



SUMMARIES OF PAPERS

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DURHAM

USING RIVER RESTORATION AS A FOCUS TO GUIDE RIVER BASIN MANAGEMENT

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Summary

The river within Europe can be divided into four main regions: Northern Europe where boreal conditions dominate and dams built for hydroelectric power which in turn has meant that fish migration is now almost impossible and hence conflicts occur between recreational, economic and natural interests; Eastern Europe where water and sediment pollution, together with the loss of (fish) habitats are the main problems although a lack of management of the existing dikes also has implications for flooding issues; Southern Europe where water availability is the main issue because of the climatic conditions that prevail (i.e. high temperatures and low precipitation in summer). Here conflicts often exist between the engineering groups supporting the economic growth and a growing public awareness that there is a need to conserve the remaining “unspoiled” rivers; and finally Western Europe where many rivers have been embanked for centuries for safety reasons, shipping and to increase the area of agricultural fields.

Together these impacts have meant that today few ‘Living Rivers’ remain in Europe and despite the classification outlined river management problems are similar throughout Europe (i.e. safety, water quality, water availability and degradation of fishery and habitats)

All EU-countries must implement the Water Framework Directive (WFD) in their national legislation. By 2015 all water bodies should reach a good water quality and a good ecological status. River restoration is one way of not only increasing riverine habitat diversity but should help to achieve the goals of the WFD. Furthermore flood management and the prevention of economic damage can be mitigated when considered in the context of river basin management.

The European Centre for River Restoration (ECRR) has evolved to share the experiences and practices in river restoration throughout Europe
Restoration measures take place on different scales, from river basin scale to regional or even local scale. Two examples will be discussed to show this different scale approach in order to apply the 3-step strategy of “retaining-storing-draining” water in the Netherlands:

- 1) The River Rhine: Along the River Rhine, an Environmental Impact Assessment (EIA) has been undertaken in order to find the most suitable places for the future safety measures in terms of alleviating flooding to be implemented. The water management

philosophy has changed in the last decennium from an engineering approach of dike heightening to an integral multipurpose approach where 'Space for the river' or 'green rivers' is important and further more in order to keep 'dry feet' in the Netherlands over the longer-time scale especially as a result of probable climatic change where higher peak discharges and a rising sea level are expected in is now recognised that flood retention areas must be designated in the new spatial planning legislation.

- 2) The River Dinkel: The Dinkel catchment is a sub-basin of a tributary of the River Rhine in the Eastern part of the Netherlands. Here habitat restoration along the main river and in brooks which run out into the Dinkel and retention measures were undertaken.

STREAM - RESTORING A CHALK RIVER SYSTEM ON A CATCHMENT SCALE

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Summary

The River Avon and its tributaries comprise one of the most biodiverse chalk river systems in Britain. The river system has been designated as a candidate Special Area of Conservation (cSAC). Although of outstanding natural value, the watercourses and their floodplains have been extensively modified and managed over centuries for agriculture, mills and fishing. Whilst habitat modification is characteristic of chalk streams some works, in particular mid – late 20th century flood defence and drainage engineering have created stretches of oversized channel which cannot now support typical chalk river biodiversity. In order to restore ecological function, intervention is required as the Avon is a low energy river system.

Over the last decade, a “new wave” of fishery enhancement works has developed on the Avon system, especially the upper Avon and Wiltshire tributaries, prompted in part by extremely low flows in the early 1990s. Fishing clubs began to experiment with soft river enhancement techniques that improve fish habitats and fishing, meet flood defence criteria and enhance biodiversity. These techniques have been supported by English Nature and the Environment Agency, and since 1999 the Wessex Chalk Streams Project, which assists river managers in river rehabilitation with definite biodiversity benefits. There is now widespread acceptance of “soft” engineering techniques to effect multi-purpose benefits, however to date the majority of projects have been small scale, fisheries led and locally focussed, rather than selected strategically.

In 2003, a River Avon cSAC Conservation Strategy was developed as part of the LIFE in UK Rivers Project. This was produced by a group of stakeholders (coordinated by a Project officer based with English Nature) and achieved broad consensus on the conservation priorities for the river system. A number of issues identified cannot be addressed through statutory mechanisms such as SSSI/cSAC protection, of which strategic, conservation-led river rehabilitation and diffuse pollution were the highest priority. Whilst work has started nationally and locally on addressing diffuse pollution, there was no focus for habitat restoration, and so the River Avon and Avon Valley Initiative (RAAVI) was established. This includes a LIFE Project bid, STREAM: Strategic Restoration And Management of the River Avon cSAC and Avon Valley Special Protection Area (SPA). The River Restoration Centre is an advisor to RAAVI.

employing a project officer to coordinate a funding bid to the EU LIFE nature fund and advising on design, construction and monitoring.

The STREAM bid developed a selection process prioritising river restoration sites. Data analysis, expert panel assessment and prioritisation of sites against criteria were used to identify and prioritise reaches for river restoration. Data analysis is a useful coarse filter for identifying and prioritising wildlife led restoration works throughout the catchment, but expert assessment on the ground is still essential.

A monitoring methodology is being developed, which aims to determine if the restoration works planned do create the necessary physical conditions for the target (cSAC) species, and if these changes are sustained by the existing physical processes in the river system.

There is also a poster presentation on this project.

ADDRESSING AN URBAN EROSION PROBLEM: TILMORE BROOK, PETERSFIELD, HAMPSHIRE

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Summary

Anecdotal and other evidence suggests that there has been a long history of flash flooding and erosion along the Tilmore Brook at Petersfield in Hampshire. Not only is the watercourse unusually naturally steep for southern Britain, it has previously been artificially straightened and has suffered from unattenuated flows from urban surfaces. In the winter of 2001/2002 extreme flow conditions contributed to the collapse of the banks and also continued scour and downward migration of the channel bed. This put riparian properties and a public footpath in the immediate vicinity at risk.

A project to address these problems was completed in December 2003. A unique feature of the design was bed raising by the placement of flint rejects and gravels and checking the gradient by a series of low flow weirs. This paper describes how collectively a team of specialists and stakeholders (including riparian owners) arrived at the final solution and highlights some of the key challenges and opportunities along the path from problem identification to the final handover of the project to East Hampshire District Council.

In effect, a wide range of options were considered from catchment-level alternatives to changes of design detail as the contract was in progress. The options were informed variously as follows:-

- The Client – East Hampshire District Council
- The Client's Advisor – River Restoration Centre
- The Design Team – Gifford and Partners
- The riparian owners
- The Regulators (in particular the Environment Agency)
- The Contractors – Trant

The paper demonstrates how each of these Agents was vital in securing a final solution, relying primarily on effective communication.

It is too early to evaluate the long-term performance of the project, but a number of indicators for success (or otherwise) are developed in this paper. This paper also provides advice for future restoration works drawing on the experience gained throughout the project, particularly in the public consultation and construction phases.

A MULTI -PURPOSE CATCHMENT MANAGEMENT PILOT PROJECT

David Collins (Senior Environmental Advisor, Flood Management Division, Department for Environment Food and Rural Affairs)

Summary

Over the last few years there has been growing interest in sustainable catchment management. This is, at least in part, in response to recent severe flood events. But what do we mean by sustainable catchment management, and what does it look like in practice?

Over the last year or so, Defra has hosted a series of meetings with key stakeholders to consider this matter. One tangible result of these meetings was the production of a joint statement on land-use, wetlands and flood management. The second tangible outcome was an agreement between Defra, English Nature, the Environment Agency, the Forestry Commission and the River Restoration Centre (RRC) to identify a pilot project to investigate a multi-functional approach to catchment management. The RRC played a role in this process by preparing a scoping study that will be used to help steer the pilot project.

The Environment Agency was asked to put forward suggested locations for consideration by the group, and this resulted in a short-list of three sites. These were on the lower Don below Doncaster, the upper Don above Chesterfield, and the Laver above Ripon. The project steering group then visited the three sites in late January. Each of the three proposed sites had their own merits, but the Laver was subsequently recommended as the best location for the pilot project. The next stage will be the appointment of a project officer to work alongside the Environment Agency. The key task of the project officer will be to help delivering a multi-funded project that delivers not only flood defence benefits, but also delivers real environmental and social benefits that could not be paid for directly from flood defence expenditure.

This paper will consider why the pilot project is needed, and will then go on to discuss some of the possible benefits of the Laver project and the wider implications for future catchment management.

THE YTHAN PROJECT – RIVER RESTORATION AND PUBLIC PARTICIPATION ON A CATCHMENT SCALE

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Summary

The Ythan Project is a multi organisation project which aims to involve local people in protecting, restoring and enhancing the river Ythan in Aberdeenshire, Scotland. The project is funded by the European Commission's Life Environment fund and has four main areas of action:

- Undertaking river restoration work at key locations around the catchment
- Working with farmers to assist them to use agri-environment schemes to create new wildlife habitats on their farms
- Assisting farmers to complete nutrient budgets on their farms and reduce the potential for leaching of surplus nutrients into river water
- Undertaking monitoring work around the catchment and estuary to create a set of baseline data for the current state of the river system

The river restoration element of this project will be discussed in more detail in this paper. To date work has been undertaken during the summers of 2002 and 2003 and has included a variety of small scale restoration works. In both summers the selection of the individual restoration projects has taken into account the views of statutory organisations, advisory bodies such as the RRC and the wishes of the local people. This has resulted in a site selection process which included the creation of a shortlist of possible sites, which were agreed by the statutory organisations, followed by local people voting on their priority sites from this shortlist. Work was then undertaken at those sites which received the most votes. This process ensured that the work undertaken was acceptable to all, and provided the best method for reaching a consensus decision.

Work undertaken has included the creation of a sea trout spawning bed; the removal of overshadowing conifers and their replacement with broad-leaved trees; the exclusion of livestock from eroding banks; the introduction of a fish pass and the creation of a floodplain wetland. Work planned for 2004 includes the creation of a berm adjacent to a straightened channel and the re-meandering of a canalised section of the main river stem. Further detail will be provided on the work undertaken and proposed.

INTEGRATING ECOLOGICAL AND AGRICULTURAL OBJECTIVES INTO SUSTAINABLE FLOODPLAIN MANAGEMENT

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Summary

There is increasingly widespread recognition that integrated floodplain landscape rehabilitation can deliver multiple and sustainable benefits for society, for example:

- To urban communities through enhanced flood alleviation.
- To rural communities through the diversification of farm incomes and rural enterprise
- For wildlife through the protection, re-creation and enhancement of semi-natural habitats.

Delivering multiple, and integrated, floodplain management entails working through multi-disciplinary partnerships, the Severn and Avon Vales Wetlands Partnership (SAVWP) is an example of how such partnerships can develop and the enhanced benefits they can be deliver.

Established in August 2000, SAVWP stems from research jointly funded by the Environment Agency, English Nature and the RSPB. The Study, “*Re-creation options for River Severn / Avon floodplain wetlands*” (Ecoscope 1999), provides the catchment framework within which the Partnership defines its priorities for wetland habitat and biodiversity enhancements.

SAVWP recognises that large-scale wetland habitat gains can only be achieved by working with local communities, flood defence, agricultural and environmental organisations. This is reflected in the Partnership’s membership, which includes representatives of eighteen, conservation, land drainage, farming, local planning and community organisations from both the statutory and voluntary sectors.

New opportunities for promoting greater integration of floodplain management objectives and practices have been created through recent changes in government policy and economic incentives, for example:

- The increasing emphasis on sustainable flood risk management in preference to continuing development of hard engineering defences
- The on going development of measures to meet the Water Framework Directive.
- The restructuring of the agricultural support and agri-environment schemes.

To reflect the new opportunities that have arisen from policy changes and to guide SAVWP's development over the next three years, the Partnership has set a comprehensive series of aims and objectives, which embrace the three key themes:

- Agriculture / Rural land use and economy
- Biodiversity and Landscape
- Floodplain and water resource management.

Supported by aims for data collation and dissemination, communication and promotion and funding.

This paper will outline SAVWP's development and achievements since 2000, highlighting the catchment framework and the Partnership's focus on promoting landscape/sub-catchment scale restoration.

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THE RESTORATION OF WETLAND HABITAT IN THE NEW FOREST: A CATCHMENT SCALE APPROACH

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Summary

This paper highlights the value of taking a catchment-scale approach for the planning, design and execution of a floodplain forest restoration. The project is part of a LIFE-3 programme to restore floodplain forest habitat within degraded streams within the New Forest, Hampshire. Central to the planning was the collaboration of land and river management agencies within a catchment management framework. This involved exchange and analysis of a range of catchment scale datasets including Forestry work programmes, geomorphological fluvial audit, and in stream ecology. These datasets were used to identify 1) the nature of the physical impacts to the system, 2) the system-wide scale of floodplain and channel degradation and 3) the specific design options for given reaches and 4) a catchment-wide programme of forest and channel management. Following initial design, a catchment-modelling approach was adopted to establish the impacts of the proposed restoration on downstream flooding. During the initial design phase, ecological constraints to the restoration process were identified in one location. Uncertainty arising from a lack of catchment scale data in this case constrained the options for restoration. The paper concludes by summarising the benefits to this project, of having catchment scale data and coordination.

INSTITUTIONAL DRIVERS AND CONSTRAINTS OF FLOODPLAIN RESTORATION: A COMPARATIVE REVIEW OF PROJECTS AND POLICY CONTEXTS IN ENGLAND, FRANCE AND GERMANY

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Summary

The task of restoring floodplains, as a means of improving flood protection or providing other benefits, poses multi-dimensional challenges to policy-makers and project managers alike. Involving essentially a reconfiguration of the interaction between a river and adjacent low-lying land, floodplain restoration affects a wide range of institutions – or rule systems – designed to secure a variety of private and public goods associated with water and land use. These institutions relate to water protection, nature conservation, flood defence, navigation, recreation, urban and rural development and the protection of historical landscapes, to name but a few of the most significant. The institutions for each of these policy fields comprise a complex arrangement of codified norms (such as laws, regulations and contractual obligations), planning instruments and funding mechanisms, organised and individual actors responsible for, or to, these rule systems as well as standardised procedures of operation, values and accepted practices. A scheme to restore a floodplain requires the successful enrolment of these institutions and organisations in such a way as to create a result acceptable to the principal stakeholders who operate according to spatial remits and time scales which only very rarely match those of a floodplain ecosystem. This is a highly complex process.

I will present the principal findings of recently completed EU-funded research into institutional aspects of floodplain restoration in Germany, France and England and Wales (FLOBAR 2). Following some introductory remarks on the institutional complexity of floodplain restoration I outline the key institutional constraints as identified in national policy analyses and case studies of six restoration schemes. I then explore how recent shifts in problem awareness and problem-solving in a number of relevant policy fields are creating windows of opportunity for more integrated approaches to the complex task, encouraging the emergence of large-scale, multi-purpose schemes of floodplain restoration. Finally, I problematise the relationship between policy development and project management, highlighting some new dimensions to the policy delivery gap emanating from the growing complexity of project management.

THE LEGAL FRAMEWORK FOR CATCHMENT SCALE APPROACHES

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Summary

The concept and process of river restoration and enhancement has brought about important changes in river management. While most of the implementation has so far been mainly at localised sites, the process has generated much useful experience in holistic and integrated management. However to realise the full benefits of the river restoration concept the process needs to be applied at all scales; localised projects need to be coordinated at the sub-catchment scale and in turn sub-catchment projects need to be planned and managed at a catchment scale.

Two current events provide an opportunity to take this forward:

- (a) Changes to the land-use planning and development control regime; i.e. the advent of Regional Spatial Strategies in combination with Local Development Frameworks
- (b) Introduction of River Basin Management Planning with reference to water and land use, under the Water Framework Directive.

The paper will review the current legal framework under which river restoration projects operate and compare it to that under the new emerging legal framework. Enabling and constraining features will be identified. It is concluded that opportunities are there not to be missed.

TOOLING UP FOR THE WATER FRAMEWORK DIRECTIVE – PRESENTATION TO THE RIVER RESTORATION CONFERENCE

Rob Oates (WWF-UK Natural Rivers Programme Coordinator)



Summary

The theme of this conference is river and wetland restoration at the catchment scale. Which is the same goal as the WWF-UK Natural Rivers Programme. This presentation will show the content of that programme and how we will use the results to influence others to achieve sustainable management of water and wetlands at the catchment scale.

One of the key outputs from the programme will be a model river basin management plan. This will be an interactive web or CD based software programme. It will feature a virtual catchment, containing all the water, river and wetland management issues found across the UK. Each issue will have a drop down menu, containing best practice projects, policy documents and advice from around the UK, and further a field if needed.

The model RBMP will be a tool for the real river basin managers of the future to use in developing the plans required by the EC Water Framework Directive. The WWF model will be a 'gold standard' for the real river basin plans to follow. And we will measure their success against it.

Our model plan will be populated in part by the results of the Natural Rivers Programme work in the fields of:

- Policy
- Research
- Demonstration projects

Our policy work involves:

- Influencing the implementation of the Water Framework Directive, to meet WWF criteria for sustainability;
- Helping develop tools to reduce diffuse pollution while maintaining farm incomes;
- Working with partners to produce natural flood management methods that work with nature.

WWF is running a range of demonstration projects across the UK. In England, we are investing £440k in the expansion of the Yorkshire Wildlife Trust reserve at Potteric Carr to create a national demonstration site of how a multi-functional wetland can help achieve the aims of the WFD – for biodiversity, flood management, pollution abatement, recreation and tourism. WWF is also a member of the EA Task Group that is planning and managing the Ribble Pilot Project for the WFD. We are working with stakeholders

there to develop a long-term vision for water management in the Ribble, as a foundation for the prototype Ribble River Basin Management Plan.

In Scotland – We are developing a ‘Flood Planner’ tool for local authorities to use in developing flood management strategies that work with nature rather than against it. We also have a Wise Use of Water project developing materials to inform householders on how to use less water and reduce their input of household chemicals to the water environment. In Northern Ireland – we are developing a conservation strategy for the Ballinderry River, which will be a model of how to manage a river cSAC. Our research work, based in Wales, is mainly in the field of human footprint - particularly the footprint of UK consumers when buying thirsty crops such as cotton.

All these products and others will help populate our model river basin management plan with real tools for the river basin managers of the future. Our model will show them not only what to do, but how to do it in an integrated way to achieve sustainable management of water and wetlands at the catchment scale.

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INTEGRATING LAND AND WATER MANAGEMENT: CATCHMENT-SCALE STRATEGIES FOR RIVER RESTORATION AND PUBLIC PARTICIPATION

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Liz Chalk (Environment Agency)

Stuart Lane (University of Leeds)

Summary

Whilst it is axiomatic to environmentalists and managers that integrated, strategic planning should precede and accompany river basin development, including restoration, many restoration schemes legitimately arise from opportunistic, local action. However, with EU reforms of river management via the WFD and reforms of the rural economy via the CAP (and with EU and UK funds for innovation in ‘best practice’ schemes) it is timely to review the ways forward. A frequently expressed ideal is for the natural systems of the basin to be part of a social learning process by participating local communities; there is, however, little practical experience of, or guidance, for such idealism.

We report on the Upper Wharfedale ‘Best Practice’ Project and the way in which it built strategies on the basis of public participation in an ‘environmental capital’ framework. Information management is vital in creating the right political environment for participation, from the identification of priority actions to the monitoring of implementation. Translating strategies into operations requires a highly pragmatic exploration of the public role in river management. Sustainability ideals also depend on the longevity of such projects and therefore on monitoring to facilitate adaptive management of design failures or unforeseen environmental changes.

A framework for comprehensive river restoration can only be expressed in terms of very general principles; local conditions are frequently a primary determinant of priorities, directions and outcomes. Raising expectations is, however, a potential danger: in Upper Wharfedale the community is now receptive to the idea of an integrated approach to environment and the economy but processes of delivery are hindered by traditional economic pathways and traditional management philosophies.

FROM DARLINGTON TO THE DALES, SKERNE TO SOURCE – WHERE NEXT FOR RIVER RESTORATION?

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Summary

The River Restoration Centre (RRC) owes its origins to an international conference on river conservation held in York in 1990 (Boon *et al.*, 1992), and more precisely to a paper given by Bob Petersen of the Stream and Benthic Ecology Group at the Limnology Institute in Lund. In it he described a “Building Block Model” as an approach to lowland stream restoration measures. Linking agriculture, wetlands and streams, he showed that the current condition of most streams in southern Sweden had been reduced to the status of drainage canals, with minimal self-cleaning capacity and little nature conservation value. What he proposed, and what caught the imagination of a small group of delegates was a structured approach to river restoration based on biological principles. However, his approach was largely theoretical and related to small drainage ditches – could, the delegates wondered, the idea be scaled up and tested in “real life” in the UK – a few drinks later and the River Restoration Project (RRP - the forerunner to RRC) was in the making!

In the UK, the Cole and Skerne river restoration projects did in deed scale the problems up, in an agricultural and urban environment respectively – but only to stretches of 2kms – while maintaining the scientific approach. What neither the Building Block approach nor these new projects did however was to embrace the whole catchment, and neither did they fundamentally attempt to explore or influence the political and stakeholder networks that drive much of wetland and river management. For river restoration to move from demonstration and activity at a local scale to the mainstream agenda, both aspects need to be embraced, and the political and biological issues tackled together on a wider scale.

The EU Water Framework Directive (WFD) provides an opportunity to do exactly this, as indeed does the Haskins review of agricultural and rural policy delivery in England, alongside other initiatives on water policy, flood defence, sustainable urban drainage, planning legislation and biodiversity landscapes. However, reflecting somewhat the vacuum that the original members of RRP identified, when setting up the project, there is still no clear leader to take forward this holistic view of river catchment policy and management. However, there are signs that different stakeholders are indeed now engaging with the issues and raising important questions about restoration of rivers in the context of deviation from reference conditions for the WFD and the role of catchments and floodplain wetlands.

One such project, lead by Northumbrian Water is attempting to evaluate the role of the various stakeholders in catchment management, taking as its starting point Darlington again, and the problem of increasing water colour in the Tees. By going “upstream” and joining forces with others, such as English Nature working on related issues in the dale, the project aims to look at a new approach to the stakeholder networks and to the costs and benefits of restoration. Projects such as this and other work centred on the WFD should, it is suggested be the way forward for river restoration now.

IMPLEMENTING RIVER HABITAT OBJECTIVES

*Jim Walker, Mark Diamond, Marc Naura and Paul Raven
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Summary

- River Habitat Objectives (RHOs) are a series of methods devised by the Environment Agency to set targets for the improvement of the physical morphology of rivers for the benefit of wildlife, landscape and society.
- The RHO draft methodology and a pilot application in the Ribble catchment are now complete (April 2004).
- This presentation will build on the introduction to RHO methods given at the Stockton 2002 RRC conference and the RHO update (poster presentation) given at the Bristol conference 2003.
- RHOs support the Environment Agency's Vision, that "*habitats will improve in their extent and quality to sustainable levels*". To achieve this goal we need to assess the quality of existing habitats and set improvement objectives. RHOs are therefore part of the Agency Corporate Plan to "*publish habitat targets for watercourses by 2003*".
- RHOs will also feed into Agency work to address the needs of the Water Framework Directive, offering methods by which to assess hydromorphology and its role in supporting good ecological status. They will also help to inform the programme of measures that will be put in place to improve the ecological status of waterbodies.
- This presentation will review the national strategy for RHOs, including the division of rivers into morphological reaches, mechanisms for assessing current habitat quality and for setting simple habitat improvement targets. It will briefly examine the application of RHO methods in a pilot catchment and it will consider the future application of the methods.

DEVELOPING A NEW APPROACH TO PROTECTING RIVER HABITATS IN SCOTLAND

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Summary

In Scotland, the only widely applied control of works in or near watercourses is through the land use planning system. The level of control and activities covered varies considerably between local authorities.

The Water Framework Directive (WFD) requires that measures are put in place to protect and enhance morphology. The Water Environment and Water Services (Scotland) Act 2003 transposes the WFD into Scottish Law. Critically, it gives Scottish Ministers powers to produce regulations to control works in or in the vicinity of watercourses. SEPA has been charged with the regulation of this new regime, with implementation due in November 2005.

The Scottish Executive has stated that the level of regulation must be proportionate to environmental risk, and the regulatory burden must be minimised. Therefore, it is intended that there will be a tiered approach to regulation, using the following levels of authorisation:

- Registration – for low risk activities. A simple notification identifying the site, activity, and time of works.
- General Binding Rules (GBR) – for medium risk activities. A set of mandatory standard conditions for a particular activity. GBRs will be agreed by Scottish Ministers. Applicants will be required to register under the relevant GBR.
- Licence – for high risk activities. An authorisation with activity and site specific conditions.

The paper will expand on the new challenges that regulation of this new regime will present to SEPA, concentrating on the following:

- Determination of thresholds between authorisation types
- Site and activity risk assessment
- Assessment of cumulative impacts
- Derogation procedures

PURE NORTH SEA

Edd Clegg (Environment Agency)

Summary

Four major cities around the Northsea (Newcastle, Göteborg, Deventer and Groningen) are working together in an Interreg IIIB-project with the acronym PURE (Planning for rural-Urban River Environments) on the improvement of water catchment areas in their city-borderzones.

The PURE NORTH SEA project wants to explore the possibilities of combining watersystem/river restoration with the integration of the rural and urban areas of the fringe zone in such a way that the fringe zone will be transformed into a high quality and attractive area to live and work in, as well as for recreation. Capital works and pilot projects involving the water system/river restoration are being implemented to demonstrate that, especially in fringe zones, the integration of spatial planning with water management policies can be very rewarding for enhancing ecological, landscape and hydrological qualities and using them for the socio-economic development of the area. Because of this the PURE projects at Groningen, Deventer and Goteborg are strongly oriented to implementation, whereas Newcastle is more oriented to awareness raising/participation and finding practical ways for sustainable development based on water.

In the Netherlands, Groningen and Deventer have developed coherent spatial development visions for their specific situations. They found out that water is an important instrument which can be used as an organising principle to create a high-quality, multifunctional urban fringe zone where several functions can be combined in a sustainable way. They also discovered that water can be used to link the urban and rural areas to each other and that by doing that it is possible to create a cleaner, safer and more sustainable water system that generates different qualities (ecology, landscape) and spatial functions (housing, business areas and recreation).

Linking water management and spatial planning in the project areas gives more space to water.

The PURE exchange programme is directed towards learning this approach of both integrating water management with spatial planning and using water as an organising principle for the use of space and using water to generate spatial qualities (biodiversity; landscape variety) and multifunctionality (housing, business areas, recreational areas). Newcastle and Goteborg will implement pilots of river restoration which focus more on environmental goals and water quality. Another important aspect of the PURE exchange programme is about different practices of public-private partnership and public participation (local entrepreneurship; community engagement etc) in relation to water management and spatial planning.

It is very important to involve the general public and stakeholders in the process in the making of development visions, action plans and during implementation. If this is done in an sophisticated way the plans will meet with agreement and can be implemented faster and more effectively. This is especially prevalent in Newcastle.

The projects

The Groningen project is aimed on restoring the ecological and hydrological relations in the western border of the city. A long term development vision for the area has been developed. On this basis the restoration of the old connections with the brooks from Drenthe is envisaged. Restoration of the brooks must fit into a larger plan for water management for the whole catchment area of the Reitdiep system.

As a first step the Waterstructure plan Westborder will be carried out. This plan brings the brookwater back into the outskirts of the town and contributes to a better water quality and more chances for natural development within the city outskirts.

The next step is developing a land use plan for the urban fringe zone of Groningen.

In Deventer the project concerns the rehabilitation of the river Zandwetering: the design of an integral, multifunctional zone on the boundary between the growing city and the surrounding rural area, with water as the organising principle.

The Zandwetering is now a deep, unattractive ditch with no recreational value. In addition, the relatively high level of agriculture in the source area is affecting the groundwater level and the original variety of species.

The project will try to make considerable improvements from an environmental perspective by getting farmers to operate in a more sustainable way and by indicating a solution for the current sewage overflows. The area as a whole must function as an urban reserve area, with special attention to the recreational needs of the city's large group of ethnic minority residents.

The Osbäcken is a small stream located in the northwestern part of Göteborg, on the island of Hisingen. Within the catchment area there are also two substreams, Madbäcken to the north and Kålsereidsbäcken to the south. At the top end of Osbäcken there is a small wetland, Klare Mosse. The Osbäcken reaches the sea within the marina at Björlanda. Osbäcken and the catchment area has for a long time suffered from high levels of nutrients from the surrounding farmlands, pollution from various facilities and littering. This project aims to develop action plans for the area and to implement measures in order to make the area more sustainable, available and attractive.

Presentations

AT the meeting the local PURE partners will present background information about their projects. Each of them will explain what the problem is they want to cope with, what plans they are to implement and the steps they will take, which results they expect and what they learned in doing so.

RIVER RESTORATION: MEETING THE NEEDS OF BOTH THE EU WATER FRAMEWORK DIRECTIVE AND FLOOD DEFENCE?

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Summary

A major component of river restoration is the recreation of physical habitat heterogeneity and re-establishing the linkage between the in-stream environment and adjacent floodplains. Re-engineering channels to reinstate a more natural form and restoring processes of water and sediment transfer can bring about significant benefits particularly if undertaken within the context of the whole catchment. These include improvements to the ecological quality of rivers and reductions in the severity of flooding downstream. The benefits are achievable because rivers in their natural state are ecosystems that maintain high bio-diversity, floodplains when inundated provide flood attenuation and flooding of low-lying areas creates wetland areas of high conservation value and flood storage. This paper will explore the extent to which catchment-based river restoration (a current RRC initiative) can assist environmental organisations such as the Environment Agency and Scottish Environmental Protection Agency in achieving the WFD target of "good ecological status" for their rivers, whilst also reducing flood risk and providing a more sustainable approach to flood management.

DEVELOPMENT AND APPLICATION OF A FLUVIAL GEOMORPHOLOGICAL AUDIT IN THREE NORTH EAST CATCHMENTS TO AID DECISION MAKING IN RIVER AND FISHERIES MANAGEMENT

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Summary

Babtie Brown and Root were commissioned by the Environment Agency (North East Region) in August 2003 to develop and apply a catchment approach to geomorphological assessment capable of informing the management of salmon rivers. Three rivers in North East England, namely the Rivers Esk, Tees and Wear, were identified in 2003 as failing to meet their salmon spawning targets. These rivers were selected for catchment scale geomorphological study with a view to developing individual Catchment Geomorphological Action Plans.

The overall aim of the project is to build on existing fluvial audit techniques to scope an approach towards a catchment wide method of resolving key geomorphological issues in river systems for salmon fisheries. This is particularly intended to help deliver optimal habitat for salmon through identifying and planning management, protection and enhancement of geomorphological processes. In addition to fisheries, the Environment Agency identified water resources and development control as areas which would benefit from improved geomorphological baseline datasets.

A bespoke fluvial audit has been developed which focuses on point and diffuse sediment sources and sinks and transport mechanisms. Channel and floodplain modifications, land use and ad-hoc fisheries management practices, have also been incorporated into the pro forma. Each watercourse was segmented into geomorphologically homogenous reaches (determined in the field) and surveyed accordingly. The total length of river surveyed within all three catchments was 387km.

The data collected were entered into a customised database and analysed using a GIS. These tools, combined with observation and geomorphological interpretation in the field, assisted in understanding the geomorphological functionality of each of the watercourses and that of the catchment as a whole. Geomorphological Action Plans for each of the three catchments identified i) areas where good quality salmon habitats are evident and should be protected ii) locations where targeted actions could be undertaken and iii) areas where potential management and enhancement opportunities exist. The construction of a decision making flow chart, targeted at fisheries managers, aims to promote management

on a catchment level by considering upstream and downstream impacts (both positive and negative) of future capital works, maintenance and land management practices.

RIVER RESTORATION OPPORTUNITIES & ACHIEVEMENTS IN THE PARRETT CATCHMENT

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Summary

The predominantly rural River Parrett catchment is situated in Somerset in the English West Country and encompasses 1690 square kilometres of very varying topography. Some 13% of the catchment comprises the famous Somerset Levels which feature the UK's most important area of remaining lowland wet grassland. Like most populated areas, agricultural and urban development in the upper catchment has resulted in a progressive increase in sensitivity to rainfall and a resultant worsening of flooding problems downstream. Following successive winters of particularly disruptive flooding in the late 1990s the Parrett Catchment Project (PCP) was set up as a partnership of concerned local institutions with the aim of augmenting the established arrangements for mitigating flooding problems by adopting a catchment-wide multi-organisational approach.

The PCP's aims include the enhancement of natural catchment processes and it is on this aspect of river restoration that the paper focuses.

The Lowland Moors

Over many centuries the lower reaches of the local rivers and the extensive areas of associated lowland have been subject to very significant changes, mainly in the interests of improved agricultural production. The moors have been extensively compartmentalised and flooding managed in such a way that the majority of the area which would have flooded frequently in historic times is now virtually flood-free. By contrast the zones retained for flood storage frequently suffer deep and prolonged inundation, severely inconveniencing many aspects of local life. Much of the lowest land in the catchment has been designated under national and international habitat legislation and this has resulted in an obligation on the relevant authorities to achieve a very significant increase in the area of inundation grassland by 2010.

The paper explores the potential both for reducing disruptive flooding and for meeting habitat obligations by the redistribution of floodwater and the reconnection of rivers with their floodplains, and comments on the practical, institutional and financial barriers to change.

INTEGRATING GEOMORPHOLOGICAL AND RIVER HABITAT SURVEYS (RHS) AT A CATCHMENT SCALE: IDENTIFYING THE RESTORATION POTENTIAL OF GOLDRILL BECK

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River Habitat Survey (RHS) has become an Environment Agency standard for collecting data on the quality of physical river habitats across the UK. The methodology is proven at a variety of scales, ranging from single sites to coverage of whole catchments. A more recent approach in the application of RHS at a catchment scale is to combine it with a Geomorphological survey that records information on sediment erosion and deposition, and use the results to identify potential rehabilitation options. A number of catchment appraisals have been produced as a result, including the Eden, Cumbria and Glaze Brook, Merseyside.

Goldrill is a small upland catchment in the Lake District, in which the predominant pressures are agricultural land use and historical flood defence measures. RHS data was collected along 50% of river length, and Geomorphology data along approximately 100%. The RHS data were analysed by calculating indices for habitat quality and channel modifications. Data from the Geomorphological survey identified areas of natural or enhanced erosion and deposition in the catchment, and explored the impact of land use on the naturalness of fluvial sediment processes. The findings of the two sections were combined to identify possible sites for enhancement or rehabilitation, and to suggest catchment-wide management strategies.

The Goldrill catchment has a rich variety of rare features in terms of wetlands, wood features and waterfalls. Flow and substrate types are varied, providing a wide range of potential habitats, but habitat quality was limited at many sites by the low number of bank features. The highest quality reaches in the catchment are often located in the headwater tributaries, while channel modifications affect many sites in the upland floodplains. Flood embankments and banks reinforced by stone walls and are the most prevalent alterations.

Some level of erosion was recorded at most geomorphological survey sites. The highest erosion rates are due to natural processes and there is no evidence of this causing excessive deposition or over-siltation within the catchment. Poaching, caused largely by grazing livestock, was identified at a number of locations and contributed to erosion at some sites. Deposition is dominated by coarser sediment and is concentrated in the upland valley floors, appropriate in the context of a high-energy river system. Finer sediment is flushed through and deposited within the channel further downstream or in lakes. The catchment as a whole is considered a net producer of sediments.

Possible sites for enhancement works were selected along the main channels of Goldrill and Grisedale Becks, due to the low habitat quality and relatively high modification of these reaches. Catchment management strategies include; improving fencing or providing natural barriers along river banks; removing invasive plant species (recorded at 3 sites); removing urban debris, relaxing some flood defence structures, and protecting important habitat areas.

There is considerable value in the integration of RHS and Geomorphological surveys for obtaining a balanced view of the state of the environment within an area, and in aiding the identification of nagement options for the catchment.

IT'LL ALL COME OUT IN THE WASH

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Summary

The River Great Ouse in eastern England flows across the Fens to The Wash. Allied to the river are the Ouse Washes, a major washland that absorbs excess flow off the land as well as tidal incursion from the sea. The storage function of the Washes primarily serves flood protection needs but has led to the area becoming of international environmental importance with designation as a Ramsar site. Changes in flooding patterns, attributed to increase in catchment rainfall over past decades, have brought deterioration in the environmental quality of the Washes. Since the cause is catchment-wide, solutions on the same scale are sought. This paper presents and discusses whole-river concepts for giving the Washes a brighter future. Ideas encompass extensive reclamation of the floodplain, source control and revised river management practices. Linkage is made to other possible initiatives such as navigation, wider environmental enhancement, and urban flood defence improvement. Comment is given on the important issues of funding, impact on existing communities and political will to make things happen.

THE LONG AND WINDING RIVER? THE DEVELOPMENT AND IMPLEMENTATION OF THE SOUTH LONDON RIVER RESTORATION STRATEGY

Dave Webb (Environment Agency)

Summary

The decision to develop a catchment based strategy for South London was taken in the summer of 2002. The goals were to broaden the range of groups promoting restoration with the effect of increasing the number of schemes and increasing the range of benefits achieved and raising the profile of restoration to key decision makers to ensure that the development control process provided the space to implement such schemes. This would overcome the fragmented nature of restoration and ensure that river restoration was a material consideration within the planning process.

The summer of 2002 was significant in this instance because a good range of completed schemes were available as case studies, and the London Plan which provides a strategic overview for London was being developed.

The primary objectives of the strategy were to illustrate the range of benefits of restoration schemes and establish a shared vision for the rivers in south London. The need for such a strategy emerged from the recognition that no single organisation or group could develop or implement a catchment scale restoration and that river restoration in London could not be promoted without raising the economic and social benefits.

The approach taken in the development of the strategy was that it should be developed as a partnership project. With the objective of broadening participation, and achieving a common consensus it was considered that the process of developing a strategy was as important as the strategy itself.

To establish the partnership the initial objectives were broad, responding to what was considered the need at the time. Keeping a simple objective was helpful in attracting partners and subsequently with the implementation selling the strategy to politicians and groups not usually associated with river restoration. The drawback was that the process was slow.

Once a working group had been established it became apparent that the strategy had to focus on some key objectives and audiences, otherwise it would become too bulky and as a consequence its ability to influence may have been diminished. This was a crucial period within the development of the strategy for by concluding that to influence audiences the document had to be short and snappy, we had to recognise that the document itself could never achieve everything we had hoped for. The consequence of this was that detailed discussions on how the document would be used and what complimentary measures would be necessary to fill the gaps took place.

These discussions on how the document would be used and the audience were essential in the effective promotion of the document. The identification of audience were those who make the decisions and those who have the money. Case studies have subsequently been found to be a powerful tool in encouraging new groups to be involved.

Regarding the mechanics of the development, commissioning a media specialist who could put our thoughts in a jargon free language was very important. Endorsements added credibility to the document and highlighted the partnership approach.

The consequences of the document were that river restoration was included in both the London Plan and the London Biodiversity Strategy. This year we are working with new partners such as the National Health Service, and Sustrans. There will be restoration schemes on the Hogsmill, Wandle and Ravensbourne catchments, attracting money from developers and London Boroughs.

For the immediate future we shall continue with our road shows promoting the document, a rivers and streams habitat action plan will be written and a strategy for north London is in the process of being developed. For the longer term more needs to be done on quantifying the social and economic benefits of such schemes. As for the document itself, elements such as the case studies will endure, but ultimately the strategy is the product of its time and its impact will diminish. There may come a time where we will need to reproduce the strategy. If that time comes the strategy must be a different animal and as a consequence we will be able to draw little from the original but broad principles that remain:

- Work in partnership.
- Adopt the language of those you are trying to influence.
- Do not be afraid to speak to broaden the audience.
- Have a simple message to sell and know who you are selling it to.
- A strategy is a means to an end not an end in itself know what you are going to do with it and its limitations before releasing.
- Don't be afraid to kill the baby.

SUSTAINABLE RIVER BASIN MANAGEMENT - A RIVERS TRUST IN ACTION

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Summary

The Westcountry Rivers Trust is a registered Charitable Trust established in 1995 and its objectives are: to secure the preservation, protection, enhancement and improvement of watercourses in the Westcountry and to advance the education of the public in water management.

To achieve its objectives the trust operates at several levels ranging from academic research and education, to practical fisheries, river and land management advice. On a practical level, the Trust works wherever possible on a catchment scale to deliver advice to farmers and riparian owners looking to implement management change to improve profitability, diversify and hence restore ecosystem function. Some of the work of the Rivers Trust is executed in response to requests from individual landowners or more often in response to concerns voiced by communities or agencies.

The Westcountry Rivers Trust has to date designed and undertaken three major European funded million pound-plus, catchment-scale projects. The aim of these projects is to engage and empower landowners to tackle diffuse pollution and improve bio-diversity on a catchment scale whilst sustaining farming incomes and community development. The solution is to find win-win solutions to problems with equitably distributed costs and benefits.

The Rivers Trust has both developed and adopted a number of tools to assist this process, a keystone being the adoption of the Ecosystem Approach, as a tool assisting in the delivery of the Convention on Biological Diversity (CBD). The Trust has also accepted that a logical scale on which to work is the river basin or catchment, as at this level ecosystem function and land use may be most appropriately addressed. This approach involves the Trust's project officers proactively engaging landowners within each sub-catchment to achieve the scale of change or critical mass necessary to address the issues. The Trust's approach is proving successful because many of the diffuse pollution and flow related problems affecting Westcountry rivers are as a result of unsustainable or wasteful agricultural practices. The work and advisory principles of the Trust are best exemplified by case studies, which will be discussed during the presentation.

MAPPING AND DEVELOPING A STRATEGIC PLAN FOR THE BLOCKING OF GULLIES FOR RESTORATION OF PEAT HYDROLOGY WITHIN THE DARK PEAK SSSI (HIGH PEAK ESTATE, THE NATIONAL TRUST)

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Summary

The National Trust owns 5000 hectares of the Dark Peak SSSI (cSAC). The area includes Kinder Scout and Bleaklow and the catchment area of Howden, Derwent and Ladybower reservoirs. Historical and contemporary land use practices have resulted in a serious and widespread degradation of the blanket peats. This has taken the form of large areas of wind and water eroded peats (Bleaklow and Kinder Scout) and deeply incised gullies in the remaining lower elevation peats landscapes. The oxidation of the peat has resulted in serious coloration of the runoff water, which has affected the recreation and drinking water quality of the reservoirs. This is in addition to the large volumes of peat and mineral sediments that are currently infilling the reservoirs.

In order to stabilize the peat, to reduce erosion rates and restore the hydrology of the peat mass, a range of experiments have been undertaken by various organizations. In 2000 the National Trust, with English Nature funding started a program to physically block the worst gullies within the estate. In order to develop an operational plan and focus resources onto the critical areas and critical gullies we have developed a series of new techniques using remote sensing information.

The presentation will summarize the development and use of LiDAR (light detection and ranging) information, currently used for floodplain mapping, in upland environments. We have deployed this information in order to classify the morphology and dynamics of the peat surface within the estate and then apply new topographically derived flow and network propagation models to map the drainage network of the landscape. From this information and the ability to classify the depth and drainage information of the gullies we have been able to identify the critical gullies within the estate, select appropriate gully blocking techniques and then develop operational working plans that assist in the air-drop of materials to key locations.

Within the High Peak Estate this process has identified approximately 250 km of critical gullies within areas locally to intact peat masses or peat landscapes that are currently in

favourable status. These gullies range from 0.2-1.95m deep and in order to block them it will require 25 000 gully blocks. As of March 2004, a total of 2500 gully blocks have been installed.

The National Trust is committed to restoring the peat mass of the Dark Peak SSSI, and the development of these techniques is focusing resources onto critical areas. The benefits for this upland habitat will be considerable as well as for the quality of water within the Derwent Reservoir complex. We believe this is the largest example of catchment manipulation currently being undertaken in the UK.

FLUVIAL GEOMORPHOLOGY FOR ADAPTIVE RIVER CATCHMENT MANAGEMENT AND TARGETED RESTORATION

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Summary

The importance of fluvial geomorphology as the physical understanding that underpins all the functions of a river catchment has been increasingly recognised within river management. Crucially, the application of fluvial geomorphology to describe processes within a river catchment can illustrate the physical complexity and variability of the system and create some order out of apparent chaos. Such information is central to the sustainable management of rivers.

Fluvial geomorphology has been applied to a number of projects and attempts to define consistent methodologies continue to be developed. However, it remains the case that fluvial geomorphology is not part of the operational side of the UK river regulator the Environment Agency and so any outside expertise provided is mainly by academic fluvial geomorphology is used in decision making by “non-geomorphologists”. In order to maximise the benefit of catchment investigations and audits a general approach to the organisation and use of data have been developed together with empirical models that are catchment specific but may be applied as a general approach to other catchments.

These models can inform management decisions and allow targeting and prioritising of channel maintenance and restoration and monitoring. These are not a “set of tools” but rather a system for further development, for learning and adaptive management and that aim to shape rivers that are more resilient to change.

RIVER WYRE GRAVEL ENHANCEMENT PROJECTS

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Summary

A decline in the salmon and sea trout population of the Lancashire River Wyre has been partly attributed to the loss of spawning areas and acidification of the upland tributaries. A major cause for the loss of gravel is Abbeystead reservoir. The reservoir retains gravel generated in the headwaters causing the loss of spawning riffles downstream of the reservoir. From redd distribution it is possible to plot the loss of spawning riffles below the reservoir. To mitigate for the loss of spawning riffles four gravel additions have been undertaken on the Wyre catchment, two on the main river and two on tributaries. The first method gravel addition on the R. Wyre was to remove the original bed material and then seed a bed of 25 to 50mm gravel obtained from a quarry on the Wyre catchment. The first major flood washed the bed away. A more successful method was seeding riverbed material removed for flood alleviation, from spawning areas downstream of the reservoir. The river bed material was seeded on to erosion scars and the material included fines to cobbles, with a major component of gravel. Downstream of the seeding site a spawning riffle formed and was used by salmonids. Gravel was seeded in two tributaries in constructed channels. There was some spawning in the first seasons but the design of the channels caused major erosion problems.

To counter the acidification of a major sea trout spawning tributary limestone gravel was seeded on erosion scars. Gripping of the moor around this catchment caused increased acid runoff and the loss of spawning gravel. Sea trout spawned in riffles formed by the added gravel. The beck was surveyed by electrofishing and for pH before and after the gravel addition. In the year after gravel addition 1km of beck downstream of the gravel addition site produced an extra 3000 trout fry. Further limestone gravel additions have been successful at upstream sites. These sites were more acid stressed and had no fry survival before gravel addition.

THE CREATION OF FLOODPLAIN FOREST IN MILTON KEYNES

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Summary

Historical forest clearances, agriculture, increased silting on floodplains and river channel 'improvements' have virtually eliminated inundation woodlands from Britain's floodplains. The characteristically rich wildlife associated with them has declined as a result. Continued attempts to confine and control rivers are now seen as not working and not sustainable. Recent flood events and the extensive degradation of our rivers have lead society to take a new look at river and floodplain management, so restoration is now a very significant issue. Although restoration cannot return rivers to a pre-disturbance state, their structure and function can be partially restored, enhancing their structural and functional attributes and creating new habitats to mitigate for past damage and degradation. Most river restoration schemes however, do not reach out into the floodplain, they are usually constrained in a narrow corridor and only simulate small elements of the former floodplain environment. This is where the Milton Keynes Parks Trust's project is different, proposing the development of a topographically diverse habitat mosaic - 'floodplain forest' on a large area of the Great Ouse floodplain in the north of the city.

Milton Keynes Parks Trust manages 1800ha of parkland, predominantly along river valley floodplains, including a 50ha site alongside the river Gt. Ouse. This site provides ideal conditions for the creation of a variety of floodplain habitats. A feasibility study has shown that removal of the alluvial gravel underlying this site can fund and achieve re-modelling of the floodplain surface to form a multiple channel, topographically diverse system, upon which elements of the wet woodland, fen, reedbed, wet grassland, marsh, carr, river shingles, earth cliffs, sand bars, debris dams, seasonal and permanent pools that are characteristic of natural floodplains may be developed, to create a new Floodplain Forest Park.

Following creation of the new landform by restoration of the gravel workings, the woodland element will be developed as a patchwork of mixed tree stands, varied to suit the different soils and hydrology across the site. On the higher ground with infrequent winter flooding the dominant trees will be ash, oak and field maple, with some aspen and a small component of small-leaved lime. In the damper areas subject to more frequent flooding the planting will still be predominantly ash and oak with some maple, but will include small numbers of alder and downy birch, with scattered white willow, crack willow and black poplar. Winter wet/summer dry woodland containing a greater proportion of wet ground species will be established at a lower level – with some ash, but

more alder, and more white willow and crack willow, with scattered grey poplar, black poplar and downy birch, and a very few almond willow. On the frequently flooded, permanently wet ground a wet woodland will be planted, dominated by native black poplars, with white, crack, almond and osier willows and sallow. Hazel, hawthorn, and blackthorn will be present in the shrub layers. In this woodland matrix there will be new stream channels, reedbeds, meadows, fen etc and the entire site will be subject to a changed hydrological regime facilitated by lowering the floodplain to restore its connection with the river and deliver the essential dynamics of the fluvial geomorphic and biological processes that drive the cycle of succession and reversion that maintains habitat diversity.

The value of the gravel deposits is sufficient to fund the exercise and long-term management. A planning application, in partnership with Hanson Quarry Products (Europe) has just been approved. The project will show that extraction of alluvial sands and gravels and subsequent site restoration can be used positively to rectify the damage and re-create some of the former natural features and functions of floodplains, restoring their former richness and diversity. It is suggested that Local Authorities should develop a strategic approach to mineral planning policy which guides the use of the process of extraction of alluvial sands and gravels to put right the past mistakes made on floodplains, using society's need for minerals as a mechanism to deliver floodplain restoration at a catchment scale.