The Four Major River Restoration Project
See page 92

Chemical and Biological Monitoring in Palestinian-Israeli Streams
See page 88
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Chemical and Biological Monitoring in Ephemeral Transboundary Palestinian-Israeli Streams

Because they lack the recreational appeal of perennial rivers and offer a different aesthetic, ephemeral streams, with their seasonal flow are often neglected water resources.

Water quality and greenhouse gas emissions from Nam Theun 2 reservoir in Laos: recent findings and modelling

A comprehensive assessment study was implemented by Electricity of France (EDF) in collaboration with the Nam Theun 2 Power Company (NTPC) aiming to assess the organic carbon stocks, the evolution of water quality and net GHG emissions of the newly impounded NT2 reservoir.

The Four Major River Restoration Project in Korea: The Rivers for Green Growth

This project is expected to provide water security, flood control and ecosystem vitality to the regions along the rivers and their tributaries.

Conference report

The Symposium on Outfall Systems took place from 15 to 19 May 2011, with a large number of attendees, officials, experts, NGO, students and high-level scientific presentations.

People & Places

Page 95
Dear Members,

At the beginning of the New Year I would first like to send you my very best wishes for the coming year and I hope that the year ahead will be a peaceful, prosperous and healthy one for you and your family.

The past year has again seen troubled times across the world relating to water, with the following being two such examples:
- The earthquake off the Pacific coast of Tohoku, near Japan, was of magnitude 9.0.
- The tsunami caused a number of nuclear accidents, primarily the meltdown of three nuclear reactors at the Fukushima Nuclear Power Plant complex.

Both of these events resulted in massive destruction, loss of life and health-related issues. Disease continues to be a major concern in the affected areas. Source: Wikipedia.

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These examples of tragic water-related disasters that have occurred over the past year have highlighted to me that our Association is as relevant today as it was over 75 years ago when it was first formed. First and foremost one cannot fail to be impressed by how nations pull together when faced with such tragedies and how the Japanese and Australian people have so quickly rebuilt much of their infrastructure in both countries. Those of us who went to the IAH-R World Congress in Brisbane could not fail to have been impressed by the way the city has been rebuilt so quickly after the flood disaster; The Congress organisation chaired by Hubert Chanson did a remarkable job in putting together such a successful IAH-R Congress and with so many practitioners in attendance.

The other lesson that has come out of these water-related disasters for me is that IAH-R must continue to diversify. In the first instance the tragedy of the meltdown of the Fukushima Nuclear Power Plant complex has shifted public opinion world-wide away from nuclear power and in many of those countries where tidal and wave power are readily available there has been a groundswell of public opinion to consider these resources more favourably. I am therefore delighted to see the growing activities of the Working Group on Marine Renewable Energy within IAH-R and I look forward to the prospect of seeing this Group flourish in the future.

In the second instance, not only is it my view that we should have a Technical Committee which is specifically called ‘Flood Risk Management’ (or similar), with Flooding as a topic being more visible within the Association as one of our main themes, but I also believe that we need to be more involved in the increased health risks associated with flooding, and particularly epidemiology. Several years ago myself and several other IAH-R members organised a successful 2-day workshop on Hydro-Epidemiology at the 5th International Environmental Hydraulics Symposium in Tempe, USA, 2007, including a number of epidemiologists and several IAH-R members from all regions within the IAH-R community. I believe it is timely for us to try and build on this workshop and establish links with an appropriate epidemiological learned society to develop a partnership in Hydro-Epidemiology (or similar) for the future.

In looking to the year ahead, and my term as President, I also believe that it is essential that we do all we can to attract more practitioners into IAH-R. With a global recession and research funding in our respective countries becoming more competitive than ever, I believe that we are all going to be under increasing pressure to identify the ‘impact’ of our research if we are to attract funding from our funding agencies in each of our respective countries; in the UK ‘impact’ is now a key parameter for the likelihood of a grant being funded. In order for us to enhance the ‘impact’ of our research then we need to be engaging more than ever with stakeholders from industry, government departments, non-government agencies etc., and IAH-R must enhance this opportunity for the future. Hence, we need to work together to attract more companies and public sector organisations into IAH-R as Institute Members. My Council colleagues and I will be concentrating on this agenda over the next two years, but if you have any ideas on how you think we can make IAH-R more attractive to the private or academic sector, I would be delighted to hear from you.

IAH-R President
Prof. Roger A. Falconer
Halcrow Professor
Cardiff University UK

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“The two recent examples of tragic water related disasters that have occurred over the past year have highlighted to me that our Association is as relevant today as it was over 75 years ago when it was first formed”
What are the objectives of JRBM and how does it differ from JHR?
JRBM aims to promote an objective, rigorous and scientific approach to all aspects of river basin management. Its remit is therefore somewhat broader than JHR and can include studies of hydrology, ecology, management and economics, as well as hydraulics. The key requirement is that papers should have some relevance for the science or practice of how we manage the fluvial environment.

What is the role of JRBM in fomenting an interdisciplinary approach to analyzing and finding solutions to river basin problems?
River basin management problems are by their very nature interdisciplinary: river engineering and basin management schemes now need to meet both hydraulic and ecologic requirements; and they can have large social and economic impacts. It is therefore clear that the solutions cannot be found within one discipline alone. However, a common complaint is that interdisciplinary research is harder to publish than disciplinary science as it often needs to pass peer-review by two communities rather than one, and this leads to a higher risk of failure. JRBM’s role is to value, fairly judge and promote interdisciplinary research by recognizing the difficulty involved.

Who are the authors of JRBM and what is their distribution by discipline and interest area?
JRBM’s authors are drawn from a very wide range of disciplines. Broadly, about one third are hydraulicians, one third are hydrologists and the remaining third are drawn from economics, geomorphology, ecology, political science, chemistry, mathematics and management. However, in terms of advancing the discipline of river basin management the best papers arise when these groups work closely together.

What are the topics you would like to see addressed in JRBM, especially in terms of the multidisciplinary approach to river basin problems?
Rather than particular topics, what I would really like to see develop is a more rigorous and scientific approach to river basin management. There is currently very little comparative analysis that provides robust evidence that particular management interventions are better than others. The problem arises because controlled tests can be very difficult, but as a result methods are often developed without a detailed appraisal of their likely benefits and weaknesses. Only by addressing this key aspect will real progress in river basin management be made.

What are the key matters you look for in reviewing a paper for JRBM?
Ultimately there is only one single test for work to be published in an International peer-reviewed journal: does the paper make a new and substantial contribution to knowledge? Published work must move a discipline forward, and not just by a trivially small increment. The very best papers are the ones that fundamentally shift how a discipline thinks about a topic. Such ‘game changing’ papers occur very rarely, but are exactly what young scientists should be striving to achieve.

What are the typical turnaround time and acceptance rate?
We aim to return first review comments to authors within 3 months and on acceptance papers appear on the ‘early view’ section of our website in just a few days. The final printed work will appear 3-6 months from acceptance. JRBM is lucky not to have a significant backlog so we are able to get papers out very quickly indeed. Our review standards are high so the rejection rate is about 40%.

In considering best practices in river basin management, what do you see as the weaknesses of traditional hydraulic engineers?
What needs to be done to remedy these weaknesses?
I think many of the perceived flaws in traditional river engineering are now a thing of the past. River engineering schemes now are designed to meet multiple flow and environmental objectives and are much more ‘sympathetic’ to the environment. At the same time hydraulic engineers are now much more likely to collaborate with geographers and biologists, and have embraced the technologies, such as airborne laser scanning and habitat analysis, that such disciplines are skilled in. However, we should not be complacent about these collaborations and hydraulic engineers need to continue to be outward looking.

What should be the role and the contribution of Fluvial Hydraulics Committee to JRBM and to its development?
The main things the Fluvial Hydraulics Committee can do are to encourage the submission of great papers to JRBM, to cite appropriate JRBM papers in the work that they publish and to draw their colleagues’
Paul Bates is Director of the Cabot Institute (www.bris.ac.uk/cabot) and Professor of Hydrology in the School of Geographical Sciences at the University of Bristol, UK. Since commencing his PhD in 1989 his primary research focus has been to improve the prediction of flood inundation. He has published over 150 refereed journal papers, books and book chapters in the field of hydraulic modelling, including in 2005 the edited volume “Computational Fluid Dynamics” published by John Wiley. He is probably best known for his work developing the LISFLOOD-FP flood inundation model and on the NASA/CNES Surface Water Ocean Topography satellite mission (http://swot.jpl.nasa.gov). He undertakes research with numerous groups in the US, Europe, Asia and South America including Princeton University, NASA Jet Propulsion Lab, Laboratoire National d’Hydraulique, Paris and the EU Joint Research Centre, Ispra, Italy.

attention to relevant JRBM papers. At conferences, meetings and within their own Universities FHC members can be ambassadors for the journal, and hence for IAHR. I would also encourage FHC members wishing to make an even great contribution to consider joining the JRBM Editorial Board in order to take a role in reviewing and selecting papers for publication.

How should the Fluvial Hydraulics Committee in IAHR be responding to the wider needs of society, especially from the point of view of analyzing and solving river basin problems? I think FHC has an important role to play in promoting an interdisciplinary and evidence-based approach to river basin management. We require scientific societies to be bastions of rationality in the face of both political, social and economic expediency. In this way FHC will very clearly be serving the wider needs of society.

When do you expect JRBM to be included in the citation index? We intend to apply for inclusion in 2012. The current success rate for applications is about 10%, however JRBM publishes regularly and the Editorial Board is composed of high profile people from different disciplines and geographical regions so these two factors improve our chances of being included in the Index.

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There are two reasons for this:

- the difficulty of representing spatially variable inputs (especially rainfall) in arid areas that are notorious for variability and lack of observations and
- the dominance of in-channel processes that are either difficult to quantify or simply not understood sufficiently to incorporate into models.

In their natural state, ephemeral streams lie in watersheds in which channels are hydrologically active for less than 2% of the time or about seven days/year. These watersheds are also characterized by flash floods, making them difficult to monitor and stream behavior, the ecological systems it supports, high sediment content and pollutants.

Effluent concentrations produced by municipal wastewater treatment are typically set based on the full dilution associated with perennial streams, while flow conditions in ephemeral streams present different hydrological and ecological requirements. In addition effluent discharge introduces continuous inputs of water into a desiccated ecosystem. This shift affects vegetation cover, bank and bed stability, sediment transport and storage. The associated hazards of mosquitoes, odors and groundwater contamination can be substantial. Natural vegetation and fauna are often replaced by invasive species, better adapted to contaminated wet environments.

We conducted a three year study that for the first time characterized environmental conditions in transboundary watersheds that cross the Palestinian Authority into Israel: the Hebron/Besor and the Zomar/Alexander. These two stream systems are representative of over ten ephemeral streams that originate in-land under the jurisdiction of the PA in the West Bank and that flow into Israel. In the Zomar/Alexander the current flows from the West Bank into Israel and to the Mediterranean. The Hebron/Besor watershed begins in the West Bank, where water flows south in the Hebron to Beer Sheva – and from there returns to the Palestinian Gaza Strip. Restoration strategies require cooperation and coordinated management by the two sides, making the study of particular importance.

Methods

A network of automatic hydrometric monitoring stations was established for sampling of storm events in the basins. Four stations were set up in the PA territory, and ten in Israel. Monitoring the base flow was an important preliminary step for quantifying dominant wastewater “point source” inputs in both streams. Samplers in the stations were programmed to sample every fifteen minutes during the first hour of a rain event and every two hours subsequently, to better characterize “first flush effects” where higher concentrations of pollutants are typically found.

Extensive chemical analysis was carried out with major ions measured as well as metals and trace elements. Nutrient fluxes were calculated during storms. The study also included monitoring of in-stream macroinvertebrate communities which served as a proxy for stream health. This requires comparing the community structure of the studied stream/site with that of an undisturbed situation (reference stream/site).

Findings

In the Hebron/Besor watershed, the predominant initial source of pollution in the watershed is effluent and raw sewage leaving the Palestinian city of Hebron and Jewish settlements, especially Qiryat Arba. Measurements...
suggest that 15,000 cubic meters of sewage per day, mostly untreated, flow over approximately 120 kilometers downstream until reaching Israel’s Besor Reserve in the Negev region. This steady baseflow fundamentally alters the character of the stream, transforming it from a seasonal stream where historically high quality storm water flowed for only a few days a year throughout a largely semi-arid watershed, to one with a constant flow of sewage throughout the year.

A significant portion of the water in the Hebron/Besor does not reach the Israeli border. Measurements of flow from the different monitoring stations in various seasons indicate that along the stream’s first 60 km, between 40% and 90% of discharged wastewater percolates into groundwater before reaching the border and the Beer Sheva stream. This is consistent with previous hydrological research in Israel and in other regions. These values represent high transmission channel losses in during the flow, and infiltration into the groundwater, far beyond the potential water lost by evaporation and transpiration from plants and vegetation cover from the streambed. The rate of percolation appears to be seasonal. The quality of the water which infiltrates the surrounding aquifer in the upper stretch is extremely poor – made up of raw sewage. Water quality in the stream varies dramatically along its flow as a process of biological purification. There is a substantial drop in nutrient concentrations for Total phosphorus and NO3, reflecting general reductions in concentrations of organic material flowing in the stream. The declining gradient in pollution levels along the sampling route between the top and the bottom segments of the stream is further reflected in a drop of 91.7% in biological oxygen consumption (BOD), 87.7% in chemical oxygen consumption (COD), 73.9% in overall nitrate levels, and 72.8% in overall ammonia levels (yearly average). Results suggest that water quality improvement is not as predictable and linear as anticipated.

Similar to the Hebron/Besor watershed, discharge measurements revealed that in all of the Palestinian and Israeli sections of the Zomar/Alexander watershed, the predominant source of water and pollution in base-flow were sewage effluents. The trend in the data reflects a steady increase in base flow due to increased discharges of waste water from the area’s growing population. Pollution loads during storm events are much higher than pollution loads in base flow. Furthermore, the data show that the larger the discharge of the storm, the larger the pollution loads. Accordingly, the highest quantities of nutrients discharged into the stream correspond to winter storms. These results can be explained the water flowing in the stream that already contains nutrients. Nutrient levels differ during storm events. At the same time, results consistently indicate that the greater the amount of water flowing in the stream, the higher the nutrient loads.

Conclusions
Although the geomorphology of the two streams differs greatly as does their climatic setting and conditions, the ecological state of both upper tributaries is “very poor”. Man-made alteration is so extreme (perennial flow and heavy pollution) that none of the site specific attributes is being expressed biologically. As both watersheds receive no rain during the summer and have trivial spring flow, their water quality is dominated by sewage discharges. The greater precipitation during the rainy season and associated dilution in the Zomar/Alexander basin do not affect this dynamic. Nor does a decade of efforts to reduce point sources and partially treat sewage from the West Bank. Both streams are heavily polluted as reflected in water quality variables and by biological health categories. This is noteworthy given the steady growth in the number of residents living in the watershed, particularly on the Palestinian side. Regardless of reductions in point source discharges as well as self-purification processes, reducing pollution loads, water quality did not attain the required level even at the stream’s distant downstream reach. Water quality during storm events, in terms of pollutant concentration, is of better quality than that found in base flow. However, during storm events, significant amounts of nutrients (total nitrogen and total phosphorous) flow through the stream. Thus, nonpoint source discharges from the agricultural fields surrounding the stream, and urban runoff from adjacent towns, are the most plausible nutrient sources. Even before formal common water quality standards are set and a coordinated management strategy for restoring transboundary streams crafted, controlling non-point source pollution can and should be integrated into present management programs.
For such large reservoirs located in the tropical and sub-tropical areas, the flooding can lead, particularly in their first years, to the degradation of the water quality and the emission of greenhouse gases (GHG), namely carbon dioxide ($CO_2$), methane ($CH_4$) and nitrous oxide ($N_2O$). This change is directly related to the degradation of the pre-existing inundated organic matter and to a lesser extent to organic matter brought by the reservoir tributaries and primary production.

That is why a comprehensive assessment study was implemented by Electricity of France (EDF) in collaboration with the Nam Theun 2 Power Company (NTPC) aiming to assess the organic carbon stocks (fig. 2), the evolution of water quality and net GHG emissions of the newly impounded NT2 reservoir. For this purpose, nature and amount of GHG emitted from the reservoir are carefully measured, together with physical, chemical and biological characteristics of the water body and sediments. The weekly measurements provided the spatial and temporal variability of the GHG emissions and underlying biogeochemical parameters.

The water quality / GHG model of NT2
In order to calculate the net GHG footprint of the reservoir (gross emissions after impoundment minus pre-impoundment...
emissions), a 3D coupled physical biogeochemical model was developed under the supervision of DELTARES. This model includes a hydrodynamic model for the prediction of water flow fields and thermal stratification. The biogeochemical and physical processes are represented with 3D water quality model that also predicts sediment quality and GHG emissions into the atmosphere. The model includes re-growth and decomposition of vegetation biomass and the relevant cycle of nutrients. The computational grid consists in cells of 150 m × 150m (horizontal) distributed on 25 layers of about 1.24-m thick (vertical). The calibration of the model has been done from the dataset obtained within the framework of the monitoring and research programs and from the available information acquired on the tropical Petit Saut Reservoir (French Guyana).

**First results**
Results show that the peak of emissions corresponding to the first years after impoundment is lower in this region compare to those of the South America tropical regions. Model results predict a rapid decrease in GHG emissions and highlight the importance of the thermal stratification in the GHG concentrations in the water column. The vertical variations in water temperatures predicted by the model are in good agreement with those measured in the same locations with main seasonal patterns such as stratification-destratification well reproduced (Fig. 3).

**Conclusion**
Combined with measurement campaigns, the water quality and GHG model is a precious tool in order to understand the processes responsible for the production and emission of GHG from the reservoir and calculate the net GHG footprint of the reservoir.

Long term simulations are useful to test various scenarios for instance the vegetation clearance, the fill and flush strategy, the tree trunk degradation rate, etc…

This work contributes to a more global UNESCO/IHA project which has the objective to define methodologies and tools, and to understand the range of the net emissions from reservoirs.

Complementary research is dedicated to the emissions of the temporary drawdown area that may appear especially during the dry season.
There are five key objectives to the project: 1) to secure abundant water resources against potential water scarcity; 2) to implement comprehensive flood control; 3) to improve water quality and restore the ecosystems in and around the rivers; 4) to create multi-use spaces for local residents; and 5) to prepare for further revitalization of these river systems under regional authorities in the future. The project will renew and revitalize a total 929km of Korean nationwide rivers. Subsequent projects which will be administered by regional governments will restore more than 10,000km of local streams and 39 riparian wetlands. In this article the outline of the Four Major Rivers Restoration Project will be introduced and suggest the desired future of Korean rivers and landscape which can promote the human life quality.

Flood Control

The flood levels are expected to be decreased 0.4~3.9m through sediment dredging of the riverbeds. The flood control capacity is expanded through flood control areas and riverside flood retention facilities including elevation of existing agricultural reservoir banks (250 million m³) and reinforcement of old levees (620 km). The flood levels are significantly decreased through the expansion of water gates along estuary barrages. The water flow at the confluence is improved through the installation of a baffle work.

Water quality and ecosystems

The highly polluted 34 basins will be managed by expanding and upgrading environmental facilities by 2015. Through the expansion of 750 waste water treatment facilities, sewerage supply will increase up to 91% by 2012. The 46 wastewater treatment facilities will be launched at industrial and agricultural complexes by 2012, and 104 chemical treatment systems will be constructed at existing and newly launched facilities. The standards for the discharge from environmental facilities will be revised for greater precision by 2012. The 31 public treatment facilities will be expanded and improved by 2012 to meet the changes in regulations. Grassed swales, conservation buffers, and detention basins will be installed to minimize the non-point source pollution. In addition, 8.13 million m² of waterfront ecological belt will be developed by 2012.

Multi-purpose Spaces

A total 1,592 km of country-wide network of bicycle paths along the rivers will connect major highways and local arterial roads, encouraging low-carbon, green transportation. Convenience facilities such as camping sites and rest areas will be constructed, along with spaces for leisure activities, including promenades, in-line skating tracks, and water-sport facilities. To improve river accessibility the pedestrian and bicycle paths will connect public waterfront areas to adjacent urban areas. Waterfronts will serve as bases for local development through partnerships between the public and private sectors. Cultural and historic landmarks will be developed on waterfronts to provide tourist resources and boost local economies.

Local development along the rivers

The restoration of tributaries will be accompanied considering irrigation, water control, environment, culture, and tourism, etc. The flood control capacities will be reinforced on local streams flowing
Commemorative local festivals will be held to promote the history, culture, and ecology of the rivers with the participation of local communities and international tourists.

Securing water resources

Additional water resources (800 million m³) can be secured through the dredging of riverbeds and installation of multi-functional weirs (16 sites). The water supply capacity is increased through construction of small and medium dams (250 million m³) for environmental water supply. The existing agricultural reservoir banks (96 sites, 250 million m³) are elevated. Control of water flow during the period of water shortages and operational network systems will be established in collaboration with local flood control agencies, local governments, K-water and the Korea Rural Community Corporation.

Rivers are the source of civilization – global four major civilizations began along rivers. They are also the arteries of state development, and thus the foundation for governing the country. The Four Major Rivers Restoration Project will synthesize ecological characters and quality, culture, tourism, and history to promote a locally based economy focusing on the enriched riparian characters of the regions. The project provides an example of how the green initiative can revive environment, economy, and culture.
The Symposium on Outfall Systems took place from 15 to 19 May 2011, with a large number of attendees, including the presence of authorities, officials, experts, NGO, and students and high-level scientific presentations.

The symposium was organized by Obras Sanitarias Mar del Plata Sociedad de Estado, OSSE (Mar del Plata Public Sanitation Works), Ente Nacional de Obras Hídricas de Saneamiento, ENOHSA (National Entity of Water and Sanitation Works of Argentina), Municipalidad de General Pueyrredón, MGP (Municipality of General Pueyrredón Party) and the IAHR/IWA Joint Committee on Marine Outfall Systems.

Background
Since the submarine outfall of Mar del Plata city, that it is being constructed by a local company, will be the first open water submarine outfall in Argentina and the largest and most extensive of South America, professionals from Mar del Plata Public Sanitation Works have been participating in the Marine Wastewater Discharged Conferences since 2006, in order to exchange knowledge and experiences in relation to the outfall systems and the Integrated Costal Management strategy implemented by OSSE for the last 15 years.

Conference conclusions
The Mar del Plata symposium achieves multi-disciplinary presentations covering all aspects including modeling, civil and environmental and hydraulic engineering, marine biology, construction, economics, and legislation and facilitated communication between the diverse groups of practitioners, regulators, and financing agencies in the field of integrated systems of wastewater treatment and disposal.

Regarding the need for further research, it has identified some relevant issues of which would be important to have more scientific contributions such as:

- More far fields studies of outfall discharges.
- More technological applications of construction methods.
- Monitoring to see the differences before and after the outfall constructions.
- More epidemiological studies relating cause effects of bathing in recreational waters in relation to the level of indicator bacteria, taking into account the differences between places, ages, and diets of people.
- More modeling to predict bacteria levels in recreational waters in real time and rapid detection methods.
- T90 bacterial decay studies using enterococci as indicator bacteria instead of faecal coliforms or Escherichia coli, since it is proved to be a better indicator of cause-effect for marine recreational waters.

For Argentina specifically: In Argentina there is a loophole regarding the disposal of sewage by means of pipelines underwater, the rules of each province are based on the quality of the effluent regardless of whether the discharge is through emitters and the characteristics of the receiving water. It is therefore necessary to have guidelines that regulate the effects of the discharges considering a classification according to the uses in order to ensure the protection of human health and maintain a level of quality in receiving waters that supports the use for which they are designated.
Stephen Wallis has retired from his academic position at Heriot Watt University and is now an honorary member of staff.

John J.R. Williams has retired from the Queen Mary, University of London Department of Engineering.

Snorri P. Kjaran has retired

Tony Minns appointed Director of the Goyder Institute for Water Research
He is responsible for the overall strategic leadership of the institute and in particular the development and execution of a strategic research and development programme to support the management of South Australia’s water resources, to enhance water security, and to contribute to water reform in Australia. The Goyder Institute for Water Research was established in July 2010 as a partnership between the South Australian Government through the Department for Water, CSIRO, Flinders University, the University of Adelaide, and the University of South Australia. www.goyderinstitute.org

In October 2011, Alistair Borthwick took up the position of Professor of Civil and Environmental Engineering at University College Cork, Ireland. He was previously a Professor of Engineering Science at the University of Oxford, where he worked for 21 years. The professorship at University College Cork is one of the oldest in the world, the first professor being appointed in 1845.

Obituaries

Prof. Toshiharu Kojiri has passed away on November 2nd, 2011. Prof Kojiri was head of the Water Resources Research Center in Kyoto University. He was recently elected a Council Member of IAHR, and was Chair of the IAHR Working Group on Climate Change. Prof Kojiri was also closely involved in launching and was President of the IAHR Japan Chapter. For full information go to www.iahr.org under obituaries.

Dr. Gaele Rodenhuis passed away on Saturday 8th October, 2011. For many years a member of the Board of Directors of Delft Hydraulics, he was responsible for operations, research and development. For full information go to www.iahr.org under obituaries.

Robert Russell, former Director of HR Wallingford has died.
Invitation for Nominations
5th Award (2012)

Recognizing Innovation
Nominations open online from 1 May 2011 to 31 January 2012

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