No. 81 June 2004

THE NEWSLETTER OF THE BRITISH HYDROLOGICAL SOCIETY

# Circulation

## Contents

**Integrating wetland hydrology and ecology in the UK**

**Correction to last issue**

**Use the BHS email network**

**New members**

**President's piece**

**Celia Kirby steps in as editor**

**Weather radar committee article**

**Predicting and managing hydrological disasters**

**Drivers and responses to flood risk 2030-2100**
Joint BHS / FloodRiskNet Meeting in Bristol on the Foresight initiative

**Job opportunity: United Utilities**

**Travel grants**

**Water resource strategies**
Scottish Hydrological Group meeting

**Large flood control structures**
Henry Gunston's illustrated talk

**National River Flow Archive**
Download data from the website

**BHS meetings on the web**

**South East Section reports:**
Catchment Abstraction Management Strategies (CAMS)

Water and poverty: redressing the balance

Advances in spatial rainfall representation

**News from members**

**News from the Pennines Group**

**Book: Flood in Brentford in 1841**

**Recent IAHS publications**

**Correction to members' directory**

**Diary of forthcoming events**

*Circulation* is published quarterly. It is free to members of the British Hydrological Society and costs £25 to nonmembers on annual subscription.

- Membership enquiries: Tim Fuller, BHS Secretary, Institution of Civil Engineers, 1-7 Great George Street, London SW1P 3AA. *Tel 0207 665 2234, Email bhs@ice.org.uk.*
- Editor: John Griffin, CEH Wallingford, *Tel 01491 692395, Email jhgr@ceh.ac.uk.* **Editor for *Circulation* 82:** Dr Celia Kirby, Newton House, Newton Lane, Kington, Herefordshire HR5 3NG. *Tel 01544 23005, Email celia.kirby@btopenworld.com*
- Web pages: **http://www.hydrology.org.uk/**

*Circulation* is produced at CEH Wallingford and indexed in *Geosystems' Hydrotitles* & *GeoArchive* and *NISC HydroROM.*

# Integrating wetland hydrology and ecology in the UK

## BHS and British Ecological Society joint meeting
## Institution of Civil Engineers, London
## 31 March 2004

**Wetlands are receiving increasing national and international attention. Wetland science is of growing interest amongst researchers as they are complex environments presenting exciting and interdisciplinary challenges in a relatively new discipline. Despite limited current fundamental knowledge of how wetlands function, responsible agencies are required to undertake assessments under legislation such as the Habitats and Water Framework Directives.**

Organised jointly by BHS and BES, with support from the Environment Agency and the Centre for Ecology and Hydrology, over 160 wetland scientists and managers met to examine recent developments in wetland science and its application.

In Session 1, **Bryan Wheeler** (Sheffield University) discussed the complexities of trying to define water regime requirements for wetland plant communities in a paper, jointly authored by **Sue Shaw**, entitled *Holy grail or wholly pointless*. Bryan highlighted the importance of a range of controlling factors including nutrient supply and pH and vagaries of vegetation classification schemes.

**David Gowing** (Open University) continued the theme with a paper, co-authored by **Owen Mountford** (CEH), on *Plant communities and water tables in wet grasslands*, focusing on the niche for each plant community defined by two axes: degree of waterlogging and degree of soil drying. This highlighted

the fact that too much water at the wrong time can be as damaging as too little.

**Malcolm Ausden** (RSPB) changed the focus to wetland fauna. In his paper on *Manipulation of hydrology to benefit birds* he explained the water requirements for a wide range of avian species, including snipe, lapwing, bittern and redshank. In discussion, **Andy Bullock** (independent) asked about the relationship between river level and floodplain level. **Sarah Norton** (EA) asked about restoration of agricultural land where water supply may be limited and nutrient levels high. **Simon Wood** (Atkins) questioned how target vegetation communities are defined. **Sarah Woolvern** (English Nature) asked about timescales for MG4 grassland recreation, which may be very long term due to compaction of soils. **Hans Schutten** (English Nature) stressed the need to maintain a diversity of sites and work with the available water supply. **Angelo Papaioannou** (Enviros Consulting) queried whether vegetation communities had changed over the past 30 years due to a general increase in nutrient levels: there was little evidence of this.

Session 2 began with a paper *on Wetlands in catchments: the ultimate management challenge* by **Edward Maltby** (Royal Holloway Institute for Environmental Research), co-authored by **Richard Thorne** and **Hongyan Chen**. Edward described a ten-year research programme to develop methods to evaluate wetland functions, such as nutrient removal, based on readily available data, and develop a management tool.

**Richard Harding** (CEH), presented a joint paper with **Colin Lloyd** and **Mike Acreman** on *Water, carbon and methane fluxes in UK wetlands*. In general, wetland evaporation is higher than from "dryland" land types, whereas annual carbon inputs and outputs are roughly in balance. **Andy Baird** (Sheffield University) described *Piezometers and protocols: improving the ways of characterising groundwater flow in wetlands*. He highlighted the problems of false piezometer readings resulting from, for example, blocked slots or the build-up of gas within the wetland sediment. In discussion, **Penny Johnes** (Reading University) felt there may be contradiction between wetland conservation for wildlife and maximising functions such as water quality improvement. **Clive Agnew** (Manchester University) highlighted the problem of scaling up evaporation from individual communities to wetland mosaics. **Kevin Gilman** (independent) asked whether laboratory testing of samples should be used in favour of field measurements such as auger holes. Andy said that it is often better to use lab determinations, because of problems with using piezometers. However, removing 'undisturbed' cores of peat from depths greater than c.150 cm for lab analysis is very difficult: at these depths piezometers are to be preferred, provided that account is taken of piezometer test procedures.

In Session 3, **David Gasca-Tucker** (Atkins) gave a paper on *Assessing the impact of abstraction on Vertigo moulinsiana, Desmoulin's Whorl Snail*. The snail is a Habitats Directive species found in wetlands fed by Chalk rivers.

**Mark Whiteman** (Environment Agency) then presented *East Anglia Habitats Directive Impact Assessments at Groundwater-fed fens*, co-authored by **Andy Brooks** (Entec), including a range of approaches from water balance studies to detailed distributed multi-layer modelling at sites such as Great Cressingham Fen.

Kevin Gilman spoke on *Hydrology and the restoration of lowland raised mires: lessons from Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses*. He highlighted the challenge for future restoration of the mires, since past management had led to development of a unique site hydrology. In discussion, **Sean Furey** (Environment Agency) suggested it was difficult to set abstraction levels when wetland site conditions were influenced by management practices. **Rob Lowe** (Water Management Consultants) questioned whether groundwater abstraction impacts could be determined accurately, given the uncertainty in regional groundwater models. **Simon Wood** (Atkins) queried whether eco-hydrological guidelines were sufficiently well supported by data to justify revoking abstraction licences. Andy Baird suggested that small-scale models for particular wetland sites should be developed before the regional groundwater models. Andy Bullock asked whether the economic value of wetland conservation had been determined to set against economic losses in farming or other water uses.

In Session 4, **Paul José** (Environment Agency) presented a paper entitled *Quantifying the unquantifiable: ecohydrology of the Ouse Washes*, co-authored by **Eliot Simons**, **Simon Clarke** and **Nick Jarritt**. Paul explained that much of the site is out of regime in terms of water table depths, flooding occurrence and duration to meet the needs of the vegetation upon which the designated interest (birds) depend. Phosphate levels were also high.

Andy Bullock described work co-authored by Mike Acreman (CEH) on the role of wetlands in the hydrological cycle. The available scientific evidence supported the high hydrological impact that wetlands have, but results of many studies went counter to widely-held views, e.g. many wetlands generate floods. **Mark Robinson** (CEH) presented a paper jointly authored by **John Bromley** (CEH) and **John Barker** (UCL): *Hydraulic conductivity: size matters!* He described results from Thorne Moor that showed increasing values of soil permeability obtained at different scales of measurements from laboratory cores to field pumping tests.

In discussion, **Ruth Davis** (RSPB) felt that wetlands should be promoted more as wildlife habitats than for their hydrological functions. **Helen Gavin** (Atkins) said that wetland functions may vary in time according to wetland or catchment. Andrew Baird felt that there might not actually be a scale effect with K but that the problem was more one of taking measurements in the right places. Mark Robinson replied that measurements at a large scale integrate the effects of small-scale heterogeneities (which were visible at the site) and provide a more accurate description of regional permeability. **Kate Heal** (Edinburgh University) sought further details of the high phosphate levels in the Ouse Washes: they were from a sewage treatment works.

Mike Acreman thanked the speakers, participants and ICE staff for a very interesting and productive meeting, which had challenged some previously widely-held views of wetlands and presented ideas for future research. It had also recognised that important decisions need to be made on sometimes inadequate information, but that tools were being developed on current knowledge and the responsible authorities were grasping the nettle.

Presentations from the meeting are available on-line though the 'past meetings' section of the BHS website at *www.hydrology.org.uk*.

*Mike Acreman*
*CEH Wallingford*

# Correction

The report on the BHS National Meeting (Managing our aquatic environment in the 21st Century) in the last issue was by **Barnaby Smith** & Michael Hutchins (CEH Wallingford) and not by Gareth Old. The editor apologises to Barnaby for this error.

## Email network

Keep in touch with other hydrologists in Britain through the BHS electronic mailbase.

To join this free service, see the website or contact Jenny Thorne *(jthorne@south-west-water.co.uk)*.

# New members

A warm welcome to 32 new members of the Society:

| | |
|---|---|
| A Shaukat Awan | Flood Forecasting (Pakistan Government), Lahore, Pakistan |
| Dr James R Blake | Centre for Ecology and Hydrology, Wallingford |
| Simon Bond | Worcester |
| Lee E Brown | University of Birmingham |
| Dr Hannah Cloke | King's College, London |
| Eleanor Foster | Hydro-Logic Ltd, Bromyard, Herefordshire |
| Allan E Gear | Atkins Water, Epsom, Surrey |
| Oliver J W Goodall | Dartford, Kent |
| Robin Guy | Ewan Associates, Leicester |
| Dr Barry Hankin | Hydro-Logic Ltd, Bromyard, Herefordshire |
| Anna Harlow | University of Exeter |
| Mari Jones | Halcrow Group Ltd, Swindon |
| Daniel G Kingston | University of Birmingham |
| Gary Kinsella | Hydro-Logic Ltd, Bromyard, Herefordshire |
| Reggie Koh | Heriot-Watt University, Edinburgh |
| Christina McKay | Environment Agency, Warrington |
| Helen L Moggridge | King's College, London |
| Alastair Morriss | Ewan Associates Ltd, Exeter |
| Sarah A Norton | Environment Agency, Addington, Kent |
| Anita Parbhakar | Imperial College, London |
| Louise E Pennington | Hannah Reed & Associates, Cambridge |
| Emma Y Reynolds | Environment Agency, Camberley, Surrey |
| Neal W Ricketts | Pell Frischmann, Exeter |
| Jenny S Ritson | Halcrow, Crawley, Sussex |
| Rebecca Routh | Environment Agency, Blandford, Dorset |
| Dr David Sear | University of Southampton |
| Robert Schindler | University of Leeds |
| Andrew P Smith | WRSRL, University of Newcastle upon Tyne |
| Timothy A Smith | Hyder Consulting, Birmingham |
| Dr Mark A Sudworth | Atkins Water, Peterborough |
| Daniel Watson | Independent consultant, London |
| Andrew Willo | Environment Agency, Worthing, Sussex |

# President's piece

Undoubtedly, the highlight for the Main Committee over the past quarter was a visit to the new headquarters of the Met Office in Exeter in early March. Kindly organised by **Murray Dale** and his colleagues, Committee members were treated to a series of excellent presentations which explained the work of the Met Office, both in general terms and more specifically in relation to hydrology. A fascinating tour of the new building followed, including a visit to the weather forecasting operations suite and a peek at the impressive supercomputers. The new headquarters are housed in a stunning building and are well worth a visit by anyone with the opportunity to do so.

Since the January Committee meeting, work has continued on developing the website, providing up-to-date information on careers in hydrology, and exploring with ICE routes to Chartered Membership for those without a traditional engineering background. A subgroup is preparing a questionnaire that will be circulated to the membership later in the year in order to seek your views on potential future developments for BHS, including whether the Society should publish a Journal of its own and whether it is time for BHS to have a new logo!

The Main Committee has also reviewed the policy on charging for participation in national meetings and has agreed to increase the extra charge imposed on non-BHS members, with the object of using the additional revenue to subsidise further the attendance of student and retired BHS members at these events.

It is pleasing to report a phase of growing activity in the regional/national sections/ groups , which will provide a focus of interest for many members who are not readily able to attend events in London. A very successful inaugural meeting of the newly re-formed Welsh Section took place in Cardiff in March, and work is going on to develop a programme of future meetings and to form a committee. New initiatives are taking place in both the Pennines Hydrological Group and the Midlands Section, which it is hoped will complement the activities in the South-West and the very full programmes of events scheduled for Scotland and the South-East. All the sections and groups of the Society will always welcome further input from BHS members, be they ideas for future meetings, offers to serve on the local committee or any other forms of help. These should be directed to the section/group representatives listed on the BHS website: *http://www.hydrology.org.uk/BHS_Contact_Addresses.html*.

Contributing to the work of the regional /national groups of the Society often provides a way for young members to become involved in the work of the Society, and we are keen to encourage new talent to participate in all our activities.

One way in which young members have been encouraged is through the generosity of **Professor Peter Wolf**, a Past President and Honorary Member of the Society, who has sponsored the subscriptions of a number of mostly younger hydrologists. In conjunction with the Main Committee, these awards have been made to members who are already making a significant contribution to BHS activities or who are expected to take an active role in the future. I am very pleased to announce that this year's awards have gone to **Helen Proctor** (Environment Agency), **Neal Ricketts** (Pell Frischmann) and **Suzanne Wales** (Halcrow).

During the present quarter, BHS has a very full programme of events: national and regional meetings, the Postgraduate Symposium and the International Conference at Imperial College in July. As of mid-April, we had already had more than 200 registrations for this conference, and the National Organising Committee is looking forward to a very successful event. If you haven't done so already, there is still time to register, and I look forward to welcoming many BHS members to London in July.

*Bruce W Webb*
*b.w.webb@exeter.ac.uk*

# Items for *Circulation* 82

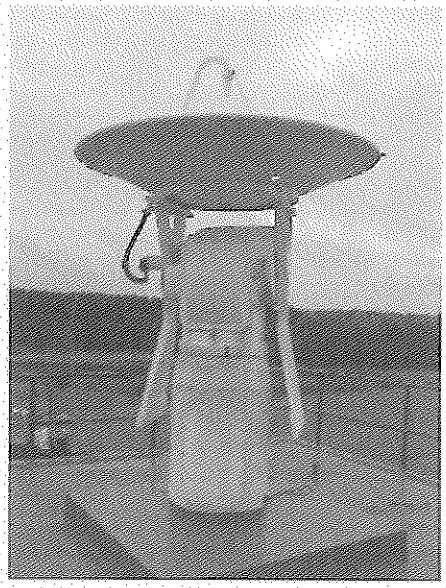
The editor is away over the summer, but the previous editor has kindly agreed to edit the August issue, so please send all contributions to her:

Dr Celia Kirby, Newton House, Newton Lane, Kington, Herefordshire HR5 3NG. *Tel 01544 23005, Email celia.kirby@btopenworld.com*

The copy date is ***9th July***.

# Weather radar is more accurate than ever —

## and there is an Inter-Agency Committee who can prove it!



"Not another committee!" do I hear you say? Well, this one has been in existence for about 12 years and was first set up to ensure coordination of activities and interests across all areas of Government involvement in funding and supporting the UK's radar network — and that is still its primary focus.

As well as relevant Government Departments and Agencies (Met Office, Environment Agency, Defra, SEPA, DARD, States of Jersey) the Committee also has representation from NERC, CCLRC, the water companies and seconded members of the University Community.

The Inter-Agency Committee has just reached the end of its fourth session and the report and accompanying bibliography has recently been published. It covers a range of topic areas, including an overview of progress in the main programmes of work in the UK and Europe, but the main focus is on the notable achievements in the quality and accuracy of today's radar rainfall estimates.

The diagram shows a time series of the Root Mean Square fractional difference between hourly gauge accumulations and co-located 5-km-resolution quality-controlled radar rainfall estimates. Whereas monthly values (dashed line) show considerable variability, the 12-month running mean (solid line) shows a steady downward trend in difference between radar and gauge, with every sign that this continues to decrease.

Achievements such as this only come with a large amount of commitment and investment by several of the organisations represented on the Committee. These organisations have been working hard to improve this capability, so as to deliver the highest quality of flood and severe weather warnings across Europe.

A number of recent developments have opened up new opportunities to work with the radar information to help improve the quality and accuracy of both the data itself and the way in which this is used within modelling studies. These include:

- New radar processors, which now make it possible to obtain high resolution data (in its original polar projection) from the radar network;
- New techniques to provide real-time correction and adjustment of operational radars, including the use of complementary data from radio-propagation links and optimal use of naturally occurring non-precipitation targets;
- A polarisation-diversity operational demonstration radar, soon to be established in the south-east of England. This will provide a much awaited assessment of polarisation capability for C-band (the frequency used by radars in the UK, around 5.6 GHz) on which a decision for future investment can be based;
- New radar processing and display systems interfacing to flood forecasting systems for improved decision-support to flood warning.

Within the wide field of activities currently being investigated by the radar community at large, the Committee's recent report has identified a number of significant areas of opportunity for greater focus in Europe.

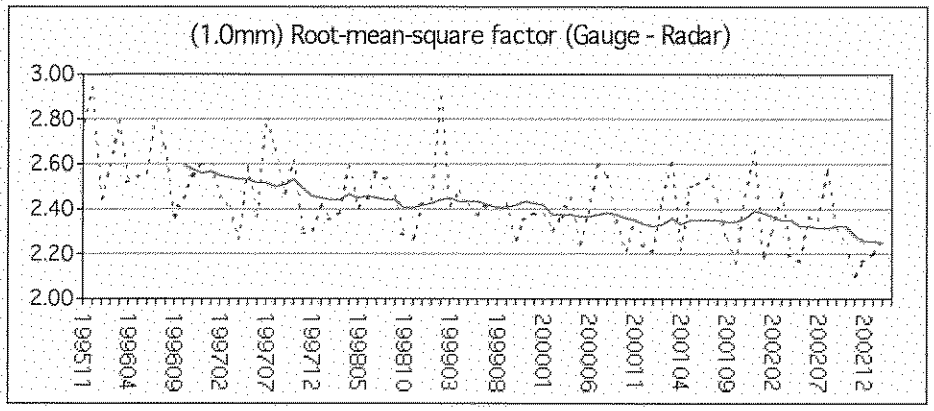
The first is the forecasting of convective rainfall, which is notoriously difficult because of its spatial and temporal variability. However, as the resolution of numerical models increases, there is a need to represent this convection, including its surface impacts, more explicitly. This has many benefits, including enhanced thunderstorm nowcasts, improved flood forecasting and unlocking the ability to provide predictive real-time control systems based on spatially-distributed rainfall data. The direct assimilation of radar information into high-resolution models is key to this improvement, but as yet experience is limited in an operational environment.

Secondly, the radar measurements often have within them inherent information on the quality and accuracy of the data themselves. By using this information to a greater extent it is possible to significantly improve the error characteristics of the data. This in turn is critically important in gaining maximum value from the assimilation of both radar derived precipitation and wind field data into numerical models.

Thirdly the discontinuous nature of precipitation fields makes it difficult to verify and validate the performance of measurements and forecast information. This is important in understanding where skill is added and where improvement needs to be made. There is still significant potential here to make much greater use of spatial techniques that will improve on current verification methodologies.

In order to provide a framework that promotes further work in these areas, the Committee will focus on three strategic areas in its next session:

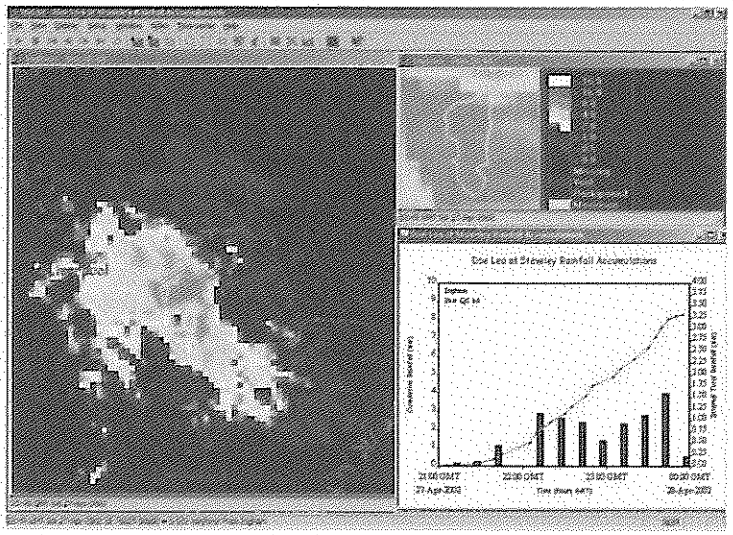
- The pull-through of research into operational benefits for the wide range of users of radar information,



and in particular for a greater accuracy of public rainfall and flood warnings.
- Identifying and overcoming service delivery issues of operational agencies, so that the valuable information the radar provides gets to those who need it in good time.
- Raising awareness of the value of weather radar to a wider community who are not yet benefiting fully from all that radar has to offer.

A full copy of the report, bibliography and further details of the work of the committee are available on the website *http://www.iac.rl.ac.uk*, where you can find out more about what the Committee does and how its work might be able to help your activities and interests.

*Paul Hardaker (Met Office) and Chris Haggett (Environment Agency)*



# Predicting and managing hydrological disasters

## BHS National Meeting
## Institution of Civil Engineers, London
## 11 February 2004

**Following several months of drought conditions and a couple of weeks of snow and heavy rainfall, which brought floods to Wales and the North-west and Midlands of England, the topic for this BHS meeting could not have been more apt. Its international perspective put the scale and impact of recent events in the UK into perspective.**

**Frank Farquharson** (CEH) started the meeting with some statistical scene setting. He defined hydrological disasters as natural events caused by extremes of precipitation, the effects being usually exacerbated by anthropogenic factors. Storms and floods cause over 90% of insured natural disaster losses and floods were responsible for 47% of natural disaster deaths between 1985 and 1999.

Natural disasters have been increasing in frequency and magnitude in recent years as more people are affected (because of population growth and development in flood prone areas) and the costs of the damage caused are higher. Frank reminded us all that scientists can help by researching and developing new and improved tools to predict disasters and using innovative solutions to manage disasters.

The paper by **Richard Graham** (Met Office) described a project to assess how seasonal forecasts can improve long-range prediction of inflows to Lake Volta in Ghana. Currently linear regression is applied to early season rainfall data to indicate how much more rain can be expected in the whole season. Seasonal prediction, based on sea surface temperature predictions combined with dynamic model outputs, can generate probabilistic forecasts that improve on the performance of this process. The technique also predicts extremes better. This method could be applied elsewhere in areas where the seasonal forecasting skill is sufficient, e.g. tropical areas, to give early alert capability of hydrological events.

Still in Africa, **David Grimes** (University of Reading) discussed rainfall monitoring and how this information can be used in mitigating disasters. The raingauge network is often sparse, with data only collated infrequently, and radar installations are too costly. Alternatives for monitoring include satellite data and numerical weather prediction (NWP) model results. The satellite observations from Meteosat give the best data for real-time use by inferring rainfall amounts based on cloud top temperature. This has been successfully validated over areas of good raingauge coverage. However, the areal rainfall estimates can be improved by using NWP parameters for windspeed and humidity. The information is combined in an artificial neural network, which adjusts the parameters until the outputs are close to gauged values. The outputs from the combined satellite and NWP data give a feasible method for monitoring rainfall over a wide area.

The morning ended with a change of emphasis, from the scientific to the humanitarian. **Andy Bastable** (Oxfam) discussed the threats to public health following flood events. These range from the immediate lack of shelter, through contamination of drinking water, to an increase in diseases such as malaria and the longer-term impact on the livelihoods of the affected communities. Organisations like Oxfam respond when the event is defined as an emergency: an exceptional threat to life, health or subsistence, which the community cannot cope with. The typical response is to provide shelter, food and clean water, and to target this response to appropriate beneficiaries. There is a need to be prepared to provide this response, and some risk mapping has highlighted prone areas where local authorities can be trained in required techniques and safe areas can be built. This local 'preparedness' work is carried out with the involvement of the communities at risk.

The discussions following this session considered how scientific research can provide the tools that NGOs need to be forewarned of disasters: there was a need to engage NGOs in dialogue to guide this work.

The afternoon session focused more on the response to disasters. **Steve**

**Parsons** (Mott MacDonald) outlined recent work on solutions to flooding in Tajikistan. The country suffers from severe flooding problems, with many lives lost and thousands of homes and crops damaged by floods each year. The challenge was to reduce the flood impact using low maintenance solutions that would suit the difficult terrain. Suggested solutions included improved forecasting and warning, emergency response development, planning controls and encouraging community self-help measures. These solutions are intended to be more sustainable than earlier attempts at hard engineering solutions that were too costly to maintain.

**Murray Dale** (Met Office) is involved in a project that was launched following an extreme flash flood in Algiers in November 2001, where there was a large loss of life and huge amounts of damage. The project has two parts: assessment of the current forecasting service with recommendations for warning procedures, and an in-depth analysis of the event using meteorological modelling. Algeria's Meteorological Service is quite well developed and forecasts are passed to the Civil Protection Agency. However, both forecasting and the dissemination of flood warnings can be improved. The project will assess how to do this and consider new defences and other works funded by the World Bank.

Returning to the UK, **Russell Turner** (Environment Agency) gave an overview of how the Environment Agency manages flood events. In risk management, the first step is to assess and publicise the level of flood risk, the second is to try to prevent risk by keeping development out of risk areas or building defences, and the third step is to respond to events. Weather forecast, weather radar, raingauge and river level information is used in real time along with some forecasting models to trigger the issue of flood warnings. There is scope for improving the forecasting process, as well as a move towards flood extent forecasting. Warnings are disseminated directly to interested parties as well as being loaded onto a very popular website, with further information available from the Floodline telephone service.

A number of projects are under way to make improvements to the flood warning service. A new radar is planned, to be installed in Kent to improve coverage of weather radar data. A new National Flood Forecasting System is being developed to run flood forecasting models and a Multi-Media Warning Dissemination System will soon replace the Automatic Voice Messaging systems to allow more targeted warning dissemination. Russell concluded that it was critical to get communities involved in managing and responding to the flood threat.

**James Dent** (HR Wallingford) highlighted the benefits of hydrologists and meteorologists working together in a project to develop Global Hydrological Forecasting (GHF). An example of this is the European Flood Forecasting System project which uses medium range weather forecasts to run a 1km grid surface model and gives early warnings of runoffs up to 36 hours ahead. This type of application is useful in large catchment areas where response times are slow. As the models are run by different organisations, there is a need for greater cooperation between them and the potential to identify other interested parties who may derive benefits from this type of work, e.g. utilities companies and supermarkets.

Throughout the day it was clear that there is a large amount of valuable research in progress and the priority of this work needs to be sustained by keeping hydrological disasters high on the political agenda. It is also clear that hydrologists need to build relationships both with fellow scientists, such as meteorologists, and also with the communities who will benefit from disaster prediction, to ensure that their needs are met.

*Katharine Robb*
*Environment Agency*

# Drivers and responses to flood risk 2030-2100

## Joint FloodRiskNet and BHS National Meeting
## School of Geographical Sciences, University of Bristol
## 16 April 2004

**For the last 12 months over 60 UK hydrologists, hydraulicians, engineers, economists and social scientists have been contributing to the Foresight initiative on flood and coastal defence being run by the government's Office of Science and Technology. Foresight programmes aim to provide visions of the future in order to ensure that effective policy choices are made now. This is especially relevant to future flood risk, given the long lead-time to implement particular mitigation strategies such as development controls or large-scale engineering works.**

Foresight operates through a rolling programme that looks at three or four areas at one time, of which flood risk is currently one. The starting point for a project is either a key issue, where science holds the promise of solutions, or an area of cutting-edge science where the potential applications and technologies have yet to be considered and/or articulated. Flood risk science qualifies on both these counts, as recent years have seen major advances in the availability of national datasets to populate large-scale flood risk assessment models and in the development of methodologies to assess flood risk and societal response formally in an integrated way.

The official launch of the results of the Foresight project on flood and coastal defence took place at the Institution of Civil Engineers on 27th April 2004. It was therefore extremely timely that hydrologists and flood risk scientists met in parallel to evaluate the technical insights gained as a result of the methods developed to meet the Foresight objectives: these were to produce a challenging and long-term vision for the future of flood and coastal defence for the period 2030-2100 that took into account the many uncertainties and which could be used as a basis to inform policy and its delivery.

**Jim Hall** (University of Bristol) welcomed the 60 delegates to the meeting on behalf of BHS and the EPSRC-funded FloodRiskNet (*http://www.floodrisknet.org.uk/*) cross-disciplinary network. Jim provided a brief introduction to the Foresight project, which he characterised as one of unprecedented ambition in terms of the science required and the short timescale available in which to

complete the work. Foresight had stretched existing methods and required the development of new models to enable perhaps the most complete example of risk-based integrated assessment yet accomplished. Jim proposed that it was now appropriate to start thinking about the lessons learnt from this process and welcomed the meeting as an opportunity to focus on the risk and hydrological aspects of the initiative.

**Edward Evans**, the project leader for OST, began the formal presentations with a background to the project methodology. This was split into three phases: an initial set-up period was followed by an assessment of the drivers to change in flood risk and finally an evaluation of society responses and policy recommendations. Edward emphasised that Foresight looked at potential scenarios that might occur, rather than things that were necessarily going to happen. The OST publication "Foresight futures" defines four possible futures for the UK based on changes in agriculture, society, economy and governance systems. Coupling these four possible futures to the scenarios for climate change defined by the UK Climate Impacts Programme (*http://www.ukcip.org.uk/*) in the UKCIP02 assessment could then be used, with a suitable methodology, to calculate changes in flood risk at a national scale and evaluate policy responses. The idea was not to develop assessments for local areas or catchments, but to give a long-term national view of flood risk and options for policy development.

**Nick Reynard** (Centre for Ecology and Hydrology) gave a presentation on the use of UKCIP scenarios for hydrological modelling, demonstrating how change in flood flows could be estimated by combining the UKCIP02 scenarios of climate change with a continuous hydrological simulation model. This allowed one to change the climate drivers (e.g. winter precipitation) for flooding and explore the resulting changes in flood frequency. The scenarios of climate change could vary from simple percentage changes in drivers for the whole catchment to the use of regional climate model data. For example, for the River Severn at Haw Bridge a discharge of 630 $m^3s^{-1}$ currently has a return period of 42 years, but by 2050 this could have decreased to only 6 years. This gives a seven-fold increase in risk, assuming that flood management policies remained unchanged (the so-called baseline condition). This analysis showed that Defra guidance in 2001, to allow for a 20% increase in peak flows due to climate change when designing new flood defence schemes, still appears appropriate, as a conservative estimate.

**Enda O'Connell** (University of Newcastle upon Tyne) spoke about the impact of land-use change on flood risk. He began by assessing the current state of knowledge, and concluded that there was good evidence that surface runoff was increased by certain farming practices (e.g. increased stocking densities) and the type of land drainage installed. There was also good evidence that local mitigation measures, such as the use of cover crops could alleviate some of these effects. However, Enda showed that there was little direct evidence that these effects propagate downstream through the surface water network, and therefore there was no evidence of a link between local surface runoff generation and flooding at larger UK catchment scales. However, there was a lack of studies in which such evidence had been sought. Enda showed that there were problems in demonstrating the impact of land-use change on future flood risk including: (1) the lack of a generally-accepted theoretical basis for a design of model suitable for predicting land use impacts; (2) poor knowledge of which data are essential to predicting impact and (3) limitations in the methods available for estimating uncertainty. He concluded that land-use management effects are of second order importance in comparison with natural climatic variability.

The morning concluded with **Jim Hall** (University of Bristol) talking about work within the Foresight programme to understand the factors leading to changes in future flood risk and to rank policy responses in terms of their effectiveness for each scenario. This work was led by **Colin Thorne** (University of Nottingham) and used evidence-based expert appraisal of driving factors. The work aimed to achieve completeness, rather than detail, and was broadly successful in view of the short time scale available to elicit responses. A central conclusion was that the effectiveness of particular policy responses was strongly dependent on the assumptions about governance built into each Foresight scenario. For example, under the free-trade-dominated "World Markets" scenario, the most effective strategies to reduce flood risk are unsustainable on environmental quality criteria. By contrast, in other scenarios where political power was less centralised, governance may not be in place to coordinate particular policies.

The afternoon began with **Paul Sayers** (HR Wallingford) giving a presentation on national-scale quantified analysis of flood risk. The RASP methodology (Risk Assessment of Flood and Coastal Defence for Strategic Planning: *http://www.rasp-project.net/*), jointly developed by the Bristol University and HR Wallingford, was applied to give national-scale quantified estimates of flood risk on a 1km grid. RASP estimates the probability of failure of systems of flood defences for a given defence loading. Whilst RASP consists of high, intermediate and detailed methods, with decreasing scales of application, only the high level national method was used for Foresight. This was applied for 2002 and for 2050 and 2080 under the Foresight scenarios, assuming either no change in flood management (the baseline scenario) or the implementation of a portfolio of policy responses. The analysis predicts that in certain scenarios flood risk will increase by up to an order of magnitude by 2080, but that it can be substantially reduced by the policy responses. A similar pattern emerged for potential damages, which increased from £1bn now to £22bn by 2080 under the "World Markets" future, although this could be reduced to only £2bn by policy measures. A common feature of the analysis was that flood risks were spatially well defined, and that coastal floodplains were the most vulnerable under all scenarios. No single policy response worked well in all scenarios and a portfolio of measures was always required. Paul noted that recent improvements in nationally available data sets in the period since the analysis would allow the analysis to be improved, but that for national assessments the emphasis would continue to be on computationally efficient methods.

**Richard Ashley** (University of Bradford) presented the impacts of climate change on urban drainage systems, giving an overview of current research into urban flooding and identifying the constraints with the current generation of modelling and analysis tools. In particular, he identified a lack of urban hydraulic models and the data necessary to parameterise them. Thus, urban hydraulic models capable of simulating the above ground flow around obstacles were lacking, as were the necessary topographic and topologic data to describe the urban fabric in such schemes. Richard showed how this would require multi-scale data from the household and kerb level, up to the scale of whole urban areas. Mitigation of urban flood risk would also be complex and require a combination of responses, including socio-economic measures.

In the final talk, **Edmund Penning-Rowsell** (Middlesex University) considered policy insights and directions for future research. He asked, "What should be our flood management aims in the future, and are we prepared to accept increases in risk and damage?" The Foresight report will argue that such increases will be unacceptable to the public. We must ask therefore how we reduce risk, but balance this against expenditure and sustainability. Might we even reduce risk below the current

Barrier, with its distinctive rising sector gates.

My thanks for valuable discussions 'on site' with many Environment Agency staff, and for helpful guidance from Jack Lewin's book 'Hydraulic gates and valves'.

*Henry Gunston*





*Above: Denver Sluice on the Great Ouse, from upstream, February 2004. From left to right: the "Big Eye" guillotine gate of 1923; the three sluice openings rebuilt by Rennie in 1834; and a guillotine gate of 1984 on the enlarged navigation lock.*

*Left: Dog-in-a-Doublet Lock and Sluice below Peterborough on the Nene, from upstream, February 2004, part of a major upgrading of structures on the Nene in the mid-1930s. The lock, with three guillotine gates, is on the left, and two sluice gates on the right.*

# National River Flow Archive website — data download facility

A major restructuring of the National River Flow Archive (NRFA) website is scheduled for later this year to provide access to a wider range of hydrological, spatial and reference information. In preparation for this upgrade, a river flow data download facility has been developed which, initially, allows site visitors access to full daily flow time series for around 200 representative gauging stations throughout the UK.

The time series data posted on the NRFA website supersede those previously published and have been harmonised with the data holdings of the principal measuring authorities: the Environment Agency, SEPA and the Rivers Agency in Northern Ireland. Their active cooperation in the routine updating and quality control of the NRFA is gratefully acknowledged. Small differences between the NRFA and corresponding measuring authority summary statistics for some of the selected gauging stations may be expected — reflecting, for instance, differing lengths of record or different proportion of missing values.

Validation, particularly of historical datasets, is an ongoing process and a small proportion of the flow data remains under review. In addition, some future reprocessing of high flows may be anticipated as calibrations are revised following the major flood episodes experienced in recent years.

The gauging stations for which time series can be downloaded from the NRFA website are mainly those with the longer records for which flows have been included in the series of 'Yearbook' publications (which ended with the 1995 Yearbook in the Hydrological data UK series). Generally, data are featured for the full period of record up to 2002; flags or colour coding is used to indicate where flow values have been estimated.

Three data download options are currently available:

- Annual tables of daily mean flows — format closely follows that in the Yearbook;
- Long-term hydrographs — showing daily flows for the full record, together with the highest and lowest flows for each day (as shaded envelopes);
- Daily flow download — full record in csv (comma-separated) format.

Consistent with NRFA policy, gauging station and catchment descriptions are also provided together with essential reference information to allow the suitability of individual time series for particular applications or analyses to be assessed.

Comprehensive reference information for all primary gauging stations in the UK is contained in the *Hydrometric Register and Statistics 1996-2000* volume, an essential handbook both for practising hydrologists and a wide community of other users of UK hydrometric data. Copies are available from CEH Wallingford.

Access to the current data download facilities is via the NRFA website: *http://www.nwl.ac.uk/ih/nrfa/index.htm.*

Please contact **Terry Marsh** (email *tm@ceh.ac.uk*) or **Oliver Swain** (*os@ceh.ac.uk*) if you would like any further details.

# BHS meetings on the web

With the kind cooperation of the authors, it has been possible to add PDF versions of presentations used at three recent BHS meetings to the BHS web site:

*Predicting and Managing Hydrological Disasters* — meeting held at ICE, London, 11th February 2004

*Integrating wetland hydrology and ecology in the UK* — BHS/BES joint meeting at ICE, London, 31 March 2004

*Drivers and responses to flood risk 2030–2100: Technical insights from the OST Foresight programme on Flood and Coastal Defence* — University of Bristol, 16 April 2004

The relevant page of the BHS web site is at *http://www.hydrology.org.uk/BHS_past_meetings.html.*

Reports of the meetings appear on other pages in this issue of *Circulation.*

# Catchment Abstraction Management Strategies (CAMS)

## BHS South East Section Meeting
## ICE, London
## 27 November 2003

**Tom Nichols** and **Dan Wykeham** (Regulatory and Technical Water Resources Team, Environment Agency, Sussex Area) gave a presentation on the implementation of CAMS in Sussex. They focused on the production of the Arun and Western Streams (A&WS) CAMS from the perspective of Agency operational staff. This was the first of a total of 129 CAMS that the Agency will produce by 2007.

The main phases of the project included the results of the Resource Assessment and Sustainability Appraisal phases, together with Sussex Area's experiences in stakeholder engagement and consulting the wider public. A case study on the Chichester Chalk Water Resource Management Unit highlighted some of the key challenges faced in applying the CAMS methodology on the ground. They concluded with a summary of the final abstraction management strategy and how this was to be implemented as part of the Agency's day-to-day operational work.

**Jacob Tompkins** (Water UK) then gave a water industry view of CAMS. The industry is broadly supportive of the process and commends the Agency on delivering such an ambitious project. The concept is excellent and can teach our European colleagues a lot, particularly in implementation of the Water Framework Directive. However, the Environment Agency should go further. The main problems with CAMS relate to its scope. Focusing on Abstraction (the A in CAMS) rather than overall water resources management tends to mean restricting abstractions rather than enhancing recharge or managing catchments better. There is also a problem with separating water quality from quantity: if the UK is going to implement the WFD optimally, we need to look at these issues simultaneously. Generally, however, whilst the water industry has concerns over some of the details of the process and the accountability of the CAMS groups, this is a good vehicle to deliver integrated catchment management. Jacob suggested that CAMS officers should be paid more (a crowd pleaser, but also a serious issue) and made into catchment managers, who could look at other issues such as diffuse pollution and flooding.

# Water and poverty: redressing the balance

## BHS South East Section Meeting
## ICE, London
## 22 January 2004

**There was a very good attendance of about 85 people for this evening meeting at the ICE. The quality of the speakers provoked a most interesting and lively discussion on provision of water and sanitation in the world's poorest countries. A collection on the evening raised £60 for WaterAid.**

The meeting opened with **Dr Richard Francys** (Senior Lecturer in Water & Sanitation Management, Cranfield University, Silsoe) describing his research on public private community partnerships in the urban slums. The benefits of a publicly-managed, subsidised, piped water connection are very distant and public sector involvement is failing to meet the needs of the urban poor. In the light of all the factors (urban poverty, informal illegal dwellings and rapid population growth), the limited service coverage figures, although unacceptable, are perhaps understandable. An Asian Development Bank study, 'Beyond Boundaries', has investigated a range of innovative non-state water and sanitation providers that have apparently been delivering significant benefits in urban areas. Analysis of the highest profile of these, the Public Private Partnerships (PPPs) with international operators, shows a clear trend towards serving the higher income regions and metropolitan cities, with the poorer areas often disadvantaged and less likely to access the benefits of these partnerships.

In advance of any reform, NGOs and small-scale private providers have been 'filling the void' with initiatives that meet the needs of the poor through non-networked and decentralised services. The void or failure of service is due to the inability of the public direct service provider or main utility to break through an apparent 'performance ceiling' and get services to the slums and shanties. This role of NGOs was discussed, with the recognition that there may be only limited capacity for NGOs to grow to meet the rapid growth of urban areas. In order for the performance ceiling to be breached, the public direct providers have to be reformed — and the most recent approach to achieve this reform has been through the private sector.

Dr Francys described how the best PPPs, where the private operators have a more comprehensive remit, have begun to deliver efficiency and innovation in tripartite partnerships, the Public Private Community Partnerships (PPCPPs). Here international operators work creatively with government,

NGOs and independent providers. He described early results from two new DFID-funded research projects: one looked at how economic regulation of water can be focused to benefit the poor; the second investigated how much it costs to get access to a conventional water connection, asking 'could you afford to pay between three and seven months' household income for a new water connection?' Unless we enable the poor to get connected they will not be able to benefit from the convenience and health benefits of piped water supply, whether publicly or privately supplied.

The second speaker was **Ravi Narayanan**, Director of WaterAid. He described the global problem of lack of access to safe water and sanitation. Approximately 1.2 billion and 2.4 billion people do not have access to safe water and sanitation respectively: the worst affected continent is Asia, followed by Africa. The consequences of this situation include increasing infant mortality and increasing the time people take off from work as a result of sickness. According to Ravi, 73 million working days are lost each year in India to water-borne diseases, costing $600m in medical treatment and lost production, while 40 *billion* working hours are lost each year in Africa because of the need to carry water.

There is evidence of a delivery gap between actual progress on increasing the number of people who have access to safe water and sanitation and meeting the water and sanitation targets set by the United Nations.

The UN Millennium Goals relating to water and sanitation are ambitious — to halve the proportion that lack clean water and sanitation by 2015 — but they can be reached through a combination of focused investments, effective governance in developing countries and the use of appropriate and affordable technology solutions.

WaterAid and other successful projects have had direct, immediate benefits. The provision of water, sanitation and hygiene has been shown to reduce mortality caused by diarrhoeal disease by an average of 65%. In Bangladesh, school attendance has increased by 15% with access to piped water and lower collection times. The simple act of washing hands with soap and water has been shown to reduce diarrhoeal disease by one third. Other outcomes include the impact on peoples' livelihoods. People are able to develop new skills and consequently economic activities increase. This causes migration into these areas and people become empowered. Knowledge and organisational abilities increase and there is evidence of advocacy rooted in the community, helping its people to be more self-reliant.

*Helen Procter*
*Environment Agency*

# Advances in spatial rainfall representation

## BHS South East Section Meeting
## ICE, London
## 8 March 2004

**Approximately 40 people attended the recent South East Section meeting at the ICE to listen to three interesting presentations on recent advances in spatial rainfall representation.**

Past President **Howard Wheater** (Imperial College) spoke on 'Recent developments in rainfall modelling'. The use of continuous simulation rainfall-runoff modelling as an alternative to a design event approach requires an input rainfall time-series. Howard described a family of stochastic single-site rainfall models, originally developed by Cox and Isham, and discussed issues of model calibration and performance. Under current Defra-funded research at Imperial College, University College London and the Centre for Ecology and Hydrology at Wallingford, calibration and simulation software have been developed and regionalisation of the models for the UK is in progress.

These models can be extended to simulate rainfall in space as well as time, and again, model performance was illustrated. Current work on their development and application is being based on a long radar (Chenies) and associated rainfall record. In the absence of radar data, Generalised Linear Models (GLM) can be used to represent spatial variability of daily rainfall based on raingauge data, and an example was given from Western Ireland, where this approach was used to investigate impacts of climate variability on flooding. The method can produce simulated output in which rainfall frequency varies as a function of identified trends or explanatory climate variables, such as the North Atlantic Oscillation. Finally, Howard mentioned that approaches to the disaggregation of GLM data are being explored, to allow simulation of sub-daily data from a mixture of daily and sub-daily raingauges.

**Scott Ferguson** (Symonds Group) discussed the joint project between the Met Office and Environment Agency to make better use of the rainfall data collected in England and Wales by both organisations. The objective is to provide the Met Office tipping bucket rainfall (TBR ) data from a core network of Agency gauges, of uniform quality and standard design. The data will be used by the Met Office to improve the quality of their rainfall radar products, including adjusted radar rainfall data using TBR ground truth. It also includes an integrated rainfall accumulation product derived from the best aspects of both data types, i.e. point accuracy of the TBR and spatial coverage and variability provided by the radar. The project has been ongoing since 1999, and it is hoped that once the last of the Agency new generation telemetry systems are commissioned, the project drawn to a close. It must be recognised though, there will be no step improvement as a direct result of the project, but clear benefits will ensue in the future with improved flood forecasting and severe weather prediction the goal.

The final speaker of the evening was Malcolm Kitchen (Met Office). He gave a talk on behalf of Murray Dale on the use of radar data for hydrological analysis, describing recent developments and applications. Traditionally weather radar data have been used to forecast rainfall and see where rainfall is in real time. However, recent improvements in accuracy and resolution now enable radar data to be used to analyse high-intensity storms quantitatively. Furthermore, radar data can be used to identify any regional or national trends in storm behaviour and hence better predict the impact of high intensity storms on catchments and particularly urban drainage systems.

In particular, there is a significant problem in urban drainage design in understanding the spatial variability and extent of severe storms. It has been recognised that design storms used currently do not replicate reality well and can lead to significant under-design in some areas and over-design in others. This is particularly true as sewer catchment models grow in size, such as those over the major UK cities.

In these large catchments rainfall events can be very localised or widespread, but are almost never homogeneous, as assumed by the existing design storms. In partnership with the water industry, the Met Office aims to develop a methodology to produce a synthetic radar-based 'design storm' and then to analysis the data to make this into a usable tool for urban drainage modellers. From an analysis of radar data patterns of significant storm events, it is proposed that a form of 'design storm' can be derived from radar data for any part of the country.

High quality 1km resolution radar data can also be used to validate and improve areal reduction factors (ARFs) used for design. The ARF methodology was developed as part of the Flood Studies Report in 1975 and reinstated in the *Flood Estimation Handbook* (FEH), in spite of well-documented criticisms of this method (*FEH* Volume 2, 1999).

*Helen Procter*
*Environment Agency*

# Flood!

The Brentford Flood of 1841 by Valerie Bott (2002), published by Brentford and Chiswick Local History Society, 3 Campden Terrace, Linden Gardens, London W4 2EP. 54 pp, Price £7.95 plus 80p p&p.

Well illustrated, this booklet brings to life a localised disaster that needs to be remembered. A rapid thaw on frozen ground in mid-January 1841 caused such run-off at the confluence of the River Brent and Grand Junction Canal with the River Thames that three persons died, in a township of 10,000 over 50 cottages were inundated, and 70 working canal boats were damaged.

Just as now, crowds swarmed to the sad scene, albeit by horse and carriage. But perhaps that did assist the Relief Fund, which soon passed £700. Besides householders, 58 businesses received modest compensation of up to £20 from the fund, a negligible amount for Norris's tannery where the damage bill was £1000.

The author, a museum curator, has made best use of a wide variety of sources, not least *The Times* and inquest reports. The performance of Brent Reservoir, a major canal property, comes in for attention because of damage to its spillweir. Prior catchment conditions are well covered, but better still is the Postcript. It draws attention to an earlier serious Brentford flood of 1682, as well as reminding readers of lesser floods in 1898 and 1903, and of the success in 1987 at containing Brent flows in the canal reservoir. Had its spillweir siphons cut in then, the events of 1841 in Brentford might have come close to being repeated.

I commend this booklet as being well worth its cost to any hydrologist with flood management or design reponsibilities.

*Frank M. Law*
*Thames Regional Flood Defence Committee*

# News from members

## New editorship

**Professor Colin Neal** (Centre for Ecology and Hydrology) has accepted the position of editor of *Journal of Hydrology*, as one of its four editors-in-chief. He will cover the areas of water quality and sedimentology.

Colin will also continue in his editorial roles for *Science of the Total Environment* and *Hydrology and Earth System Sciences*.

## Fellowship for Frank Law

Former BHS President **Frank Law** has recently been awarded a three-year CEH Fellowship.

This unpaid position allows former CEH staff to write papers and take part in collaborative research with current staff after they have retired, passing on their wealth of experience in the process. The local CEH site provides accommodation and support.

# Pennines Hydrological Group news

The BHS Pennines Hydrological Group has been relaunched and will start with an afternoon meeting on *Upland hydrology* at Salford University on 3rd June, preceded by a buffet lunch. A meeting report is expected in the next *Circulation*.

Committee members are arranging a programme of three meetings for next year. If you would like to make sure you are on the Pennines mailing list, or would like to offer more active involvement, please contact David Collins (email: *d.n.collins@salford.ac.uk* and *davidncollins@hotmail.com*), or Hilary Smithers (*hilary.smithers@environment-agency.gov.uk*).

# Latest IAHS Red Book

Wastewater Reuse and Groundwater Quality, edited by Joop Steenvoorden & Theodore Endreny, IAHS Publication 285 (*April 2004*), ISBN 1-901502-52-X, 112+viii pp. £29.30.

An integrated approach to the *groundwater resource – wastewater production – wastewater (pre-) treatment – wastewater re-use* chain is required to find optimal solutions for food security, cost-effectiveness, environmental load and overcoming health risks.

Abstracts of the papers in this volume can be seen at the IAHS website, *www.iahs.info*, along with details of earlier publications in the same series and forthcoming IAHS meetings.

# Publications

## IAHS *Hydrological Sciences Journal*

***Papers in Vol. 49 No. 1*** *(February 2004)* including a special section, *Detecting change in hydrological data*, with a leading article by *HSJ* editor, Zbigniew W. Kundzewicz.

**Special section**

Zbigniew W. Kundzewicz: *Searching for change in hydrological data — Editorial*

Zbigniew W. Kundzewicz & Alice J. Robson: *Change detection in hydrological records — a review of the methodology*

Sheng Yue & Paul Pilon: *A comparison of the power of the t test, Mann-Kendall and bootstrap tests for trend detection*

Maciej Radziejewski & Zbigniew W. Kundzewicz: *Detectability of changes in hydrological records*

Donald H. Burn, Juraj M. Cunderlik & Alain Pietroniro: *Hydrological trends and variability in the Liard River basin*

Göran Lindström & Sten Bergström: *Runoff trends in Sweden: 1807–2002*

Jacques Callède, Jean Loup Guyot, Josyane Ronchail, Yann L'Hôte, Hélène Niel & Eurides de Oliveira: *Evolution du débit de l'Amazone à Obidos de 1903 à 1999*

Lihua Xiong & Shenglian Guo: *Trend test and change-point detection for the annual discharge series of the Yangtze River at the Yichang hydrological station*

**Other scientific papers**

Soussou Sambou: *Modèle statistique des hauteurs de pluies journalières en zone sahélienne: exemple du bassin amont du fleuve Sénégal*

R. K. Singh, V. Hari Prasad & C. M. Bhatt: *Remote sensing and GIS approach for assessment of the water balance of a watershed*

Naziano Filizola & Jean Loup Guyot: *The use of Doppler technology for suspended sediment discharge determination in the River Amazon*

S. V. N. Rao, V. Sreenivasulu, S. M. Bhallamudi, B. S. Thandaveswara & K. P. Sudheer: *Planning groundwater development in coastal aquifers*

Kenan Tüfekçi & A. Unal Akman: *Soil moisture assessment in the alluvial basins associated with seismic activity of northwest Anatolia, Turkey, using Landsat TM/ETM satellite imagery*

Özgür Kisi: *Daily suspended sediment modelling using a fuzzy differential evolution approach.*

—

Members may use CEH Wallingford's Library by appointment to consult *HSJ* and other journals *(tel 01491 692266).*

# Correction

We apologise for the error in the October 2003 Membership Directory, which inadvertently confused the details of two of our professorial members. The correct entry should read:

O'DONNELL, Professor Terence MA
5 Priory Road
Abbotskerswell
NEWTON ABBOT
Devon
TQ12 5PP
Tel 01626 356818
Email todpriory@talk21.com

# Meetings

## Hydrology: science and practice for the 21st century

*12th–16th July 2004*

**Imperial College, London**

Registration is still open for the second BHS International Conference. Full details of the scientific programme, the banquet in the Science Museum and all the other events are in the 3rd circular, available from Dr Adrian Butler *(see diary)* or at the conference website: *www.hydrology.org.uk/bhs2004.*

**INTERNATIONAL GEOGRAPHICAL UNION CONGRESS**
Glasgow, Scotland
*15–20 August 2004*

There are several sessions on hydrology, geomorphology and other topics of potential interest to members. Among the field trips, Alan Werritty, Colin Ballantyne and John Gordon are leading a Post Congress Excursion (20th to 23rd August) to look at the geomorphology of the Cairngorms, as part of the programme of the IGU Commission on Climatic Changes and Periglacial Environment.

**BHS National meeting**
**LOW FLOWS: MEASUREMENT THEORY AND PRACTICE**
**ICE, London**
**22 September 2004**

This meeting will discuss important aspects of low flow studies and identify operational and research priorities. Low flow regimes are important for a wide range of reasons, including abstraction, hydropower and the Water Framework Directive.

For details see the flier enclosed. Full details are available from Andy Young, Centre for Ecology and Hydrology *(ary@ceh.ac.uk).*

# Diary

*10th June 2004*
BHS South East Section meeting
"Hydroecology and the Habitats Directive", followed by site visit to the River Itchen, Hampshire
Venue: Environment Agency, Hants Area Office; Time: 12.00
Contact: Helen Procter *(tel 01903 703822, email helen.procter@environment-agency.gov.uk)*

*10th June 2004*
BHS South West Section meeting
"Monitoring at different landscape scales" — field visit to IGER North Wyke, near Okehampton, Devon
Time: 2 – 5 p.m.
Contact: Prof. Bruce Webb, Dept of Geography, University of Exeter *(tel 01392 263334, fax 01392 263342, email B.W.Webb@exeter.ac.uk)*

*12th–16th July 2004*
BHS International Conference
"Hydrology: science and practice for the 21st century"
Venue: Imperial College, London
Contact: Dr Adrian Butler, Dept of Civil & Environmental Engineering, Imperial College, London SW7 2BU *(tel 0207 594 6122, email a.butler@ic.ac.uk, website www.hydrology.org.uk/bhs2004)*

*15th–20th August 2004*
30th IGU Congress *(see Meetings)*
Venue: Scottish Exhibition and Conference Centre, Glasgow
Details: *www.meetingmakers.co.uk/IGC-UK2004*

*22nd September 2004*
BHS National Meeting and AGM
"Low flows: measurement, theory and practice" — *see flyer for details*
Venue: ICE, London
Contact: Dr Andy Young, CEH Wallingford *(tel 01491 692347, email ary@ceh.ac.uk)*

*29th September – 1st October 2004*
IFAC workshop on modelling and control for planning and managing water systems
Venue: Venice, Italy
Details: *http://www.elet.polimi.it/IFAC_TC_Environment/Venice2004*

*20th October 2004*
BHS South West Region Meeting
"Hydro-meteorological forecasting in the south west: science & applications"
Venue: The Met Office, Exeter
Time: 11 a.m. to 4 p.m.
Contact: Prof. Paul Bates, School of Geographical Sciences, University of Bristol, University Road, Bristol BS8 1SS *(tel 0117 928 9108, fax 0117 928 7878, email paul.bates@bristol.ac.uk)*

*10th November 2004*
BHS National Meeting
"Past trends and future directions in British hydrology – in celebration of the BHS 21st Anniversary"
Venue: Godfrey Mitchell Theatre, Institution of Civil Engineers, London
Time: 10:00-17:45, followed by a reception for members and guests
Contact: Prof. Bruce Webb *(see above)*

*15th December 2004*
BHS Midlands Section meeting
"Saving the Severn"
Venue: Aston Webb Building, Birmingham University
Contact: Dr Chris Bradley, University of Birmingham *(tel 0121 414 8097, fax 0121 414 5528, email c.bradley@bham.ac.uk)*

*3rd–9th April 2005*
7th IAHS Scientific Assembly
Venue: Foz do Iguaçu, Brazil
See the IAHS website: *http://iahs.info*

**Copy deadline for *Circulation* No. 82**
**9th July 2004**

—

**Please send all contributions to Celia Kirby *(see front page)***