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THE NEWSLETTER OF THE BRITISH HYDROLOGICAL SOCIETY

Circulation

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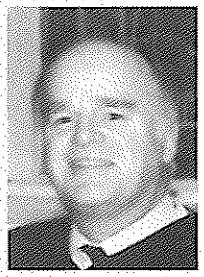
Diary of forthcoming events

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President's piece



Rod Hawnt's first article as President

Raising the profile ...

As I sat down to write this, my first piece, after less than one month in the hot seat, I was tempted to put forward a 'Mission Statement' on what I was hoping to achieve in my two-year term of office. But the more I thought about it, the more the words of that old adage kept coming back to me: if it works, don't fix it! There is no doubt that BHS *does* work and I believe this Society already offers excellent value for its members. So perhaps a longer period of reflection is required before I start meddling...

There are certainly a few areas I feel can be improved to give members even better value for money, and I also want to try to raise the profile of the hydrologist as a 'profession'. But before instigating change, I and the rest of the Main Committee will be studying the results of the membership questionnaire quite closely so that any changes reflect member's views. There is still time for you to express your views, so please do visit our new website at *www.hydrology.org.uk* and after choosing the option 'Hydrological issues' you can follow the link to complete the questionnaire on-line.

Our aim with the new website is to keep our members better informed on events, activities and issues: it will be updated more often than before. We also want to make better use of email for communicating with members, so please register your email address if you want to benefit from the e-news service.

Those indulging in regular browsing will already have noticed the latest 'News' items posted soon after last month's AGM held at 1 Great George Street. The news that Terry Marsh has won the President's Prize, awarded by my predecessor Bruce Webb, is now therefore old news. Yet such is Terry's contribution to British Hydrology through his work on hydrometric information management and standards that I have no hesitation in adding my own congratulations to Terry for this well deserved award.

Mention of my predecessor prompts me put on record, on behalf of the Committee and all members, our

thanks to Bruce Webb for his hard work, dedication and outstanding contribution to the society over the last two years, and also to IAHS as he retires as UK Chairman.

The new Main Committee met for the first time earlier this month and there are several personnel changes. The new Honorary Treasurer, Peter Ede, is already getting to grips with the society's financial affairs after serving on the committee as an elected member for two years. I am particularly pleased to be working with Peter, as he and I share a common interest in the hydrometry of the Juba and Shebelli Rivers in Somalia (not a lot of people know that). Peter followed in my footsteps working in Mogadishu on an ODA-funded project in the 1980s, and was among a group of expatriates to escape from Mogadishu on the last commercial flight out of the capital in 1989, before Somalia fell into anarchy.

We welcome back onto the Committee Professor Ian Cluckie, Head of Bristol University's Water and Environmental Management Research Centre. Ian joins us in his capacity as the new Chairman of the UK Committee for the International Association of Hydrological Sciences. Ian is one of the founder members of BHS and is well known in the UK for his work on applied hydrological research, for example on rainfall radar measurement and flood forecasting techniques. It will be a pleasure to hear his words of wisdom once again on the Committee.

New elected members welcomed onto the committee are Dr Sarah Dunn from the Macaulay Institute, Dr Neil McIntyre from Imperial College and Tim Norton from the Environment Agency's Southern Region and you will be hearing more of them in future.

One of the goals that we are all committed to is to provide much clearer guidance for any member wanting to attain Chartered Status. The new website already offers some useful guidance, but I do think that the Society should be providing much more detailed information, perhaps even case studies, on the most appropriate routes for members with different qualifications and experience. Following discussions with ICE there are several routes open to most hydrologists who are working in areas such as flood hydrology or water resource engineering, to enable them to qualify as Chartered Engineers, with an alternative option to qualify as a Chartered Environmentalist. Similar options are available within the Chartered Institution of Water and Environmental Management. There are also routes via The Royal Geographical Society and Royal Meteorological Society, and we will provide further detailed guidance on these options via the website in the near future. I firmly believe that if more hydrologists can achieve Chartered status, at the same time as satisfying their own career aspirations, then more and more employees will recognise the value of the professional hydrologist, and we really can start to raise the profile of hydrology in the UK.

Rod Hawnt (rhawnt@hydro-logic.co.uk)

BHS 23rd Annual General Meeting

The 23rd Annual General Meeting of the British Hydrological Society was held during the national LOCAR meeting at the Institution of Civil Engineers (ICE) in London on Friday 22nd September 2005.

Professor Bruce Webb, outgoing President, opened the meeting and highlighted the significant milestone of the 21st Anniversary of the Society's formation. There was particular sadness that this year has also seen the passing away in April of our first Honorary Secretary, and founding member, **Professor Mike Hall**. In his three-year term of office Mike did much to lay the foundations of the successful organisation that the Society has become. He will be sorely missed by many members of the BHS and in the wider hydrological community. In recognition of his major contribution to the Society, the Main Committee awarded Mike Honorary Membership in March, which we understood he was very pleased to receive.

Celebrations marking the first 21 years of the Society were held in November in the form of a National Meeting at which many of the country's leading hydrologists reflected on *Past Trends and Future Directions* in the discipline. There was an enjoyable opportunity at the evening reception for many of those involved in the development of the Society to get together and to enjoy some reminiscing and a piece of Birthday cake. Bruce described it as an encouraging sign that younger hydrologists had also used the 21st Anniversary as a reason for looking ahead, rather than back. In a meeting at Lancaster in March they put forward some very interesting ideas about future goals for hydrology and started a debate which was still ongoing up to the time of the AGM.

The Society's wish to support the continued participation of younger members has been promoted through the continuing postgraduate symposium (highlighting the recent very successful event in Reading), Professor Peter Wolf continued very generously to sponsor active young hydrologists in the Society, and the BHS awarded its annual Student Dissertation Prize of £400 to Rebekah Rochester of UCL for her report on 'Modelling hydrological impacts of climate change on the Lena River, Siberia'. The number of entries to this competition was higher than the previous year, but there was scope for further interest if the number of submissions made during the early years of this prize were to be reached.

Reflecting on achievements for the year, the launching of the new BHS website had been somewhat protracted in its gestation, but it was hoped that members would agree the new site is most attractive and provides the ability to update information more readily. The President thanked John Griffin for seeing this project through to a successful conclusion and also Jenny Thorne who helped to manage the transition to the new website and has now retired as BHS webmaster.

At the previous year's AGM, the President mentioned that BHS had become a founder member of EEON (the earth, environment and ocean network), a loose association of UK societies concerned with the earth and environmental sciences. The association was to be based on an overarching website, which was launched during the year. In addition to providing information on the member societies, their events and relevant international organisations, the website would also provide fora for the development of joint meetings, communication with the media and with government.

One ongoing issue that had been partly clarified over the past 12 months was the question of routes to chartered status, especially for hydrologists with a non-engineering background. At one time, BHS had hoped that it might be possible to customise special arrangements with the Institution of Civil Engineers. However as the ICE was considering different forms of membership more generally, a special

avenue for the BHS was no longer believed to be an option. The Society would seek to provide clear information on the website about different routes to charted status, not only with ICE but also with other organisations.

The Main Committee had also been using the occasion of the Anniversary year to solicit views from members about future directions for the Society. Members were encouraged to complete and return the questionnaire.

During the year, by providing travel grants to half-a-dozen members, the Society had strongly supported the 7th Scientific Assembly of the International Association of Hydrological Sciences (IAHS), a major international event held in Brazil in early April. The UK Committee for the IAHS is an Associate Committee of the Society, and in July Professor Ian Cluckie (Bristol University) had taken over the chair from Bruce Webb. After long and distinguished service, Alan Gustard had stepped down as National Correspondent for Surface Water, being replaced by Gwyn Rees of CEH.

Bruce concluded by expressing his appreciation to the Main Committee for their generous support and help over the previous two years, and also to ICE and CEH for their continuing and much welcome sponsorship of BHS. He thanked Sue White and Steve Parsons, retiring members of the Main Committee. Sue had been a very effective advocate for younger hydrologists on the Committee and strongly supported BHS activities for postgraduates, while Steve had reached the end of a second term as Honorary Treasurer after a total of seven years on the Committee. Steve was praised as an exemplar of those members who are willing to give unstinting service and support to BHS over a prolonged period, and his calm and sound advice (often offered from the remoter corners of Eurasia where his travels with Mott MacDonald routinely took him) would be missed greatly.

Honorary Secretary's report

Joe Pearce reported on the wide range of regional and national meetings that had taken place during the year. The national meetings programme had been influenced by the 21st anniversary events. All national meetings held during the year were well attended, most notably the one in January at the ICE on flood estimation, which attracted 155 people. Unfortunately, two meetings had to be postponed in the national programme: one of them was subsequently held later in the year. Lessons learned from these would be taken forward for consideration in future programming.

Successful meetings were held in each of the Society's regions, with all having meetings that were well attended. Among the largest was the South-West region meeting on land-use change, distributed modelling and the water framework directive, attended by around 100 people in Exeter in May. The 2005 postgraduate symposium had been organised by students at the University of Reading and was very successful. Joe thanked the large number of people involved in the successful and interesting meetings which had taken place during the year.

The year had seen the implementation of a new policy of charges for meetings, with a set differential between fees for members, non-members and students. It incorporated the option to take up membership as part of the higher rate and this resulted in around 40 new members during the year. The coming year's programme was looked forward to and views were welcomed from members on the range of topics provided and whether there were other subjects they would be keen to see, or even organise.

Joe drew attention to the Society's 9th National Hydrology Symposium to be hosted by Durham University between 10th and 13th September 2006. He looked forward to the event, which has the theme of new legislation's impact on land management and protection of the water environment, and hoped that many members would support it by attending and offering papers and posters.

Finally Joe paid tribute to the outgoing President and thanked Bruce on behalf of the Society for all his hard work before and during his term as President.

Honorary Treasurer's Report

Peter Ede presented Steve Parsons' report to the meeting and began by passing on Steve's apologies for not being able to attend because of his current posting in China. Steve reported being able to hand over a healthy financial position at the end of his term, raising the question of whether funds had even increased too much.

The international conference held at Imperial College in July 2004 was dominant in the year's accounts. Payments on behalf of the Society of £21,456 were expected to be more than balanced by an anticipated income of £31,591 from this event. Some of the issues arising were summarised.

Membership

At the end of June 2005 there were 942 "active" members in the database, although 67 were about to be removed for non-payment. This is a significant increase year-on-year, suggesting a real increase of about 60 members – representing a continuing growth in membership of about 5% year-on-year over the past few years.

Summary of accounts for 2004-05

The Statement of Financial Activities for the year ended 30 June 2005 was presented, showing the accounts of the society to be audited and submitted in the Trustees Report of the Society to the Charity Commissioners. This showed a generally healthy picture, with a significant operating gain on the year, and a significant improvement on the budget, which was planning for a modest net loss. Points in the accounts included:

A small increase in subscription income (reflecting increased membership numbers)

- Significant gain over a series of National meetings, where income (£16,914) exceeded expenditure (£12,043)
- Increasing "newsletter" income from advertisements in "Circulation" and the website
- Lower than anticipated expenditure on the website, mostly because delays in the launch of the new site meant payments due to the developer were postponed
- Little expenditure on publications and membership directories
- Significant increases in the value of investments held by the Exeter Fund, offset by significant expenditure on travel awards from the fund – with many members being provided help to travel to the Congress in Brazil.

In conclusion, there had been a net increase in total funds of around 10%.

Most of the Assets of the General Fund are held in high interest accounts in the Northern Rock Bank, whilst the Exeter Fund assets are invested in the Charities Official Investment Fund. In addition to the travel awards made from the Exeter Fund, some nine awards, with a total value of £3163, were provided to members from general funds.

Steve's report concluded by thanking colleagues on the committee for their support and understanding during his term as Honorary Treasurer and he acknowledged the very considerable support provided by the team at the Institution of Civil Engineers: Tim Fuller as co-ordinator and Marianne Foster and Dave Jarvis in the accounts section, who handle the real business of running the Society. He was confident in handing over his responsibilities to Peter Ede.

Changes on the Main Committee

Rod Hawnt took over as President of the Society from Bruce Webb. Three new members were elected to the Committee: Sarah Dunn, Neil McIntyre and Tim Norton. Peter Ede replaced Steve Parsons as Honorary Treasurer and Sue White came to the end of her three-year elected term. Ian Cluckie joined the Committee as representative of the IAHS UK Committee.

Editor's report

John Griffin summarised highlights of the four issues of *Circulation* since the last AGM — 1000 copies each time.

Circulation was usually reaching members around the end of the month of publication, a week or two later than planned. This sometimes meant extending the effective deadline for contributions. Now that we have a more user-friendly website, advertising there is likely to grow, as *Circulation*'s quarterly schedule will only fit an advertiser's needs coincidentally. Advertising, email communication and distribution of fliers should probably be reviewed by the committee.

Extended articles (under the heading *Circulation* Plus) had not been seen this year, but could be revived. The nature of *Circulation* is that it usually includes the mixture supplied.

John encouraged all members to submit news, views and articles to share with fellow members through *Circulation*. Sometimes meeting reports seem to dominate: ideally there should be a balance between these and other articles. Short items for the **News from Members** section were always most welcome, as were good diagrams and photographs suitable for monochrome reproduction. He invited suggestions for improvement to the content or format. *Circulation* is, as always, your newsletter!

John apologised for the long delay in getting the new BHS website project to completion, and thanked those who had helped along the way, including Jenny Thorne (who ran the site previously), Steven Wade and other members of the Internet committee (who helped in setting up the structure and content of the site), Andrew Black (who helped while John was away last year) and to Samui Design and Management, who designed and built the new website. There were still a few details to sort out, but the Society now had an opportunity to expand web-based services to members and to involve more of the committee and regional sections in keeping the website up-to-date.

Travel grants & Exeter Fund

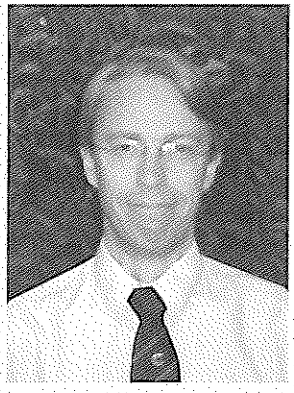
Travel grants are available to help BHS members whose travel expenses are not met by an employer to attend scientific meetings. The amount will depend on the nature and location of the meeting and the case put forward.

Grants are mainly intended to help younger members, but are open to all. Successful applicants will be expected to write a short report for *Circulation*.

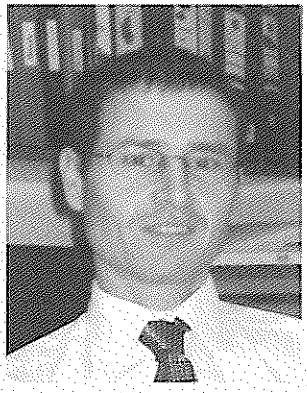
The Exeter Fund offers grants to British hydrologists to take part in IAHS / IUGG events, such as the recent IAHS Scientific Assembly in Brazil.

Please apply to **Peter Ede**, Mott MacDonald Group, Demeter House, Station Road, Cambridge, CB1 2RS *(tel 01223 463690, email peter.ede @mottmac.com).*

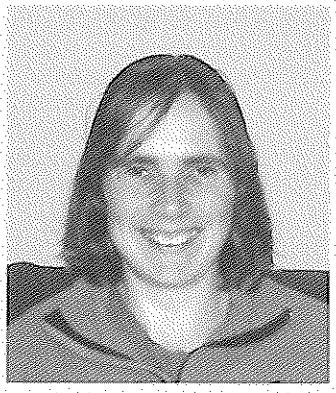
Introducing new committee members



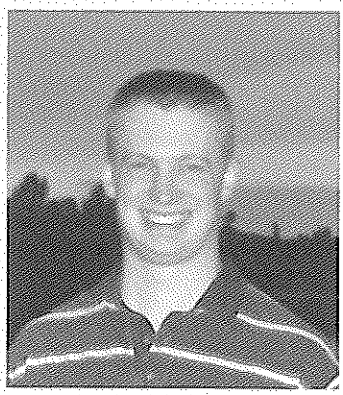
Peter Ede



Neil McIntyre



Sarah Dunn



Tim Norton

Peter Ede (Hon. Treasurer)

Peter is a Senior Hydrologist with Mott MacDonald. He has been based in Cambridge with Mott MacDonald or its predecessor, Sir M MacDonald and Partners, since 1985, working in the UK and in nearly 20 overseas countries. After serving two years as an elected committee member he has now been elected as Honorary Treasurer, taking over from his colleague Steve Parsons.

Neil McIntyre

Neil graduated in Civil Engineering from Edinburgh University in 1990. He then spent six years working for Lothian Regional Council and East of Scotland Water, designing and implementing sewage disposal schemes on the Lothian coast.

After achieving Chartered Engineer status and taking a year's career break, he took the MSc in Environmental Engineering at Imperial College London and in 1999 he began a two-year period as Research Assistant, working under Professor Howard Wheater on an EU-funded research project, modelling river water quality in China, which led to his PhD.

In 2001 he became a Lecturer in Hydrology at Imperial, since when his research has focused on uncertainty analysis of hydrological models, regionalisation of rainfall-runoff models, distributed hydrological modelling and catchment-scale water quality modelling. He is currently a co-investigator on LOCAR and Flood Risk Management Research Consortium projects.

Neil's undergraduate and MSc teaching includes rainfall-runoff modelling, surface water quality modelling, open channel hydraulics, hydroinformatics and hydrometry.

He was a convener at the BHS 2004 International Conference and Secretary to the Organising Committee. He has presented aspects of his research at that conference and several other local and national BHS meetings.

Sarah Dunn

Sarah Dunn is a senior research scientist at the Macaulay Institute in Aberdeen, where she has worked for the last ten years. Before this she was a research associate at Newcastle University where she completed an MSc and PhD in hydrology.

Her specialisation is in hydrological and water quality modelling, and particularly in the development of spatially distributed modelling techniques. Sarah has worked on a broad range of projects related to the prediction of impacts of land use on stream flows and hydrochemistry, as

well as a number of inter-disciplinary projects involving other scientific specialists and socio-economists.

She is currently leading research at the Macaulay Institute to further utilise data and understanding from tracer studies to improve catchment modelling capabilities. She has also recently carried out modelling studies to support new policy development for implementation of the Water Framework Directive.

Tim Norton

After studying at King's College, London, Tim has worked as a hydrologist with the Environment Agency for four years. His work has included high and low flow hydrology, climate change, hydrological modelling and data analysis. He is interested in applied hydrology, and the ways in which research and practice can be more integrated. Tim hopes that BHS will continue to promote hydrology, and encourage the development and professional status of hydrologists.

New members

A warm welcome to the following new members of the Society:

Claire R Anderson	Environment Agency, Nottingham
Christopher D Baker	EnviroCentre Ltd, Glasgow
Dr Victoria Boase	JBA Consulting, Newcastle upon Tyne
Elizabeth Buchanan	Entec UK Ltd, London
Benjamin D Moon	Entec UK Ltd, Bristol
Deborah A Hatton	Capita Symonds, Bristol
Bethanna M Jackson	Imperial College, London
Dr Simon A Mathias	Imperial College, London
Daniel L Stansfield	University of Newcastle upon Tyne
Catherine E Treagus	Environment Agency, Warrington
John Waddington	Environment Agency, Exeter
Dr Duncan Wishart	Jacobs Babtie, Manchester
Ahamed Zayaan	Centre for Ecology and Hydrology / Reading University
Manna Wan	Centre for Ecology and Hydrology, Wallingford

40 years of the Scottish Hydrological Group

This year the Scottish Hydrological Group celebrates its 40th year of activities. It was formed in 1965 to encourage and advance the study of Hydrology in Scotland by holding meetings for the discussion of papers on hydrological subjects or any other appropriate activities. Every year the group holds 4 – 6 evening meetings that are always free and open to all.

This year's programme has already included a full-day seminar on *Hydro-morphological aspects of the WFD in the UK* (joint with BHS) and evening meetings on *Revitalisation of the FSR/FEH rainfall runoff method* and *Postgraduate studies in hydrology and hydraulics*. The remaining programme includes a presentation on *Impacts of climate change on Caspian Sea levels* and the *Edinburgh flood alleviation scheme*.

The programme culminates in a presentation by former SHG Chairman **Professor Paul Jowitt** on *Hydrology and Water Resource Development – 40 Years of the SHG*. This will reflect on the first presentation given to the group on a similar theme by N. Rowntree Esq. (Director of the Water Resources Board) in October 1965. See also *www.dundee.ac.uk/geography/shg*.

Michael Cranston
SHG Honorary Secretary

Integrated catchment research — LOCAR

National meeting on lowland catchment research (LOCAR)
Institution of Civil Engineers, London
Wednesday 21 September 2005

Ian Douglas (LOCAR Science Co-ordinator) and **John Hilton** (CEH Dorset, Manager of the LOCAR Catchment Service Teams) introduced this lowland permeable catchment research programme (LOCAR), which is a £7.75 million 5-year thematic project, funded by the Natural Environment Research Council (NERC).

They outlined the aims of LOCAR, the significance of the catchment instrumentation and data, and the character of the three study areas: the Tern, Shropshire; the Frome and Piddle, Dorset and the Pang and Lambourn, Berkshire. Emphasising the importance of linking groundwater investigations to stream hydrology, chemistry and aquatic ecology, they stressed the value of data at catchment management scale as well as the traditional small catchment research scale. LOCAR provided a globally unique, comprehensive view of the whole hydrologic cycle and related aquatic ecology.

Adrian Butler (Imperial College) elegantly explained a multi-dimensional approach, using a range of tests, to improve understanding of groundwater flow in the Chalk. Boreholes are essential for investigation but they disturb flow patterns. Presence of an enlarged (conductive) feature does not necessarily imply flow. The heterogeneity of the chalk plays a key role, while structural features in the chalk appear to cause anisotropy in flow patterns. Conventional concepts, such as the "cocktail glass" conceptualisation of decreasing flow with depth, may need re-examination.

Andrew Ireson (Imperial College) presented results from the detailed instrumentation of one of LOCAR's recharge monitoring sites, at West Ilsley, Berkshire. In the soil layer, with plant roots, soil moisture content varies greatly and mean water content decreases with depth, whereas in the consolidated chalk of the unsaturated zone, the water content varies little and has a fairly constant mean value. Large soil-water variations in response to rainfall are thus attenuated by the soil layer. He showed that the soil layer is an important buffer, which acts to regulate fluxes into the Chalk. The balance of his evidence seemed to support the displacement mechanism of groundwater recharge — i.e. matrix flow is dominant — but he could not completely dismiss the possibility that fracture flow is an important process.

The drift deposits of the sandstone Tern catchment create a more complex recharge situation. **Mark Cuthbert** (University of Birmingham) showed

that drift structure at the scale of 10s to 100s of metres is likely to exert a significant control on recharge; that preferential flow is very important at the field scale; that a few centimetres of clay can have a significant effect on recharge, and that localised, small-scale run-on and runoff processes and delayed infiltration of lateral subsurface flow are potentially important.

Painting a broad picture of the interplay of groundwater processes in the Pang and Lambourn catchments, **Denis Peach** (British Geological Survey, Wallingford) showed that the location of springs in the Lambourn and Pang is controlled by lithological features, intersection of fracture lineaments with the valleys and the karstic development of the Chalk associated with the Quaternary evolution of the aquifer. Noting that groundwater flow in the Berkshire downs is dominated by the Rivers Kennet and Thames, he argued that the River Thames should be thought of as a highly transmissive linear feature, approximately one kilometre wide and >20 metres deep.

He stressed that hydrological science has some way to go before our understanding of these Chalk systems will be sufficient to manage water quality, wetlands and individual abstractions adequately. Management of riverine and riparian ecology generally will require a more detailed understanding of flow regimes than we currently have, and present regional numerical models simulate very few of the mechanisms discussed here. We need to develop appropriate models to represent this complexity in order to help understand, predict behaviour of and design monitoring for catchments under changing land use and climate.

Angela Gurnell (King's College London) and **Geraldene Wharton** (Queen Mary University of London) explained how vegetation and sediment interact at the reach to sub-reach scales (100m+ to 10m+) and the sub-reach to patch scales (10m+ to plant). *Ranunculus* grows in areas of high velocity and causes a dramatic decrease in velocity but modest fine sediment accumulation. Other macrophytes grow in areas of low velocity and cause significant accumulation of fine sediment. Deposited fine sediment contains large quantities of terrestrial, wetland and aquatic plant propagules which are available for colonisation and also for remobilisation by the river. In detail, the extensive macrophyte cover reached >80% at one site, with sediment trapping rising to 0.085 m^3 of fine sediment trapped per m^2 of vegetation. The trapped sediments have a high organic matter content and abundant faecal pellets which influence the breakdown of nitrogen compounds and the release of N to the atmosphere.

Des Walling (Exeter University) presented work by himself, Adrian Collins and Paula Jones (Exeter) with Gareth Old and Graham Leeks (Centre for Ecology and Hydrology, Wallingford). This was an excellent illustration of how the detailed LOCAR instrumentation and multiple measurements enabled detailed catchment fine sediment budgets. The annual suspended sediment yield of the Pang (almost 500 t) represents a sediment yield of only 1% of the over 57000 t gross erosion, most of which comes from cultivated fields. The combination of techniques makes a major contribution to the analysis and modelling of diffuse (non-point source) pollution.

Richard Harding and John Roberts (CEH, Wallingford) also demonstrated the value of multiple observations at different scales in establishing the dimensions of hydrological fluxes. Emphasising how estimates of catchment average evaporation require local, catchment scale and satellite observations, together with evaporation and uncertainty modelling, they showed that there is considerable variability of evaporation across the landscape linked to land cover, soils and meteorology. Forest edges and hedgerows show enhanced evaporation. There is considerable potential for estimating catchment average evaporation using available gridded data sets. The LOCAR data set is proving extremely powerful, providing for the first time (in the UK at least) simultaneous measurements of soil moisture, evaporation and hydrological measurements.

Ian Douglas (on behalf of Mike Bonell, the Chairman of the LOCAR Steering Committee, who was unable to attend) described the position of LOCAR in relation to major international catchment research programmes, such as CUASHI in the USA and the UNESCO HELP programme. A lively discussion followed, expressing concerns about the future of the LOCAR catchment infrastructure, the future safeguarding of, and long-term access to, LOCAR data, and the communication of LOCAR outcomes to stakeholders, especially national policy makers.

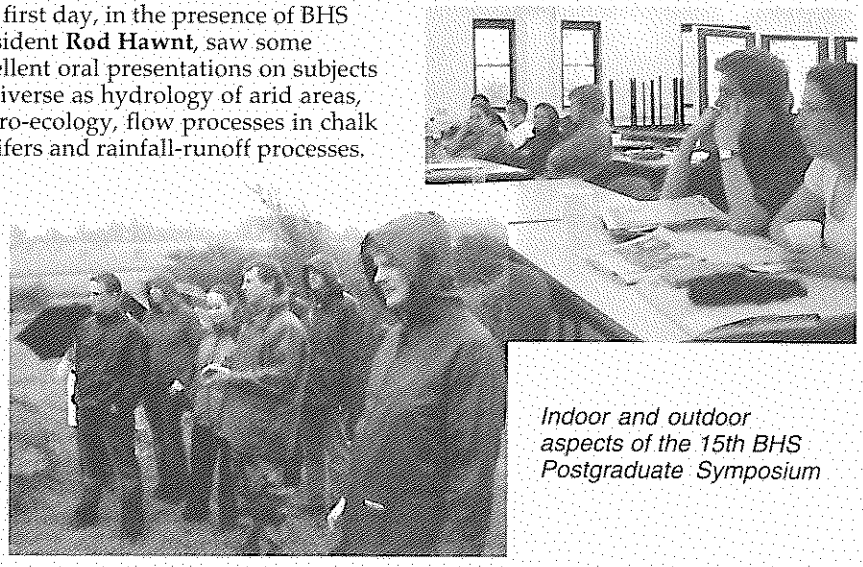
Ian Douglas
University of Manchester

BHS Postgraduate Symposium

University of Reading
14–15 September 2005

The 15th BHS Postgraduate Symposium was hosted by the Department of Geography at the University of Reading. This annual symposium brings together postgraduates working in hydrology and young hydrologists, to promote exchange of hydrological ideas and experience and to help establish networks among hydrology researchers.

The first day, in the presence of BHS President **Rod Hawnt**, saw some excellent oral presentations on subjects as diverse as hydrology of arid areas, hydro-ecology, flow processes in chalk aquifers and rainfall-runoff processes.



Indoor and outdoor aspects of the 15th BHS Postgraduate Symposium

Paul Whitehead. Following questioning from the delegates and some tough deliberations by the judges, the BHS Young Person's Prize for the best presentation was awarded to **Andrew Ireson** of Imperial College for his presentation on *'Modelling flow processes in the Chalk unsaturated zone'.*

After proceedings closed for the day the delegates joined each other for an evening meal and social activities, providing the opportunity for discussion and networking.

On the second day there was a field visit. After the glorious sunshine of the previous day, when everyone was stuck inside, it decided to chuck it down with rain! Despite this, everyone enjoyed an extremely interesting and informative tour of the River Kennet between Stitchcombe Mill and Mildenhall, led by John Hounslow, the local river keeper. John was able to give a great insight into the problems and issues that he has faced in managing the river for over 25 years, both as a fishery and to maintain the quality of flora and fauna. Delegates were also able to observe some of the restoration and rehabilitation work that has been undertaken on the river, funded by Thames Water PLC, in an attempt to improve instream habitat structure and functioning.

The Symposium was then rounded off over a delicious lunch at the Red Lion pub in Axford.

Paul Franklin & Basak Guven
University of Reading

SUDS in Scotland

Joint evening meeting of the Scottish Hydrological Group and the ICE Scottish Hydraulics Study Group
Royal Society of Edinburgh
13 April 2005

Professor Chris Jefferies from the Urban Water Technology Centre (University of Abertay, Dundee) gave a presentation on the 'Rolling out of sustainable drainage solutions throughout Scotland'.

There has been a policy of implementing sustainable urban drainage schemes (SUDS) on all new developments in Scotland for five years now. SUDS started to appear in an uncoordinated fashion in a number of areas, particularly in the Forth valley about five years before that. The talk focused on the way that SUDS have changed in that ten-year period, the designs which have been implemented and their advantages and disadvantages.

Professor Jefferies began by outlining the drivers for implementation of SUDS in Scotland. The construction of the M74 motorway had caused massive pollution in tributaries of the River Annan. In 1990 a Forth River Purification Board (FRPB, now part of the Scottish Environmental Protection Agency, SEPA) report highlighted the number of small streams that had been downgraded as a result of diffuse pollution from urban and industrial areas. Eventually the agenda for water quality issues became prevalent and a shift in the drainage approach was called for. Structural Best Management Practices (BMPs) were seen as the only option.

Informal implementation of BMPs by the FRPB occurred from about 1990 onwards. A stakeholder group (SUDSWP) was set up to guide progress. SEPA began implementing its SUDS policy in 2000 and in 2003 SUDS were incorporated into Scottish Legislation through the Water Environment and Water Services (Scotland) Act 2003. A publicity drive was mounted through written guidance and information packages. Initially, BMP solutions were driven in targeted areas. An international expert Larry Roesner was brought in to advise and convince sceptics that solutions were possible and economically viable, and by 2000 the name SUDS was coined.

Professor Jefferies described some early experiences with SUDS. The initial sites had problems such as poor site management, lack of sediment control and sometimes the wrong technical solutions. There were also some good examples, the most obvious of which was the Dunfermline Eastern Expansion Area Project (DEX). This project was a major development over 354 ha on the periphery of one of Scotland's ancient burghs. A regional SUDS strategy was adopted comprising seven retention ponds and a range of detention basins, swales, filter drains and porous surfaces. The sub-networks were designed as conventional systems which collectively drained to the SUDS ponds.

Based on the operational experiences from the Dunfermline Project and others, ponds were found to be more efficient than expected, leading to Scottish Water's decision to accept smaller ponds for housing schemes. Detention basins were also found to give better pollutant removal than expected because most pollutants are conveyed in small events. Permeable paving gave excellent pollutant removal and good flow attenuation and were highly recommended for residential locations under driveways. However, filter drains and infiltration trenches had a poor record. Many of them failed and many were not built as designed and were therefore not recommended.

From a hydrological perspective, SUDS resulted in reduction of percentage runoff, attenuation of peak flows and reduction of flow volumes. An improvement in water quality was also noted from many SUDS components, with reduction in peak pollutant concentrations at the outlet. Socially SUDS were seen in a positive light and there were fewer barriers to acceptance than initially feared.

Towards the end of the talk, Professor Jefferies presented current



Aerial view of DEX showing eight SUDS components



Figure 2 Conveyance swale in Dundee

concerns and issues that exist with SUDS, dividing them into adoption, maintenance and associated costs. He indicated that most public SUDS will be adopted by Scottish Water after a development has been completed and all, or nearly all, of the properties have been connected. Sedimentation was a major issue for maintenance. Sediment problems mainly arise from construction phase runoff, and most filter drains and infiltration trenches were affected by construction sediment. However, after the initial phase of construction there is less concern about sedimentation. In both England and Scotland maintenance roles have not been clearly defined, which raises the issue of asset maintenance and costs which are of principal concern.

Looking to the future of SUDS in Scotland, many will be owned and operated by Scottish Water but are being held up by finalisation of technical details, maintenance costs information and adoption decisions which need to be made. SUDS will also be the responsibility of private landowners and councils and will become even more integrated into watercourse improvement projects, and retrofitting for older towns will become increasingly important.

The talk was well received as shown by the range of questions that followed. Michael Cranston summed up and thanked Professor Jefferies for an excellent presentation.

Alvin Pedzai and Pascal Lardet
Halcrow Group Ltd, Edinburgh

Watershed and river basin management

Calgary, Canada
13-15 September 2005

The International Water Association has a number of specialist groups and this conference, held in the Telus Convention Centre in downtown Calgary, was the tenth organised by the specialist group on Watershed and River Basin Management.

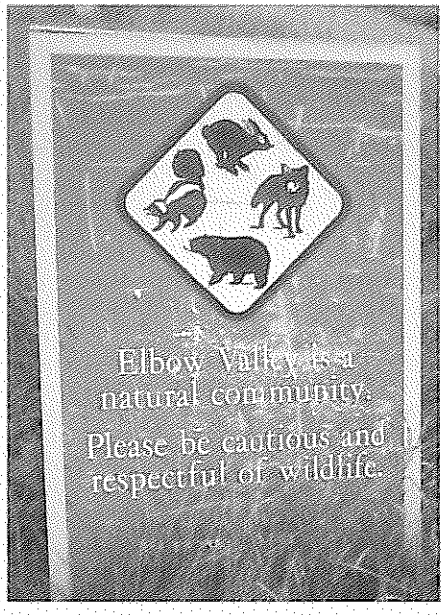
As became apparent during the conference, Calgary is an ideal location in which to discuss river basin management. The city is the fastest growing in Canada (its population will soon reach 1 million) in an arid area with multiple demands on water resources for drinking water supply, wastewater and storm runoff disposal, agricultural irrigation, sport fishing and other recreational activities. In addition, following a monthly record rainfall total of 275 mm in June 2005, the city experienced severe flooding (estimated to be a 1 in 200 year event).

Before the formal presentation sessions, about a quarter of the delegates (total about 100) spent a day visiting stormwater and wastewater management facilities in Calgary. This included "green infrastructure" for stormwater management (SUDS or sustainable urban drainage systems as we know them in the UK) in a new residential development, an experimental wetland facility for stormwater treatment, and the beautifully named Bonnybrook wastewater treatment plant. For me it was particularly interesting to observe the apparently receptive attitude to SUDS ponds in Calgary compared to the UK where safety concerns are often raised as an objection to the use of such techniques. This could be because of the presence of other environmental hazards in Calgary, such as bears (see image of wildlife warning sign in the development that we visited).

The indoor conference kicked off with breakfast in the conference venue, followed by the keynote address from Dr Dave Sauchyn (University of Regina, Canada) who introduced the Canadian Climate Impacts and Adaptation Research Network and placed Calgary's variable rainfall (200-800 mm p.a. from the 100-year instrumental records) in a long-term context based on tree-ring data for the last millennium. His conclusion was that adaptation to climate change will not be a problem in the prairies, as farmers are used to adapting to climate change. However water conservation efforts are intrinsically worthwhile whether climate change predictions turn out to be correct or not.

Over the following three days a mixture of technical and management-oriented papers were presented by researchers, regulators, consultants and water utility providers. The conference themes were: Water Resources Management, Monitoring and Modelling, Water Supply Protection, Impact of Climate Change on Water Resources, Pollution Sources and Control, and Sustainable Urban Drainage (in which I presented a paper on sediment management issues in SUDS). Presentations were held in parallel themed sessions in adjoining rooms so it was easy to move between sessions. There was plenty of opportunity for discussion within the sessions, and also over breakfast, lunch and the conference banquet. This was at Calgary Zoo, and Brian Keating, a local celebrity in conservation outreach, entertained us after dinner with a talk entitled "Antarctica: the last watershed". It was a shame, however, that there was not a dedicated poster session in the programme apart from over breakfast at 7:30 to 8:30 in the morning.

My conference highlights included papers on the EU Water Framework Directive which discussed new approaches for achieving good



Sign to raise awareness of wildlife, new residential development, Calgary

ecological status, ranging from paying farmers for using sustainable farming methods which result in improved quality of runoff from agricultural land and reduced water treatment costs (Jan Tyson, United Utilities), and a very rigorous assessment of the cost-effectiveness of restoring fish passes in the Ruhr basin (Michael Weyand, Ruhrverband Essen). It was also extremely interesting to see how water management is being addressed locally in the province of Alberta: water allocations have been traditionally associated with land ownership but increasingly licences are being transferred away from land. When this occurs 10% of the licence is capped to maintain instream flows as at times the water allocated for use exceeds the water availability in Alberta (Doug Ohrn, Alberta Environment). The City of Calgary aims to halve water usage per capita in the future by measures such as domestic metering (already 75% of properties in Calgary are metered), reuse of stormwater runoff for park irrigation, rebates on the purchase of water efficient appliances, a strong public education campaign, and charging for stormwater runoff from individual properties depending on the provision of stormwater management controls, such as water butts or infiltration devices. In contrast to England and Wales, water supply and wastewater treatment are generally municipal utilities in Canada. The City of Calgary appears to take a very proactive role and pride in water management through partnerships between the City, researchers, consultants, regulators and the community.

For me the conference was an invaluable start to a three months sabbatical at the University of Calgary. It provided me with a good resumé of local water resources issues and enabled me to meet many of the key players. Congratulations are due to the local organising and programme committees for a well-run, varied and useful conference. Thank you also to the British Hydrological Society for the award of a travel grant which allowed me to attend.

Kate Heal, School of GeoSciences, University of Edinburgh

Hydromorphology and the Water Framework Directive

Joint BHS and Scottish Hydrological Group conference Burrell Collection, Glasgow 15 September 2005

This one-day conference was entitled "Hydromorphological aspects of the WFD in the UK: new concepts, new problems, new practices". It was held in one of Glasgow's main attractions, the award-winning Burrell Collection, set in the rural Pollok Country Park, and attracted 60 participants, with a fairly equal representation from regulatory bodies, research institutions and consultancies. The presentations were in three blocks: hydrological and morphological risk assessments, classification and monitoring, and managing pressures.

Andrew Black (University of Dundee) began by placing the meeting in the context of our focus on the hydrological cycle and the management of associated resources. It had been arranged because there had been a lack of discussion meetings on this important aspect of the WFD. Andrew chaired the first session, which focused on hydrological and morphological risk assessments.

Stuart Greig (SEPA Ecological Advisory Group) gave an overview of the Water Framework Directive and the new responsibilities that come with this legislation, before going on to look specifically at hydromorphology. Hydromorphology is a term coined by the WFD and is not a discipline in its own right, but represents a combination of geomorphology, hydrology and ecology. Under the WFD existing drivers for aquatic management (fisheries and flood defence) will be accompanied by a requirement to attain and maintain 'good ecological status'. The ecological status of water bodies (rivers, lakes, transitional water bodies and coasts) is determined by a combination of physicochemical and biological standards and consideration of hydromorphological condition. Hydromorphology quality elements consist of hydrological regime, river continuity (the ability of organisms and sediment to move through the river network) and morphological conditions.

Paul Copestake and **Paul Rodgers** (SEPA Hydrology and Water Resources Support Unit) discussed *'Water resources risk assessments and next steps'*. Risk assessments developed for abstraction and flow regulation are based on the assumption that hydrological characteristics can be used to define good ecological status, and thereby identify water bodies at risk of failing to meet WFD targets. The UK Technical Advisory Group (UK TAG) uses a flow duration curve to summarise the hydrology of a watercourse. This determines the minimum flow required to maintain good ecological status and therefore allow the maximum abstraction to be defined as a percentage of the discharge (typically Q5, Q50 and Q95). This system is simple to apply, but its disadvantages centre on the loss of detail in the flow data such as duration and seasonality. Low Flows 2000 is the presently accepted method for producing flow estimates in ungauged catchments and can be used to model the impacts of impoundments, abstractions and discharges. Future water resource assessments will focus on improving flow monitoring on watercourses, and better use of data handling and models, specifically Low Flows 2000.

David Corbelli (SEPA Ecological Advisory Group) focused on *'Morphological risk assessments and next steps'*. He explained the importance of cross-function linkages within SEPA, and outlined the watercourse characterisation process. A key element of this is the identification of reference conditions against which other watercourses are compared. The provisional morphological risk assessment undertaken by SEPA focused on a range of pressures including flood defence works, agricultural influences (such as channel straightening), urbanisation, engineering, loch modifications and interruptions to watercourse continuity (such as culverts). The severities of pressures were identified by experts familiar with the rivers under consideration and were evaluated by establishing the extent (percentage of watercourse length) of their impacts. Moving forward, the next stage is to validate these risk assessments using river habitat survey and geomorphological survey together with some engineering assessments.

During the discussion **David Martin** (independent consultant) asked whether discharge consents would be reviewed every six years and how Scottish Water would be expected to manage the water supply if the 'goal posts' keep moving. Stuart Greig responded that the consents will be valid as long as appropriate, and adjustment will be required in response to significant findings within the RBMP review process. **John Waddingham**

(EA) queried whether the April 2006 deadline was too tight.

Session 2 was on 'Classification and Monitoring' and was chaired by **Hilary Smithers** (SEPA). The first talk was about *'Morphological assessment of rivers: tools and standards'* by **Jonty Gibson** (Environment Agency). With the aid of a photograph of a degraded river reach influenced by man-made structures, he highlighted morphological pressures and emphasised that processes as well as form require protection. The talk described the ongoing development of a morphological and ecological impact assessment tool based on the identification of bio-geomorphic attributes and sensitivities. The tool is intended to give decision support for application of the new environmental standards and classification methods. He explained that a board of external experts is involved as well as internal review.

John Rowan (Dundee University) gave a talk on *'Morphological assessment of lakes and the development of Lake Habitat Survey (LHS)'*. Based on a review of international literature it was noted that there are no standards and systematic procedures for characterisation and assessment of the physical characteristics of lakes. LHS was therefore developed, which is based on systematic collection of field data. LHS samples lake transects (HabPlots) along with some whole-lake metrics. Key outputs from the survey include summary metrics, the Lake Habitat Modification Score, and a measure of diversity and naturalness of the physical structure through the Lake Habitat Quality Assessment. LHS could contribute to a European Standard (CEN) for assessing the hydromorphology of standing waters.

Mike Dunbar (CEH Wallingford) and Andrew Black gave a joint talk on *'Developing water resources environmental standards'*. The project aim was to review existing standards and typologies for both rivers and lakes and to propose standards for the UK. As part of the work, national datasets were analysed and expert opinion obtained. The rivers typology was based on previous work on macrophyte communities. The definition of lakes-typology was based on UK-TAG reporting based on chemical status and depth, and extended to include altitude, lake area, basin form and season. Water level was found to be the key hydromorphological control on lake ecology. Therefore the project recommended investing in lake level monitoring.

The last talk of this session was by **Richard Gosling** and **Fiona Logan** (SEPA Hydrology and Water Resources Support Unit) on *'Hydrological monitoring in Scotland: current networks and future plans'*. The presentation reported on a SEPA in-house review of river and loch monitoring networks to identify gaps in the distribution of suitable analogue monitoring locations for assessment of long-term natural and anthropogenic change in Scottish surface waters. The audience learned that there are presently 390 river level/flow monitoring locations, with a lack in coverage of the North-West Highlands and Islands. There are about 13,000 lochs in Scotland of which currently six lochs are monitored. SEPA have short-listed a further 24 suitable sites, mainly in the North-West Highlands and Islands. Since traditionally loch data focused on ecology and chemistry, there is a lack of loch bathymetric data, which are required to estimate loch volumes and residence times. SEPA are focusing on Lochindorb in order to establish a working bathymetric method.

A brief discussion followed in which **Rebecca Wade** (University of Abertay) asked whether the river sensitivity calendar presented by Andrew Black may be a suitable tool to inform on best practice for the timing of works within rivers. The response was that this may be a good idea but different calendars would require to be developed according to individual applications. However, the harder one looked the more sensitivity one was likely to find, resulting in no gaps in the calendar year. Finally, **Iain Sime** (SNH) enquired how many new river gauging stations SEPA is planning. Richard Gosling's answer was three, specifically for WFD surveillance monitoring, in the first instance.

David Martin (chairman of the Scottish Hydrological Group) oversaw the final session of the day on *'Managing Pressures'*. **Robert Stewart** (Mott MacDonald) and **Julie Hawkins** (Scottish Water) explained the requirement to translate the emerging guidance on the WFD into investment need in Scotland. Scottish Water (SW) has recently completed its business plan for the next Capital Investment Period - Quality and Standards III - which is from 2006-2014. Because this period covers the key dates for WFD implementation, SW had to assess the likely cost of complying with the WFD. Scottish Water used SEPA's guidelines on thresholds for abstraction and impoundment to assess the likely changes to current operational practice. These limits are based on low flow statistics such as Q95 and Q90 and SEPA's characterisation report. Applying these guidelines results in a substantial reduction in available yield which would require a considerable investment, in the order of £100 million, to replace. The presenters see the early interpretation of WFD guidance as the main challenge and highlighted the need for improved data, confidence in low flow statistics and the need to properly understand the environmental benefits from delivering this investment. Indeed, what became clear is the enormity of the task facing Scottish Water in balancing water demand with sustainable use of water resources ahead of the key WFD dates.

Hilary Smithers followed on neatly by describing the *'New abstraction and impoundment controls in Scotland'*. Controlled Activity Regulations (CAR) will come into effect in April 2006 and allow SEPA to tackle wider issues associated with the water environment in an integrated manner. The WFD has been the principal driver for these changes, as 45% of water bodies in Scotland are at risk of failing by 2012. CAR will encompass building and engineering, which may affect morphological quality together with abstractions and impoundments and which may lead to changes in hydrological regime. It is based on a three-tier environmental risk system, with high-risk abstractions requiring a licence and low risk abstractions being governed by General Binding Rules (GBR).

The final presentation of the day was by **Adrian Johnson** (MWH) on *'Effectiveness of Combinations of Measures for WFD Implementation'*. The project aims to provide a framework with which stakeholders can make a decision on a combination of measures. Proposed methodology was broken into several steps, the key one being defining indicators for predicting effectiveness. Adrian explained that the methodology has been piloted at three test sites including the River Ribble. The tests highlighted the need to collate more data in an effort to streamline the methodology further.

In the short discussion that ensued, **John Rowan** (Dundee University) asked how Scottish Water planned to take forward the guidance on classifications. Research on this is ongoing, and Julie Hawkins explained that Scottish Water saw this as a dynamic process, with the guidance becoming available (please!) as soon as possible for incorporating it into future strategies. There was some discussion about burden of proof, specifically where the responsibility lies to demonstrate that an activity (such as an abstraction or impoundment) is having a negative impact on the environment. Currently the responsibility appears not to be defined and neither SEPA nor SW could provide an answer to this question: guidance is clearly required.

In summary, the conference addressed the basis for the characterisation of water bodies both in terms of morphology and hydrology. However, it is apparent that different approaches have emerged in England and Scotland, largely depending on data availability. To add to this, Scotland has set the ambitious target of implementing these measures by April 2006. The conference introduced strategies for moving forward into the monitoring phase of the WFD, programmes of which must

be up and running by 2007. Discussion in the latter part of the meeting focused on water resource management, particularly in the context of abstraction.

Following the conference, the authors of this report identified the following as significant challenges in the run up to WFD implementation:

- identification of opportunities for improving the ecological status of water bodies;
- getting acceptance and support from land owners and land managers (such as farmers);
- effective dissemination of information to relevant industries and stakeholders;
- consistent internal approach by regulatory bodies, and
- ensuring co-operation and ongoing discussion between water suppliers and regulatory bodies.

Duncan Wishart (fluvial geomorphologist), Manuela Toth (hydrologist) and Lindsay Beevers (water quality and sediment modeller) Jacobs Babtie

News from members

New Chair for Paul Younger

Professor Paul Younger FCIWEM CGeol CEng, a former Honorary Secretary of BHS, has taken up a three-year research-only Chair in Environmental Technologies, sponsored by HSBC Bank as part of their new 'Partnership for Environmental Innovation', which involves both the University of Newcastle (where Paul's Chair is based) and the University of East Anglia.

Henry Gunston's recent activities

Since retiring from CEH Wallingford in May 2002, **Henry Gunston** has continued his interests in hydrological and river engineering history, as well as in applied tropical hydrology.

Working with Adrian Bayliss and Terry Marsh at CEH, he is exploring the history of the hydrometry linked to a record of flow (dating back to the 1840s) from the Wendover Springs into the Wendover Arm of the Grand Union Canal in Buckinghamshire.

An interest in land drainage history, shared with past-President Frank Law, has led to the joint preparation of an extensive bibliography on the subject, a "good home" for which is currently being organised.

A presentation at a Waterways History Conference in March 2004 on *"Large Flood Control Structures on English Navigable Waterways"* (see *Circulation 81*, p. 9) led to a paper in the Journal of the Railway & Canal Historical Society. He will give a related presentation to the Newcomen Society in Bristol during 2006.

Finally, strong links with the Tropical Agriculture Association led to Henry presenting a paper on *"Wetland Hydrology for Resource Planning"* at a Tropical Agriculture Association seminar on "Wetlands: Hydrology, Restoration and Biodiversity" in June, held appropriately at the Wildfowl and Wetlands Trust at Slimbridge.

FREE — NERC flood research programme

A new five-year £6 million flood risk research programme is just beginning, funded by the Natural Environment Research Council (NERC).

The Programme, Flood Risk from Extreme Events (FREE), aims to improve the prediction of river and coastal floods occurring from extreme events, accompanied by quantitative measures of uncertainty which take into account the non-stationarity of environmental conditions.

The programme will bring together meteorologists, hydrologists, oceanographers and earth scientists to tackle these research challenges, building on existing science and linking with other related research programmes

Professor Chris Collier (University of Salford) has been appointed Science Coordinator of the Programme, reporting to a steering group chaired by **Professor Paul Hardaker** (Met Office) and comprising representatives from NERC, universities, the consultancy community and government departments and agencies.

The Programme will be formally launched at Defra's offices in London on Monday 28 November, with an announcement of opportunity soon after. Currently work on the detailed Science Plan is nearing completion.

Chris Collier

River flood frequency using continuous simulation and revitalisation of the FSR/FEH rainfall-runoff method

Scottish Hydrological Group meeting Edinburgh 12 October 2005

This meeting comprised two complementary talks by staff from the Centre for Ecology and Hydrology (CEH), presenting the results of recent research into flood estimation and their application to Scottish catchments. Both studies were funded by the joint Defra / Environment Agency Flood and Coastal Erosion Risk Management Research and Development Programme, with supplementary funding from the Scottish Executive.

River flood frequency using continuous simulation

The first talk was by **Ann Calver**. Ann discussed the background to continuous simulation and explored the main stages in establishing a generic methodology. In summary, a calibrated rainfall – runoff model is transferred to an ungauged catchment by developing a relationship between physical catchment characteristics and the model parameters (Figure 1). A rainfall generator is then used to generate a long time-series of runoff which in turn is used to derive flood frequency statistics.

This method avoids the difficult problems of defining a storm event, the relation between rainfall and flood recurrence interval and the separation of baseflow. Ann stated that data from a total of 119 gauged catchments were used in England, Wales and Scotland with 10-17 years of record per site. For 46 catchments hourly data were used: elsewhere daily data modelled at hourly discretisation were used. All

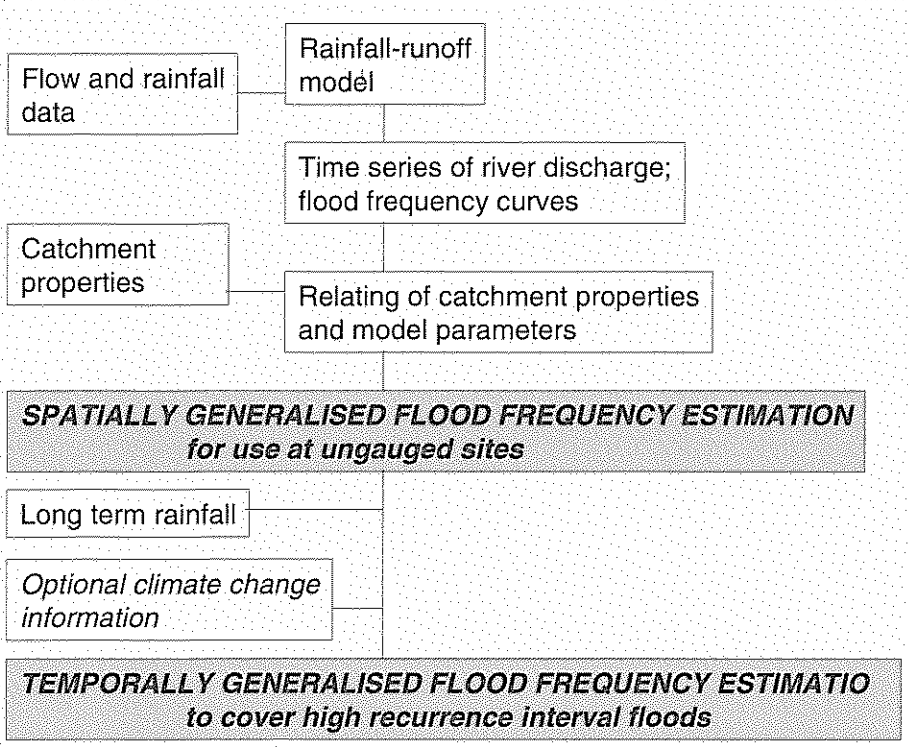


Figure 1 Principle of continuous simulation for river flood frequencies

data were quality controlled and gaps were filled in as appropriate.

Because a linkage is required between parameters and catchment properties consideration was only given to simple models with relatively few parameters. A range of models were tested including the probability distributed model (PDM) and, the time-area topographic extension (TATE) model. A variety of spatial generalisation methods were developed (e.g. site similarity approaches, sequential and univariate regression), this being the most challenging part of the research.

Ann described how "blind" testing was carried out using gauged catchments to assess the performance of various combinations of model and generalisation schemes. Ann indicated that a number of methods performed to a similar level (~20-25% mean error in 1-in-20 year flood at ungauged sites): uncertainty bands (derived using multiple sampling) proved to be wide for all cases.

In conclusion, Ann commented that the research had been successful in developing a generic methodology and looked forward to opportunities both to further develop research aspects and to apply and test the method in water industry practice.

Revitalising the FSR/FEH rainfall-runoff method

Lisa Stewart introduced her talk on the revitalisation of the FSR/FEH rainfall-runoff method as a complementary approach to continuous simulation and not a "competitor". Lisa explained that this had been a three-year project to develop and disseminate an improved version of the FSR/FEH rainfall-runoff method for developing design flood hydrographs. Specifically, this study aimed to update the flood event data, redefine the underlying model and to reassess the design inputs.

The revitalised method was developed in the context of observed problems with the FEH method including:

- the over-estimation of peak flow;
- design storm depths that are invariant with season;
- different return periods for design rainfall and flood.

The approach incorporated loss, baseflow and routing components (Figure 2). The loss model is based on the PDM with a single parameter (maximum soil moisture capacity or C_{max}) and an initial soil moisture state (C_{ini}).

The routing model adopts a unit hydrograph defined by a peak, time to peak, duration and a "kink" in the recession. The baseflow model adopted is based on the linear reservoir concept and exhibits an exponential decay.

The study had access to over 1200 observed events from 101 catchments (including data from England, Wales and Scotland). Catchments were only included if there were at least five observed rainfall-runoff events of which at least one had a peak flow value which exceeded Q_{med}.

Lisa went on to discuss the performance of the model across the UK based on an analysis of 683 ungauged catchments (with areas up to 750 km^2) and a comparison with the FEH method. In general, the method performs well, although an upward tendency was observed in the peak flows for urban catchments. No clear pattern was evident for Scottish catchments.

CEH will be using support from the Scottish Executive to analyse additional events in Scotland, to validate the model for Scottish catchments further and to identify potential problem areas. The model will not be recalibrated, as there is to be a single model for the UK, however, it will allow practitioners to understand the factors that influence model performance in a Scottish context.

Lisa commented that the model was not calibrated for events of greater than 150 year return period, further work is necessary to address particular issues associated with permeable catchments and the lack of data for urban catchments. The model was calibrated for catchment areas up to 500 km^2 but validated for areas up to 750 km^2.

Lisa concluded by explaining that the new method will be disseminated in two stages. First, a spreadsheet has been prepared by CEH and will be made available shortly via the FEH website at no charge. Secondly, a more comprehensive software product will be circulated with an FEH supplementary report that will address design event modelling, flood event analysis and reservoir routing. Lisa expected the supplementary report and software to be available from the end of March 2006.

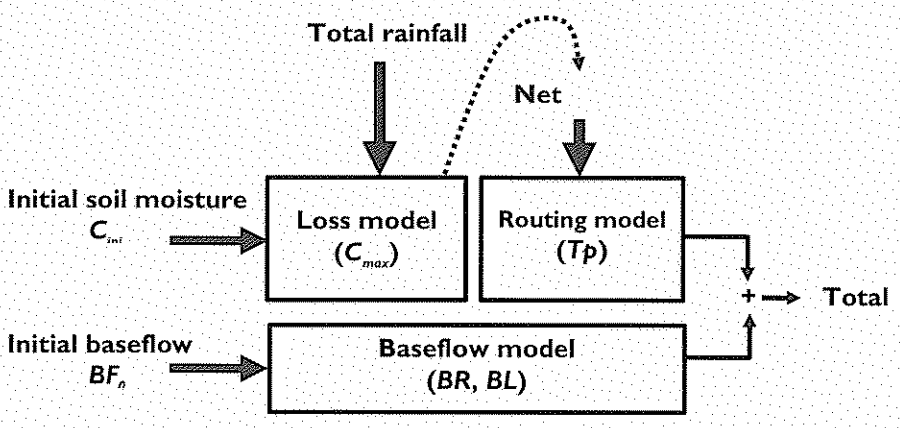


Figure 2 Revitalised Flood Hydrograph (ReFH) Model

Question and answer session

Robin Wardlaw asked Ann how close the method she described was to roll-out. Ann responded that the critical factors were improved rainfall generators and the need for user acceptance of continuous simulation: she anticipated that it would be 5-10 years before a product is rolled out.

Robin asked the speakers if they had "compared notes" on the same catchments. Ann said that this was the subject of a current research proposal submitted to Defra/EA. Lisa added that both methods were still very new and there had not been the opportunity for comparison.

There were numerous questions to Lisa on the detail of the revitalised method: the calibration of the model, the value of comparing the results with the statistical FEH method, the importance of assuming that the rainfall and flood return period are equal, the applicability of the model to Scottish catchments, the use of donor catchments and the applicability of the method to reservoir safety and flood forecasting.

Lisa responded that the calibration was limited to those catchments that satisfied the quality criteria. CEH would consider extending the validation to events >150 year return period in Scotland (as the 200 year return period is a national standard). The comparison with the statistical method was beneficial for a generalised method. CEH do not recommend rescaling the output from the method, nor do they advise users to modify a part of it: the method should be treated as a package. Snowmelt events had been excluded from the analysis, which would affect Scottish applications. The additional work on Scottish catchments will allow CEH to look specifically at response times for Scottish catchments. CEH will be doing further general research to reconsider the concept of donor catchments. The method has not been developed to meet the needs of reservoir safety and has not been tested for Probable Maximum Flood (PMF) estimation. **Bob Moore** (CEH) has applied the PDM to flood forecasting applications.

In response to a question from **Richard Cole**, Lisa commented that the method had not been calibrated for Northern Ireland but that CEH hope to consider developing the FEH short-cut method for use there.

Martin Mansell gave the vote of thanks. He reflected on the need for academics to keep abreast of rapid changes in flood estimation in order to disseminate this information to students and the professionals of tomorrow. He thanked Ann and Lisa for their enjoyable and informative presentations.

Tim Jolley
Head of Hydrology, SEPA, Perth

President's prize awarded to Terry Marsh

Terry Marsh, leader of the National Hydrological Monitoring Programme, based at the Centre for Ecology and Hydrology, was awarded the BHS President's Prize by Professor Bruce Webb on 21st September.



Throughout Terry's career he has been closely involved with data and information related to river flows and catchments, principally at the national UK level but also in the overseas arena. A Geography graduate (Reading University), he joined the Water Resources Board (WRB) in 1971, where he received a grounding in hydrometric practice from the likes of Roger Fisher, Reg Herschy and Duncan MacDonald. From 1971 to 1974 Terry was active in the WRB National Hydrometric Processing Service (NHPS) in an era when few measuring authorities had the necessary computing capacity, and the NHPS processed river level (stage) punched paper tapes received from gauging stations throughout the UK.

When part of the WRB was transferred in 1974 to the Water Data Unit of the Department of the Environment, Terry became Head of the NHPS where he was an influential author writing about hydrometric standards and practice and he ensured involvement of field staff with the data product - a practice he has promoted throughout his career to the benefit of the end-user.

It was at the WDU that Terry's skill as an editor became evident; initially in the annual Surface Water UK, subsequently Hydrological Data: UK series and eventually the web-based National River Flow Archive pages – which now total around 20,000. Over the years, as management of the national hydrometric database passed to a succession of organisations (WRB, WDU, Institute of Hydrology, and now the Centre for Ecology and Hydrology) Terry has played a key role in assuring high standards and continuity in the dissemination of hydrometric data and information through publications. He has always had a flair for words – he was tempted to become a sports journalist and could probably write a history of Blackpool football club! The richness of his prose has become notable at CEH where colleagues are always on the lookout for a new "Terryism" to depict some new zenith or nadir in hydrological records, such as appear from time to time in his narratives for the monthly Hydrological Summaries of the UK. The Summaries were initiated in 1988 and are widely read by hydrologists and water resource managers throughout the UK today.

Many BHS members will have enjoyed Terry's presentations at national and regional BHS meetings and elsewhere and will know that he has wide research interests in using data to quantify and investigate trends in hydrological data related to climate change or patterns of water use. He manages to convey information in a way that keeps audiences interested, and he is always enthusiastic in pursuit of the value of a strategic input to hydrometric network evolution. His colleagues report that one of Terry's special skills is in being able to drink tea at almost super-hot temperatures – and typify his keenness to move on to his next task.

Data archives can represent huge investments of resources and present important issues of security which often can only be overcome by the sort of meticulous and careful approach that Terry has brought to his work. For example, in 1981, he was involved in helping to establish a national hydrometric processing system for Lebanon. When war broke out there in 1984, three copies of the historical data were prepared in order to safeguard security of the information. The war resulted in damage and destruction of gauging stations, and the Processing System was never delivered but resided in Cyprus. The Lebanese copy of the data archive was lost. The second copy, which had been sent to an international agency in Rome, was also lost. Fortunately the third copy, was safe in Terry's wardrobe, and in 1995 he was able to return to Lebanon with a magnetic tape of the pre-war hydrometric data, much to the relief of Lebanese officials.

Terry has authored or co-authored more than 170 papers, reports, book chapters and articles, on hydrometry, hydrology and water resources in the UK and abroad. A Fellow of the Royal Meteorological Society, he has also

served on the Water Resources Panel of CIWEM and the Editorial Board of Weather magazine. Over more than 30 years, his contributions to hydrometric data management and promotion of the utility of hydrometric data and associated information have been tireless.

Undoubtedly he has had impact. His services to British hydrology are marked and he is a most worthy recipient of the 2005 BHS President's Prize.

Register of consultants

The BHS Register of Consultants in Hydrology is being updated for the coming year. The register includes consultancy firms with hydrology practices, hydro-meteorological equipment manufacturers and software firms, plus independent consultants.

The register provides focused advertising for hydrological services. It is mailed to over 900 BHS members and the details are also available through the BHS website. The charge is only £100 for companies and £15 for individuals. For further information please contact the Hon. Treasurer, **Peter Ede** *(tel. 01223 463690, email peter.ede@mottmac.com)*

Meetings

Ecological River Restoration: Combining Ecology and Engineering (call for papers)
River Restoration Centre
7th Annual Network Conference
Heriot -Watt University, Edinburgh
April 26 -27, 2006

The main objective of this conference is to encourage the exchange of river restoration ideas and experiences between delegates from a wide range of backgrounds.

This is a call for papers and posters. The usual length of presentations is between 15 and 20 minutes. We wish to continue to attract participants from across the UK and abroad, furthering our commitment to promote the exchange of ideas and experiences.

If you are interested in giving a paper, or completing a poster, please contact either Jenny Mant or Chris Banks; *email rrc@therrc.co.uk*. Presenters should provide a suggested title by 30th November. The RRC will then contact you regarding abstracts in mid December. See the website *http://www.therrc.co.uk* .

BHS National Hydrology Symposium
Durham University
10-13 September

Don't forget the ninth BHS National Symposium. The theme is "Land Management and the protection of the water environment: understanding the impact of new legislation" and we look forward to a wide range of members participating by offering papers and posters and contributing to the debate.

Convenors: Prof. Tim Burt *(t.p.burt@durham.ac.uk)* and Prof. Stuart Lane *(s.n.lane@durham.ac.uk)*.

Diary

23rd November 2005
Scottish Hydrological Group
"Postgraduate studies in hydrology and hydraulics"
Venue: Rankine Building, Glasgow University, Time: 6.00 for 6.30
Contact: Mike Cranston *(tel 01738 627989, fax 01738 630997, email michael.cranston@sepa.org.uk)*

24th November 2005
BHS South East Section meeting
"Tsunamis and the impact on water resources and water supply"
Venue: ICE London, Time: 18.45
Contact: Helen Procter *(tel 01372 754201, email helen.procter@atkinsglobal.com)*

28th November – 2nd December 2005
New Zealand Hydrological Society Annual Conference, Carlton Hotel, Auckland, New Zealand — see *www.hydrologynz.org.nz/index.html.*

14th December 2005
BHS Midlands Section meeting
"Low flows & the hydro-illogical cycle"
Venue: University of Birmingham
Contact: David Hannah *(email d.m.hannah@bham.ac.uk)* Website: *www.drought.unl.edu/plan/cycle.htm.*

18th January 2006
Scottish Hydrological Group
"Impacts of climate change on Caspian Sea levels" — Robin Wardlaw (Edinburgh University)
Venue: Rankine Building, Glasgow University, Time: 6 p.m. for 6.30 p.m.
Contact: Mike Cranston *(see above)*

26th January 2006
BHS South East Section meeting
"Flood warning and mitigation"
Venue: ICE London, Time: 6 p.m.
Contact: Helen Procter *(see above)*

23rd February 2006
Scottish Hydrological Group joint meeting with Scottish Hydraulics Study Group and ICE Edinburgh Branch
"Edinburgh Flood Alleviation Scheme"
Alvin Barber (Edinburgh City Council)
Venue: Overseas League, 100 Princes Street, Edinburgh, Time: 5.30 for 6 p.m.
Contact: Mike Cranston *(see above)*

22nd March 2006
BHS National / South East meeting
"Does land management really affect flood risk?"
Venue: University of Cranfield, Silsoe
Contact: Helen Procter *(see above)*

2nd–7th April 2006
European Geosciences Union (EGU) General Assembly, Vienna, Austria
http://meetings.copernicus.org/egu2006/
Deadlines: *9 December 2005* for support, *13 January 2006* for receipt of abstracts, *10 March 2006* for pre-registration.

25th April 2006
Scottish Hydrological Group
Celebrating 40 Years of the SHG
"Hydrology and water resource development" — Prof. Paul Jowitt (Sistech, Heriot-Watt University)
Venue: Royal Society of Edinburgh, Time: 6 for 6.30 p.m.
Contact: Mike Cranston *(see above)*

26th–27th April 2006
River Restoration Centre
7th Annual Network Conference:
"Ecological River Restoration"
Heriot -Watt University, Edinburgh
Call for papers: send suggested title by *30 November* to *rrc@therrc.co.uk*. More details at *http://www.therrc.co.uk*

11th May 2006
BHS South East Section meeting
"Managing our coasts: competing interests" Venue: ICE, London, Time: 18.00, Contact: Helen Procter *(see above)*

14th–18th August 2006
International Conference on Riverine Hydroecology, supported by BHS
Venue: Stirling University, Scotland
Abstracts invited: contact Dr David Gilvear *(d.j.gilvear@stir.ac.uk)*, tel. 01786 467840 or use the website *www.sbes.stir.ac.uk/riversconference.*

10th–13th September 2006
9th National Hydrology Symposium
Durham University — *see above*

26th–28th September 2006
3rd International Symposium on Integrated Water Resources Management
Venue: Bochum, Germany
Deadline for abstracts *30 November 2005*
See *www.conventus.de/water* or contact Mrs Jana Radoi, Conventus, Markt 8, 07743 Jena, Germany *(tel +49 3641 35 33 221, fax +49 3641 35 33 271, email water@conventus.de).*

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