River Restoration NEWS

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NEWSLETTER of the RIVER RESTORATION CENTRE

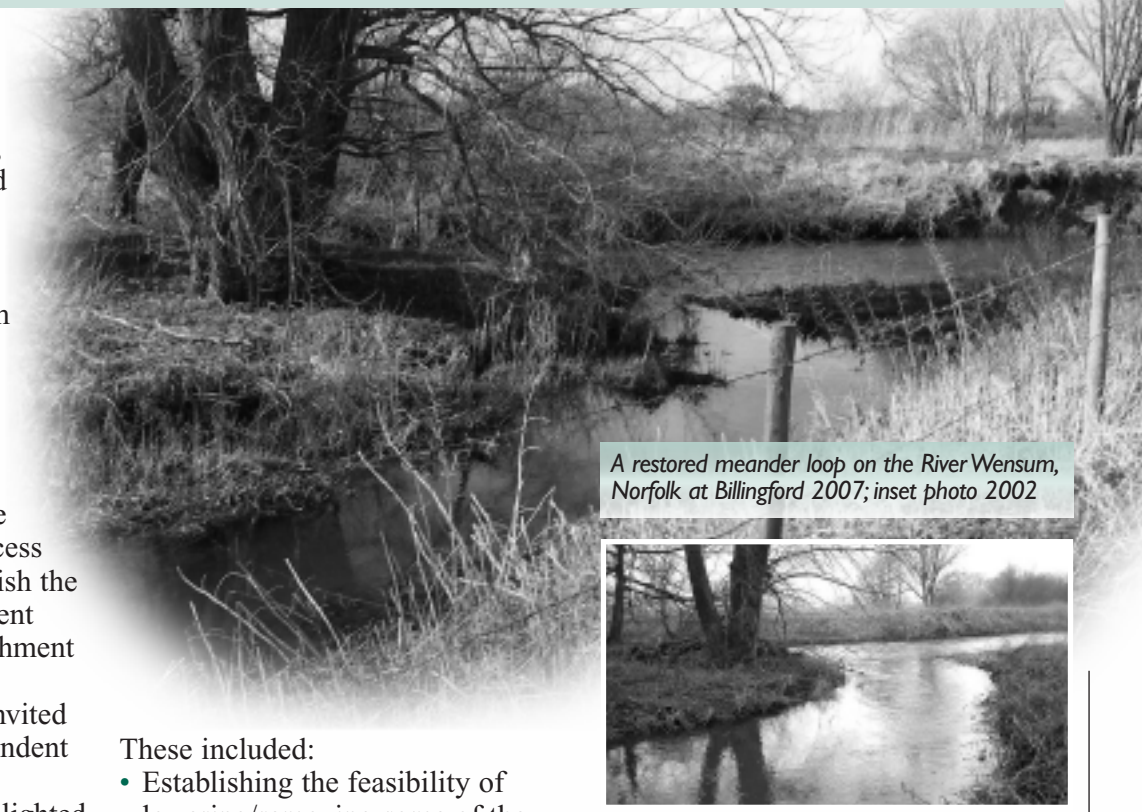
Tel/Fax: 01234 752979 Email: rrc@theRRC.co.uk

RRC goes North, South, East and West

The last time RRC provided an update on some of the work we have been involved with was March 2005! Doesn't time fly! So we thought we would write a short update to give our readers a flavour of what we have been up to more recently (based on over 65 advisory reports competed during the last 2 years) and to remind you about how we can help with your river restoration projects.

A Norfolk Conundrum

With snow forecast and temperatures well below zero, the intrepid RRC team headed off to Norfolk to spend a number of days carrying out appraisals of eight restoration schemes on the River Wensum in March this year. Why you may ask? The River Wensum Restoration Strategy (JBA Consulting, 2006) outlined recommendations for future enhancement measures for the Wensum catchment. This process highlighted the need to establish the success of existing enhancement projects in the context of catchment scale chalkstream restoration objectives. Natural England invited the RRC to provide an independent rapid assessment of Wensum schemes. The assessment highlighted some important points which, it is hoped, will help in the future implementation of the River Wensum Restoration Strategy.



A restored meander loop on the River Wensum, Norfolk at Billingford 2007; inset photo 2002

These included:

- Establishing the feasibility of lowering/removing some of the many in-channel structures that punctuate the watercourse;
- Identifying opportunities to reconnect the river to its floodplain;
- Appreciating how wider catchment landuse issues (e.g. fine sediment transfer) can detrimentally affect restoration projects.

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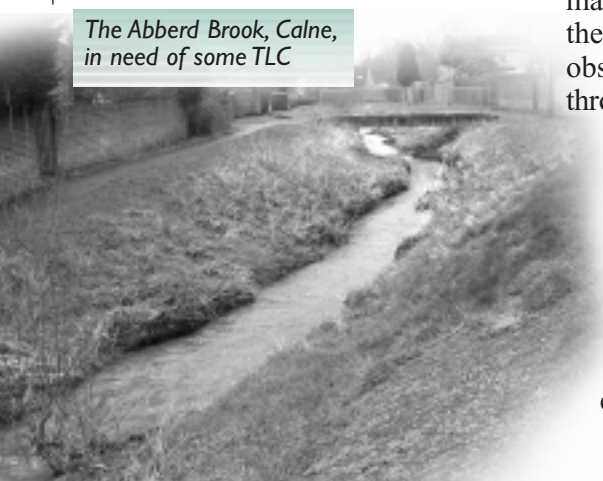
A Fragile Southern England Habitat

The ephemeral North and South Winterbournes in Dorset are fed by springs and require autumn and winter rainfall to recharge groundwater. Anthropogenic pressures, along with recent changes in rainfall patterns, have threatened these systems especially where they have been diverted for agricultural reasons or disconnected from their floodplain. A visit to a number of sites in this area indicated that, with a little TLC, enthusiasm from the local community, a small injection of cash and good river management, further deterioration of these watercourses and their associated rare habitats could be avoided. On the larger scale, it was exciting to find the relic of an old watercourse route still clearly visible across an unploughed field. Outline suggestions for the Environment Agency, Purbeck District Council and others were provided as to how this sinuous route could be reinstated whilst keeping the option to divert excess water along the straightened course of the field edge; a rare opportunity to restore one of the UK's most fragile river types.

Urban Wildlife

But not all our work has been in rural areas. Moving further south west, the RRC provided advice to a housing association suggesting ways forward to improve the Abberd Brook (that flows through a green corridor within the urban area of Calne) for a variety of species including water voles; these have been spotted along this reach of the river and recorded by Chalkhill Environmental Consultants. Project options needed to be divided into a number of phases with management and restoration options outlined for each that sought to combine habitat gain without negating flood risk responsibilities.



The Abberd Brook, Calne, in need of some TLC

River Valency designed to mimic a naturally forming rock bed

New Approaches to Flood Risk

The River Valency at Boscastle received much media attention after the floods in 2004. Work is now underway to implement a Flood Alleviation Scheme to reduce the likelihood of a repeat of the disastrous scenes that occurred some 3 years ago. Richard Vivash (RRC Adviser) has been working with the Environment Agency and other consultants to provide advice on sustainable river engineering including (amongst others): reinstating a meander created by the flood but subsequently infilled as remedial works after the flood; channel regrading, so the village reach matches the slope upstream, to prevent sediment dropping out where flood risk is greatest, thus avoiding future dredging needs and; channel widening and deepening at the harbour approaches to emphasise the gentle meanders already existing here.

A catchment-wide riparian tree management programme to control the risk of flood washed timber obstructing the critical reaches through the village has complimented the scheme and should be completed in Spring 2008.

The RRC's involvement has continued through the construction period to help achieve a natural form of rock break within the bed. This has involved working extremely cautiously with the dip and strike of the slates, the many fracture lines and the hard lenses. Upper river form has influenced the final design which mimics naturally occurring asymmetric sections and intermittent cascades with pools within the bed.

It is hoped that fish habitat and fish passage will be improved and visual amenity conserved.

A High Level Strategy

Integrating flood risk and ecology is very topical and many places in the UK are grappling with ways to accommodate both given that there are often very stringent local constraints. In Derby, a high level Flood Risk Management Strategy was commissioned by the Environment Agency for the Ecclesbourne Stream and the River Derwent. It was recognised that this provided an excellent opportunity to look, in parallel, at options to include river enhancement measures, more environmentally friendly river management and bio-engineering bank protection measures. The RRC completed a high level enhancement overview for this area following a site visit. This type of approach is a fantastic way of getting cost effective restoration ideas developed within a large scale project at an early stage; one that the RRC would certainly advocate.

Fishing for Support

The implementation of the Controlled Activities Regulations (CAR) has presented increasing opportunities for Scottish Natural Heritage (SNH) and the Scottish Environmental Protection Agency (SEPA) to control developments close to watercourses and request river enhancement as part of schemes.

From an RRC perspective, this has meant a considerable amount of time has been spent over the last few years providing advice, often within extremely degraded river systems.

Monumental effort on the part of a Tayside Gillie has seen two short reports from Scottish Native Woods and the RRC evolve into a £60,000 project to restore Salmon passage to the Inchewan Burn, and provide a more open, broadleaf riparian woodland along the now accessible spawning grounds.

Bridge access over the burn for the A9 had replaced the original bed with a gabion mattress cascade. Torn wire and disappearing flows had become the talk of the burn. In summer 2007 the dense conifer cover was felled back from the burn and in September, with help from those organisations involved in the process, the work to replicate the natural boulder strewn and flowing burn began.

From the initial idea and funds derived from casting lessons, a much larger study of a further three large burns has been started.

Inchewan Burn, Tayside: disappearing flows under a torn gabion mattress

A Question of Disguise

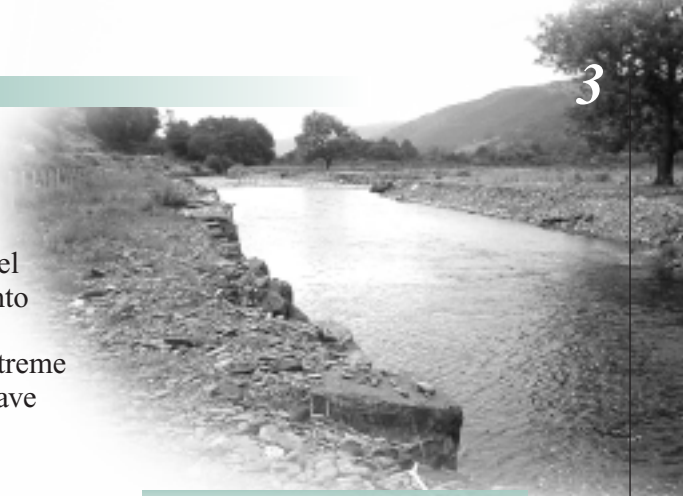
Scotland is renowned for its spatey high energy, gravel bed rivers. Burns flowing into the River Tummel are no exception. Responses to extreme events where these burns have experienced rapid geomorphological change have resulted in reactive measures with over designed bank and bed protection measures. The Kinaird Burn, Pitlochry, is no exception. On visiting this site it was clear that, at least in the short-term, the removal of a large gabion structure was not feasible. Options were suggested that included the use of large wood structures to prevent downcutting, increase habitat potential and help to disguise this bare 'feature'.

Unspoilt Vistas in Wales

Have you been to Snowdonia National Park recently? It conjures up pictures of beautiful rugged scenery and unspoilt countryside. Yet even here where human activities meet the watercourse this vision of naturalness is not all it might seem. Long established farming practices and in the case of the River Dyfi, the railway line, has led to a series of river re-alignments, bankside tree removal and boulder bank stabilisation all of which contribute to the degradation of this watercourse for salmonids and other species. In the summer of 2006, the RRC spent a few days with the Environment Agency Wales, looking at some of the key issues (both local 'hotspots' and wider catchments issues) along the Rivers Dysynni, Clwyd, and Dyfi. Site specific restoration options were outlined and how the current management practices can have detrimental influences on this very fragile landscape were also explained for the wider audience.

Training the Trainers in Northern Ireland

The Environment section of the Rivers Agency are committed to influencing current river management. To this end they are finalising a new Maintenance Manual and the RRC have been able to provide input into this publication. This includes geomorphological understanding for use in practical terms by river maintenance operatives.



Bankside revetment/river alignment – Snowdonian National Park

Training is a big part of the current need in Northern Ireland and after successful courses in the past the Rivers Agency team are looking to their colleagues across the water for guidance and practical suggestions for good river management. To facilitate this, the RRC is organising a study tour to help the staff, with this quest for knowledge, to better promote good practice advice.

Networking

The RRC is always keen to keep in touch with what is happening in the world of river restoration. It is the only way we can disseminate information to others and make sure that good practice is encouraged. We have provided support to a number of research and development and other projects, taken numerous national and international parties around UK restoration schemes and organised talks and workshops for our members. One recent example is a workshop held in September, at Birnam as part of the SNH 'Sharing Good Practice' programme. This provided an introduction to the physical processes of natural rivers; how they are linked to river habitats; the impact of modifications upon river habitat; and explored sustainable and sympathetic river management practices.

For further details about the projects outlined in this article or how RRC can help you, please contact the Centre.

River Restoration: A

River restoration now appears to be a global concept so the Centre thought it would be a good opportunity to assimilate the information discussed at some symposia in August and September this year, to see if any clear global trends in river restoration emerged.

At the beginning of September two river restoration focussed symposia were simultaneously taking place (one in the southern and one in the northern hemisphere). Ecological, economic, social and water resources issues, related to river restoration and even the thorny question of "why do river restoration at all?", were all addressed.

And, if that wasn't enough, a couple of weeks earlier the Society for Ecological Restoration (SER) joined forces with the Ecological Society of America (ESA) to debate their ideas about what constituted ecological restoration aspirations, in California, USA.

Swiss Timekeeping

Amidst the unmistakeable sounds of cow bells and alpine horns, 40 delegates spent a few days in an isolated old monastery in the canton of Thurgau, Switzerland. Away from the distractions of daily life it provided a perfect setting to reflect on world-wide river restoration issues. There was much debate about the conflicts between seeing rivers as an ecosystem service and improving them for biodiversity gain.

Of course ecosystem services have played an important part in determining river restoration opportunities and outcomes for centuries. The rationale for restraining rivers in much of Europe, Asia and the US for example has been the protection of infrastructure and, as reminded by Helmet Blöch (European Commission); Johann Tulla (in the late 18th Century) deemed that 'the rule (for the upper Rhine) should be that the rivers and streams are canals'. It was generally agreed that making space for water is the way forward to deal with flood risk but we still needed to appreciate rivers as a water resource. River restoration may now be viewed by many as a way to address past ecological damage but must still consider economic, environmental, ecological and societal services and protection.

But then the question of sustainability was raised. How do we know the true extent of river rehabilitation? Margaret Palmer from the University of Maryland, provided an account of the status, trends and future of river restoration from a USA-wide perspective outlining the importance of high level post project appraisal to identify restoration trends, cost and 'fashionable' techniques. She also voiced concern that of the 37,000 restoration projects her team had examined, the majority had not tracked ecological outcomes even though this is usually seen as one of the key restoration objectives. In fact only 317 projects had evaluated this aspect in any detail.

She concluded that there was a need to have an international agenda to advance science and practice that included a standardisation of metrics to be monitored (based on funding resources and objectives) and an agreement about what constitutes ecological restoration success.

A site visit to the River Thur restoration project (completed 2001) followed, which provided delegates with plenty of time to consider such issues and it soon became apparent that information databases including a 'European Observatory' were urgently needed to increase our understanding of river restoration projects.

G'day from Down Under

Meanwhile the Brisbane River*festival* which aims to celebrate the Brisbane River, what it means to the city and

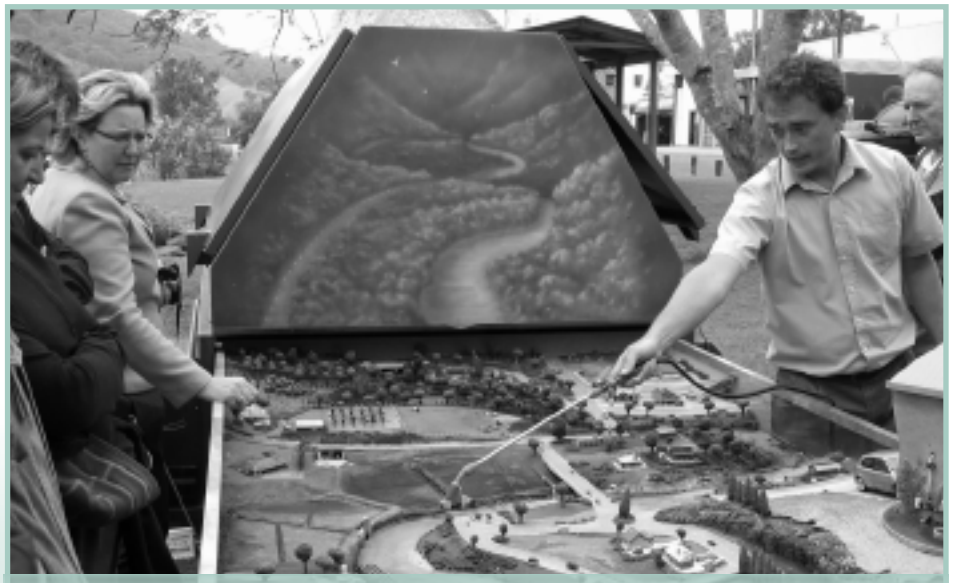
River Thur, Switzerland – 2003 Post-restoration (main photo), 1992 Pre-restoration (photo above)

Photos by Christian Hermann, BHA team, Ingenieure, Frauenfeld (Switzerland)

A Global Perspective

what all rivers mean to everyone else, was in full swing. This week long celebration included many river related events and an international symposium.

The 10th River*symposium* teamed up with the Nature Conservancy to host over 800 attendees from 57 countries, with a record 43 percent from outside Australia. The event was opened by the Governor of the State of Queensland and music (from the River*symphony*) performed by one of the foremost didgeridoo musicians and the Queensland Orchestra. This gives you an idea of the scale and reputation of this event, just within Australia.



Tweed Shire Council mobile river catchment. A £12,000 flowing model showing diffuse pollution impact on Dugong to escapee floaters (Coco pops) from mis-connections

Over four days, 150 presentations covered a wide range of issues from community engagement in urban rivers to the plight of the world's river dolphins. The major theme throughout the meeting was environmental flows, all taking place on one of the driest continents whilst in the grip of a major drought.

Amongst the sea of invited international speakers, Mike Acreman from CEH Wallingford did a sterling job of summing up the entire WFD process, for an audience of whom 50 percent did not know what the ubiquitous TLA (three letter acronym) meant, setting it in the context of environmental flows and allocating resources.

Each year the event highlights good practice river management from around the world, with the 2007 Rive*prize* totalling £130,000 given to the best international river project. This year the winner was the River Danube, entered by the International Commission for the Protection of the Danube River. The award recognised the long standing work of the 19 countries of the Danube River. The National prize, a mere £40,000, was soaked up by the River Murray Wetlands Working Group who have been moving vast quantities of water between 'playing the market' to fund their work and every few years wetting up their sleeping wetlands (what appears to a European as a dust bowl) to rich habitat in 6 to 12 weeks.

Events with such an international spread of experiences and such a completely different starting point, such as an Australian river system, are a good opportunity to sit back and reconsider what you take as granted. Bio-diverse rivers such as the Mekong with 1800 species of fish, the Apalachicola in the US with 35 mussel and 30 crayfish species, to problems such as the Yangtze dealing with 40% of China's waste effluent and the Mara River in Kenya supporting 30 Million people and 1.5 Million wildebeest, were all discussed.

California Dreaming

On a hazy day in August, droves of Ecologists descended on the city of San Jose, California, to present research and discuss Ecological Restoration in a Changing World. There was an overwhelming impression that whilst we have made large strides in terms of ecological restoration science there is a long (but fruitful) road ahead for restoration and ecology in the years to come. Regardless of the scale of the project, degree of wetness or amount of water, there was a strong focus on the structure, connectivity, stability and resilience of ecosystems and their constituent organisms. Furthermore, the functional aspect of ecosystems, particularly in relation to energy and nutrient transfer and transformation was prominent in much of the research. So, whilst biodiversity associated with ecosystems is important, there is emerging evidence that it is more crucial to know the functional role of the species in the community and how their abundance, size and position in the food web (trophic level and linkage) affects the ecosystem (i.e. processes and function). For river restoration in particular this is important as current efforts are still regarded as centred too much on the water quality and quantity (i.e. the physical and chemical aspects) with an assumed corresponding response by the organisms that live within the running waters. It would be easy to say it's all much more complex than that, but that doesn't provide a satisfactory way forward. What is

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recognised is that there has to be greater cross-over and integration between ecology and the more physical and chemical aspect of river restoration.

And here too there was much talk about restoring a moving target and many agreed that restoration must factor in the continued human element and climate change; 'restoring back is not the way forward'. Instead restoration should be seen as trying to achieve a better functioning ecosystem in the contemporary landscape with reference to the trajectory of change.

In all of the conferences there were some key overlapping messages. Not least, understanding the existing linkages and processes within ecosystems and how they will change/respond to restoration measures. Only then can scientists provide a better foundation on which to make restoration decisions to improve ecosystem functions and services to humans. So rest assured, wherever you are reading this article, you are not alone. Conferences such as these are an excellent opportunity to disseminate information and forge ahead in a quest to rehabilitate our watercourses.

For further information about any of these meetings please contact the RRC.

Wild Trout Trust Conservation Awards

Now in its 9th year, this annual award recognises and encourages ingenuity, sustainability and best practice, in wild trout fisheries and river habitat management. WTT Trustee Allan Frake, reviews this year's winning entries.

The Natural History Museum was the highly appropriate setting for this year's awards ceremony which was sponsored by the well known fishing gear company, 'Orvis'. The £5000 prize money and certificates were presented by the famous conservationist and Wild Trout Trust Vice President, Professor David Bellamy.

A very successful partnership under the auspices of 'The River Glaven Conservation Group' won the Professional category for their delivery of some real tangible benefits to this classic "Cinderella" Chalk Stream in North Norfolk. The use of some subtle bioengineering techniques, inclusion of in-stream woody debris and the creation of some experimental gravel spawning areas were exhibiting their effectiveness even though, in some instances, they had only been completed a few months earlier. The judges, however, were particularly impressed by the removal of 1000 tonnes of flood embankment allowing the reconnection between the river and floodplain.

River Glaven – Flood bank removed & reprofiled

Runners-up in this category were the Ryedale Angling Club and the aptly named 'CAN –DO' Partnership which had very sensitively improved the riverine habitat of the Rye, primarily by selectively opening up the tree canopy in the outstanding landscape of Duncombe Park in the North York Moors National Park. Some simple but effective ecological monitoring had already demonstrated significant benefits within just a couple of years.

River Sence – Artificial spawning gravels

The highly enthusiastic Gopsall Fishing Club, working on the River Sence in North West Leicestershire secured first prize in the amateur category. The construction of flow deflectors, 'V'-groynes, spawning riffles, fencing and the retention of woody debris - with some 'in-house' monitoring - had clearly enhanced this heavily managed watercourse. Club members were not just 'fish focused' but had included a number of habitat enhancements for biodiversity gain including a sponsored otter project linked to Twycross Zoo.

At a different scale, the runner-up in this year's closely fought competition went to the highly motivated team within the Camel Fisheries Association for their simple but effective experimental salmonid spawning redd rehabilitation on the Stannon Stream, Camelford. Purpose built spawning areas, empirically designed and efficiently constructed, using waste material from the local ball clay industry, clearly demonstrated a very innovative approach to improving impoverished spawning habitat within the catchment.

The WTT and the judges would like to take this opportunity to thank all who found the time to enter these awards. It is always enjoyable to visit such enthusiastic and proactive groups.

A new river is released: The River Pinn at Hatch End, Harrow, London

A recent flood alleviation scheme provided opportunities to include habitat and recreational enhancements. Xenia Stravropulos carried out a post-project appraisal of the scheme as part of her Cranfield University MSc thesis.

The River Pinn in Harrow is one of many rivers in London which have been channelised and hidden underground in the past. A restricted channel capacity meant that households and livelihoods were affected by increased flash flooding in the catchment area, especially to the north of Harrow, at Hatch End. This led to the need for a sustainable flood management solution for the river in this area. A flood alleviation scheme was proposed, but it had to ensure that it also aimed to enhance both the environmental and recreational value of the site.

The project (completed in 2006) comprised the transformation of a former straightened and partly culverted reach into a 600m open meandering river. A more natural cross-sectional channel profile with increased bankfull capacity and new wetlands were designed to connect the river to its natural floodplain. In order to evaluate scheme success, a post-project appraisal was undertaken, looking mainly at the environmental and recreational benefits. Also geomorphological short-term changes were identified and the water quality was monitored.

Despite numerous rainfall events, only minor adjustments in cross-sectional form at the meander bends were observed. Soil samples of the new river channel were taken as part of the MSc project which indicated both the banks and bed had a high percentage of clay, typical of London's geology. This short-term assessment demonstrated the need for good channel geometry design in such environments, since these cohesive sediment types mean that fluvial adjustments evolve slowly over time. Nevertheless, due to occasional high flows and the presence of gravel seams, features such as pools, riffles and point bars have already begun to develop.

Table 1: Average temperature, pH and water quality for the restored reach of the River Pinn over a three month period

Measured parameter	Result	Units/score
Average Temperature	16.3	°C
pH	7.8	-
Dissolved Oxygen	Very good	Chemical GQA score
Biological Oxygen Demand$_5$	Fair (D)	
Ammonia	Good (B)	
Nitrate	Low (2)	Nutrient GQA score
Phosphate	Very high (5)	
E coli	32,282	cfu/100ml

Furthermore, vegetation has started to grow in the channel and on the created wetlands. It is therefore predicted that the scheme will go a long way in achieving its aim of creating new and enhanced river and wetland habitats.

This MSc project was completed during the heavy rainfall events which occurred in July 2007, and although Hatch End did not suffer extreme rainfall, a flood event of at least a one in five year return period was recorded. No flooding of roads or properties occurred (which would have been the case when the river was still culverted). Instead high flows were carried throught the open channel and were able to spill onto the floodplain indicating that the main flood alleviation objective has been fulfilled

Though water quality was not one of the key objectives, the high faecal contamination observed on site is likely to compromise the recreational success. A comparison to the General Quality Assessment (GQA) by the Environment Agency resulted in a "fair" chemical classification and "very high" phosphate concentration in the river water *(see Table 1)*. These levels of contamination are not surprising since urban rivers often suffer from misconnections of foul sewerage. These results exemplify the need to tackle this problem on a catchment wide basis.

This short-term post-project appraisal has demonstrated the value of designing flood alleviation schemes that incorporate environmental benefits. It also shows that improving water quality must be considered part of a river rehabilitation scheme since it can determine the success level. Perhaps one of the most important lessons learnt is the value of pre- and post-project appraisal. Only through such concerted efforts can the scientific community begin to build up a database of when and where project objectives have been successful and identify what future aspects of river management need to be considered and delivered to the scheme.

This scheme was undertaken by Harrow Council in collaboration with the Environment Agency.
The detailed design was completed by Atkins and APTEC River Enginering Consultancy.

News and Events

New Staff

We would like to welcome Gareth Codd (*pictured*) as the newest member of the RRC's staff.

Gareth has taken over the role of Information Officer from Alice, who has now taken up the new post of Projects Officer.

Courses

River restoration and natural channel design
September 9th to 18th 2008 – Pilot View, Dobson, US
and September 30th – October 9th 2008 – Colorado, US
Run by Dave Rosgen, PhD.
For more information visit: www.wildlandhydrology.com

Wedding

The RRC would like to congratulate Alice Fellick (RRC's Project Officer) on her recent marriage to Tom Hall.

We wish Mr. and Mrs. Hall all the best for their future together.

Amendment to the 'River Sediment and Habitats and the Impact of Capital Works and Maintenance' article published in the *RRNews* Issue 27

The Sediment and Habitats Project article in Issue 27, p6 has sparked off an interesting discussion on the attention that has been paid in the past to sediments, habitats and maintenance and capital works. It has been pointed out that the headline sentence of the article makes the comment that "the impact of FD maintenance and capital works on habitats, either directly or indirectly by impacting on sediments, has received little attention". This is potentially misleading, as the topic has received a lot of attention recently at the operational level, but what has been missing are the links between Flood Risk Management (FRM) objectives and the morphological/ecological regime and it is this aspect that the work of the Sediment and Habitats project is trying to address.

Due to pressures of space, the original article did not mention that it is the intention of the Environment Agency to vary the initial contract to ensure that the outputs of the project will dovetail with other on-going initiatives in FRM, for example, the development of a Performance-based Asset Management System (PAMS), to ensure that the results of the project are integrated into FRM activities. It is hoped to amplify on this in a future article in RRC News.

For further information please contact Roger Bettess at HR Wallingford.

RRC's 9th Annual Network Conference

University of Exeter 16th – 17th April 2008, with an optional site visit on 18th

Restoring Back is Not the Way Forward:

(*Achieving a functioning ecosystem in the contemporary landscape with reference to the trajectory of change*).

This year's broad themes include:

• Demonstration of new restoration projects from inception to completion • Monitoring and project appraisal • • Social and economic indicators for river restoration • Climate change and river restoration •

Conference cost (both days, meals and accommodation for 16th included) will be approximately £275 for Members and £360 for Non-Members. Day rates also available. Bookings will begin in the New Year.

Some discretionary discounted places will be available. Please contact the Centre for details.
For further information visit: http://www.therrc.co.uk/conferences.htm

RRC is most grateful to all those who have contributed text or photos for this Newsletter

The following statutory organisations provide Core Funding for the River Restoration Centre and their Representatives form the Advisory Board who together with RRC's Directors make up the RRC Council.

Environment Agency · Natural England · SEPA Scottish Environment Protection Agency · Rivers Agency · Scottish Natural Heritage