, Panagiotis Prinos</i>	2208
Weakly Compressible MPS Method for Non-Newtonian Tailings Overland Flows <i>Herman Musumari Siaben, Rubens Augusto Amaro Junior, Liang-Yee Cheng, Ahmad Shakibaeinia</i>	2215
How to Characterise Behaviour of Water Drinking Water Tanks Infrastructures Using 3D CFD Models <i>Antonio Lastra, Alejandro Pinilla, Mónica Ortega, Jaime Botello, Celia Ortega</i>	2225
Effect of Splitter Plate Attached to the Pier on the Flow <i>T Chaturyya, Amrendra Maurya, Ellora Padhi, Shivakumar Khaple</i>	2234
Study on Air Injecting Hydrofoil: Improving Aerating Runners Technology <i>Grégoire Recchia, Leila Dhar, Florentin Anne, Cédric Béguin, Stéphane étienne, Laurent Bornard, Philippe Côté</i>	2244
Effects of a Bubble Curtain Device on Flow Hydrodynamics <i>César Augusto Vaz Santos, Cátia Sofia Batista Tabora, Cristina Maria Sena Fael</i>	2254
Settling Behaviors of Microplastic Disks in the Acceleration Processes in Stagnant Water <i>Ge Yang, Wenming Zhang</i>	2258
Numerical Analysis of Free Flow over Rectangular Sharp-Crested Compound Weirs <i>Burhan Yildiz, Wim Uijtewaal</i>	2264
Experimental Analysis of Flow over Rectangular Sharp-Crested Compound Weirs <i>Burhan Yildiz, Wim Uijtewaal</i>	2270
Experimental Study on Microjet Induced Vortex in the Near-Wall Region <i>Caisheng Huang, Jianmin Zhang</i>	2275
On the Role of Free-Surface Treatment for Simulating Flow Past Submerged Obstacles <i>Yannick Marschall, George Constantinescu, Robert M. Boes, David F. Vetsch</i>	2282
Hydroinformatics, machine learning and artificial intelligence	
Development of Predictive Models for Shallow Lake Turnovers <i>Lam, M.Y., Yucel-Bilen, O., Unalan, U.B., Celebi, E.B., Aksoy, A., Ahmadian, R.</i>	2290
Classification of Typhoon Pattern Landed in Japan Using Self-Organizing Map <i>Koji Asai, Hajime Shirozu, Koji Nishiyama</i>	2297
A Hybrid Optimization Model for Calibrating the HBV Hydrological Model <i>Pinar G. Durgut, M. Tamer Ayvaz</i>	2305
A Simulation-Optimization Approach for Identifying the Aquifer Parameter Zone Structures <i>M. Bugse Tozak, M. Tamer Ayvaz</i>	2313
Development of Machine Learning-Based Rainfall Outlook Models in Madagascar <i>Victor Munoz S., Lorenzo Bianco, Mark Sumka, Andrew Magee</i>	2321

Identifying Bank Profile Shapes in Stable Channels Using Machine Learning <i>Isa Ebtehaj, Azadeh Gholami, Saeed Reza Khodashenas, Hossein Bonakdari</i>	2326
A Porosity Shallow Water Scheme for Urban Flood Modelling <i>Alessia Ferrari, Renato Vacondio, Paolo Mignosa</i>	2336
Analysis of Diffusive-Dispersive Processes in Spatially-Varying Flows in a Water Distribution Network <i>Stefania Piazza, Zhangjie Peng, Frederick C. Sonnenwald, Jesus Leonardo Corredor Garcia, Mariacrocetta Sambito, Gabriele Freni, Ian Guymer</i>	2342
Modeling and Assessment of Lateral Grooved Airport Runway Water Film Thickness <i>Kaihua Guo, Mingfu Guan</i>	2346
Numerical Simulation of Water Table Fluctuation in Sloping Aquifers <i>Gizem Mermer, Gurhan Gurarlan</i>	2353
Classification of Meander Bends a Data-Driven Approach <i>Sergio Lopez Dubon, Alessandro Sgarabotto, Stefano Lanzoni</i>	2357
River Water Temperature Prediction Based on Improved Support Vector Regression <i>Yongqao Lu, Linglei Zhang, Min Chen, Ning Liao, Youcai Tuo, Yunxiao Jia</i>	2365
Evaluation of IMERG Precipitation Products for Water Management in Thailand <i>Narongrit Luangdilok, Watin Thanathanpon, Ticha Lolupiman, Kachapond Chettanawanit, Piyamarn Sisomphon, Sathit Chantip, Apimook Mooktaree, Theerapol Charoensuk</i>	2374
Comparison of Modern Bias-Correction Techniques for Operational Hydrological Applications <i>Narongrit Luangdilok, Watin Thanathanpon, Ticha Lolupiman, Kachapond Chettanawanit, Piyamarn Sisomphon, Sathit Chantip, Apimook Mooktaree, Theerapol Charoensuk</i>	2381
Decision-Making Improvement and Modelling Tools for Drinking Water Treatment During Rainfall Events <i>Christian Ortiz-Lopez, Christian Bouchard, Andres Torres, Manuel Rodriguez</i>	2388
Pilot Development of Water Supply Network Digital Twins in Hong Kong - Shaping the Digital Transformation Roadmap <i>Wan Chin Man, Liu Kai Chun, Chan Kwok Tai</i>	2393
Modern instrumentation and experimental technologies	
New Insights into Continuous Estimation of Streamflow Direction Using Travel Time Principles <i>Mohamad Basel Al Sawaf, Kiyosi Kawanisi</i>	2398
Deep-Learning Optical Flow Compared to Conventional Large-Scale Image Velocimetry Techniques <i>Saber Ansari, Colin Rennie, Elizabeth Jamieson, Ousmane Seidou, Shawn Clark</i>	2408
CFD of an Accelerator Decanter: Lessons Learned <i>M.Ortega, C.Ortega, A.Lastra, J.Botello, S.de Rico, E.Arenas, E.Arozamena, A.Lastra</i>	2415
Experimental and Computational Evaluation of Fish Passageway with Porous Media Boundary <i>P. A. Mikael Hedberg, J. Gunnar. I Hellström, Nils Solheim</i>	2422
Pump Erosion Test: A Low Cost Erodimeter for Field Studies <i>Frédérique Larrarte, Christophe Chevalier</i>	2429
Experimental Investigation of Pressure-Flow Scour Using Particle Image Velocimetry <i>Sofi Aamir Majid, Shivam Tripathi, Debopam Das</i>	2435
Vertical Jet Generation During a Sudden Flow Deceleration <i>Gerald Muller</i>	2444
Monitoring the Manning's N Coefficient Variation over the Yearly Cycle <i>M. Muste, B. Cikmaz, A. Lamoreux, O. Baydaroglu Yesilkoy, I. Demir, E. Meselhe, C. Bacotiu</i>	2449
Exploration Technology Using Cosmic Ray Muons Applied to River Embankment <i>Keigo Namikawa, Naoki Koyama, Taro Kusagaya, Keiichi Suzuki, Tomohito Yamada, Tadashi Yamada</i>	2459
Energy Dissipation on Stepped Spillways: The Effect of Mounted Step Roughness <i>Mojtaba Kordnaeij, Mohammad J. Ostad Mirza Tehrani, Seyed Amin Asghari Pari, Hassan Falahat</i>	2468
A Test Flume for Assessing Fish Behaviour During Downstream Movement <i>Roessger Tom, Wagner Falko, Roth Márcio S., Busch André, Kopecki Ianina, Stamm Juergen</i>	2478
Comparison of Four-Transducer UVP Configuration and ADV for Flow Velocity and Turbulence Measurements <i>Clara Streule, Gabor Suss, Mohammadreza Maddahi, Robert M. Boes, Ismail Albayrak</i>	2481
Evolution of Cavitation Bubble Morphology Under Different Wall Temperatures Using Lattice Boltzmann Method <i>Yang Liu, Jianmin Zhang</i>	2487
Hydrogeochemical and Isotope Characterization of Groundwater in Morelia, Michoacan, Mexico <i>Juan Rodrigo González-Sosa, Joel Hernández Bedolla, Sonia Tatiana Sánchez Quispe, Marco Antonio Martínez Cinco</i>	2493

Hybrid modelling and scale influence

Wind Drag Coefficient in Large Shallow Lakes: Experimental Study and Modeling Application <i>Lingwei Chen, Chen Zhang</i>	2500
Numerical and Physical Modelling of the Jandula Dam Spillway (SPAIN) <i>Ángel Gassó Sánchez, Juan José Rebollo Cillán, David López Gómez, Luis Balairón Pérez</i>	2508
Material Scaling for Laboratory Experiments of Zoned Dam Breaching Due to Overtopping <i>Matthew C. Halso, Frederic M. Evers, David F. Vetsch, Robert M. Boes</i>	2513
Application of Multi-Scale Coupled CFD-DEM to Geotechnical Processes <i>Marcel Kwakkel, Giovanni Viciconte, Christoph Goniva, Christoph Kloss</i>	2523
Influence of Cycle Number in CFD Studies of Labyrinth Weirs <i>P. Langohr, D. B. Bung</i>	2530
Surface Cooling of Sloping Water Bodies with Shallow Vegetated Regions <i>Panagiotis Prinos, Vassilios Papaioannou</i>	2535
Vegetation Effects on Unsteady Natural Convection in Sloping Water Bodies <i>Vassilios Papaioannou, Panagiotis Prinos</i>	2544
A Three-Dimensional Wave Vegetation Interaction Using Hybrid Model <i>Divya R., V. Sriram</i>	2554
Numerical and Physical Modelling of the Arenos Dam Spillway (SPAIN) <i>Juan José Rebollo Cillán, Ángel Bautista Yáñez, Cristina Solá García, Roberto Carlos Martínez García, Luis Balairón Pérez, Lucía Turrero Ruíz, Tamara Ramos del Rosario, Ángel Gassó Sánchez, Ricardo Herrero Santos, David López Gómez</i>	2562
Adaptive Hybrid 1D Modeling for Digital Twin of Hydropower Systems <i>Hong Wang, Osman Ahmed, Kyle DeSomber, Colin Sasthav, Pal-Tore Selbo Storli, Ole Gunna Dahlhaug, Hans Ivar Skjelbred, Ingrid Vilberg</i>	2572
A Future Prediction of Loss of Coastal Forest and Vegetation Species Due to Rising Sea Level <i>Kohji Uno</i>	2581

River Research and Management

Modelling of Large-Scale Deposits of Heterogeneous Gravel Material <i>Christina Baumgartner, Nils P. Huber, Bernd Hentschel</i>	2588
Adequate Balance Between Water's Withdrawal and Rivers' Environmental Protection <i>Elena Carcano, James Ball, Barry Croke, Murray Konzang</i>	2596
River Hydraulic Analysis for Flood Mitigation Project in Pekan, Pahang, Malaysia <i>Azyan Zafyrah Mohd Zahid, Lim Foo Hoat, Nurul Hidayah Ruslan, Jalina Kassim</i>	2606
Hazard Analysis Critical Control Point Approach for Assessing the Downstream Impact of Flood Risk Reduction Measures <i>Mateja Skerjanec, Franci Steinman, Gasper Rak</i>	2616
Estimating Flood Inundation in Urban Areas Using Scenario Generation Algorithms <i>Jaehyun Shin, Seung Ki Kim, Dong Sop Rhee</i>	2623
Flooding Damage Expansion by the Northern Kyushu Heavy Rain 2017 Japan <i>Akira Tai, Riko Yamamoto, Mukhsan Putra Hatta</i>	2625
Influence of Hybrid Groyne in River Channel on Flow Field <i>Takayuki Tanaka, Takuro Fukatsu, Yasuko Yamamoto</i>	2632
Characteristics of Water and Sediment and Sedimentation in the Xiluodu Reservoir in Jinsha River <i>Bangwen zhang, Anjun Deng, Dangwei Wang, Shenghang Feng, Hongling Shi</i>	2640
Study on the Safety Width Planning and Influential Factors of Riparian Buffer Zone in the Middle and Upper Reaches of Ziwu River, China <i>Hang Chen, Xiaode Zhou, Ying Wang, Wei Wu</i>	2646
Dealing with Spatial Variability When Modelling Rainfall-Runoff Processes <i>Sergio Zubelzu, Raúl Sánchez</i>	2656
CFD Modelling as a Tool to Better Understand Fish Behavior <i>Lovisa M. Sjöstedt, J. Gunnar I. Hellström, Anders G. Andersson</i>	2665

Nature-based Solutions for Upstream Catchments and Small Streams

- Natural Infrastructure Practice for Flood Protection and Resilience Against Extreme Events in Peru
Irantzu Lexartza Artza, Martin Alcalde, Ian Carradice, Paolo Damone, Siraj Tahir, Nicole Tarrío 2673
- Prevention of Flood Risk Using Detention Basins, Agva Case Study
Yunus Oruc, Kutay Yilmaz, Serhat Kucukali 2680
- Flood Risk Reduction Using Nature-Based Solutions in Climate Change Conditions
George Mitsopoulos, Apollon Bournas, Aimilia Theochari, Michalis Diakakis, Aristeidis Bloutsos, Efthymios Lekkas, Evangelos Baltas, Anastasios I. Stamou 2690

Nature-based Solutions for Large Rivers

- Methodology to Simulate Flow Around Kasumi-Dike -a Nature Based Solution
Kenichiro Kobayashi, Tetsuya Sumi, Moe Ohata 2699
- Meusepark Ooijen-Wanssum: Lessons from a NBS Benchmark Project in the Netherlands
Jeroen Rijke, Maarten Podt 2703

Nature-based Solutions for Cities and Urban Watersheds

- Inclusion of Nature-Based Solutions in Urban River Management Plan
Apoorva Bamal, Sogol Moradian, Tomasz Dabrowski, Agnieszka I. Olbert 2711
- Integrated Development of Nature-Based Solutions (NBS) for Tropical Urban Watershed Restoration
Ricardo Bonilla Brenes, Martín Morales Mora, Rafael Oreamuno Vega, Jochen Hack 2720
- Participatory Approach to Increase Urban Flood Resilience Through Blue-Green Infrastructure
Virginia Rosa Coletta, Alessandro Pagano, Irene Pluchinotta, Nici Zimmermann, Umberto Fratino, Raffaele Giordano 2730

From White River to Green River, a New Paradigm of Ecohydraulics

- Riparian Vegetation Effects on Island Development in Sand Braided River
García de Jalón D., Lora E., Lestienne C., García L., Bejarano MD. 2736
- River Bed Deformation Induced by the Riparian Vegetation in the Case of the Sand River
Won Kim, Chaewoong Ban 2746
- 20 Years After the River Restoration Measure at the Upper Drava River (AUSTRIA) - Has the Tipping Point Been Crossed?
Isabell Becker, Gregory Egger 2749
- A New Method to Evaluate the Stress Intensity of Macrophytes
Mizanur Rahman, Takashi Asaeda, Jonas Schoelynck 2756

Deltas and Coastal Engineering

- Anthropological Design of a Tidal Creek in the Elbe River
Luis Manuel López Zárate, Stefan Kraatz, Jan-Moritz Muller, Gabriele Gönnert 2765
- Change of Tide by Decreasing the Length of Ariake Bay
Akira Tai, Reitaro Muroyama, Simon Neill 2770

Marine Outfall Systems

- Analytical Model of Effluent Discharge Under Tidal Oscillations
Ahmed Al Kasbi, Anton Purnama 2777
- Numerical Simulation of Buoyant Jet in Linearly Stratified Flowing Ambient
Danial Goodarzi, Abdolmajid Mohammadian, Sina Tahmooresi 2786
- Large Eddy Simulations of Desalination Discharges: Detrainment Processes
Shuen Law, Mark Davidson, Craig McConnochie, Daniel Lagrava 2791
- Effluent Discharge Modelling in Shallow Waters
Hossein Kheirkhah Gildeh, Abdolmajid Mohammadian, Ioan Nistor 2800
- Distribution of Turbulent Schmidt Number in Inclined Negatively Buoyant Jets
Sina Tahmooresi, Abdolmajid Mohammadian, Ioan Nistor, Hossein Kheirkhah Gildeh, Danial Goodarzi 2805

Sediment Transport and Morphodynamics

Sediment Trapping Mechanism of Lingdingyang West Bay in Dry Season <i>Longhua Gao, Hanqing Liu, Yulong Xiong</i>	2814
ELMOD - Background and Outlook on the Research Project <i>Sebastian Furst, Holger Weilbeer, Jessica Kelln</i>	2819
Interactions of Land Use Change and Sediment Load in the Grijalva River <i>Alejandro Mendoza, Fabian Rivera-Trejo, Gastón Priego-Hernández, Gabriel Soto-Cortés</i>	2825
Influences of Hillslope Erosion on Basin-Scale Sediment Transport Processes <i>Menglu Qin, Daisuke Harada, Shinji Egashira</i>	2832

Reservoir Sedimentation and Sustainable Management

1D Numerical Modelling of Sediment-Bypass-Tunnel Operation in a Narrow Reservoir <i>Sudesh Dahal, Frederic M. Evers, Robert M. Boes, David F. Vetsch</i>	2842
Assessing and Managing Sediment-Induced Problems at Tuyamuyun Hydro-Complex in Central Asia <i>Sanjay Giri, Eric A. Stern, Malika Ikramova, Mohammad A. Anwer, Aksulu Kushanova</i>	2848
Impact of Land Use on Soil Erosion: Fincha Watershed Case <i>Motuma Shiferaw Regasa, Michael Nones</i>	2858
Pressurized Flushing: The Effect of Water and Sediment Heights <i>Hassan Falahat, Mohammad J. Ostad Mirza Tehrani</i>	2863
Sediment Monitoring and Modelling for a Hydropower Reservoir, Madeira River <i>Leonardo Zandonadi Moura, Sérgio Koide, Jean-Michel Martinez, Henrique Llacer Roig, Alexandre Kepler Soares</i>	2871
Boulder Transport by Kali Gandaki River in Central Himalayan Region <i>Mahendra B. Baniya, Takeshi Fujino, Rocky Talchabhadel, Arjun Baniya, Naba Raj Sharma, Shivaram K.C.</i>	2880

Surrogate Techniques for River Sediment Transport Monitoring

Acoustic Measurements for Reservoir Sedimentation Analysis <i>Slaven Conevski, Ignacio Pereyra Yraola, Massimo Guerrero, Kordula Valerie Anne Schwarzwaldler, Stefan Haun, Kilian Mouris, Siri Stokseth, Nils Ruther</i>	2885
A User's Perspective on Bedload Sampler's Field Deployment <i>Gordon Gilja, Antonija Harasti, Robert Fliszar</i>	2895
Turbulence Implications on Suspended Sediment Concentration Assessment by Using the ADCP <i>Massimo Guerrero, Slaven Conevski, Nils Ruther, Vittorio Di Federico</i>	2901
Kivi: The Smartest of Pebbles <i>Georgios Maniatis, Gert Toming, Trevor Hoey, Jeffrey A. Tuhtan</i>	2911
Plate Accelerators for Bedload Monitoring in Run-of-River Plants: Laboratory Testing <i>Manuel Pirker, Hannes Badura, Josef Schneider</i>	2918

Integrated Management of Extremes, Climate Change

Experimental Study of the Formation of Dammed Dams by Bulk Landslides <i>Jingyi Zhang, Jianmin Zhang</i>	2922
El Nino Impacts from Large to Local Scale on Peruvian Rivers <i>Marco Córdova, Pedro Rau, Luc Bourrel, Jesús Sosa</i>	2927
Human and Climate Impacts on Drought Dynamics and Vulnerability <i>Jaroslav Napiórkowski, Ewa Bogdanowicz, Monika Kalinowska, Emilia Karamuz, Krzysztof Kochanek, Iwona Kuptel-Markiewicz, Michael Nones, Tesfaye Belay Senbeta</i>	2937
A Study on Erosion Risk Associated with Climate Change <i>Tsubasa Kawai, Makoto Nakatsugawa</i>	2942
Research on Flood Risk Reduction in Snowy Region Linking Dams <i>Seren Nishijima, Makoto Nakatsugawa</i>	2950
Predicting Stormwater Nitrogen Loads from an Urban Catchment in Cold Region in Year 2050 Under the Impacts of Climate Change <i>Xiaoyu Zhang, Shereif H Mahmoud, Wenming Zhang</i>	2959
Preliminary Assessment of Flood Hazard Reduction Strategies: The Enza River <i>Susanna Dazzi, Renato Vacondio, Paolo Mignosa</i>	2974

Integrated Flood Risk Management from Science to Practice (1)

- Flood Information Systems - Experiences from the Summer 2021 Flood 2981
Martin Fabisch, Hellen Hammoudi, Robert Jupner

Integrated Flood Risk Management from Science to Practice (2)

- Imputation Methods for Missing Hydraulic Infrastructure Data: A Performance Evaluation 2986
Hoa Xuan Nguyen, Ana Margarida Bento, Tiago Ferradosa, Biswajit Basu
- Low Flows Detectable from Different Insights 2994
Elena Carcano, Paolo Bartolini
- Integrating Artificial Intelligence for Early Flash Flood Detection and Decision Support 3001
Isa Ebtehaj, Hossein Bonakdari
- International Geological and Geotechnical Practice for River Defences Developed for Delivery of Flood Infrastructure in Peru 3011
Francesc Mirada, Andrew Keene, Frank Chuquin, Irantzu Lexartza-Artza

Extreme Events in Coastal and Offshore Environments

- The Accelerating Frequency of Extreme Weather Events in Lisbon, Portugal 3018
Maria Manuela Portela, Luis Angel Espinosa, Salem Gharbia
- Increased Recurrence of Global and Coastal El Nino Events on the South American Coasts 3025
Marina Farias de Reyes, Karla Montero
- Impacts of Detached Breakwaters in Ofir Sandspit and Cavado River Mouth, Portugal 3033
Francisco V.C. Taveira Pinto, Paulo Rosa Santos, Francisco Taveira-Pinto, Luciana das Neves, Victor Ramos
- Sea Level Rise and Overtopping on Sandy Beach During Monsoon 3043
Benson, Y.A., Razali, M.R., Abdul Halim Zaki, I., Tajul Ariffin, A.S., Hamzah, S. B., Jamal, M.H.
- Global Trends in Wave Height in Western Mediterranean Sea 3054
Andrea Sulis, Andrea Carboni, Silvia Serreli

Water Engineering Design in a Changing Climate

- Modeling of Extreme Rainfall Processes in a Changing Climate 3058
Van-Thanh-Van Nguyen
- Experimental Impact Analysis of Climate Change on Vertical Slot Passes 3065
Philipp Werner, Nicole Saenger
- Urban Flood Defence Strategies: Suds Solutions in Queretaro, Mexico 3072
Martina Altana, Gianfranco Sanna, Andrea Sulis

Environment and Society

- Study on Counter-Flow Absorption Tower for Capturing CO₂ from Air 3082
Wenhui Huang, Xiaojun Song
- Variations of Algae According to Opening of Yeongju Dam 3091
Kyong Oh Baek, Dong Yeol Lee
- Assessing River Environments for Aquatic Habitats and Recreational Use 3096
Masayuki Nitta, Muneyuki Aoki, Mitsuru Ohira
- Fundamental Study on Monitoring Microplastic Deposition in Sanbanze Using UAV 3105
Takeshi Takemura, Shinya Nishio, Tomoaki Nakamura
- Dynamics of Mesoscale Fluvial Habitats of an Alpine Reach Under Various Flow Conditions 3111
Mahmoud O.M. Awadallah, David F. Vetsch, Robert M. Boes, Erik van Rooijen, Davide Vanzo
- The Statistical Description of Microplastic Discontinuous Motions in Open Channel Flow 3121
Zijian Yu, Wenming Zhang

Environment and Society – Novel Ecohydraulic Approaches in River and Hydro-Environmental Engineering

- Experimental Study on the Dilution and Diffusion Pattern of Grass Carp Environmental DNA Under Different Water Flow Conditions 3128
Ruiyu Ding, Jianmin Zhang, Yurong Wang

Novel Ecohydraulic Approaches in River and Hydro-Environmental Engineering

- Hydrocomplexity in Vegetated Lateral Cavities 3134
Luiz Eduardo Domingos de Oliveira, Carlo Gualtieri, Johannes Géron Janzen

RIBES – River flow regulation, fish Behaviour and Status

- Novel 'Dancing Rods' Behavioural Barrier for the Guidance of Juvenile Salmonids 3142
Velizara Stoilova, Patrik Andreasson, David Aldvén, Larry Greenberg
- The Transition of Spatial Distribution Pattern of Fish Between River and Lake 3147
Jiajian Qiu, Hongwu Tang, Saiyu Yuan
- Passability of Weir Complexes for Fish in the River Meuse 3155
Erik Ruijgh, Hans Brinkhof, Tom Buijse, Roel van der Schee, Tom O'Mahoney

Sustainable development goals

- Green/Gray Solutions for Restoration of Historic Canals in Fort Kochi 3163
Tara Pillai, Swati Arya, Pranit Rai, Angelos Findikakis

Hydropeaking in Regulated Rivers – from Hydraulic Analysis to Design of Mitigation Measures

- Pool-Riffle Morphology as a Holistic Mitigation Measure for Hydropeaking 3171
Serhat Kucukali, Ahmet Alp, Adil Akyuz
- River Hydrodynamics and Seed Establishment Processes: A 2D Modelling Approach 3181
Davide Vanzo, Michael Looser, David F. Vetsch, Sabine Fink, Francesco Caponi

Urban Water and Water Industry

- Harnessing the Disinfectant Effect of Ultraviolet Light Radiation in Water Treatment System 3186
Abayomi Olusegun Adeniyi, Modupe Jimoh
- Optimal Deployment of Moving Sensors for Water Quality Monitoring of Sewer Systems 3192
Mariacrocetta Sambito, Gabriele Freni

Transient Flows

- Numerical Analysis of Air-Water Stratified Flow in Pipe with Branch Junctions 3196
Janek Laanearu
- Hydropneumatic Tank Optimal Sizing for Surge Protection of Pumping Systems 3205
Leonardo Morimoto, Luis Eduardo Moussa Youssef, Laura Aurora de Melo Santana, Alexandre Kepler Soares
- Efficient Transient Analysis Method for Leak Detection in Pipe Networks 3214
Manli Wang, Bin Pan, Alireza Keramat, Huan-Feng Duan
- Pumping Stations Transients' Models from Canal de Isabel II Water Supply Network 3222
C. Ortega, A., Carrasco, A. Lastra, P. Gómez, J. Botello, M. Ortega
- Surge Analysis of Hot Water Heat Exchanger Tube Rupture 3232
Hamid Bashiri, Yifan Zheng
- Hydraulic Simulation of an Urban DMA Under Different Operating Conditions. The Case of Efkarpia District in Thessaloniki, Greece 3237
Panagiota Galiatsatou, Panagiota Stournara, Christos Anastasiadis, Filippos Iosifidis, Ioannis Kavouras, Alexandros Mentis
- A Multi-Scale Convolutional Neural Network Model for Detecting Pipeline Leak 3247
Tan Zhen, Guo Xinlei, Li Jiazhen

Hydraulic Engineering and Water Management

Review of Structural Mitigation Measures for Glacial Lake Outburst Floods <i>Jan Hrebrina, Slaven Conevski, Elena Pummer</i>	3260
Flood Control Potential of Dam Reservoirs in River Basin of Central Vietnam <i>Kei Koura, Naoki Koyama, Tadashi Yamada</i>	3269
Flow Regularization Study in the Chapeco River- Santa Catarina – BR <i>Beatriz Sepulveda Pires, Alberto Luiz Francato</i>	3275
Experimental Study on Aeration Concentration Distribution of Submerged Underflow Stilling Basin <i>Wu Yaodong, Liu Xingyu, Wei Wangru</i>	3283
Design Proposal of a Prototype of Gravitational Water Vortex Turbine with Modified Blades for Hydro Power Generation on Micro Scale <i>Víctor Hugo Guerra-Cobián, Miguel Angel Zamora-Juárez, Adrián Leonardo Ferrino Fierro, David Clemente López, José Luis Bruster Flores</i>	3292

Computational and Experimental Methods

Study on Regional Groundwater Numerical Simulation Model and Its Application <i>Shaobo Wang, Hanqing Liu, Zhiqiang Li, Longhua Gao</i>	3302
Draining of a Water Tank Under Different Ventilation Conditions <i>Jialing Liang, Nian Ye, Yuanhao Xiao, Yiyi Ma</i>	3308
Calculation Methods of Landslide Dam Break Flood Peak Discharge <i>Ou Zhao, Jianmin Zhang</i>	3316
Non-Hydrostatic Galerkin Model with Linear/Quadratic Weighted Average Pressure Profile <i>Lucas Calvo, Diana De Padova, Michele Mossa, Gisselle Guerra</i>	3323
Novel Data Augmentation Method for Rainfall-Runoff Calculation by Machine Learning <i>Masayuki Hitokoto, Takeru Araki, Kenta Hakoishi, Yuto Endo</i>	3331
Interaction Between Driftwood and Free-Surface Flow in an Open Channel <i>Terunori Ohmoto, Hirotaka Une</i>	3339
Flow Aeration Effect on Laser Ranging Measurements of Free Water Surface <i>Benjamin Bizjan, Marko Hocevar, Sabina Kolbl Repinc, Gasper Rak</i>	3346
Application of Elasticnet Modeling for Management of Reservoir Under Uncertainty of Inflows <i>Shoma Wakasaya, Makoto Nakatsugawa, Yosuke Kobayashi</i>	3350
Experimental System for Studying the Ultrasonic Flowmeter in Open Channels <i>Zhigang Wang, Heming Hu, Dong Zhang, Dejun Zhu, Hongwei Zhang</i>	3360
Pump-Driven Generation of Long-Period Ship Waves in Experimental Flumes <i>Christina Carstensen, Gregor Melling, Bernhard Kondziella, Lars Tretau</i>	3367
Optimizing Discharge Coefficients Spillways Labyrinth Implementing Two Hydrodynamics Forms Devices in the Upstream <i>Gustavo A. Delgado F., Fernando J. Camino S., Mann A. Paulina</i>	3376

Computational and Experimental Methods – Fluid-Structure Interactions: experimental & numerical

Numerical Simulations of Underground Seepage in Earthen Embankments by Natural Element Method and Sibson Interpolants	3383
Sand-Bar Impact on Bank Protection Structure: Cases of Ganges and Brahmaputra-Jamuna Rivers <i>Shampa, Hussain Muhammad Muktadir, Maruf Ahmed, AKM Saiful Islam</i>	3390

Fluid-Structure Interaction: experimental and numerical

Flow Hydrodynamics Around a Large and Complex Pier. Numerical Study <i>César Augusto Vaz Santos, Cristina Maria Sena Fael, Juan Pedro Martín-Vide</i>	3399
Investigation of Flow Through Small-Hydropower by Numerical and Experimental Methods <i>Shu Kai Ng, Akihiko Nakayama, Wei Xuan Ng, Tatsuhiko Uchida</i>	3407
A Physical Modelling Approach to Assessing Water Control Structures <i>Mohd Kamarul Huda S., Saiful Bahri H.</i>	3416

Transport dynamics of plastics in aquatic environments

- Coupled Field and Numerical Analysis of Riverine Macroplastic 3423
Gábor Fleit, Tímea Nagy, András Kristóf Málnás, Daniel Husztik, Csaba Ilcsik, Attila Dávid Molnár, Miklós Gyalai-Korpos, Sándor Baranya

Large (Real)-Scale Experiment for Fluvial Hydraulics

- Discharge Coefficients Spillways Labyrinth According Transitional Hydrodynamic Upstream Walls Forms at the Approach Canal 3431
Gustavo Delgado, Oscar Paz Paiz, Vesile Akasel
- Experimental Analysis of Sediment Transport Rate in Vegetation Patch and Channel Changes 3438
Chang-Lae Jang, Minseok Kang, Hyo Hwang, David Oh
- Preliminary Results of Periodic Flow Fluctuation at a Large-Scale River Confluence 3446
Lei Xu, Saiyu Yuan, Bart Vermeulen
- The Ecohydrodynamic Traits of Sparse-density Vegetated Open Channels: real-scale Analysis 3451
Giuseppe Francesco Cesare Lama
- Land Use Planning of FSDAs based on Flood Risk Zoning 3459
Qian Yu, Na Li, Jing Wang, Yanyan Wang

Author Index