RRC ANNUAL NETWORK CONFERENCE

ABSTRACTS OF PAPERS AND SUMMARIES OF POSTERS

28TH - 29TH APRIL 2003

ROYAL MARRIOTT, BRISTOL

PROGRAMME

THE RIVER RESTORATION CENTRE
ANNUAL NETWORK CONFERENCE
MARRIOTT ROYAL BRISTOL

Day 1: Monday 28th April 2003

10.00-11.00 **REGISTRATION (ROYAL FOYER) –see attached floor plan**

10.30 Coffee (Kings Lounge & Royal Foyer)

11.30 Welcome David Gilvear (*University of Stirling and River Restoration Centre Chairman*) 5mins

SESSION 1: THE WIDER WORLD (KINGS ROOM)

CHAIR: David Gilvear (University of Stirling and River Restoration Centre Chairman*)*

11.35 Keynote speaker: David P.F.King *(Director of Water Management - Environment Agency)* 25mins
'Restoration as a platform for regeneration'

12.00 *Discussion* ***10mins***

12.10 Andrew Black and David Crichton *(University of Dundee)* 20mins
'Flood hazard management , the changing role of insurance and some perspectives from Scotland'

12. 30 Mark Lloyd *(Thames21)* 20mins
'Reconnecting people with the rivers'

12.50 15mins

Discussion

LUNCH (KINGS LOUNGE & ROYAL FOYER) 13.05-14.15

SESSION 2: DEMONSTRATING PRACTICAL APPLICATION OF RIVERINE RESEARCH (KINGS ROOM)

CHAIR: *Janet Hooke (University of Portsmouth)*

14.15 Stuart Lane *(University of Leeds)* Liz Chalk *(Environment Agency)* and Nick Haycock *(Haycock Associates)* 15mins
'The challenge of linking scientifically-informed river restoration to the needs and goals of local communities; a case study from the River Wharfe'

14.30 Karen Fisher *(University of Birmingham)* 15mins
'Roughness advice for UK rivers: practical applications'

14.45 Malcolm Newson *(University of Newcastle) et al* 15mins
'Rehabilitating a high-energy river: environmental engineering works on the River Ogwen, North Wales'

15.00 15mins

Discussion

SESSION 3: MAIN POSTER SESSION AND TEA/COFFEE (KINGS LOUNGE & ROYAL FOYER) 15.15-16.15

SESSION 4: RESTORATION PROJECT APPRAISAL (KINGS ROOM)

CHAIR: *Kevin Skinner (Haycock Associates)*

16.15 Stuart Downward *(Kingston University*) *et al* 15mins
'Geomorphological appraisal of London rivers'

16.30 Judy England *(Environment Agency)* 15mins
'Invertebrates and gravel –is size important? The River Mimram, Hertfordshire'

16.45 15mins

Discussion

SESSION 5: SETTING SOUND OBJECTIVES

CHAIR: *John Andrews (Andrews Ward Associates)*

17.00 Nigel Holmes *(Alconbury Environmental Consultants) et al* 15mins
'Upper River Kennet rehabilitation project: a matrix approach to site selection'

17.15 Sally German *(Gifford and Partners)* and David Sear *(University of Southampton)* 15mins
'Applying geomorphology in support of chalk stream restoration; the River Wylye'

17.30 30mins

Open Discussion and Close

EVENING MEAL (KINGS ROOM 19:30 FOR 20:00)

For residential & pre-booked delegates only. Kings Bar until 12:30am, Cocktail Bar - late

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Day 2: Tuesday 29th April 2003

8.15-8.40 **TEA/COFFEE & REGISTRATION FOR TUESDAY DAY DELEGATES (ROYAL FOYER)**

8:50 Welcome, Introduction and Explanation of Sessions **(KINGS ROOM) ALL** 10mins

PARALLEL SESSION 6: (KINGS ROOM)

CHAIR: *Martin Janes (River Restoration Centre)*

9:00 Simon Langan *(The Macaulay Institute)* 15mins
'A framework for investigating river restoration and the water framework directive: the river Dee and Tarland catchment initiatives, N. E. Scotland'

9:15 Andrew Donnelly *(Águas de Gaia, EM)* 15mins
'Practical experiences of river restoration and management in an urban Portuguese environment'

9:30 10mins

Discussion

9:40 David Holland *(Land Wood and Water)* 15mins
'Streambank protection using bioengineering techniques: River Coly demonstration project'

9.55 David Sear and Steve Darby *(University of Southampton)* 15mins
'How uncertain is the geomorphology used to design river restoration projects?'

10:10 10mins

Discussion

POSTERS AND TEA/COFFEE (KINGS LOUNGE & ROYAL FOYER) 10:20 – 10:55

PARALLEL SESSION 7: (KINGS ROOM)

CHAIR: *Roger Bettess (HR Wallingford Ltd)*

10.55 Ian Wiseman *(Environment Agency) et al* 15mins
'Recovery of an aquatic ecosystem following treatment of abandoned mine drainage with constructed wetlands: River Pelenna'

11:10 Dan Evans *(Queens University Belfast)* and Chris Gibson *(Dept of Agriculture and Rural Development)* 15mins
Sediment transport dynamics in the River Bush: implications for catchment management

11.25 Graham Pearson and Paul Frear *(Environment Agency*) 15mins
'Use of angler catches to appraise the effectiveness of river habitat restoration on fish stocks; data from the Rivers Calder, Derwent and Nidd'

11.40 **Discussion (return of those from Lancaster Room)** 20mins

PARALLEL SESSION 8: (LANCASTER ROOM)

CHAIR: *Terry Langford (University of Southampton)*

9:00 Jo Goodson *(King's College, London)* 15mins
'Seed and sediment transport along rivers; a recent study from the River Dove, Derbyshire'

9:15 Nafisa Mingazova *(Kazan State University, Russia)* 15mins
'Problems of rivers and possibilities of river restoration in the middle Volga region of

Russia'

9:30 10mins

Discussion

9:40 Doug Booker (*CEH Wallingford*) *et al* 15mins
'Modelling the effects of channel design on fish habitat during high flows'

9.55 Gary Priestnall *(University of Nottingham) et al* 15mins
'Interactive mapping for communicating the results of a fluvial audit'

10:10 10mins

Discussion

POSTERS AND TEA/COFFEE (KINGS LOUNGE & ROYAL FOYER) 10:20 – 10:55

PARALLEL SESSION 9: (LANCASTER ROOM)

CHAIR: *Jenny Mant (River Restoration Centre)*

10:55 Richard Dooley *(Office of Public Works – Co Galway)* 15mins
'Arterial Drainage maintenance – an environmental approach'

11:10 Martje Wise *(PosfordHaskoning) et al* 15mins
'A new habitat for the River Lark; improvements to nature conservation and implications to flood defence and water supply'

11.25 Conrad Young *(London Borough of Lewisham)* 15mins
'Urban environmental regeneration in the London Borough of Lewisham; a view from the Quaggy River bridge'

11:40 **Discussion and move to Kings Room** 20mins

12.00 **0PEN DISCUSSION ALL – KINGS ROOM** 20mins

SITE VISIT INTRODUCTION: (12:20 – 12:35) 15mins

Kathy Derrick (Bristol City Council – Environmental Quality Unit), River Frome, Bristol

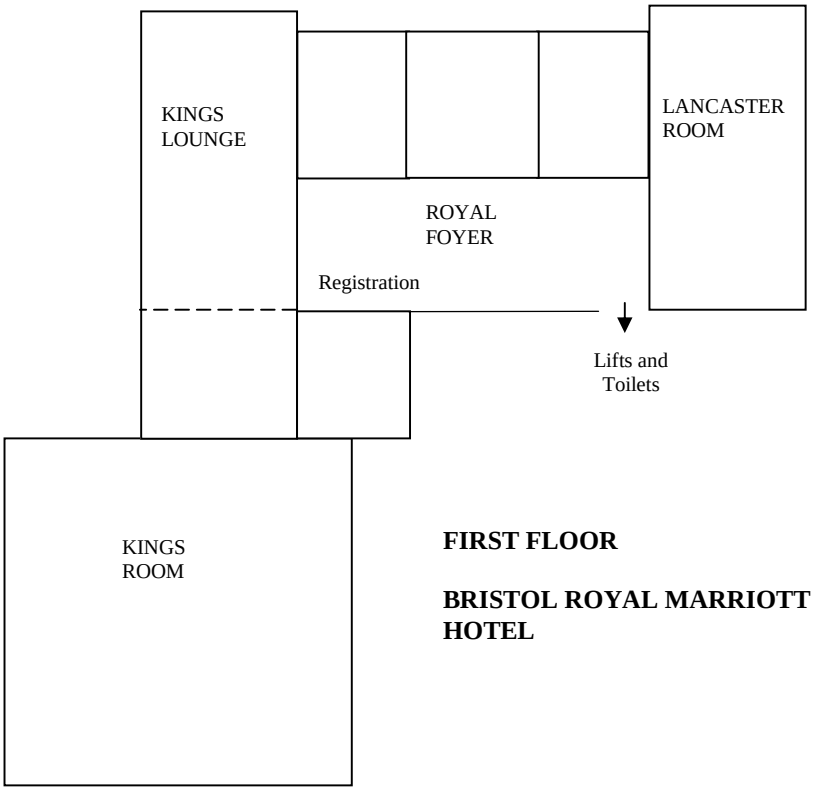
12:35 5mins

Closing Remarks - Martin Janes (RRC Centre Manager)

LUNCH: (KINGS LOUNGE & ROYAL FOYER) 12:40 -13:40

13:40 Delegates booked on site visit assemble in hotel lounge
13:50 Coach departs from hotel for afternoon site visit to the River Frome sites within Bristol
16:50 Coach returns to hotel

NB Please plan your travel arrangements for departure from the hotel at 5.15pm to allow for any hold-ups.



FIRST FLOOR

BRISTOL ROYAL MARRIOTT HOTEL

COMPANY STANDS (Kings Room)

Wild Trout Trust	Simon Johnson and Edward Twiddy
WS Atkins	Malcolm Hewitt and Karen Hills
Willow Bank	Julie Grant
Land Wood and Water	David Holland
Macaferri	Hugh Ellis
Cain Consultancy	Simon Cain

POSTER SESSION (Kings Lounge/Kings Room)

Poster	**Name**
Sustainable Management of Urban Rivers and Floodplains (SMURF) project	Mark Scott (*Environment Agency*)
River Brent Enhancement, Wembley - lessons learnt	Susie Tudge *(Environment Agency)*
URBEM - urban river enhancement methods	Roger Bettess and Michelle Malcolm *(HR Wallingford)*
Geomorphological approaches to restoring rivers and reconnecting floodplains	Janet Hooke *(University of Portsmouth)* and Jenny Mant *(River Restoration Centre)*
Water quality modeling of the Usk catchment for habitats directive	Andy Robinson *(Environment Agency)*

Floodplain sediment quality following river restoration – River Meuse	Guiuseppe Frapporti and Hilde Passier *(PosfordHaskoning)*
Gaywood River Restoration Scheme Grimston, Norfolk	Lou Mayer *(King's Lynn Consortium of Internal Drainage Boards)*
A typology integrated washland management for flood defence and biodiversity	Joe Morris and Neil Bannister *(Institute of Water and Environment at Silsoe, Cranfield University)*
Modelling habitat - population relationships for brown trout in a small chalkstream.	Andrew Burrows *(Flood Hazard Research Centre)*
The use of habitat modelling methods to restore the stream physical habitat	Cesar Alcacer *(Symonds Group)*
Sustainable wetland restoration in the New Forest	Tim Holzer and Maxine Elliott *(Environment Agency)*
Appraisal work for four pilot farming water schemes in Somerset	Dan Alsop *(Chartered Engineer)*
Why is all the water going? Lowland England and Malta	Sylvia Haslam *(University of Cambridge)*
European Centre of River Restoration: secretariat acting from a new basis	Ute Menke *(ECRR)*
Assessing the feasibility of using remotely sensed data to detect river hydromorphology and hydromorphic alteration to meet WFD obligations	David Gilvear, Corine Davids, Andrew Tyler, *(University of Stirling)* David Corbelli and Kirsten Thorburn *(Scottish Environmental Protection Agency)*
Lincolnshire chalk streams	Caroline Tero and Amanda Jenkins *(Environment Agency*)
Objective 1: Habitat improvement in Gwynedd	Mark Potter *(Environment Agency*)
Ythan LIFE Project	Tamsin Morris *(Aberdeenshire Council)*
Appraisal: River Restoration's missing link	Lydia Bruce-Burgess *(Environment Agency),* Kevin Skinner *(Haycock Associates)* and the River Restoration Centre.
River habitat objectives: progress update	Jim Walker *(Environment Agency)*
Italian Centre for River Restoration	Enrico Isnenghi *(Italian centre for River Restoration)*

PAPER SUMMARIES

RESTORATION AS A PLATFORM FOR REGENERATION

David King, Director of Water Management, Environment Agency

Summary

The Environment Agency is committed to improving the environment, not only by its own actions, but also by working with, and influencing, others. Many of our major developments are associated with rivers and waterways. These sites offer the opportunity to enhance the local environment, promote sustainable development and restore rivers to their original form. Our objectives are to improve the quality of the landscape and reinstate the natural floodplain.

The Environment Agency has already developed a number of decision tools, underpinned by sound science, that go beyond considering the physical structure of a river - Strategic Environmental Assessment, Catchment Abstraction Management and Catchment Flood Management Plans - as well as visioning. This philosophy of combining environmental, social and economic issues is already being used to develop our approach to community plans, for example, the 'Thames Gateway,' as well as our flood defence and navigation strategies.

The Environment Agency now has the opportunity to build on this framework as a result of receiving additional resources from central government. If the extra funding is used to build engineering structures rather than deliver integrated river basin management, we will have failed in our aspiration for a better quality of life and an enhanced environment for wildlife.

FLOOD HAZARD MANAGEMENT, THE CHANGING ROLE OF INSURANCE AND SOME PERSPECTIVES FROM SCOTLAND

Andrew Black[1] and David Crichton[2]
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[1] Lecturer in Physical Geography, University of Dundee
[2] Honorary Research Fellow, University of Dundee (also Visiting Professor, Benfield Greig Hazard Research Centre (UCL) and at Middlesex University Flood Hazard Research Centre)

Summary

In recent years, one of the most prominent issues associated with development in flood risk areas has been the availability and price of insurance cover. This issue has gained considerable significance since the end of December 2002 following the withdrawal of the Association of British Insurers' previous guarantee of flood insurance cover availability for domestic and small business properties. To property owners and residents in many areas at risk of flooding, this insurance issue therefore represents a major problem: as many as 200,000 properties could in future be uninsurable and therefore impossible to mortgage. However, from the point of view of sustainable use of flood risk areas, insurance drivers can be seen to be positively encouraging change, although their effects in Scotland have differed from those observed in England and Wales.

This presentation examines the legislative and organisational differences relating to flood hazard management in Scotland and in England and Wales. It reviews differences in planning policies concerning the risk levels to be accepted in development areas, and the effectiveness of the procedures by which flood risk assessments are used by planning authorities. The significance of differing levels of mapping resource will also be explored.

A particular focus will be the role of Flood Appraisal Groups (FAGs), which have been established widely in Scotland but which have no parallel south of the border. These groups provide for stakeholder representation in forums designed to allow discussion of flood issues and to advise local authorities (responsible for flood defence) accordingly. Significantly, the insurance company esure, owned by HBOS, has agreed to a more lenient approach for Scottish local authorities that have active flood appraisal groups, and others are beginning to recognise that Scotland is "different".

The authors argue that the partnership developing in Scotland between planners and the insurance industry offers a more sustainable approach by virtually eliminating floodplain development. Without such a partnership, planning blight becomes a significant risk.

RECONNECTING PEOPLE WITH RIVERS

Mark Lloyd is Director of Thames21 *mark.lloyd@thames21.org.uk*

Mark has been working since the inception of Thames21 in 1994 to remove litter and graffiti from the tidal Thames and its tributaries in London, with the help of tens of thousands of volunteers.

Summary

Thames21 now comprises a team of 11 full time staff and removes nearly 1,000 tonnes of litter each year with the help of 5,000 volunteers. The groups include Greenwich Mencap, Swiss Reinsurance, St. Mungo's homeless hostel and Iglesio ni Christo (a Philippine-led Church group). More significant, however, are the social benefits of this community engagement. By providing physical and intellectual access to urban rivers, Thames21 allows communities to develop a sense of ownership and civic pride of their local river. It also encourages people from different backgrounds to work together in a common endeavour that breaks down social divisions.

In the USA, such community involvement is commonplace. People power is a major feature of the American environmental management system and community involvement has become incorporated into the work of statutory organisations. The EPA website provides a searchable database of community groups for each watershed (catchment). 30,000 volunteers each year help maintain and protect rivers in the state of Missouri alone. 3,000 volunteers turned out on one evening for a candlelit vigil on the banks of the Hudson to campaign for the clean-up of PCBs.

The vast majority of people in the UK are blissfully unaware of this conference and of our collective work in restoring rivers. This would not be the case if those members of the public had helped plan, implement, monitor and maintain our projects. We have achieved a great deal in changing our approach to managing river form, but there is still a vast amount of work to do. We will only be able to achieve this with political will and the help of volunteers. We must involve people in our projects, if only to get them to harangue their politicians to pump more money into the funding streams that will allow us to carry out more projects. People can also act as campaigners in their local community; each volunteer probably tells at least ten other people what they are doing. This is a very effective way of getting messages across to a large number of people, without the use of leaflets.

The benefits of involving people in river restoration are much greater than pure politics, however. Projects that involve local communities have inherent longevity because the people that were involved will monitor, protect and maintain the works long after the project managers have moved on. The projects will be distinctive because local people will have insisted on stamping their unique influence on the design. They will be able to attract greater revenue funding from sources like the Lottery because of the indirect social benefits and because the benefits in kind generated from volunteer involvement can be used as match funding.

ROUGHNESS ADVICE FOR UK RIVERS: PRACTICAL APPLICATIONS

Karen Fisher University of Birmingham karen@monguzam.freeserve.co.uk

Summary

Traditionally within the UK 'roughness values' for use in hydraulic design in man-made and natural river systems have been estimated using references such as Chow (1959), Barnes (1967) and Hicks and Mason (1991). These references include data which are pictorial or tabular with roughness values associated with rivers in the US and New Zealand. There is little available specifically for the UK although there are many papers which deal with roughness values for individual river sites, or reaches, or with different roughness features such as substrate, vegetation, boulders etc. In response to this need for a UK focussed roughness advisor a 'roughness review' and 'desk top roughness advisor' have been produced as part of the Environment Agency/DEFRA funded project on "Reducing Uncertainty in Flood Conveyance Estimation" (2002). Several expert papers were written from that network to look at the state of the art which included a review on vegetation roughness, Fisher and Dawson (2001). Part of the Environment Agency/DEFRA funded project has been to produce a roughness review, to gather, validate and catalogue knowledge on the resistance of UK rivers and then a 'roughness advisor', to develop a structured view of the information, site data and photographs from the roughness review for rivers in England and Wales.

This presentation will demonstrate examples of how the 'roughness advisor' can be used and describe the philosophy behind the approach used. Included will be practical examples of its use, to date, on the River Cole, Birmingham and the River Skerne, Darlington. Its potential to aid the classification of reaches within the framework of the River Habitat Survey will also be discussed.

References

Barnes, H H Jr. (1967) Roughness characteristics of Natural Channels, United States Geological Survey Water-Supply Paper 1849

Chow, V T (1959) Open Channel Flow. McGraw-Hill Book Company, Singapore

Fisher, K R and Dawson, F H. (2001) Parameters affecting conveyance (vegetation). Review paper for EPSRC network on Conveyance in River/Floodplain systems (ncrfs.civil.gla.ac.uk/fisher.pdf)

Hicks, D M and Mason, P M (1991). Roughness characteristics of New Zealand Rivers, Water Resources Survey DSIR Marine and Freshwater, New Zealand

REHABILITATING A HIGH-ENERGY RIVER: ENVIRONMENTAL ENGINEERING WORKS ON THE RIVER OGWEN, NORTH WALES

Newson, M. D. *(1)***, *Heritage, G. L., Vivash, R. and Jones, B.***

(1) Department of Geography, University of Newcastle, Newcastle upon Tyne, NE1 7RU. m.d.newson@ncl.ac.uk

Summary

Prior to the environmental engineering works on the River Ogwen, conducted in 1999, the channel consisted of long undifferentiated cobble and gravel runs and occasional pools created through land drainage works in the 1960s. Boulders had been removed to reduce in-channel roughness and these were dumped on the banks. Gravel material was accumulating as lateral and point bars along the system and coarser riffle/rapid areas existed upstream probably composed of material originating from the Blaen-y-nant tributary. Finer sediment was being moved through the system and very little fine material was present in the pools during the November 1998 walkover survey. An integrated approach to channel re-design was adopted for the 1999 environmental engineering scheme. Geomorphological information derived from a walk over survey was utilised together with hydrodynamic information, sediment sampling and sediment transport modelling, to reinstate a series of boulder rapids and upstream pools along a 1.5km reach of the river at Blaen-y-nant. When compared with the pre-works cross-sections the February 1999 resurvey did not reveal any areas of instability created as a result of the environmental engineering and the morphology appeared stable following the first winter flows. Slight bank erosion was noted in the area of some of the reinstated rapids and fine material was recorded in many of the pools. Both problems were investigated using the HECRAS flow model linked to a sediment transport function, which revealed that elevated flows should remobilise this material. Channel resurvey and repeat sediment sampling conducted in November 2002 support the results of the simulation indicating only very minor localised bank erosion associated with 2 of the reinstated rapids and accumulation of fine and medium gravel immediately downstream of the boulder rapids. The remarkable stability of the works in such a high energy system provides support for the approach used to design the scheme which linked historic information sources to a semi-quantitative assessment of sediment transport potential and it is suggested that this approach should underpin future environmental improvement schemes.

GEOMORPHOLOGICAL APPRAISAL OF LONDON RIVERS - EVALUATING UNCERTAINTY TO INFORM RESTORATION DESIGN

Stuart Downward[a], Helen Dangerfield[b] and Trevor Odell[c]
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b, Geomorphologist, Babtie Group, Simpson House, 6 Cherry Orchard Road, Croydon, CR9 6BE (helen.dangerfield@babtie.com).
c, Improvements Engineer, Environment Agency, Thames Region, South East Area Office, Swift House, Frimley Business Park, Frimley, Camberley, Surrey, GU16 5SQ. (trevor.odell@environment-agency.gov.uk).

Summary

Many urban rivers have been extensively modified, primarily in order to increase their flood conveyance. Complete or partial channelisation of these rivers has promoted the perception that these rivers are morphologically stable by virtue of their small-scale changes by comparison with rural and upland counterparts. This has lead to uncertainty about the nature and extent of their morphological adjustment and the management significance of these changes. Maintaining sustainable channel morphology forms the basis for achieving restoration and management objectives which are commonly set around enhancing biodiversity and amenity value without compromising standards of flood defence and reducing maintenance requirements. A question facing river restoration is what level of morphological change is 'acceptable' and over what time-scale? Accurate answers to these questions will inform geomorphologically sound management practices and restoration design in urban rivers.

Determining the characteristics of urban river change requires geomorphological appraisal. Geomorphological appraisal cannot, and should not, aim to predict exact change. Instead, anticipated future behaviour must be based on an understanding of contemporary processes and assessed at the relevant spatial and temporal scales. This will help to determine the 'likely' trajectory of future change.

This presentation outlines a research methodology for the appraisal of London Rivers to determine the character and magnitude of geomorphological change in restored (or soon to be restored) reaches. The rivers have been selected to exemplify a range of restoration options. They include reaches with varying degrees of physical channel constraint to those where there are no direct structural controls and full restoration may be achieved.

The geomorphological appraisals will occur at a range of spatial and temporal resolution over a two to five year observation period from November 2002. The results of the appraisal will:

- Aid decision making with regard to selecting appropriate tools and methods to most efficiently represent urban river change
- Determine at-a-site changes, responses and recovery rates
- Determine between sites river changes
- Provide feedback to better inform geomorphological appraisal and restoration design.

INVERTEBRATES AND GRAVEL – IS SIZE IMPORTANT?

Judy England

Environment Agency, Thames Region judy.england@environment-agency.gov.uk

Ecological Appraisal Team Leader in the North East Area of Thames Region, also undertaking a part-time PhD "Ecological Appraisal of River Restoration Schemes" at the University of Hertfordshire.

Summary

The River Mimram in Hertfordshire is a chalk stream arising from springs above Whitwell. From here it flows for 23km until its confluence with the River Lee in Hertford. For the majority of its length the river exhibits characteristic chalk stream features and a typical flora and fauna. The river is characterised by riffle and pool with a rich diversity of habitats. The section of river at Archer's Green, upstream of Hertford, has been historically widened and deepened. In 1998 this section of channel was restored to a more natural riffle and pool habitat structure. Integral to the scheme was the introduction of a gravel substrate to raise the level of the bed. Since the River Mimram is geomorphologically stable there is little sediment transport within the system. For this reason it was debated whether the gravel added to the channel should be graded to match that of the river or whether a cheaper standard gravel size could be used. In order to answer this question both types of gravel were used within the scheme and an extensive monitoring programme established.

A series of surveys of the river were undertaken, before and after the restoration scheme was implemented. The surveys included sampling both the sediment and the invertebrates and an assessment of the habitat composition of the river. The results were analysed to examine changes in substrate composition and invertebrate colonisation trends. In all instances the results were compared with a control site. The finding of the surveys and the conclusions reached are presented within this paper.

APPLYING GEOMORPHOLOGY IN SUPPORT OF CHALK STREAM RESTORATION; THE RIVER WYLYE

Sally German[1]. and David Sear[2].

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2. Dept. of Geography, University of Southampton
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Sally German was a research scientist in the GeoData Institute Environmental Consultant, but now works for Gifford and Partners, Southampton

David Sear is a Senior Lecturer in Physical Geography

Summary

Chalk streams have specific hydrological, geomorphological and ecological characteristics that combine to present a range of distinct river management issues. Moreover, management of chalk rivers has created an additional layer of complexity that makes interpretation of physical process and moreover its translation into science-based management more challenging. To date, attempts to treat perceived problems of siltation, loss of physical habitat and ranunculus (watercrowfoot) decline have tended to be undertaken in the absence of catchment scale assessment of physical process functioning. This paper draws on a recent catchment-scale case study to demonstrate the application of geomorphological audit and dynamics assessment in support of rehabilitation options in a chalk river. At a catchment scale, a combination of literature review, field-based reconnaissance and interpretation provides an assessment of the sediment system functioning of chalk rivers and the Wylye specifically. At the reach-scale, geomorphological assessment of existing rehabilitation treatments is used to demonstrate the impact of current practice on geomorphic functioning and physical habitat. The role of large woody debris and source control in catchment and reach scale rehabilitation of chalk streams is discussed.

A FRAMEWORK FOR INVESTIGATING RIVER RESTORATION AND THE WATER FRAMEWORK DIRECTIVE: THE RIVER DEE AND TARLAND CATCHMENT INITIATIVES, N. E. SCOTLAND

Simon Langan, Principal Scientist.
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Summary

The catchment of the River Dee is one of the largest in north east Scotland with a total catchment area of approximately 2100km2. The headwaters are in the Cairngorm Mountains with the mouth, 126 kilometres east, entering the North Sea after passing through the City of Aberdeen. The eastern area of the catchment comprises gently rolling lowland from the foothills to the urban fringe of the City of Aberdeen. The main land use of this rural area is forestry and agriculture. The river underpins the social and economic well-being of communities in the area by supporting industries such as tourism and recreational fisheries. Recreational fisheries alone contribute approximately £1.5 million to the local economy.

The Scottish Environment Protection Agency is in the process of developing a catchment management plan for the River Dee. This is a forerunner of a sub-basin plan needed under the Water Framework Directive. The River Dee is also a proposed Special Area of Conservation (SAC) under the Habitats Directive. To initiate discussion on these topics, a consultation document was produced in January 2000 and through this, a series of issues and actions have been identified. As a test of how and what can be achieved in relation to catchment management, a partnership between the regulators, planners, research scientists and stakeholders has been established. Initially work on the process required to deliver these actions will be piloted by focusing on three sub-catchments of the River Dee and addressing a number of the actions highlighted in the River Dee Catchment Management Plan. The sub-catchments are Tarland, Loch Davan and Elrick. Each faces a different range of problems that will need addressing utilising different stakeholder involvement. In this paper examples are drawn from the Tarland Catchment Initiative.

The Tarland catchment is the upper most tributary of the River Dee under intensive land management. Both land development issues, through increased local population and a legacy of maximising agricultural output, has given rise to a deterioration in habitat as well as water quality:- Habitat, through canalisation and use of streams as waterings for livestock; Water quality deterioration, from increased nutrients (nitrogen and phosphorus); suspended sediments and bacterial coliform contamination. At the same time the local infrastructure has added to the pollution pressures. These changes to habitat and water quality are also linked to changes in aquatic ecology of invertebrates, fish and mammals. Within the catchment each of these elements has been monitored and quantified prior to proposing and discussing options available to the stakeholders to initiate a programme of restoration. This will allow an assessment of the process and efficacy of different measures used to improve water quality, habitat and ecology at the catchment scale.

Many of these issues described are common to rural areas of Aberdeenshire, the east coast of Scotland and indeed Europe.

PRACTICAL EXPERIENCES OF RIVER RESTORATION AND MANAGEMENT IN AN URBAN PORTUGUESE ENVIRONMENT

Andrew Donnelly
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Águas de Gaia is the municipally owned water supply and wastewater treatment company for Vila Nova de Gaia in northern Portugal, which has also assumed responsibility for managing the rainwater drainage network, beaches and urban rivers within the council area. The author is responsible for co-ordinating an environmental monitoring scheme, linking development and performance of the sewage network under construction, with water quality indicators, flow management and a programme to rehabilitate up to 400kms of urban river systems. The objectives are to eliminate wastewater discharges to watercourses, thus permitting ecological and habitat reconstruction and development of public recreational space.

Summary

In the context of river restoration, Portugal is amongst the less advanced nations in Europe, with little practical experience of implementing successful projects, which incorporate consideration of habitat reconstruction, water quality and flow management as well as more superficial visual improvements. With little national co-ordination, most developments result from local initiatives with varying degrees of success and application, whilst actual implementation of plans is often a rare event. Against this basis, the work undertaken by Águas de Gaia is not perfect, but is one of few examples of a co-ordinated programme of river rehabilitation actually being implemented and effected at this time. With little experience nationally, intervention and improvement plans are based on local knowledge combined with international research modified to consider the specific conditions encountered in the region.

Vila Nova de Gaia is located on the southern side of the River Douro and is most well known as being the home of port wine production. The area covered by the company encompasses around 250km^2 of dense urban, semi-urban and rural zones, with a resident population of around 350,000, bounded by the River Douro to the north and east and Atlantic Ocean to the west, with 15kms of sandy beaches. The company provides an unusual example of vertical integration of water management, being responsible for water supply, wastewater collection, treatment and disposal, rainwater network management as well as the small rivers and beaches within the council limits, though not the River Douro. The program of river rehabilitation is inextricably linked with on-going construction of the sewage network and treatment stations. With 80% of the population not having a sewage connection even in 1999, resulting in most wastewater being discharged either directly or indirectly into watercourses, river systems have been severely degraded in terms of water quality and ecological diversity.

Whilst much activity has concentrated on improving the fundamental issue of water quality, sufficient progress has been made so as to allow actual environmental improvements and interventions along the watercourses to proceed. Much of this work has to be considered experimental, as in a Portuguese context, little prior knowledge has been available upon which objectives and intervention designs can be based. The work is also considered essential not only on an environmental basis, but also to demonstrate to the resident population the benefits and necessity for the sewage network development, creating public spaces and amenities as well as protecting the largest recreational zone in the area, namely the Blue Flag accredited beaches.

STREAMBANK PROTECTION USING BIOENGINEERING TECHNIQUES: RIVER COLY DEMONSTRATION PROJECT

David Holland, Technical Director, Land, Wood & Water International.

Contact David Holland at: davidholland80@hotmail.com

David's primary responsibility is the design of bioengineering projects in watercourses, within Land, Wood & Water international (LWW int.). LWW int. is a design & build company with offices in 10 European countries, employing over 25 bioengineering specialists.

Summary

Blockstone and other hard revetments are still extensively used in gravel-bed rivers in the south west, and indeed across the UK, for erosion problems. Lack of design information, no case history of successfully completed local schemes and several high profile willow spiling failures have resulted in a lack of confidence in bioengineering techniques. The river Coly project provided the opportunity to demonstrate that numerous low cost bioengineering techniques can be successfully implemented, even in mobile gravel bed rivers. Initial plans were to straighten and revete 180 metres of the river Coly, Devon, which was experiencing accelerated bank erosion.

The key objective was to demonstrate the following points:

- Bioengineering techniques can be used in mobile gravel-bed rivers in the south west & UK wide
- Extensive quantified and empirical information does exist on bioengineering methods/materials that can be built into design to enhance certainty and increase confidence in bioengineering techniques.
- Bioengineering techniques can be more cost effective for landowners contemplating blockstone or other hard revetments
- Ecological and sustainability benefits of bioengineering techniques

HOW UNCERTAIN IS THE GEOMORPHOLOGY USED TO DESIGN RIVER RESTORATION PROJECTS?

David A. Sear and Stephen E. Darby
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Summary

To be sustainable, river restoration projects must be designed to recreate appropriate functional characteristics, often within a context of physical (i.e. morphological) stability. Hence, much restoration science has focused on the development and application of geomorphic principles for river restoration design. Generic frameworks underpinning geomorphic approaches to river restoration design have now been proposed and are supported by a wide range of design tools and models. Unfortunately, the state of the art is that existing tools are either entirely empirical or empirically calibrated in nature, so different results are obtained when applying different models to the same problem. Accordingly, 'designers of stream restoration projects are confronted with rather high levels of uncertainty' (Brookes and Shields, 1996). To date, no study has yet attempted to constrain or quantify the actual level of uncertainty involved. River restoration science has instead focused on the management response (e.g. post-project appraisal, adaptive management strategies) required to confront the assumed uncertainty. This is unfortunate because institutional and public confidence in river restoration and management could in the future be undermined if the limitations of restoration science are not adequately communicated. To address these issues, we herein present two case studies in which we have 1) quantified the uncertainty involved in developing a (geomorphic) restoration design for the highly disturbed River Cherwell, a typical British lowland stream and 2) identified the role of uncertain post-restoration adjustment on the hydraulic performance of the River Restoration demonstration site at the River Cole. In the Cherwell case study, although our restoration design is based on geomorphic principles, the level of quantified uncertainty is very high. We hypothesise that the impact of uncertainty in restoration designs based on geomorphic principles is greatest in lowland landscapes. In such environments geomorphic evidence that might be useful in reconstructing pre-disturbance conditions, and hence informing restoration design, is often not available due to the extent and severity of prior human modifications. It is ironic that these types of disturbed landscapes are precisely those most in need of restoration.

RECOVERY OF AN AQUATIC ECOSYSTEM FOLLOWING TREATMENT OF ABANDONED MINE DRAINAGE WITH CONSTRUCTED WETLANDS

***Ian M. Wiseman, Paul J. Edwards, and Graham P. Rutt*[1]**

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Summary

River restoration is frequently undertaken by making physical changes to a watercourse. However in many situations it is the water quality that is limiting the ecological development of a river. The successful treatment of sources of poor water quality should allow considerable stretches of river to recover. Seven kilometres of the River Pelenna in South Wales was impacted for approximately 30 years by discharges from abandoned coal mines. Elevated iron and low pH caused significant ochreous staining and had detrimental effects on the river ecology. The River Pelenna Minewater Project constructed a series of passive wetland treatment systems to treat these discharges. Monitoring of the performance and environmental benefits of these has been undertaken as part of an Environment Agency R&D project. This project has assessed the changes in water quality as well as monitoring populations of invertebrates, fish and birds between 1993 and 2001.

Performance data from the wetlands show that on average the three systems are removing between 82 and 95% of the iron loading from the minewaters. In the rivers downstream, the dissolved iron concentration has dropped to below the Environmental Quality Standard (EQS) of 1 mg/l for the majority of the time. Increases in pH downstream of the discharges have also been demonstrated.

Trout (*Salmo trutta)* recovered quickly following minewater treatment, returning the next year to areas that previously had no fish. Intermittent problems with overflows from the treatment systems temporarily depleted the numbers, but the latest data indicate a thriving population. The overflow problems and also background episodes of acidity have affected the recovery of the riverine invertebrates. However there have been gradual improvements in the catchment, and in the summer of 2001 most sites held faunas which approached unpolluted controls. Recovery of the invertebrate fauna is reflected in marked increases in the breeding success of riverine birds between 1996 and 2001.

This study has shown that constructed wetlands can be an effective, low cost and sustainable solution to ecological damage caused by abandoned mine drainage. It has demonstrated how quickly a river system can recover following efficient treatment of point source pollutants.

SEDIMENT TRANSPORT DYNAMICS IN THE RIVER BUSH: IMPLICATIONS FOR CATCHMENT MANAGEMENT

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Role in organisation: Research fellow at Queen's University working on a 2 year project funded by Department of Environment, Northern Ireland.

Summary

A significant decline in the survival of salmon from ova to smolt has been reported in the River Bush, County Antrim. Habitat degradation (sedimentation and eutrophication) has been identified as a causative factor of this decrease in recruitment. Four study sites in the Bush catchment were instrumented in July 2002 to investigate the sedimentation issue.

The transport of nine different size fractions of bedload (granule gravel to silt and clay) is being monitored using pit traps. Total loads vary on a spatial and temporal scale between 0.001 and 42 kg m^{-1} $week^{-1}$. The transport of suspended sediment is also being monitored using storm-integrating collection tubes. Total loads vary between 0.02 and 48 kg m^{-1} $week^{-1}$. Flow competence to entrain certain sizes of particles and sediment supply has been suggested as limiting factors controlling both suspended and bedload transport. Indeed, the strong relationships between sediment transport and flow could lead to the prediction of loads.

Sources of sediment within the catchment are being assessed using a combination of visual observations (helicopter survey and transect walking), GIS erosion potential maps and bank erosion monitoring (using networks of pins). Maximum erosion rates are observed during high flow conditions with a range between 0 and > 500 mm per event. Possible source areas identified by these methods will be fingerprinted using various diagnostic physical and chemical properties to elucidate the link between soil erosion and downstream sediment delivery. A pilot study to measure rates, distances and the active depth layer of coarse sediment transport (30-80mm) using pebble tracers is underway.

Further work is investigating the effect of invasive macrophytes upon oxygen dynamics within the Bush. Preliminary data using continuous temporal sampling has shown large diurnal fluctuations that are not recognised by a traditional weekly spatial sampling programme.

This work will identify sources and sinks of fine and coarse sediment, as well as determining the magnitude, timing and type of sediment transported within the Bush catchment. Based upon this information, recommendations for manipulating sediment loads by changes in management of the river and riparian zone can be suggested. In particular, benefits of a floodplain/river bank restoration project and the impact of land use and drainage upon the river sediment budget will be addressed.

USE OF ANGLER CATCHES TO APPRAISE THE EFFECTIVENESS OF RIVER HABITAT RESTORATION ON FISH STOCKS

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****Lead author – Graham Pearson, e-mail graham.pearson@environment-agency.gov.uk (Senior Fisheries Scientist)***

Summary

Angler catch data have been shown to be effective means of determining the changes in fish stocks resulting from habitat alterations. Until recent years, angling catch data have represented the best means of collecting information about changes in coarse fish stocks in large British rivers. Angler catch data from the River Nidd were used to show the adverse effects of installation of a gauging weir on the upstream fishery. A subsidiary weir to raise tail water levels gave no observable benefit and installation of baffles on the face weir provided inadequate amelioration. Removal of the gauging weir and replacement by ultrasonic gauging led to rapid and sustained improvements to catches upstream. Increased catches were most marked for small fish.

Angling match catches from the River Calder consisted mainly of just two species, roach and gudgeon in the 1970s, but better water quality, resulting from elimination of the use of pesticides and improved treatment of trade and sewage effluents, allowed greater diversity of fish by the 1990s.

A tidal barrage across the River Derwent largely eliminated ingress of flounders, as evidenced by angler catches. This evidence will assist the case for installation of a fish pass.

SEDIMENT AND SEED DYNAMICS ALONG RIVERS

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(This paper relates to NERC research grants NER/T/S/2001/00930, NER/D/S/2000/0142, GR3/CO036 involving researchers at King's College London (A.M. Gurnell, J.M. Goodson, A.J. Davenport), University of Nottingham (N. Clifford, O. Harmar, K. Watson), University of Birmingham (P.G.Angold, G.E. Petts, I.P.Morrissey), University of Sheffield (K. Thompson), Centre for Ecology and Hydrology (O.M. Mountford, P.D. Armitage), Harper Adams U.C. (A. Wilcox)

Summary

Seed banks and seed dispersal mechanisms in the environment have a long-established interest for ecologists, particularly for their role in shaping vegetation communities and influencing the physical environment. A recent study along the banks of the lower River Dove, Derbyshire revealed new insights into the vertical distribution and species content of riparian seed banks. It also identified close links between the transport and deposition of viable seeds and river-transported sediment. The main applications of these findings for riparian management are:

For the seed banks: Environmental conditions within the river bank zone are not suitable for seed bank formation below the upper top-soil layers (hence eroding bank faces remain bare). Removing this layer will expose seed-barren soil layers resulting in slow vegetation recovery. However, gentle disturbance of the seed bank layer can create conditions for the rapid proliferation of a diverse plant community within riparian areas. Where planting is necessary, plans must be wholly applicable for the individual site character, local environmental/energy conditions and the structural design. Careful, site/species-specific planning for effective post-disturbance vegetation restoration is essential.

For the transport and deposition of seeds and sediment: An appreciation of the importance, scale and behaviour of water transport along river corridors is crucial, particularly for biodiversity. Plant propagules are associated with deposited organic litter *and* they are an important, predictable component within redistributed river sediments. With greater understanding of the interactions between the physical attributes of seeds as components of the river's sediment load, and thus their deposition within particular depositional environments (reflecting bank profile and planform and variations in water levels and flow velocity patterns), future designs could create conditions suitable for the selective deposition and recruitment of desirable materials/plants, perhaps encouraging greater natural regeneration whilst retaining structural integrity.

The maintenance of longitudinal connectivity between rivers and their banks and lateral connectivity across floodplains is crucial for continuous transfer of a diverse range of material across riparian habitat boundaries. The importance of flow, sediment and vegetation interactions for (i) both aquatic and riparian vegetation in the context of river flow regulation and vegetation management along river channels and margins, and for (ii) the recovery of plant communities and the evolution of river bank and channel form following engineering modification are the subject of current research projects on the Rivers Cole (West Midlands), Tern (Shropshire) and Frome (Dorset). Clearly, there is much still to be learnt through focused research in the field of dispersal. There is also a real need to establish more collaborative work and research between practising river engineers, ecologists and hydrogeomorphologists if we are to better understand the processes involved in sustainable river management.

PROBLEMS OF RIVERS AND POSSIBILITIES OF RIVER RESTORATION IN THE MIDDLE VOLGA REGION OF RUSSIA

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Summary

The river Volga is one of the largest rivers in Europe (length – 3,531 km, catchment basin – 1,360,000 km^2); at the present time it is partitioned by dams, forming a chain of 9 water reservoirs. About 2600 rivers (tributaries) run into the Volga and the water reservoirs. The basic regulator of water flow is Kyibishevski water reservoir (area 6150 km^2) in the basin of the middle Volga. The building of water reservoirs has slowed the flow of the river by more than 10 times and has lead to the strong anthropogenic transformation of the river and its ecosystem. The restoration of the properties of the Volga river and its tributaries count towards the global complexity of the problems and exemplify the difficulty of the problems faced.

The basin of the middle Volga forms a large geographically, and economic important region of the European part of Russia. This area includes the Cheboksarskoe and Kyibishevskoe water reservoirs and large tributaries such as the Svijaga, Ilet, Kokshaga and Kazanka rivers.

The Svijaga river is a large main tributary of the Volga with a length of 375 km, a catchment basin 16700 km^2 and 30 other tributaries. The main ecological problems of the small and medium sized rivers of the region are: 1) depletion of water resources because of soil erosion and consumption of water; 2) accumulation of pollutants in sediment; 3) regulation of water flow and eutrophication; 4) decrease in biological diversity in flora and fauna and as a consequence degradation of the fluvial ecosystems.

The Svijaga river and the Svijagski bay of the Kyibishevskoe reservoir are valuable natural resources and they have a high value for fisheries. Our research in 1991-2002 showed that the self-cleaning of the Svijaga river is helped by the flow and biological self-cleaning of the bed, and also in the processes of deposition and biosedimentation where sand is extracted from the bed of this river (in the city of Ulyanovsk). Aquatic plants in these areas act as biofilters reducing the amount of biogenic matters and heavy metals by 8-10 times that of the average flow. The ecological state of the undercurrent and the Svijagski embayment is still in very poor condition.

According to the concept of river restoration (proposals of the European conference «River Restoration 2000», Netherlands) and the results of our studies, for restoration of the rivers of the middle Volga basin it is necessary to establish a regime of special water protection zones, the clearing of sewage, the application of hydraulic engineering (for example opencast quarries for sedimentation etc.), bioengineering measures, the restoration of elements of the former hydrological regime and the creation of biological places for plants and molluscs.

MODELLING THE EFFECTS OF CHANNEL DESIGN ON FISH HABITAT DURING HIGH FLOWS

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Summary

This research uses three-dimensional hydraulic modelling to assess fish habitat during high flows in two urban river channels chosen to represent different levels of channel modification. Maximum Sustainable Swimming Speeds (MSSS) of fish have been determined in laboratory experiments for the purposes of ecotoxicological research, however they have further uses. In this study, simulations of high flow hydraulic patterns are compared with fish MSSS. Results show that when the water levels rise to fill the first channel of the two-stage channels at the sites MSSS are surpassed in the majority of the channel. This suggests that high velocities at high flows are one factor that limits fish habitat. A comparison between the two reaches shows that there is less usable habitat (defined as river area with velocity below MSSS) in the more modified reach. This work demonstrates the role that three-dimensional hydraulic modelling can play in understanding fluvial processes in restored river channels when properly calibrated and tested using field measurements. Conclusions suggest that geomorphological diversity created in river rehabilitation schemes can improve fish habitat during high flows.

INTERACTIVE MAPPING FOR COMMUNICATING THE RESULTS OF A FLUVIAL AUDIT

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Summary

River management is multidisciplinary and consequently information arising from such action is diverse and is utilised by a wide variety of end users. It is important to communicate this information in accessible and understandable ways. Many software tools are available to aid this process. This paper briefly illustrates various existing methods before focusing on how an interactive CD was used to communicate the results of a fluvial audit of the Hawkcombe Stream, Somerset, to a wide variety of end users.

The potential for using Geographical Information Systems to capture, organise and analyse spatial information is being realised within river management. Illustrative material (including maps) is often extracted for use within reports to communicate the results of a particular study. There is increasingly a need to communicate these results to a wider audience in a non-technical and accessible way. It would be desirable to utilise some of the interactive data exploration capabilities of GIS but to create a software tool that was distributable and did not rely on pre-installed software (including web browser plugins). Interactive mapping distributed on CD allows the full range of multimedia elements such as text, photographs and video clips to be organised spatially. The map becomes a fundamental device with which to link together a whole range of related information (Figure 1). 3D models are used as alternative representations and selective map overlays allow users to browse map-based information in different combinations and at their own pace.

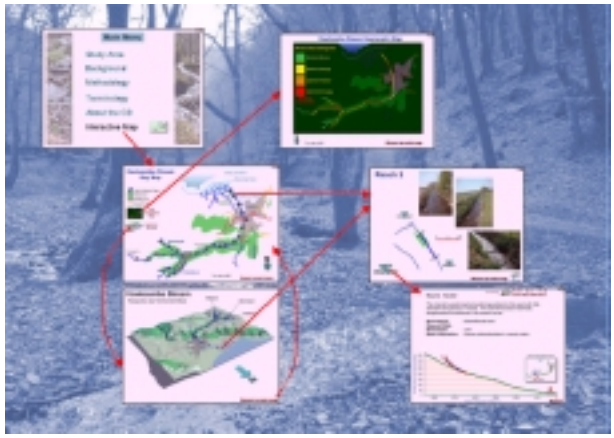

Figure 1. Summary of CD interface

Geomorphological assessment is an important step in developing a thorough understanding of the sediment dynamics and trends of morphological adjustments in a stream system. A fluvial audit was thus performed on the Hawkcombe Stream since a reach downstream of Porlock was suffering from severe bed and bank instability. The results of the audit may assist in the selection of an appropriate and sustainable solution to the problem. Through conveying the results through an interactive CD it was possible to obtain the views of a wider audience and use this input to advance the selection process.

Interactive mapping has a wide variety of potential applications within river management. The CD illustrated here offers a user-friendly method for conveying scientific results in a non-technical and accessible manner. Current research in this area is examining the usage of these techniques in other aspects of river management, such as a providing a tool for communicating river restoration options or as a means for conveying the results of a post-project appraisal.

ARTERIAL DRAINAGE MAINTENANCE – AN ENVIRONMENTAL APPROACH

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A Civil Engineer with the Office of Public Works for twenty two years and for twenty of those involved in the construction and maintenance of Arterial Drainage Schemes in the West & North West. Recently been appointed to head up an Environment Section under the Arterial Drainage Maintenance Service.

Summary

The Office of Public Works (OPW) is a government body which has carried out a substantial number of Arterial Drainage Schemes throughout the country between 1945 and 1995. The purpose of these schemes, which were catchment based, was to provide outfall for the drainage of agricultural land. OPW has a statutory responsibility under the 1945 Arterial Drainage Act for the maintenance of these schemes in proper repair and effective condition. The Act was amended in 1995 to allow the OPW to embark on a programme of urban flood alleviation schemes which are not catchment based. A number of these schemes have been completed and there is also a statutory maintenance responsibility associated with them. The OPW's maintenance operations are carried out on a direct labour basis generally.
Existing Irish and EU legislation on the environment and a greater awareness, have altered the manner and timing of channel maintenance operations in recent years. The existing Experimental Drainage Maintenance (EDM) Programme, which has been managed by staff from the Central Fisheries Board and funded by the OPW, has been extended to include environmental training for outdoor staff. Methods, which have been found successful under the programme, are now being adopted in routine channel maintenance operations.
Over the years the OPW have built up a good working relationship with many of the Regional Fisheries Boards and with the Central Fisheries Board. Similar links are being developed with Duchas – The Heritage Service of the Department of the Environment.
It is envisaged that the EDM programme will be further expanded to include categorisation of channels into various habitat types. A GIS mapping system is at development stage.

***Acknowledgements*:**
I wish to acknowledge the assistance of the following in the preparation of this paper. In particular Dr. James J. King of the Central Fisheries Board and also John Murphy, Regional Engineer, OPW, West Region Arterial Drainage Maintenance and John Curtin, Assistant Chief Engineer, OPW, Arterial Drainage Maintenance Service.

A NEW HABITAT FOR THE LARK

Martje Wise[1], Jonathan Lewis[2], Lee Garratt[3], Barrie Gooding[4]

(1) Royal Haskoning Nijmegen, (2,3,4) Posford Haskoning, Peterborough

(1) Hydrologist, (2) Environmental Scientist, (3) River Modeller (4) River Engineer

Summary

Posford Haskoning was commissioned by English Nature in December 2001 to undertake a study to assess the feasibility of restoring the River Lark within the Cavenham & Icklingham Heath Site of Special Scientific Interest (SSSI).

The SSSI, near Mildenhall, Suffolk, has an area of 418ha and is located in the Breckland Natural Area. It is well known for its dry heathland, wet alder woods, and its population of stone-curlew, nightjar and woodlark. The River Lark bisects the SSSI but never floods due to an existing flood embankment. As a result of this, the wetland plant and animal communities that form part of the SSSI have become degraded.

The primary objective of the study was to assess the feasibility of re-instating a more natural flooding regime from the River Lark to its associated floodplain without compromising the current standard of protection outside of the SSSI.

A two-stage approach was adopted, with Stage 1 involving hydrological analysis and the construction of a hydraulic model (ISIS) so that the existing standard of flood protection could be determined, along with the existing flooding regime. Stage 2 required the identification and consideration of outline options for the river and floodplain restoration, which maintain the existing standard of flood protection.

Within Stage 2, consultation was carried out with key stakeholders along with further modelling of the outline options. The economic and environmental aspects of these options were also assessed during this stage.

Eight outline options were initially investigated, all of which had to comply with criteria agreed through discussion with English Nature and the Environment Agency. Of these eight options, two were taken forward and examined in greater detail. Capital costs were determined for each of these two options and an appraisal of the potential environmental effects of these options, during both the construction and operational phases, was also undertaken. Based on existing literature, the environmental requirements of the characteristic wetland flora and fauna were determined, and these linked, as far as possible at this feasibility stage, to the predicted change in conditions (water levels, flooding frequency) that might be produced by each option. The potential for habitat creation within specific parts of the study reach, along with the possible constraints to this, was described.

Key recommendations included, amongst others, the need to define specific restoration targets with the client, the need to undertake a geotechnical survey of the study area to determine hydraulic continuity of local substrates, the need for a ground investigation of the materials to be used in any bunds and the need to carry out a hydrogeological investigation of the site to investigate the links between surface water and groundwater in the area.

URBAN ENVIRONMENTAL REGENERATION IN THE LONDON BOROUGH OF LEWISHAM: A VIEW FROM THE QUAGGY RIVER BRIDGE

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Conrad is the authority's Environmental Sustainability Manager. A brief which covers:

- **operational projects – such as river restoration, greenwaste composting, office waste minimisation;**
- **environmental policy**
- **quality of life indicators**
- **sustainability communications**

Summary

The talk draws on the speaker's experience project managing a recent urban river restoration project in South London – the Quaggy in Chinbrook Meadows. This non-statutory project was delivered through an innovative partnership of Local Authority, EA, Groundwork, the authority's grounds management contractor and local non-profit and community sector organisations. The award-winning project has been chosen by John Prescott's department as a case study of sustainable community regeneration.

The talk will focus on what local authorities need to know about river restoration and under what conditions LA's might match funds. It will discuss the partnership issues, and flag up some indicative "good practices" to help with getting such projects from idea to delivery.

POSTER SUMMARIES

A TYPOLOGY FOR INTEGRATED WASHLAND MANAGEMENT FOR FLOOD DEFENCE AND BIODIVERSITY (POSTER)

Joe Morris, Tim Hess, Neil Bannister and Peter Leeds-Harrison (Institute of Water and Environment at Silsoe, Cranfield University)
Richard Vivash (Riverscapes Consultancy)
Max Wade (Ecoscope Applied Ecology Ltd)
Dave Gowing (Open University)

Summary

The poster summarises the washland classification system developed as part of a DEFRA and English Nature funded project entitled 'Integrated Washland Management for Flood Defense and Biodiversity'.

The classification system categorizes washlands via a two stage process. A Hydraulic Matrix was devised to categorise washlands by degree of hydraulic control and a Habitat Matrix was devised to categorise washland by those attributes of hydrology that critically define the type of habitat that exists or can be created. To link the two matrices a 'Menu of Interventions' was adopted describing engineering or management practices which alter flooding and soil wetness regimes thereby better exploiting habitat potential.

The findings of the project demonstrated that there is potential synergy between flooding and biodiversity functions on a washland. Also there is opportunity to enhance biodiversity under most flood regimes identified.

ECRR (EUROPEAN CENTRE OF RIVER RESTORATION) SECRETARIAT ACTING FROM A NEW BASIS (POSTER)

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Summary

In 1999, the European Centre for River Restoration (ECRR) was constituted to promote the importance of river restoration in all facets as an essential part of sustainable water management. Since then, we have added members (people and organisations) of almost all European countries. The need for exchange of information and learning from each other has increased on a Pan European scale. A Management Board and a secretariat have been installed to manage the ECRR. After the completion of the EU Life Project in April 2002, the secretariat of the ECRR rotated to RIZA (Institute of Inland Water Management and Waste Water Treatment) which is a part of the Ministry of Transport, Public Works and Water Management.

ECRR is keeping close contact between practitioners, both nationally and internationally, by exchange of information through newsletters, homepages and meetings. The ECRR facilitates and encourages the establishment of (more) national networks (so-called national centres), especially in Eastern European countries. The national networks function as a focal point for individuals and organisations working on river restoration. The (international) ECRR and the national networks work complementary and support each other.

The RCC (United Kingdom), the DCVR (Denmark) are the most active national centres dealing with the implementation of restoration projects, promotion and publicity. The Dutch NCR is a more scientific network, focussing on river studies, representing universities and research institutes. The Italian CIRF is growing fast, and is paying special attention to policy and public participation in projects. Other national centres are established in Romania, Spain, Belgium and Finland.

What's going on in Europe?
(1)Most emphasis is on the implementation of the Water Framework Directive (WFD). Every European country must reach a "Good Water Status" that is defined on the level of biological, hydrological and chemical quality in a catchment area. Additionally, the WFD puts great emphasis on economic instruments to help meet environmental objectives and on public participation in local water policies and planning. Integration with other policies and Directives especially with the Convention on Biodiversity, is important.
(2) The high floods of last year in Central Europe confronted people in various river basins with the fact that living with water is not always easy. Also politicians recognised that more space for rivers is needed to reduce the future risks and costs.
(3) Due to economic stagnation or even downturn, nature is an expensive subject nowadays. It is equally important to conserve natural rivers as well as of repairing the resultant damage years after, for what often equates to nearly the same amount of money which was used earlier to make the area "more suitable" for human use.

FLOODPLAIN SEDIMENT QUALITY FOLLOWING RIVER RESTORATION (POSTER)

Giuseppe Frapporti[1] and Hilde Passier[2]
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Giuseppe Frapporti is a senior scientist consultant, specialised in geochemistry, monitoring networks, data interpretation and statistics.

Summary

In river restoration projects the sediment quality needs to be considered. Especially in river systems carrying a polluted suspended solid load with heavy metals, nutrients and organic contaminants, river restoration will redistribute the pollution pattern on floodplains and floodbanks, affecting the river restoration potential in terms of nature conservation.

The sedimentation process is complex as is shown in the River Meuse restoration project, the Netherlands. The sedimentation rate depends on the river flow regime, and morphology of the floodplain. In addition, the quality of the suspended solids depends on river flow regimes during flooding events. River restoration may involve changes to floodplain morphology and flow regimes of a river system, and affects the sedimentation process.

To predict the floodplain sediment quality following restoration, the past and present sedimentation process can be used as a reference. In a floodplain of the Meuse river (Itteren, in the south of the Netherlands), 21 cores down to a depth of 120 cm were taken and centimetre cross-sections were sampled to analyse the heavy metal content and macrochemical characteristics of the sediment. Additionally, 24 cores were sampled and analysed for ^{137}Cesium activity. This enabled the calculation of sedimentation rates, because, due to specific events (open air nuclear tests in the 1950s/1960s and the Chernobyl accident), two anthropogenic peaks of high Cs activity were deposited from the atmosphere on the floodplain.

By studying the depth profiles of each core, a historic pollution pattern over the floodplain was identified. In the 1970s, the heavy metal pollution loads were highest, caused by an untreated discharge. Although much effort has been placed on treating the sewage, the pollution load still exists in the Meuse today. It is considered that part of the heavy metal load is derived from natural variations of heavy metals (in sulphide minerals) in the catchment areas.

The sedimentation rates and spatial distribution of heavy metal concentrations were correlated to examine the sedimentation process that governs the heavy metal pollution distribution on the floodplain. Heavy metal contents were highest in areas that suffered first from flooding during periods of high water levels. Heavy metal contents were lowest in areas that flooded only during extreme flooding events. Sedimentation rates (ranging from 0.4 to 2 cm/yr) are, however, comparable in both these areas.

The fact that the Meuse is still carrying a polluted load of heavy metals and that the concentrations are distributed on the floodplain during flood events, indicates that parts of the floodplains and floodbanks may (still) become polluted following river restoration. This may limit the opportunities for usage of the floodplain such as nature conservation or agricultural use.

Acknowledgements: This research was carried out for the Dutch Ministry of Transport, Public Works and Water Management, Institute for Inland Water Management and Water Treatment (RIZA). We like to thank Gerard van den Berg and Marjolein van Wijngaarden of RIZA for making available the data, results and discussion.

King's Lynn Consortium of Internal Drainage Boards

GAYWOOD RIVER RESTORATION SCHEME GRIMSTONE, NORFOLK (POSTER)

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Summary

The Gaywood River Restoration Scheme has been developed to stop Leziate, Sugar and Derby Fen SSSI from drying out and safeguard these important sites for the future. This Scheme is a partnership project between English Nature and the Gaywood Internal Drainage Board, part of King's Lynn Consortium of Internal Drainage Boards (KLCIDB). It has been developed in close co-operation with the landowners and fen trustees. The scheme is funded by Gaywood IDB, DEFRA, English Nature and the Borough Council.

The vision of English Nature and KLCIDB is to "*restore the SSSI, link its fragmented sections, and secure creation of new habitats in the Gaywood Valley as a significant contribution to wetland and heathland habitat Biodiversity Action Plan Targets.*"

Work started in December 2002 to reinstate the old river meanders and raising the bed levels on a one kilometre stretch of the Gaywood River as it runs along side Derby Fen. In addition, to recreating the old river meanders, water levels will be raised by re-profiling the drainage pattern across the valley flood plain and privately owned farmland has been taken out of arable production to be returned to wet grassland, fen and reedbed, to form a valuable link between the three Fens.

GEOMORPHOLOGICAL APPROACHES TO RESTORING RIVERS AND RECONNECTING FLOODPLAINS (POSTER)

Janet Hooke (Department of Geography University of Portsmouth)
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Jenny Mant (River Restoration Centre)
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Summary

This poster outlines the uses of a geomorphic assessment to inform River Restoration. Currently such 'audits' of rivers tend to be used as a way of identifying reaches that are susceptible to disturbance whilst also providing a geomorphological sensitivity index. This type of data, however, can also help to identify reaches that could benefit from restoration. Furthermore reaches that have been modified in the past but are now showing signs of recovery can be identified and those that showing high morphological 'naturalness' that can be used as templates for restoration schemes in the same catchment.

Such assessments have been completed for the Environment Agency on the Beverley Brook in London and the River Wey to the south-west of London: both rivers flow into the Thames. These provide the basis of the example methods and data presented in this poster. It is critical that any restoration project takes account of both potential and present geomorphological processes, the maintenance regime, and the channel changes that have been implemented due to human intervention. It is also essential that consideration is given to these issues both up and downstream of a proposed project to ensure that it will either be adversely affected itself, or, conversely, that proposed changes, will negatively impinge on the adjacent reaches.

This type of geomorphological assessment provides a way of collecting baseline data that can help to identify these past and existing regimes. This can help focus attention on the issues that need to be addressed during any restoration project in terms of any change in flow regimes etc that may be proposed. In addition, a snapshot in time of a river system is achieved. On subsequent visits the stream can be re-assessed and data captured compared to that previously collected thus having the added bonus of providing a relatively cost effective and efficient way of appraising restoration work.

RIVER HABITAT OBJECTIVES: PROJECT UPDATE (POSTER)

Jim Walker, Marc Naura, Mark Diamond and Paul Raven
Conservation and Ecology, Environment Agency, England and Wales.

Summary

- This poster provides an update of the ongoing Environment Agency work on river habitat objectives, (the methods for which were presented at last years' RRC Network Conference in Stockton-on-Tees).

- The current approaches to setting objectives for river restoration at a catchment and national scale in the UK are briefly described.

- The methods for developing a national framework to set River Habitat Objectives (RHOs) for the benefit of wildlife, landscape and society are presented.

- A national strategy for RHOs is outlined, including the development of a typology of 'natural' rivers and mechanisms for setting simple habitat improvement targets for different river types.

- Ideas are outlined for how the River Restoration Centre database and other data can be used to establish a baseline of the habitat improvements that have been achieved over the last decade in England and Wales, and how this baseline can be used in the setting of RHOs for the next decade.

- Proposals for a pilot application of this strategy at a catchment scale and the importance of Flood Defence and other forms of river management in the implementation of RHOs is presented.

- A provisional timetable for the completion of the national RHO strategy is put forward.

ASSESSING THE FEASIBILITY OF USING REMOTELY SENSED DATA TO DETECT RIVER HYDROMORPHOLOGY AND HYDROMORPHIC ALTERATION TO MEET WFD OBLIGATIONS (POSTER)

David Gilvear, Corine Davids, Andrew Tyler (Department of Environmental Science, University Of Stirling) and David Corbelli and Kirsten Thorburn (Scottish Environmental Protection Agency).

Summary

This poster presents the outcomes of a SEPA funded project to assess the feasibility of using remotely sensed data to detect river hydromorphology and human modifications and impacts to rivers. The work was undertaken in the context of exploring methodologies to meet the obligations for environmental monitoring under the EU Water Framework Directive. Aerial photography, multi-and hyperspectral imagery and radar, both from satellite and airborne platforms were evaluated along with a range of other data sets (eg Mastermap) to assess their usefulness for monitoring at the national scale. The application of manual and automated classification to the new "Scottish National Millennium Map" appears one practical way forward. The map is 25cm ground resolution digital colour aerial photography, and complete ground coverage is in the process of being achieved. All but the smallest river features are identifiable on the photogarphy. High resolution satellite imagery is also useful for mapping mainstem rivers but spatial resolution becomes a problem on small streams and cloud cover can obscure large areas of scenes. Radar data (eg LIDAR) is also useful where topographic information is required and can assist with automated classification procedures. Limitations to the use of most forms of remote sensing include wooded canopies, shading at low sun angles, inability to see submerged surfaces in turbid waters and the nature of vertical river banks. Examples of output will be presented from the two main areas where the techniques have been trailed; namely the Rivers Forth and Tummel.

APPRAISAL: RIVER RESTORATION'S MISSING LINK (POSTER)

Lydia Bruce-Burgess (Environment Agency- formerly of Queen Mary, University of London) and Kevin Skinner (Haycock Associates/University of Nottingham- formerly of Integrated River Services) in collaboration with the River Restoration Centre.

Summary

In November 2002 a workshop was organised at the University of Nottingham drawing together a select group of academics, policy makers and practitioners to discuss the role of appraisals in river restoration. This workshop examined: what appraisal comprises of; why it is a necessary component of sustainable river restoration; current practice in the UK; the pitfalls of policy/funding/knowledge transfer; methods/types of appraisal that are currently available focussing, in particular, on geomorphology, ecology and public participation; potential ways forward; appraisal frameworks; dissemination of appraisal results.

Essentially, the workshop highlighted appraisal as a vital component of successful (and hence sustainable) river restoration as in its absence we cannot be certain whether the most appropriate methods and techniques are being used and whether schemes have been successful as a result.

Other key features that arose from the various presentations and discussions were:

Constraints to appraisal: - The key constraint to appraisal was related to financing as no specific funds exist within the statutory Environmental Agencies for undertaking appraisals hence they often end up being flood defence-centric rather than catchment-based. In addition, funding is often only short-term as it is hard to put money aside for longer time frames. Monitoring over a longer time frame is important for assessing the success of a scheme in a future post-project appraisal. Finding staff, time and resources were also seen to be significant constraints as was pressure to undertake new projects rather than appraising old ones.

Restoration Protocol: incorporating essential elements of appraisal

1) Site selection;
2) Pre-project appraisal and data;
3) Objective/goal setting;
4) Scheme installation;
5) Monitoring;
6) Post-project appraisal; and
7) Dissemination of results.

Choice of appraisal techniques: - Choice of appraisal techniques is context specific. The choice of technique needs to consider both the form-process relationship and examine the local context of the scheme.

Uncertainty and risk: -

- There is considerable uncertainty associated with different scale projects.
- We still do not fully appreciate the scale of uncertainty that exists so when we are setting aims and objectives we may need to determine levels of risk that we can accept to achieve these aims.

THE USE OF HABITAT MODELING METHODS TO RESTORE THE STREAM PHYSICAL HABITAT (POSTER)

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Summary

River restoration practices seek to return a river or watershed to a condition that relaxes human constraints on the development of natural patterns of diversity. The paradigm of all river restoration is to succeed in stably reintroducing the historically autochthonous fish population, which is at the end of the food chain. In order to do so, adequate water quality (chemical restoration) and habitat quality (physical restoration) must be achieved. Only then can practitioners complete the ecological restoration of the stream not only by reintroducing the autochthonous species, but also by removing all the invasive ones.

This poster focuses on habitat reconstruction to restore stream habitats. Habitat modeling methodologies (e.g. Phabsim) assess the habitat suitability of natural streams by measuring the depth, velocity and substrate composition in different cross-sections along the stream. These values are contrasted with experimental *preferenda curves*. These methodologies can become, therefore, very supportive tools in the physical restoration of the stream channel.

However, it is necessary to use them warily, as these methods have a couple of shortcomings. These methodologies are usually bidimensional, just snapshots of a habitat instant. To help overcome this drawback, it is a key issue to restore the fish habitat by creating a reasonable sequence of geomorphologic units, beyond the pool and riffle sequence. Fish and macroinvertebrates need specific geomorphologic units, depending on their life stage, and the restored units must be within the species range.

A second disadvantage is that they do not take into account the dimension of time. Flow variation/fluctuation with time, both seasonal and yearly, may change the characteristics of the habitat enough to make it unsuitable for the fish populations. Habitat restoration practices should take into account the variable of time, in order to create the most suitable habitat year-round by adapting the physical habitat to match the seasonal needs of the main species.

ITALIAN CENTRE FOR RIVER RESTORATION (POSTER)

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Summary

CIRF, the Italian Centre for River Restoration, is a no-profit organisation that works to spread the "culture" of river restoration in Italy and to promote projects of rehabilitation and protection of rivers.

The poster aims to highlight what CIRF considers the main issues of sustainable flood risk management in Italy. It describes the common Italian approach to flood risk management and the contribution that CIRF is giving to solve this problem. In the past, in Italy (but not only there…) the flood risk has been managed just through structural engineering projects. Nowadays all around Europe, the approach is changing and the need for a sustainable approach on a catchment wide basis is being broadly recognised. In Italy this approach is pursued by the River Basin Authorities. CIRF recognises the improvements they have brought, but underlines the need for progressing further. In particular, CIRF is raising awareness to bring the scientific community and the decision makers to admit that "achieving safe conditions" and "succeeding in keeping the river in a fixed pre-defined place" is nothing but a mere utopia. Rivers will always move and there may always be a flood exceeding the design flood. Rather, a new culture is needed, one that recognises the need to "learn how to live together with the risk" by searching for a new equilibrium between man and his territory.

The goal is to put together the need for safety and the respect for the river catchment environment. This looks like a difficult planning problem with conflicting objectives. However, "rivers in good shape" are possibly the only sustainable mean to achieve the safety objective itself, thus smoothing the conflict. A new balance between the needs of the people who live in highly urbanised floodplains and the needs of natural rivers can be achieved only through modifying current land-use status, set challenging regulations and financial burdens: these changes inevitably will impact on the economic activities, on existing interests and stakeholders. The difficult process of modifying current situation is therefore possible only with the involvement of the public and of the stakeholders through a win-win negotiation process. This is why CIRF strongly supports innovation in environmental decision making.

MODELLING HABITAT – POPULATION RELATIONSHIPS FOR BROWN TROUT IN THE RIVER PIDDLE, DORSET (POSTER)

Andrew Burrows (Flood Hazard Research Centre) a.burrows@mdx.ac.uk

Summary

The presence of wild brown trout in a river is an excellent indicator of aquatic ecosystem health (Hellawell, 1986; Elliott, 1994). However, trout are a species under siege with evidence of on-going and widespread decline in the status of wild stocks (Giles, 1989, 1992). Anthropogenic impacts resulting in habitat degradation are a major cause of this decline. The nature of available habitats fundamentally influences population structure because absence of a habitat critical for a given life stage can lead to a " habitat bottleneck" with a population being limited at that stage of the life cycle (Hunter, 1991).

Conservation and enhancement of wild brown trout requires the restoration of riverine habitats to address the causes of depleted populations. The restoration of degraded trout streams can be improved with a better understanding of the relationships between stream biology and habitats. Studies that match physical and hydraulic characteristics of streams with population dynamics are increasingly important to the improvement of river habitat design. This project aims to explore the relationships between habitat quality and brown trout population dynamics in the River Piddle, a small chalk-stream in Dorset, and to address the following key questions:-

- ***Can habitat-limiting factors be modelled to better inform river restoration design***

- ***What role does habitat type and juxtaposition play in the population dynamics of wild brown trout***

RIVER BRENT ENHANCEMENT PROJECT, WEMBLEY - LESSONS LEARNT (VIDEO TO BE SHOWN DURING POSTER SESSION)

Susie Tudge

Affiliations – Environment Agency, Thames Region, North East Area
Role - Project Manager in Flood Defence Improvements team - role part funded by London's Waterway Partnership

Summary

The Brent Enhancement Project is a partnership between the Environment Agency and the London Borough of Brent. It was designed by Halcrow, with input from Babtie Group and the RRC. The project is due to be completed by the end of March 2003 and several lessons have been learnt which could be applied to future projects. This video outlines those lessons, as well as providing a documentary of the life of the project.

WHY IS ALL THE WATER GOING?
LOWLAND ENGLAND AND MALTA (POSTER)

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Summary

Over the last century, at least three-quarters of the length of lowland English river have dried. Malta, being so much smaller, has no large rivers, so has lost proportionately more. The main loss has been of those under 3 m in England, though also of the largest (*c.* 10 m) in Malta.

Malta's loss was, earlier, inadvertent, due to (1) marsh drainage for public health, (2) groundwater abstraction (i.e. loss of spring flow), (3) building without run-off planning (i.e. loss of retention in land, and flash floods: bad ecologically and hydrologically), (4) planting enough eucalyptus (for bird slaughter) to cause concern for groundwater loss. Evidence of (mostly twentieth-century) drying is abundant.

Lowland England's loss is similar, (1) land drainage for crops and flood defence, (2) abstraction of ground and river water, (3) catchment management to increase flash floods. Because larger streams still exist, the greatness of the loss is less easily noticed. Even in 1990 many upper streams on the 1/4" O.S. map no longer flowed normally, and in 2000 even more of these and smaller watercourses are dried and often filled in. Since the smallest have gone, the rather larger are—as in Malta—following. The sequence is progressive.

It would still be possible for the destruction to be halted, and perhaps even slightly reversed.

BUT WHO WANTS RIVERS TO SURVIVE?

The Ythan Project

What is it?

The Ythan Project aims to involve local people in protecting, restoring and enhancing the river Ythan. The project is funded by the European Commission's Life environment fund and the following project partners:

Aberdeenshire Council; Forest Enterprise; Formartine Partnership; Macaulay Institute; River Restoration Centre; Scottish Environment Protection Agency; Scottish Natural Heritage; Ythan District Fishery Board

Where is it?

The project is based around the river Ythan in Aberdeenshire, Scotland

Where did it come from?

In response to the designation of the Ythan catchment as a Nitrate Vulnerable Zone, the Formartine Partnership produced the Ythan Project Plan. This included ideas from local people on how they would like to see the catchment improved in the future. Some of those ideas were then put together to make this project

What will the project do?

Actions in the project will include:

- getting the local community involved
- targeting specific sections of the river for restoration work
- monitoring ecological changes
- assisting farmers to access grants for creating wildlife habitats on their farms
- assisting farmers with nutrient budgets

GWYNEDD SUSTAINABLE ANGLING INITIATIVE (POSTER)

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Summary

Background:

- EU Objective 1 funding for N. Wales, total of £430k.
- Environment Agency led partnership project with Gwynedd County Council, CCW, National Park, Local Angling Clubs.
- The Aim: "To optimise the economic, environmental and social benefits to local communities from developing the sustainable use of fisheries in Gwynedd through restoring and improving the fisheries resource and angling facilities and by promoting quality angling opportunities for anglers."
- Phase 1: Habitat improvement & restoration
- Phase 2: Angling infrastructure
- Phase 3: Marketing

Habitat Improvement:

- 13 rivers throughout Gwynedd, from 2001-2004.

Problems:

- Overgrazing/Livestock poaching
- Siltation
- Overshading
- Erosion

Targets:

- Protect and improve salmonid spawning beds
- Improve riparian vegetation and increase instream productivity
- Improve habitat for otter/water vole and bats
- Coppice tunnel vegetation and re-establish native trees and introduce a variety in height of vegetation

SUSTAINABLE MANAGEMENT OF URBAN RIVERS AND FLOODPLAINS (SMURF) - POSTER

Mark Scott
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Summary

SMURF (Sustainable Management of Urban Rivers and Floodplains) is an EU LIFE Environment demonstration project. The project is being led by the Environment Agency in partnership with Birmingham City Council, HR Wallingford, Severn Trent Water and Staatliches Umweltamt Herten and also involves The University of Birmingham and Kings College London.

SMURF will change the way that land use and water management planning is carried out within urban floodplains. The project is based on the River Tame catchment in the West Midlands which has suffered from significant structural modifications and pollution associated with 200 years of mining, industrialisation and urban development. The existing river channels are highly modified and have persistent poor water quality. Flash flooding is occurring more frequently with parts of south-west Birmingham being badly affected during the 2000 floods.

The primary aim of the project is to demonstrate how the principles of urban river basin planning in the EU Water Framework Directive can be applied to highly modified and degraded catchments such as the River Tame. In particular to demonstrate how the integrated implementation of various techniques, technology and models can sustainably address water management problems that typify many industrial cities and towns across Europe.

The expected long-term results are:

- Demonstration of the latest IT techniques for river basin modelling (integrating land-use, ecological status, flood risk and water quality aspects). The project will deliver a G.I.S.-based Land-Use planning model for the period 2004-2015, enabling accurate predictions to be made on the effect of introducing future developments in the river basin.
- Stable flow levels will allow reintroduction of key riverine species (Habitats Directive output).
- Reduced flood episodes will boost business investment around the river.
- Improved water quality will benefit companies who utilise water in industry.
- Enhanced amenity will boost economic development, increase land values and add to quality of life, with social benefits.

LINCOLNSHIRE CHALK STREAMS (POSTER)

Summary

Chalk Streams and their Importance

- The Chalk Wolds in Lincolnshire is an Area of Outstanding Natural Beauty. The geology of this area, in the east of the county, is mainly boulder clay and marine silts overlying chalk
- Chalk streams arise from or flow over chalk, most are fed from groundwater aquifers, producing clear waters and stable flows and temperatures. There are eighteen large and numerous small chalk streams in the Lincolnshire Wolds
- Chalk Streams are categorised as high priority habitat in the UK's Biodiversity Action Plan, making Lincolnshire's chalk streams a precious resource for the county. The National Habitats Action Plan for Chalk Rivers required the "Assessment of the nature conservation value and potential for restoration of chalk rivers other than those which are SSSI/pSAC by 2001". No formal European designations exist for Lincolnshire's chalk streams

Chalk Streams Project

- To implement the national BAP, work was undertaken by the Environment Agency to identify, define and assess the value of chalk streams for nature conservation and raise local awareness to ensure that they are protected, enhanced and appropriately managed.
- Lincolnshire's chalk streams contain six out of seventeen recognised chalk river species these are brook, river and sea lamprey, spined loach, grayling and otter. In addition to these characteristic species the streams contain five nationally important invertebrate species and twelve species of local or regional importance. Over fifty chalk springs have been surveyed and rare assemblages of flat worms and a rare ranunculus species have been discovered.

Partnerships

- A Lincolnshire Chalk Streams Partnership has been established with key partners identified including local landowners, Water Company, Wildlife Trust, English Nature, FWAG, Countryside Agency, Parish, County and District Councils. The partners helped to identify suitable sites for management and restoration of wildlife interest and progress implementation of the project.
- Other potential chalk streams in Lincolnshire may have been degraded due to intensive agriculture, water abstraction, past mismanagement & urban development. Planned work seeks to mitigate and redress these problems in the future.

Future Work

- A survey of chalk springs is already underway and due for completion in the late 2003
- A project is to be undertaken with the Lincolnshire Wildlife Trust to assess ecological interest and importance of blow wells found to the east of the Wolds on the coastal plain
- The Environment Agency has projects planned as part of our local contributions designed to enhance and protect the environment for wildlife these include: -

    - Working with the Lincolnshire Chalk Streams Partnership to produce a five year work plan
    - Identifying priorities for, and undertake best practice habitat restoration of, Lincolnshire Wolds chalk streams
    - Production of a State of the Environment Report for Lincolnshire chalk streams with prioritised survey requirements

For more information on Lincolnshire Chalk Streams please contact:
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URBEM – URBAN RIVER BASIN ENHANCEMENT METHODS (POSTER)

Summary

URBEM is funded under the European Commissions Fifth Framework programme. URBEM has 12 partners from 6 countries. The three-year project started in November 2002.

Problems to be solved

Urban watercourses have been confined to narrow river corridors with the channels canalised and concrete and other man-made materials forming the bed and banks of the river. Many urban streams have been converted into closed conduit sewers, and now receive both storm drainage and raw or dilute sewage from the surrounding area. The pollutant loading also frequently leads to poor water quality, indeed this adverse impact of urbanisation often extends to the watercourses downstream of the urban area. In some cases the bacteriological or chemical quality of urban streams may present a severe threat to public health. The result is that many urban watercourses have virtually no aesthetic or amenity value, support a limited range of ecosystems, and do not meet the water quality objectives prescribed by the EC Water Framework Directive.

Objectives

The specific technical and scientific objectives of the URBEM research project are:

- To develop new tools to assess the potential for enhancement and rehabilitation of urban watercourses,
- To develop innovative urban watercourse rehabilitation techniques for use in future schemes,
- To develop decision making support procedures, including social, economic, environmental and safety aspects, to help planners and city authorities effectively prioritise and plan urban river rehabilitation projects that help to achieve "maximum ecological potential".
- To provide guidance, in the form of training and briefing modules, to public, professional and environmental authorities about how to plan, implement and maintain an urban rehabilitation scheme.

HR Wallingford are co-ordinating URBEM, for further details visit the website: www.urbem.net or contact:

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SUSTAINABLE WETLAND RESTORATION IN THE NEW FOREST
Life 02 Nat/Uk/8544 (Life 3) (POSTER)

Environment Agency: Tim Holzer (Conservation Officer) or Maxine Elliott (Project Manager)
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Summary

The LIFE 3 Partnership* has secured 40% funding from the LIFE Nature fund to support a £2.8 million cSAC habitat restoration project in the New Forest, Hampshire, and bring it back into favourable condition.

Whilst New Forest Rivers are said to be amongst the least impacted lowland rivers in the UK, significant reaches have been severely degraded, primarily associated with forestry drainage operations. Deepening and straightening of channels, placement of bed material along the bank top, extensive removal of debris dams and the cutting of new drainage grips well into the catchment have altered the geomorphology and hydrological characterisation of these watercourses and severed the functional integrity between the channel and its natural flood plain.

The principal project objectives are to:

- restore the priority interest features of the New Forest cSAC & their supporting adjacent habitats in accordance with the cSAC management plan;
- establish their long-term sustainability through the development of mechanism which ensures the integrated management of the main water basins;
- create suitable conditions for the regeneration of a significant area of priority habitat.

Targeting innovative works on the wooded head-waters of the River Lymington, the Environment Agency role within the LIFE 3 restoration programme aims to:

- ensure the sustainable restoration of processes within approximately 10km of degraded priority habitat (riverine woodland and bog woodland);
- research the geomorphological and hydrological processes currently influencing or constraining the cSAC habitat, and use this as the basis for the design and targeting of restoration works;
- integrate nature conservation and flood defence objectives by combining habitat restoration works with the development of the River Lymington Strategy (a flood management strategy), ensuring such restoration works makes a positive (or neutral) contribution to flood management further down the catchment;
- inform and influence land use within the catchment and reduce or remove land use practices which are damaging, and introduce practices (forestry) vital to the maintenance of the cSAC priority habitat;
- develop a template for river restoration in lowland, wooded catchments which could be applied more widely throughout the New Forest or further afield;
- refine and better quantify the templates used by English Nature to assess the condition of the cSAC priority habitat;
- integrate LIFE 3 restoration works with mire restoration works undertaken in an earlier LIFE 2 project, contributing to the sustainable nature of this earlier work.

A key element of the project which will provide the sound basis of information on which to develop and implement restoration works will be the establishment of three Studentships based within the Geography Dept, University of Southampton. These will be looking more specifically at the geomorphological and hydrological processes, and catchment land use.

* The Partnership comprises: Hampshire County Council, Environment Agency, Forestry Commission, English Nature, National Trust, and Royal Society for the Protection of Birds.