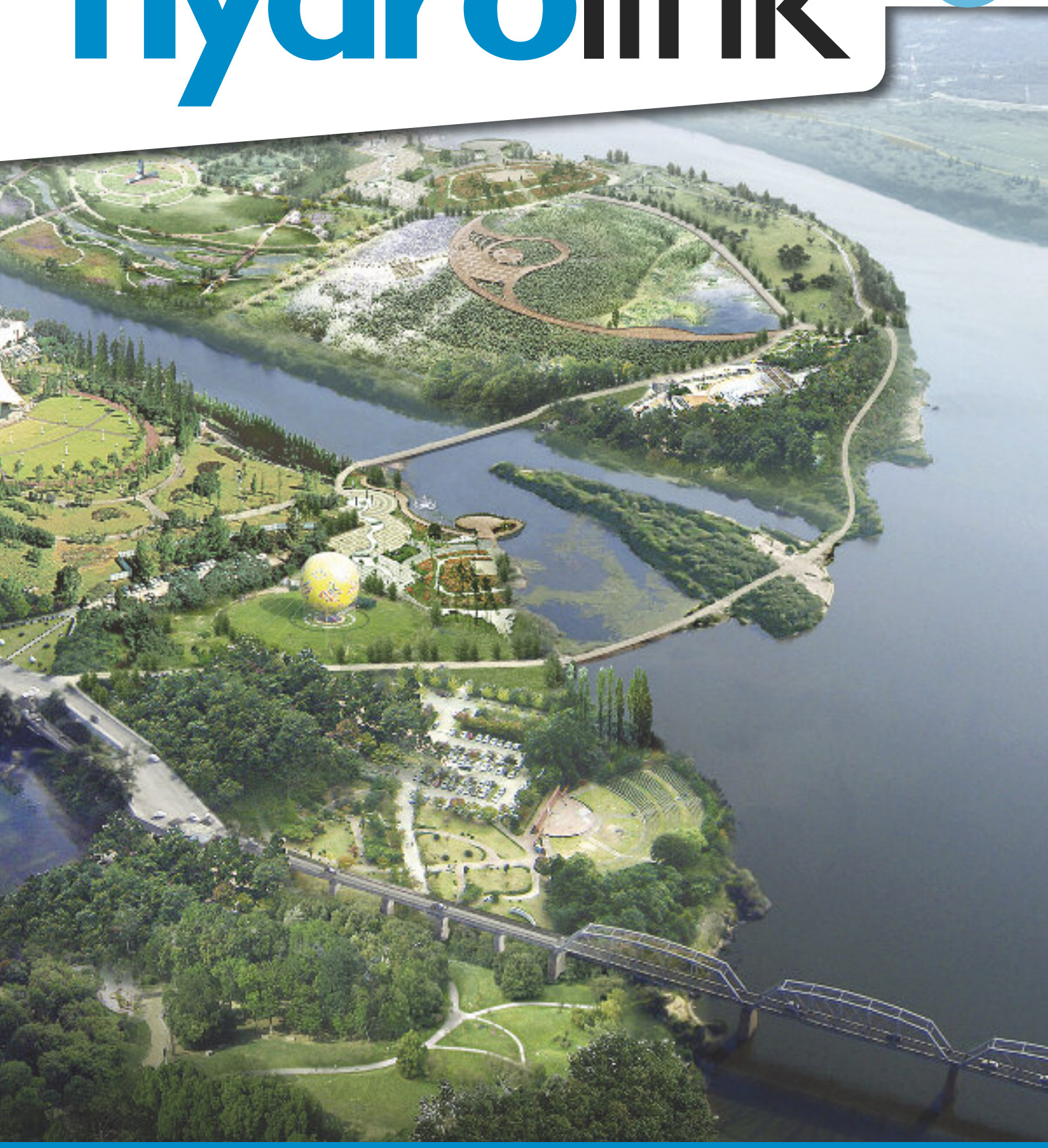
INTERNATIONAL ASSOCIATION FOR HYDRO-ENVIRONMENT ENGINEERING AND RESEARCH

hydrolink

number 6 2011



The Four Major River Restoration Project

See page 92

Chemical and Biological Monitoring in Palestinian-Israeli Streams

See page 88

IAHR AIRH
Supported by CEDEX

[SOUND PRINCIPLE NO. 53]

Believe in infinite possibility.

Collect flow data in areas previously thought immeasurable

Whether a shallow stream, an icy river, or the depths of the darkest blue ocean, SonTek/YSI's acoustic Doppler systems measure water flow in areas you might have thought were impossible:

- *Reversing flow*
- *Rapid and complex changes*
- *Tidal influence*
- *Under ice*

3-D velocity profiling, bathymetric measurement and discharge calculation as you transect a channel.
featuring **SmartPulseHD™**

Backed by a professional support staff with broad expertise in fluid dynamics, hydrology, oceanography and civil engineering, it's easy to see why we embody our motto – Sound Principles. Good Advice.

FREE Technical notes, web-based training and product information at www.sontek.com.
Questions? E-mail: inquiry@sontek.com or call +1.858.546.8327
See our systems in action! youtube.com/SonTekYSI

SonTek
YSI incorporated

hydrolink

in this issue

Number 6 / 2011 (Supplement to JHR - Vol 49 - Number 6)

IAHR
International Association for Hydro-Environment Engineering and Research

IAHR Secretariat
Paseo Bajo Virgen del Puerto, 3
28005 Madrid SPAIN
Tel. : +34 91 335 79 08
Fax.: +34 91 335 79 35
www.iahr.org
iahr@iahr.org

Editor:
Michele Mossa,
Technical University of Bari, Italy
e-mail: m.mossa@poliba.it

Contact us:

Dr. Christopher George, Executive Director
tel.: +34 91 335 79 64
e-mail: christopher.george@iahr.org

Estibaliz Serrano
Publications Manager
IPD Programme Officer
tel.: +34 91 335 79 86
e-mail: publications@iahr.org

Beatriz Comesaña
Publications Assistant
Hydro-environment Division Programme Officer
tel.: +34 91 335 79 08
e-mail: office@iahr.org

Elsa Incio
Membership and subscriptions
Hydraulics Division Programme Officer
tel.: +34 91 335 79 19
e-mail: membership@iahr.org

Carmen Sanchez
Accounts
tel.: +34 91 335 79 48
e-mail: accounts@iahr.org

Cover picture:
Nakdong River (After restoration project).
See page 92.

IAHR AIRH

Supported by
CEDEX

Dear Members,

Prof. Roger A. Falconer
IAHR President
Halcrow Professor
Cardiff University UK

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. It was one of the most powerful earthquakes ever known to have hit Japan and one of the five most powerful earthquakes in the world since modern record keeping began in 1900. The earthquake triggered powerful tsunami waves which reached heights in excess of 40m and which in the Sendai area travelled up to 10km inland. In addition to loss of life and the destruction of over 200,000 homes, the tsunami caused a number of nuclear accidents, primarily the meltdown of three nuclear reactors at the Fukushima Nuclear Power Plant complex. Source: Wikipedia.

• Also at the beginning of 2011 a series of floods had hit Australia, primarily in the state of Queensland including the capital city, Brisbane. The floods forced the evacuation of thousands of people from towns and cities, 35 people lost their lives and three quarters of the state of Queensland was declared a disaster zone. Source: Wikipedia. More recently we have seen massive floods in Thailand; the worst flooding in 50 years. The floods affected 9 million people, more than 360 people were killed and 100,000 have been made homeless. Disease is still rife in the flood waters and health-related issues associated with the floods continue. Source: International Rescue Committee.

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 IAHR 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 IAHR Congress and with so many practitioners in attendance.

The other lesson that has come out of these water-related disasters for me is that IAHR 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 IAHR 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 IAHR 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 IAHR members from all regions within the IAHR 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 IAHR. 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 IAHR must enhance this opportunity for the future. Hence, we need to work together to attract more companies and public sector organisations into IAHR 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 IAHR more attractive to the private or

"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"

public sector, then please contact the Executive Director or myself through the IAHR Secretariat.

Finally, I am delighted to report to you a number of developments that have taken place over the past year and I will briefly summarise them below, with more details obtainable from the Executive Director:

• A new online Association Management System (based on the iMIS software system) has been developed and should be "live" as you read this. This system will greatly improve our Association by enabling members to share information on their expertise, allow Committees and Working Groups to share knowledge and discuss activities, allow web access to information on jobs, etc., and allow members to access our large historic archive of Congress Proceedings.

• In parallel to this a new accounts system has now been put in place at Head Office which has greatly improved our invoicing and accounts handling.

• Two new monographs were published in 2011 entitled: (i) 'Groundwater Management Practices' by A. Findikakis and K. Sato, and (ii) 'Guide to Physical Modelling and Experimentation Design Manual' by E. Frostick et. al., with a further monograph due out shortly entitled: 'Environmental Fluid Hydraulics' by W. Rodi. These are the first fruits of our agreement with Taylor and Francis to publish the IAHR Book Series – and I am grateful to Peter Davies who is Book Series Editor!

• A new Working Group on Oil Spill Modelling has been established, chaired by Prof. Poojitha Yapa, Clarkson University, New York, USA, with the vice chair being Dr. Khaled Al Banaa, Kuwait Institute for Scientific Research, Kuwait. The inaugural meeting of this new group was hosted by the Kuwait Oil Company in the offices of our Institute Member KISR in Kuwait in November. This meeting also served as the first activity of our IAHR MENA (Middle East and North Africa) Committee.

• Prof. Vladimir Nikora, University of Aberdeen, took over in September from Prof. Willi Hager as Editor of the Journal of Hydraulic Research and we are delighted that the Impact Factor of JHR has now passed the '1' barrier.

• Efforts continue to make Hydrolink a valuable member benefit, with more themed issues and thicker and quarterly issues to follow in 2012, together with a drive to link more future articles to 'research impact' and case studies from industry/Institute Members. I am particularly grateful to Prof. Michele Mossa for all his efforts as the first Editor of Hydrolink.

• Electronic balloting was introduced for the first time for the committee leadership elections for the Groundwater and Hydroinformatics Section Committees and I will be asking one of my Council colleagues to lead a Working Group to review the success of this new process.

• In September the first joint course was held with the World Meteorological Organization. The course was organised by Prof. Roberto Ranzi and was highly successful, leading to discussions with the WMO about opportunities for further collaboration in the future.

These are just some of the exciting changes and developments occurring within IAHR over the last year and I believe that there are many more exciting opportunities to come. However, I also believe there are some challenging times ahead for our Association; and members of the Executive Committee and myself are already exploring how we can work more closely in the future with other complementary organisations to address some of these challenges for the benefit of our community. In the meantime, I would like to conclude this message by again extending you my very best wishes for 2012.

10 QUESTIONS TO...

Paul Bates, JRBM Editor

Interviewed by Mustafa Altinakar, Chair of the Fluvial Hydraulics Committee

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 a 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.

9 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.

10 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.

90 day turnaround rate SUBMIT YOUR PAPER TO JRBM!

This is a summary article of the full paper published in Vol. 8 Issue 2010 and available in open access at www.tandfonline.com

2010 JRBM Best Paper Award Winner

Chemical and Biological M Ephemeral Transboundary

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. Environmental conditions in ephemeral streams in general are more difficult to characterize than perennial streams.

Written by:
Prof. Alon Tal, Blaustein Institutes for Desert Research, Ben Gurion University of the Negev, Israel
alontal@bgu.ac.il

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

onitoring in Palestinian-Israeli Streams

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 by 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 duringe 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.

Water quality and greenhouse gas em
recent findings and modelling

Fig 1: View of Nam Theun 2 dam and reservoir. Credit: EDF Philippe Eranian

The Nam Theun 2 (NT2) hydroelectric scheme is located in Laos, some 250 km south east of Vientiane and has the capacity to generate 1070 MW with 93.5% of the electricity generated exported to Thailand. The NT2 reservoir was impounded in 2008 (fig. 1). At full supply level, it covers 450 km^2, vs. 80 km^2 at Minimum Operating Level.

Written by:
Alain PetitJean, Head of the River Hydraulics Section of the Hydraulics Laboratory, of EDF R&D, France.
He is presently Head of a Department in charge of Sustainable Development at the Hydro Engineering Centre of EDF. He is a former Chair of the IAHR Fluvial Hydraulics Committee. EDF is an Institute Member of IAHR.
alain.petitjean@edf.fr

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

issions from Nam Theun 2 reservoir in Laos:

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).

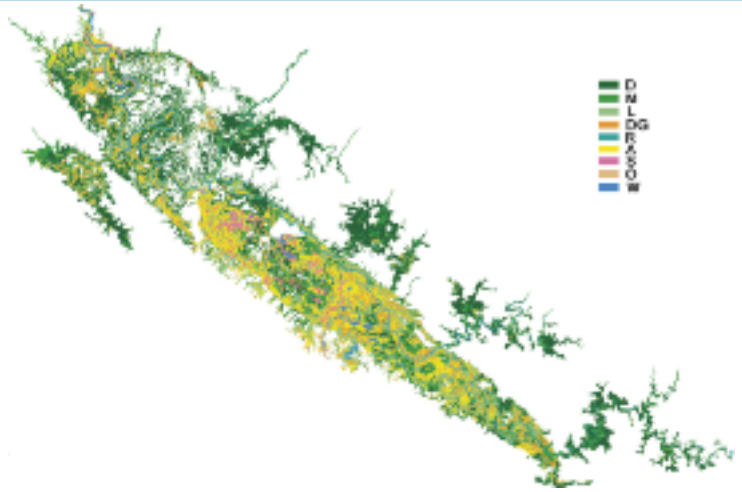
First results

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

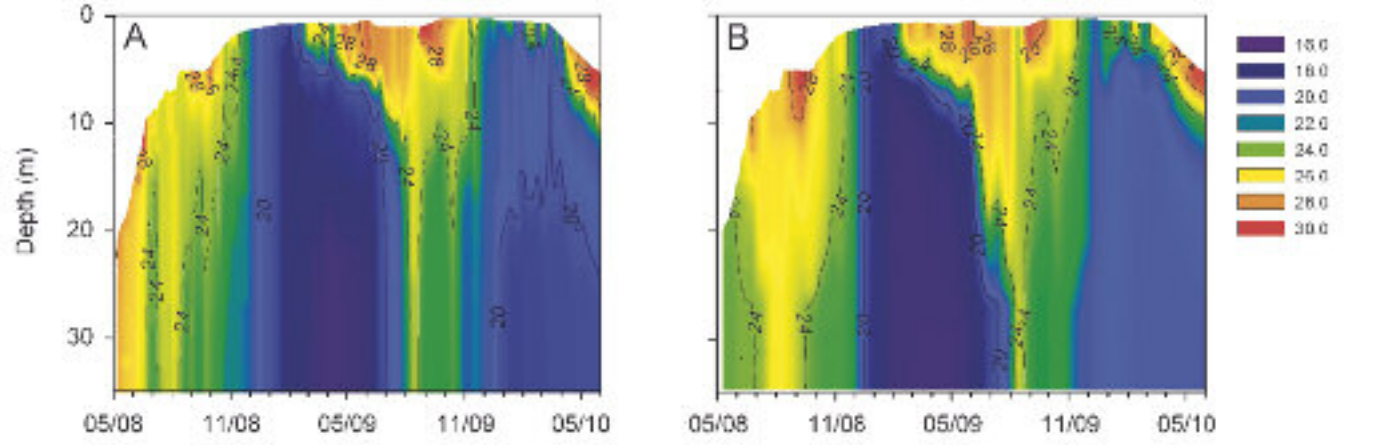
Combined with measurement campaigns, the water quality and GHG model is a precious tool in order to understand the processes responsible for the production and emission of GHG from the reservoir and calculate the net GHG footprint of the reservoir.
Long term simulations are useful to test various scenarios 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.



← Fig 2 : Soil cover in the inundation area (D: Dense forest, M: medium, L: light, DG: degraded forest, R: riparian forest, A: agricultural soil, S: swamps, W: water, O: others) –Descloux et al., 2011

↓ Fig.3: Evolution of measured (A) and modelled (B) water temperature (°C) profiles in the Nam Theun 2 Reservoir.
Reference: Chanudet, V., Fabre, V., van der Kaaij, T., "Application of a three-dimensional hydrodynamic model to the Nam Theun 2 Reservoir (Lao PDR)." in press in Journal of Great Lakes Research.



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

The Four Major Rivers Restoration Project in Korea is the country-scale total river water course work that aims to restore the natural river functions that have been deformed and disturbed by natural or industrial activities in the past. The project is expected to provide water security, flood control and ecosystem vitality to the regions along the rivers and their tributaries.

Written by:
Myung-Pil Shim, Minister, Office of National River Restoration
shim@inha.ac.kr

Sang-Il Lee
Professor, Dongguk University
islee@dongguk.edu

Boosik Kang
Professor, Dankook University
bskang@dankook.ac.kr

Seung Kyum Kim, International Public Relations Specialist, Office of National River Restoration,
finekim@gmail.com

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 food 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 m^3) and reinforcement of old levees (620km). 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 m^2 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 waterfronts 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

[Before restoration project: Nakdong River] Over the past decade, the frequent flooding of the Nakdong River US$54.9 Billion in property damage and forced as many as 50,000 people from their homes. Because of its narrow width, the upper reaches of the river suffers from droughts while the lower reaches are subject to flooding every year. Given that the river s normal water volume per unit area is half that of the Han River, it is urgently needed to reengineer the river in a fundamental manner.

[After restoration project: Nakdong River] The Four Major Rivers Restoration Project aims at preventing natural disasters, reviving the ecosystem and revitalizing regional economies. The project will be first carried out in the Nakdong River, and thus, cities along the river will be re-born in the eyes of local residents and tourists. In addition, a world-class tourism belt will be created through diverse projects embracing nearby historic, cultural cities, including Andong and Gyeongju.

across major urban areas to levels equivalent with the national rivers, typically with 200-year frequency floodplains. More than 500km river walks will promote the history, culture, and ecology of local areas, with connections to tourist routes and accommodation facilities. The villages will be developed to promote eco-cultural, environmental, and geological tourism. 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.

For more information on the IAHR-IWA Outfall Committee visit www.iahr.org

International Symposium on Outfall Systems

Mar del Plata, Argentina, 15-19 May 2011

Written by:
Ana Paula Comino & Marcelo Scagliola
"OSSE Mar del Plata Sanity Public Work"
Organizing Committee International Symposium on Outfall Systems
Mar del Plata - Argentina

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 multidisciplinary 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 of 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 download is through emissaries 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.

Technical Division News!

Following the Brisbane Council Elections we welcome the new Division Leadership

IAHR Hydraulics

Chair Prof. Jean Paul Chabard
Professor at Ecole des Ponts ParisTech. Project Manager at EDF Research & Development

Secretary Dr. Colin Rennie (Ph.D., P.Eng.)
Associate Professor and Director of the Hydraulics Laboratory at the University of Ottawa, USA

IAHR Hydro-Environmer..

Chair Prof. Zhaoyin Wang
Professor of Tsinghua University & Chairman of the Advisory Council of UNESCO.

Secretary Prof. Jorge Matos
Instituto Superior Técnico Departamento de Engenharia Civil, Arquitectura e Georrecursos, Portugal

IAHR IPD Innovation and Professional Development

Chair Dr. Marian Muste
IIHR-Hydroscience & Engineering Civil & Environmental Department, The University of Iowa, USA

Secretary Dr. Sandra Soares Frazao
Civil and Environmental Engineering (GCE) Universite Catholique de Louvain, Belgium

Invitation for Nominations
5th Award (2012)

Prince Sultan Bin Abdulaziz International Prize for Water

Recognizing Innovation

Nominations open online from 1 May 2011 to 31 January 2012

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