

22nd Congress of the International Association for Hydro-Environment Engineering and Research-Asia Pacific Division (IAHR-APD 2020)

Creating Resilience to Water-Related
Challenges

Held online due to COVID-19

Sapporo, Japan
14-17 September 2020

Volume 1 of 3

ISBN: 978-1-7138-2703-0

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© (2020) by International Association for Hydro-Environment Engineering & Research (IAHR)
All rights reserved.

Printed with permission by Curran Associates, Inc. (2021)

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

VOLUME 1

1. RIVER ENGINEERING AND MANAGEMENT

1-1 HYDRAULIC STRUCTURES

1-1-1: COMBINED SEEPAGE BENEATH GRAVITY HYDRAULIC STRUCTURES BASED ON DROPPED BED	1
<i>Ahmed M. Abdelrazek, Mohammad A. Abourohiem</i>	
1-1-2: APPLICATION OF RIVER BANK PROTECTION WITH PRIMARY VELOCITY REDUCTION FUNCTION TO CURVED FLOW	9
<i>Katsutoshi Watanabe, Nozomu Oonaka</i>	
1-1-3: FLOW DETAILS AROUND PILE-GROUP GROYNES.....	17
<i>Obaidullah Safie, Akihiro Tominaga</i>	
1-1-4: EXPERIMENTAL INVESTIGATION ON ARTIFICIAL CONTROL AGAINST PERIODICALLY DEFLECTED FLOW IN SUBMERGED HYDRAULIC JUMP.....	25
<i>Youichi Yasuda, Shintaro Narazaki</i>	
1-1-5: PROPOSAL OF SLOPING ENERGY DISSIPATOR WITH STACKED BOULDERS IN LOW DROP STRUCTURES.....	33
<i>Youichi Yasuda, Keito Masui</i>	
1-1-6: THE APPLICATION OF CONCRETE BLOCKS AS SLOPING ENERGY DISSIPATOR WITH LARGE ROUGH ELEMENTS	41
<i>Nobuyoshi Sukanuma, Youichi Yasuda, Keito Masui</i>	
1-1-7: PERFORMANCE EVALUATION OF BANDAL-LIKE STRUCTURES FOR SEDIMENT MANAGEMENT IN BRAIDED JAMUNA RIVER.....	49
<i>Md. Ashiqur Rahman, Md. Munsur Rahman, Shampa, Anisul Haque, Md. Maruf Dustegir, Nusrat Jahan Nishat, Hajime Nakagawa, Motaher Hossain</i>	
1-1-8: MEAN FLOW AND TURBULENT STATISTICS OF THE FLOW OVER A SUBMERGED SHARP-CRESTED WEIR	55
<i>Chaewoong Ban, Sung-Uk Choi</i>	
1-1-9: THE EFFECT OF GRAIN SIZE IN DIKE BREACHING DUE TO OVERTOPPING FLOWS	59
<i>Shinichiro Onda, Koichi Shimizu, Yosuke Higo, Takashi Hosoda</i>	
1-1-10: A METHOD OF AERIAL STIV WITHOUT REQUIRING OF GROUND CONTROL POINTS.....	63
<i>Masahiro Hashiba, Ichiro Fujita, Noriyuki Nishiyama, Yoko Ohta</i>	
1-1-11: STUDY ON FLOW CHARACTERISTICS IN THE CAVITY OF STRAIGHT OPEN CHANNEL SIDE WALL.....	71
<i>Itsuki Nonaka, Katsutoshi Watanabe</i>	

1-1-12: FLOW CHARACTERISTICS OF COMPOUND OPEN CHANNEL FLOW WITH DISCONTINUOUS FLOOD PLAIN.....	75
<i>Kenshin Teyama, Katsutoshi Watanabe</i>	
1-1-13: UNDISTURBED FLUID FLOW FOR IMPROVED MACROSCOPIC ESTIMATION OF DRAG FORCES ACTING ON CIRCULAR CYLINDERS.....	79
<i>Satoshi Yokojima, Tatsuhiko Uchida, Yusuke Kazehaya, Yoshihisa Kawahara</i>	
1-1-14: DAMAGE TO BRIDGES DUE TO MEDIUM SCALE FLOODING: A CASE STUDY OF THE IWANE OHASHI BRIDGE.....	85
<i>Tomoya Matsuda, Yasuharu Watanabe</i>	
1-1-15: COMPUTATIONS OF THE FLOWS OVER THE WEIR CHANGING FROM THE SUBMERGED TO SURFACE FLOWS.....	93
<i>Seongwook Choi, Sung-Uk Choi</i>	
1-1-16: NUMERICAL STUDY ON A TURBULENT BACKWARD-FACING STEP FLOW IN OPENCHANNEL.....	96
<i>Donggeun Yoo, Joongcheol Paik</i>	
1-1-17: CAVITATION INTENSITY IN GLASS BEAD-WATER MIXTURES BASED ON IODOMETRIC TITRATION.....	98
<i>Dingkang Xia, Kunpeng Su, Jianhua Wu, Xinming Zhang</i>	
1-1-18: CAVITATION DAMAGE IN PARTICLE-LADEN LIQUIDS WITH CONSIDERING PARTICLE CONCENTRATION AND SIZE.....	104
<i>Kunpeng Su, Jianhua Wu, Dingkan Xia, Zhiyu Ding</i>	
1-1-19: HYDRAULICS OF 3D-AERATOR WITH LATERAL ENLARGEMENTS ON SPILLWAYS.....	110
<i>Fei Ma, Jian-Hua Wu, Kunpeng Su, Jianrong Xu</i>	
1-1-20: EXPERIMENTAL STUDY ON THE ENERGY DISSIPATION MECHANISM OF THE TWO-STAGE STILLING BASIN IN LOW FROUDE NUMBER FLOW.....	116
<i>Han Changhai, Tan Gaowen, Yu Kaiwen, Han Kang</i>	

1-2 SEDIMENT TRANSPORT

1-2-1: THREE-DIMENSIONAL NUMERICAL SIMULATION OF SEDIMENT CONTROL AT LATERAL DIVERSION.....	124
<i>Kazuyuki Ota, Takahiro Sato</i>	
1-2-2: EXPERIMENTAL OBSERVATION AND ANALYSIS ON THE MICRO ARCHITECTURE OF BIOFLOCCULATION SEDIMENT.....	132
<i>Huiming Zhao, Yuefeng Zhang, Liqun Tang, Chonghao Wang, Xiaowei Gao, Yuhai Wang, Badin Liu, Chuansheng Guo, Haochuan Feng</i>	
1-2-3: EROSION RATE OF BED SEDIMENT IN TERMS OF ENTRAINMENT CONCEPT.....	139
<i>Daisuke Harada, Egashira Shinji</i>	
1-2-4: SEDIMENT RUNOFF IN IRRAWADDY (AYEYARWADDY) RIVER BASIN AND THE SEDIMENT MANAGEMENT.....	146
<i>Myo Thandar, Kazuki Yamanoi, Masaharu Fujita</i>	

1-2-5: TIDAL CURRENTS AND SAND BAR EVOLUTION IN SITTAUNG RIVER ESTUARY, MYANMAR.....	154
<i>Tanjir Saif Ahmed, Shinji Egashira, Daisuke Harada</i>	
1-2-6: BEDLOAD DISCHARGE MEASUREMENT IN ACTUAL RIVER WITH MBES AND ADCP	162
<i>Koichi Tsuchida, Masahiro Hashiba</i>	
1-2-7: STUDY ABOUT BOIL IN ACTUAL RIVER.....	170
<i>Atushiro Yorozuya, Ahmad Ali Gul, Tsuyoshi Hoshino, Shoji Okada</i>	
1-2-8: INFLUENCE OF BASSET HISTORY FORCE ON PREFERENTIAL CONCENTRATION OF SMALL PARTICLES AND BUBBLES IN TURBULENCE	178
<i>Satoshi Yokojima, Yoshiaki Shimada, Kazuki Mukaiyama</i>	
1-2-9: NON-EQUILIBRIUM BED VARIATION ANALYSIS IN STONY-BED RIVERS CONSIDERING CHANGES IN THE BED SURFACE STRUCTURE: APPLICATION TO ENLARGEMENT MECHANISM OF THE MONOBE RIVER MOUTH DUE TO FLOODS.....	186
<i>Yoshiharu Takemura, Shoji Fukuoka</i>	
1-2-10: FACTORS AFFECTING THE CONTINUITY OF RIVER BED ELEVATION AT THE SLIT THE SITE OF SLIT TYPE CHECK DAM	194
<i>Sayumi Katayama, Yasuharu Watanabe, Taiki Kibuchi</i>	
1-2-11: SEDIMENTATION OF A NON-SPHERICAL SOLID PARTICLE UNDER INFLUENCES OF FLOW DISTURBANCES	202
<i>Yasuo Hattori, Hitoshi Suto, Keisuke Nakao, Kiyoshi Toshida, Mitsuharu Nomura</i>	
1-2-12: MORPHOLOGICAL COMPUTATION OF A CASCADE SYSTEM OF DAMS USING DELFT3D-FM COUPLED WITH A REAL-TIME CONTROL TOOL	209
<i>Sanjay Giri, Haoxi Huang, Amgad Omer, Yuichi Kitamura</i>	
1-2-13: EFFECT OF SHEET LAYER ON THE FLOW CHARACTERISTICS IN AN ALLUVIAL CHANNEL.....	216
<i>Anurag Sharma, Mahesh Patel, Bimlesh Kumar</i>	
1-2-14: IMPACT OF DOWNWARD SEEPAGE ON PLANE BED ALLUVIAL CHANNELS.....	222
<i>Mahesh Patel, Anurag Sharma, Bimlesh Kumar</i>	
1-2-15: EXPERIMENTAL INVESTIGATION OF POROSITY AND VOLUME OF SEDIMENT MIXTURE IN STRAIGHT OPEN CHANNEL FLOWS	228
<i>Yusuke Hayashi, Tatsuhiko Uchida, Yoshihisa Kawahara</i>	
1-2-16: DEVELOPMENT OF BED VARIATION CALCULATION METHOD CONSIDERING NONEQUILIBRIUM SEDIMENT MOTION AND INTERACTION BETWEEN BED LOAD AND SUSPENSION: APPLICATION TO RIVER MOUTH SANDBAR WITH LARGE-SCALE TOPOGRAPHIC CHANGES DUE TO FLOOD.....	236
<i>Takahisa Gotoh, Shoji Fukuoka</i>	
1-2-17: A SEDIMENT TRANSPORT MODEL CONSIDERING POROSITY VARIATION OF SEDIMENT MIXTURE COUPLED WITH A EULERIAN DEPOSITION MODEL	244
<i>Nao Nakashima, Tatsuhiko Uchida, Yoshihisa Kawahara</i>	
1-2-18: HIDING EFFECT AMONG SEDIMENT PARTICLES EXPOSED ON SURFACE OF RIVERBED WITH AN EXTREMELY WIDE RANGE OF SEDIMENT GRAIN SIZES.....	248
<i>Yuki Hiramatsu, Ryota Nakama, Koki Hongo, Masato Sekine</i>	

1-2-19: PROCESS OF CLAY BED DEFORMATION DUE TO THE ACTION OF MOVING PARTICLES OF BEDLOAD.....	252
<i>Masato Sekine, Shun Ishihara, Noko Fujiura, Fumitaka Yoshikawa</i>	
1-2-20: INFLUENCE OF SEDIMENT COMPOSITION ON BREACHING PROCESS OF MODEL RIVER LEVEE	256
<i>Masato Sekine, Taichi Matsuura, Moe Hirokawa, Toshiki Suga</i>	
1-2-21: FLOW STRUCTURE AND SEDIMENT TRANSPORT IN ESTUARY: A CASE STUDY OF THE TOJINGAWA RIVER, JAPAN	260
<i>Ryuichi Hirakawa, Terunori Ohmoto</i>	
1-2-22: HYDRAULIC CHARACTERISTICS OF SAND WAVE IN MOVABLE BED BASED ON STOCHASTIC PROCESSES.....	266
<i>Seunghwan Seo, Tadashi Yamada</i>	
1-2-23: SUSPENDED MOVEMENT OF POLLUTANT AND SEDIMENT IN OPEN CHANNEL FLOW AS STOCHASTIC PROCESS.....	270
<i>Geraldo Wilson Junior, Cid Da Silva Carcia Monteiro</i>	
1-2-24: ANALYSIS OF FLOOD AND RIVER BED VARIATION IN THE KAMANASHI RIVER WITH LARGE AMOUNT OF SEDIMENT DEPOSITION	278
<i>Shiro Okayama, Yuko Naito, Shoji Fukuoka, Takahisa Gotoh</i>	
1-2-25: ANALYSIS OF LAND USE LAND COVERAGE DYNAMICS AND ITS EFFECTS ON RAINFALL-RUNOFF AND RUNOFF-SEDIMENT PATTERNS IN YOM RIVER BASIN THAILAND	286
<i>Aksara Putthividhya, Sasin Jirasirirak, Pakkasem Thongchai</i>	

1-3 RIVER MORPHODYNAMICS

1-3-1: RIVERBED INCISION IN THE VIETNAMESE MEKONG DELTA DUE TO ALTERED FLOW REGIME AND SEDIMENT LOAD.....	294
<i>Doan Van Binh, Sameh Kantoush, Tetsuya Sumi, Nguyen Phuong Mai, La Vinh Trung</i>	
1-3-2: VARIABILITY IN STAGE-DISCHARGE RELATIONSHIPS IN RIVER REACH WITH BED EVOLUTIONS.....	300
<i>Robin Kumar Biswas, Shinji Egashira, Daisuke Harada</i>	
1-3-3: FLUID-SOLID MUTIPHASE NUMERICAL SIMULATION ON LOCAL SCOUR BELOW A WEIR USING COUPLING METHOD OF E-MPS AND DEM	308
<i>Takayoshi Higuchi, Takahiro Saitoh, Yoshihiko Shimizu</i>	
1-3-4: NUMERICAL COMPUTATION OF ANTIDUNE MIGRATION USING 3D FLOW MODEL.....	316
<i>Shinichiro Onda, Ryoya Inaba, Takashi Hosoda</i>	
1-3-5: DYNAMIC STATE OF RIVER-MOUTH BAR IN YURAGAWA RIVER AND APPLICATION OF DRONE PHOTOGRAPHY IMAGE TO OBTAIN ITS TOPOGRAPHIAL DATA.....	320
<i>Hiroshi Miwa, Mio Omura, Takashi Wada, Yoshinori Kato, Keiichi Kanda</i>	
1-3-6: MORPHOLOGICAL IMPACT OF BRIDGE CONSTRUCTION ON SUNSARI MORANG IRRIGATION INTAKE	328
<i>Bijay Shrestha, Sanjay Giri, Alessandro Cattapan, Mario J. Franca</i>	

1-3-7: HYDRO-GEOMORPHOLOGICAL FORMATION PROCESSES OF SPAWNING HABITATS FOR AYU FISH REQUIRED UNDER TURBID CONDITIONS BY DAM IMPACTS IN THE TENRYU RIVER.....	336
<i>Makoto Hyodo, Shinji Takahashi, Hiromi Yamasaki, Yasuhiro Takemon, Tetsuya Sumi</i>	
1-3-8: CAN A MEANDER CUTOFF-INDUCED CHANNEL DEGRADATION BE ALTERNATIVE FOR THE CHANNEL DREDGING? CASE STUDY FOR THE HUALLAGA RIVER, PERU.....	342
<i>Kensuke Naito, Toshiki Iwasaki, Leo Guerrero, Henry Valverde, Yulissa Estrada, Jorge D. Abad</i>	
1-3-9: SIMULATION OF RIVER MORPHOLOGY DEVELOPMENT ACCOUNTING FLEXIBILITY OF RIPARIAN VEGETATION	346
<i>Runye Zhu, Ryota Tsubaki</i>	
1-3-10: THE EFFECTS OF BASIN GEOLOGY ON THE GRAIN SIZE CHARACTERISTICS OF BED MATERIALS AND THE VARIABILITY OF BEDFORM CONFIGURATION AMONG ALLUVIAL RIVERS.....	354
<i>Menglu Qin, Takeyoshi Chibana</i>	
1-3-11: MEANDERING CHARACTERISTICS OF CIMANUK RIVER FOCUSING ON ASPECT RATIO VARIATIONS AND GEOLOGICAL CONDITION	360
<i>Hendra Ramdhani, Takeyoshi Chibana, Agus Santoso</i>	
1-3-12: EXPERIMENTAL STUDY ON SANDBARS EVOLUTION WITH BED EROSION GROWTH IN MIXED ALLUVIAL-BEDROCK UNIFORMLY CURVED CHANNEL	368
<i>Mamy Rija Andriamboavonjy, Adriano Coutinho Lima, Norihiro Izumi</i>	
1-3-13: EXPERIMENTAL INVESTIGATION OF SEDIMENT SORTING PROCESSES IN THE VEGETATED CHANNELS	372
<i>Chang-Lae Jang</i>	
1-3-14: A ONE-DIMENSIONAL HYDRO-SEDIMENT-MORPHODYNAMIC MODEL FOR THE CHANGJIANG WATERWAY	378
<i>Chunchen Xia, Hui Liang, Zhixian Cao, Songbai Peng, Youwei Li, Qifeng Liu, Wei Zhang</i>	

1-4 RIVER BASIN MANAGEMENT

1-4-1: RAINFALL TREND ANALYSIS AND RELATIONSHIP WITH FLUVIAL DISCHARGE AND SUSPENDED SEDIMENT TRANSPORT IN KALI GANDAKI RIVER BASIN, HIMALAYA, NEPAL	386
<i>Mehendra B. Baniya, Takashi Asaeda, Takeshi Fujino, Rocky Talchabhadel, Shiv Aram K. C., Guligena Muhetaer</i>	
1-4-2: RESEARCH ON METHODS FOR ANALYZING THE IMPACT OF FLOOD CONTROL FACILITIES ON EXTREME RAINFALL EVENTS	393
<i>Takehiro Oki, Makoto Nakatsugawa, Thu Nguyen Thanh</i>	
1-4-3: DISCHARGE ESTIMATION BY STIV COMBINED WITH THE MAXIMUM ENTROPY METHOD.....	397
<i>Takuya Hamada, Ichiro Fujita, Kojiro Tani, Keisuke Nakayama</i>	
1-4-4: APPLICATION OF OPTICAL FLOW TECHNIQUES FOR RIVER SURFACE FLOW MEASUREMENTS	403
<i>Jumpei Yagi, Kojiro Tani, Ichiro Fujita, Keisuke Nakayama</i>	

1-4-5: FLOOD SIMULATION MODEL COUPLED WITH WOODY VEGETATION WASH- OUT IN THE LOWER ASAHI RIVER, JAPAN	409
<i>Kimihisa Nagata, Keisuke Yoshida, Shiro Maeno, Shinya Nigo, Md. Touhidul Islam</i>	
1-4-6: QUANTITATIVE EVALUATION OF WATER AND SUBSTANCES CYCLE IN THE UPPER RIVER BASIN OF KUSHIRO MIRE BY USING SWAT MODEL	417
<i>Hiroki Ohashi, Makoto Nakatsugawa</i>	
1-4-7: BASIC STUDY ON DRAINAGE METHOD FROM A RETARDING BASIN TO THE UJI RIVER.....	425
<i>Yoshiya Ogawa, Masanori Sera, Shota Michikata, Tomoki Yamamoto, Akitsugu Kajitani, Yuko Ishida</i>	
1-4-8: ANALYZING LONG-TERM CHANGES IN WATER DISCHARGE AND SOIL CONDITION OF OGOUCHI RESERVOIR CATCHMENT.....	433
<i>Charles John C. Gunay, Chika Nakagawa, Katsuhide Yokoyama</i>	
1-4-9: HYDRAULICS SIMULATION OF RUBBER DAM FOR OPERASIONAL AND EMERGENCY RESPOND GUIDELINES IN WEST FLOOD CANAL, SEMARANG, INDONESIA	441
<i>Wahyudi S. I., Intan Nurcahyani, Henny Pratiwi Adi</i>	
1-4-10: HYDRAULIC SIMULATION OF TIDAL FLOOD HANDLING OF PABEAN DRAINAGE SYSTEM IN PEKALONGAN, INDONESIA.....	448
<i>Henny Pratiwi Adi, Wahyudi S. I., Jonathan Lekkerkerk</i>	
1-4-11: VERIFICATION OF STIV ANALYSIS OF FLOOD DISCHARGE AT NAKANO OBSERVATORY IN THE OTA RIVER BY FLOW ANALYSIS USING ALB DATA	455
<i>Keisuke Yoshida, Shinya Nigo, Shiro Maeno, Koji Mano, Mitsutaka Nakano</i>	
1-4-12: PHYSICS-BASED BASIN-SCALE MODELLING OF WATER QUANTITY AND SEDIMENT DYNAMICS USING WFLOW	463
<i>Helene Boisgontier, Jos Van Gils</i>	
 <u>1-5 RIVER ENGINEERING (GENERAL)</u>	
1-5-1: NUMERICAL MODELING OF VEGETATED FLOW BY CONSIDERING PHYSICAL VEGETATION CHARACTERISTICS	473
<i>Eun-Kyung Jang, Myeonghui Ahn, Un Ji, Inhyeok Bae</i>	
1-5-2: APPLICATION OF HIGHER ORDER BATHYMETRY REPRESENTATION IN FIXED GRID SHALLOW WATER SOLVERS	477
<i>Shuang Gao, Greg Collicutt, William J. Syme</i>	
1-5-3: THE ROLE OF SUBMERGED MACROPHYTES IN THE REGULATION OF INTERNAL NITROGEN AND PHOSPHORUS RELEASE	484
<i>Jing Wan, Hong Peng, Xu Zhang, Wanshun Zhang, Xiaomin Chen</i>	
1-5-4: UNCERTAINTY EVALUATION OF ADCP MOORING BOAT STRUCTURE ON OBSERVED FLOW VELOCITY VALUES	492
<i>Shojun Arai, Taichi Tebakari, Takashi Kitsuda, Yoriko Yoshikawa, Yukihiro Sasakawa</i>	
1-5-5: EXPERIMENTAL STUDY ON PROCESS OF EXFOLIATION FROM DRIFTYWOODS IN FLOOD AT OMOTOGAWA RIVER	496
<i>Junya Taniguchi, Kazuya Watanabe, Noritoshi Saito</i>	

1-5-6: ESTIMATING THE CHARACTERISTICS OF WOODY DEBRIS MECHANISM IN TERAUCHI DAM RESERVOIR CATCHMENT.....	504
<i>Hikari Yokoyama, Daisuke Komori, Thapthai Chaithong</i>	
1-5-7: EXTRACTION OF HAZARDOUS LOCATIONS IN MARCH, 2018 HOKKAIDO ICE JAM FLOOD.....	508
<i>Taro Koike, Yasuhiro Yoshikawa, Hiroshi Yokoyama</i>	
1-5-8: STUDY ON NUMERICAL SIMULATION OF FLOW STRUCTURES IN A CURVED OPEN CHANNEL	514
<i>Fikry Purwa Lugina, Tatsuhiko Uchida, Yoshihisa Kawahara</i>	
1-5-9: EFFECT OF EXISTENCE OF HOUSES ON INUNDATION AREA OF DEBRIS FLOW.....	521
<i>Hidetoshi Nakamoto, Hiroshi Takebayashi, Masaharu Fujita</i>	
1-5-10: NUMERICAL SIMULATION OF MUD FLOW GENERATED IN ATSUMA, HOKKAIDO, JAPAN.....	523
<i>Arata Ishikawa, Hiroshi Takebayashi, Masaharu Fujita</i>	
1-5-11: DETECTION METHOD FOR VULNERABLE POINTS OF RIVERBANK EROSION AGAINST LARGE FLOODS.....	525
<i>Fumiya Yagi, Tatsuhiko Uchida, Yoshihisa Kawahara</i>	

2. PORTS, COASTAL ENGINEERING AND MANAGEMENT

2-1 PORT AND COASTAL STRUCTURES

2-1-1: PHYSICAL MODELLING YIELDS AN INNOVATIVE BREAKWATER STRUCTURE PROTECTING A REED BED IN LAKE GENEVA FROM WIND-WAVE INDUCED HARMS.....	529
<i>Vecsernyes Zsolt, Venturi André, Wohl Wend Florent, Gobat Karine, Andreini Nicolas, Jaeger Amandine</i>	
2-1-2: STABILITY PERFORMANCE ASSESSMENT OF HONEY COMB SHAPE BLOCKS FOR COASTAL ARMOUR UNITS.....	537
<i>Kouhei Oguma, Hiroshi Matsushita, Tomohiro Yasuda</i>	
2-1-3: FUNDAMENTAL STUDY FOR RESISTANCE OF COASTAL DIKE WITH CONCRETE PANELS AGAINST COMPOUND DISASTER OF EARTHQUAKE AND TSUNAMI.....	545
<i>Mizuki Ueno, Yohei Kawabata, Yasuo Nihei</i>	

2-2 COASTAL HYDRODYNAMICS AND MORPHOLOGY

2-2-1: DATA ASSIMILATION TSUNAMI FORECASTING USING RADIAL FLOW VELOCITY DISTRIBUTION WITH A SINGLE OCEAN RADAR	548
<i>Toshimichi Kaneto, Tatsuto Kimura, Shunsuke, Teraoka</i>	
2-2-2: LABORATORY EXPERIMENTS OF BUBBLE FORMATIONS AND BEHAVIORS IN SURFACTANT SEAWATER	555
<i>Takumi Nonaka, Yasunori Watanabe</i>	
2-2-3: PERFORMANCE OF GABION REVETMENTS FOR STABILIZING BEACH PROFILE	557
<i>Ayumi Saruwatari, Masanori Kobayashi, Nobutaka Takasuka, Hirofumi Koyama, Mikio Takahashi, Yasunori Watanabe</i>	

2-2-4: STUDY ON THE BEHAVIOR OF SUSPENDED SOLIDS IN THE NERITIC REGION IN AN INNER BAY.....	560
<i>Hiroaki Tanaka, Hideo Oshikawa, Akira Tai, Yuichi Hayami</i>	

2-3 ESTUARINE HYDRAULICS

2-3-1: NUMERICAL ANALYSIS ON IMPACTS OF THE PROJECT OF NORTH BRANCH NARROWING ON SEDIMENT DISTRIBUTION.....	568
<i>Guo Chuansheng, Tang Liqun, Wang Yuhai, Zhao Huiming</i>	
2-3-2: NUMERICAL MODELING OF SECONDARY FLOW IN MEANDERING ESTUARINE RIVER.....	576
<i>Gillang Noor Nugrahaning Gusti, Kiyoshi Kawanishi</i>	

VOLUME 2

2-3-3: COMPUTATIONAL MODELLING OF THE IMPACT OF SALT MARSH MANAGEMENT INTERVENTIONS ON COASTAL FLOODING	584
<i>William G. Bennett, Thomas J. Van Veelen, Tom P. Fairchild, John N. Griffin, Harshinie Karunarathna</i>	

2-4 OCEAN AND COASTAL WAVES

2-4-1: MULTI-DECADAL VARIABILITY IN GLOBAL WIND AND WAVE CLIMATE: AN ANALYSIS BASED ON MIROC6 DATASET	588
<i>Bahareh Kamranzad, Hiroaki Tatebe, Kaoru Takara</i>	
2-4-2: INTER AND INTRA-ANNUAL VARIATION OF WAVE ENERGY IN SOUTHEAST ASIA.....	592
<i>Bahareh Kamranzad, Pengzhi Lin, Wen Yi</i>	
2-4-3: THE RELATION BETWEEN PROPAGATION PATHS OF BAROMETRIC WAVES OVER THE EAST CHINA SEA AND SEA-LEVEL FLUCTUATIONS OFF THE WEST COAST OF KYUSHU, JAPAN.....	596
<i>Tomonori Saita, Toru Yamashiro</i>	
2-4-4: HIGH WAVE CONIDITIONS DUE TO TYPHOONS MEASURED AT AN OFFSHORE OBSERVATION TOWER.....	604
<i>Yasuyuki Baba, Teruhiro Kubo, Nobuhito Mori, Yasunori Watanabe, Tomohito Yamada, Ayumi Saruwatari, Junichi Otsuka, Yusuke Uchiyama, Junichi Ninomiya, Tomoya Shimura</i>	
2-4-5: REYNOLDS NUMBER EFFECTS OF INTERNAL SOLITARY WAVES PROPAGATING ON A UNIFORM SLOPE.....	611
<i>Hai Zhu, Songping Mao, Decai Sun, Lingling Wang, Zhezhen Yu, Cheng Lin</i>	
2-4-6: CHARACTERISTICS OF WHITECAPS ESTIMATED FROM IMAGE PROCESSING OF THE OCEAN SURFACE.....	618
<i>Yukun Wang, Ryo Ohnishi, Yuji Sugihara, Yoshihiro Nakamura, Osama Eljamal</i>	

3. ENVIRONMENTAL HYDRAULICS

3-1 ECO-HYDRAULICS AND MANAGEMENT

3-1-1: FLOOD CONTROL EFFECT AND HABITAT CREATION IN THE MIDDLE BASIN OF THE YODO RIVER USING A RETARDING BASIN	626
<i>Yuko Ishida, Kento Okunishi, Masashi Harada, Yoshiya Ogawa, Masato Maegawa</i>	
3-1-2: EFFECTIVENESS ANALYSIS OF MAINTENANCE FLOW FOR NON-ORGANIC MATTERS IN JAPANESE CLASS-A RIVERS	634
<i>Marina Kishida, Yui Shinozaki, Kaito Enomoto, Naoki Shirakawa</i>	
3-1-3: RESPONSES OF BED MORPHOLOGY AND CONGESTION PATTERNS WITH DRIFTWOOD ON SAND BARS	642
<i>Taeun Kang, Ichiro Kimura, Shinichiro Onda</i>	
3-1-4: RIPARIAN MICROTOPOGRAPHY OF SHONAI RIVER BY APPLYING POLE-CAMERA METHOD	650
<i>Ryosuke Akahori</i>	
3-1-5: EFFECTS OF SUBMERGED WEIR WITH AN OPENING ON BED DEFORMATION AND FLOW STRUCTURE UNDER LIVE-BED CONDITIONS	657
<i>Hirotaaka Une, Terunori Ohmoto, Kazuki Kuranaga</i>	
3-1-6: A INVESTIGATION OF THE DRAG COEFFICIENT IN A OPEN CHANNEL WITH GROUP OF COLUMNS	665
<i>Muneyuki Aoki, Mutsumi Sakama, Daiki Akema</i>	
3-1-7: DO RECOVERY PROCESS IN A SQUARE EMBAYMENT CONNECTED TO AN OPEN- CHANNEL FLOW	672
<i>Michio Sanjou, Takaaki Okamoto</i>	
3-1-8: BASIC FIELD SURVEY AND HYDROLOGICAL SIMULATIONS FOR RIVERS IN TOYAMA PREFECTURE, JAPAN FOR HABITAT EVALUATION OF ITASENPARA	678
<i>Rui Zhang, Shuichi Kure, Guanzhen Bian, Bambang Adhi Priyambodho</i>	
3-1-9: MULTI-FLUID MODELING OF TURBULENT FLOW WITH AIR ENTRAINMENT IN A HYDRAULIC JUMP	685
<i>Byungjoo Kim, Joongcheol Paik</i>	
3-1-10: DEVELOPMENT OF THE GLOBAL FLUVIAL BIOMASS MODEL CONSIDERING DISTURBANCE	687
<i>Hikari Matsuda, Yui Shinozaki, Naoki Shirakawa</i>	
3-1-11: THE EFFECT OF STORM EVENT ON DETECTION THE SPECIES	695
<i>Sakiko Yaegashi, Mohd Saiful Farhan Bin Tahir, Hirokazu Haga</i>	
3-1-12: EFFECTS OF FLOW REGIME ON THE VEGETATION RECRUITMENT AND ESTABLISHMENT IN AN UNREGULATED SANDY STREAMS IN KOREA –FOCUSED ON THE LIMITING SURVIVAL CONDITION OF PIONEER PLANT BY HYDROCHORY	701
<i>Hyoseop Woo, Chanju Lee, Chang-Rae Jang, Hyung-Jin Cho</i>	
3-1-13: NUMERICAL EXPERIMENTS TO EVALUATE EFFECT OF EXTERNAL FORCES ON TEMPERATURE STRATIFICATION IN LAKE KASUMIGAURA, JAPAN	710
<i>Wang Yueyi, Masayasu Irie, Shunsuke Komuro, Guillaume Auger, Ayato Kohzu</i>	

3-1-14: THE FLOW CHARACTERISTICS AROUND THE SPUR DIKES AND SWIMMING BEHAVIOR OF FISH TO IT	718
<i>Daiki Akema, Muneyuki Aoki</i>	
3-1-15: INFLUENCES OF RIVER CHANNEL PLANAR SHAPES ON CHARACTERISTICS OF FISH HABITAT IN SMALL-MIDDLE SIZED STREAMS	726
<i>Kazuaki Ohtsuki, Mori Terutaka, Keigo Nakamura, Yuichi Kayaba</i>	
3-1-16: THE IMPACT ASSESSMENT OF RIVERBED EXCAVATION WITH A RIVER ECOSYSTEM MODEL	730
<i>Yoshihisa Akamatsu, Takanori Kono, Ryutei Inui</i>	

3-2 RIVER RESTORATION

3-2-1: COARSE SEDIMENT MOVEMENT AROUND U-SHAPED VEGETATION ZONE ON GRAVEL BAR WITH TWO MEANDERING CHANNELS	734
<i>Hirokazu Ikeda, Kosuke Imura, Yuka Soeta, Chie Kawashima, Satoshi Komura</i>	
3-2-2: INSTALLATION OF ALTERNATIVE GRAVEL BANKS IN CHANNELIZED RIVER	742
<i>Pietro Beretta Piccoli, Youichi Yasuda, Robert Boes</i>	
3-2-3: INSTALLATION OF GROUND SILL WITH STACKED BOULDERS IN CHANNELIZED RIVER	750
<i>Youichi Yasuda, Pietro Beretta Piccoli Marco</i>	
3-2-4: THE ROLE OF COMMUNITY-BASED ORGANIZATIONS FOR URBAN RIVER RESTORATION PROJECTS IN ZENPUKUJI RIVER, TOKYO, JAPAN.....	758
<i>Kyohei Takizawa, Satoquo Seino, Takehiro Watanabe</i>	
3-2-5: ADAPTIVE UNIFORM AND NON-UNIFORM CONFIGURATION OF BOULDERS ON BLOCK RAMPS FOR RIVER RESTORATION.....	762
<i>Ngangbam Romeji, Zulfequar Ahmad, Nayan Sharma</i>	
3-2-6: EVALUATION OF OCCURRENCE TENDENCY AND HABITAT TYPES FOR WADING BIRDS IN JAPANESE RIVERS USING DATASETS FROM THE NATIONAL CENSUS ON RIVER ENVIRONMENTS.....	771
<i>Kota Tawa, Terutaka Mori, Yuichi Kayaba, Keigo Nakamura</i>	

3-3 SURFACE WATER AND GROUNDWATER HYDRAULICS

3-3-1: IN-SITU ESTIMATION FOR SPATIAL AND TEMPORAL VARIATION OF HYDRAULIC CONDUCTIVITY IN A NEWLY CREATED GRAVEL BAR.....	775
<i>Enbang Xiao, Yasuhiro Takemon, Sohei Kobayashi, Karim Ibrahim Ahmed, Tetsuya Sumi</i>	
3-3-2: HEAT TRANSFER MODEL OF A LINING BOREHOLE GROUND HEAT EXCHANGER UNDER GROUNDWATER FLOW	782
<i>Yosuke Suzuki, Hiroaki Terasaki, Teruyuki Fukuhara, Akira Saida, Masahiro Kusama, Haruki Taniguchi, Masato Tanaka</i>	
3-3-3: SIMULATING THE EFFECT OF WIND-DRIVEN SHEAR STRESS ON TURBULENT OPEN-CHANNEL FLOW	788
<i>Shoko Sugimoto, Ko Shirakawa, Yuji Sugihara, Michio Sanjou, Takaaki Okamoto</i>	

3-3-4: ESTIMATION OF GROUNDWATER RECHARGE USING WETSPASS MODEL IN THE PHANOM THUAN–SONG PHI NONG–BANG LEN OPERATION AND MAINTENANCE PROJECTS, THAILAND	796
<i>Pattarapong Teerapunyapong, Yutthana Phankamolsil, Areeya Rittima, Yutthana Talaluxmana, Allan Sriratana Tabucanon</i>	

3-4 CONTAMINANT FLOWS

3-4-1: TRANSPORTATION PATHWAYS OF LAND SOURCE BASED MICROPLASTICS INTO THE MARINE ENVIRONMENTS: THE CONTEXT OF RIVERS	804
<i>A. H. M. Enamul Kabir, Masahiko Sekine, Tsuyoshi Imai, Koichi Yamamoto</i>	
3-4-2: UNSTEADY SETTLEMENT TEST AND NUMERICAL CALCULATION OF ACTIVATED CARBON PARTICLES IN STATIC WATER	812
<i>Lu Tianshu, Huang Shehua</i>	
3-4-3: FIELD OBSERVATIONS OF VERTICAL PROFILES OF MICROPLASTIC CONCENTRATIONS IN A RIVER	818
<i>Shunsuke Kobayashi, Tomoya Kataoka, Hayata Miyamoto, Yasuo Nihei</i>	

3-5 WATER QUALITY

3-5-1: EVALUATION OF RIVERINE WATER TEMPERATURE IN A-CLASS RIVERS IN ARIAKE BAY BASIN BY ARTIFICIAL INTELLIGENCE.....	821
<i>Nanako Haraguchi, Hao Lin, Shinichiro Yano</i>	
3-5-2: FIELD OBSERVATION ON BLUE CARBON DYNAMICS IN THE YATSUSHIRO SEA CONSIDERING INFLUENCE OF STRATIFICATION	825
<i>Naoki Saito, Xion Bing, Hiroto Komori, Shinichiro Yano, Keisuke Nakayama, Katsuaki Komai, Kei Yajima</i>	
3-5-3: EVALUATION OF HYDRODYNAMIC EFFECTS ON BLUE CARBON DYNAMICS IN THE YATSUSHIRO SEA	829
<i>Bing Xiong, Naoki Saito, Hiroto Komori, Shinichiro Yano, Keisuke Nakayama, Katsuaki Komai, Kei Yajima</i>	
3-5-4: META-ANALYSIS OF WATER QUALITY CHARACTERISTICS IN THE LOWER CHAO PHRAYA RIVER, THAILAND.....	837
<i>Yusuke Horiuchi, Takuya Matsuura, Taichi Tebakari, Sanit Wongsa</i>	
3-5-5: IMPROVEMENT OF WATER QUALITY USING A TRIANGULAR SOLAR STILL.....	844
<i>Amir Asyraf, Hiroaki Terasaki, Kenji Furuichi, Shunya Kato, Tomohiro Umemura, Teruyuki Fukuhara, Mika Hasegawa, Yukinori Kusaka</i>	
3-5-6: CHANGES IN WATER QUALITY DUE TO ANTHROPOGENIC ACTIVITIES AND FEASIBLE BIOLOGICAL NITROGEN REMOVAL METHODS FOR SALINE WATER– CASE STUDY IN NEW ZEALAND.....	850
<i>Yashika De Costa, Wei-Qin Zhuang</i>	
3-5-7: WATER ENVIRONMENT IMPROVEMENT IN AN ORGANICALLY POLLUTED CLOSED WATER BODY BY ARTIFICIAL WATER SURFACE COOLING.....	858
<i>Masayoshi Harada, Kosuke Hayami, Kazuaki Hiramatsu, Toshinori Tabata</i>	

3-5-8: LONG-TERM CHANGE OF RIVER WATER TEMPERATURE FLOWING INTO RESERVOIRS IN JAPAN	866
<i>Yusuke Kume, Makoto Umeda</i>	
3-5-9: WATER TEMPERATURE SIMULATION OF RIVERS IN INDONESIA.....	873
<i>Intan Supraba, Istiarto, Radiana Triatmadja, Djoko Legono</i>	
3-5-10: STATISTICAL ANALYSIS OF DECADEAL WARMING AND COOLING TRENDS IN EQUILIBRIUM WATER TEMPERATURE IN JAPAN	881
<i>Hitoshi Miyamoto, Kohei Kamimura</i>	
3-5-11: SEASONAL COMPARISON OF PREDOMINANT FACTORS IN RIVER TEMPERATURE FORMATION IN AN URBAN RIVER.....	885
<i>Junichi Nishimata, Hitoshi Miyamoto</i>	
3-5-12: NUMERICAL CHARACTERISTICS STUDY ON DELFT3D FOR SIMULATING THE DENSITY FLOW CAUSED BY TEMPERATURE DIFFERENCE IN A RESERVOIR FLUME.....	889
<i>Zijun Hu, Yun Lang, Yanbing Zhao, Lei Zhang, Weiwei Guo</i>	
3-5-13: THE IMPACTS OF MICROPLASTIC POLLUTION ON FRESHWATER FISHES IN JAPAN'S KOMAOI RIVER AND TAMA RIVER	896
<i>Saori Oshiro, Naoko Okuyama, Tomoya Kataoka, Arata Mukotaka, Yasuo Nihei</i>	
3-5-14: DAILY BEACH WATER QUALITY FORECAST: 3D DETERMINISTIC MODEL VS STATISTICAL MODEL.....	900
<i>K. W Choi, Joseph H. W. Lee</i>	
3-5-15: PREDICTION OF LEAD CONCENTRATION AT CONSUMER TAP OF LEAD CONTAMINATED WATER SUPPLY SYSTEM IN HIGH-RISE BUILDINGS	905
<i>Lu Chang, Shu Ning Chan, Joseph Hun Wei Lee</i>	

3-6 FISH PASSAGES

3-6-1: EFFECT OF DIFFERENCE IN SHAPE OF STEPPED FISHWAY ON FLOW STRUCTURE.....	911
<i>Takayuki Tanaka, Keigo Aoki</i>	
3-6-2: THE SWIMMING BEHAVIOR OF TRIBORODON HAKONENSIS IN STREAM-TYPE FISHWAY WITH THE SLOPE OF 1/10	918
<i>Taisei Sato, Tomoaki Funakoshi, Muneyuki Aoki</i>	
3-6-3: THREE-DIMENSIONAL MODELLING OF FLOW IN A WEIR AND POOL TYPE FISHWAY WITH ORIFICES FOR DESIGN OPTIMZATION	925
<i>W. M. L. K. Abeyratne, P. S. Weerasinghe, S. B. Weerakoon</i>	

3-7 ENVIRONMENTAL HYDRAULICS (GENERAL)

3-7-1: QUANTITATIVE EVALUATION OF WATER TEMPERATURE CHANGE ON COLD WATER FISH HABITAT IN SNOWY COLD RIVER	933
<i>Keisuke Kudo, Makoto Nakatsugawa</i>	
3-7-2: RIVERBED VARIATION AS INFLUENCED BY NATURAL AND HUMAN-INTERFERED PHENOMENA OF GENDOL RIVER, MT. MERAPI AREA, INDONESIA	937
<i>Djoko Legono, Paula Swastika, Bambang Yulistyanto, Radiana Triatmadja, Intan Supraba</i>	

3-7-3: MIXING CHARACTERISTICS OF 45° INCLINED DUCKBILL DENSE JETS IN CO-FLOWING CURRENTS.....	945
<i>Mingtao Jiang, Wei Chen, Adrian Wing-Keung Law</i>	
3-7-4: STUDY ON A MONITORING METHOD FOR SEAGRASS BEDS USING ENVIRONMENTAL DNA.....	949
<i>Maiko Akatsuka, Yuriko Takayama, Edwin Muchebve, Kazunori Ito, Tomohiro Kuwae, Kenta Watanabe, Toshifumi Minamoto</i>	
3-7-5: IMPROVEMENT OF THE MIXING LENGTH MODEL AND NUMERICAL CALCULATION OF THE FLOW OVER A BACKWARD-FACING STEP	957
<i>Huang Shehua, Zhuang Keyun, Lv Tianshu, Fu Xiangqian</i>	
3-7-6: DIATOMS AND DINOFLAGELLATES DISTRIBUTION DURING DRY SEASON IN MARCROTIDAL TANINTHARYI RIVER ESTUARY, MYANMAR.....	963
<i>Lett Wai New, Gubash Azhikodan, Katsuhide Yokoyama, Masashi Kodama, Nay Oo Hlang, Nyo Nyo Tun</i>	

4. HYDROLOGY, WATER RESOURCES

4-1 WATER MANAGEMENT

4-1-1: STUDY ON ASSESSMENT OF FLOOD DISASTER LOSS IN TAIHU LAKE BASIN.....	971
<i>Weiwei Shao, Xin Su, Jiahong Liu Zhiyong Yang, Chao Mei, Zhaohui Yang</i>	
4-1-2: A COMPREHENSIVE INTERGRATED MANAGEMENT APPROACH FOR WATER RESOURCES MANAGEMENT	977
<i>Trinh Minh Ngoc</i>	
4-1-3: STUDY OF ADAPTATION MEASURES TO CLIMATE CHANGE ON URBAN AREA IN BANGKOK, THAILAND	986
<i>Thidarat Komkong, Sanit Wongsas, Shinichiro Nakamura</i>	
4-1-4: SNOW COVER MAPPING FOR SUSTAINABLE WATER RESOURCE MANAGEMENT IN THE BALKHAB RIVER BASIN IN AFGHANISTAN USING MODIS SATTELLITE NORMALIZED DIFFERENCE SNOW INDEX (NDSI) PRODUCTS.....	994
<i>Hussainzada Wahidullah, Han Soo Lee, Vinayak Bhanage</i>	
4-1-5: IMPACT OF DECREASING GLACIER COVER ON STREAMFLOW OF THE GILGIT RIVER BASIN, KARAKORAM, PAKISTAN	1001
<i>Sohaib Baig, Takahiro Sayama, Kaoru Takara</i>	
4-1-6: EVALUATION OF IMPACT OF CLIMATE CHANGE AND RURAL DEVELOPMENT ON RAINFALL-RUNOFF IN A SOUTHEAST ASIAN WATERSHED BY A DISTRIBUTED MODEL INCORPORATED WITH TANK MODELS FOR SEVERAL LAND USES	1009
<i>Asari Takada, Kazuaki Hiramatsu, Ngoc Anh Trieu, Masayoshi Harada, Toshinori Tabata</i>	

4-2 WATER RESOURCES ENGINEERING AND MANAGEMENT

4-2-1: RESEARCH OF INITIAL WATER RIGHTS ALLOCATION IN LONG-DISTANCE WATER TRANSFER PROJECT.....	1017
<i>Ting Wang, Yu Liu</i>	

4-2-2: ESTIMATIONS OF STREAMFLOW CHARACTERISTICS THROUGHOUT JAPAN USING ARTIFICIAL NEURAL NETWORK.....	1023
<i>Ryosuke Arai, Yasushi Toyoda, So Kazama</i>	
4-2-3: EXPLORING THE GROUNDWATER HYDROGRAPHS OF CHOU-SHUI CHI ALLUVIAL FAN BY LINEAR SIGNAL MODEL (LSM)	1031
<i>Ouedraogo Abdoul Rachid, Shaohua Marko Hsu, Yu-Wen Chen</i>	
4-2-4: SALINITY DYNAMICS UNDER SEA LEVEL RISE SCENARIOS IN THE RED – THAI BINH RIVER DELTA, VIETNAM	1035
<i>Nguyen Thi Hien, Nguyen Hai Yen, Matteo Balistrocchi, Vu Minh Cat, Roberto Ranzi</i>	

4-3 EXTREME WEATHER

4-3-1: NUMERICAL SIMULATION OF RUNOFF GENERATION AND INUNDATION PROCESS OF AN EXTREME PRECIPITATION EVENT IN NEPAL.....	1043
<i>Rocky Talchabhadel, Hajime Nakagawa, Kenji Kawaike, Kazui Yamanoi, Herman Musumari, Tirtha R. Adhikari, Rajaram Prajapati</i>	
4-3-2: STATISTICAL ANALYSIS OF RAINFALL TREND AND VARIABILITY DUE TO CLIMATE CHANGE IN BANGLADESH.....	1051
<i>Md. Rezaul Karim, Sakib Shadman Prosun, Ahmed Farhan Mahabub</i>	
4-3-3: PERFORMANCE OF A SMALL-COMPACT X-MP RADAR TO MONITOR EXTREME RAINFALL EVENT ON 7 JULY 2018	1058
<i>Magfira Syarifuddin, Mariko Ogawa, Haruhisa Nakamichi, Satoru Oishi, Masato Iguchi</i>	
4-3-4: PREDICTION OF FUTURE RAINFALL VARIATIONS DUE TO GLOBAL WARMING IN THE KYUSHU ISLAND BY LARGE ENSEMBLE EXPERIMENTS	1066
<i>Akira Tai, Tatsuya Oku, Akihiro Hashimoto, Hideo Oshikawa, Yuji Sugihara, Nobuhiro Matsunaga, Toshimitsu Komatsu</i>	
4-3-5: HOT SPOT OF CLIMATE EXTREME EVENTS (FLOODS AND DROUGHTS) IN THAILAND FOR A CHANGING CLIMATE	1073
<i>Sawitree Rojpratak, Chaitawatch Sudprasert, Thannob Aribarg, Seree Supharatid</i>	
4-3-6: PROJECTION FOR FUTURE CHANGE OF CONFIDENCE INTERVAL AND PREDICTION INTERVAL OF EXTREME RAINFALLS BASED ON BAYESIAN METHOD USING A LARGE ENSEMBLE DATA SET.....	1081
<i>Keita Shimizu, Tadashi Yamada, Tomohito Yamada</i>	
4-3-7: RAINFALL-RUNOFF ANALYSIS CONSIDERING THE UNCERTAINTIES OF RAINFALL INTENSITY AND MODEL PARAMETERS BASED ON THE THEORY OF STOCHASTIC DIFFERENTIAL EQUATION	1085
<i>Daiwei Cheng, Tadashi Yamada</i>	
4-3-8: A RAINFALL-RUNOFF/FLOOD-INUNDATION MODEL FOR MYOHOJI RIVER BASIN KOBE JAPAN WITH RAINWATER SEWAGE CHANNELS	1089
<i>Kenichiro Kobayashi, Atsushi Tamura, Ichiro Fujita, Akinobu Yamamoto, Kazuyoshi Kanayama</i>	
4-3-9: COMPARISON OF HYDROLOGICAL MODELS TO DETERMINE FLOOD CHARACTERISTICS FOR THE TOKACHI RIVER, HOKKAIDO (JAPAN)	1095
<i>Mark Hegnauer, Tsuyoshi Hoshino, Tomohito J. Yamada</i>	

4-4 HYDRO INFORMATICS

4-4-1: HYBRID DWT WITH NARX NEURAL NETWORK FOR RESERVOIR INFLOW FORECASTING IN A CHANGING CLIMATE.....	1099
<i>Thannob Aribarg, Serre Supharatid</i>	
4-4-2: TEMPORAL VARIABILITY OF DISCHARGE RATING CURVE INVESTIGATED USING SHALLOW-WATER ACOUSTIC TOMOGRAPHY	1106
<i>Kiyoshi Kawanishi, Mohamad Basel Al Sawaf</i>	
4-4-3: UNCERTAINTIES OF MACHINE LEARNING IN PREDICTING THE HYDROLOGICAL RESPONSES OF LID PRACTICES	1112
<i>Yang Yang, Ting Fong May Chui</i>	
4-4-4: ANALYZING HYDROACOUSTIC SIGNALS TO MEASURE THE STREAMFLOW OF A SHALLOW MOUNTAINOUS RIVER	1119
<i>Mohamad Basel Al Sawaf, Kiyoshi Kawanishi, Masoud Bahreinimotlagh</i>	
4-4-5: DEVELOPMENT OF A DEEP LEARNING MODEL FOR PREDICTING THE RIVER WATER LEVEL BASED ON THE RAINFALL DISTRIBUTION DATA	1126
<i>Yusuke Nakatani, Motoki Okumura, Shuzo Nishida</i>	
4-4-6: JAPANESE LAKE INFORMATION IN A WEB APPLICATION, THE CLIMATES OF LAKE BASINS (CGLB).....	1132
<i>Toshiyuki Nakaegawa</i>	

4-5 HYDROLOGY (GENERAL)

4-5-1: ENSEMBLE PROJECTION OF RUNOFF FOR THE NEXT 30-50 YEARS IN THE YELLOW RIVER BASIN WITH BMA APPROACH.....	1135
<i>Ziqi Yan, Zuhao Zhou, Jiajia Liu</i>	
4-5-2: VALIDATION OF SATELLITE DATASETS FOR THE OPERATION OF FLOOD AND DROUGHT INDICATORS IN CERTAIN REGIONS OF MYANMAR.....	1143
<i>Kay Khaing Kyaw, Ticha Lalupiman, Watin Thanathanphon, Piyamarn Sisomphon</i>	
4-5-3: APPLICATION OF WEATHER RADAR FOR URBAN FLOOD EARLY WARNING SYSTEM. CASE STUDY OF CHATUCHAK DISTRICT, BANGKOK, THAILAND.....	1151
<i>Theerapol Charoensuk, Narongrit Luangdilok, Ticha Lolupiman, Watin Thanathanphon, Piyamarn Sisomphon</i>	
4-5-4: ASSESSMENT OF SOIL EROSION AND SEDIMENT DEPOSITION USING GIS TECHNIQUE IN THE YOM RIVER BASIN	1160
<i>Prem Rangsiwanichpong</i>	
4-5-5: WEATHER PROJECTIONS AND DYNAMICAL DOWNSCALING FOR THE REPUBLIC OF PANAMA: EVALUATION OF IMPLEMENTATION METHODS VIA GPGPU ACCELERATION	1167
<i>Reinhardt Pinzón, Michel Müller, Toshiyuki Nakaegawa, Javier Sánchez-Galán, Manuel Ujaldón, José Fábrega</i>	
4-5-6: FLOOD HAZARD EVALUATION FOR RIVERS IN TOYAMA PREFECTURE, JAPAN	1173
<i>Shouma Ishikawa, Shuichi Kure, Ryuusei Yagi, Bambang Priyambodho</i>	

VOLUME 3

5. IRRIGATION AND DRAINAGE

5-1 IMPACT OF CLIMATE CHANGE ON IRRIGATION AND DRAINAGE SYSTEMS

- 5-1-1: STUDY ON PREDICTION MODEL OF CROP EVAPOTRANSPIRATION BASED ON WEATHER FORECAST 1179
Xin Han, Baozhang Zhang, Zheng Wei, He Chen, Yinong Li, Taisheng Du
- 5-1-2: IMPACT OF CLIMATE CHANGE ON TIDAL IRRIGATION CASE STUDY: TERANTANG IRRIGATION UNIT, INDONESIA 1189
Maya Amalia Achyadi, Koichiro Ohgushi, Toshihiro Morita

5-2 WATER SUPPLY AND SANITATION

- 5-2-1: CLIMATE CHANGE AND ADAPTIVE WATER MANAGEMENT IN BANGPAKONG RIVER, THAILAND 1197
Sanit Wongsu, Sunaaree Sueathung, Taichi Tebakari
- 5-2-2: FEASIBILITY OF COASTAL RESERVOIRS FOR FRESH-WATER STORAGE IN NEW ZEALAND 1203
Induka Werellagama, Gregory De Costa, Binil Davis
- 5-2-3: BREAKPOINT REACTION OF CHLORINE JETS IN AMMONIA NITROGEN AND TREATED PRIMARY EFFLUENT: MODELING AND EXPERIMENTAL STUDY 1211
S. N. Chan, Q. S. Qiao, J. H. W. Lee

5-3 IRRIGATION (GENERAL)

- 5-3-1: REDUCING ENERGY CONSUMPTION IN PRESSURIZED IRRIGATION NETWORKS USING NEURAL NETWORKS-SOMS CLUSTERING TECHNIQUE 1218
Ahmed M. Abdelrazek, Engy M. Khalil, Farouk A El-Fitany, Mohammad, A. Abourohiem
- 5-3-2: IMPLEMENTATION OF THE ANN MODEL TO A COMPLICATED DRAINAGE SYSTEM 1226
Nobuaki Kimura Ikuo Yoshinaga, Kenji Sekijima Issaku Azechi, Daichi Baba
- 5-3-3: TRACING CROP WATER DEMAND IN THE LOWER PING RIVER BASIN, THAILAND USING CLOUD-BASED IRRISAT APPLICATION 1236
Khin Myar Kyaw, Arreya Rittima, Yutthana Phankamolsil, Allan Sriratana Tabucanon, Wudhichart Sawangphol, Jidapa Kraisingka, Yutthana Talaluxmana, Varawoot Vudhivanich
- 5-3-4: ASSESSMENT OF IRRIGATION PERFORMANCE OF SEKAMPUNG BATANGHARI IRRIGATION AREA, LAMPUNG PROVINCE, INDONESIA 1244
Dyah Indriana Kusumastuti, Dwi Jokowiarno
- 5-3-5: ENVIRONMENTAL IMPACT OF IRRIGATION TO GROUNDWATER CONTAMINATION AND AQUIFER VULNERABILITY FROM INTENSIVE AGRICULTURAL PRACTICES IN THAILAND 1248
Aksara Putthividhya, Sasin Jirasirirak, Wimolpat Bumbudsanpharoke Khamkanya

5-3-6: ON THE DISTRIBUTION OF SALINITY AND FISH SPECIES IN A CHANNEL NETWORK IN THE MEKONG DELTA, VIETNAM	1261
<i>Shinji Fukuda, Masaomi Kimura</i>	

6. WATER-RELATED DISASTER RISK REDUCTION

6-1 NATURAL DISASTERS

6-1-1: EVALUATION OF DRIFTWOOD GENERATION IN THE NORTHERN KYUSHU HEAVY RAIN IN 2017 BY LOGISTIC REGRESSION	1263
<i>Takahiro Shogaki, Akiyoshi Tsusue, Shinichiro Yano, Kiyonobu Ksama</i>	
6-1-2: A DIAGNOSTIC STUDY OF ATMOSPHERIC BLOCKING USING ANALOGY BETWEEN JET STREAM AND OPEN CHANNEL FLOW	1267
<i>Yoshikazu Kitano, Tomohito J. Yamada, Yasuo Hattori</i>	
6-1-3: HINDCAST OF TYPHOON JONGDARI AND NON-TIDAL SEA LEVEL RESIDUALS IN MIKAWA BAY USING FDDA IN WRF	1271
<i>Ryo Nakamura, Kyeong Ok Kim, Shigeru Kato, Ryota Nakamura, Takumi Okabe</i>	
6-1-4: APPLICATION OF SATELLITE PRECIPITATION DATA TO MODEL THE EXTREME RAINFALL-INDUCED LANDSLIDE EVENT	1279
<i>Thapthai Chaithong, Daisuke Komori</i>	
6-1-5: INVESTIGATION OF COMPLEX DISASTER OF DEBRIS FLOW AND FLOOD IN HIGASHI RIVER, SHIMATA RIVER SYSTEM	1289
<i>Nozomu Onaka, Yoshihisa Akamatsu, Takanori Kono, Kohei Yamaguchi</i>	
6-1-6: NUMERICAL ANALYSIS OF STORM TIDES ALONG THE NORTHERN COAST OF CAGAYAN, PHILIPPINES	1293
<i>Imee Bren Villalba</i>	

6-2 DISASTER PREVENTION ENGINEERING

6-2-1: FLUME STUDY ON DRIFTWOOD CAPTURING SYSTEM USING RECTANGULAR EMBAYMENT ZONE	1296
<i>Takaaki Okamoto, Michio Sanjou</i>	
6-2-2: A STUDY ON SAFE EVACUATION FROM INUNDATED UNDERGROUND MALL BY A MULTI-AGENT MODEL	1302
<i>Yutaro Nakasaka, Taisuke Ishigaki, Ryuji Kawanaka</i>	
6-2-3: DETECTION OF RISKY MOUNTAIN STREAM AND SLOPE FAILURE AREA IN NOROGAWA RIVER BASIN USING GIS AND OPTICAL SATELLITE IMAGE	1310
<i>Koji Asai, Tomohiro Ishii, Takuzo Amano, Hajime Shirozu</i>	
6-2-4: OPTIMAL RESERVOIR FLOOD CONTROL CONSIDERING LARGE FLOODS BASED ON RAINFALL-RUNOFF-INUNDATION ANALYSIS	1317
<i>M. Iwamoto, D. Nohara, Y. Takemon, T. Koshihara, T. Sumi</i>	
6-2-5: URBAN INUNDATION ANALYSIS CONSIDERING THE WATER BEHAVIOUR OF SUBWAY	1324
<i>Daisuke Sato, Makoto Takeda, Masataka Murase, Naoki Matsuo</i>	

6-2-6: NUMERICAL SIMULATION OF FLOOD MITIGATION EFFECTS OF AN ASSUMED RETARDING BASIN.....	1332
<i>Kenji Kawaike, Hajime Nakagawa, Nanae Watanabe</i>	
6-2-7: A STUDY ON THE FLOOD CONTROL MEASURES BY EXISTING DAMS IN THE KASE RIVER BASIN IN CONSIDERATION OF GLOBAL WARMING	1339
<i>Konan Sakamoto, Hideo Oshikawa, Akira Tai, Akihiro Hashimoto, Toshimitsu Komatsu</i>	
6-2-8: CALCULATING FLOOD RISK IN OBIHIRO USING A RISK BASED APPROACH.....	1347
<i>G. Rongen, U. Fumihiko</i>	
6-2-9: A SUITABLE RISK INDEX FOR EVALUATING BRIDGE DAMAGE IN THE MISASA RIVER CAUSED BY THE 2018 WESTERN JAPAN FLOODS	1351
<i>Takashi Inoue, Yuka Yamamura, Yasuo Nihei</i>	
6-2-10: A CASE STUDY OF FLOOD MODELING WITH ADAPTIVE MESH REFINEMENT	1354
<i>Wentao Gong, Yasuyuki Shimizu, Toshiki Iwasaki</i>	

6-3 DISASTER INFORMATION SYSTEMS

6-3-1: AN INTELLIGENT FLOOD EVACUATION MODEL BASED ON DEEP LEARNING OF VARIOUS FLOOD SCENARIOS.....	1362
<i>Mengtong Li, Tokiyosh Hosono, Tomoharu Hori</i>	
6-3-2: EXTRACTION OF SLOPE FAILURE BEHIND AGRICULTURAL RESERVOIRS DUE TO HEAVY RAINFALL USING REMOTE SENSING	1369
<i>Hajime Shirozu, Koji Asai</i>	
6-3-3: THE ASSIMILATION ANALYSIS OF 2D SHALLOW WATER FLOW MODEL WITH THE ADJOINT METHOD FOR THE PREDICTION OF DOWNSTREAM WATER LEVELS	1376
<i>Tetsuaki Mikami, Shoji Fukuoka, Akihide Watanabe</i>	
6-3-4: REGIONAL DISASTER PREVENTION WITH CLOUD-BASED GIS MAPPING AND LOCATION-BASED GAMING: DISASTER PREVENTION GO!.....	1384
<i>Masaya Uesugi, Toshiyuki Moriyama</i>	
6-3-5: STUDY ON SUPPORT OF EVACUATION USING HAZARD MAP FOR OVERFLOW.....	1392
<i>Yoshiya Ogawa Masanori Sera, Kotaro Kusakawa, Kosuke Morii, Akitsugu Kajitani</i>	
6-3-6: REAL-TIME DATA DRIVEN FORECAST SYSTEM FOR COASTAL ALGAL BLOOMS	1400
<i>Jiuhao Guo, Joseph H. W. Lee</i>	

6-4 FLOOD PREDICTION

6-4-1: TOPOGRAPHIC AND GEOLOGICAL FEATURES INVOLVED IN WATER LEAKAGE AT LEVEE FOUNDATIONS AND IN LEVEE BODY DEFORMATION BY PIPING ON THE KAKEHASHI RIVER.....	1404
<i>Yutaka Sato, Shoji Fukuoka</i>	
6-4-2: FLOOD DETECTION AND FORECAST BY IOT TECHNOLOGY.....	1412
<i>J. H Jang, T. W. Li</i>	

6-4-3: FLASH FLOOD PREDICTION USING HIGH RESOLUTION SATELLITE RAINFALL DATA IN THE SOUTHERN PART OF THAILAND	1417
<i>Theerapol Charoensuk, Apimook Mooktaree, Sathit Chantip, Ticha Lolupiman, Watin Thanathanphon, Narongrit Luangdilok, Piyamarn Sisomphon</i>	
6-4-4: APPLICATION OF IRIC SOFTWARE FOR FLASH FLOOD DISASTER PREDICTION IN LAOS AND THAILAND	1426
<i>Wongsa Sanit, Urya Weesakul</i>	
6-4-5: UNDERGROUND INUNDATION BY PLUVIAL FLOOD IN FULLY URBANIZED AREA OF OSAKA	1433
<i>Kaito Kusano, Taisuke Ishigaki, Taira Ozaki</i>	
6-4-6: PROBABLE MAXIMUM FLOOD INUNDATION SIMULATION FOR RIVERS IN TOYAMA PREFECTURE, JAPAN	1439
<i>Ryusei Yagi, Shuichi Kure, Shouma Ishikawa, Bambang Adhi Priyambodho</i>	
6-4-7: UNDERGROUND INUNDATION BY SIMULTANEOUS PLUVIAL AND FLUVIAL FLOODING IN URBAN AREA.....	1446
<i>Mitsuhiro Terada, Taisuke Ishigaki, Taira Ozaki, Keiichi Toda</i>	
6-4-8: DEVELOPMENT OF DYNAMIC FLASH FLOOD HAZARD INDEX (DFFHI) IN WANG RIVER BASIN, THAILAND.....	1452
<i>Sathit Chantip, Nat Marjang, Kobkiat Pongput</i>	
6-4-9: FLOOD RISK ANALYSIS FOR THE ISHIKARI RIVER CONSIDERING RAINFALL PATTERNS USING DOWNSCALED D4PDF DATA.....	1460
<i>Nguyen Thanh Thu, Makoto Nakatsugawa, Tomohito Yamada, Tsuyoshi Hoshino</i>	
6-4-10: COMBINING TWO ALGORITHMS AS A TRANSITION RULES FOR CA-BASED INUNDATION MODEL.....	1468
<i>Obaja Triputera Wijaya, Tsun-Hua Yang</i>	
6-4-11: CONVOLUTIONAL NEURAL NETWORK (CNN)-BASED TRANSFER LEARNING IMPLEMENTED TO TIME-SERIES FLOOD FORECAST	1474
<i>Nobuaki Kimura, Daichi Baba</i>	
6-4-12: THE ANALYSIS OF FUTURE FLOOD RISK IN HOKKAIDO, NORTHERN JAPAN, USING DATABASE FOR POLICY DECISION MAKING FOR FUTURE CLIMATE CHANGE (d4PDF).....	1484
<i>Tomohito J. Yamada, Tsuyoshi Hoshino</i>	
6-4-13: FUTURE CHANGE OF TROPICAL CYCLONE INDUCED RAINFALL OVER THE TOKACHI RIVER BASIN, NORTHERN JAPAN USING DATABASE FOR POLICY DECISION MAKING FOR FUTURE CLIMATE CHANGE (d4PDF).....	1488
<i>Tsuyoshi Hoshino, Tomohito J. Yamada, Hiroaki Kawase</i>	
6-4-14: FLOOD DISASTER AND SAFE EVACUATION IN DRAINAGE AREA WITH SMALL RIVERS.....	1493
<i>Yukimi Wakayama, Taisuke Ishigaki</i>	
6-4-15: RESEARCH ON DAM INFLOW PREDICTION DURING SEVERE FLOOD USING MACHINE LEARNING METHODS	1499
<i>Makoto Nakatsugawa, Riko Sakamoto, Yosuke Kobayashi</i>	

6-4-16: FLOOD SUSCEPTIBLE ANALYSIS AND INUNDATION RISK MAPPING FOR A REGULATED RIVER, CASE STUDY: SG. TAJAR	1506
<i>Eny Suria A. Jalil, Shanker Kumar Sinnakaudan, Mukhlis Zainol Abidin</i>	
6-4-17: FLOOD FORECAST BASED ON DEEP LEARNING USING DISTRIBUTION MAP OF PRECIPITATION	1514
<i>Go Ohno, Kazunori Ito</i>	
6-4-18: INUNDATION ANALYSIS MODEL ON CARTESIAN COORDINATE SYSTEM CONSIDERING INFLOW AND OUTFLOW INTO HOUSES.....	1522
<i>Makoto Takeda, Masaya Abe, Yusuke Nakajima, Masataka Murase, Naoki Matsuo</i>	
6-4-19: PREDICTION OF URBAN INUNDATION AND FLOODING OF URBAN RIVERS CAUSED BY HEAVY RAINFALL AND STORM SURGE IN TOKYO 23 WARDS	1528
<i>Masato Sekine, Yonglin Wu, Wataru Baba, Kumik Ogata</i>	
6-4-20: PREDICTION OF URBAN INUNDATION IN YOKOHAMA AND KAWASAKI CITY BY USING “S-UIPS”.....	1532
<i>Masato Sekine, Moe Yoshino, Naoki Takemura, Wataru Baba</i>	
6-4-21: HYDROLOGIC AND HYDRAULIC MODELING OF PANAY RIVER UNDER TROPICAL STORM BOLAVEN 2018 RAINFALL EVENT FOR FLOOD MAPPING OF PONTEVEDRA, CAPIZ, PHILIPPINES.....	1536
<i>Imee Bren Villalba, Warren Gabayeron, Dominic Bautista</i>	
6-4-22: A STUDY ON APPLICABILITY OF FLOOD FORECASTING METHOD BASED ON TIME SERIES ANALYSIS USING OBSERVED WATER LEVEL AND RAINFALL DATA	1539
<i>Naoki Koyama, Tadashi Yamada</i>	
6-4-23: DEEP LEARNING APPROACH FOR PREDICTION OF WATER LEVEL IN RIVERS	1545
<i>Takehiko Ito, Ryo Kaneko, Tomoya Kataoka, Shiho Onomura, Yasuo Nihei</i>	
6-4-24: APPLICATION OF EMBANKMENT BREACHING MODEL TO SIMULATE DAMBREAK FLOODS OF BARRIER LAKES.....	1549
<i>Zhu Yonghui, Lv Qingbiao, Chen Dong, Zhou Jianyin</i>	
 <u>6-5 TSUNAMI</u>	
6-5-1: CHANGES IN THE FLOW STRUCTURE AND ENERGY LOSS OF A TSUNAMI CURRENT THROUGH FOREST WITH A GAP	1555
<i>Naveed Anjum, Norio Tanaka</i>	
6-5-2: ASSESMENT OF TSUNAMI PREPAREDNESS MEASURES IN EAST COAST OF SRI LANKA BASED ON 2004 TSUNAMI EVENT	1562
<i>N. R. Josiah, D. P. C. Laknath, S. Araki</i>	
6-5-3: HIGH RESOLUTION NUMERICAL MODELLING OF TSUNAMI INUNDATION USING QUADTREE METHOD AND GPU ACCELERATION	1570
<i>Shuang Gao, Greg Collecutt, William J. Syme, Philip Ryan</i>	
6-5-4: SUBWAY INUNDATION AND WHELCHAIR USER EVACUATION DURING TSUNAMI BY NANKAI TROUGH EARTHQUAKE.....	1576
<i>Yuhei Shoda, Taisuke Ishigaki, Tomohiro Yasuda</i>	

6-5-5: ENERGY REDUCTION IN TSUNAMI THROUGH A DEFENSE SYSTEM COMPRISING AN EMBANKMENT AND VEGETATION ON A MOUND.....	1583
<i>Md. Abedur Rahman, Norio Tanaka, A. H. M. Rashedunnabi, Yoshiya Igarashi</i>	
6-5-6: INLAND FOREST MODEL DESIGN CONSIDERING TSUNAMI BORNE LARGE DRIFTWOOD.....	1590
<i>Rowan Sachika De Costa, Norio Tanaka</i>	
6-5-7: STABILITY OF SAND TUBE SEAWALL AS A TSUNAMI PROTECTION.....	1598
<i>Radiana Triatmadja, Warniyati, Djoko Legono, Intan Supraba, Nur Yuwono</i>	
6-5-8: THE EFFECT OF LARGE DEBRIS DAMMING ON SCOUR BEHIND A SEAWALL DUE TO TSUNAMI	1605
<i>Warniyati Seimahuira, Radiana Triatmadja, Nur Yuwono</i>	
6-5-9: IMPROVED NUMERICAL SIMULATION AGAINST OVERFLOW FROM EMBANKMENT UNDER STEADY AND UNSTEADY FLOW CONDITIONS BY CONSIDERING NON-HYDROSTATIC PRESSURE	1611
<i>Yoshiya Igarashi, Norio Tanaka</i>	
6-5-10: MEASUREMENT AND CALCULATION OF BORE PROPAGATION IN MEANDERING RIVER	1619
<i>Daisuke Kobayashi, Tatsuhiko Uchida, Yoshihisa Kawahara</i>	

6-6 BANK EROSION

6-6-1: VEGETATION EFFECTS ON THE LATERAL CHANNEL MIGRATION DURING 2016 AUGUST FLOODS IN THE OTOFUKE RIVER.....	1625
<i>Tomoko Kyuka, Satomi Yamaguchi, Kazunori Okabe, Yasuyuki Shimizu, Hideto Kon</i>	
6-6-2: MORPHODYNAMICS OF A SMALL MEANDERING RIVER IN THE AMAZON BASIN FROM LANDSAT AND UAV	1632
<i>Kattia Rubi Arnez Ferrel, Jonathan Nelson, Yasuyuki Shimizu</i>	
6-6-3: FLUME EXPERIMENTS ON REVETMENT FAILURE DUE TO BED DEFORMATION DURING FLOOD	1639
<i>Jun Okuda, Yasuyuki Shimizu, Tomoko Kyuka</i>	

6-7 DEBRIS FLOWS

6-7-1: EFFECTS OF PARTICLE-SIZE DISTRIBUTION AND STREAM GRADIENT ON SEDIMENT SORTING OF A DEBRIS FLOW	1646
<i>Takashi Wada, Jumpei Maeda, Hiroshi Miwa</i>	
6-7-2: NUMERICAL SIMULATION OF DEBRIS FLOW WITH DRIFTWOOD IN THE SOZU RIVER, SAKA TOWN, HIROSHIMA PREFECTURE, JAPAN ON JULY 6 2018	1654
<i>Naoki Fukuoka, Hiroyuki Nagano, Haruyuki Hashimoto</i>	
6-7-3: MULTI-SENSOR FOR DEBRIS FLOW MONITORING AND WARNING.....	1662
<i>Ratih Indri Hapsari, Satoru Oishi, Gerard Aponno, Ratna Ika Putri</i>	
6-7-4: HYDRAULIC CONDITIONS FOR RILL INITIATION ON STEEP SLOPES.....	1666
<i>Seung Sook Shin, Sim Young Ju, Park Sang Deog</i>	

6-8 FLOOD RISK ANALYSIS FOR CLIMATE CHANGE ADAPTATION

- 6-8-1: FATALITY ESTIMATION BY LIFE LOSS EVALUATION MODEL FOR THE LARGESCALE FLOODS UNDER FUTURE CLIMATE..... 1669
Sho Tomura, Manabu Chiba, Taro Yamamoto, Fumihiko Uemura, Shigekazu Masuya, Noriaki Omura, Takatoshi Yoshida, Atsushi Takeda, Tsuyoshi Hoshino, Tomohito Yamada, Makoto Nakatsugawa
- 6-8-2: ESTIMATION OF PROBABLE RAINFALL CONSIDERING UNCERTAINTY BASED ON MASSIVE ENSEMBLE CLIMATE PROJECTIONS IN THE TOKACHI RIVER BASIN..... 1677
Fumihiko Uemura, Shigekazu Masuya, Takatoshi Yoshida, Noriaki Omura, Sho Tomura, Manabu Chiba, Taro Yamamoto, Atsushi Takeda, Tsuyoshi Hoshino, Tomohito Yamada

6-9 WATER-RELATED DISASTERS (GENERAL)

- 6-9-1: STORM SURGE FORECASTING AND INUNDATION ESTIMATION DURING TROPICAL STORM PABUK 2019 IN THE SOUTHERN COAST OF THAILAND..... 1685
Watin Thanathanphon, Narongrit Luangdilok, Kachapond Chettanawanit, Piyamarn Sisomphon
- 6-9-2: EXPERIMENTAL STUDY ON DROWNING ACCIDENT RISK IN RIVER AND SIDE DITCH..... 1692
Sosuke Oka, Takaaki Okamoto, Keiichi Toda, Yasufumi Touma
- 6-9-3: A STUDY ON THE EFFECT OF FLOOD EXPERIENCE ON EVACUATION DECISION MAKING USING REINFORCEMENT LEARNING..... 1698
Riona Michigashira, Tomoharu Hori

7. HISTORICAL WATER PROJECTS AND TRADITIONAL WATER TECHNOLOGIES IN THE ASIA-PACIFIC REGION

- 7-1: EFFECT OF MASONRY EMBANKMENT LOCATED ON MOUNTAIN SLOPE CALLED AS “IGA-BANE” 1706
Taisuke Ishigaki, Ruiji Kawanaka, Michik Hayashi
- 7-2: A REVIEW OF RECENT RESTORATION OF THE CHUGUGI RAINFALL DATA (1770~1910) IN KOREA 1712
Hyeonjun Kim
- 7-3: HYDRAULIC STUDY ON LEVEE ARRANGEMENT ON KUROBE ALLUVIAL FAN CONSTRUCTED IN THE EARLY 19TH CENTURY 1716
Tadaharu Ishikawa, Hiroshi Senoo
- 7-4: HISTORICAL WATER PROJECTS IN KYUSHU DISTRICT, JAPAN, AND A CURRENT PROJECT IN AFGHANISTAN..... 1722
Toshiyuki Moriyama
- 7-5: A TRADITIONAL FLOOD MANAGEMENT TECHNOLOGY IN KASE RIVER BASIN, JAPAN 1730
Koichiro Ohgushi
- 7-6: A HISTORY OF WATER IN THE KINGDOM OF WATER, TOYAMA, JAPAN 1736
Taichi Tebakari

7-7: SEDIMENT BYPASS TUNNEL OF THE OLDEST MASONRY DAM IN JAPAN ~KOBE NUNOBIKI DAM BYPASS SYSTEM AND DAM RESILIENCY UPGRADE~	1742
<i>Makoto Matsushima</i>	
7-8: DEVELOPMENT AND MANAGEMENT OF RIVER FLOOD CONTROLS AND WATER UTILIZATION FACILITIES IN THE MIDDLE AND LOWER REACHES OF THE ISHIKARI RIVER OVER 100 YEARS - TRANSFORMATION OF COLD REGION PEATLANDS INTO ONE OF JAPAN'S TOP RICE CULTIVATION AREAS, LEADING TO THE FORMATION OF A MAJOR ECONOMIC ZONE -	1749
<i>Hideto Kon, Takashi Inoue, Yasuyuki Hirai, Kazumasa Nakamura, Satomi Kawamura</i>	
7-9: A GLIMPSE OF THE WATER MANAGEMENT POLICY IN THE CHOSUN DYNASTY (1392-1910) IN KOREA THROUGH THE ASPECT OF EMBANKMENTS.....	1757
<i>Hyoseop Woo, Byungman Yoon, Young-Uk Kim, Ha-Young Jang</i>	
7-10: HISTORICAL RIVER COURSE CHANGES AND PADDY FIELDS DEVELOPMENTS IN THE ARAKAWA RIVER BASIN, JAPAN AND THE ROLE OF SECOND EMBANKMENTS IN THE RECENT 2019 FLOODING EVENT.....	1760
<i>Norio Tanaka, Hayato Kajitani, Kengo Fushimi</i>	
7-11: INVESTIGATION OF HYDRAULIC CHARACTERISTICS OF ANCIENT INLET SLUICE BARREL IN NUWARA WEWA RESERVOIR	1764
<i>G. N. Paranavithana, J. M. W. S. Jayasundara, H. W. G. Harindra, W. D. N. Ranasinghe, R. S. Ranasinghe</i>	

Author Index