*Desalination and Water Treatment*
www.deswater.com
32 (2011) 1–3
August
1944-3994 / 1944-3986 
doi: 10.5004/dwt.2011.2671

# Challenges in Environmental Science and Engineering CESE-2010

## 26 September – 1 October 2010, The Sebel, Cairns, Queensland, Australia

# Total Water Management for the Sustainability of Freshwater in the Future

## Editorial

The third international conference on the "Challenges in Environmental Science & Engineering" series CESE-2010 was held at the Sebel Hotel, Cairns, Australia from the 26th of September to the 1st of October 2010. The conference again brought together internationally renowned engineers, scientists and researchers in the fields such as sustainability, water reuse, renewable energy, public health and biotechnology from more than 12 countries to discuss the environmental challenges the world facing today and into the future. Both CESE-2008 and CESE-2009 have been a great success. In particular, the CESE-2009 has attracted more than a hundred delegates from sixteen countries who presented their research outcomes in areas of Sustainable Catchments, Green Chemistry and Membrane Technology. Wealth of information was shared in those two conferences while enjoying the hospitality of tropical Townsville. Selected presentations from CESE-2009 were peer reviewed and published in three special issues of the journals *Bioresource Technology*, *Desalination and Water Treatmen*t and *Water, Air and Soil Pollution: Focus*.

The conference themes ranged from fresh water to wastewater and wetlands to the Great Barrier Reef and exciting papers were presented in five parallel sessions on days 2 and 3 and in four parallel sessions on day 4. Day one set the tone for the above through key note speeches from world renowned researchers from India, Japan, USA, Taiwan and Australia. Professor Ashok Pandey provided valuable insight into the importance of biofuels for a cleaner environment and in which he discussed the case of bioconversion of lignocellulosic biomass into bioethanol. Professor Kazuo Yamamoto evaluated the changes in wastewater treatment systems that enhance the quality of treated effluent and discussed about biomass/water production. Professor Poojitha Yapa discussed about processes, behavior and modeling of deep water oil spills. Professor Kuo-Lun Tung spoke about the advances in pore morphology characterization for water treatment membranes. Professor Richard Pearson analysed the values of wetland ecosystems in Great Barrier Reef (GBR) catchments and Mr. Jon Brodie detailed the issues, priorities and

management response to terrestrial pollutant runoff to the GBR. Mr. Nick Heath explored about deep pollution cuts deeper sugar profits from regulatory reform and Mr. Matt Kealley queried whether environmental risk management plan of catchments adjacent to GBR could improve water quality of GBR. Thus, those keynote speeches covered issues and solutions that are available for sustainable catchments as well as future plans to extend the sustainability.Finally, half of day five was dedicated to field visit which gave insight to the operations of Cairns water and wastewater treatment plants. We want to make significant contribution to "Sustainable Growth" and this could only possible if scientists and engineers were worked together. This will pave way for further interactions with other stakeholders who are as important as the previous two to find ways for complete solutions. The Guest Editors of this special issue are thankful to the Editor of *Desalination and Water Treatment*, Professor Miriam Balaban for providing an opportunity to publish selected papers that were presented at CESE-2010 after peer review. This special issue covers the challenges that are faced by scientists and engineers in protecting the aquatic environment and delivering potable water to communities all over the world in sustainable ways. Combating to reserve and to sustain freshwater for future generations is already under way around the globe. This combat could only be successful if a holistic approach is taken considering "Total Water Management" (TWM). The TWM will comprise the following:

- Better catchment management for sustainable ecosystems and communities
- Sustainable industrial and urban water management
  - Water treatment
  - Wastewater treatment and reuse
- Resource recovery

Better catchment management should focus on the application of cleaner production in all types of industries and implementation of efficient urban storm water management. Socio-economics, public health and managing community perceptions as well as impact on aquatic and terrestrial biodiversity should also be incorporated in better catchment management.

Sustainable industrial and urban water management needs research on water and wastewater treatment in order to provide smart water management in domestic and industrial uses. Future water treatment should involve in improving the understanding and analysis of water quality and developing advanced water treatment technologies. Effective wastewater treatment and reuse will also depend on the innovation of novel treatment technologies and the planning of efficient use of treated wastewater. Research on sustainable water management in primary industries needs to be considered as well. So far, the by-products of treatment technologies are considered as waste streams. However, those streams have wealth of resources which should also be recovered in order to maintain the quality of receiving streams. For example, biosolids as well as concentrate from membrane processes should be targeted for resource recovery. Thus, we have included 60 relevant papers that deal with challenges faced in the following areas:

- Water treatment including the fate and removal of micro-pollutants
- Ground water monitoring and modeling
- Factors affecting the water quality in drinking water distribution systems
- Wastewater treatment including membrane technology and wetland systems
- Water reuse and resource recovery
- Seawater

We sincerely hope the contributions made to this special issue will help in moving forward in the direction of "Total Water Management" and we thank all the authors for doing so. We also thank reviewers for critically reviewing those manuscripts and improving the quality of the papers that appear in this special issue.

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