THE NEWSLETTER OFTHE BRITISH HYDROLOGICAL SOCIETY

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Another successful Postgraduate Symposium

Newcastle upon Tyne
1st - 3rd April

The University of Newcastle upon Tyne was the venue of the Sixth BHS Postgraduate Symposium. Fifteen of the 35 delegates gave presentations. These were on a wide range of subjects, reflecting the breadth of research in hydrology today. The BHS President, **Prof. Mike Hamlin**, attended the first day of the symposium and gave a presentation based on his experience in hydrological modelling.

In the evening **Dr Paul Younger** started a debate on the nature of hydrology and hydrologists, which provoked lively discussion particularly about the science/engineering divide.

The second afternoon was spent visiting the Kielder Water Scheme. The field trip consisted of climbing the valve tower at Kielder Reservoir and seeing both the Kielder hydro-electric power station and the Riding Mill pumping station in action.

An anonymous vote was used to decide who had given the best presentation and should therefore receive the £50 book token. **Michael Steel** (University of Dundee) was awarded the prize for his presentation: "Extreme rainfall, climatic variability and the modelling of flood risk." This was particularly flattering considering the high quality of all the presentations.

Julia Sherwood
University of Newcastle upon Tyne

President's Prize

Nominations are requested for the 1996 President's Prize, to be presented at the AGM in September.

This prize was inaugurated to recognise services to hydrology, and it was first awarded last year to Prof. Des Walling. The prize will now be given biennially, alternating with the Penman Lecture prize, awarded at the National Hydrology Symposium.

Please send nominations, with a short statement of the nominee's contribution to hydrology, to the Hon. Secretary, Dr Paul Younger, Dept of Civil Engineering, University of Newcastle, Cassie Building, Newcastle upon Tyne, NE1 7RU.
Fax: 0191 222 6669, E-mail: p.l.younger@newcastle.ac.uk

BHS on the Internet

Recent months have seen considerable developments in the use of the Internet by the BHS. The Society operates an electronic mailing list, and a comprehensive set of World Wide Web pages. This article introduces both and provides information on how they serve the Society's membership and how you can access and utilise them.

Electronic mailing list

An electronic mailing list is an extension of electronic (e)mail. A mailing list consists of names and email addresses of list members held on a central computer server. When a message is sent to the list by a list member, all other list members are automatically emailed a copy. This means that announcements, enquiries or opinions can be addressed to the entire list membership by sending one email message.

When it was set up, it was hoped that the mailing list would evolve to become an active forum for the discussion of technical and scientific hydrological problems; where opinions could be expressed; meetings, seminars and conferences publicised; calls for papers made; research studentships, job vacancies, scientific papers, reports and theses advertised. This has only happened in a limited way so far, and I urge you to join the list — the more members there are, the more lively and useful the list will be.

Joining the mailing list is quick and simple. (The only cost for home-based emailers is the telephone bill.) To join, send the following one-line email message:

join bhs-hydrology *Kevin Tilford*
(substituting your own name)
to: mailbase@mailbase.ac.uk.

The subject header can be left blank and list commands can be in UPPER, lower, or mIxEd case. Your name will automatically be added to the list; you will receive an introductory message which provides full details about the mailing list and guidelines for its use, and you will start receiving messages from the list.

Once you have joined the list you can begin to contribute to it. To do so, send your message to:

bhs-hydrology@mailbase.ac.uk.

Once submitted, your message will automatically be sent to all the list members — you will also receive a copy from the list.

World Wide Web Pages

The BHS World Wide Web pages, first put on-line in May 1995 have recently undergone a complete redesign. The pages are extensive and incorporate a considerable amount of information on the Society: its structure and organisation, a hydrological Situations Vacant page, the Rolling Programme of BHS Meetings, the Consultants Register and much, much more!

The pages can be read by anyone with access to the Internet and a Web Browsing program such as Netscape or Mosaic. They perform two roles: they are a source of BHS-related information, and they are a worldwide shop-window for the Society. It is hoped that the pages will prove extremely useful to the BHS membership, while simultaneously raising the profile of the Society and British hydrology worldwide.

The pages can be browsed by opening the following address (URL):
http://www.salford.ac.uk/civils/BHS/BHS_Homepage.html

This will take you to the BHS homepage — the starting point for your browsing. From there you can access all the other information.

The pages are constantly being updated and expanded. Ideas for the future development of the pages, and any comments (hopefully constructive) are welcomed.

If you have any enquiries or questions about the WWW pages, the mailing list or anything else raised in this article, please contact Kevin Tilford. Tel.: 0161 734 5000 ext. 3458; fax: 0161 745 5060;
email: k.a.tilford@civils.salford.ac.uk.

Kevin Tilford
University of Salford

President's piece

I have often wondered what Councils of Professional Institutions discuss. Little thought seems to be given by many of them to communicating the salient points of their discussions to members. I am sure the BHS committee is not immune to this criticism.

At the last committee meeting held on 17th April the agenda included the normal reports from the President, the Treasurer and the Secretary. Amongst other items, my report included the occasions on which I had represented the BHS at meetings and formal functions, as well as my attendance at the sixth Post-Graduate Symposium in Newcastle. The Treasurer reported on the satisfactory financial position and the committee decided on the mechanism for distributing the interest from the Exeter Fund to enable members to attend the IAHS General Assembly in Rabat during May 1997. The Secretary gave a full account of the Post-Graduate Symposium. The committee then spend some time planning the programme for national meetings for the remainder of 1996 and for 1997.

There were a number of other important issues. The committee discussed a request from the European Geophysical Society to support a publication to rival the *Journal of Hydrology*, which has become so expensive as to be beyond the means of most individuals. More importantly we discussed the professional publication of our BHS symposia and occasional papers. **Celia Kirby** reported on her discussions with two publishers and the committee asked for a full report so that a decision could be taken at the July meeting and a proposal put to the AGM on 10th September.

The format of the AGM was also discussed. When it is circulated, I hope all BHS members will agree that the programme is an attractive one: I hope that many of you will wish to attend. Please note the date in your diary.

Kevin Tilford ran a demonstration of the current BHS pages on the World Wide Web, and I hope that those members with access to the Internet will look at the BHS pages to see what an excellent job Kevin has done.

The committee saw the final form of the BHS response to the Prior Options Review. In response to a request from the Environment Agency the committee suggested names to be forwarded as BHS nominations for the eight local Environment Protection Advisory Committees.

The committee also discussed a letter from **Susan Walker** on the assistance BHS should give to young scientists from developing countries to attend the Exeter conference — an issue you will recall I raised in my *President's Piece* in the February *Circulation*.

She writes: "In discussing the financing arrangements of the 1998 Conference Organising Committee, the idea of a 4% overhead on registration, to provide bursaries to assist young hydrologists in need, was accepted. However, it occurred to me that it may be an opportune time to raise again the idea which I had regarding a voluntary contribution, in addition to the BHS subscription, which members may wish to make to set up a travel fund. This would allow us to supplement the 4% levy on registration.

"I thought it would be useful to ask for the voluntary contributions annually, alongside the subscription reminder. However, I wonder whether we could initiate the fund by a flyer in the next edition of *Circulation*. We could particularly link it to assisting young hydrologists attending the 1998 Exeter event as an example of how the monies would be used. We could thereafter ask for voluntary contributions routinely with the subscription reminder."

With the Committee's support, I agreed to prepare a form of words for the next meeting, which we could approve for sending out with the August issue of *Circulation*.

M J Hamlin

Travel grants committee

A subcommittee has been set up to administer the interest from the Exeter Fund and other travel grants. Its four members are the President, the Hon. Treasurer, Dr David Collins (IAHS rep. on the BHS committee) and Dr Jim McCulloch.

Applications for grants from the Exeter Fund to attend the IAHS General Assembly in Rabat in May 1997 should be made ***by the end of August*** to the Hon. Treasurer, Dr Richard Harpin, Sir William Halcrow & Partners, Burderop Park, Swindon, Wiltshire, SN4 0QD. The committee will then decide how to allocate the money and let applicants know by early October.

Generally, grants of up to £100 are available to help members with the cost of attending meetings (see *Circulation 38* to *47*). Successful applicants are expected to produce a short report of their experiences in attending the meeting.

Any enquiries should be made to **Richard Harpin** (tel/fax 01793 812479).

Continuing Professional Development (CPD)

CPD seems set to become the issue of the nineties as far as the technical professions are concerned. Some people already see it as the thin end of the wedge, leading us steadily towards statutory registration, similar to the schemes in professions such as medicine and law, accompanied by a radical reorganisation of the institutions which run our professional activities. The two engineering institutions of most relevance to BHS members, CIWEM and ICE, have already implemented voluntary CPD schemes, which could soon become obligatory.

Whether they are engineers or not, hydrologists had better take a close look at the way in which CPD is being implemented, and are well advised to set up their own personal schemes of personal development with a formal system for recording it. Why? Because the world is becoming a very litigious place, and because employers want proof that their employees have kept up with the rapid changes in science, technology and management. And because CPD shows to any interested person that you are taking your role as a professional seriously. What is CPD? CPD is a programme of training which enables you to consistently develop your professional knowledge and skills (technical and managerial) throughout your working life. At present it is seen by CIWEM and ICE as a programme which is devised by yourself, administered by yourself, recorded and assessed by yourself.

Myself? Yes, it is assumed that anyone calling themselves a professional would wish to treat personal development as a serious endeavour, and carry it out in a carefully planned and structured way, and reflect periodically on the success of their scheme and their needs for the future. Pompous or what! Well yes, but you know it makes sense. And you know it has to be better to start sooner rather than later.

OK, I'm sold. So how do I do it? Well the planning is entirely up to you, and depends on how you perceive your needs. Similarly, only you can tell how much you have benefitted from a CPD activity. Just make sure that you allocate time for planning and assessment.

The recording can be done in any way, as long as copy records are available. It's not good enough just to note things in your work diary though. Both ICE and CIWEM provide proformas for keeping a log. What kind of activities count? Again, only you can tell. You alone know where your personal needs for development lie. A whole range of things could be considered beneficial: attendance at meetings, conferences, courses, self-planned study, presentation of papers, helping to run professional societies, etc. ICE has a guide to help you identify suitable training courses (ICE 105). Your record should give an assessment of the value of these activities in relation to your personal goals.

How much do I have to do? ICE recommend 5 days a year, CIWEM say much the same, but give ideas on rolling targets, minima and maxima. Both institutions give ideas on how to assess the time value of an activity.

Do BHS meetings qualify? They do if they meet your personal needs. There is no system of accrediting meetings with "CPD hours", because the value depends on the individual concerned. Any advertisement for a course, conference or meeting which implies that it is "approved" for CPD is therefore misleading. What if I am working towards some level of chartered status? CPD is absolutely essential: check your chosen institution's requirements.

Is CPD likely to become mandatory? There will certainly be an important debate on this in the coming few years, so make your opinion known. At present ICE says CPD is "recommended", CIWEM says that it is voluntary, but that it is scheduled to become obligatory at 1 January 1997. Recent comments from CIWEM suggest that the date for change to "obligatory" status will be reviewed at the end of this year, so a 1997 start now appears to be unlikely. Other Engineering Council bodies also appear to be anticipating a lengthy period for appraisal during which CPD will remain a voluntary activity: watch this space.

These are the personal views of Rob Drayton.

New environment agency takes shape in Scotland

The Scottish Environment Protection Agency (SEPA) took over the duties of the Scottish River Purification Boards, HMIPI and District Council waste regulation functions on 1st April, 1996. The move parallels the creation of the Environment Agency in England and Wales, but important differences between the two countries will remain. SEPA will not have a land drainage function and ministers have not taken the opportunity to introduce more comprehensive control of water abstraction in Scotland.

SEPA has a head office in Stirling and three geographic regions: West, East and North, based on the catchment areas of predecessor river purification boards. The West, based at the old Clyde RPB office, East Kilbride, encompasses the areas of the former Clyde and Solway RPBs. The East Region has headquarters in the old Forth RPB Edinburgh base and is formed from the Tweed, Forth and Tay RPBs, whilst the North Region covers the old Highland and North East RPBs and the Islands Councils and is based at Dingwall.

Hydrology will continue to be operated from the regions, although some policy coordination will be established by the new Directorate of Environmental Strategy based in the Stirling HQ. The hydrology teams of the old RPBs have been transferred unchanged into the Regional structure, although a Head of Hydrology has been created at each Regional base.

Some new hydrological tasks have been given to SEPA. The new legislation requires it to provide guidance on Flood Risk to planning authorities, when consulted, and it is thought that this will develop into a more active role in flood risk assessment. It was also thought likely that the regulatory functions in the 1975 Reservoirs Act would pass from the Regional Councils to SEPA, but a later decision on this has delayed transfer. These functions passed to the new unitary authorities on the demise of the Regional Councils on March 31st, pending legislation to eventually transfer them to SEPA, perhaps in 1997.

Several BHS members have been affected by the new structure. **James Curran**, formerly with Clyde RPB, is now Head of Science and **Bob Sargent** has moved from Forth RPB to become Head of Environmental Services. Both are now based at SEPA headquarters, and together they form a strong hydrology presence in the Environmental Strategy Directorate. The new Heads of Hydrology in the Regions are **Richard Brown** in the North, **Ian Fox** in East Region and **John Burns** in the West.

Bob Sargent
Head of Environmental Services, SEPA



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Can weather radar forecast rainfall at lead times of 1 hour up to 2.5×10^5 years?

Modern radar systems (operating at frequency ranges from audio to visible) have a broad application in remote sensing of the environment — from space, airborne and ground-based platforms. Radars operating from 3 to 10 GHz are commonly used to observe and forecast weather patterns and rainfall amounts: the weather radar network in the UK operates at 5.6 GHz (C-band).

Weather radars (depending on design) can measure the strength (amplitude) and phase of the signal returned from precipitation particles. Determining hydrometeorological information from these returned signals can be difficult, requiring adjustments and corrections (Collier, 1989). These difficulties can be due to the way the radar samples, to effects inherent at the operating frequency and to the precipitation type. However, many of these can be tackled by a range of procedures, some within limits acceptable to the data users and some that still require improvement. The problems are by no means solved, and this is an active area of research, but despite measurement inaccuracies, weather radar still provides spatial and temporal accuracy unmatched by other observing instruments. One common example is the comparison of radar and raingauges for measuring rainfall (Hardaker, 1995).

The advent of radar rainfall estimates has opened the door to many forecasting applications that would never have been possible based on raingauge information alone. This is especially so in hydrology, where the control of real-time urban water management systems was never practical with just raingauge information. The application of radar-based forecasting in the UK, unlike many countries in Europe, has been driven largely by the hydrological community. Indeed, the current radar network is strongly supported by hydrologists, and six of the eight radars in England and Wales were 50% funded by the Environment Agency (EA).

Since the late 1970s a range of radar-based forecast tools have been developed to help forecast rainfall rates and accumulations over significant catchments. Simple cross-correlation methods (Austin and Bellon, 1974) provide useful information over very short periods, up to one hour, but only in certain types of events. Systems such as FRONTIERS (Browning and Collier, 1982) and the now operational Nimrod system (Harrison *et al.*, 1995) can extend this forecast range out to around six hours by combining the radar with other observational and model data.

Heavy rainfall from convective, or embedded convective, events is of primary importance to hydrologists, particularly in urban areas. These events are often the hardest to predict accurately in current forecast schemes. Both in the UK, with the GANDOLF system, (Collier *et al.*, 1995) and in the USA (Wilson and Mueller, 1993), attempts have been made to use physically-based conceptual models, selected objectively and automatically by observations, to improve forecasts of heavy rainfall. Such systems have yet to demonstrate their usefulness in operation, but early tests look promising. New methods can also help in estimating the time ahead to which forecasts are useful: that is they out-perform a persistence forecast, based on environmental conditions (Zawadzki *et al.*, 1994). This information is of great benefit to operational flood control centres. Coupled with the development of new radar technology and observational techniques, these systems should improve the ability of radar to forecast accurately up to about three to six hours ahead.

Radar also provides an opportunity to improve the performance of Numerical Weather Prediction (NWP) models, with impacts on forecasts from 1 to 120 hours (5 days) ahead. Through data assimilation schemes, radar observations offer the possibility of improving the moisture content fields, and through Doppler radar the accuracy of wind field information, held within these computer models. This requires radar measurements to be properly quality controlled and to cover a wide enough area of the model grid to have a useful impact. In the UK the finest scale operational forecast model is the Mesoscale Model, which can produce precipitation up to 30 hours ahead for the UK and surrounding area. The model grid area is 92 x 92 points in total with a grid length of 16.8 km.

The scale of radar data is also ideal for the initialisation and improved performance of the smaller scale (less than 1 km) cloud models, such as those based on large-eddy simulations (Mason, 1994). This is required if they are to be used in future developments of operational model forecasts, which are already driven by radar data in the USA (Lin *et al.*, 1993), but have not yet been demonstrated in operation.

As well as assimilation procedures, radar can also help to improve understanding of processes in the atmosphere, which is important since they govern the characteristics of the rainfall at the surface. Some of these processes are on a smaller scale than the model grid resolution and so need to be parameterised in the model. Radar observations can provide an ideal way to improve their representation and understanding. Work is under way in the Met Office to do this for convective precipitation.

Radar also has application in improving the return-period analysis of wind and rainfall events, used by engineers building large civil and defence structures. This information is based so far on limited point observations, and is therefore restricted in its use and quantitativeness. A long archive of radar information, which does not exist at present, is required for these studies, although the Met. Office are currently improving and upgrading the weather radar data archive. Even without long records, radar, together with satellite information, is already helping in the recognition of precipitation systems that are likely to impact on design engineering and that otherwise would not be identified. An example is the Mesoscale Convective System (MCS) described by Browning and Hill (1984), which is extremely important to flood hydrologists (Hardaker and Collier, 1996).

Without long records of radar rainfall estimates, radar can still help to forecast events on extremely long time scales, and so provide guidance in areas such as reservoir safety studies and dam designs. Recent studies in the UK (Austin *et al.*, 1995), Malaysia (Collier and Hardaker, 1995) and Greece (Hardaker, 1996) have used radar-derived storm efficiencies in the calculation of Probable Maximum Precipitation (PMP). PMP is an important design parameter in reservoir engineering and can affect the height of the dam face and the capacity of the dam spillway itself. In recent studies in the UK it was found that PMP estimates for longer duration storms (in excess of 11 hours) are likely to be the result of stationary MCS events, estimated to have a return-period of the order of 1 in 250 000 years (Collier and Hardaker, 1996).

Weather radar provides a great deal of variety in measuring and forecasting for hydrology at a range of time scales and forecast lead times. While rainfall estimates from conventional radar systems are widely used, new radar technology has not yet been brought to bear on key problems in hydrology. This is because of the additional costs of the new technology and partly because it is not operationally mature,

but both of these aspects are likely to change over the next five years. Techniques such as Doppler and polarisation-diversity, together with new phased array electronic scanning systems, are set to improve both qualitative and quantitative estimates of rainfall, and so to increase the ability to forecast hydrologically significant events.

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Young persons' meeting

BHS (Midlands) and CIWEM (West Midlands) joint meeting
The University of Birmingham
18 October 1995

This meeting at the School of Civil Engineering at the University of Birmingham was planned to encourage younger members to participate in the activities of BHS and CIWEM. It also provided an opportunity to promote the respective merits of the two organisations to students and graduates of relevant disciplines (who are prospective members). The chairman *Paul Webster* welcomed the 60 delegates. The first part of the meeting, promoting the activities of BHS and CIWEM, was followed by three technical presentations.

BHS and CIWEM

The first speaker was **Richard Cross** (NRA Severn Trent Region), the young persons' representative on the BHS Midlands Committee. He gave an introduction to BHS, discussing its structure and the benefits of membership: local meetings, the quarterly *Circulation*, the biennial national symposium and the annual postgraduate symposium (to be held at Newcastle in April 1996). The Society's links with ICE, IH and IAHS were described, and also the memorandum of understanding between BHS and CIWEM, which covers joint meetings, publications, education and training. Routes to chartered status via CIWEM, ICE and the Royal Meteorological Society were mentioned. Richard finished by stating the aim to have 1000 members of BHS by the year 2004, through a process of sustained growth and maintaining the society's independence.

Julie Robinson (Severn Trent Water) then introduced the attributes of CIWEM, a large organisation with membership across a broad range of disciplines. The benefits of membership were highlighted: a full programme of professional meetings, symposia held abroad, links with other international organisations (such as the American EPA) and a journal produced every two months. Routes to chartered status were discussed, together with links to chartered membership of other professional institutions. The cost of joining CIWEM is significantly higher than BHS, but still compares favourably with other chartered bodies, and the benefits of membership were said to outweigh the costs.

The question time that followed highlighted the lack of meeting reports in the CIWEM journal compared with the regular reports in BHS Circulation. Julie Robinson said this was being addressed and write-ups may be included in the regional newsletter. There was a perception that membership of CIWEM was primarily for professional status, whereas BHS provided more activities of value and interest to its members. The loss of the *Water and Environmental Management* magazine following the sale of Thomas Telford publications to EMAP was regrettable, but hopefully the publication would be restored in future.

Flow measurement by the rising air float technique

The first technical presentation was by **Chris Toop** (now of Parkman Consultants) who described an alternative means of river flow measurement he had investigated for his MSc industrial project (sponsored by HydroLogic Ltd.) on the Water Resources Technology and Management course at the University of Birmingham. The RAFT or integrating air float technique uses a reinforced PVC pipe with drip irrigation nozzles inserted at intervals of 250 mm. The pipe is placed across the river bed, perpendicular to the flow, and air is pumped through the pipe, causing bubbles to rise from the nozzles. These bubbles are carried downstream by the flow and they form an arc across the river when they reach the surface (Figure 1). Research has shown that the bubbles reach terminal velocity (v_t) almost instantaneously, and this velocity is combined with the area of the bubble envelope to calculate discharge, using the simple formula $Q = A.v_t$. The area of the bubble envelope can either be measured manually in the stream or computationally by digitising photographic images.

Chris carried out laboratory tests to

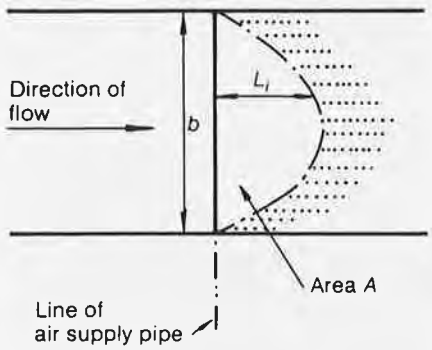


Figure 1a Form of bubble envelope on water surface (plan view)
from Sargent, D.M., *Proc. Instn Civ. Engrs Pt 2*, **71**, March 1981, Fig. 2, p. 3.

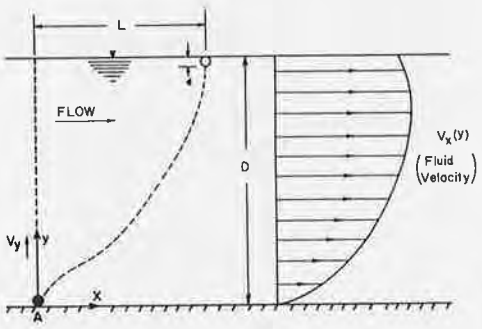


Figure 1b Rise of float in open channel flow (cross-section)
from Liu, H. & Martin, A.M., *J. Hydraul. Div. ASCE*, **94**, HY5, 1968, Fig. 1, p. 1247.

determine the optimum pressure that would ensure uniformity of bubble size and hence uniformity of rising velocity. Bubbles were released in a flume and observed with a video camera. A graduated scale in the water enabled the bubble size to be measured on the video freeze frame. An air pressure of 10 pounds per square inch was found to give the best results, producing bubbles 10 to 12 mm in diameter. It was found that an increase in water depth led to a decrease in bubble velocity. This presents no problem for spot gauging, as the pressure can be adjusted in the field to give the required diameter and velocity, but a permanent installation would require some means of accounting for this, such as a relationship between depth and bubble velocity.

Two field sites were chosen adjacent to Environment Agency (then NRA) gauging stations on the River Tame and the River Rea in Birmingham, enabling calculated flows to be compared with the gauged flows. Photographic images of the bubble envelope formed on the river surface were examined using a Global Lab image analyser, but the images had to be enhanced manually before the area could be calculated by this technique. It also led to under-estimation of the area compared with measurements in the field.

Chris concluded by saying that the RAFT remains a viable technique for spot gaugings, because air pressure can be adjusted until it is suitable, and the area of the bubble envelope can be measured manually. Further work is necessary on digital area measurement and the variation in bubble velocity due to water depth before the technique can be used in a permanent installation.

Flood forecasting at the Severn-Vyrnwy confluence

The second technical presentation by **Dave Lindsay** (NRA Severn Trent Region) also covered work done on his MSc project at the University of Birmingham. The aim was to set the groundwork for improving flood warning at Shrewsbury, about twenty miles downstream of the Severn-Vyrnwy confluence. Dave showed an interesting set of slides illustrating the extent of recent flood events and hydraulic features at the confluence that complicate the difficult task of flood prediction, done using hydraulic computer models.

The confluence of the Severn and Vyrnwy occurs on a wide floodplain, in an area of gently sloping farmland (Figure 2). The hydraulic characteristics of the area are complicated by the presence of earth embankments (known locally as argaes) to protect low-lying land from flooding. These have led to a complex out-of-bank flow and storage regime, which is difficult to model. There are two other features that further complicate accurate modelling. The *Morda Gap* is a low point on the divide between the catchments of the River Morda (a tributary of the Vyrnwy) and the Weir Brook (a tributary of the Severn downstream of the Vyrnwy confluence). When flow starts to rise in the River Vyrnwy, flow backs up into the River Morda, leading eventually to water spilling out through the Morda gap. The *Hayes Basin* is a large depression at the downstream end of the confluence area (Figure 2) with much of the land below river bank level. Once the river starts to go out of bank, it spills into this basin,

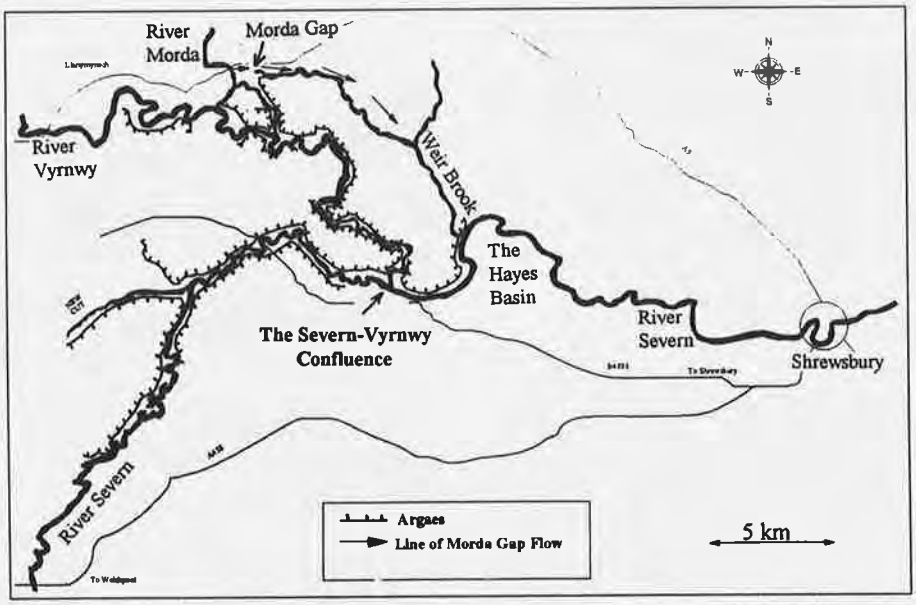


Figure 2 The Severn-Vyrnwy confluence

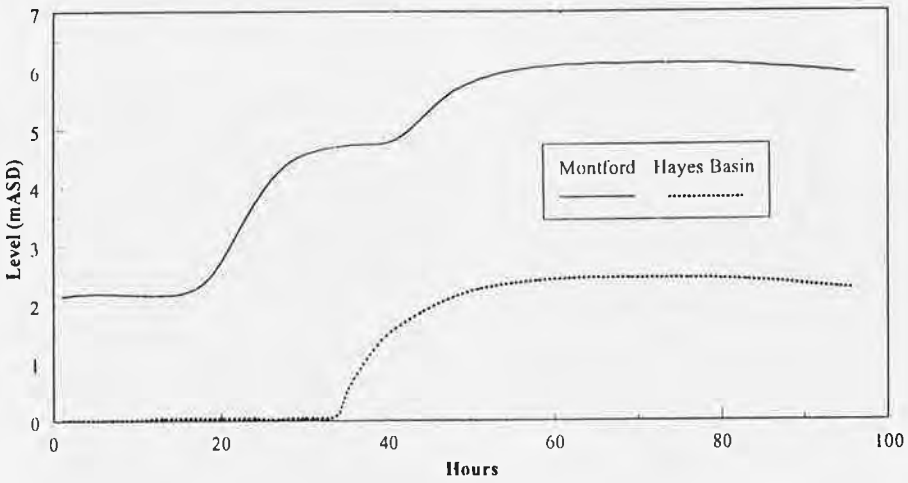


Figure 3 The Montford shelf (data from 26 to 30 December 1994)

causing the hydrograph of the Severn at Montford gauging station to remain at a constant level until the basin is full and starts to spill back into the river. This results in a characteristic shelf on the hydrograph (Figure 3).

The NRA uses the catchment runoff and flow routing model FFS II to forecast downstream flows and levels. This model can give reasonable results in simple river channels, but in more complex situations such as this it is less reliable. Dave examined this model together with two others: the Variable Parameter Diffusion model developed at Hydraulics Research in the 1970s, and HYDRO, a one-dimensional hydrodynamic model developed by Mott McDonald. Despite some errors in the configuration of the HYDRO model to the Severn-Vyrnwy confluence area, and its one-dimensional limitations with respect to out-of-bank flow, it does give the most accurate results of the three, although data input and run times can be slow.

The final recommendations were (i) to improve model inputs by installing telemetered level gauges on the Morda and a tipping-bucket raingauge, (ii) to improve understanding of the physical processes, by current meter gauging under flood conditions and archiving model results compared with actual recorded flows, and (iii) to modify FFS II to enhance performance, and in the longer term, introduce a new hydrodynamic model to give more accurate flood forecasts.

Campaigning for catchment protection

The final presentation was by **Alison Court** (Severn Trent Water) on 'Campaigning for Catchment Protection'. This programme run by Severn Trent Water aims to reduce contamination of water resources. It is split into three categories: SPRAYSAFE covering non-agricultural pesticides, CHEM-E-SAFE covering industrial chemicals from industry and transport and FARMSAFE covering agricultural chemicals, silage and slurry.

The chemicals simazine and atrazine were banned in 1993 because of their effect on water quality, but usage of isoproturon and mecaprop remains high. Recent high peaks of pesticides due to inadequate treatment have resulted in water quality standards sometimes not being met, with levels of 2 $\mu g\ l^{-1}$ compared to the standard of 0.1 $\mu g\ l^{-1}$. Treatment of polluted water is very expensive: in particular, contaminated groundwater resources can remain unfit for drinking water supply because of the excessive treatment costs required. It is much better, therefore, to prevent pollution than to attempt to treat it later.

The campaign targets groups and individuals whose activities put public water supplies at risk of contamination, either by normal operating practices or through potential accidents. For example, pesticides are used by a variety of organisations, such as local authorities, public utilities and farmers: they are all being encouraged to reconsider their usage. This will involve considering whether a pesticide is really needed at all, and if so how much and what type is required (i.e. is it necessary for a residual to remain in the soil?), and then to consider where it is being used (will any excess be washed straight into water courses?). Herbicides used on non-agricultural land are significant in causing the drinking water standard of 0.1 µg/l to be exceeded, because applications on hard surfaces (e.g. roads) will lead to high levels of runoff. Non-agricultural users are easy to target, because they are a small discrete group, but agricultural use is by large numbers of individual farmers.

Reducing chemical usage involves work with Railtrack which controls weed growth on railway lines by using herbicides. This has involved identifying sensitive areas and switching to non-residual herbicides. A joint campaign between Severn Trent Water and the British Agrochemical Association has identified pilot catchments and is trying to address farmers' views. A catchment information service (CATCHIS) has been set up covering soil, climate, pesticide characteristics and land use. Hazards other than pesticides include cryptosporidium, which may be present in watercourses, but a farm slurry spill could raise levels sufficiently to result in overloading of a water supply treatment works.

Alison concluded by describing the perceived way forward for the campaign, which is to work closely with the NRA and Environment Agency, learn from the pilot studies, improve and extend liaison with local farmers and raise awareness of catchment risks.

Paul Webster closed the meeting by summing up the benefits of the two organisations, particularly organising informative meetings. He thanked all five presenters for their contributions.

Owen Bramwell
University of Birmingham

High magnitude precipitation-flood events in the Midlands

BHS Midlands Section / Royal Met. Soc.
University of Birmingham
22nd November 1995

This joint meeting of the Midlands Section of the British Hydrological Society and the West Midlands Centre of the Royal Meteorological Society included three presentations followed by an open forum for discussion.

The first paper, 'Rainfall: analysis and mechanisms' was by **John Kings**, a meteorologist in the School of Geography at the University of Birmingham. Using data for 200 years (since 1793) for the Birmingham area, with the last 120 years considered homogeneous and stationary, he examined various monthly time series: (a) total rainfall, (b) highest daily rainfall and (c) the number of rain days (defined as more than 0.2 mm). The analysis showed these measures to be fairly equally distributed throughout the year, with February and September having the greatest coefficient of variation.

John Kings then posed the question "What is high magnitude rainfall?" A literature search reveals numerous definitions: most of them seem to lack statistical vigour. In general, high magnitude is often confused with intensity, being referred to as heavy rainfall and, as a consequence, thresholds are too high. In the UK, heavy rainfall is defined by WMO and UK Met. Office as rainfall exceeding 4 $mm\ h^{-1}$. Consequently, John suggested that definitions of extreme and high-magnitude rainfall should be re-examined and more appropriate definitions and statistical treatment sought. Exemplifying this, using daily rainfall since 1930 and taking a threshold of +3 standard deviations (for Birmingham this is 15 $mm\ day^{-1}$), a 'new' distribution and time series (Figure 1) was constructed. This can be treated as an extreme value distribution, allowing return periods to be

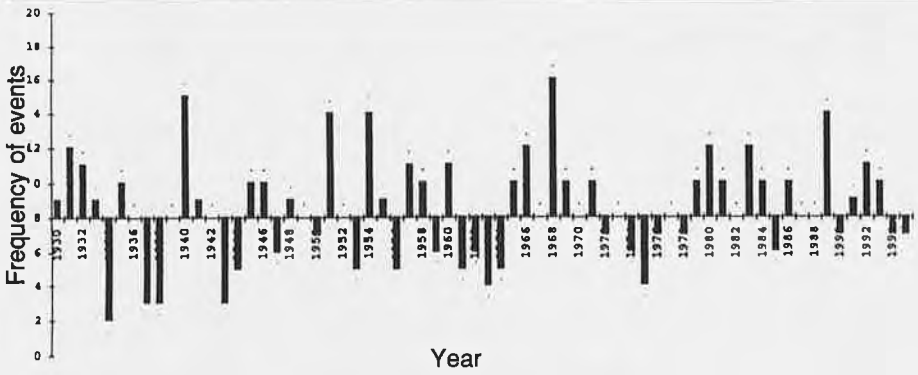


Figure 1 Extreme daily rainfall in Birmingham, 1930-1995

derived. Further analysis of the time series reveals variability but little trend. Attention can then turn to the synoptic mechanisms involved with this class of events, an aspect rarely treated in the literature.

In conclusion he emphasised the importance of synoptic mechanisms. Although it might be thought that the Cyclonic weather type produced these events, he showed that the Cyclonic Easterly also contributed a significant number of high magnitude or extreme daily rainfall events in the West Midlands.

Paul Webster (University of Birmingham) asked to what degree the Birmingham site is representative of the West Midlands — does the city have an influence? John said that convective mechanisms are locally distributed within the conurbation, but he was confident that the station is representative. However, variability depends on the month and rainfall type.

Dr Richard Harding (Institute of Hydrology) presented a paper on the contribution of snow melt to flooding. Using data from Edgbaston for days with snowfall and days of snow lie 1945-1995, he emphasised the inter-year variability of snow and the runs of snow-free years. In spite of this variability, snow melt can contribute significant proportions of flood waters, amounting to at least 16% in England and Wales and 27% in Scotland. Generally, snow melt events contributed 15-55 mm per day, with rates up to 100 mm per day in upland areas.

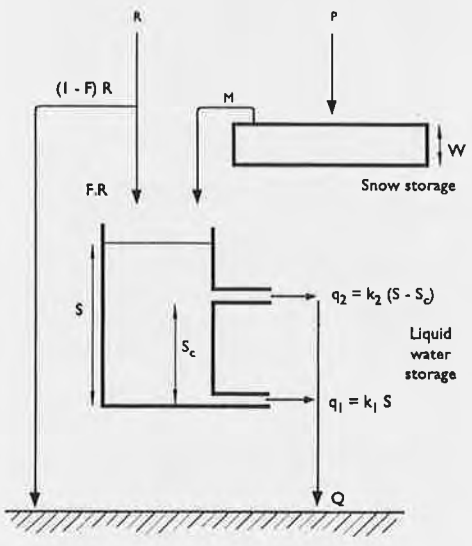


Figure 2 The PACK snowmelt model

In the UK, the primary causes of snow melt are sensible heat exchange with high winds and temperatures above zero, often associated with frontal systems. Considering the physics of snow melt process, Richard went on to review the meteorological parameters in snow melt models. He showed a schematic diagram of the pragmatic snowmelt model PACK (Figure 2), designed to improve flood forecasting by monitoring both the static and the dynamic components of snow melt. Citing examples such as the 1947 floods, he said that rain on snow can cause significant amplification of floods. He concluded that a physically based snow melt component of a flood forecasting system is desirable and also practical.

Richard Douglas (Severn Trent plc) asked if weather radar has been used to estimate snowfall. Dr Harding felt that the weather radar interpretation techniques being presented are very hopeful, but there are problems with calibration. In response to **Andrew Carvel**'s question about the use of remote sensing to estimate snow cover, he considered that microwave technology had the advantage of penetrating cloud cover, but much better resolution is still required.

The final paper, on recent Midland flood events, was by **Tim Harrison** (NRA Severn Trent Region). He began by showing slides of flooding along the River Severn and an impressive video of the Epney flood event (25 February 1990) when river flooding, high tides and strong winds coincided. Although the recent floods of the Severn did not reach the 1946-7 level, floods between 1989 and 1995 seem to have been more frequent, but with lower return periods. The results show on average a one in five year flood for every year in the last six years (Table 1).

Tim presented interesting results on the December 1993 to January 1994 flood, which lasted for 46 days, flooding 275 properties, although the magnitude only reached the 1 in 10 year flood at Shrewsbury. Between 2nd December 1993 and 15th January 1994, 600 mm of precipitation fell in the upland parts of the Severn catchment. Using a number of key stations, he demonstrated how this long period of flooding was transmitted down the Severn. At Welsh Bridge, Shrewsbury, the hydrograph peaks reflected the individual storms, with a gradual build up as flood plain storage filled, to the highest peak of 4.2 m, recorded on 25th December (Figure 3a). At Saxon's Lode, 110 km further down-river, levels rose close to the red warning threshold, the peaks were more subdued and duty officers remained on permanent alert for 46 days (Figure 3b). At Gloucester Docks, the river flows were insufficient for flooding, but the coincidence of three cycles of high spring tides and hydrograph peaks presented two periods of potentially serious risk (Figure 3c). In order to account for this pattern of flooding on the Severn, Tim presented rainfall data for Lake Vyrnwy and the Clywedog Dam. Rainfall data for the winter months only (December to February) for Vyrnwy (1909 to 1995) showed the

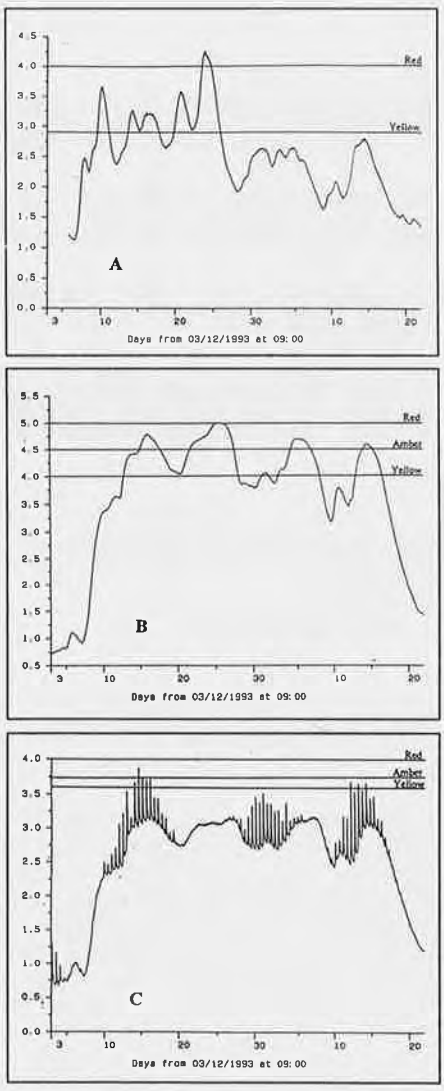


Figure 3 Hydrograph progressing down the Severn

YEAR	MONTH	SHREWSBURY	BEWDLEY	WORCESTER	TEWKESBURY	GLOUCESTER
89	Dec	MAF - 3	< MAF	4 - 5	5	4
90	Jan/Feb	7 - 9	6 - 7	10 - 15	15 - 20	30 - 40
91	Jan	< MAF	MAF	MAF - 3	4	< MAF
92	Nov/Dec	MAF - 3	3	7 - 8	10	< MAF
93/94	Dec/Jan	8 - 10	6 - 8	5 - 6	3 - 4	MAF - 3
94	Dec	7 - 9	3 - 4	3 - 4	MAF - 3	4 - 6
95	Jan/Feb	5	4	5 - 6	5 - 10	5 - 10

Table 1 River Severn flood return periods, 1989-1995 (MAF = Mean Annual Flood)

highest values in 1989, 1993 and 1994. Annual rainfall for Clywedog Dam (1971-1994) showed a 2.5% increase since 1985.

Alec Willis (Hydro Logic Ltd.) asked, in view of the evidence, whether a flood protection scheme for Shrewsbury should go ahead. Tim Harrison replied that a £4 million proposal submitted by the NRA had been rejected.

The meeting concluded with an open forum with the guest speakers. **Dr David Mitchell** (University of Wolverhampton) asked if the influence of climatic change was responsible for changes in flooding. John Kings considered that it was a case of 'weather system variability' rather than 'climatic change'.

Alastair Dale (Symonds Travers Morgan) asked about using the flood plain for storage of flood waters and **John West** (University of Birmingham) enquired whether farmers were cooperative with flood warnings. In Tim Harrison's experience, the farmers in the Severn flood plain are most cooperative. The NRA has operated a successful flood warden system in the Upper Severn for many years, to disseminate flood warnings.

Considering the long-term record of flooding at Shrewsbury, Paul Webster observed that the highest events in 1946-47 were not caused by the wettest winters. Richard Harding, Richard Douglas and Tim Harrison explained that heavy rainfall following a large accumulation of snow, created rapid snow melt in 1947, and rainfall intensity, not volume, had been the main factor in 1946 and in many of the major floods in the 1960s.

David Mitchell and Andrew Barton
University of Wolverhampton

Hydrological aspects of small-scale hydro-power in Scotland

Scottish Hydrological Group Meeting
Glasgow
1 February 1996

Paul Jowitt, Chairman of the Scottish Hydrological Group, began the meeting with a brief AGM, before introducing the evening's guest speaker, *Richard Hackett*.

Richard described his company (EHS Consult Ltd, Edinburgh) as a small group that had completed nine schemes (a total of 2.9 MW) and had conducted 30-40 site feasibility studies. He then turned his attention to introducing the Scottish Renewables Order (SRO) that has in the last couple of years opened the market to small-scale sustainable energy supplies. The objective of the Order is to facilitate 1500 MW of renewable power in the UK by the year 2000. Since the Order's announcement in December 1994, 15 small hydro schemes (<5 MW) have been awarded contracts. Richard put forward the case that it was quite possible to construct such schemes in an environmentally unobtrusive way.

In terms of hydrology he highlighted the importance of using accurate flow duration curves (FDCs) in the feasibility studies to calculate the potential for power generation. His real interest was to estimate the FDCs between the Q_{30} and the Q_{80} percentiles to prevent expensive mistakes from being made. Methods available to produce the FDCs included (i) gauged data, (ii) scaling from nearby gauged catchments, (iii) rainfall runoff models and (iv) the Low Flows Studies reports (LFSR). He was anticipating FDC errors to be about 10-15% to permit effective economic appraisal, but had found that the errors in both the 1987 and 1992 LFSR procedures require further investigation for application to upland Scottish catchments.

Richard recognised that uncertain values for both rainfall and evapo-transpiration in the uplands could be introducing errors into the LFSR procedure, but he also questioned the suitability of the LFSR regression equations to the whole of Scotland, where, he said, considerable variability in the natural upland terrain existed.

He illustrated the problem with several case studies. He compared estimated flows between the Q_{30} and the Q_{90} percentiles to measured flows, and found errors ranged from 10-25% for the stations considered. This, he said, clearly caused problems in bidding for SRO contacts, since they are awarded to the lowest bid price, but going in too low results in economic failure.

He saw two possible ways of improving matters. He wondered if refining the Hydrology of Soil Types (HOST) Groups for Scotland would help the LFSR approach, quoting a case study by Curran (Clyde River Purification Board) where an improvement of

around 15% in the expected error of $Q_{95}(1)/Q_{95}$bar resulted from carrying out a local study within the Clyde RPB's area using an approach similar to the HOST group methodology.

Secondly he thought that careful use of rainfall runoff models might allow sufficiently accurate annual estimates of the quantity of water flowing between the Q_{30} and Q_{80} percentiles. He went on to illustrate this with an encouraging case study using the model HYRROM.

Problems in the hydrological predictions were not the only problems that he faced in his site appraisal. Indecision about the minimum level of compensation flow required was also of great concern and needed rapid clarification from the authorities.

Summarising, Richard pointed out the benefits of a sustainable energy resource, that Scotland had 88% of the UK potential, and that small-scale hydro schemes would be good for the Scottish economy. In terms of the hydrology he felt that improvements to the assessment might be possible by refining the HOST version of Low Flows Estimation, or possibly by using appropriate rainfall-runoff models.

Richard Brown (Highland RPB) was invited to lead off the discussion. He congratulated Richard on such a good talk and raised the important issue of compensation requirements. Who did he think was best placed to set these, and on what basis? The speaker noted that the legal situation in Scotland makes no specific compensation requirement, so long as downstream interests are not disadvantaged. He suggested that responsible hydro planning was always likely to favour some compensation provision, but suggested that there may be many aspects of this 'can of worms' for the Scottish Environmental Protection Agency to tackle in the future.

Bob Sargent (Forth RPB) asked what the financial implications of changing from a Q_{95} to a Q_{90} threshold would be to a scheme. Richard suggested that a change of 75 l s^{-1} could result in a £10 000 – £15 000 loss. **Robin Wardlaw** (Edinburgh University) asked if continuous flow monitoring over the structures was normally made. Richard only knew of two examples. Robin also asked if the rainfall runoff approach would suffer from a lack of accuracy in the rainfall data sets from upland sites. Richard agreed that the lack of high level gauges, orographic influences and undercatching 12"-high gauges did make the task more difficult.

John Riddell (Strathclyde University) suggested that the criteria for compensation flows should also consider the duration of continuous low flows. Bob Sargent echoed this and suggested that a habitat simulation model could be helpful. **Alastair Ward** (Scottish Office) suggested that local fishery concerns would be quick to raise objections to proposed alterations to flow — and they were a powerful lobby in Scotland.

Dick Johnson (Institute of Hydrology, Stirling) asked if any of the methodologies for predicting flow duration curves would take snow into account. Richard admitted that snow caused problems, as did freezing conditions in general. He felt that the processes governing snow weren't sufficiently well understood to be incorporated into an model.

David Price
Institute of Hydrology, Stirling

New Members

We welcome the following members to the Society:

Alker, G.R.	Reading
Al-Nammari, S.S.	Stirling, Scotland
Brasington, J.	Hull
Brown, M.W.A.	Environment Agency, Warrington
Brown, R.R.	London
Chaudhry, M.A.	Edinburgh
Franks, S.W.	CRES, University of Lancaster
Gergov, G.	National Institute of Meteorology and Hydrology, Bulgaria
Huntley, K.	SEPA, Perth, Scotland
Lane, A.	Warrington
MacDougal, K.A.	Glasgow
Robb, G.A.	Bristol
Robinson, Dr M.	Institute of Hydrology, Wallingford
Sawkins, J.W.	Heriot-Watt University, Edinburgh
Sherwood, J.M.	Leeds, West Yorkshire
Turpin, O.C.	Dept of Geography, University of Sheffield
Wallis, A.	Environment Agency, Anglian Region
Wilson, J.	Dept of Agric. & Environmental Science, University of Newcastle

Letters to *Circulation*

Hydrometry overseas revisited

From David Archer, Quetta, Pakistan
17 February 1996

Dear John,

I noted with interest the discussion in *Circulation 44* on the parlous state of hydrometry overseas and James Robertson's letter about his experiences in East Africa. Having also worked in East and Central Africa I thought I had experienced the full range of hydrological fabrications and misconceptions, but I have come upon a new set in Balochistan, the western semi-desert province of Pakistan. The following note appeared in the 1970 station file for a gauging station on the Khost River at Chapper Rift, the only station with a stilling well and recorder in the province. The bed is very mobile and the control unstable, and at the time the note was written two of the four inlet pipes were blocked.

"During continuous low flow periods, the gauge observer tried to keep the level of water so as to ensure the water entering the intake pipe. He thus maintained a pool level and whenever it tried to decrease in discharge he raised the level by putting more stones on the abstracted (sic) bund formed by him. The Junior Engineer or Senior Research Assistant present at the site and even the Senior Engineer seemed to be ignorant about the mistake being committed by the Observer and any of them might have suggested him to do so."

I examined the level record for the same station for the last ten years and was suspicious of its curious hydrological behaviour. A visit to the station showed that by now all four inlet pipes were completely buried and the only access to the well was seepage through the frame of an inspection window. The downstream bund was still a regular feature of the station and the observer assured me that he had always kept it well maintained.

Pity the hydrologist trying to squeeze data from the station or the dam, or the irrigation engineer depending on it for design!

Yours sincerely,

David Archer

Floods and sheep – is there a link?

From Dr B.M.J. Barton, Corby Glen, Lincs. 19th March 1996

Dear Mr Griffin,

Anne Sansom's article in *Circulation 49* raised a number of intriguing points. I do however feel that her indictment of sheep may be somewhat overstated. The real culprit, if there is one, is more likely to have been the deforestation of the Pennine uplands, centuries before the recent shift in the population balance between sheep and cattle.

Are cattle really any more "environmentally friendly" than sheep? Admittedly sheep do graze closer to the turf than cattle but the damage caused by trampling cattle to riparian meadows and river banks is considerably worse than anything sheep are capable of.

Many country churchyards utilise controlled grazing by sheep as a cheaper and neater alternative to machine mowing, but who in their right mind would let a cow into a churchyard?

Where sheep can cause a problem is when they behave "like sheep", following in each others footsteps and creating narrow bare sheep-tracks. This is a recurring irritation to anyone having to maintain a sheep-grazed flood bank but is essentially a localised problem. The suggestion that sheep and hedges cannot coexist is questionable and, in any case, are hedges a significant feature of the Pennine dales?

Where Ms Sansom may have a valid point is the damage caused by sheep to heather moorland, but this is hardly a recent phenomenon. It is difficult to accept that a shift from cattle-based to sheep-based husbandry should have produced the radical overall changes in both unit hydrograph and baseflow characteristics of the two large Pennine catchments required to produce the significant increase in flood frequency alleged.

Perhaps the fundamental question is this: is there any firm statistical evidence that the floods in the Swale and Ure catchments have become more frequent in recent years? We should be very careful before assuming a simple relationship between flood stage and flood flow. Even if a recent increase in flood levels at a given location is significant, might it not be due to the fact that modern floods are better contained than their 19th and early 20th century predecessors? The lower Trent illustrates this admirably: the levels achieved by the disastrous flood of 1947 have been exceeded in recent years without any appreciable inundation resulting.

Severe flooding on Pennine rivers is nothing new, as anyone who knows the area and has read David Archer's superbly researched book *"Land of Singing Waters"* will appreciate. And these floods do occur in the summer months, and they can be very flashy. Before the construction of Cow Green Reservoir the Tees was notorious for its flood wave, levels in the middle reaches rising by three or four feet in almost as few minutes. In the 1960s the then Northumbrian River Authority "lost" a bulldozer in the Tees. It was working in the bed of the river near Barnard Castle regrading gravel shoals when a flood wave struck. The 'dozer driver just managed to scramble to the bank but had to abandon his machine. The Tees flood wave phenomenon was undoubtedly due to a combination of steep thalweg and the very high roughness coefficient of the boulder-strewn channel, but although the Tees may be an extreme example it is not entirely atypical of Pennine rivers — and it is of course immediately adjacent to the Swale.

Whilst not disputing the occurrence of the many extreme-event related phenomena described by Ms Sansom, two questions have to be answered. Firstly, is there any convincing evidence that these phenomena are becoming more frequent or more severe, and if they are, is the cause of these hydrological changes a result of climatic change or land use changes? Only if the answer to the second question is the latter will sheep have a possible case to answer.

Yours sincerely,

Barry Barton

Urban drainage and flood control

Scottish Hydraulics Study Group
Glasgow
22 March 1996

This timely seminar, exploring traditional and innovative approaches to urban drainage and flood control, will probably interest many members of BHS.

Ninety delegates attended this meeting to explore the application of source control measures to urban drainage schemes in Scotland. The opportunity was presented to contrast the "pipe it and pass it on" approach of traditional drainage hydraulics with the environmentally beneficial "local storage and treatment" offered by source control schemes.

Experiences of these source control schemes were described from Sweden and the USA, and their suitability for the climate and runoff patterns found in Scotland was discussed.

The theme was covered by eight papers delivered by a range of local, national and international speakers: **John Gardiner, Yusuf Kaya, Chris Jefferies, Brian D'Arcy, Peter Stahre, Chris Pratt, Alan Frost, Bill Jameson** and **David Ashton**. The meeting was accompanied by a technical exhibition, comprising displays from nine major firms of consulting engineers and product manufacturers.

Each session, morning and afternoon, was rounded off with a lively and thought-provoking discussion period, orchestrated by the day's chairman, **Roy Halliwell** of Heriot-Watt University.

Further details of this meeting may be obtained from **Dr Steve Wallis**, Department of Civil and Offshore Engineering, Heriot-Watt University, Edinburgh, EH14 4AS.

News from Members

Bob Sargent, formerly of Forth RPB, is now Head of Environmental Services in SEPA. His article on the new SEPA appears on page 3.

Congratulations to **Professor Tim Burt** on his promotion from Oxford to a Chair of Geography at Durham University.

IAHS News

The International Association of Hydrological Sciences (IAHS) 5th Scientific Assembly, comprising seven symposia and five workshops, is to be held in Rabat, Morocco, from 23 April to 3 May 1997 — earlier in the year then usual, to avoid the extreme heat. Most of the symposium papers will be pre-published by the IAHS Press.

Proceedings of the six symposia convened by IAHS at the General Assembly of IUGG, Boulder, Colorado, have been published in the IAHS 'Red Book' series.

The new 1996 IAHS Catalogue of Publications contains details of these and other publications. For a copy, please contact the IAHS Press at the Institute of Hydrology, Wallingford, Oxfordshire, OX10 8BB *(Tel. 01491 692442, Fax 01491 692448 or 692424, e-mail jill@iahs.demon.co.uk).*

The *International Hydrology Prize* (awarded jointly by UNESCO and WMO) was awarded to **Professor John Philip** from the CSIRO Centre for Environmental Mechanics, Australia. His work has contributed greatly (over more than 40 years) to the understanding of water movement in the soil/plant/atmosphere continuum, and he has also made a study of the life of Darcy in Dijon.

The *Tison Award,* for an outstanding paper by a young scientist in an IAHS publication, went to three Dutch scientists, **W G M Bastiaansen, D H Hoekman** and **R A Roebeling,** for their paper in IAHS Special Publication No. 2 (1994), entitled *"A methodology for the assessment of surface resistance and soil water storage variability at meso-scale based on remote sensing measurements".*

Individual membership of IAHS is *free* and open to all. Members are expected to work in some field of hydrology, to participate as much as possible in IAHS workshops and symposia, and to contribute papers to *Hydrological Sciences Journal.* To join IAHS, please contact the Secretary General, Dr G. J. Young, Department of Geography, Wilfrid Laurier University, Waterloo, Ontario, Canada, N2L 3C5, Fax +1 519 846 0968 or +1 519 725 1342, e-mail 44iahs@mach1.wlu.ca

The IAHS newsletter may be found on the World Wide Web at http://www.wlu.ca/~ wwwiahs/index.html

What's in a name?

No attempt has been made to edit any environmental organisation's names in this issue, but from next time, I shall try to refer to the correct organisation in all articles for *Circulation.*

No Millennium funding for *2000 years of hydrology* CD

Sadly, the Millennium Commission has let **Prof. Ken Gregory** and his committee know that the BHS bid to coordinate a group to produce a WATER-2000 CD has not won its 50% funding.

Competition is always tough, and we have not quite caught the judges' eyes. BHS will now have to decide whether to rebid in the next round in the same or an altered form, or whether to hope that one of the Trusts we have approached will be more responsive.

Max Beran (in particular) put in a lot of good work to get to the second round with a credible text, and the committee secured some worthy patrons. One consolation is that the science programme of the NERC Centre for Ecology and Hydrology (which includes the Institute of Hydrology) now embodies a specific sub-area called Environmental History, in which there is a lot of potential.

Perhaps the Earth Centre, an earlier Millennium winner, will have a space for hydrology?

Frank M Law
Institute of Hydrology

Wetland studentship

A three-year NERC Research Studentship on *Marshland hydrological processes and salinity dynamics: Science for modelling and management* is open to UK and EU citizens.

This is a CASE studentship with English Nature and the Institute of Hydrology to look at the hydrology and salinity of the marshes and ditches of the North Kent Marshes — SSSIs, SPAs and Ramsar Sites, managed through reserves, management agreements, MAFF ESA payments and long-established agriculture.

The CASE Partners will be English Nature's Kent Team (Robert Cameron, Tel: 01233 812525 Fax: 01233 812520) and the Institute of Hydrology (Dr Mike Acreman, Head of Hydroecology, Tel: 01491 838800 Fax: 01491 692424).

Enquiries should be addressed to Dr G.E. Hollis, Wetland Research Unit, Department of Geography, University College London, 26 Bedford Way, London WC1H 0AP. Tel: 0171 387 7050 (ext 5520) or 0171 380 7551 (secretary), Fax: 0171 380 7565, e-mail thollis@geog.ucl.ac.uk Information about UCL Geography is at: http://www.geog.ucl.ac.uk

FORTHCOMING EVENTS

Meetings

1st International Conference on GEOCOMPUTATION
Leeds
17-19 September 1996

This conference aims to bring together emergent computer-based techniques in geography to transfer methods between the different areas of research and thus drive future developments.

Sessions will cover expert systems, neural networks, fractals and chaos, data analysis and data mining, GIS, macro- and micro-modelling and scaling, process-based and fuzzy modelling.

Abstracts of papers should be submitted by **15 May 1996;** publication of accepted papers is anticipated.

Further information (including the updated list of speakers) is available on the World Wide Web — http://www.geog.leeds.ac.uk/geocomputation.html — or from Tracey Harris, School of Geography, University of Leeds, LS2 9JT (tel 0113 233 3324, fax 0113 233 3308, Email geocomputation@geog.leeds.ac.uk).

1996 Western Pacific GEOPHYSICS MEETING Brisbane, Australia 23-27 July 1996

There is a new special session in the Hydrology Programme for this Meeting, sponsored by the American Geophysical Union, devoted to El-Niño/Southern Oscillation, Climate and Hydrology. See the World Wide Web pages: http://earth.agu.org/kosmos/wpgm96ca.html#brisbane

For details contact F. Chiew, Dept of Civil and Environmental Engineering, University of Melbourne, Parkville, Vic 3052, Australia. Fax: 61-3-93446644, email:fchs@engineering.unimelb.edu.au

Diary

5th June 1996
BHS National Meeting
"Floodplain restoration"
Venue: Birmingham
Contact: Andy Large, University of Newcastle upon Tyne *(Tel 0191 222 6342, Fax 0191 222 5421)*

10th June 1996
Water Board Half-Day Meeting
"Sustainable catchment management"
Speakers: John Gardiner, Kathy Kennedy, Craig Woolhouse, Emma Edward-Jones and an "expert panel"
Venue: ICE, 1 Great George St, London
Time: 1.00 to 4.30 p.m.
Contact: Richard Howard, ICE, 1 Great George Street, London SW1P 3AA *(Tel 0171 839 9836, Fax 0171 799 1325)*

18th June 1996
BHS South West Section Meeting
"Hydrology and nature conservation"
Venue: Bristol *(details to be confirmed)*
Time: 6.00 p.m. for 6.30 p.m.
Contact: Bill Finlayson, RUST Environmental, Queen Victoria House, Redland Hill, Bristol BS6 6US *(Tel 0117 973 9090)*

8th – 11th July 1996
IAHS / BHS — Interceltic Colloquium
"Hydrology and Water Management"
Venue: Rennes, Brittany
Contact: Alain Jigorel *(Fax +33 99 63 67 05, e-mail:* alain.jigorel@insa-rennes.fr*)*

10th July 1996
BHS / Geological Society Joint Meeting
"Aquifer properties"
Venue: University of Newcastle
Time: 6.00 p.m. for 6.30 p.m.
Contact: Dr Paul Younger, Dept. of Civil Engineering, University of Newcastle upon Tyne *(Tel 0191 222 7942, Fax 0191 222 6669, e-mail:* p.l.younger@newcastle.ac.uk*)*

15th – 19th July 1996
IAHS — "Global Patterns of Erosion and Sediment Control"
Venue: Exeter University
Contact: Prof Des Walling, Dept of Geography, Exeter University, EX4 4RJ. *(Tel 01392 263345, Fax 01392 263305)*

30th August – 2nd September, 1996
Conference on Buffer Zones
Venue: Heythrop Park, Woodstock
Contact: Dr Nick Haycock, Quest Environmental, P.O. Box 45, Harpenden, Herts. AL5 5JL. *(Tel/Fax 01582 764727, e-mail:* NEHaycock@eworld.com*)*

3rd – 5th September 1996
UNESCO IHP-V Conference
"Conflicts in reservoir development and management" (see *Circulation 46*)
Venue: City University, London
Contact: Mrs Pat Walker *(Tel 0171 477 8141, Fax 0171 477 8570, e-mail* PWalker@city.ac.uk*)*

10th September 1996
BHS National Meeting and AGM
"Capturing the hydrological cycle" — Dr John Rodda (Honorary Member)
Venue: Imperial College, London
Contacts: Dr P L Younger *(address above)* or Prof. H S Wheater, Dept of Civil Engineering, Imperial College, London SW7 2BU *(Tel 0171 589 5111 ext 4736/4720, Fax: 0171 823 8525)*

10th September 1996
Welsh Hydrological Group AGM
"River Wye Gauging Station"
Venue: Univ. of Wales College Cardiff
Contact: Dr Rob Drayton, 208 Fidlas Road, Llanishen, Cardiff CF4 5NA *(Tel 01222 754879, Fax 01222 754879)*

8th – 10th September 1996
"Nitrogen deposition & acidification of natural ecosystems"
Venue: MLURI, Aberdeen
Contact: Dr Sue Bird, MLURI, Craigiebuckler, Aberdeen AB9 2QJ *(Tel 01224 318611, Fax 01224 311556, Email* mi307@mluri.sari.ac.uk*)*

8th – 12th September 1996
Geological Society Meeting
"Contaminated land and groundwater"
Venue: University of Portsmouth
Contact: Prof David Lerner, University of Bradford *(Tel 01274 385 470, Fax 01274 383 888)*

11th – 13th September 1996
"Multiple land use & catchment management"
Venue: MLURI, Aberdeen
Contact: Dr Sue Bird *(address above)*

17th – 19th September 1996
1st International Conference on "Geocomputation" *(see Meetings)*

18th September 1996
CIWEM One-day Conference
"Water resources – planning for peak demand"
Contact: Hannah Sime, CIWEM Conferences *(Tel 0171 831 3110, Fax 0171 405 4967)*

24th – 26th September 1996
Sixth ERB General Assembly
"Ecohydrological processes in small basins"
Venue: Strasbourg, France
Contact: Dr Mark Robinson, Institute of Hydrology *(Tel 01491 838800, Fax 01491 692424)*

15th or 23rd October 1996 (to be confirmed)
"Water resource modelling"
Venue: York
Contact: Dr Kevin Tilford, University of Salford *(Tel 0161 745 5000)*

6th November 1996
BHS / NERC Joint Meeting
"HYREX"
Venue: Institution of Civil Engineers
Contact: Prof H Wheater *(address above)*

Copy Deadline for *Circulation* No. 51 9th July 1996

Committee nominations

Nominations are now invited for the positions of *President-Elect* (to succeed Mike Hamlin as President next year) and *Hon. Secretary*, as well as for one *ordinary member* of the BHS Main Committee (which meets four times a year in London). A nomination form is enclosed with *Circulation*.

Circulation is the quarterly newsletter of the British Hydrological Society. It is issued free to members, but is also available on an annual subscription of £20. All enquiries concerning membership should be made to Richard Howard, Institution of Civil Engineers, 1-7 Great George Street, London SW1P 3AA. Telephone 0171 839 9836. Please address all other correspondence to the Editor, John Griffin, Institute of Hydrology, Wallingford, OX10 8BB. Telephone: 01491 692395. Fax: 01491 692424. Email b.h.s@ua.nwl.ac.uk.

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