



UNIVERSITAS  
GADJAH MADA



JASA TIRTA 1  
JALAN SURABAYA 2A, MALANG

MSD  
NetWork



International Association  
for Hydro-Environment  
Engineering and Research

Supported by  
Spain Water and IWHR, China

IAHR-APD 2018  
Yogyakarta, Indonesia



# PROCEEDINGS

**21<sup>st</sup> IAHR-APD Congress** | International Association for Hydro-Environment  
Engineering and Research (IAHR)  
Asia Pacific Division (APD)

## Multi-perspective Water for Sustainable Development

### Volume 2

- o Water Resources
- o Hydroinformatics
- o Water-related Disaster Risk Reduction
- o Special Sessions

**Yogyakarta, Indonesia**  
**2-5 September 2018**

ISBN 978-602-71762-7-0



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ISBN : 978-602-71762-7-0

Edition : First, September 2018

Publisher:  
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**FOREWORDS FROM CHAIRMAN OF THE LOCAL ORGANIZING  
COMMITTEE**

Dear Readers,

Universitas Gadjah Mada was honored to host the 21<sup>st</sup> Congress of International Association for Hydro-Environment Engineering and Research-Asia Pacific Division (IAHR-APD) on 2-5 September 2018 in Yogyakarta which was co-hosted by PT. Jasa Tirta I (Jasa Tirta I Public Corporation) and Multimodal Sediment Disaster Network (MSD-Network). The Congress brought up the theme “Multi-perspective Water for Sustainable Development”. This phrase was adopted as the main theme of the Congress to maintain awareness of the stakeholders that water should be valued from various viewpoints namely technical, socio-economic, cultural and environmental viewpoints which integrate all efforts on water resources-related development to contribute to people’s welfare.

The 21<sup>st</sup> Congress of IAHR-APD accommodated the 6<sup>th</sup> AUN/SEED-Net Regional Conference on Natural Disaster (RCND 2018) which was mostly relevant to water-related natural disasters to be part of the Congress. The joint congress was aimed at introducing the IAHR-APD organization to even wider areas of hydro-environment engineers and scientists as well as strengthening cooperation with similar organizations.

The Congress has successfully encouraged the interactions among researchers, industries, and communities, on the dissemination of water-related research achievements and ideas that paves the way for sustainable water and environment-related development. The local organizing committee especially appreciates all of the staff of the IAHR and IAHR-APD for their endless and excellent support to the congress.

The cooperation and support of Universitas Katolik Parahyangan, Sekolah Tinggi Teknik Nasional Yogyakarta, Universitas Kristen Duta Wacana are also highly appreciated. We would like to thank all of the sponsors and participants for their contributions to make the Congress fruitful and memorable. Our special thanks go to the reviewers of the papers and the editors of the proceedings without whom the publication of such excellent quality proceedings would not have been possible. We hope that this proceedings will furnish the readers with excellent references and stimulate further studies and researches in the related areas.

Thank you very much and God bless you all.

Radiana Triatmadja

21<sup>st</sup> IAHR-APD 2018 Congress Chair

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## FOREWORDS FROM CHAIRMAN OF THE IAHR-APD

It is my great honor and pleasure to say 'Welcome' to all the attendees of the 21<sup>st</sup> Congress of the International Association for Hydro-Environment Engineering and Research-Asia Pacific Division. The IAHR-APD Congress is the official and most important open forum for all persons, not only the members but also general participants, who are interested in presenting, discussing, and exchanging their knowledge and experiences in hydro-environment areas. Since the first congress was held in Bangkok, Thailand in 1978, this is the 21<sup>st</sup>, following the previous congress that was held in Colombo, Sri Lanka two years ago with great success in terms of numbers of papers presented and participants. You can see about the past APD congresses at the official website of IAHR-APD <http://www.iahrapd.org/APd/Congress/webinfo/2014/08/1408074914387664.htm>.

We, the APD members, have tried to delineate as well as generalize the conference characteristics such as by emphasizing specialty sessions dealing with the water-issues which are especially important and sometimes unique in the Asia and Pacific region such as typhoon, monsoon, and tropic-affected water issues, as well as historical water projects and traditional water technologies in the region. For example, we have special sessions of Historical water projects and traditional water technologies in the Asia-Pacific region, Green infrastructure as disaster risk reduction measure, Ecosystem-based disaster risk reduction for floods and tsunamis, Adapting to climate change using green infrastructure and LID measures, Conceptual ideas to solve problems related to hydro-environment engineering, Volcano and multimodal sediment disaster, Simulation and risk mitigation, and Hydrology-geomorphology links in tropical rivers. At this congress, we are also hosting some international panels with recognized high-ranking officials on the water issues that are of mutual interests in the region.

Among many special sessions that are held at this conference, the session of Historical water projects and traditional water technologies in the Asia-Pacific region, would be worthwhile to introduce more in detail. It has the purpose of giving international professional recognition to the works of: 1) past water projects that contributed or are still contributing to the welfare of the people, and 2) past brilliant water technologies that blossomed once and are still useful in the Asia – Pacific region. The first special session was held in Sri Lanka congress in 2016 with seven presentations from different countries in the region. Those are now in the process of being published in the Journal of Hydro-environment Research (JHER), the official journal of IAHR-APD, as a special issue. This type of special session will continue at every APD congress and a few papers presented at the session will be strictly screened and submitted for a possible publication in JHER along with the ones receiving the best-paper award in the congress.

I strongly believe that this conference should be a very useful and effective forum in which we are able to foster interdisciplinary research and collaboration, rapid dissemination of latest findings, and will provide an opportunity for discussing how novel methods and techniques can be used interchangeably in various fields and application areas of hydro-environment engineering and research especially in the Asia and Pacific region.

Last, but not least, I as the IAHR-APD chair express many thanks to the LOC members including Prof. Radianta Triatmadja, the conference chair, for their full devotions to the preparation and proceedings of the conference for the last two years. I strongly believe that this conference will be one of the most successful events ever in the history of the IAHR-APD activities.

Hyoseop Woo

IAHR-APD Chair



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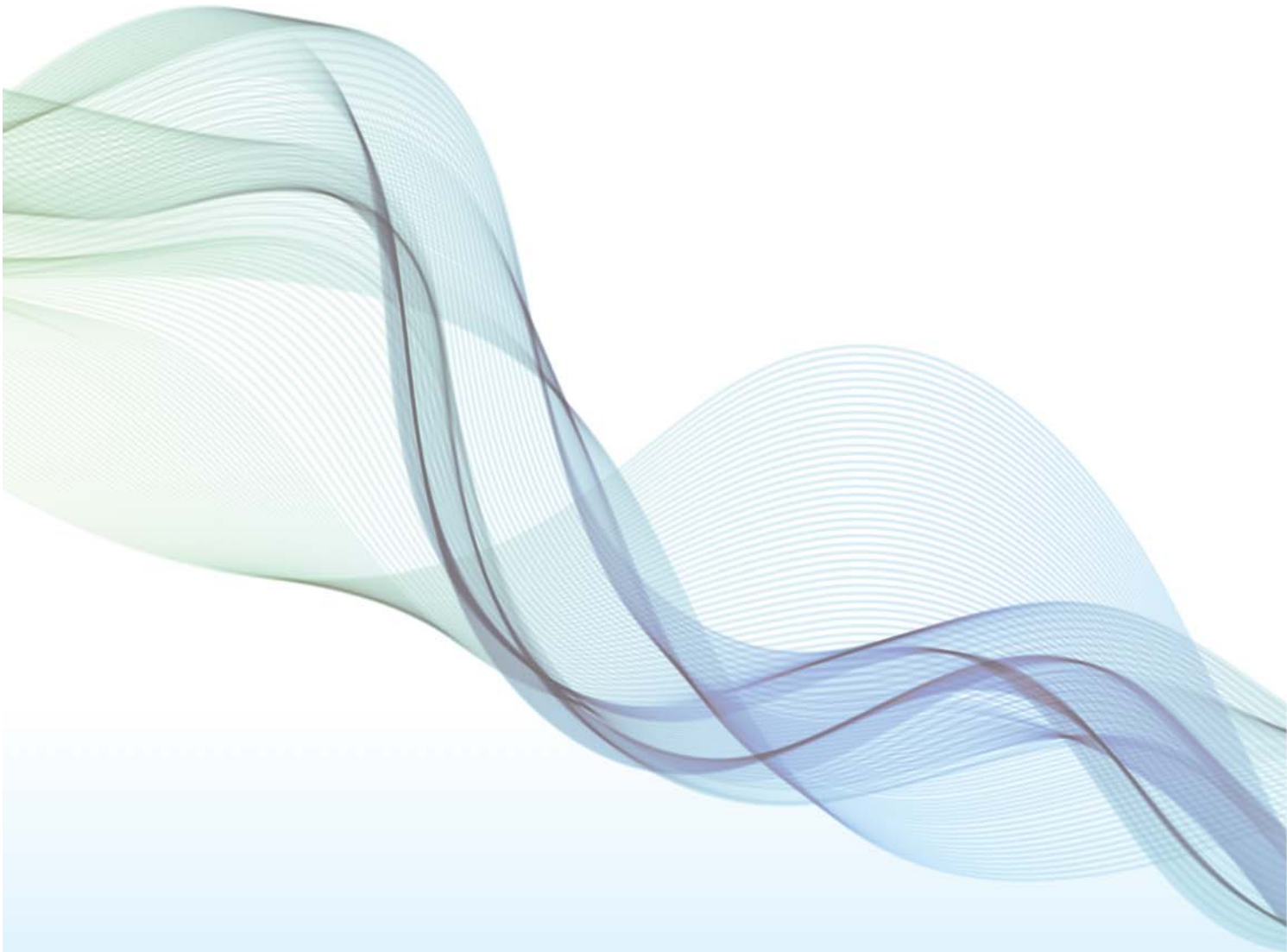
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ISBN 978-602-71762-7-0



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