



**Prince Sultan Bin Abdulaziz
International Prize for Water**

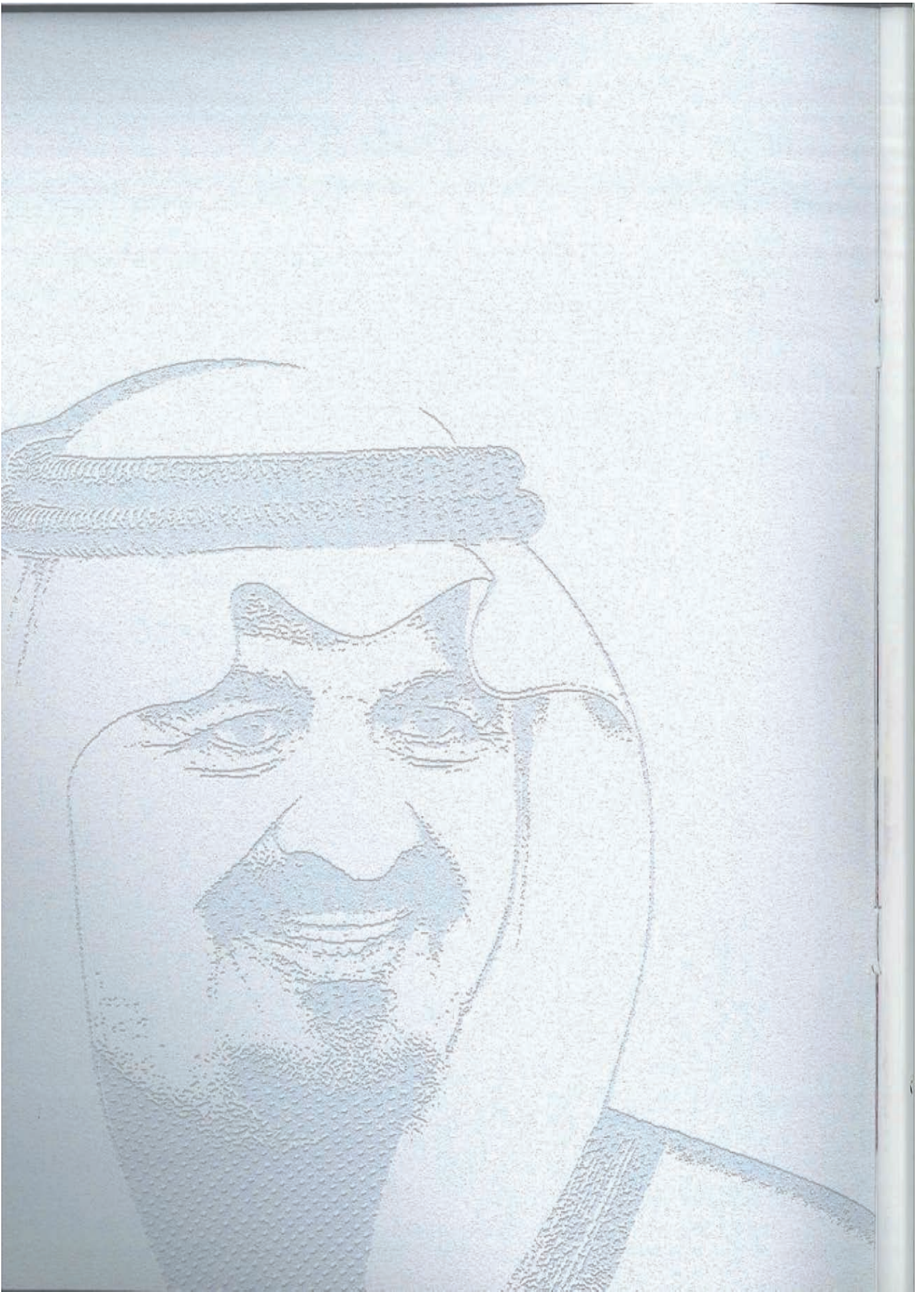
Recognizing Innovation

**General Information and
Invitation for Nominations**

**th
Award (2016)**

**Nominations
open online until
31 December 2015**

www.psipw.org e-mail: info@psipw.org





HRH Prince Sultan Bin Abdulaziz
(1930 - 2011)

PSIPW is an undertaking that reflects brightly on Saudi Arabia's continued efforts and constructive work on behalf of humanity. There can be no doubt that by honoring creative scientists, PSIPW gives recognition to the contributions they are making to protect one of our most precious resources. Whether it is for their work in water conservation, quality-control, minimizing pollution, or some other worthy endeavor, honoring these researchers is an inspiration for scientists to give their utmost in developing ever-better research methods and capabilities.

A handwritten signature in blue ink, appearing to be the name of the prince, written in a cursive style.

The Prize in Brief

PSIPW is a scientific prize with a focus on innovation. Established in 2002 by HRH Crown Prince Sultan Bin Abdulaziz, it rewards the efforts made by scientists, inventors and research organizations around the world which contribute to the sustainable availability of potable water and the alleviation of the escalating global problem of water scarcity.

To this end, PSIPW awards a suite of five bi-annual prizes, covering the entire water research landscape. In this way, PSIPW encourages research to find solutions to the various water-related challenges facing the world today.

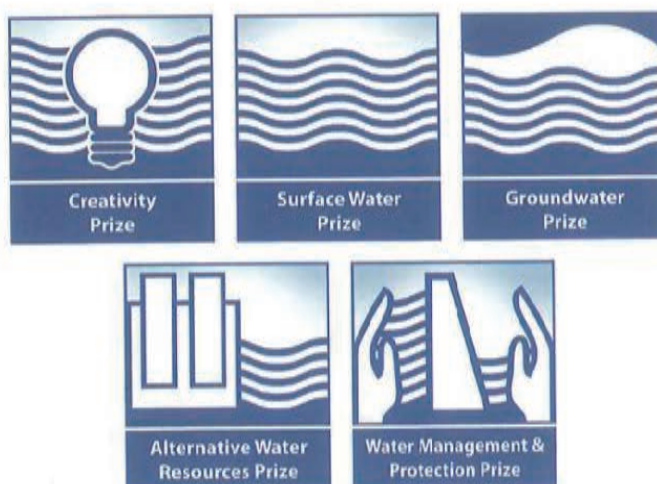
First, there is the **Creativity Prize**. Worth US\$ 266,000, the Creativity Prize is by nomination only. Universities, university departments, research institutes, companies, and

agencies can nominate individuals and teams of researchers for this prize. The Creativity Prize is awarded to an innovator or pioneer for scientific work that can rightly be considered a breakthrough in any water-related field. The work might be a body of research, an invention, or a new patented technology.

Then there are four **Specialized Prizes**, each worth US\$ 133,000. Researchers, research teams, and organizations nominate themselves for these prizes:

- Surface Water Prize
- Groundwater Prize
- Alternative Water Resources Prize
- Water Management & Protection Prize

Each prize is accompanied by a distinctive trophy and certificate.



Prize Topics

PSIPW covers all topics pertaining to potable water and water resources management. The **Creativity Prize** is open to pioneering and innovative scientific work in any water-related field that provides an original solution which is useful to society. It should contribute to development and social upliftment while being

practical, environmentally friendly, and cost-effective.

Each of the four **Specialized Prizes** is dedicated to the wide range of research topics that fall within its scope. Nominations are open to all relevant, innovative and current research. Some of the many topics that are relevant to each prize are as follows:

<p>Surface Water Prize</p> <ul style="list-style-type: none"> Water Harvesting Rain & Runoff Water Modeling Effects of Global Warming on Precipitation Flood Mitigation & Control Evaporation & Transpiration Sedimentation Control in Surface Water Systems <p>And all other topics related to surface water</p>	<p>Groundwater Prize</p> <ul style="list-style-type: none"> Groundwater Recharge Groundwater Exploration & Assessment Groundwater Contamination Aquifer Characteristics Pumping Tests <p>And all other topics related to groundwater</p>
<p>Alternative Water Resources Prize</p> <ul style="list-style-type: none"> Desalination Wastewater Treatment Water Reclamation, Purification & Recycling Innovative Water Production Methods Cloud Seeding Fog & Dew <p>And all other topics related to alternative water resources</p>	<p>Water Management & Protection Prize</p> <ul style="list-style-type: none"> Integrated Water Resources Management (IWRM) Water Conservation Water Demand Management Water Pollution Control Sustainability of Water Resources <p>And all other topics related to the management and protection of water resources</p>

Award: Creativity Prize		Value: \$266,000
Nominators:	universities, university departments, research institutes, companies, water organizations and agencies	
Candidates:	individual researchers, research teams	
Eligible Works:	published research papers, published books and registered patents within the past 5 years	
Award: Specialized Prizes		Value: \$133,000
Nominators:	self-nomination	
Candidates:	individual researchers, research teams, water organizations	
Eligible Works:	published research papers, published books and registered patents within the past 5 years	

Nomination Process

Nominations for all five prizes are made online through an electronic application form available on the PSIPW website. All required documentation and works to be submitted are uploaded by way of the same form.

Once a user has registered to the site, he or she can log in at any time and complete the application process at his or her leisure up to the 31 December 2015 nomination deadline. All documentation can be uploaded in PDF format during this timeframe at the user's convenience.



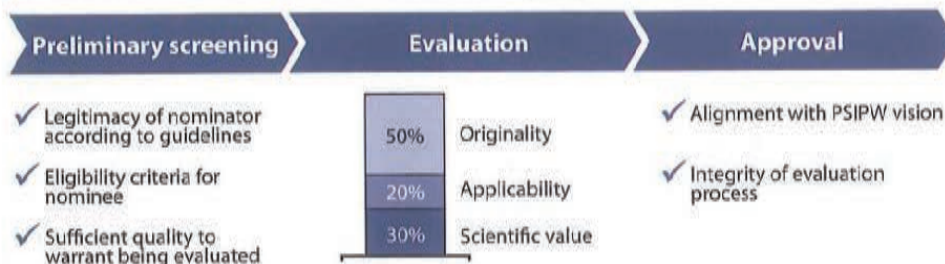
Evaluation of Nominated Works

Nominations are evaluated to determine their originality, scientific value, and applicability. Special consideration is given to how a nominated work contributes to its field of research and its usefulness to society, particularly with respect to development and solving problems on an international level.

Three committees are dedicated to evaluating the nominations for each of the five prizes:

1. Preliminary Screening Committee
2. Referee Committee
3. Selection Committee

PSIPW places great emphasis on enlisting the participation of leading scientists from around the world to act as judges on these committees.



General Conditions for Nominations

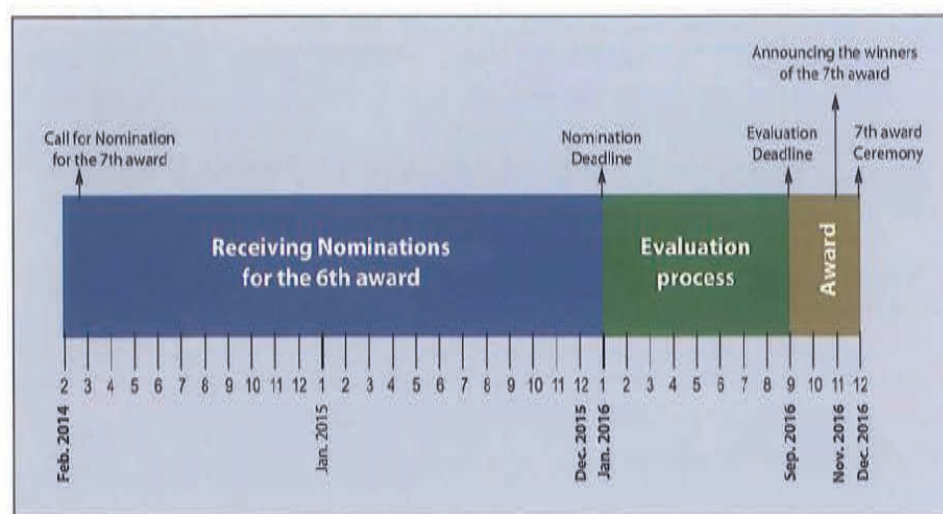
1. All nominations are made online through an electronic application form that is available on the PSIPW website. All required documentation and submitted works are uploaded by way of the same form. Mail-in applications are not accepted.
2. In the event that a team of individuals are being nominated, all team members (up to five) must be named at the time of application and one member must be specified as their representative. Groups of people working on the same project may not be nominated separately. They must be nominated as a group with a single nomination form.
3. A university, institution, or government agency is not eligible to be nominated for the **Creativity Prize**. The nominee must be an individual or group of individuals. Organizations as well as individuals may nominate themselves for one of the four **Specialized Prizes**.
4. Nominations for the **Creativity Prize** must be made by a university, institution, or government agency on behalf of individuals or teams of researchers. Individuals may not nominate themselves or others for the Creativity Prize. Nominations for the **Specialized Prizes** are by direct self-nomination.
5. The nominated body of work must have been completed no more than five (5) years prior to the nomination deadline for the current award.
6. Published research papers, published books, and registered patents may be submitted for consideration. Unpublished works and unregistered patents are ineligible for the prize.
7. No more than five (5) distinct works may be submitted. Multiple works should not be collected together and submitted as a single work.
8. Works will be reviewed and judged in English. A work published in another language must be submitted in the original language accompanied by a full translation or a translation of the parts of the work that are to be considered for the prize. If a partial English translation is provided, then only that portion of the work will be considered for assessment.
9. A nominee may only be nominated for one of the five prizes during the same award period.

10. The work being nominated must not have previously been a recipient of any other international prize. (However, it may have been the recipient of local, national or regional prizes.)

11. Members of the PSIPW committees and their immediate relatives may not be nominated for the prize.

Prize Calendar

1. 20 February 2014: Call for nominations and opening of the online application form for the 7th award.
2. 31 December 2015: Deadline for receiving nominations.
3. January-September 2016: The evaluation process.
4. November 2016: The Prize Council announces the winners of the 7th Award.
5. December 2016: The awards ceremony for the 7th Award.



Activities of PSIPW

PSIPW is a non-profit, non-governmental organisation that promotes a wide range of innovative water-related work around the world. Among its most important activities are the following:

1. PSIPW serves on the Arab Water Council's Board of Governors. It also provides support for some of the Council's activities.

2. PSIPW is a member of a number of leading international organizations, including the World Water Council. PSIPW also has special consultative status with the United Nations Economic and Social Council (ECOSOC) It was granted this status at ECOSOC's Substantive Session of July 2013.



3. PSIPW is an observing member of the United Nations' Committee on the Peaceful Uses of Outer Space and participates in its meetings in Vienna.

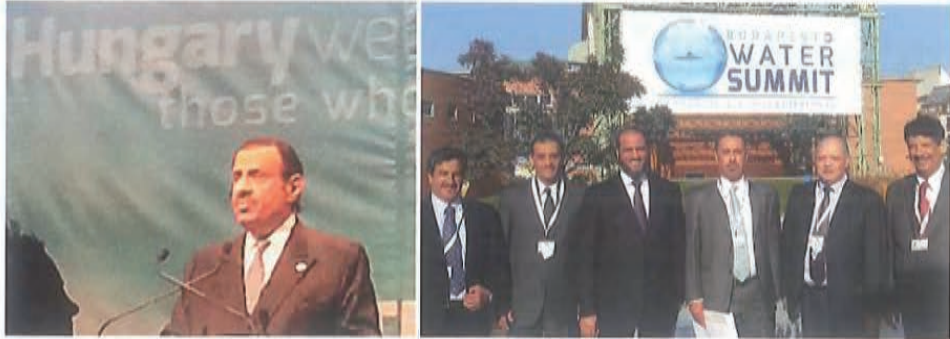
4. PSIPW, in conjunction with the United Nations and various space agencies, organizes the bi-annual International Conference on the Use of Space Technology for Water Management, which to date has been held in Riyadh, Buenos Aires, and Rabat.

5. In conjunction with King Saud University and the Saudi Ministry of Water and Electricity, PSIPW organizes ICWRAE - the International Conference on Water Resources and Arid Environments, held concurrently with the PSIPW awards ceremony.

6. PSIPW provides financing and support for the Prince Sultan Bin Abdulaziz International Prize's Chair for Water Research located at King Saud University. The Chair, in turn, supports a number of graduate students of various nationalities engaged in a program of research into rain and floodwater harvesting.

7. PSIPW sponsors and participates in a number of international conferences and exhibitions. It presents seminars at some of these conferences, as well as independently, to facilitate meetings between participating scholars in order to foster the exchange of ideas.

8. The Prize Council holds regular meetings around the world. During each bi-annual award, two meetings are held in Riyadh, a third in the capital of another Arab country, and a fourth in a non-Arab country. This is to encourage the exchange of ideas and to open channels of cooperation among water specialists.



Budapest Water Summit - Budapest, Hungary



23rd SETAC Europe Meeting - Glasgow, Scotland UK



3rd International UN Conference on the Use of Space Technology for Water Management - Rabat, Morocco



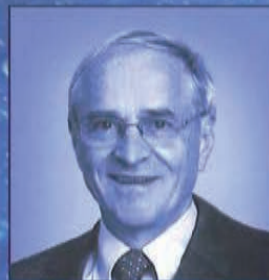
Wasser Berlin International - Berlin, Germany



8th IWA Micropol & Ecohazards Conference - ETH Zurich, Switzerland



Dr. Kristine M. Larson

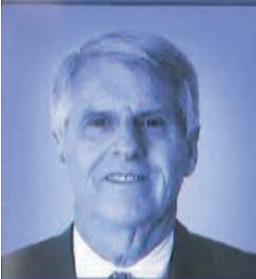


Dr. Eric F. Wood



Dr. Justin Sheffield

Prizewinners for the 6th Award (2014)



Dr. Larry W. Mays



Dr. Jesús Carrera Ramirez



Dr. Polycarpos Falaras



Dr. William W-G. Yeh

Winners for the Creativity Prize – 6th Award (2014)

The prize is split between two winning teams:

[1] The GPS Reflections Group led by Dr. Kristine M. Larson (University of Colorado, Boulder), and including Dr. Eric E. Small (University of Colorado), Dr. Valery U. Zavorotny (NOAA) and Dr. John J. Braun (UCAR)



Topic: The discovery that standard geodetic GPS instruments are sensitive to hydrological influences and the subsequent development of a new, unexpected, and cost-effective technique, GPS Interferometric Reflectometry (GPS-IR), to measure soil moisture, snow depth, and vegetation water content.

Description: GPS-IR is based on the discovery that the “noise” (interference pattern) observed with ordinary GPS instruments correlates with the water content of the reflecting surface in the vicinity of the receiving antenna.

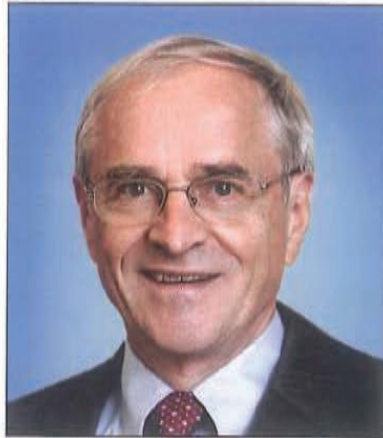
This method of measuring soil moisture complements the cosmic ray technique (COSMOS) of Dr. Marek Zreda and Dr. Darin Desilets, a work previously honored by PSIPW back in 2010. Whereas COSMOS provides soil moisture averages over a circular area of radius 300 m to a depth of several decimeters, continuously-operating GPS receivers can be used to estimate soil moisture variations over areas of radius 50 m to a maximum depth of 6 cm, with greatest sensitivity to the upper 1 cm of soil depth at near saturation. Furthermore, GPS-IR has the advantage of relying on an existing GPS infrastructure installed by surveyors and geoscientists that covers an increasingly large portion of the global surface (including more than 12,000 continuously-operating GPS systems on and near a wide range of soil and vegetation types around the world). Its ability to reliably measure and track snow depth is extremely important because on-site snow distribution data are sparse and remotely sensed data are coarse-scale and imprecise. The ability of GPS-IR to sense and track vegetation growth complements conventional remote sensing data that have limited temporal coverage and do not work well in the presence of clouds.



From left to right: Dr. Valery U. Zavorotny, Dr. Kristine M. Larson, Dr. Eric E. Small and Dr. John J. Braun



[2] The team of Dr. Eric F Wood and Dr. Justin Sheffield (Princeton University, USA)



Topic: The development of a state-of-the-art system for accurately monitoring, modeling, and forecasting drought on regional, continental and global scales.



Description: Their in-depth and comprehensive exploration, monitoring, modeling, analysis and forecasting of drought on regional, continental and global scales utilizes modern remote sensing and ground monitoring capabilities to help fuse state-of-the-art hydrologic science, much of which they helped develop, with seasonal climate and shorter-term weather studies in a way that enhances, fundamentally and significantly, our understanding of land-atmosphere coupling and ability to monitor as well as quantify the space-time variability of droughts, past and future.

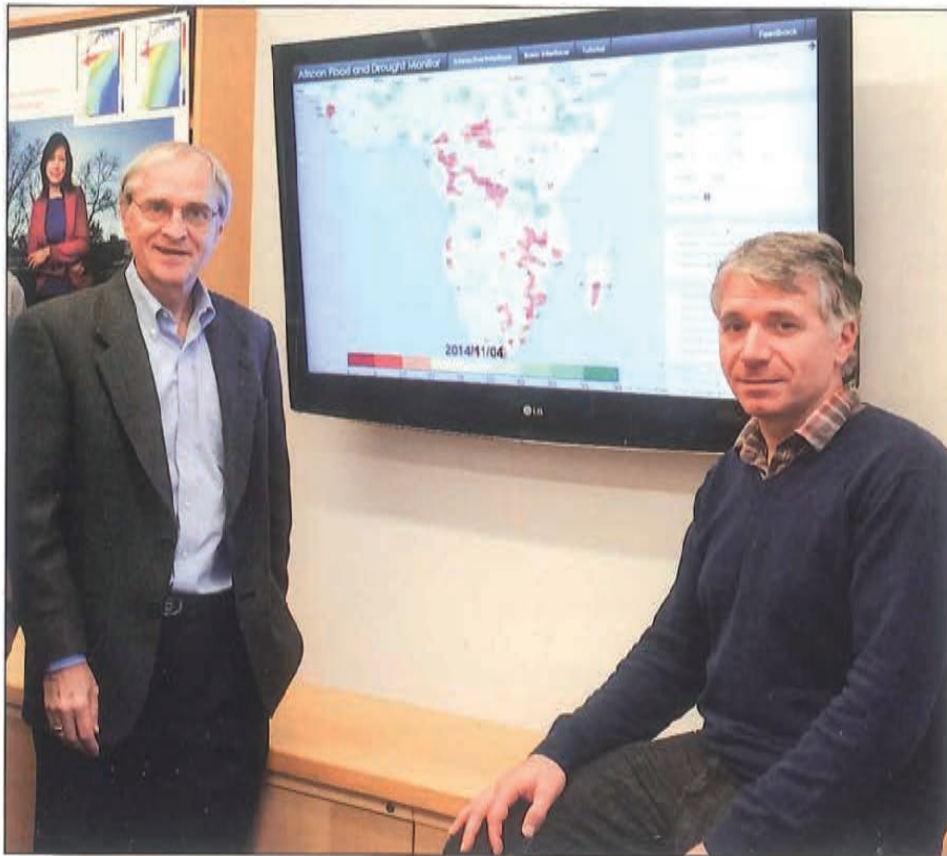
An important component of this fusion is the bridging of scales between relatively low resolution climate models and hydrologic models having much finer spatial and temporal scales of resolution.

The team's Bayesian downscaling approach has allowed translating climate model outputs into much higher-resolution inputs as drivers of corresponding hydrologic models. Consequently, terrestrial hydrology can be simulated at fine temporal (hourly) and spatial (12 km) scales over continental domains for the long periods (50 years) necessary to create the historical record required to fit probabilistic models. Today, virtually every drought monitoring system in the world uses Wood's and Sheffield's approach.

Another very important outcome of this capability has been a unique Princeton Global Forcing Dataset that is now widely used by the scientific and drought forecasting communities worldwide.

Previous assessments of historic changes in drought over the late twentieth and early twenty-first centuries expected climate change to cause an increase in draught frequency and severity due to a corresponding decrease in regional precipitation and increase in evaporation. In a 2012 letter to *Nature*, the team effectively overturns this expectation by demonstrating that it is based on an oversimplified potential evaporation model. By contrast, their more comprehensive approach indicates that there has been little change in drought over the past 60 years. This explains why tree-ring drought reconstructions diverge from earlier drought records and alters our perspective on how global warming impacts hydrological phenomena and extremes.

The team's efforts have culminated in the recent development of a drought monitoring and forecasting system with UNESCO for sub-Saharan Africa.



From left to right: Dr. Eric F. Wood and Dr. Justin Sheffield

Winner for the Surface Water Prize – 6th Award (2014)

Dr. Larry W. Mays (Arizona State University, USA)



Topic: Comprehensive work in surface water hydrology and water resources engineering, culminating in three leading and innovative textbooks in the field and the development of optimization models in practical hydrology for current problems, including real-time optimal dam release during flood conditions and watershed development in urban areas.

Description: The books by Mays, with their breadth, depth and broad relevance, have made a unique and tangible contribution to water resources engineering and the management of water resources throughout the world. His books include *Ancient Water Technologies* (2010), *Ground and Surface Water Hydrology* (2012), and *Integrated Urban Water Management: Arid and Semi-Arid Regions* (2008). One of his most unique contributions is to demonstrate how ancient water technologies can be applied today to manage water resources in concentrated urban areas and alleviate many present-day sustainability problems.



Winner for the Groundwater Prize – 6th Award (2014)

Dr. Jesús Carrera Ramirez (Institute for Environmental Assessment and Water Research (IDAEA), Barcelona, Spain)



Topic: The development of mathematical hydrogeology and transport modelling in groundwater systems.

Description: His work increases the significance and relevance of computer simulations for groundwater, by re-estimating the value of governing parameters, identifying new mechanisms and parameters to describe transport phenomena in groundwater, and searching for solutions on transport situations that are not described by standard simulation techniques. As a result, he has made a quantitative identification of the processes and searched for solutions to these phenomena, including the globally critical problem of seawater intrusion and water salinisation in arid regions. His developments in the field of groundwater conservative and reactive transport modelling have advanced the field towards the reliable prediction of the long-term fate of pollutants in environmental systems.



Winner for the Alternative Water Resources Prize – 6th Award (2014)

Dr. Polycarpos Falaras (National Center for Scientific Research “Demokritos”, Athens, Greece), coordinator of the European Union’s CLEANWATER Project



Topic: The development of a novel water detoxification technology by taking advantage of solar light and advanced titania photocatalysts combined with ceramic and composite membranes.

Description: This is an innovative and efficient water detoxification technology exploiting solar energy and nano-engineered titania photocatalysts in combination with nanofiltration membranes for the destruction of extremely hazardous toxins and pollutants

in natural waters and water supplies.

Conventional membrane technologies to remove pathogens and toxins from drinking water rely exclusively on the physical separation (i.e., “sieving”) of pathogenic microorganisms and other contaminants. In particular, the concentrate stream, which can be a significant percentage of the volume of treated water, will contain active pathogenic microorganisms. This waste stream can impose a serious threat to the receiving stream or site of discharge if not further treated.

The new technology, by contrast, by focusing on advanced oxidation processes with global environmental applications, brings about the photocatalytic degradation of contaminants during the filtration process and permits efficient water purification. Moreover, it does so under normal solar light conditions, a key factor for the reduction of energy requirements for water treatment. Falaras’ work also emphasizes the use of novel, environmentally friendly materials and represents a cost-effective cutting-edge application of nanotechnology for enhancing water quality.



Winner for the Water Management & Protection Prize – 6th Award (2014)

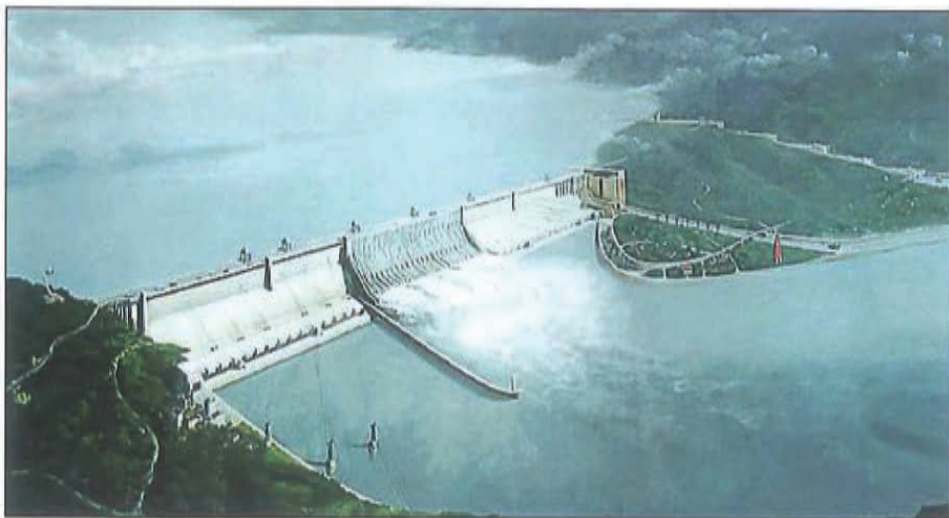
Dr. William W-G. Yeh (University of California, Los Angeles, USA)



Topic: The development of optimization models to plan, manage and operate large-scale water resources systems throughout the world.

Description: His methodology utilizing systems analysis techniques — as well as the algorithms he developed for the real-time operation of complex, multiple-purpose, multiple-reservoir systems — have been adopted in the United States and throughout the globe, most notably in Brazil, Korea, Taiwan and the People's

Republic of China. Dr. Yeh's many achievements include the development of the operation rules and optimization of California's reservoir and water distribution systems; the water distribution system model and optimization for water supply for the city of Sao Paulo, Brazil; and the management and operation of large-scale hydropower systems, such as the Brazilian hydropower system and the Three Gorges Project in China. His work represents the practical and novel application of new methods to deal with many different and difficult aspects of water management under a wide and diverse range of situations.





Dr. Ashok Gadgil



Dr. Susan Addy



Dr. Robert Kostecki



Dr. Joyashree Roy



Dr. A. B. M. Badruzzaman



Dr. M. Khayet Souhaimi



Dr. Damià Barceló



Dr. Marek Zreda

Prizewinners



Dr. Soroosh Sorooshian



Dr. Chih Ted Yang



Dr. Wolfgang Kinzelbach



Dr. Abdul Wahab Mohammad



Dr. Abdulkader Larabi



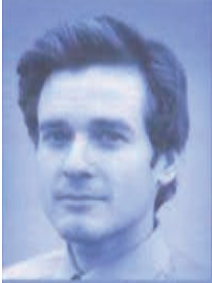
Dr. Abdul Latif Ahmad



Dr. Howard S. Wheeler



KACST



Dr. Case van Genuchten



Dr. Kevin Trenberth



Dr. Aiguo Dai



Dr. Charles Franklin Harvey



Dr. Darin Desilets



Dr. Ignacio Rodriguez-Iturbe



Dr. Andrea Rinaldo



Dr. Bart Van der Bruggen

(2004-2012)



SWCC



Dr. Patricia Gober



Dr. Zainuddin Abd Manan



KFUPM



Dr. Jery R. Stedinger



Dr. Herman Bouwer



Dr. Hisham Taha El Dossouky



Dr. Hisham Ettouney

Winners for the 5th Award (2012)

Creativity Prize

- The team led by Dr. Ashok Gadgil (University of California, Berkeley): for developing an innovative and effective method to treat the arsenic contamination of groundwater using electrocoagulation. Team members include: Dr. Susan Addy, Dr. Robert Kostecki, Dr. Joyashree Roy, and Case van Genuchten

Surface Water Prize

- The team of Dr. Kevin Trenberth and Dr. Aiguo Dai (National Center for Atmospheric Research, USA): for groundbreaking work that provides a powerful estimate of the effects of climate change on the global hydrological cycle, with a clear explanation of the global water budget.

Groundwater Prize

- The team of Dr. Charles Franklin Harvey (Massachusetts Institute of Technology) and Dr. Abu Borhan Mohammad Badruzzaman (Bangladesh University of Engineering and Technology): for developing a complete diagnostic and conceptual model for understanding and preventing the arsenic contamination of groundwater.

Alternative Water Resources Prize

- Dr. Mohamed Khayet Souhaimi (University Complutense of Madrid, Spain): for his work in pioneering and promoting membrane distillation for water recovery using alternative renewable energy sources.

Water Management & Protection Prize

- Dr. Damià Barceló (Catalan Institute for Water Research, Spain): for work at the leading edge of water science in understanding the effect of pharmaceuticals in the water environment and developing new methods for future risk assessment and the management of emerging contaminants.

Winners for the 4th Award (2010)

Creativity Prize

- Dr. Marek Zreda (University of Arizona) & Dr. Darin Desilets (Sandia National Laboratory, USA): for the development of the cosmic ray probe which, for the first time, measures soil moisture content and snow pack thickness over an area of tens of hectares.
- Dr. Ignacio Rodriguez-Iturbe (Princeton University) and Dr. Andrea Rinaldo (École Polytechnique Fédérale de Lausan, Switzerland): for developing the field of Ecohydrology.

Alternative Water Resources Prize

- Dr. Bart Van der Bruggen (Katholieke Universiteit, Leuven): for the use of nano-filtration membranes to approach zero wastewater discharge in industrial water recycling.

Water Management & Protection Prize

- Dr. Soroosh Sorooshian (University of California, Irvine): for the development and refinement of the PERSIANN model using artificial neural networks to estimate precipitation from remotely sensed data.

Winners for the 3rd Award (2008)

Surface Water Prize

- Dr. Chih Ted Yang (Colorado State University, USA): for significant contributions to the understanding of sediment transport and river hydraulics, particularly through the development of the Unit Stream Power Equation.

Groundwater Prize

- Dr. Wolfgang Kinzelbach (Swiss Federal Institute of Technology): for developing a new and effective approach to using remote sensing for groundwater modeling by linking spatially widespread remotely-sensed data, including geophysical data, with point surface observations and measurements.

Alternative Water Resources Prize

- Dr. Abdul Wahab Mohammad (Universiti Kebangsaan, Malaysia): for the development of advanced models for the fundamental characterization of nanofiltration to enhance its use in water desalination.
- Saline Water Conversion Corporation (Saudi Arabia): for developing a nanofiltration pre-treatment for seawater desalination which significantly reduces the scaling and fouling potentials of feed to a reverse osmosis (SWRO) desalination plant, thereby realizing substantially higher recovery rates at lower energy consumption, resulting in a lower cost per cubic meter.

Water Management & Protection Prize

- Dr. Zainuddin Abd Manan (Universiti Teknologi, Malaysia): for work which extends an established chemical engineering technique (pinch analysis) to water demand management.
- Dr. Patricia Gober & the Decision Center for a Desert City, (Arizona State University, USA): for work at the forefront of integrating physical and social science into a decision support system for enhanced water planning.

Winners for the 2nd Award (2006)

Groundwater Prize

- Dr. Abdulkader Larabi (University Mohammed V-Agdal, Morocco): for research into the characterization of seawater intrusion and the development of optimal models for sustainable water management in coastal aquifers.

Alternative Water Resources Prize

- Dr. Abdul Latif Ahmad (Universiti Sains, Malaysia): for using membrane separation technology coupled with chemical physical pretreatment to achieve a cost-effective method for treating palm oil mill effluent (POME) with zero discharge.

Water Management Prize

- Dr. Howard S. Wheeler (Imperial College, London): for developing suitable modeling tools for effective water resources management in arid and semi arid areas.

Water Protection Prize

- King Abdulaziz City for Science and Technology (KACST): for research into using ion exchange resins for nitrate removal from water.

Winners for the 1st Award (2004)

Surface Water Prize

- Dr. Jery R. Stedinger (Cornell University): for developing a statistical framework for understanding and interpreting hydrologic and flood data, including historical and regional information, so that flood risk management and flood control projects can effectively address the risk of floods.

Groundwater Prize

- Dr. Herman Bouwer: for developing effective design and management criteria for the artificial recharge of groundwater, including the Bouwer and Rice slug test for measuring hydraulic conductivities of aquifers, and improved cylinder infiltrometer procedures.

Alternative Water Resources Prize

- Dr. Hisham Taha El Dossouky (NWFP-EUT, Peshawar) & Dr. Hisham Ettouney (Kuwait University): for developing economical technologies for seawater desalination.

Water Management Prize

- King Abdulaziz City for Science and Technology (KACST): for the innovative use of soil moisture sensors, automatic weather stations, and remote controlled tensiometers to achieve water conservation by automatic scheduling.

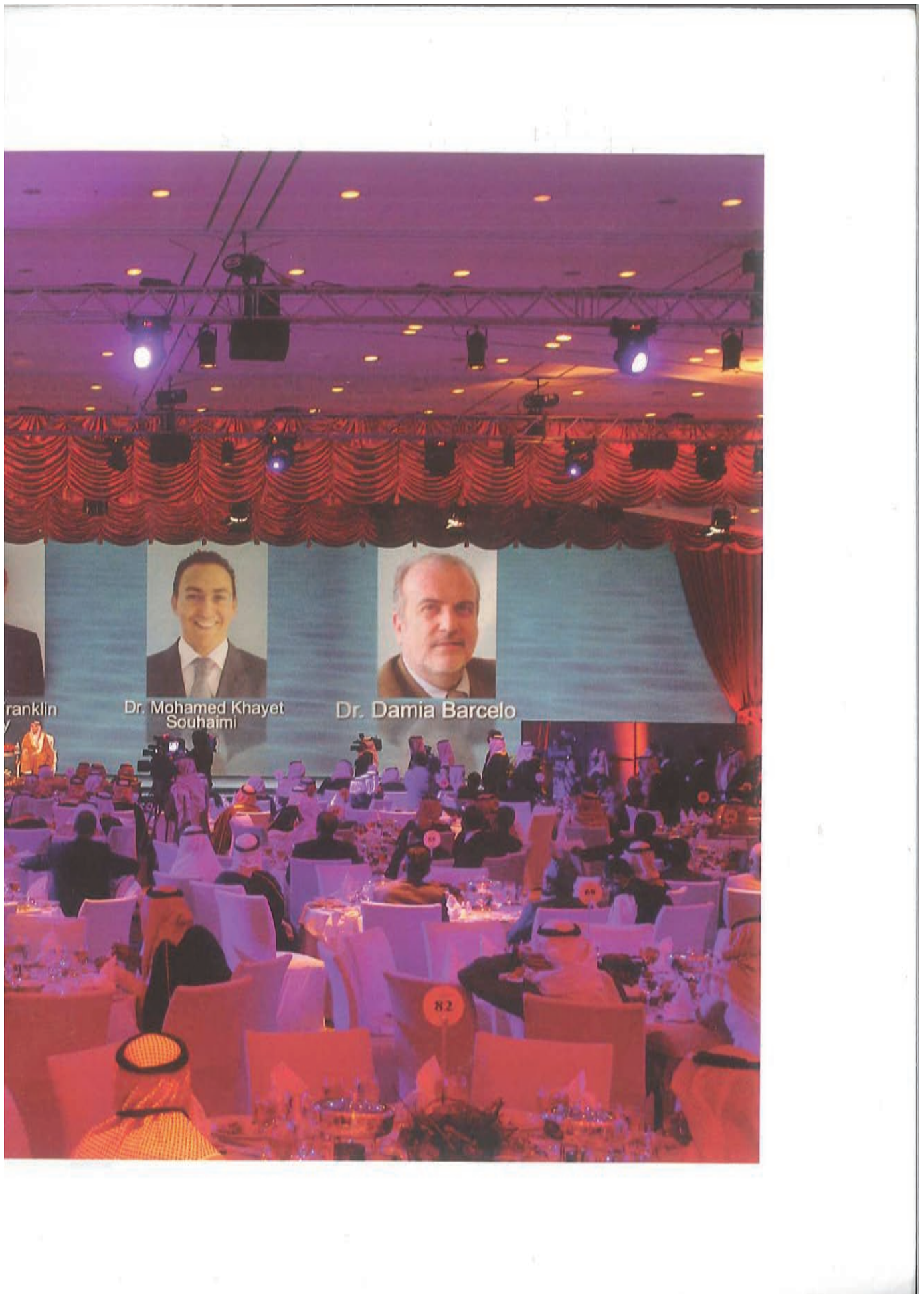
Notes: (1) The Creativity Prize was first awarded during the 4th Award. (2) The Water Management Prize and the Water Protection Prize were offered separately in the 1st and 2nd Awards, and were combined into a single prize during the 3rd Award. (3) The awarding of prizes depends on the quality and suitability of nominations. Therefore, even though five prizes have always been on offer, some prizes were not bestowed during particular PSIPW award cycles.



Water is life



5th Award Ceremony - 6 January 2013





**Prince Sultan Bin Abdulaziz
International Prize for Water**

General Secretariat
**Prince Sultan Institute for Environmental,
Water & Desert Research**
King Saud University

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