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THE NEWSLETTER OF THE BRITISH HYDROLOGICAL SOCIETY

Circulation

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Hydroecology of managed rivers

BHS National Meeting
University of Birmingham
16 May 2001

This National meeting on the hydroecology of managed rivers focused particularly on the relationships between river flow regimes and ecological processes in riparian habitats. It attracted 48 participants from a wide range of universities, research centres, the Environment Agency, consultancies and conservation groups, who enjoyed five thought-provoking presentations.

After an introduction by the convenor, Dr Chris Bradley, **Prof. Geoff Petts** (University of Birmingham) started the proceedings with a talk entitled "Freshwater and Environmental Change: a global crisis?" He described the work of the Scientific Committee on Water Research of the International Council for Science. This committee's brief is to place freshwater ecosystem sustainability on the global political agenda — essentially to put the ecological component of flow into the water balance equation. Geoff suggested that the use of emotive facts and simple explanations were required to engage politicians in sustained debate. Future scientific priorities should include

In the Circulation **PLUS** *section:*

Discharge estimation in torrential wadis — an 'engineering' method
Brian Watts, Shipston on Stour

looking at long-term influences on freshwater ecosystems and including risk and probability assessments in research outputs.

The second and third presentations focused on urban river habitat assessment, a specific aspect of hydroecology that has been the subject of much recent UK research interest. Both talks described research funded as part of the NERC URGENT thematic programme. **Angela Davenport** (University of Birmingham) described her work extending the River Habitat Survey methodology (RHS) to urban rivers. Most of this research has concentrated on the River Tame in the Birmingham area. Angela concluded that alterations to the RHS methodology were needed to cope with the unique character of urban channels, and that (contrary to popular belief) urban rivers are not homogeneous lengths of channel but do display much physical diversity.

Doug Booker (CEH Wallingford) continued the urban river assessment theme with a talk entitled "Hydro-ecological modelling: the application of PHABSIM to urban river channels". Like Angela Davenport, Doug had taken an established methodology, in this case the PHABSIM approach previously used in lowland rural low flow applications, and tried to extend it to the full range of flows in urban channels. Doug suggested that flashy flow regimes and multi-stage channels in urban areas cause problems with the methodology. A main conclusion was that habitat availability is limited at both low and high flows. Further sensitivity analysis of PHABSIM at higher frequency timescales was necessary for urban applications. In answer to questions, Doug conceded that water quality might be a limiting factor in his analysis. He suggested that although methods such as Computational Fluid Dynamics offered promise in habitat assessment, they were currently too complex to apply to most management situations.

Following a short tea break, the second session opened with a talk on the Environment Agency Lotic-invertebrate Index for Flow Evaluation (LIFE). **Doug Wilson** (Environment Agency) described the technique, which compares LIFE scores of the abundance and ability of invertebrates to survive in different flow velocities to the statistics of total flow. Doug raised some of the statistical problems with the current method, particularly with auto-correlation of variables, but said that these conflicts were the subject of further work.

Efforts to place the LIFE methodology within RIVPACS were under way, but some elements were missing, for example winterbourne streams were not included. Future developments of the LIFE concept within the Agency include work on a conceptual model of ecology and flow, pooling hydrological and ecological datasets, testing for statistical robustness, and examining the confounding effect of water quality.

Doug suggested that possible applications of LIFE could include use in the catchment abstraction management system (CAMS) and assessing the ecological status of sites for the Water Framework Directive.

This comment led nicely on to the final presentation by **David Tickner** (WWF-UK) on "The new priority for Europe's rivers: ecological status and the Water Framework". He explained the philosophy behind the Water Framework Directive and the proposed implementation timetable. Key dates include the incorporation of the directive into UK legislation by 2003, analysis and classification of river flow districts by 2004, and the first wave of river basin management plans to be in place by 2009.

David went through some of the definitions in the directive and outlined some of the uncertainties. These included the proposed classification terminology — for example, what is a heavily-modified river and do wetlands fall under the scope of the directive? He also outlined a list of research opportunities arising from the directive, such as floodplain use, the definition of a single acceptable ecological assessment method, the processes involved in diffuse pollution, and public participation in decisions. David indicated that many of these issues are already being addressed by UK scientists.

He concluded by outlining several key points that he hoped the delegates would take away. These were that the Water Framework Directive will be a major policy driver in river management over the next 20 years, stringent definitions and rigorous science are needed for its implementation, particularly for 'heavily-modified' rivers, and that the integrated river basin approach and interdisciplinary management suggested in the Directive will lead to new science. He termed this 'landscape hydro-ecology' and said that public participation will be crucial in this area.

The meeting closed with some remarks from Chris Bradley, who was given a vote of thanks for organising such an excellent afternoon of talks from a diverse range of speakers. Chris announced that the 8th BHS National Hydrology Symposium would be held in Birmingham from 8th-11th September 2002, with the theme "Water extremes and water stress: science, policy and practice".

Barnaby Smith
CEH Wallingford

The Loch Lomond Water Supply Scheme 30 years on

Scottish Hydrological Group meeting
Balmore Water Treatment Works
5 April 2001

When last October the committee of the SHG conceived the idea of holding a half-day meeting on recent developments of the Loch Lomond Water Supply Scheme, a sunny afternoon enjoying the panoramic views of the Loch and its surrounding hills from the boardroom at Ross Priory seemed a wonderful idea. However, the outbreak of foot and mouth forced us to relocate the meeting to Balmore Treatment Works. As it turned out, it was a typical Glasgow day of steady drizzle, making the choice of an indoor tour of the treatment works seem an even better idea!

Stephen Hogg (operational engineer with East of Scotland Water – ESW), began the meeting with an introduction to the Lomond Water Supply scheme. Conceived in the 1960s as a source for the growing residential and industrial demands of the Central Belt, it was a large potential source that could be developed in stages and was close to the demand area.

In May 1968 the Central Scotland Water Development Board became operational, with the objective of developing the Lomond scheme, and in June 1971 the scheme was officially opened. The Water Order allows for a potential abstraction rate of 455 Ml/d and a total compensation flow in the River Leven of 740 Ml/d. The compensation flows are controlled by a barrage, which also serves to control the water level in the Loch.

Stephen explained that the barrage can only control loch levels once the level has fallen below 26ft OD. At levels above this the gates are opened. The Scottish Environment Protection Agency (SEPA) monitors flows downstream of the barrage.

He went on to describe the network of mains, pumping stations and treatment works that conveys Lomond water to the demand areas. Water from Ross Priory is pumped to the treatment works at Balmore and Blairlinnans. After the reorganisation of the Scottish water industry in 1996, Balmore and Ross Priory were inherited by East of Scotland Water while Blairlinnans passed into West of Scotland Water (WoSW) control. Treated water from Balmore is conveyed to Cumbernauld, Falkirk and Grangemouth, and also exported to WoSW at Dalmacoulter. WoSW conveys treated water from Blairlinnans to north-west Glasgow.

Balmore Treatment works was built in 1970 to deliver 225 Ml/d to supply. Thirty years ago treatment at the works simply consisted of lime dosing, chlorination and microstraining. Ortho-phosphoric dosing was added later. However, this was no longer sufficient to satisfy drinking water standards in the 1990s, nor the demand for high quality drinking water, and in 1999 the new works was completed at a cost of £45M with a capacity of 364 Ml/d and the potential to expand to 455 Ml/d. Balmore also serves as the control centre for the Lomond supply network. Pumping stations are monitored and controlled remotely and mains bursts can be detected and isolated.

Stephen finished by introducing the concept of conjunctive use. By combining the supply from Lomond with supplies from the Carron Valley and Loch Turret, ESW can maximise the use of cheaper gravity water and minimise the pumping requirement from Loch Lomond.

Owen Bramwell (Water Resource Planner with ESW) made a presentation of a recent review of the yield of Loch Lomond and proposals for future development of the scheme. ESW and WoSW are currently looking at the possibilities of linking ESW's Lomond scheme with the WoSW Loch Katrine scheme in order to achieve further cost savings and possible yield enhancement. The raw water supplies from Katrine and Lomond cross over at Strathblane and a cross-connection would allow Katrine water to feed by gravity to Balmore, thus saving pumping costs. Spare capacity at Balmore could also be used to supply further treated water to Glasgow and reduce the size of the new treatment works to be built by WoSW at Milngavie.

Owen went on to describe the methodology used to reassess the yield of the combined scheme. The methodology was developed by Water Resources Associates for the Scottish and Northern Ireland Forum for Environmental Research (SNIFFER). It entails using historic rainfall series to drive a conceptual rainfall-runoff model (HYSIM), the output from which is used as input for a reservoir and network model (AQUATOR).

The results of the reassessment that was carried out by Mott MacDonald illustrated that, in theory, if the conditions in the Water Order were adhered to precisely, then the reliable yield of Loch Lomond is only 61 Ml/d based on the extreme drought year of 1984. However the return period of the 1984 drought in Loch Lomond is estimated to be well over 100 years. The severity of 1984 is illustrated by the fact that the yield jumps to 395 Ml/d for the second most severe drought year, 1869. However, if the smoothing effect of manually operating the barrage and the reduction in low flows in the River Leven associated with deposition at the outlet of the loch are taken into account, then these yields fall to 0 Ml/d and 325 Ml/d respectively. The 1-in-100-year yield was estimated at 320 Ml/d.

Interestingly, only two of the ten most severe drought years for the Lomond scheme are in the top ten most severe drought years for the Katrine scheme. Owen explained that this reflects the fact that Lomond is a single season scheme and demonstrates the value of combining the two schemes. The combined 1-in-100-year yield is approximately 900 Ml/d, which is a significant enhancement of the two stand-alone yields.

Both the talks stimulated discussion on a number of issues, including leakage reduction, demand forecasting and future compensation requirements.

Following the talks the group split into two parties and had a guided tour of the works. The tour took us from the control centre to the raw water storage tanks, on to the lime and alum dosing and the rapid gravity filters. The 24 filters are used in rotation, so we were able to see all stages of the cycle from backwashing through to operation. We then moved onto the chlorination process and finally to the outlet pumps and treated water storage tanks.

The Scottish Hydrological Group members would like to thank East of Scotland Water for their hospitality, and in particular Stephen and Owen for their presentations, **Frank Stone** and **Billy Gordon** for the guided tour and **Willie Thomson** for co-ordinating the meeting.

Tim Jolley
SEPA

New members

Welcome to Young and Old, and to 21 other new members of the Society:

Katie Barber	Institute of Water and Environment, Cranfield University
Joanna M Clarke	School of Geography, University of Leeds
Alan P Cundill	School of Geography, University of Leeds
Alison Edwards	Cheltenham & Gloucester CHE, Cheltenham
Karen J Hudson	Environment Agency, Solihull
Matthew James	Peter Brett Associates, Reading
Dr Soon-Thiam Khu	School of Engineering and Computer Science, University of Exeter
Martha J King	Beenham, Berks
Paul Hart	Moray Flood Alleviation Group, Moray, Scotland
Kirsteen MacDonald	Urban Water Technology Centre, Dundee
Edward McKenna	Edinburgh
Kimbyl James Mann	Environment Agency, Winchester
Stephen D Marks	Environment Agency, Bodmin
Richard Maxey	Environment Agency, Cambridge
Michelle H Lewis	Droitwich, Worcs
Dr Gareth H Old	CEH Wallingford
Catherine Peacock	Cranfield University, Silsoe, Beds
Katy Reed	Aston University, Birmingham
Eileen Robertson	Ewan Associates Ltd, Nairn, Scotland
Paul Ryles	Ewan Associates Ltd, Stirling, Scotland
Mary Jane Tyler	Environment Agency, Mold, Flintshire
Andrew Wilson	Dept of Geography, University of Exeter
Dr Andy R Young	CEH Wallingford

President's piece

Two years now seems a very short time, and this is my final "President's Piece" before handing over to **Peter Walsh** at the AGM in September.

Over Easter, I visited Australia and New Zealand, and was very pleased to meet possibly the furthest-flung BHS member, **Alistair McKerchar**, at NIWA in Christchurch, and to establish personal contact with the New Zealand Hydrological Society. They have donated recent conference publications (now in the CEH Wallingford Library) and we hope to explore closer links and an improved exchange of information. I was impressed by current work on high-resolution radar and raingauge rainfall data at the University of Auckland, and the operational problems associated with the huge rainfall gradients in South Island (15 metres of annual rainfall in the southern highlands). It was a pleasure to meet **Richard Ibbitt** for the first time in Christchurch, whose PhD at Imperial in 1970 I have been quoting for 25 years!

Back in the UK, I have continued to represent BHS on the ICE Water Board and CIWEM Water Resources Panel, and to participate in the ICE Reservoir Safety Working Group, which is pressing the government for action to reconcile discrepancies in extreme flood estimates, as well as overseeing a project to review integrated assessment of the various elements of risk associated with reservoir safety.

On other aspects of BHS business, the ICE has offered to compensate the Society for posting the incorrect subscription rate this year, but there may well be continuing problems in the accuracy of the new membership system. I can only ask for your patience if you are having difficulties with contact details: please tell **Tim Jolley** or me about any outstanding problems. A related issue is the Membership Directory, which has suffered from current legislation (the Data Protection Act). We are advised that information cannot be released without explicit permission, but a large number of members have now returned the relevant form, and we are proceeding to produce the Directory, albeit lacking the names of those who have not returned the consent forms.

The various strategic initiatives started last year have borne fruit. The Publications team has produced a policy statement and we have launched *Circulation Plus* (please keep the contributions coming). The International team has similarly produced a policy statement, and we are actively planning increased collaboration with other societies, and preparing for the second BHS International Symposium in 2004. After site visits by two impartial committee members to the competing bidders, and a screening procedure, in which I was not involved, I was delighted to be told that Imperial College had emerged as the preferred venue.

The Membership group has produced new publicity material and is proceeding with a drive to recruit new members. We have been giving serious thought to the Web and web-based information delivery, and have agreed a budget for enhancing the BHS web site. Many thanks to all who responded to **Roger Simpson**'s questionnaire on Regional and National performance: Roger will be reporting his findings in *Circulation*, and we are working on recommendations that flow from them. The main cause for concern appears to be lack of notice of our meetings. On Education and Training, our current project to define an appropriate background and portfolio of experience for a Professional Hydrologist is continuing, with linkage to the ICE Professional examination requirements. An exciting new initiative, developed by **Dawei Han**, was agreed at our July committee meeting. With effect from the next academic year, we will be offering a BHS prize for undergraduate project work in hydrology, to enhance the visibility of hydrology at undergraduate level.

At national level, various strategic research initiatives are proceeding. The NERC thematic research programme on Lowland Catchment Hydrology (LOCAR) was launched at a "town" meeting in Birmingham on 1st July, and together with the JIF awards to Newcastle and Imperial College to support a National Infrastructure for Catchment Hydrology Experiments (NICHE), this is providing a £12 Million injection of resources to experimental hydrology. On the floods front, DEFRA and the EA have been holding workshops to promote a coherent view of research needs and priorities, with action imminent on enhancing current methods and developing new and improved approaches to decision support on flood management, and the ICE Presidential Commission under **George Fleming** is reviewing flood defence needs in the light of changing climate. Our own meeting on floods at the Royal Society is now arranged (see elsewhere in this issue). The rainfall research community held a meeting to plan a new initiative in quantitative precipitation forecasting, which I hope will move forward with funding in due course. There is certainly no shortage of exciting issues for hydrologists in research and practice, and in both areas it is good to see a fairly healthy funding programme, and an expanding need for the employment of hydrological specialists.

In conclusion, the role of BHS President is one that I regard as a great honour, and which I have greatly enjoyed fulfilling. I must express my thanks to all those people on the main committee and in the regional sections, whose support and enthusiasm remains the essential element in maintaining and developing the society's activities.
I hand over the President's role to **Peter Walsh** in the confidence that he will continue to work indefatigably for the Society, as he has in his roles of Hon. Sec. and President-Elect, and I look forward to the contribution that he will bring, with his extensive experience of hydrological practice, to the next two years of the Society's activities.

Howard Wheater
Imperial College, London
h.wheater@ic.ac.uk

Floods issue of *Weather* — special offer to BHS members

The Royal Meteorological Society's general journal *Weather* is publishing a special issue entitled *"Water Resources and Floods"* in mid-October. This will deal in detail with both meteorological and hydrological events relating to the October floods in England last year, together with articles on the Italian floods the same month, a substantial flood event in Lynmouth in 1770 and a paper on the long-term hydrological stability of the UK's water resources.

To foster links between the two societies, BHS members will be able to buy this special issue at a reduced price of £2.50. This is about two-thirds of the normal single issue price. If you are interested, please write to *Weather*'s sub-editor, Mrs Mary Spence, at *Weather*, Royal Meteorological Society, 104 Oxford Road, Reading RG1 7LL, enclosing a cheque payable to "The Royal Meteorological Society". The closing date for reserving copies at this reduced price is *14 September 2001*. Later enquirers will still be able to purchase copies while a supply exists, but will need to pay £3.80 a copy.

Dr Grant R. Bigg
School of Environmental Sciences
University of East Anglia

C+ Circulation PLUS

A method for estimating discharge in torrential wadis

Brian Watts, Shipston on Stour

The third C+ contains one article, a piece by Brian Watts on practical gauging techniques in difficult conditions. Have you an item to offer for the next issue of C+? If you have something that you wish to share with other members, but which might not be appropriate for publication in a formal Journal, these pages are for you. Please send your contributions in good time for the next issue (see the box on the back page).

Torrential wadis typically occur in the mountain slope regions of arid and semi-arid zones. They are notoriously difficult to gauge, particularly by conventional current-metering methods, other than at low stages.

Reasons for this are as follows:

- Rainfall heavy enough to cause runoff occurs typically only a few times a year and there can be long periods of one or more years with no runoff.
- Events are difficult to predict, they are generally intense short-lived and extremely variable in space and time-
- Both rising and falling stages can be rapid
- High sediment flux-rates can have safety implications if conventional current-metering is attempted, large boulders are often transported with a wide assortment of wadi gravels.
- Suspended sediments can give rise to problems in recording stage
- Mean velocities of over 5m/s are not uncommon
- Hyper-turbulent flow is a feature of torrential wadis
- Access can be difficult, particularly during rainfall events.

Depending upon local geology, some wadis are effluent and perennial in the upper mountain tracts, they also can be intermittent, with flow resurgences and total loss of base flow, due to structural changes, in lower slope areas. They usually grade into braided sandy channels that are generally influent and ephemeral. Gauging site selection can prove difficult and generally results in the selection of a site in the rocky channel regions of the lower mountain slopes, which can mean a trade-off between vehicular access and less than ideal hydraulic conditions.

Because of the above, indirect methods of estimating discharge are resorted to. The methods rely upon the estimation of Manning's 'n'. Field staff making the surveys have to be hydraulically astute. The under-estimation of 'n' is not uncommon. This probably comes about through the occurrence of hyper-turbulent flow. There is a tendency for steeply graded wadis to exhibit numerous mini critical / sub-critical flow transitions which are brought about by channel geometry and / or boulder induced obstructions to flow, combined with high sediment flux rates, all of which are high energy dissipaters. Other difficulties can be from trash-line interpretation and stage recording, particularly if a vertically set pressure transducer is used in an in-wadi situation. These errors can arise from the $v^2/2g$ component of flow, in both cases.

The method introduced here for estimating discharge in torrential wadis is based on channel flood routing to give an 'engineering' solution to problems presented. It requires the siting of a pair of stage recorders with a separation distance sufficient to accurately discriminate between events recorded at the two gauges in an hydraulically suitable reach of wadi channel. This generally means using automatic stage recordings, but simultaneous manual readings of two staff gauges would produce the same result if circumstances were favourable. In general the distance between the two gauges must be sufficient to discriminate between times and to minimise errors through lateral inputs into, or losses from, the wadi reach.

A study in Oman examined a wadi where flow was confined within one channel. The study examined in detail the translation of a large, multi-peaked flood event that had originated from rainfall over the upper catchment and was recorded by two synchronised stage recorders. This presented two approaches to rating the wadi:

a) If a defined medium to high stage control exists at the lower wadi gauge, then a surveyed cross-sectional area applied to stage at the control gauge is combined with the mean velocities obtained from the time required for each peak and trough on the multi-peak event to travel the known distance between the two gauges. This allows part of a stage discharge relationship to be determined.

b) If there is no medium to high stage control and the overall control appears to be of channel characteristics then an average of a number of surveyed cross sectional areas along the wadi reach, between the two gauges, would be applied in a similar manner; then however it is the reach as a whole that is rated rather than the particular down stream gauge.

The study in Oman was for the latter case and resulted in seven points on a rating curve for the reach, all of which had been derived from one intense, multi-peak event, which could be assigned to the downstream gauge.

Similarly if only one peak occurs then the stage discharge relationship would have to be built up over a number of such events.

Making a bold assumption, in an effort to give some mathematical credibility to the over simplification of the complex physical processes that are involved in torrential wadi flow, then this is via the channel routing equation:

$$I = D + dS/dt$$

Where I = inflow at the upstream gauge, D = discharge at the down-stream gauge, and dS/dt = the rate of change of storage in the reach between the two gauges with respect to time. A gauging station record is conveniently thought of as a recording of stage with time. It can equally be thought of as a recording of volume or discharge with time. Any point on such a record, e.g. at peaks or troughs, represents (say) a discharge occurring at a particular stage.

Cross-sectional area multiplied by mean velocity is equal to discharge.

The cross-sectional areas for different stages can be obtained by survey and an estimate of mean velocity can be made by considering the storage term in the routing equation. Storage in a reach is made up of prism and wedge components. The peaks and troughs in a record are mathematical turning points, where dS/dt = 0. The wedge portion of storage is a measure of slope related to wave celerity, therefore when the rate of change of storage is zero, there appears to be some justification in regarding the wave celerity, at the turning points, as approximately equal to the mean velocity. Points plotted on this assumption, on the stage discharge curve, are therefore for a theoretical steady-state condition, which represents the discharge of a routed flood wave with translation only, but no attenuation.

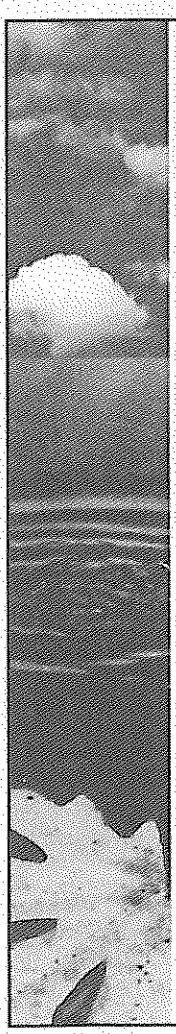
The proposed method should only be considered when the event being analysed displays synchronised, well defined and distinct peaks and troughs that can be distinguished at both gauges and when the flood originates further upstream to avoid complica-tions from tributary inflows. However, when these conditions are satisfied, it is an indirect method that allows discharge to be determined without the need to estimate Manning's 'n'.

These proposed procedures require further research and confirmation of their suitability for differing physical situations particularly in relating the average cross-sections for the reach to a down stream stage recorder cross-section, when control is from channel characteristics, together with the validity of any assumption made.

Other areas that require a wider exchange of ideas are on gauging station design and operation in torrential wadis, particularly in remote areas.

Brian Watts

Have you found this section interesting? If so, why not send in a contribution for a future edition of C+?



Team Leader Development Control

Brampton, Huntingdon — Starting salary £22,921 - £26,047

This is an ideal opportunity for you to make a major contribution to sustainable development, by leading the Area team which works with developers and planners to reduce flood risk. If you are looking for a role which is really at the forefront of this increasingly important field, then read on!

Leading your team of 7, you will primarily be managing flood defence aspects of the Agency's involvement in the Town and Country Planning System as well as managing our flood defence consents system. Development planning is one of the key priorities in the area, which includes the rapidly growing areas of Cambridgeshire, Bedfordshire and Milton Keynes.

Educated to degree level or equivalent, you should also have around 5 years' relevant experience and ideally be a member of a professional institution. Equally important will be your thorough understanding of the issues relating to flood risk and ability to apply your technical understanding of flood hydrology to the requirements of strong regulation. You will also need excellent interpersonal skills and be a good organiser, with the confidence, commitment and enthusiasm to motivate your team. You will be required to take part in a standby roster and respond to flood events both during and outside working hours and a driving licence is essential.

This really offers great scope for personal development, as it combines the principal role of first line manager with an ongoing involvement in technical matters. For an informal discussion, please telephone Nigel Fawthrop on 01480 483929.

For an application form and job description please telephone Lesley Baxter on 01733 464464, quoting reference CP100. Completed forms should be returned to Lesley at Environment Agency, Kingfisher House, Goldhay Way, Orton Goldhay, Peterborough PE2 5ZR. Closing date for receipt of applications is 7 September 2001.

www.environment-agency.gov.uk

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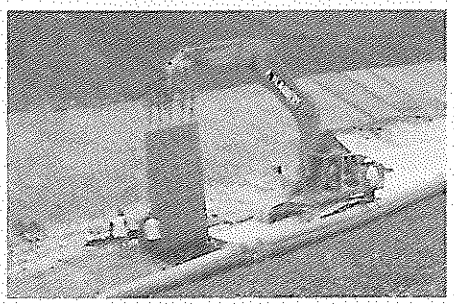
ENVIRONMENT AGENCY

The Maidenhead, Windsor and Eton Flood Alleviation Scheme

BHS Southern Section field visit 13 June 2001

You may remember a diversionary "kink" on the M4 motorway west of London a couple of years ago. Did you know that the diversion was to allow a bridge to be built over the channel of the Maidenhead, Windsor and Eton Flood Alleviation Scheme? For BHS members to learn more about this major Scheme, **Adrian Butler** organised a visit on behalf of the Southern Section. Our host was **Graham Croucher**, Project Engineer for the Environment Agency, who started with an introductory presentation in the office.

The principal element of the Scheme is an 11.6 km long channel on the left bank, leaving the Thames upstream of Boulter's Weir. The channel starts along the line of the existing Taplow Mill Leat, but then continues along a newly-dug route, rejoining the Thames downstream of the Black Potts railway viaduct. The new channel will carry a maximum flow of 215 cumec, whilst the main Thames channel and existing right bank channels can carry 300 cumec. The EA predict that the overall channel system (with a capacity of 515 cumec) should then be able to handle a 1-in-65-year return period flood. The estimated gross implementation cost of the Scheme is approximately £90 million, and an overall Benefit/Cost Ratio (including intangible benefits) of 1.4:1 is forecast.



On the site tour, we first visited the control structure at the downstream end of Taplow Mill Leat. The gates here, as well as admitting flood flows into the new channel, will allow a "sweetening" flow of 10 cumec along the channel at all times. There is a second moving control structure at Marsh Lane, further downstream. We then visited the bridge under the main line railway from Paddington to Bristol, where the ground had to be frozen before the reinforced concrete box "bridge" was jacked into the embankment little by little as (frozen) earth was excavated ahead of it. Trains continued to run above. Our next stop was close to a zone of contaminated land where a waste containment cell covering some 6 hectares had to be



constructed under stringent environmental conditions. Major landscaping works have followed and a wetland habitat is being developed. Also in this area is a fixed weir (105 m wide) at Manor Farm. Our last stop was close to the downstream end of the channel at the Black Potts railway viaduct, where fixed weirs have been installed in nine of the thirteen flood arches to provide a final control structure. Our thanks go to Adrian, and to Graham and his team, for organising such a successful and informative visit.

Henry Gunston
CEH Wallingford

News from members & others

HERO at Newcastle

Congratulations to **Dr Paul Younger** CEng (former BHS Honorary Secretary) who has been promoted to a Personal Chair within the Department of Civil Engineering at Newcastle University. As Professor of Hydrogeochemical Engineering and Director of a new inter-disciplinary research unit, HERO ('Hydrogeochemical Engineering Research and Outreach'), Paul will continue to develop his research into low-cost technologies for remediation of polluted mine waters and other effluents. He will also still be actively involved in the teaching and research activities of the highly successful Water Resources Group headed by **Prof. Enda O'Connell**.

Birmingham position

Professor Geoff Petts has been appointed Pro-Vice Chancellor at the University of Birmingham from 1st August, and will be stepping down as Head of the School of Geography and Environmental Science.

Changes in structure at SEPA

Congratulations to **Tim Jolley**, our Hon. Secretary, on his promotion to National Hydrology Manager for SEPA. This follows a reorganisation to replace the regional structure with a national one. All science functions are led by a national manager reporting to the Environmental Assessment Manager, Geoff Burns.

Lecture on water resources

Chris Binnie, who sits on the ICE Water Board with Howard Wheater, and is a long-standing member of BHS, is also on the Council of the Worshipful Company of Water Conservators. In January he will deliver an illustrated lecture on the history and future of water and plumbing development. This could be of interest to members in the south-east — details are in the *Diary*.

Dr Mike Horner MBE

Congratulations to **Dr Mike Horner**, Technical Advisor to the Easter Floods Review and joint author with **Peter Bye**, was awarded an MBE in the Queen's Birthday Honours for his services to flood defence.

Honour for US hydrologist

Among six ASCE members elected to the prestigious National Academy of Engineering in the United States is a hydrologist, **Professor Rafael L Bras**, Head of Civil & Environmental Engineering at MIT, for innovation in hydrological forecasting and hydrometeorology and contributions to civil engineering education.

Hydroinformatics 2000

Report of the conference in Cedar Rapids, Iowa, USA 23-27 July 2000

There is not, and probably never will be, a consensus on what exactly constitutes hydroinformatics. So it is hardly surprising that a frequent post-session discussion at the *Hydroinformatics 2000* conference, hosted by the Iowa Institute of Hydraulic Research and held in Cedar Rapids, revolved around the "fit" of a particular paper to the hydroinformatics theme.

However, cries of, "Too much 'hydro' and not enough 'informatics'," or *vice versa*, were often applied in equal measure (usually by different people) even to the same paper. The positive side of this is that the Hydroinformatics conferences (this was the fourth of the biennial series) probably brings together a group of people with more diverse backgrounds and viewpoints than any other in the field.

My own week in Cedar Rapids, made possible by travel grants from BHS and the American National Science Foundation, was useful and constructive. My presentation (on a relatively esoteric subject — the design of a highly modular software framework for constructing real-time hydrological modelling and forecasting systems) was well attended, and received a number of helpful comments and interesting/pertinent questions. As my first conference presentation it was a positive and encouraging experience.

There were approximately 300 presentations, ranging from the abstract (Abbott, "Application of Meinongian object/value theory in hydroinformatics") to the concrete (Simões *et al.*, "A new Java-based approach in the development of a graphical user interface for GSTARS 2.1"), and from the 'hydro' (Sánchez, "A numeric model to simulate level-furrow irrigation.") to the 'informatic' (my own). Among this diversity, it was a difficult task to pick from the five simultaneous sessions at any one time. However, I mainly followed my own primary interests of software architecture and integrated systems design.

Since the aim of my work is to allow the integration of modules from multiple sources into a coherent whole system, presentations of past or ongoing integration efforts were of great interest. Most of them, however, focus on offline modelling, rather than real-time operation, and most rely on the "Elastoplast" approach to integration: file format conversion, and a coordinating program to run the component parts of the overall model at the right times. While this is a sensible means of integrating existing models, it is my belief that flexible forecasting systems require a more open, extensible, and holistic approach.

Blind *et al.*, in "Towards a well-oiled model infrastructure for water management" made an admirable job of arguing for the creation of a new framework, designed from the ground up to be modular (with the implied requirement that existing models be rewritten or heavily adapted to work within the framework). I believe that this approach will ultimately succeed, but there are many financial and political barriers to creating and adopting a single framework. The paper explains that all of the main players in academia and the water industry in the Netherlands are involved in the creation of, and committed to using, the "Generic Framework [for] Water (GFW)".

Designing a framework that allows models to be interchanged at will (desirable for a number of reasons, not least to accelerate the adoption of new science) is difficult. The GFW approach to this is to define "unambiguous application programming interfaces (API)" to which the models must adhere. This can be problematic — just because two models tackle the same problem doesn't mean they necessarily have the same data requirements or provide exactly the same information. A rigid API system can result in new approaches to a problem that are incompatible with an existing framework.

This is one area where my own work has an advantage, and it was encouraging to find that others are looking at similar ideas. In "Object-oriented Hydrological Modeling System," Ichikawa and Shiiba describe a framework for constructing hydrological models from smaller components, similar to that described in my own paper. Their work is at a more advanced stage (they offer the software at their website, OHyMoS), but appears to have been applied only to the development of grid-based rainfall-runoff models: it is unclear how easily it could be applied to models of a different structure. Evaluating this is difficult, as much of the documentation is in Japanese! That said, the use of model components that pass data over ports (the basis of both developments) offers the ability to create complex models by linking ports, and eliminates the restrictions introduced by using fixed APIs.

It is unlikely that anyone has ever agreed with everything they heard at a conference, and it was the same in Iowa. During the week, however, I came across some interesting ideas and people.

Orchids go to the British Hydrological Society and the National Science Foundation for their financial support, without which I could not have attended *Hydroinformatics 2000*, and to the conference organisers. An onion to American Airlines, who kept me in Chicago for 24 hours, and were rude and unhelpful.

Hydroinformatics 2002 will be organised jointly by Cardiff and Bristol Universities, and hosted by Cardiff.

David Harvey

Links

Iowa Institute of Hydraulic Research
http://www.iihr.uiowa.edu/
Hydroinformatics 2000 conference
http://www.iihr.uiowa.edu/hydro2000
OHyMoS
http://hywr.kuciv.kyoto-u.ac.jp/ohymos.html
US National Science Foundation
http://www.nsf.gov/

Committee membership

BHS Hon. Treasurer

One nomination was received for the post of Hon. Treasurer: **Steve Parsons** (Mott MacDonald) will take over this role from **Terry Evans** at the AGM.

BHS Committee members

There were just two nominations for the two committee places, so there will be no election. **Murray Dale** (Senior Hydrologist at the Met Office) is very welcome as a new member of the committee, and we welcome back **Hilary Smithers** (Environment Agency, North West Region), previously the Society's Hon. Secretary, and more recently the BHS committee member representing CIWEM.

We warmly thank retiring committee members **Dawei Han** and **Steve Parsons** (although Steve is now taking on the treasurer's role), and especially thank **Terry Evans** for all his hard and extremely efficient work as the Society's Hon. Treasurer.

Publications

Land-ocean interaction book

Land-ocean interaction: measuring and modelling fluxes from river basins to coastal seas, Editors: D. Huntley, G.J.L. Leeks, D.E. Walling. Published by IWA Publishing, July 2001. Price £70 (IWA members £53). ISBN 1 900222 10 8.

This new book publicises the results of the UK Land-Ocean Interaction Study (LOIS), a NERC-funded programme to measure and model the processes controlling the fluxes of materials between river basins and coastal seas.

The main programme of research between 1992 and 1998 involved about 360 coastal researchers contributing to more than 70 collaborative projects.

More details are on the web at http://www.iwapublishing.com/template.cfm?name=isbn1900222108.

New Zealand Journal contents

The latest issue of the *Journal of Hydrology (NZ)* — Vol. **40**, No. 1 — contains papers on

Bedload transport in a meltwater stream, Miers Valley, Antarctica: controls and prediction *(R.M. Hawke & J.A. McConchie)*

Efficient and effective irrigation in the Wairarapa: results from field monitoring *(R.M. Hawke, L.F. Watts & J.A. McConchie)*

Chemical and biotic processes affecting the fate and transport of trace organic contaminants in municipal landfills: a discussion *(R. Herrmann)*

Economic valuation of the Waimea Plains groundwater system *(P.A. White, B.M.H. Sharp & G.N. Kerr)*

Water loss from plantations of Douglas-fir and radiata pine on the Canterbury Plains, South Island, New Zealand *(B. Fahey, A. Watson & J. Payne)*

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Issue No. 17 of *Current*, the NZ Hydrological Society's newsletter, is devoted to the *Fresh perspectives* conference, held jointly with the NZ Meteorological and Limnological Societies last November. As well as the workshops and field trips, it reports on numerous awards and profiles two academics at length.

Their next conference *Just add water* is this November. Contact the conference centre to receive the 2nd circular *(email afsconference@massey.ac.nz)*.

HSJ contents

The latest issue of the *Hydrological Sciences Journal* (Vol. **46**, No. 4) contains the following papers:

Vol. 46 No. 4, September 2001:

G.S. Cavadias, T.B.M.J. Ouarda, B. Bobée & C. Girard: *A canonical correlation approach to the determination of homogeneous regions for regional flood estimation of ungauged basins*

Berhanu Fanta, B.T. Zaake & R.K. Kachroo: *A study of variability of annual river flow of the southern African region*

Zekai Sen & Zeyad Habib: *Monthly spatial rainfall correlation functions and interpretations for Turkey*

Salvador Sánchez-Carillo, Miguel Álvarez-Cobelas, Manuel Benítez & David G. Angeler: *A simple method for estimating water loss by transpiration in wetlands*

E.J. Klok, K. Jasper, K.P. Roelofsma, J. Gurtz & A. Badoux: *Distributed hydrological modelling of a heavily glaciated Alpine river basin*

R.S. Kurothe, N.K. Goel & B.S. Mathur: *Derivation of a curve number and kinematic-wave based flood frequency distribution*

D.H.A. Al-Khudhairy, C. Leemhuis, V. Hoffmann, R. Calaon, I.M. Shepherd, J.R. Thompson, H. Gavin & D.L. Gasca-Tucker: *Monitoring wetland ditch water levels in the North Kent Marshes using Landsat TM imagery and ground-based measurements*

Renaat De Sutter, Andreas Krein & Ronny Verhoeven: *Simulation of sediment transport during flood events: laboratory work and field experiments*

Andreas Krein & Renaat De Sutter: *Use of artificial flood events to demonstrate the invalidity of simple mixing models*

M. Bayazit, B. Önöz & H. Aksoy: *Nonparametric streamflow simulation by wavelet or Fourier analysis*

Plus a book review of *Global Perspectives on River Conservation: Science Policy and Practice*, edited by P.J. Boon, B.R. Davies & G.E. Petts.

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Members wishing to refer to these or other publications may contact the National Hydro-Sciences Library at CEH Wallingford *(tel 01491 692266)*.

Travel grants

Travel grants are available to help 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, looked after by BHS, also pays grants, specifically to help British hydrologists to participate in IAHS activities.

Anyone wishing to apply for a BHS travel grant should contact the Hon. Treasurer, **Terry Evans**, 107 Ely Road, Littleport, Ely, Cambridgeshire, CB6 1HJ *(Tel. 01353 862723, email TEEVANS100@AOL.com)*.

Tropical field hydrology book

The UK Department for International Development (DFID) has provided funding to distribute copies of Henry Gunston's recent book *"Field hydrology in tropical countries – a practical introduction"* to practising hydrologists and teaching institutions in Third World countries. Many have already been sent out, but if you know of someone who would be keen to receive and make good use of a copy, please contact Henry at CEH Wallingford, Maclean Building, Crowmarsh Gifford, Wallingford, Oxon, OX10 8BB *(tel 01491 692452, fax 01491 692424, email hmgu@ceh.ac.uk)*.

Waterways hydrology group

The Inland Waterways Hydrology Group has published its second newsletter, edited by **Henry Gunston** and **Frank Law**. It includes items about historic floods and water supply issues. If you would like a copy (electronic or by post), please contact Henry at CEH Wallingford, Maclean Building, Crowmarsh Gifford, Wallingford, Oxon, OX10 8BB *(tel 01491 692452, fax 01491 692424, email hmgu@ceh.ac.uk)*.

MISER update announced

The MISER water resource modelling suite has been upgraded. For further details, contact Marcus Fowler, Tynemarch Systems Engineering Ltd, Crossways House, 54-60 South Street, Dorking, Surrey RH4 2HQ *(tel 01306 742772, fax 01306 742276, email mfowler@tynemarch.co.uk)*.

FORTHCOMING EVENTS

Future Meetings

Peter Walsh and the Meetings subcommittee are now developing a programme of meetings for 2002.

It is expected to include: FEH experiences two years on, Hydrological aspects of climate change, Monitoring networks, an update on the Water Framework Directive (discussions are being held on the possibility of again holding this jointly with CIWEM and the ICE Water Board), and the Hydrology of the Autumn 2000 Floods. In addition, an approach has been received from the Royal Meteorological Society to hold a joint meeting on Rainfall measurement.

Peter would welcome offers to contribute papers or to organise meetings, including many of the topics above — email *walshpeter@cs.com.*

Diary

5th September 2001
Scottish Hydrological Group
Postgraduate research in hydrology and hydraulics in Scotland (presentations by senior research students.)
Venue: Room T9, Tower Building, University of Dundee
Time: 18.00 – 20.00 *(tea at 17.30)*
Contact: Dr Kate Heal *(tel 0131 650 5420, fax 0131 662 0478, email kate.heal@ed.ac.uk)*

5th–7th September 2001
BHS Postgraduate Symposium
Venue: Dundee University
Contact: Dr Andrew Black *(tel 01382 344433, fax 01382 344434, email a.z.black@dundee.ac.uk)*

19th September 2001
BHS **AGM** and National Meeting
"Water resources planning and development"
Venue: Bristol University
Contact: Sam Green *(tel 01392 443774, fax 01392 443231 email sagreen@south-west-water.co.uk)*

24th October 2001
Scottish Hydrological Group
"Climate change and snow"
John Harrison (University of Stirling)
Venue: Lecture Theatre B4, Cottrell Building, University of Stirling
Time: 18.30 *(tea at 18.00)*
Contact: Dr Kate Heal *(see above)*

17th October 2001
BHS Southern Section meeting
"Recent hydrological developments in China"
Venue: ICE, London
Time: 18:00
Contact: Dr Adrian Butler, Dept of Civil & Env. Engineering, Imperial College, London SW7 2BU *(Tel 0207 594 6122, Fax 0207 594 6124, email a.butler@ic.ac.uk)*

25th October 2001
BHS National Meeting
"Recent advances in hydro-ecology"
Venue: ICE, London
Time: all day
Contact: Dr Mike Acreman *(tel 01491 692443, fax 01491 692424, email man@ceh.ac.uk)*

7th November 2001
BHS Pennines Hydrological Group
"Innovation in flood risk modelling"
Venue: University of Lancaster
Time: 13.00 for 13.30
Contact: Chris Kilsby *(tel 0191 222 5614, fax 0191 222 6669, email c.g.kilsby@ncl.ac.uk)*

21st–22nd November 2001
Royal Society / BHS 2-day Meeting
"Flood risk in a changing climate"
Venue: Royal Society, London
Contact: Hannah Jemmett *(tel 0207 451 2575, email hannah.jemmet@royalsoc.ac.uk)*

21st–22nd November 2001
Irish IHP and ICID meeting
"Flood risk management"
Venue: Tullamore, Ireland
Contact: Mark Adamson *(tel 00353 1 647 6734, fax 00353 1 676 1714, email mark.adamson@opw.ie)*

5th December 2001
BHS Southern Section meeting
"New measurement techniques in hydrology"
Venue: Dept of Civil & Environmental Engineering, Imperial College, London
Time: 14.00 –17.00
Cost: £3 including refreshments (students free)
Contact: Dr Adrian Butler *(see above)*

6th December 2001
Scottish Hydrological Group
"SUDS: perceived principles and progress in Scotland"
Chris Jefferies (Urban Water Technology Centre, University of Abertay, Dundee) and Tom Wild (SEPA)
Venue: McCance Building, University of Strathclyde
Time: 18.30 *(tea at 18.00)*
Contact: Dr Kate Heal *(see above)*

12th December 2001
BHS South West Section meeting
"Advanced remote sensing techniques in hydrology"
Venue: Peel Lecture Theatre, School of Geographical Sciences, University of Bristol *(no charge for attending)*
Time: 14.00 – 17.00
Contact: Dr Paul Bates, School of Geographical Sciences, University Road, Bristol BS8 1SS *(tel 0117 928 9108, fax 0117 928 7878, email paul.bates@bristol.ac.uk, web http://www.bris.ac.uk/)*

31st January 2002
"The history and future of water and plumbing development"
A lecture by Chris Binnie *(+ a dinner)*
Venue: Institution of Electrical Engineers, Savoy Place, London WC2R 0BL
Contact: Ralph Riley, Worshipful Company of Water Conservators *(tel 0208 421 0305, email watercol@aol.com)*

BHS website advertising rates

The BHS website is happy to provide links to relevant sites, but will make a charge for placing adverts and linking to commercial sites (e.g. consultancies), at the Committee's discretion.

For placing an advert (single page or pdf) the charge will be £50 for up to three months. A link to a commercial website will cost £250 per annum.

The BHS mailbase should be used to tell members about a new advert or link, rather than to circulate adverts.

Copy deadline for *Circulation* No. 71 7th October 2001