THE NEWSLETTER OF THE BRITISH HYDROLOGICAL SOCIETY

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BHS AGM

This year's Annual General Meeting is to be held at the University of Birmingham on 10th December 1990. Please return your booking form promptly.

Report of the Honorary Secretary

for the year ending 30th September 1990

This, the seventh, Annual Report of the society's activities is a statement of continued growth and development. Since the Inaugural Meeting of the British Hydrological Society on 1st November 1983, the Society has progressively expanded its membership and its range of activities whilst at the same time continuously reviewing these activities and looking to consolidate successful initiatives. I am pleased to report that 1990 has been a successful year for the Society in all these areas. The Main Committee met on four occasions and enjoyed strong support from its officers and members.

Our current membership is 589, an increase of 2.2% over the year. This includes 536 full members and 53 students. The Society is keen to increase our membership and the Committee is continuing its endeavours in this area. The BHS/Welsh Water Hydrology prizes have proved attractive and have helped to increase the numbers of student members in particular and to promote the Society in general. The Committee gave further consideration to the issue of Honorary Membership and the guidelines for selection and election of Honorary Members were adopted following a postal ballot.

The Society will also be strengthened by the decision to include nominated members of the Institution of Civil Engineers Hydrological Groups on the Main Committee. This amendment of the statutes, approved by the membership in a postal ballot, strengthens liaison between BHS, its Sections (Midlands, Southern and South Western) and the ICE Hydrological Groups (Scottish, Pennines and Welsh). Through this new initiative, the Committee is seeking to develop improved communications between, and a coordinated range of activities for, all hydrologists throughout Britain.

Our programme of scientific meetings remains the focus of the Committee's activity, and we endeavour to provide a variety of traditional and new themes at venues located throughout the country. This year the meetings have included: Computer Simulation Techniques in Water Management, The Future of Distributed Modelling, and the 1st Symposium on Postgraduate Hydrology. The postgraduate symposium was a new venture which proved highly successful, with 35 postgraduates from 12 institutions participating. It is hoped that this will be an annual event and in 1991 the 2nd Symposium on Postgraduate Hydrology will be held at Polytechnic South-West from 15th to 17th April.

There were also two important jointly-sponsored meetings. The first, 'Natural Disaster Reduction: How Meteorological and Hydrological Services Can Help', co-sponsored with the Royal Meteorological Society, was held to mark World Meteorological Organization Day 1990 and the start of the United Nations International Decade for Natural Disaster Reduction. The second was the international conference on River Flood Hydraulics, co-sponsored with the International Association of Hydraulic Research, National Rivers Authority (Thames Region), Institution of Water and Environmental Management, and the Overseas Development Administration. Papers from both meetings have been published, the former in the March issue of *Weather* and the latter as a book with the same title published by John Wiley & Sons. The one negative point in an otherwise highly successful programme was the postponement of the North Tyne Field Meeting planned for October. Despite an excellent programme combining papers on aspects of both operations and scientific research, with visits to the Kielder Dam and research sites in the catchment upstream and downstream, the meeting had to be postponed due to a lack of interest as indicated by the small number of advance bookings.

It is my personal experience of meetings - both national and regional - that there is a 'turn up on the day' mentality operating. Unfortunately, such an approach is not appropriate when for obvious logistical reasons, meetings require detailed advanced planning. In all societies it is difficult to persuade members to complete and return forms, be they for meetings or ballot papers! Nevertheless, the Committee needs members to make advance bookings if we are to offer more specialist types of meetings.

The Society's Regional Sections and ICE Hydrological Groups have provided a range of attractions for members over the past year including meetings on River Flows and Channel Geometry; Chalk, Groundwater and Low Flows; Monitoring and Prediction of Sahel Rainfall; Soils, Water and Engineering; Aspects of Flooding on the Thames; 1989 and Beyond - Climate and Water Management; Environmental Impact of the Channel Tunnel; Climatic Changes in Seal-level Rise (the

Pennines Group's 21st birthday meeting!); and a visit to the North of Scotland's Hydro-Electric Power Board's centre at Dingwall. The Southern Section has been particularly active.

The Education and Training Sub-Committee has had a very active year under the energetic direction of Dr Sue Walker. Under pressure from the Society, the Institution of Civil Engineers has set up a working party to review the academic requirements of specialists including hydrologists who wish to achieve chartered status. The Institution is also considering the production of an advisory document to assist hydrology candidates in the interpretation of the objectives of the new ICE training scheme.

A sub-committee has been formed to deal with international links with hydrological societies and other related organisations. The Royal Society has agreed that the Society will act as the UK learned society responsible for links with ICSU and IASH. The BHS has also established links with the European Geophysical Union and has negotiated 'Institutional Membership' through which members of BHS will be able to join EGS at a significantly reduced annual subscription.

At the end of my second, and final, year as Honorary Secretary, I am pleased to report that the society, through its Main Committee, has sustained the momentum of previous years. As we move towards our tenth birthday I am confident that the Society will move from strength to strength. Certainly I have been impressed by the enthusiasm and energy that individuals have devoted to all the Society's activities. The 3rd National Hydrology Symposium is planned for September 1991 (see *Circulation* No 27 for details) and the Organising Committee is working to provide an event no hydrologist should miss!

I am grateful to Norman Tyler and Peter Bacos and to all members of the Main Committee, especially our Presidents past and present, Peter Wolf and Allan Lambert, for their support throughout my period of office. I look forward to the continued growth of the Society, and to enjoying its coming of age in 2004!

Geoff Petts

Report of the Honorary Treasurer

The 1989-90 financial year ended on 30th September, with a balance in the BHS account of £3,793. This represents a modest improvement compared with last year's figure of £2,519, though it is still well below the balance of £4,461 achieved at the end of 1988. For a society of the size of BHS, this 'float' is by no means large and provides only a small cushion against any potential financial losses to be incurred by the Society.

During the last year there has been a marked increase in the cost of staging meetings. This led to the Main Committee insisting that a minimum charge be levied for all BHS National Meetings. The decision was taken with regret, but in these increasingly commercial times even universities are being required to charge realistic prices for the use of their facilities for meetings. When BHS was formed, the view taken then was that following payment of the subscription fee, attendance at meetings should be free. With the low level of subscription charges, this is no longer attainable. Hence, the Society is faced with the choice of either substantially increasing the subscription fee in order to subsidise meeting expenses or to charge a realistic registration fee for individual meetings.

The feeling of the Main Committee is that the cost of meetings should be borne by those attending, especially as the meeting fees are more often paid for by the employer than the individual. The subscription fee is usually paid by the individual. However, we clearly do not want a situation arising where members are unable to attend meetings because of the cost, so the onus is on those organising meetings to keep costs down as much as possible.

On a more positive note, BHS was delighted to receive a cheque for £437 from the Scottish Hydrological Group, as our share of the profits from the meeting on the Hydrology of Landfill Sites, held jointly with the Scottish Associations of the ICE. This offset what would have been a loss on Regional and National Meeting expenses this year. We have been able to keep the costs of preparing and distributing *Circulation* and meeting notices down by ensuring that as much information as possible goes into each mailing. In addition, the anticipated increased printing costs associated with *Circulation* will not be felt until the 1990/91 financial year.

The subscription charges for the 1990/91 year represent an increase of £2 for members and £1 for student members. This is an increase above the level of inflation but is to help finance a 'one off' payment for the production of a new style combined Membership Directory and Directory of Hydrology. The new style will be a ring binder which will hold the two directories in a loose-leaf format. Whilst the initial cost of the binders is high, subsequent editions will be much lower since all that will be required is replacement of the loose leaves. Because of the cheaper cost, it will be possible to update the document each year rather than every two years as is the case at present.

During the next financial year the 3rd National Symposium will be held at Southampton. It is expected that this event will be self financing, especially with the generous financial support being provided for the event by the National Rivers Authority.

In conclusion, I would like to thank Mary McBride and Marianne Foster of the Institution of Civil Engineers for all their hard work on behalf of BHS and for helping enormously during my first year in office.

Sue Walker

International Association of Hydrological Sciences

The Association is the oldest and foremost international non-governmental body dealing with hydrology and water resources. It was founded in 1922, incorporating the International Commission of Glaciers, to bring together individual hydrologists to promote the sciences that involve them. IAHS provides a means for discussion and publication of the results of research and practice, particularly those of hydrological problems and water resources initiatives that require international collaboration and cooperation. The Association is a constituent body of the International Union of Geodesy and Geophysics (IUGG) which is itself a member of the International Council of Scientific Unions (ICSU). The Association cooperates actively with other non-governmental organisations concerned with water and with international governmental agencies with programmes in the same field such as UNESCO, WMO and UNEP.

Although all hydrologists can take part in any of the Association's activities, there are benefits for individual membership. Applications for individual membership should be made to the respective National Committee for IAHS or directly to the Secretary General.

Within the structure of IAHS there exists a General Assembly formed by the delegates from each country adhering to IAHS through IUGG. The General Assembly elects every four years the IAHS officers: the President, three Vice Presidents, the Secretary General, the Treasurer and the Editor. The Assembly also elects the officers of the six commissions and one committee: these bodies are the International Commissions on Surface Water (ICSW), on Ground Water (ICGW), on Water Quality (ICWQ) and on Water Resources Systems (ICWRS), and the International Committee on Remote Sensing and Data Transmission (ICRSDT). Specific Working Parties are also established from time to time. The officers of the IAHS and the immediate Past President and the President of the commissions and committees form the Bureau.

IAHS regular publications:
Hydrological Sciences Journal (6 times a year)
Proceedings of Symposia (6-12 a year)
Monographs and Reports
IAHS Yearbook (every 4 years)
Catalogue of IAHS publications (every 2 years)
IAHS Newsletter (3 times a year)

The Association makes an annual award to distinguished hydrologists, jointly with Unesco and WMO, of a silver medal known as the International Hydrology Prize. A further award, known as the Tison Award, is to be made annually to a young hydrologist on the basis of the best paper published in one of the IAHS publications.

Further information from:
IAHS Secretariat
P O Box 67
2600 AB Delft
The Netherlands
Tel: +31 15 69690
Fax: +31 15 571201

RIVER FLOOD HYDRAULICS

International Conference 17-20 September 1990

This four-day Conference at Hydraulics Research Ltd, Wallingford, co-sponsored by BHS, was well attended by 120 delegates, of whom 47 were from overseas. Over the four days of the conference, 46 papers were presented and visits to either the Thames Barrier or the newly re-constructed weir at Goring-on-Thames were organised for the afternoon of the second day. The papers were very efficiently pre-published in a 500-page hardback book by John Wiley & Sons: copies may be purchased for £60.00.

The conference was opened with a 30-minute address by the **Rt. Hon. John Gummer MP**, Minister for Agriculture, Fisheries & Food. Although his speech had been written for him by a member of staff at MAFF, John Gummer gave a very clear, well-argued presentation of why flooding, not just fluvial, but also tidal, was of relevance to the British economy and to MAFF.

He obviously had a good knowledge and understanding of the topic and made one or two interesting points. One was that the general public have no real understanding of the concept of risk. Thus, once the NRA (or its predecessor the Water Authorities) undertake a flood protection scheme for a stretch of river or coastline, the public assumes that there will be no more flooding - **ever!** However this is not economically feasible and the scheme will in fact have been designed with some risk in mind. Thus, for alleviation of urban flooding, schemes may be designed to withstand the 100-year flood, and hence the town or city should now expect flooding only once every 100 years on average. Members of the public do not generally understand this, which leads to pressures on planners to permit development on areas now incorrectly perceived as being fully flood-protected.

John Gummer then went on to discuss the implications of global warming and rising sea level for MAFF's planned flood defence budgets. He pointed out that there was not yet an agreed scenario of by how much sea level might change over the next 50 to 100 years: indeed some experts maintained that the so-called 'greenhouse effect' was a myth. However, the consensus amongst scientists and engineers was that there would be significant rises in sea level, and possibly increased rainfall and runoff over parts of Britain. Thus MAFF was spending a great deal of money now, both on research into the problem and in constructing raised defence levels. He felt that as responsible engineers we should be acting **now** on what were the best estimates of the effects of global warming. It would be irresponsible to do nothing until it had been definitely established that sea levels were rising: then it would be too late to do anything positive.

The Chief Executive of the NRA, **Dr John Bowman**, then gave an introductory address to the conference on the role of the NRA in flood and sea defences. He reiterated the final point made by John Gummer that a significant rise in expenditure on flood protection is needed over the coming years because of the forecast effects of global warming. The NRA had been born into turbulent times climatically, having experienced consecutive severe droughts in the summers of 1989 and 1990, separated by the major flood on the Severn in February of this year and the major sea wall breach in North Wales. The Thames barrier had been raised three times in 1990 to protect central London, more than in all its preceding years of existence.

The NRA would be spending over £1 million per year on research and development and major investments would also be made on:

(i) improving and making more consistent flood warnings;

(ii) carrying out major improvement in sea defences and repairing the damage caused by last winter's floods;

(iii) improving lines of communication with other bodies responsible for flood protection and informing the public of what was being done.

The main conference

The conference itself was divided up into a series of topics and papers presented in the conventional four sessions per day. The problem for this humble rapporteur is how to condense the 45 presented papers (ignoring the five papers published but not presented!) into some meaningful form for the varied readership of *Circulation*. I must admit that I didn't sit through all of the conference and hence the report in part reflects not only those sessions that I attended because they were more 'hydrological' but also my own areas of interest. I apologise if I have not commented on something which might be of vital interest to you personally, dear reader, but you can always read the entire conference proceedings!

Sessions A and B - Flood Analysis and Prediction

From the title, these sessions appeared more hydrologically-orientated than some later topics and some interesting papers were presented. The first, on regional maximum flood peaks in South Africa by **Prof W Alexander** and **Z. Kovaks**, was surprising in that South Africa seemed to be recommending a reversion from rainfall-runoff methods of flood estimation to a simple empirical formula, the Francou-Rodier equation:

$$Q = 10^6 (\text{Area} \times 10^{-8})^{1-0.1k}$$

where Area is catchment area in km² and k is a coefficient ranging from about 3 to 6. Incidentally, the somewhat strange coefficients of 10^6 and 10^8 are simply the total mean flow in m^3s^{-1} for all rivers on the earth's surface and the total drainage area of the land surface in km². The coefficient k has been mapped in South Africa and surrounding countries, based on 519 recorded flood peaks. This so-called 'Regional Maximum Flood' approach seems to ignore all of the other flood producing factors other than catchment area, or rather assumes that they are summarised within the regional mapped values of coefficient k. This approach is markedly different to current UK flood estimation practice.

Another interesting paper in this session was presented by **Dr John Mawdsley** where current catchment conditions were used to

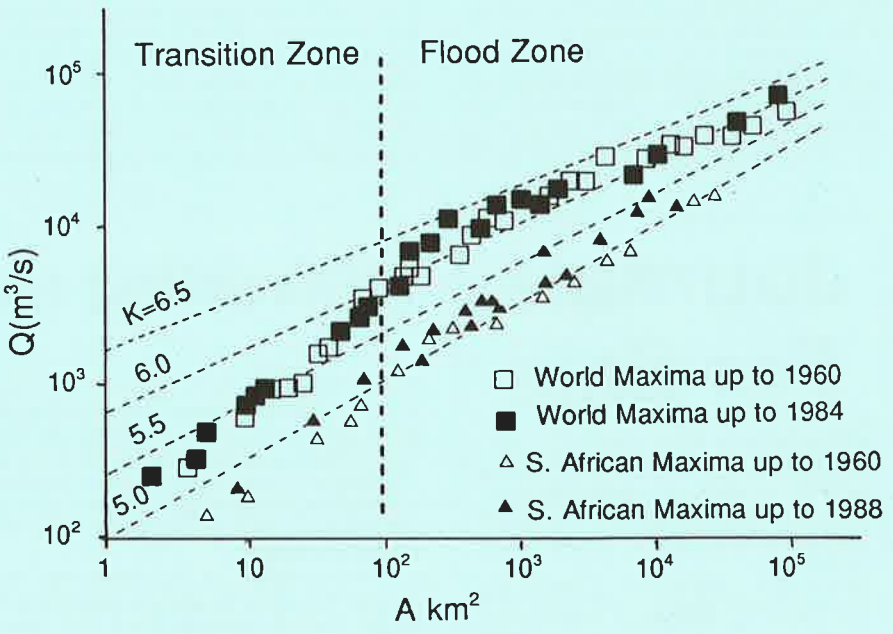


Figure 1. World and southern African record flood peaks (from Alexander & Kovaks)

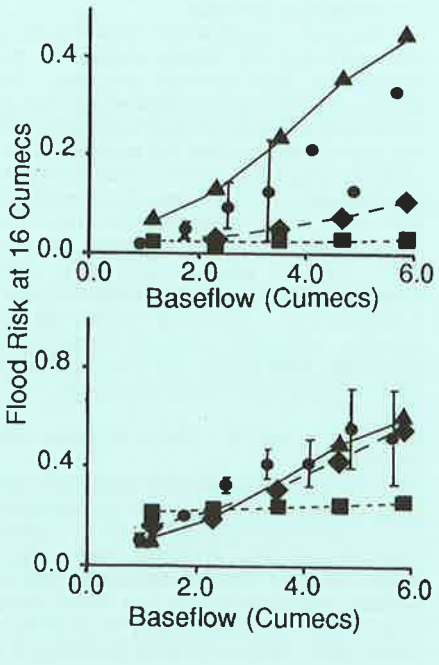


Figure 2. 30-day-ahead flood risk estimates (from Futter, Mawdsley and Metcalfe)

forecast flood flows up to 30 days ahead. Space does not permit full discussion of the paper but the approach could only be applied to gauged catchments. However, members are recommended to look at this paper, although the following paper by **Bob Moore** and **David Jones** of IH and **Margaret Cottingham** of NRA Yorkshire may be an indicator of the way flood forecasting is going in Britain. The NRA in Yorkshire are having a major new telemetry system installed which will provide the basis of a major regional flow forecasting system for flood warning, river control, intake protection and drought management. The modelling system is modular, allowing addition of new forecasting sites as required or to reconfigure the river network as channel modification such as flood by-pass channels are introduced.

Other papers in this session included one by **Dr Bernhard Sackel** from Graz University, Austria, who described a sophisticated flood database for Austria which will in time lead to a flood studies report for the country, and one by **David Rylands** of NRA Thames, who described FRQSIM, a design flood estimation model developed for urban catchments by the old GLC but now adopted as the principal design tool throughout the whole Thames region. A current study at IH is comparing FRQSIM with other common models. The main effect of the model is that it should permit estimation of the effects of increasing urbanisation on the flood regime of a catchment.

Session C and D - Field Data

These two sessions were primarily concerned with the erosional effects of flooding and how to design against it. Two papers discussed the spectacular effects of a major storm in August 1987 in the 800 km² Reuss valley in central Switzerland. Of the five gauging stations on the river, three were washed away during the flood and the other two severely damaged. The flood was reconstructed using a mathematical model and was estimated to have a peak of some 1 m³/sec/km² and a return period of 200 years.

Some spectacular slides were shown of the damage caused by this flood which led to new design criteria for bridges, embankments, etc. which depend upon the economic importance of the structure to be protected. However, as well as designing for floods of some particular return period or risk, the effects of more severe floods on the structure are now routinely examined. Another interesting paper was on the analysis of the effects of Hurricane Charley in August 1986 on some small catchments in the Yorkshire Dales and Northern Pennines, presented by **Prof. Malcolm Newson**. The authors discussed how such relatively rare floods initiated significant movements of bed material and led to dramatic re-forming of alluvial channels.

Sessions E, F and G - Hydraulics of Flood Flows; H and J - Sediment Transport and Morphological Effects; K and L - Physical and Numerical Modelling

These sessions will be reported only briefly as they entered the realms of hydraulics rather than hydrology *per se*. The distinction between hydrology and mathematical hydraulics is not precisely defined and the latter subject may well be of considerable interest to many readers of *Circulation*, but space does not allow adequate discussion of the papers here.

One point worth reporting though was an observation made by **Prof Jean Cunge** that there was increasing use of 'bought-in' software for engineering design. It was becoming increasingly easy for engineers to apply very sophisticated models with 'user-friendly' interfaces to their problems. He felt this was leading to the situation where those with the **responsibility** for design of river works did not necessarily have sufficient **knowledge** of the models used, whilst the originators of the modelling software had the knowledge without any real direct responsibility. Prof Cunge felt that this situation was undesirable and could potentially lead to poor or unwise engineering designs.

Sessions M and N - Engineering Design, Maintenance and Operation of Schemes

There were some interesting practical papers in these two sessions but I was unable to attend due to other commitments, hence the following comments are based on the published papers rather than the verbally presented material.

One interesting new approach was a paper by **Kouwen *et al.*** from the University of Waterloo, Canada, who estimate rainfall-runoff model parameters from gridded Landsat data. Each grid square is treated as a separate vegetation/land-use type and the total catchment response is the sum of the modelled grid inputs. 'Ground truth' reflectance data is used to calibrate the Landsat image and the model is believed to be capable of predicting the effects of varying land use within a catchment.

Another good paper was presented by **John Gardiner**, of NRA Thames Region, on the Thames flood model experience. The aim was to provide adequate flood protection to towns within the Thames basin at acceptable cost based on the findings from recent major flood alleviation studies on the Lower Colne and the Thames for Maidenhead and Windsor.

Similar practical case studies were presented by **Richard Mains-Smith** of NRA Severn Trent Region for Stratford and Tewkesbury and **Phil Johnson** of NRA Thames Region for Aylesbury. **Cliff Dobson** of NRA Severn Trent described their complex flood forecasting model based on a sophisticated regional data telemetry system. The lessons were that sophisticated models were of limited value without an effective and reliable telemetry network. The system must be designed to permit flexible access to data and forecasts, not just by NRA staff but also by public and emergency services.

Overall, the conference was interesting and worth attending, but I didn't feel that there were any really exciting new developments on offer; nor had anybody identified particular new problems which hydrologists should be addressing. The papers covered familiar ground and showed that many of the age-old problems of flood estimation have still to be fully resolved: there seems to be no alternative to continued research!

Frank Farquharson
Wallingford

Journals For Sale

Elizabeth Shaw has a continuous series of *Water Resources Research* from 1974 to 1989, comprising 132 issues altogether (six per annum up to 1983; 12 per annum from 1984). They could be useful to a NRA district office.
She is asking £50 for the set, which the purchaser will collect, by appointment. Please ring 071-937 4264 to make your bid and to arrange collection.

Diverting the River Calder

The River Calder is to be re-routed near Welbeck, Yorkshire, as part of a major land-fill and reclamation scheme. At present, the river forms a big loop round some 300 ha of largely derelict land, scarred by a long history of mineral extraction and waste disposal, with the Aire and Calder canal forming a western boundary to this inhospitable 'island'.

The landscape is dominated by vast mounds of colliery waste and large lagoons formed through post-war sand and gravel extraction. Some of these lagoons have been filled in and several are still being used for the disposal of PFA (pulverised fuel ash) from a local power station. Diverting the river to the west will open up the site for the controlled disposal of domestic and commercial waste, plus colliery waste from the nearby Selby coalfield, thereby solving two major local disposal problems.

The new river corridor, about 2 km long, will replace the present derelict and inaccessible stretch of the river with a pleasant landscaped environment. The detailed design work for this project is now about to be started by Mott MacDonald.

Documenting the 1989 Drought

- the 1989 Yearbook



Publication of the 1989 Yearbook in the Hydrological Data UK series comes at a time of considerable public interest in water resources - certainly unmatched since the latter stages of the 1976 drought. Partly this reflects - as does the associated media attention - a growing awareness of hydrological issues and, in particular, concern regarding the possible impacts of climate change on river flow regimes and water resources in the United Kingdom. A principle function of the Hydrological Data UK series is to document hydrological conditions and to disseminate data upon which assessments of water resources may be based. The Yearbooks provide both a perspective within which to examine the recent exceptional rainfall, runoff and aquifer recharge patterns and a benchmark against which any future changes may be assessed.

The capricious nature of the UK's climate has achieved a very full expression over the last two or three years and the extraordinary transformation in weather conditions during 1990 threatens to overshadow the similarly remarkable hydrological conditions experienced last year. In February 1990, rivers were in spate from Cornwall to northern Scotland, flooding was widespread and persistent and total runoff from Great Britain was the highest for any month in at least thirty years. The ensuing seven-month period (April-September) was the driest in the general England and Wales series, which extends back over 220 years. As a consequence, river flow and groundwater level recessions were exceptionally steep and by the end of the summer discharge rates and water-tables were extremely depressed.

In many areas, the water resources situation was equally fragile in the autumn of 1989. Last year was notable not simply in hydrological terms. Sunshine hours were the highest on record for England and Wales and very warm conditions prevailed throughout most of the year; for central England it was the warmest year in a series extending back to 1659. Over the UK as a whole 1989 was the driest year since 1976 but more remarkable were the variations - both spatial and temporal - in rainfall and runoff amounts through the year. A substantial number of rivers recorded unprecedented annual runoff totals; several catchments in north-west Scotland established new annual maxima, many more - predominantly in eastern Britain - registered annual totals substantially below the previous minimum. Low to very low flows characterised much of eastern Britain throughout much of the latter half of the year when groundwater levels were also exceptionally depressed as a result of an extended decline following the very limited recharge over the 1988/89 winter.

The 1988/89 winter was the warmest since 1868/69 and was also very dry - a most unusual combination for the United Kingdom. Rainfall deficiencies in the English lowlands could be traced back to the late spring of 1988 and in early 1989 a drought of substantial magnitude extended across much of southern and eastern Britain. Some relief was afforded by heavy and sustained spring rainfall which resulted in belated, but very welcome, aquifer recharge and a recovery in runoff rates to sustain rivers and replenish surface water reservoirs. However, this wet interlude was succeeded by a remarkable dry, and hot, May which signalled a re-intensification of the drought as evaporation rates climbed steeply into the summer. Initially, the problems experienced by the water industry were largely a consequence of heavy peak demands - often associated with the garden watering - which overstretched distribution systems. As the dry conditions continued into the autumn attention focused on the adequacy of water resources themselves; the prospect of a second successive dry winter half-year was a matter of concern especially in the English lowlands.

In many western catchments the drought broke in October but the very high soil moisture deficits in the east - where the drought had its greatest impact - limited the hydrological effectiveness of the rainfall and the anticipated seasonal upturn in runoff and recharge rates failed to materialise. Following an inordinately dry episode beginning in early November - many localities recorded 30 or more days with barely a trace of rainfall - river flows at the beginning of winter were more typical of those expected in the summer. A severe winter drought extended across much of central, southern and eastern Britain. One manifestation of the lack of rainfall was the continuing failure of springs and bourns - flows over the 1988/89 winter had been weak and intermittent and a continuing, albeit temporary, loss of habitat for fish and other aquatic life seemed probable. More worrying from a water resources viewpoint, were the exceptionally low groundwater levels in early December. The Chilgrove borehole in West Sussex registered winter levels as low as any recorded since 1836 and levels in the Dalton Holme borehole (Humberside) were unprecedented for any month in a 101-year record.

As anxiety increased regarding the water supply outlook for 1990, the breakdown of a persistent anticyclone over western Europe around 10th December heralded a dramatic recovery in runoff and recharge rates, except along parts of Britain's eastern seaboard. A series of vigorous frontal systems brought heavy rainfall to much of the UK: a few districts in southern England recorded 40% of their annual total during this period. River flows picked up briskly and at Christmas local flooding occurred in the Severn and Thames valleys. A few lowland rivers recorded their minimum and maximum daily flows within the space of a fortnight - a remarkable juxtaposition for the UK.

1989 witnessed the most widespread extension of low flow records since the 1976 drought. The decline of groundwater levels over the period of about 20 months ending in December has no modern parallel. Evaporation rates were also notable, with annual potential evaporation totals of 700 mm characterising some lowland coastal locations. Such totals are more typical of southern France, and in terms of both rainfall distribution and temperature, the climate of southern Britain assumed a somewhat Mediterranean complexion. In many western areas actual evaporation totals for 1989 were also the highest on record (1961-89), but in the lowlands substantial and sustained high soil moisture deficits served to keep annual AE totals within the normal range.

A comprehensive hydrological review of last year appears in the 1989 Yearbook, together with a feature article which examines the development and intensity of the 1989 drought. In common with earlier editions the Yearbook brings together the principal data sets relating to river flows, groundwater levels and areal rainfall in the UK. Water quality data are also featured for a representative network of monitoring stations.

Orders for the Yearbook may be placed through

The Surface Water Archive Office,
Institute of Hydrology,
Maclean Building,
Crowmarsh Gifford,
WALLINGFORD
OXON OX10 8BB.

Tel: 0491 38800

Hydrology within the European Geophysical Society

Many European hydrologists have in the past expressed a desire for a forum where they can meet and interact on a regular (e.g. annual) basis. The Hydrology Section of the American Geophysical Union (AGU) is an excellent model in this regard; with two meetings per year, American hydrologists are always fully up to date on what their colleagues are doing. With an annual General Assembly attended at present by some 1500 scientists, the European Geophysical Society provides an excellent opportunity for European hydrologists to interact annually as a group and with the larger community of geophysicists. However, only recently have hydrologists begun to take full advantage of this opportunity.

The EGS was founded in 1971 in response to the need for a society to organise regular meetings of geophysicists and planetary scientists in Europe. In particular, the EGS seeks to give an opportunity to younger European Geophysicists from East and West to meet with each other and with their more senior colleagues. To this end, Travel Awards are available to younger scientists and an East European Support Programme has also been instituted. As the size of the EGS assemblies has grown, so too has their international character, and significant numbers of colleagues from America and elsewhere also participate. EGS General Assemblies are now held annually, usually in March or April, and last five days. Only abstracts of papers (invited or contributed) need be submitted in advance and these are pre-published: hence, this allows current work to be presented and discussed, which is not always the case with pre-published papers. Papers can be published afterwards in EGS or EGS affiliated journals, or in other journals by special arrangement; in all cases, papers are subject to normal peer review.

Hydrology flourishes at Copenhagen

For the XV General Assembly held in Copenhagen from 23-27 April 1990, an expanded Hydrology Programme was organised which proved to be a resounding success. Impressed by this upsurge of hydrological activity, the EGS Council has now established a new Hydrological Sciences Section which is expected to obtain final approval from members at the Wiesbaden Assembly in 1991. This exciting development has come at an important time for European hydrology, since many cultural and political barriers are disappearing rapidly, and Europe and Europeans are coming together as never before. The BHS is very much in the vanguard of building links in Europe: the Copenhagen Assembly was very well supported by BHS members and the BHS President, Allan Lambert, negotiated an attractive 'Institutional Membership' arrangement whereby BHS members can avail of EGS membership at two-thirds of the normal annual subscription. As part of this arrangement, the EGS and BHS have agreed to cooperate in mutually publicising their meetings and activities through their respective newsletters.

Wiesbaden General Assembly, 22-26 April 1991

This is the event in the hydrological calendar for 1991 that you cannot afford to miss, for a splendid Hydrology Programme has been arranged to mark the 20th anniversary of the founding of EGS. Whatever field of hydrology you are involved in, whether theoretical or applied, surface or subsurface, you will surely find one or more of the sessions to be of interest to you. Some sessions have also been included which should be of particular interest to participants from developing countries. And to promote interaction with our meteorological and climatological colleagues, several joint sessions with Section II (Oceans and Atmosphere) have been organised, with a major focus again being the global change issue. Information on the various sessions has been printed in the Hydrology Programme leaflet, copies of which are to be circulated with this issue of *Circulation*.

If you would like to make a presentation either oral or poster, at Wiesbaden, then you should submit an abstract to the EGS office, with a copy to a convenor of the session, not later than 31 January 1991. Contributions from young scientists are particularly welcome, and applications for EGS Travel Awards should be submitted by 15 December 1990. Instructions on the preparation of abstracts are contained in the Hydrology Programme leaflet.

Wiesbaden will lay the foundations for a new era of interaction and cooperation in European hydrology: BHS members should not miss out on the opportunities that this will present. And there are also the attractions of the delightful spa town of Wiesbaden, and the festivities planned to mark the 20th birthday of EGS! I look forward to seeing you there.

P. E. O'Connell
President-designate
EGS Hydrological Sciences Section
Department of Civil Engineering
University of Newcastle upon Tyne

BOOKS

Practical guide

Engineering Hydrology Techniques in Practice. Elizabeth M. Shaw. 1989. Ellis Horwood, 348pp, hardback.

The book starts with a good clear title. The contents consist of a wide spread of practical examples of hydrological techniques with world-wide coverage, providing an excellent text to guide both theoretical and field hydrologists in the practical art of hydrological problem-solving. What it is not is a hydrological text book. It presumes a sound knowledge of up-to-date techniques, together with (in many of the sections) a good working knowledge of the much quoted anonymous *Flood Studies Report* (NERC, 1975). Fortunately, good text books are available; indeed the necessary information can be gleaned from the same author's recent second edition of *Hydrology in Practice* (reviewed in *Circulation 21*, February 1989). One view of the present book is that it could form an excellent appendix to the author's text book.

The subdivision of the contents of a book covering most of the hydrological field is never easy and inevitably leads to overlap. It has been done well, starting from the basic division mentioned in the Preface, using a broad distinction between problems of a surplus of water (requiring flood handling and drainage) and studies where water is short and resources are paramount.

Eleven subdivisions are used: hydrometric schemes, agricultural drainage, urban drainage, transport drainage, flood mitigation, reservoir spillways, water resources, reservoir yield, river basin development, irrigation and water resource-river management.

Each section has a brief introduction and then individual projects are described. A total of 63 examples are given with somewhat variable detail covered by between 3 and 11 pages of text. Each study starts by listing the source material which is very valuable if more detail is required. The problem is outlined briefly but in general, clearly. The solution is analysed, together with maps and diagrams and each study is rounded up in a conclusion. Over 40% of the examples are from the UK and some 20% each from Africa and Asia.

A number of the examples are dealt with rather superficially but these are counterbalanced by a larger selection of good examples. The breadth of cover of the book is illustrated by a selection of these: Glasgow combined sewer flow survey (1982), a good example of the value of hydrometric data; Gloucestershire River Cam drainage (1978), an example of methods given in the Flood Studies Report; Timor road scheme, Indonesia (1978) using rainfall records to design safe road culverts; Exeter flood protection (1961) using rainfall records because of the scarcity of river flow measurements; Kuantan flood mitigation, Malaysia (1977) using rainfall and flood measurements to choose the most economical of 5 possible control methods; Sukhotai groundwater development, Thailand (1986) to assess resources; Lake Nasser, Egypt (1979),

NRA plans for the future

The National Rivers Authority, now just over a year old, has published its first Corporate Plan. Established by the 1989 Water Act as a non-departmental public body, the NRA has much to do in its role as 'Guardian of the Water Environment'. The new Corporate Plan faces up to the enormity of the task by setting out clear aims, objectives and targets. Of particular interest to BHS members must be those for pollution control, flood defence and the schedule of R&D topics.

Control of pollution
The aim here is to achieve a continuing improvement in the quality of all waters, to ensure that dischargers pay the costs of the consequences of their discharges, and as far as possible recover the costs of water environment improvements from those who benefit.

Specific objectives are:

· To set water quality objectives (WQOs) for controlled waters and produce appropriate water quality standards (WQSs) (1992) and define water protection zones (WPZs) requiring special protection.

· To undertake monitoring and surveillance of all controlled waters to provide information on the national situation at routine intervals, and collate all relevant data and produce reports of the work undertaken.

· To ensure that there is a close relation between water quality and water resources management.

· To implement measures to prevent potential pollution of controlled waters at source.

· To devise a consistent format for consenting certain discharges, such that WQ standards are met, and record them on a public register.

· To develop the use of instrumentation to measure compliance of discharges with consents, and to measure environmental compliance with WQ standards.

· To develop policy for recovering the costs of consenting discharges and associated monitoring.

· To establish policy for enforcing compliance with consents, and recording actions taken on a public register, plus a procedure for reporting compliance with consents at regional and national level.

· To provide enabling powers to mitigate and remedy the results of polluting events, or the presence of poisonous or noxious substances, and recover the costs from those responsible.

· To review procedures and produce plans of action to respond to emergencies involving large-scale polluting events.

· To establish an R&D programme to further the efficiency and effectiveness of the NRA's water quality functions.

· To ensure proper consideration of water quality issues by Regional Rivers Advisory Committees

Flood Defence
Here the aims are to provide effective defence for people and property against flooding from rivers and the seas, and to provide adequate arrangements for flood forecasting, warning and for responding to flood events.

Specific objectives are:

· To produce a function strategy for flood defence through the development of a systematic approach for assessing capital and maintenance requirements and develop appropriate medium and long term plans.

· To develop a comprehensive survey of ownership and status of sea and coastal defences to ensure their integrity to prevent flooding.

· To support R&D which will identify future flood defence needs arising from climate change, improvements in best practices for operating methodology, increasing efficiency and enhancing value for money.

· To encourage development of information technology and extension of facilities which will further advance strategies and procedures for warning of, and responding to emergencies.

· To develop catchment management plans and review statutory regulations to heighten general awareness of need for development controls.

· To identify opportunities for the enhancement of the environment and recreational and amenity facilities when undertaking flood defence works.

Research & Development
The NRA intends that the future R&D programme should be driven by the policy objectives and technical needs of the different functions and Regions of the NRA. It is divided into seven Commissions: Water quality, Water resources, Flood defence, Fisheries, Recreation and navigation, Conservation, and General operations. These are further subdivided into 38 significant areas of work with a common theme, called Topic Areas. An assessment system is being introduced whereby Topic Areas and subsequent projects are subjected to Investment Appraisal, monitoring and evaluation.

The Corporate Plan includes a Schedule of these R&D topics, giving overall objectives, key elements or projects and expenditure for 1989/90, 1990/91 and 1991/92, showing the value of both inherited and new project totals.

Exceptional problems
This new plan is sure to be succeeded by others as the Authority gets to grips with the problems perceived by its own staff and responds to public concerns.

Lord Crickhowell, the NRA's Chairman, in the lead article of the September issue of the NRA's newsletter, puts his finger on one crucial point: "We're dealing very often with deterioration that's taken decades or longer," he says, "and the idea that we can suddenly create a marvellous transformation in 12 months or even longer periods, is a dangerous misconception". However, having acknowledged the difficulties, everyone wishes the Authority all the best in their endeavours.

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a complex study with 6 models for use for operational guidance; River Terrens flood plain management, South Australia (1983), which illustrates the importance of a cost/benefit approach, and Kielder hydroelectric power generation (1987) showing the need for a multidisciplinary approach using hydrology and economics.

The book contains a scatter of misprints, mostly unimportant except for a printing error which reverses the complete texts of pages 237 and 238 and is momentarily confusing. Diagrams and maps are often taken from the source material and, when reduced to book page size, are not always easy to follow.

An opportunity which this book has missed is to examine and comment on the outcome of the 63 hydrological studies. Quite a lot of them have been implemented and it would be fascinating to assemble the results and compare them with the theory and predictions, and perhaps to evaluate a "success rate" of the various hydrological techniques: an opportunity for another book, maybe?

Overall, this is a good book which is best treated as an "Appendix" to a text book and used as a guide to the alternative approaches which can be used to tackle similar problems. The source material used in its compilation is only a very small proportion of that available and it would be nice to see an ongoing series of this type of review of practical applications. But please state in the conclusion wherever possible how it all worked in practice, since this is what we really need to know.

D .B .Smith
Wantage

Approaching IWM

Integrated Water Management: International experience and perspectives. Edited by Bruce Mitchell. 225pp.

The declared interest of this book (which includes chapters from the USA, New Zealand, Canada, England, Japan, Poland and Nigeria) is to present a diversity of experiences and a framework to facilitate their comparisons. The editor's introductory chapter sets the framework, and his concluding chapter draws out the salient points from the individual contributions.

Although Integrated Water Management (IWM) is seen to receive almost universal endorsement, it is rarely achieved, and then only in a limited context operationally. The adequacy of coordinating mechanisms between diverse

interests is the crucial test, and a statutory basis incorporating accountability, flexibility (and permitting bargaining, negotiation and compromise) appears to offer the best chance of success. The editor and most of the contributors clearly recognise that the key factor is the attitude and commitment of the participants: thus appropriate structure does not necessarily guarantee good performance. In his chapter on England (and Wales!), Pitkethly compromises some of his most interesting points by overstatement: "Important lessons can be drawn from the English experience on how the national comprehensive ideal may crumble and be corrupted". Simplistically, there is no mention of the management of the many river regulation schemes developed in the UK over the last 30 years. Perhaps the most interesting success story is that of the Yahagi river in Japan, which demonstrates the impact a non-governmental organisation can have in river basin management. Overall, the book is a little short on practitioners' experience, as all the chapters were written by contributors from universities/polytechnics. Nevertheless, it is a useful and informative contribution which demonstrates that although IWM is an elusive concept, it need not always be illusory.

Allan Lambert

Call for contributions

There will be a joint meeting of BHS and the Hydrogeological Group on 7th July 1991 at the University of Birmingham on *Modelling Flows to Boreholes*.

The convenor would be pleased to hear from anyone who wants to contribute either a presentation or a software demonstration. Contact David Lerner, School of Earth Sciences, University of Birmingham, B15 2TT. Telephone 021-414 6156.

Missing Members

BHS has lost touch with a number of members. We should welcome any information which would help us to re-establish contact with the following people:

P.J. Baur, Shrewsbury, Shropshire
L.C. Macmillan, Exeter
S. Robinson, Hofheim, Germany
M.K. Thomas, Mott Macdonald, Cambridge
I. Tzeranis, West London

Funds available for IUGG Meeting

It is hoped that the Royal Society will provide financial assistance for prospective participants in the 20th General Assembly of the International Union of Geodesy and Geophysics, Vienna, Austria, 11-24 August 1991. Only non-government scientists of PHD status and who are normally resident in the UK will be eligible to apply.

In addition, financial assistance may be available, particularly for young scientists, including postgraduate research students, resident in the UK, from the IAHS Exeter Assembly Fund administered by the Royal Society and the IASPEI/IAVCEI Durham Fund.

The closing date for submission of applications is 25 February 1991 and application forms can be obtained from:

Miss B M de Vere
The Royal Society
6 Carlton House Terrace
London SW1Y 5AG
Tel: 071-839 5561 ext. 222

Outline details of the scientific programme during the 1991 IUGG General Assembly are given in the Second Circular together with an indication of registration and accommodation costs. Copies of the Circular can be obtained from:

IUGG '91 Organising Committee
c/o ZAMG
Hohe Warte
A-1190 Vienna
Austria
Fax: 010 43 222 369 1233
Telex: 131837 Meteor

FORTHCOMING EVENTS

Diary

Pennines Hydrology Group
21st Anniversary Meeting
CLIMATE CHANGE AND SEA-LEVEL RISE
28 November 1990
University of Sheffield

The Pennines Hydrological Group is celebrating its 21st Anniversary with a special meeting on *climate change and sea-level rise*, to be held in the Department of Civil and Structural Engineering, University of Sheffield. The meeting will be introduced by Prof McDowell who was instrumental in founding the Group. The keynote speakers will be Dr D Pugh of the Institute of Oceanographic Sciences and Dr S Raper of the Climate Research Unit of the University of East Anglia. Other papers, dealing with NRA responsibilities, managing water resources, coastal defence, and climate change implications, will be presented by Messrs J Sheriff, R Exelby, J A Cole and Dr C Fleming. Reception and coffee is at 10.00 am.

Further details from K Howard, NRA North West Region (Tel: 0925 53999)

Copy Deadline for Issue No. 29 4th January 1991

21st November 1990
BHS Midlands Section meeting
"Recovery and rehabilitation of rivers"
Two papers: Alleviation and low flows, D Izatt & E C Parry; River instrumentation: the channel and beyond, Geoff Petts, M Wade & A Large.
Time: 2.00 pm
Venue: Geography Department, Loughborough University.
Contact: John Pirt (tel.: 0602 455722).

27-28th November 1990
Institution of Civil Engineers Conference
"Advanced technology in water management".
Venue: London Press Centre, 76 Shoe Lane, London EC4.
Details: Conference Office, ICE, tel. 071 222 7722 (applications due by 30 Oct 1990)

28th November 1990
Pennines Hydrological Group
21st Anniversary Meeting
"Climate change and sea-level rise"
University of Sheffield
(see notice on left)

4th December 1990
Institution of Water Officers Winter seminar
"European water - the next 10 years"
New Connaught Rooms, London.
Contact: David McConnell, Eurocom Ltd, 12 Summerhill Terrace, Newcastle upon Tyne, NE4 6EB

10th December 1990
BHS Annual General Meeting
followed by BHS National Meeting
"1989-90: A period of contrasts".
(also British Dam Society Meeting on the East of Scotland Floods of 1989)
Venue: University of Birmingham.

12th December 1990
BHS Southern Section
"The 1989-90 floods in southern England"
Time: 6.00 pm
Venue: Imperial College, London SW1.

22nd January 1991
BHS/Geological Society/IAHR Joint Meeting
"Groundwater quality modelling"
Burlington House, London
Contact: Howard Wheater, Dept. of Civil Engineering, Imperial College, London SW7 2BU.

13th February 1991 (**NOT 6th**)
BHS Southern Section Meeting
Contact: Howard Wheater (see above)

15th-17th April 1991
2nd Postgraduate Hydrology Symposium
Polytechnic South-West
Contact: Peter Sims, Dept. of Geological Sciences, Polytechnic South-West, Drake Circus, Plymouth, Devon, PL4 8AA.

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Please address all correspondence to the Editor, Celia Kirby, Institute of Hydrology, Wallingford, OX10 8BB. Telephone: 0491-38800 extension 2360.