

EDITOR'S FOREWORD

The 34th World Congress of the International Association for Hydro-Environment Engineering and Research (IAHR) was held at the Brisbane Convention and Exhibition Centre, Brisbane, Australia, 26th June to 1st July, 2011.

Balance and Uncertainty: Water in a Changing World, the main theme of the Congress focuses on the central roles of hydraulic engineering, hydrology and water resources in our changing world, and how these roles link to the broader issues. The Congress itself is a confluence of the 34th World Congress of the International Association for Hydro-Environment Engineering and Research, the 33rd National Hydrology and Water Resources Symposium of Engineers Australia (EA) and the 10th National Conference on Hydraulics in Water Engineering of EA.

Some recent natural disasters, including the 2010-11 floods in Australia and the 11 March 2011 earthquake and tsunami in Japan have shown the complex interactions between nature and society. These events have highlighted that careful management and innovative solutions are required to balance these interactions, and solutions must be able to deal with the uncertainty in the natural world as well as our changing human world. A balance must be continually being sought between competing values in water engineering, including the environment, the economy, tourism, social and indigenous values, health aspects, aesthetics and the needs of current and future generations.

The seven Scientific Themes of the Congress are:

1. **Extremes and Variability**
2. **Coastal Hydraulics: Form and Function**
3. **Water and carbon: understanding processes and modelling the impact of climate change**
4. **Responding to the shifting water resources**
5. **Environmental Hydraulics and Hydrology**
6. **Professional Development: Bridging the Gap between Research and Practice**
7. **Hydroinformatics**

These themes have been chosen to address the present relevant issues supported by the traditional disciplines of engineering and research in the hydro-environment.

Paper Review Process

All papers published in the Proceedings (ISBN 978-0-85825-868-6) and presented at the 34th IAHR World Congress have been peer reviewed for technical content through a formal and rigorous process, as outlined below. The Proceedings are an Engineers Australia publication.

In response to the Call for Papers inviting Abstracts, which was sent out in 2010, the Scientific Committee received over 1300 abstracts of proposed papers. Members of the Scientific Committee assigned Associate Editors and Reviewers from the IAHR and Engineers Australia membership throughout the world to evaluate all of the papers with regard to their suitability for the World Congress. The authors of 1250 abstracts were invited to prepare a full paper for presentation at the conference, either orally or as a poster. The Panel of Reviewers was drawn from the IAHR and Engineers Australia communities and other international and national experts in fields relevant to the Congress sub-themes. The Panel reviewed over 840 full papers submitted for publication in the World Congress Proceedings. All papers submitted for oral or poster presentation were peer reviewed by at least two independent reviewers according to a set of criteria established by the Scientific Committee. Reviewers were required to assess the paper against these criteria and provide comments on the paper for both the author and the Scientific Committee against the criteria. Authors were then requested to revise their manuscript in accordance with Reviewers' comments and to submit for final review before

inclusion in the Proceedings. The final number of papers accepted for publication in the Proceedings was 590.

Whether a paper was selected for oral or poster presentation has had no bearing on the review process. The same level of rigour has been applied to all papers and all papers which have been accepted, regardless of the presentation mode, have been published in the Proceedings.

The final Proceedings were edited by the chair of the Scientific Committee, Eric Valentine, assisted by the Committee members, Colin Apelt, James Ball, Hubert Chanson, Ron Cox, Rob Ettema, George Kuczera, Martin Lambert, Bruce Melville and Jane Sargison.

Acknowledgements

We thank the many persons who have contributed to the organization of the Congress. It is a pleasure to acknowledge the great efforts of the Organising Committee members. Enormous thanks are expressed to the Associate Editors and the Reviewers, whose names are listed below. Particular gratitude is extended to Michael Leonard for his valuable contribution to organising the program.

The Editors express their sincere gratitude to the general and keynote speakers, the authors of all papers, the poster presenters and session chair persons. Without their contributions, we would not have been able to have produced these valuable state-of-the-art Proceedings.

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The Editors acknowledge the following organisations for their generous support.

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We sincerely hope that the Proceedings of the 34th IAHR Congress will contribute to the advancement of knowledge in our technical specialities, the progress of our professions and help to meet the important needs of our global society.

On behalf of the Scientific Committee,

Editor-in-Chief

Eric M. Valentine, Foundation Professor of Civil Engineering, Charles Darwin University, Darwin, Australia.

June 2011

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THE ORGANISATIONS

IAHR

The International Association for Hydro-Environment Engineering and Research (IAHR), founded in 1935, is a worldwide independent organisation of engineers and water specialists working in fields related to the hydro-environmental sciences and their practical application. Activities range from river and maritime hydraulics to water resources development and eco-hydraulics, through to ice engineering, hydroinformatics and continuing education and training. IAHR stimulates and promotes both research and its application, and by so doing strives to contribute to sustainable development, the optimisation of world water resources management and industrial flow processes.



IAHR runs a series of conferences in the hydro-environment field, with the World Congress as its flagship event.

Further detail on IAHR may be found at:

<http://www.iahr.net/site/index.html>

EA

Engineers Australia (EA) is the national forum for the advancement of engineering and professional development in the engineering field. With more than 85,000 members embracing all disciplines of the engineering team, Engineers Australia is the largest and most diverse professional body for engineers in Australia. EA seeks to advance the science and practice of engineering, cultivate lifelong learning by our members, promote the contribution of the profession, champion professional and ethical conduct, celebrate excellence in engineering outcomes, sustain the integrity of the profession and take the lead in advocacy of the profession.



The National Committee on Water Engineering (NCWE) is EA's peak representative body on water engineering. NCWE runs a series of national conferences in the water engineering field, including the Hydrology and Water Resources Symposium and the Conference on Hydraulics in Water Engineering.

Further details on EA and the NCWE may be found at:

<http://www.engineersaustralia.org.au/>

34th IAHR World Congress

The IAHR World Congress, held every two years, is one of the most important activities of the International Association of Hydro-Environment Engineering and Research (IAHR). The congress offers technical programmes, seminars, technical workshops, presentations, plenary sessions and social events alike. Signature features include the IAHR Plenary Lectures and the respected Ippen, Kennedy, Selim and Schoemaker Awards. The IAHR World Congress provides a place for the hydro-environment engineering community to meet across borders and exchange experiences, seek advice and be inspired.

Previous events in this congress series have been referred to as the IAHR Biennial Congress. This congress is the first to be officially named the World Congress, reflecting the global nature of this peak event for the hydro-environment engineering community.

33rd National Hydrology and Water Resources Symposium

The National Hydrology and Water Resources Symposium is EA's premier event in hydrology and water resources, and attract delegates from across Australia and internationally. The Symposium was first held in 1962 in Hobart, and the event is usually held every 18 months. Signature features of this event include the Munro Oration, GN Alexander Medal and the NCWE Hall of Fame.

10th National Conference on Hydraulics in Water Engineering

The National Conference on Hydraulics in Water Engineering is EA's premier event in hydraulics, and attracts delegates from across Australia and internationally. The Conference was first held in 1981 in Sydney, and is usually held every three years. Signature features of this event include the Henderson Oration and the NCWE Hall of Fame.

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Scientific Themes and Sub-Themes

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SC Coordinator:

- 1.1 Floods
- 1.2 Storm surge
- 1.3 Drought
- 1.4 Natural disaster and mitigation
- 1.5 Stochastic hydrology
- 1.6 Adaptation to climate changes and variability

THEME 2: Coastal Hydraulics: Form and Function

- 2.1 Advances in wave processes
- 2.2 Coastal processes and morphology
- 2.3 Estuarine processes
- 2.4 Coastal and offshore structures
- 2.5 Tsunamis

THEME 3: Water and Carbon: Climate Change Impact

- 3.1 Surface water hydrology
- 3.2 Groundwater hydraulics and hydrology
- 3.3 Lake and reservoir hydraulics
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- 3.5 Urban hydrology

THEME 4: Responding to Shifting Water Resources

- 4.1 Decision-support systems
- 4.2 Water resources management
- 4.3 Flow conveyance systems
- 4.4 Hydraulic structures and machinery
- 4.5 Urban water cycle management including drainage and stormwater systems
- 4.6 Wastewater treatment

THEME 5: Environmental Hydraulics and Hydrology

- 5.1 Ecohydraulics including low flows
- 5.2 Ecohydrology
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- 5.4 Fluvial hydraulics

THEME 6: Professional Development: Bridging the Gap between Research and Practice

- 6.1 University education
- 6.2 Professional development
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- 6.4 Interactions between hydraulics and hydrology

THEME 7: Hydroinformatics

- 7.1 Computational hydraulics and hydrodynamics
- 7.2 Emerging computational methods
- 7.3 Data mining and data-driven modelling
- 7.4 Applications of models and hydroinformatics tools
- 7.5 Cyber infrastructure in water

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