RRC ANNUAL NETWORK CONFERENCE

23RD-24TH APRIL 2001

BRITANNIA HOTEL, COVENTRY

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FLOOD MANAGEMENT AND RIVER RESTORATION

Mark Diamond, Fisheries, Recreation, Conservation and Biology Manager, Environment Agency –North West Region

Dr Mark Diamond is the Regional Fisheries, Recreation, Conservation and Biology Manager for the North West Region of the Environment Agency and manages the team responsible for the development and implementation of River Habitat Survey. Mark is on the Management Board of the River Restoration Centre (RRC) and is an observer on the Board of the European Centre for River Restoration (ECRR). He has the role of championing river restoration within the Environment Agency.

In the presentation I intend to cover the following topics:

- What is meant by the concept of sustainable flood management?
- How will Catchment Flood Management Plans help support river restoration objectives?
- How will we develop catchment river restoration or conservation objectives to support the strategic approach to flood management?

MANAGING FLOODPLAINS: OPPORTUNITIES FOR BIODIVERSITY

David Collins, Environmental Adviser, Flood and Coastal Defence with Emergencies Division, MAFF

David Collins joined MAFF in 1997. His role is to develop environmental aspects of the Flood Defence Divisions policy, and to provide general environmental support. He is Chairman of the Water Level Management Plan Advisory Group, and recently prepared the environmental appraisal volume in MAFF's Project Appraisal Guidance series. Prior to joining MAFF he was senior ecologist for the Channel Tunnel Rail Link, and before that he worked as an environmental consultant for seven years. He is a founder member of the Institute of Ecology and Environmental Management.

Summary

- Whilst flood defence has caused much loss of biodiversity in the past, this has, by and large, stopped over the last 10 years or so. The need now is to see how flood defence can positively contribute to biodiversity.
- Water Level Management Plans have already delivered some real environmental gains, and there are encouraging signs that there will be bigger Biodiversity gains in the near future.
- The new initiative on Catchment Flood Management Plans will lead to more strategic management of catchments, and will provide an opportunity to consider what further Biodiversity gains can be made as a result of flood defence works. It is suggested that there is a key role here for English Nature and the NGOs to help develop thinking on what flood management for biodiversity gain looks like, and what we might realistically achieve.
- It remains to be seen how the Water Framework Directive will affect the flood defence industry, and to what extent, if any, this will lead to river restoration works.

MANAGING FLOODS – SHORT TERM OR SUSTAINABLE SOLUTIONS?

Sarah Fowler – Head of Water Policy, RSPB

The RSPB works for a healthy environment rich in birds and wildlife. It depends on the support and generosity of others to make a difference. Sarah Fowler is Head of Water Policy at the RSPB. As well as leading the strategic direction of the RSPB's water policy she has lead policy responsibility for inland flood management and land drainage.

The recent floods resulted in hundreds of millions of pounds worth of damage as well as emotional trauma for many people. There are important lessons to be learned. The response must not be a simple knee-jerk reaction of building defences higher and wider, nor must it be piecemeal. There is a growing recognition that the current management of water and our countryside compounds the problems of floods, as well as increasing the risk of summer droughts. There has been no fundamental reform of arrangements for flood defence for the past 70 years. The time has come for a new approach and new partnerships in flood defence - for government, farmers and environmental groups to work together.

The Managing Floods conference was organised to encourage a reasoned debate on the future of flood management in England and Wales and to seek opportunities for delivering more sustainable and integrated approaches. The conference was timely. The Government is reviewing arrangements for flood defence funding and for development control and flood risk. It also announced an additional £51 million spending on flood defence including the development of Catchment Flood Management Plans. More recently, the Environment Agency published its report on the floods and the National Audit Office published its report on Inland Flood Defence.

The conference debated how we could seek to work with more natural processes in managing floods through:

- creating permanent wetlands in rural floodplains, designed to hold back floodwaters and reduce flooding in downstream urban areas
- achieving more extensive management of the wider catchment to slow down the rapid runoff and so reduce the flood hydrograph
- creating intelligent urban development, to reduce urban runoff and minimise development on the floodplain
- ensuring vulnerable areas will receive flood protection, e.g. factories, housing, schools and roads

The debate concentrated on how we could plan and fund such an integrated and sustainable approach. How could flood defences be planned more strategically, in a way that works with natural processed and how can floodplains be protected from built development? How could funding streams for flood management and water management be better integrated and designed to favour strategic, long-term solutions and should landowners be paid for providing flood defence benefits?

THE LANDSCAPE PLANNING AND DESIGN OF THE MAIDENHEAD, WINDSOR AND ETON FLOOD ALLEVIATION SCHEME

Richard Copas - Regional Landscape Architect, Thames Region of the Environment Agency.

Richard has twenty years experience as a landscape architect, fifteen of which have been in water management. During that time he has worked in various capacities on the Maidenhead, Windsor and Eton Flood Alleviation Scheme. He also provides advice on national landscape policy and practice for the Agency.

The Maidenhead, Windsor and Eton Flood Alleviation Scheme, which was initiated in the early 1980's and is currently under development, incorporates the creation of a new river channel, parallel to the Thames, some 7 miles (11.5kms) long and which is to be named the Jubilee River. The new channel runs downstream from the Thames at Boulters Lock, past Dorney and Eton Wick, passes to the north and east of Eton College playing fields and rejoins the Thames downstream of Black Potts railway bridge. The new channel is designed to contain a maximum flow of 215 cubic metres a second, while the Thames can itself accommodate 283 cumecs. This volume of flow is unlikely to be exceeded more than once every 65years. Although the project involves the creation of a new channel rather than river restoration, the objectives are very similar. Some of the critical elements of the scheme and the way they have been addressed are:

- Landtake, landfill and landform
- Identifying and taking opportunities for environmental enhancement - habitat creation and recreational facilities
- The use of local provenance plants
- Team-working and multi-functional appraisal
- Lessons to be learnt

The Maidenhead scheme undoubtedly demonstrates the scope presented for environmental enhancement by flood alleviation based projects. It is the role of all professionals interested in restoring more natural characteristics to rivers and wetlands to identify and develop the opportunities presented. Many urban and rural schemes offer scope for wetland creation, deculverting and channel restoration. To achieve these changes requires a clear understanding of the existing characteristics of the landscape as a whole and of the practical and financial factors that may constrain or enable successful enhancement. Time will tell if the Maidenhead scheme is designed well enough to be known as the Jubilee River, but certainly some of the key ingredients of success have been incorporated in the scheme.

INTEGRATED FLOODPLAIN AND RIVER RESTORATION: THE GWEN FINCH WETLAND RESTORATION PROJECT

R.J.McInnes, Penny Anderson Associates & A. Graham Worcestershire Wildlife Trust

Rob McInnes is Senior Wetland Specialist at Penny Anderson Associates where he provides hydrological and geomorphological support to a wide range of ecological projects. He has almost ten years experience in the assessment, management, conservation and restoration of wetlands. He has a special interest in the rehabilitation of river margins and the extension of river restoration to include adjacent floodplain habitats.

Andy Graham is Otters and Rivers Project Officer at the Worcestershire Wildlife Trust where he has particular responsibility for all aspects of wetland conservation especially habitat creation. He led the development of the Gwen Finch Wetland Reserve and is currently overseeing another wetland restoration scheme in the Avon valley.

Very few river restoration initiatives attempt to combine rehabilitation of in-channel habitats, riparian margins and extensive adjacent floodplain areas. Located in the River Avon valley near Pershore, Worcestershire, the Gwen Finch Wetland Restoration Project is one example of an integrated floodplain and river restoration project.

Following a large grant from WWF, part of a legacy left by a lady called Gwen Finch, Worcestershire Wildlife Trust, the site's current owner, managed to raise additional funds from a range of organisations and funding bodies. This money has helped to convert over 20 hectares of improved farmland into a wetland reserve comprising reedbeds, wet woodland, wet grassland, riparian berms and open water habitats. This paper describes the process of restoring river channels and floodplains from the project inception phase through to post-construction commissioning and monitoring.

Following a review of possible sites within the County, Worcestershire Wildlife Trust decided to focus its attention on an area of the River Avon floodplain near the village of Birlingham. The site was bounded by small brooks on two sides and with the remainder of the site bordering the River Avon. This effectively formed an island. Prior to purchasing the site, Worcestershire Wildlife Trust commissioned Penny Anderson Associates to undertake a wetland restoration feasibility study. The original remit was to assess the feasibility of creating up to 6 hectares of reedbed, 6 hectares of wet woodland and over 6 hectares of wet grassland.

The feasibility study examined a range of issues. A topographic survey was commissioned. A thorough soil survey was conducted to map the distribution of floodplain soils and to assess the hydraulic conductivity of substrates. Distinct hydrogeomorphic units were described in order to evaluate the potential to restore not just structural attributes of floodplain habitats but also to restore floodplain function. Data on the hydrology of the River Avon were collated and modelled to provide information on the frequency and duration of flooding. Mass water balance calculations were undertaken for a range of habitat mosaics to identify potential water demands. The likelihood of the presence of potential archaeological resources was

assessed. Information on site ownership and access rights was synthesised. The presence, and associated implications, of services was reviewed.

Following the feasibility study an initial design proposal was produced. Due to the elevation of the floodplain above the dredged bed of the River Avon and the risks involved in depending on the existing flood regime of the site, the initial design featured reedbed cells fed from a winter flood storage reservoir. Statutory consultees were asked to comment on this design. The Environment Agency (EA) expressed concern with regard to flood defence issues and loss of floodplain storage. Consequently the designs were revised and re-submitted to the EA. Following a lengthy and iterative discussion process mutually beneficial designs were agreed. The revised designs utilised wind pumps to lift water onto the floodplain surface which subsequently flowed under gravity through the reedbed areas.

Construction commenced in April 1999 and was completed by September of the same year. Reedbed cells were excavated and lined with clay derived from the floodplain sediments. One of the adjacent brooks was totally reconfigured and enhanced over a length of more than 400m. The banks of the River Avon were modified to create over 200m of more diverse habitats including seasonally inundated berms. In excess of 15,000m^3 of spoil was removed from the site to neighbouring fields beyond the floodplain. Flow control structures, weirs and the wind pumps were constructed to provide hydrological control. The County Archaeological Service was commissioned to undertake a site investigation during construction and found evidence of late Bronze Age farming activity as well as a medieval hay-making regime. Planting commenced following the completion of the earthworks. By the end of this summer (2001) 150,000 pot-grown reeds and 1200 willow trees will have been planted by volunteers and contractors.

Some of the earthworks and water flow control structures required subsequent modification and adjustment to ensure that hydrological management could be achieved. Problems associated with former land drains were addressed in the summer of 2000. Some of these issues remain unresolved.

A matrix of dipwells and piezometers was installed immediately post-construction and continues to supply valuable hydrological data. Other monitoring includes recording water abstraction rates, botanical and bird surveys as well as occasional aquatic invertebrate work.

Many lessons were learnt from undertaking the Gwen Finch Wetland Restoration Project including the problems associated with lifting water onto floodplains, bridging hydrological data gaps and insufficiencies, engaging statutory consultees, managing contractors, meeting ecological targets and satisfying the varied demands of different stakeholders including the local community. Whilst some minor issues remain outstanding, the project has been an initial success. The site now forms the largest reedbed in the county of Worcestershire. Notable arrivals include Little Egrets, a Red-Necked Phalarope, Peregrine Falcon and numerous other wetland birds. Breeding records include Redshank, Reed bunting and Yellow wagtail. The site is already used extensively by wintering wildfowl and passage waders particularly large numbers of Wigeon, Teal and Snipe. Otter spraints and tracks are regularly observed on site. This bodes well for the future and the long-term success of the project.

PROJECT MANAGEMENT FOR RIVER RESTORATION AS ILLUSTRATED BY THE UPPER RIVER KENNET REHABILITATION PROJECT, WILTSHIRE

Kevin Patrick, Principal Landscape Architect, Hankinson Duckett Associates

There are lots of "essential" project management rules to choose from but the one I find most useful is : "Develop a comprehensive and viable project plan, and keep it up to date". The project manager's job is of course to get the project completed and within the primary project constraints of time, cost and quality, hence the time/ cost/ quality triangle. A fourth dimension is that of stakeholders. It is chiefly the expectations of the various stakeholders that specify and quantify the time/ cost/ quality triangle parameters.

The project plan must contain a programme. For the Kennet project it was essential to have a detailed programme for each phase to ensure that the project could be achieved within the constraint of an annual six-week window for all river works. This programme is in the form of a Microsoft Project Gantt chart. This programme has enabled vital project management activities for example: determination of the critical path, production of a milestone chart and prediction of key dates.

The project plan must contain some form of cost plan. For the Upper Kennet project the complexity of the five-year project and the significant sums involved necessitated the use of spreadsheets to keep track of planned, spent and projected expenditure.

Pre-project surveys, and post-project monitoring are the subject of written briefs, usually accompanied by a site plan. Design drawings are reviewed in the same way and undergo exhaustive discussion at Working Group Meetings. Site construction is inspected at regular (often weekly) intervals by the project manager.

Managing the involvement of stakeholders, and integrating their expectations into the project, is crucial to a projects success, and its perceived success. Consensus is the primary principle, the project is entirely reliant on the goodwill and wishes of the project participants, principally landowners but also the Steering Group members: Thames Water, EA, EN and ARK. Team work, consideration for others and good communication derive from the need to gain consensus.

The project management techniques chosen must be commensurate with the scale and complexity of the project and the expectations of the funding agencies. If river rehabilitation is to widen its scope in the UK and attract significant funding the fund-holders must be convinced that their money will be well managed to produce positive results and enhance their reputations. Good, competent and comprehensive project management is therefore essential to the larger future of river rehabilitation.

DOES RIVER RESTORATION INCREASE BIODIVERSITY? – A CASE STUDY FROM THE RIVER COLE, COLESHILL

Dr J.Biggs, The Ponds Conservation Trust: Policy & Research

Ponds Conservation Trust: Policy & Research (PCTPR) is a national centre for research and advice on the ecology and conservation of ponds. PCTPR is a wholly owned subsidiary of The Ponds Conservation Trust and was formed following the merger of Pond Action with the Trust in January 2001

Despite widespread interest in river restoration, few studies have investigated its effect on riverine biodiversity in any detail. Studies of the River Cole, near Swindon, were used to look at the effect of restoration on biodiversity at a range of spatial scales over a two year period. The results show that, five years after restoration, restored sections of the river supported significantly more plant and invertebrate species than upstream control reaches. However, all but two of the species found in the restored sections were also recorded in the surrounding area, suggesting that the restoration had little effect on overall catchment biodiversity. The results have implications for the location and design of river restoration schemes.

THE APPRAISAL OF UK RIVER RESTORATION PROJECTS- RESULTS FROM A NATIONAL SURVEY

Lydia Bruce-Burgess, Queen Mary College, University of London

Lydia is a second year PhD candidate at Queen Mary College (University of London), looking at "UK river restoration projects- an evaluation of the appraisal procedures". This research is distinctive in that it is highly interdisciplinary (funded by an interdisciplinary ESRC-NERC studentship with CASE contribution from the Environment Agency), aiming to examine both the environmental and social components of appraisal to provide the basis for developing an integrated and holistic approach. The research strategy compromises two interconnected stages of investigation: 1. a national survey to establish the range of restoration schemes undertaken to date and the accompanying appraisal procedures; and 2. a detailed study of river restoration in the Thames Environment Agency Region, comprising a detailed survey of the appraisal procedures recently employed for rural and urban river restoration programmes, and also analysis of an on-going project appraisal.

The paper presented today will focus on the results of the first stage of research. The appraisal of river restoration projects is a process that has not been well documented in either policy or practical restoration literature, and in the UK, at present, no general consensus on appraisal procedures exists. Appraisal has various definitions. Ideally it should seek to identify all the issues - environmental, economic, and social - at a project's planning stage and promote discussion between stakeholder groups leading to the preparation of vision documents. However, it has been rarely undertaken due to: preference for funding new projects over studies of past work; fear of failure; and assumption that all restoration work is good. The purpose of this national survey was to establish both the nature and spatial patterns of the appraisal process in the UK, documenting areas of good practice and providing future recommendations for appraisal. Leading to the development of a structured appraisal process, to be used to guide the appraisal of future river restoration projects.

Accessing the results of this survey
This results of this survey can be downloaded in full from Lydia's URL:
http://www.qmw.ac.uk/~fa9128/cv.html#PUBLICATIONS:

River Restoration Mailbase
Additionally the first ever river restoration mailbase has recently been set up to act as a discussion forum for both academics and practitioners in the field of river restoration, there are currently 177 members from across the world from governmental bodies, NGOs, academic institutions etc... This list has also the potential to act as a means of disseminating information on areas of good practice, thus facilitating advancements within this field. For more information on how to join follow this link or speak to Lydia:

http://www.qmw.ac.uk/~fa9128/mailbase.html

EFFECTS OF CHANNEL MODIFICATION FOR FISHERY ENHANCEMENT ON PLANT AND INVERTEBRATE DIVERSITY OF THREE WESSEX STREAMS

T. E. L. Langford, Southampton University and Pisces Consultancy, & F. Bowles, Wessex Water

Terry Langford is a Tutor and Fellow in the Centre for Environmental Sciences at Southampton University, and an independent consultant ecologist for Pisces Conservation.

Fiona Bowles is Environmental Services Manager for Wessex Water.

The perceived loss of fish habitat and vegetation in Wessex streams that resulted from high water demand and low flows in the droughts of the late 1980's and early 1990's led to national and local pressure from anglers and conservationists for remedial action to maintain the fisheries., Trials were undertaken on various forms of river restoration (eg. marginal protection, flow diversion, gravel introduction, pool and riffle sculpting,) to investigate the influence of river management on the apparent 'low flow' effects. In 1994-1999 a series of projects were carried out in the River Piddle and Devils Brook in Dorset, the River Wylye and River Till in Wiltshire, all chalk-streams, and reaches of the Bristol Avon, a limestone-based stream, in Wiltshire and Avon. Surveys following the restoration suggested strongly that the densities of fish and abundance of vegetation in the restored reaches of both chalk and limestone streams were higher than before restoration.

In the summer of 2000, Wessex Water commissioned surveys of the plants and invertebrates in the restored reaches of the rivers to assess effects of the restoration work on diversity. Data were obtained from separate marginal and in-stream habitats at 21 sites, at each of which a restored and unrestored reach were compared. About 154 species of plants and over 180 taxa of invertebrates were identified from the 44 sampling reaches. Available data on fish densities and small mammals supplied from external sources, were also re-analysed to obtain an overview of the total effects on the flora and fauna.

Ordination analysis of physical habitat measurements and substrate composition did not discriminate between restored and unrestored reaches though most of Bristol Avon sites were separable from the other two streams. Ordination of plant and invertebrate data also separated most Bristol Avon sites from the other streams but did not discriminate between restored unrestored reaches. Paired t-tests of species-richness and diversity indices showed that differences between the diversity of in-stream vegetation, in-stream or marginal invertebrates at individual restored and unrestored reaches did not translate into an overall pattern. There was, however, a significant overall reduction in species-richness of bankside vegetation in restored reaches. Diversity of invertebrates was generally correlated with stream dimensions and instream weed-cover. In-stream weed-cover was mainly influenced by tree-canopy.
At some sites, the introduction of gravel allowed colonisation of invertebrate species not previously present in that reach. The greatest increase in invertebrate diversity was a result of increasing current diversity at one site on the Malmesbury Avon.

Paired t-tests on the available fish data indicated significant increases in the densities of some species but not others in the restored reaches. Whether the increases were a result of simple re-distribution or higher carrying capacities is unknown though marking studies indicated little movement. Evidence indicated that fencing and deepening of channels enhanced fish densities but the numbers of samples were generally low for statistical analysis. Data for small mammals are encouraging but not statistically conclusive to date.

From this analysis and from a review of available literature it is clear that the requirements of fishery managers and conservation groups may be contradictory and have led to confusion over the optimal management strategy for lowland stream ecosystems. This confusion has, in turn, led to management practices that do not meet the needs of all users and may be wasteful and conflicting. It is time for a re-appraisal and a clear strategy for future riparian and instream management.

REINTRODUCTION OF SALMON TO THE RIVER LAGAN, BELFAST, NORTHERN IRELAND

Robert Rosell, DARDNI, Northern Ireland

Before reintroduction in 1991, salmon had been extinct in the River Lagan since the late 1700s. Contemporary records indicate that weirs, without fish passes, built to supply water to mills and a canal between Belfast and Lisburn blocked the upstream migration. Subsequently, in the 19th and 20th centuries, poor water quality associated with sewage and industrial effluents added further problems and prevented any possibility of recovery.

The Lagan canal was abandoned in the 1950's. During the period from 1960 to 1990, major investment in sewage treatment led to improved water quality between Lisburn and Belfast, a reach which had been fishless. Coarse fish and brown trout gradually returned or were stocked. Even when the urban reaches of the river had been at their worst, some upstream areas and tributaries remained in good condition and supported trout populations. From 1960 onwards, there were occasional reports of "stray" salmon in the river. These developments led fisheries staff to undertake a study of the potential for salmon re-introduction in 1988, and then in 1991 to a salmon reintroduction experiment based on stocked fry from the River Bush hatchery. In 1993, an estimated 200 adult salmon returned to the river, the first significant run for over 200 years. It is now known that that salmon fry stocked in the Lagan can grow on, emigrate to sea, and return successfully, mainly after one winter at sea. Returns from stocked fry have generally been good. Upstream migration has been assisted by a programme of fish pass construction by the NI Rivers Agency. To date, four fish passes have been built and another is under construction.

Since 1995, an increasing proportion of the population is wild spawned. A good smolt emigration in 1999 led to a record return of adult fish in 2000, with at least 800 adult fish estimated to have entered the river. As a result, the project is now in a third phase aimed at establishing a self-sustaining population. This requires a partnership approach with other organisations so that any works affecting the river are carried out with maximum benefit to salmon. Meanwhile, stocking of River Bush derived fry will continue to seed a population capable of using the existing spawning areas and any new habitats created. While there are areas of reasonable water quality which need some habitat restoration, there are also physically good salmon habitats in intensively farmed parts of the catchment, where fish kills still occur and water quality improvements are required.

Of all the rivers where salmon have become extinct in the British Isles and Europe, and where re-introduction is being attempted, this has arguably been the most successful, with a real prospect of generating a self-sustaining population.

Current research activity includes: annual fry stocking and follow up electro-fishing exercises to determine survival; annual survey of unstocked areas to determine numbers of naturally spawned fry; counting of emigrating smolts and returning adults; and using all opportunities where other organisations (e.g. river engineers, angling clubs, conservation organisations) are carrying out works on the river to put in place spawning and juvenile habitat improvements.

KEW TO CHELSEA THAMES STRATEGY- FROM STRATEGY TO SITE IMPLEMENTATION

Ruth Gibbs, WS Atkins & Jonathan Reed, WS Atkins

This paper will focus on urban rivers, looking in particular at the Kew to Chelsea Thames Strategy, currently being prepared by WS Atkins. This strategy is still in draft format.

The paper will first examine the different features of this strategic study to produce comprehensive guidance for future development. These issues include the landscape of the river, built development associated with the river, ecology, heritage and archaeology, public access, sport, recreation, leisure and transport (including passenger, tourist and freight). Some specific management aspects of the strategy will be examined, for example the first stage public consultation that has recently been completed.

The second aspect of the paper will examine some of the problems that can occur moving from the strategy to a buildable solution. This will focus on the following:

- Access problems. Working adjacent to rivers usually leads to access restrictions. This has a bearing on the final scheme costs, and needs to be considered at an early stage. Think about getting a Contractor involved on the design team, who can help create a more 'buildable' solution.

- Services. Working in urban areas usually leads to conflicts with existing structures and services. An example will be presented from the River Wandle scheme, where existing high voltage electricity cables would have lead to operating restrictions during construction.

- Ground Contamination. Many sites in urban areas are contaminated and good investigation data are needed in order to determine the extent and cost of the work required. Examples will be given from the Greenwich Peninsula site.

WEMBLEY PROJECT – REGENERATION OPPORTUNITY BEYOND A NATIONAL STADIUM, MAXIMISING COMMUNITY BENEFIT

Tav Kazmi, Wembley Project Office, London Borough of Brent

Tav Kazmi joined Brent Council in 1996, initially involved in Brent's Local Agenda 21, environmental policy and service development. He has later been responsible for developing proposals for River Brent enhancements with London's Waterway Partnership SRB, the River Restoration Centre and the Environment Agency. Tav is currently engaged within the Council's Wembley Project Office, established to maximise the regeneration opportunity around the National Stadium. His main areas of involvement include project co-ordination, project planning & development, resource bidding and partnerships.

For more information visit: http://www2.brent.gov.uk/wembley/index.html
or http://www2.brent.gov.uk/la21.nsf/ *or* http://www.brent-waterways.com

The Council established the Wembley Project to maximise community benefits in response to the regeneration opportunity presented by redevelopment of the English National Stadium. The Council is working to secure the future success of Wembley for residents and business within a Project that has national, regional and local dimensions.

Wembley has seen a decline in its economic fortunes, with loss of manufacturing jobs, inadequate transport infrastructure and reduced retail market share exacerbated by expansion of neighbouring centres. Stadium events provide limited income to the area as the wider setting is poor and offers few attractions to retain visitors. The Council is working with its partners including the government-appointed Wembley Task Force to re-establish Wembley as a key London visitor destination and as a centre that will continue to contribute to London's world city status. Building on Wembley's '3 Stations Strategy' *Destination Wembley* is envisaged to be a sustainable transport location, with a local economy that builds on Wembley's international sports and entertainment heritage, and celebrates one of Europe's most diverse mix of cultures.

In looking at Wembley's own experience and at other examples around the world, it is apparent that maximising local benefits will hinge on addressing the wider setting around the stadium development.

" Don't build the fastest in-and-out stadium. If you do that, you'll never get economic return from the stadium. You get return from build-up around the stadium…."
Chief Executive of Cincinnati

Beyond the stadium development, other projects are now underway covering transportation, public realm and environment, site redevelopment, marketing & communications, and community & employment initiatives. Some of these are related to the stadium redevelopment whilst others are largely independent, such as the River Brent project.

River Brent Enhancements
The River Brent scheme is one of a group of projects being co-ordinated by the Wembley Project Office. The project addresses a degraded urban river environment and public open space through industrial and residential areas.

THE PARRETT CATCHMENT PROJECT

Chris Bowers, **Somerset County Council**

The Project was started in response to the extreme flood events that Somerset has been experiencing over the past two years. It represents a new approach because it has been developed with significant community participation and because it takes a holistic approach to catchment management. A Strategy has been published and the government minister Elliot Morley, has given his support. The Project is recognised by the Environment Agency as a national pilot project to develop an integrated catchment management plan. The Strategy includes proposals to:

* change agricultural land management to increase flood attenuation in the upper and mid-catchment
* create temporary flood water storage
* control runoff from development
* improve drainage systems
* improve coastal defence
* spread the burden of floodwater across the Moors

Besides flood control benefits, the project aims to deliver substantial environmental, community and economic benefits.

NEWPORT RIVERS: ISLE OF WIGHT

Joe Stevens – Environment Agency

Joe Stevens is an Environment Agency Conservation and Recreation Officer working in the Hampshire and Isle of Wight Area.

Newport, situated at the head of the Medina Estuary, is the Isle of Wight's county town. In the 60's & 70's tidal and freshwater sections of Newport's river channels were extensively canalised. In many areas of the town the built environment has, even very recently, been allowed to encroach right up to the bank tops.

After attending the April 2000 River Restoration Conference in Manchester, Environment Agency staff were inspired to be much more proactive about responding to local people's requests for an improved riverine environment in Newport. With assistance from Richard Vivash, Chairman of the River Restoration Centre a great deal of progress has been made in the last year.

Local people joined the key bodies and the River Restoration Centre at workshop sessions. Material from the workshop sessions was funnelled into a preliminary report which appraised river rehabilitation options. A Memorandum of Understanding now commits key players to: jointly fund a technical hydrological assessment; deliver an example river restoration project in the town centre; give greater consideration to the urban river environment in the town planning process.

To date, there is nothing to see on the ground in Newport. This talk is an explanation of how organisations and local people have finally got themselves organised to push effectively in the same direction. Perhaps the sharing of this experience will help others who are about to ask a river restoration project idea to take its first public steps.

THE RIVER NENT AT NENTHEAD - RESTORATION OF AN UPLAND STREAM

Rob Drayton, Independent Consultant, Cardiff www.bebop.demon.co.uk
Scott Doherty Associates

Introduction

The River Nent is a tributary of the South Tyne, and at Nenthead the river is just 4 km long, draining a typical upland catchment of 10 km2 lying right on the crest of the Pennines. Nenthead was for a long time the centre of a lead mining industry. Although first mined in Roman times, the peak of activity was in the period 1800 to 1920 when mining ceased. Most of the spoil was re-worked during World War II and deposited in three large tailings dams right alongside the river.

Mining activity has had a great impact on the river. Flood plain has been lost, the channel has been entrained and straightened, and its sediment supply has been drastically changed. In recent time the river has become very active, and has undercut the toe of the tailings dams, threatening their stability. Cumbria County Council commissioned Scott Doherty Associates to investigate the dams, to make proposals for works to stabilise them and carry out an Environmental Assessment. Scott Doherty found that there was a high risk of structural failure of the dams and that if they failed they would release large quantities of toxic material into the Tyne system, jeopardising the aquatic ecology of the region and the water supply to the north-east. They recommended that the dams should be re-shaped to improve their stability and that the River Nent should be stabilised so as to prevent future undercutting of the dams.

The client and consultant worked closely together to ensure that the necessary safety was provided whilst restoring the river to a more natural condition in harmony with its upland surroundings in this Area of Outstanding Natural Beauty.

The river restoration

The Nent is a steep, rocky, upland stream controlled at the upstream and downstream ends of the site by rock outcrops. It falls 38m in the 1.5km of the restoration works, giving an average gradient of 1 in 30. The flow is highly supercritical and the hydraulic parameters are well outside the range of applicability of regime data. The channel has been very active in recent years, cutting its way upstream through loose glacial soils, causing failure of the banks and the steep valley sides. This is ascribed to a sudden change in the sediment supply following the cessation of mining activities (for example Passmore et al, "Braided Rivers", Geol Soc 1993).

The main aim of the river works was to create natural stability by decreasing the channel gradient, thus reducing the tractive force of the stream over most of its length, especially in areas of new cut, but concentrating it at a number of protected sites. This was achieved by the installation of a cascade of drop structures and weirs, together with the realignment and lengthening of one reach. The design discharge was 40 m3/s.

A total of 16 weirs were installed, at roughly 50 metre centres, accompanied where necessary by the construction of blockstone banks. Massive cuboidal blocks were laid in the bed to provide a foundation for the weirs, and to provide scour-resistant aprons. Each weir crest was horse-shoe shaped in plan, and dipped to the centre. This was achieved by the careful placing of random blockstone of about 2 to 3 tonne mass.

During the first floods following construction there was some movement of blocks, as was expected, but the weirs have settled down, and now have a very natural appearance. They have collected smaller stones and silt, thus creating a pool and riffle sequence. The aeration has greatly improved the quality of the water. The works have met the engineering requirements, whilst transforming a scarred, industrial river into a mountain stream supporting a variety of aquatic life. The finished works have won praise from the Environment Agency and the local community.

EXPERIMENTAL MAINTENANCE OF UNIFORM GLIDES: IMPLICATIONS FOR FISHERIES AND CHANNEL MANAGEMENT

JAMES J. KING, CENTRAL FISHERIES BOARD, SOUTHERN IRELAND

Dr. James King joined CFB in 1981. Since 1990 he has been engaged with the Office of Public Works (OPW) in a study examining the environmental impacts of river maintenance using conventional and experimental strategies, known as the Experimental Drainage Maintenance (EDM) programme. His presentation uses material from one topic area in this study. Two papers from this study have been published.
His other areas of involvement include lake vegetation (primarily Charophyta) and conservation fish species (lampreys and shad).

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The R. Dee catchment, a salmon and trout angling fishery discharging to the Irish Sea, was subject to arterial drainage in the 1950s. This work, and subsequent channel maintenance, has been undertaken by the Office of Public Works (OPW). The drained channel contains many sections of uniform gradient with limited development of depth and hydraulic diversity. During joint OPW-Fisheries Boards investigations (1990-95), two experimental maintenance strategies were undertaken at selected uniform glide sites. One used available stone in situ to form low-level weirs and deflectors, the second overdug the channel bed to form discrete pools. The structures created local diversity, in terms of depth-velocity patterns. Pool development led to increased fish populations. The potential for use of both strategies in 'routine' maintenance procedures is discussed.

The Central Fisheries Board (CFB) is involved, with the seven Regional Fisheries Boards, in the development, protection, conservation and promotion of Ireland's marine sport and inland angling fisheries. Much of this work is done at Regional level and the CFB provides a co-ordination role as well as provision of specialist services such as fisheries research. The research function was developed during the early 1950's by its predecessor, the Inland Fisheries Trust. Investigations include those dealing with the basic biology and conservation status of individual species as well as studies of an applied nature. Topics covered range from marine sport-fish tagging, salmonid river rehabilitation, management of inland navigable waterways, studies on aquatic weed management, biology of coarse fish, salmonid and conservation species, long-term studies on lake eutrophication and lake vegetation, development of management programmes at catchment level.

THE WATER FRAMEWORK DIRECTIVE: OPPORTUNITIES FOR RIVER RESTORATION

David Corbelli, SEPA

David Corbelli – Water Framework Directive Project Officer for SEPA and Environment & Heritage Service (EHS), Northern Ireland. Responsible for the management of the Scotland & Northern Ireland Forum for Environmental Research (SNIFFER) research project on the designation of Heavily Modified Waterbodies in preparation for the Water Framework Directive.

The Water Framework Directive – Opportunities for River Restoration

The Water Framework Directive (WFD) is the most significant piece of European legislation to affect the management of our water environment over the last 20 years and will have a major impact on future environmental protection, policy and legislation.

Among other things, the WFD will require the management of surface waters (freshwater, transitional and coastal) with the aim of achieving good ecological status through river basin management planning. It also provides a framework for or progressively repeals many existing European statutes, while retaining at least the same level of protection previously provided.

The WFD recognises that hydromorpholgy can affect the biology (aquatic organisms require particular conditions to survive and thrive) or chemistry of the system and, therefore, threaten the achievement of target objectives or cause deterioration of existing status levels. Within the WFD is a requirement for measures to ensure that the hydromorphological conditions of waterbodies are consistent with the achievement of the required ecological status (or good ecological potential for bodies of water designated as artificial or heavily modified)

Heavily Modified Waterbodies (HMWB)

The Directive allows the designation of HMWB for which the baseline objectives will be to achieve good ecological potential. This means that objectives can be set for these waters which take account of existing physical modifications. This will ensure that Member States do not have to divert resources to restoring water bodies which have been modified to deliver socially important objectives (e.g. navigation, flood defence).

In preparation for the implementation of the Directive, a major project has been initiated by the European Commission in conjunction with the EU Member States to assess how to undertake the process of designating, setting environmental objectives and establishing programmes of measures for "HMWB" under the Directive.

A series of case studies are being undertaken by Member States on the main types of water body modification (navigation, flood/coastal protection, hydropower generation, agriculture/forestry, water supply, urbanisation) covering all relevant water body types (freshwater (rivers/lakes), estuarine/transitional, coastal). These will aim to apply the designation process for HMWB and to identify good ecological potential and the measures that might be required to achieve this for these water bodies. The European

project will use the analysis of these case studies as the basis of identifying recommended options for the designation and objective setting process for heavily modified waters (see attached summary of HMWB designation process and diagram).

Water Framework Directive (WFD) - Heavily Modified Waterbodies (HMWB) Project

Introduction - Designation of Heavily Modified Waterbodies for which the objectives will be to achieve good ecological potential as opposed to status. Objectives can be set for these waters which take account of the existing physical modifications.

Case studies - Series of case studies by member states as part of a European Project to provide guidelines for the designation of Heavily Modified Waterbodies.

Scotland and Northern Ireland have identified four study areas: three of these are in Scotland (River Tummel, River Dee and the Forth Estuary) and one in Northern Ireland (River Bush).

1.) Identify and describe waterbodies

- define water stretches for monitoring purposes, describe geology, topography and hydrology socio-economic/human activities.

2.) Describe physical alterations

- significant physical alterations to the waterbodies (waterbed, banks and riparian zone).
- identify the main pressures on and users of the waterbodies.
- assess how modifications have changed the hydromorphological characteristics of the waterbodies.

3.) Assessment of Ecological status

- assessment of the ecological status (biological & physico-chemical) of the waterbody.
- highlight additional survey/data requirements.
- discuss whether any impacts on the biology are likely to be a consequence of the physical alterations,

4.) Designation Tests

- assess and describe the changes to the hydromorphological characteristics that would be (theoretically) necessary for achieving 'good ecological status'.
- evaluate the effect of each of the measures on the uses, in respect of which the body would be designated as heavily modified.
- consideration of alternative methods for achieving the objectives.

5.) Designate Heavily Modified Waterbodies

- designate Heavily Modified Waterbodies on the catchment

6.) Identify Ecological Potential - The Water Framework Directive recognises the constraints that physical modifications can have on waterbodies for achieving good ecological status and allows the setting of more “realistic” targets based on comparisons to similar natural/unmodified waterbodies.

- **Maximum Ecological Potential (MEP)** - development of criteria and methods to allow comparison to similar 'natural' water bodies.
- **Good Ecological Potential (GEP)** - setting of realistic targets (which may deviate from maximum ecological potential) achievable within the given timescale of the WFD.
- Identification of measures for protecting and enhancing ecological quality.

Outputs

- Technical Report (50 pages) and summary.
- Combined UK report/synthesis (in conjunction with SNIFFER & EA).
- Feed into European project (Modification type project).