



# **A Review of Catchment Scale River Restoration Projects in the UK**

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# **Review of Catchment Scale River Restoration Projects in the UK.**

## **Abstract**

Over the last few years there has been a growing realisation that there is a need to develop a coherent integrated catchment scale approach to managing the UK's rivers and floodplains. This has become the focus of attention for a variety of reasons not least because of an increased concern about flood risk and the requirements of a range of UK and EU policy including the Water Framework Directive (WFD).

It is the view of the River Restoration Centre (RRC) that in this context Catchment Scale River Restoration can play its part in both improving the ecological status of the UK's rivers and assist in providing solutions for sustainable flood alleviation issues in areas where properties are at risk.

Catchment Scale River Restoration, for the purpose of this review, does not mean complete restoration to a pre-determined state. Instead it is viewed as a framework that takes account of all the main processes and restraints that operate at that scale. This can then be used to assess the potential for improvement and identify areas in need of restoration on a catchment or sub-catchment basis even though, through this process, it may be found that enhancement is only necessary within some reaches. Whilst it is acknowledged that some tools, policy, and plans are already in place that will go a long way to achieving this objective, it is believed that at present no one project has defined Catchment Scale River Restoration as its primary driver and subsequently delivered results in the form of an on-the-ground demonstration catchment.

Following a detailed search of literature, websites, and the River Restoration Centre's database 35 projects were identified as being catchment based in the UK. 12 of these projects met the criteria laid down in this review as potentially providing a framework for Catchment Scale River Restoration. This assessment has shown that no truly integrated Catchment Scale River Restoration project exists. Nevertheless a number of approaches, tools and methodologies are being developed at this scale which could be very valuable for creating an integrated practical solution to achieving Catchment Scale River Restoration.

Because of resource restraints this review does not provide a comprehensive assessment of projects that have been completed outside of the UK. Neither has the time been afforded to develop such a framework all an outline for this is suggested. It is therefore recommended that the next step towards developing a truly integrated framework for Catchment Scale River Restoration is twofold namely: to extend the literature review to projects outside the UK; and compile a detailed database of tools, policy and plans currently available with explanations of under what circumstances they would be most appropriately used.

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# Chapter 1: Introduction

## 1.1 Background

The primary purpose of this review is to assess whether or not there are examples of river restoration projects that take account of catchment-wide issues. The general view of the River Restoration Centre (RRC) prior to the completion of this review was that no one project in the UK covered all aspects required to provide a comprehensive approach to managing river restoration in the context of catchment issues and processes. This review therefore concentrates on highlighting projects that specifically integrate river restoration within them and does not intend to reiterate the contents of other catchment project reviews.

It is recognised, based on the RRC's project's database and knowledge of the current status of river restoration that most projects have been reach-scale and completed for a variety of reasons ranging from, for example, fisheries interests to improving aesthetic value. Furthermore, a brief analysis of worldwide literature indicates that the UK may be trailing behind parts of Europe, North America and Australia in terms of embracing river restoration within the context of wider catchment issues and demonstrating these practices on-the-ground (Water and Rivers Commission 2002 [Australia], Siuslaw Basin River Restoration Project 2004 [US]). It is in light of this evidence that the Environment Agency and English Nature have acknowledged the need to explore the present status of river restoration projects in the UK, where a Catchment Scale River Restoration project is defined as in section 2.1 of this review. It was believed that through this review processes it would be shown that no one project currently exists that encompasses all the elements necessary for a fully integrated catchment scale approach to river restoration. Nevertheless, it is predicted that, at the very least, tools that have already been identified which will help to build an integrated Catchment Scale River Restoration framework.

Recently there has been a surge of interest in sustainable catchment scale management. This is evident from the catchment/sub-catchment scale projects reviewed in detail in this report, where all but one were undertaken between 1996 and the present day. This interest has been driven, to some extent, by the high profile of the EU Water Framework Directive (WFD), which provides a sound basis for improving the UK's and other member states watercourse stating that there is a need to protect, enhance and restore all bodies of surface water with the aim of achieving good ecological status (Chave 2001). Twelve River Basins Districts have been adopted within the UK (of which one covers most of Scotland and one the majority of Northern Ireland). Furthermore, DEFRA/Environment Agency is jointly setting up Catchment Flood Management Plans (CFMP). These are aimed specifically at promoting sustainable flood management across a catchment which outline measures that should mitigate against flashy run-off, soil erosion and diffuse pollution, as well as addressing flood risk issues. Recently English Nature identified that these CFMPs should encourage innovative and visionary policies and practices which both achieve sustainable flood defence outcomes and incorporate the goals set out in the UK biodiversity Action Plan 1994 which promote the enhancement and creation of habitats for protected species. Whilst there is now a requirement for consultancies charged with completing these plans to consult with the RRC, thus acknowledging the importance of completed restoration schemes within a catchment context, this is neither their main purpose nor function.

The above shows that policy is now in place that has begun to recognise the importance of understanding catchment scale processes, nevertheless there are still hurdles that need to be overcome in order to achieve sustainable river enhancement.

The RRC now believes that there is an urgent need to promote integrated best practice river restoration from source to mouth that takes account of both flooding issues and biodiversity improvements. Exemplifying the ‘on-the-ground’ benefits of adopting a catchment-wide approach to river restoration as opposed to just concentrating on opportunistic improvements to isolated river reaches is now highly relevant.

Such a pragmatic way forward would help to provide a framework for recognising the importance of catchment scale processes and encourage river managers to view river concerns in this context. However, in order to achieve integrated best practice river restoration it is vital that adequate guidance is provided based on lessons learnt from pilot Catchment Scale River Restoration projects.

## **1.2 Aims and objectives**

The main aim of this review is to investigate if there are any Catchment Scale River Restoration projects in the UK (as defined in section 2.1 of this report).

The objectives are as follows:

- Review all large scale river projects and identify those which are catchment scale and include an element of river restoration within its scope;
- Determine if any one project already exists which specifically relates river restoration projects to wider catchment scale implications and processes;
- If no such project exists identify what lessons have been learnt and which tools currently being developed could aid the construction of a best practice framework for Catchment Scale River Restoration.

## **1.3 Structure of Report**

Following this Introduction, Chapter 2 provides an overview of what is defined as Catchment Scale River Restoration for the purposes of this review. Chapter 3 then provides a synopsis of all projects identified as being catchment scale and that include an aspect of river restoration whilst Chapter 4 explores what these reviewed projects aim to achieve and discusses where Catchment Scale River Restoration is currently, based on the information collected. Chapter 5 contains the main conclusions and recommendations from the review.

## Chapter 2: Catchment Scale River Restoration – definitions and frameworks

The purpose of this chapter is to explain the rationale behind the concept of Catchment Scale River Restoration and briefly show how existing and future policy could help influence such an approach. It also describes the review criteria used to identify Catchment Scale River Restoration projects and outlines the policies which are driving the need to take on board the Catchment Scale River Restoration philosophy.

### **2.1 Definition of Catchment Scale River Restoration**

There are a range of policy documents from DEFRA and the Environment Agency that acknowledge the importance of incorporating sustainable management in the management of the UK's water bodies. ( DEFRA 2002; 2004; Environment Agency, DEFRA and National Assembly for Wales 2002).

However, definitions that consider how to restore degraded rivers to more naturally functioning, ecologically improved systems vary considerably. Consequently, practitioners often grapple with the precise meaning of the term river restoration as exemplified by the two definitions below.

Stockwell (2000), for example, states that 'restoration of a degraded stream involves returning it to its previously undisturbed condition by reconstructing the structure and function of the pre-disturbance ecosystem'. Yet, if this definition was applied at a catchment scale then it would imply that the whole river system would need to be restored to this pre-disturbed state, which, for most rivers is impractical due to anthropogenic pressures. In contrast, Brookes (1999) defines river restoration as 'a catch all term for river management activities including restoration, rehabilitation, enhancement and/or creation' which provides a more pragmatic definition.

For the practitioner the aim of river restoration should be to achieve a more natural sustainable river habitat rich status which takes account of post- and current-human intervention. In the UK restoring rivers to a pre-disturbed state is rarely (if ever) possible. Nevertheless, enhancement works completed to date in damaged river corridors, have begun to highlight the achievable benefits of integrated river management (e.g. Harper et al 1998; Gore et al 1998; Lehane et al 2002; Hendry et al 2003; Pretty et al 2003). Schemes judged as successful, even at the reach scale, are generally those that appreciate that whilst improving the ecological status may be the primary objective, other issues such as agricultural practices, urban drainage and public perception for example, must be addressed.

For the purposes of this review, therefore, RRC has described Catchment Scale River Restoration as:

*“River- and floodplain-focused enhancement that considers catchment scale hydrological, ecological, morphological processes and associated land management pressures.*

By adopting this approach for all river restoration projects it can provide a valuable way forward for evaluating the appropriate suite of techniques and models to be used for a range of issues/drivers and thus help to identify a priority list of areas for enhancement within a catchment context.

## **2.2 Policy Framework**

It is important to stress that any river enhancement framework should be compatible with current policy. The following very brief overview is included here only to exemplify how existing European and UK directives can provide an excellent vehicle for encouraging river restoration projects which takes accounts of catchment scale processes.

### **2.2.1 European Policy Overview**

The EU WFD will establish a new integrated approach to the protection, improvement and sustainable use of Europe's rivers, lakes, estuaries, coastal waters and groundwater (Environment Agency Website 2004). The Directive is the most significant piece of water legislation to be released in 20 years.

In summary the major aims of the Directive are to:

- Prevent further deterioration, protect and enhance the status of aquatic ecosystems and associated wetlands;
- Promote sustainable water use based on a long-term protection of available water resources;
- Implement specific measures for the progressive reduction of discharges, emissions and losses of priority substances and the cessation or phasing-out of discharges, emissions and losses of the priority hazardous substances;
- Ensure the progressive reduction of pollution of groundwater and prevent further pollution; and
- Contribute to mitigating the effects of floods and droughts.

In order to deliver these aims the WFD states that the best management model is to consider riverine issues via river basins (i.e. the natural geographical and hydrological unit), instead of according to administrative or political boundaries. To this end it recommends that each river basin 'district' must have a 'river basin management plan' that will need to be updated every six years. It is envisaged that these plans will provide the context for co-ordination between all relevant organisations interested in improving the status of water bodies within the context of each river basin. Over the past few years formulating these plans has become one of the main drivers for the increased interest in sustainable catchment scale projects which can only help to highlight the need for Catchment Scale River Restoration.

Ecological protection is an essential element of the WFD. The directive is pushing for all water bodies within catchments to have 'good ecological' status by 2015 (as defined in Annex V of the WFD) in terms of biological community quality and chemical characteristics. Without the inclusion of river restoration techniques being considered it is questionable how feasible this will be; a fact already recognised by the Scotland and Northern Ireland Forum for Environmental Research (SNIFFER).



This theme is also an important element of the European Habitats Directive which has set-up a number of 'Natura 2000' sites across Europe, as Special Areas of Conservation (SACs). These sites have to be maintained or restored to bring them in line with what the Directive calls 'Favourable Conservation Status'<sup>1</sup>. A good proportion of these sites include riparian and associated riverine habitats and hence appropriate restoration measures and management is required to fulfil the habitat directive criteria.

### 2.2.2 UK Policy Overview

With around 5 million people at risk of flooding in England and Wales, and 170,000 in Scotland (DEFRA Website 2004) DEFRA and the Environment Agency have adopted a strategy for sustainable catchment scale flood defence and this has provided the impetus for the CFMP's. These aim to provide 'integrated, technically, environmentally and economically sound and sustainable flood risk management strategies' at catchment level for the next 50 years (Environment Agency, DEFRA and National Assembly for Wales 2002). The relationship between the CFMP's and the WFD, however, has not yet been firmly established. It is envisaged that CFMP's will run in parallel with the WFD (Environment Agency, DEFRA and National Assembly for Wales 2002) Also it is uncertain how the CFMP's will impact on river restoration. The plans will identify areas where habitat restoration is required but it is unclear if this is for floodplain habitat, watercourse habitat or both.

In 2001 Catchment Abstraction Management Strategies (CAMS) were launched by the Environment Agency, following a Government review of the system used to issue licenses for water abstraction in the UK, but again it is uncertain how CAMS will be integrated with the WFD (ENDS Website 2004). The main aims of CAMS are:

- To make information on water resources and licensing practice available to the public;
- To provide a consistent approach to local water resources management recognising the reasonable needs of water users and the environment;
- To provide the opportunity for greater public involvement in managing the water resources of a catchment.

(Environment Agency Website 2004)

The above shows that whilst both European and UK policies emphasize the importance of considering water-body issues within the context of a catchment scale and acknowledge the need for both ecological improvement through river restoration, the extent to which these opportunities have been seized in the context of river restoration remains unclear.

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<sup>1</sup> The Habitat Directive defines Conservation Status as 'the sum of influences acting on the habitat or its typical species that may affect its natural long term distribution, structure or functions as well as the long term survival of its typical species within the territory referred'. A habitat is favourable when 'its natural range and areas it covers within that range are stable or increasing; the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and the conservation status of its typical species is favourable' (European Community 1992).



## **Chapter 3. Catchment Scale River Restoration Project Synopsis**

This chapter firstly outlines the approach taken in identifying Catchment Scale River Restoration projects. Overviews for each project identified as being catchment scale and involving river restoration works are then provided. The summaries include information concerning the aim of the specific project, a description of the activities and deliverables, concluding with a précis of how the project contributes to Catchment Scale River Restoration.

### **3.1 Approach Taken**

In accordance with the reports terms of reference provided by the Environment Agency and English Nature the review comprises two phases. Firstly, information has been collated from a range of reports, papers and articles held with the RRC and after discussion with the main statutory UK Agencies, together with a detailed internet literature search and telephone interviews with appropriate project officers. Secondly, all collated reports were then assessed to determine if the project was catchment scale, sub-catchment or reach based and if they involved river restoration. All projects reviewed are listed in (Appendix 1).

### **3.2 Selection Criteria**

There is a large body of projects many of which have already been reviewed in the past that take account of specific aspects of catchment scale issues. Furthermore, it is recognised that there is a vast body of literature which outlines a range of ‘tools’ which, although not directly related to river restoration issues may help to identify sites for restoration. Such tools include amongst others the River Habitat Survey Data, Fluvial Audits and the Integrated River Basin Management Project GIS tool (Environment Agency 1997). This review, however, concentrates specifically on UK based projects that focus on river management and importantly include an element of river restoration.

In all 35 large scale projects where reviewed (as shown in Appendix 1) which is believed to be a fair reflection of all the current catchment scale projects in the UK which incorporate an element of river restoration. However, it is recognised that a lack of available detailed information has meant that an assessment has not been possible of some projects at this stage (e.g. the Cycleau, Floodscape, and Wensun Valley projects and the Sankey NOW initiative). Furthermore, some of these 35 Projects were catchment management plans. Such plans, including catchment management, catchment flood management, river basin plans and environment agency fisheries action plans for example, have not been selected for further discussion within this review because their primary objectives do not embrace river restoration as a main feature within the context of the plans.

From these 35 potential projects the following selection criteria was used to help to identify those project that most closely demonstrate Catchment Scale River Restoration principles.

1. Projects were first selected on the basis of scale with a unit of either catchment/sub-catchment being necessary for inclusion. Projects, for example, that considered solely restoration techniques for a specific restoration purpose were not included within this review.
2. Having established those to be included on the basis of scale, each project was then assessed for its river restoration content and divided into categories depending of whether the main emphasis was:
  - a) Practical work;
  - b) Strategic planning;
  - c) Research; or
  - d) A combination of the above.

Practical work on-the-ground (already completed or is intended to be completed within the scope of the project) was an important aspect in the selection process. However, in some cases, where the main objective was to create a tool aimed explicitly as helping to create a way forward for Catchment Scale River Restoration were in included in the second part of the selection process.

### ***3.3 Identified Projects***

This section describes projects selected on the above criteria. From the 35 projects initially reviewed 12 were selected as catchment/sub-catchment scale projects and including an element of river restoration. Table 1 summarizes the projects that are described in this section of the review.

Table 1: List of UK Catchment Scale River Restoration Projects.<sup>2</sup>

No.	Project Title	Scale	Launched	Primary Driver	Type of project	Project Summary
3.2.1	Cornwall Rivers Project	Catchment	2002-2005	Fisheries	Practical	Improve the economic potential of Cornwall's freshwater fisheries resource.
3.2.2	Cree Valley Catchment Project	Sub-catchment	1999	Sustainable Land Management	Practical	Demonstrating how to minimise the impact of commercial forestry on water quality and aquatic biodiversity.
3.2.3	Mersey Basin Campaign	Catchment	1985	Urban economic rejuvenation	Practical/ Strategic	Addressing the problem of water quality and associated landward dereliction on a river catchment.
3.2.4	Parrett Catchment Project	Catchment	2000	Flooding	Strategic	A sustainable approach to water and land use management in a catchment.
3.2.5	RAAVI	Catchment	2001	Biodiversity	Practical	Restore the River Avon cSAC, whilst enhancing floodplain ecology and improving public access.
3.2.6	SMURF	Sub-catchment	2003-2005	Water Framework Directive	Research	Water management and land-use planning in the urban environment
3.2.7	Sustainable Wetland Restoration in the New Forest.	Sub-catchment	2002-2005	Biodiversity	Practical	Influencing hydrology to enhance floodplain habitat.
3.2.8	Tamar 2000 Project	Catchment	1996-1999	Diffuse Pollution	Practical	Improve the River Tamar and its tributaries by working with farmers, landowners and the wider communities
3.2.9	Upper Wharfedale Project	Sub-catchment	1998-2002	Sustainable Land Management	Practical	Techniques of good land and water management
3.2.10	URBEM	Catchment	2002-2005	Water Framework Directive	Research	Framework to facilitate urban watercourse rehabilitation
3.2.11	Wise use of Floodplains: Cherwell Catchment	Sub-catchment	1999-2002	Hydrology	Research	Defining historic hydrology of a catchment, prior to engineering.
3.2.12	Ythan Project	Catchment	2001-2005	Sustainable Land Management	Practical	Innovative community participation approach

<sup>2</sup> Note: Some of these 35 Projects listed in annex 1 were catchment management plans. Such plans, including catchment management, catchment flood management and river basin have not been selected for further discussion within this review because their primary objectives do not embrace river restoration as a main feature within the context of the plans.

### 3.2.1 Cornwall River Project

**Project Partners:** West Country Rivers Trust, Environment Agency, The Wetland Ecosystems Research Group (WERG) University of London, BDB Associates, South West Water.

**Website:** [www.cornwallriversproject.org.uk/](http://www.cornwallriversproject.org.uk/)

**Date:** 2002-2004

**Aim:** To improve the economic potential of Cornwall's freshwater fisheries resource, the development of which relies on a pristine riverine environment.

#### **Description of project**

Cornwall Rivers Project demonstrates a practical methodology for implementing land and water resource protection through the mobilisation of local stakeholder involvement and awareness. The project targets 10 river catchments in the Cornwall area. The Project features the integrated application of proven best land use practice and water resource management delivered on a catchment community scale through the direct active participation of stakeholders. The Project also provides the practical means to protect, rehabilitate and restore the catchments of key rivers. These catchments have suffered environmental degradation as a result of unsustainable land use practices in recent decades.

#### **Deliverables**

*Catchment Planning:* Assessment of the 10 river catchments in their entirety to identify key problem areas, the nature and scale of the impacts emanating from these areas and the most effective methods of dealing with these impacts. The aim is to trace impacts to a sub-catchment (tributaries) or individual stream level, thereby optimising available resources to deliver maximum benefit.

*Engage with Landowners/River Managers:* Through free field visits the project staff will demonstrate economic savings to farmers through changes in land practice, which are beneficial to the river system. This will include provision of 'best practice' guidance notes and development of farm plans. The provision of this guidance is aimed at protecting 200km of river bank, reduce diffuse pollution and encourage simple river enhancement techniques to be adopted i.e. gravel washing, stock fencing, coppicing.

#### **Catchment Scale River Restoration Implications**

The project demonstrates that by using economic incentives Catchment Scale River Restoration and management can be accomplished. This approach has been successful as the Cornwall River Project has been adopted from the Tamar 2000 project (see 3.2.8). Even though the main aim of the project is to improve land management of the catchment to reduce diffuse pollution it does encourage simple and effective river restoration. The techniques are taken up by the landowners in order to improve their fisheries. The project demonstrates how to gain support and develop proactive management on a catchment scale.

### 3.2.2 Cree Valley Catchment

**Project Partners:** Cree Valley Community Woodland Trust, Dumfries and Galloway Council, Forest Authority, Forestry Commission Scotland, RSPB, the Fresh Field Foundation, SNH, SEPA, Galloway Fisheries Trust, European Community.

**Website:** [www.creevalley.com](http://www.creevalley.com)

**Date:** Launched in 1999

**Aim:** To demonstrate how to minimise the negative impact of commercial forestry on water quality and aquatic biodiversity.

#### **Description of project**

The project started as a LIFE Environment Project in 1999. The project was designed to investigate methods and demonstrate techniques to minimise the negative impact commercial forestry has on water quality and aquatic biodiversity. The catchment chosen to implement the project was the Cree Valley which is within the Galloway Forest District of Forest Enterprises.

The projects objectives were:

- Sustainably prevent negative effects of forestry through catchment planning;
- Identify sensitive and damaged biotopes needing, respectively, protection and restoration; and
- Promote best management practice for forestry near surface water.

The project produced a wide range of products for dissemination to a range of audiences. The project also had a significant effect on the development of strategic plans in the Cree Catchment area. Most importantly some of the practices demonstrated in the project had a significant beneficial effect on water quality.

#### **Deliverables**

*Demonstration sites:* Sites where set up throughout the catchment to illustrate to other foresters how the techniques used by the project can significantly improve the riparian environment.

*Improving Water Quality:* The waterways in the Cree Valley and similar areas are valuable resources for game fishing, and the acidification caused by forestry can kill these fish populations as well as affecting other economic activities downstream from the forests. Some of the practices demonstrated by this project had a significant beneficial effect on water quality and therefore are of significant economic benefit to the local community.

*Strategic influence:* The project has had a significant effect on the development of strategic plans in the Cree Catchment Area and may also have a bearing on the implementation of the Water Framework Directive, in the UK in particular.

### **Catchment Scale River Restoration Implications**

The project demonstrates how to manage woodland for the benefit of riparian interests. The techniques it uses can be transferred to almost any catchment with commercial forestry. This is the only catchment scale project which investigates the problems and solutions of having a commercial forestry working alongside an ecologically rich river.

### 3.2.3 Mersey Basin Campaign

**Project Partners:** The Mersey Basin Campaign is a government backed partnership which brings together local authorities, businesses, voluntary organisations and government agencies. The key partners are: United Utilities, the Environment Agency and the Northwest Development Agency (NWDA).

**Website:** [www.merseybasin.org.uk/](http://www.merseybasin.org.uk/)

**Date:** Launched in 1985

**Aim:** To address the problem of water quality and associated landward dereliction of the river Mersey and its tributaries (it has since been expanded to include the River Ribble in Lancaster).

#### **Description of project**

The Mersey Basin Campaign was established in 1985 and was one of a series of initiatives launched to kick start the regeneration of the Northwest. At the time, the River Mersey was labelled “an affront to the standards a civilised society should demand of its environment.” Today, the Mersey and its tributaries are cleaner than at any time since the end of the industrial revolution. The Campaign is backed by the government and has a 25 year initial life span. It has been expanded to include the River Ribble in Lancashire. The Campaign was founded on the principle of working in partnership with both the public and private sectors. It has been a pioneer in proving how effective this way of working can be.

The challenge of cleaning the water in the Mersey basin is very complex and there is no single organisation that can do it all. The Campaign’s success has been to bring together many diverse organisations in the public and private sectors to work together towards a common goal.

The projects objectives are:

*Improved water quality:* To improve the quality of water so that all rivers, streams and canals in the River Mersey catchment are clean enough to support fish by 2010.

*Waterside regeneration:* To encourage high quality, sustainable waterside regeneration for businesses, housing, tourism, heritage, recreation and wildlife.

*Public participation:* To actively involve the public in the Campaign’s work so that people appreciate and value the rivers, waterways and coasts of the Northwest.

#### **Deliverables**

*Water Quality:* The rivers water quality has improved dramatically, with salmon returning to the river for the first time in 150 years. However the Northwest still lags behind other regions in terms of river quality so further work is required.

*River Valley Initiatives:* A network of sub-catchment initiatives aimed at engaging communities in individual sub-catchments throughout the project area. These initiatives include river restoration where necessary.



### **Catchment Scale River Restoration Implications**

The Mersey Basin Campaign provides an excellent model of how to develop an effective partnership between government agencies, the commercial sector and community within the catchment. Also it demonstrates how to organise and run a long-term catchment based project. This is demonstrated by the River Valley Initiatives that are created for each sub-catchment. These projects are used to tackle issues that are unique to the different sub-catchments and allow greater engagement with the communities within the project area. This project also demonstrates the benefits of long-term projects, in terms of achieving ambitious goals and producing strong partnerships.

### 3.2.4 Parrett Catchment Project

**Project Partners:** Somerset County Council, RSPB, NFU, Taunton Deane Borough Council, South Somerset District Council, Sedgemoor District Council, Somerset Drainage Boards Consortium, English Nature, Environment Agency.

**Website:** [www.parrettcatchment.info/](http://www.parrettcatchment.info/)

**Date:** Launched in 2000

**Aim:** The long-term goal is to develop a sustainable approach to water and land use management that benefits the economic, social and cultural life of the Parrett catchment and conserves and enhances the environment.

#### **Description of project**

The Parrett Catchment is the largest river system in Somerset, South East England. Much of the flat catchment receives higher than average rainfall which often exceeds the capacity of the river channels in the lower reaches. This leads to frequent flooding of the low lying land. The summer floods of 1997 and 2000 demonstrated that the system was under serve stress and identified that the system was unlikely to cope with predicted future major events. This led to the Parrett Catchment project being launched.

The partnership aims to manage flood risk and water management in a more sustainable way through partnership and consensus. The project has the following objectives:

- Developing an integrated flood management plan for the Parrett Catchment.
- Providing a sustainable approach to flood management.
- Promoting measures to modify land use across the catchment.

To implement the objectives the project has a 50 year action strategy, providing a long term vision for the catchment. This is the first time that the concept of integrated catchment management has been incorporated within an action plan.

#### **Deliverables**

The main deliverable is the 50 year action strategy which focuses on 12 main areas of interest. Of these 4 relate to either sustainable flood alleviation measures or habitat improvements along the riparian corridor. These are as follows:

- Creating temporary flood storage areas on farmland
- Controlling runoff from development
- Creating new wetland habitats
- Spreading flood waters across Moors

#### **Catchment Scale River Restoration Implications**

Whilst this project acknowledges the need for habitat enhancement within the riverine corridor and within the strategy has identified areas where this might be feasible, it is not its main aim. In terms of a strategic review that values highly the needs of the community and the NGOs which have a direct interest in this catchment, there are lessons that can learnt. Furthermore, the project has recognises the importance of producing a strategy which a longer-term vision; in this case 50 years into the future.

### 3.2.5 The River Avon/Avon Valley Initiative

**Project Partners:** English Nature, Environment Agency, Wiltshire Wildlife Trust, Hampshire and Isle of Wight Wildlife Trust, Wessex Water.

**Website:** N/A

**Date:** Initiated in 2003; has not been officially launched.

**Aim:** To restore the River Avon cSAC to favourable condition, whilst enhancing floodplain ecology and improving public access and awareness of the river.

#### **Description of project**

The River Avon and Avon Valley Initiative (RAAVI) is an ambitious partnership project encompassing the entire River Avon system and its associated tributaries, from its source in Wiltshire to its mouth at Christchurch in Hampshire. The project takes forward priority actions outlined in a number of documents including Biodiversity Action Plans (BAPs), the Rebuilding Biodiversity initiative and a European funded LIFE project through which a Conservation Strategy for the River Avon was completed in March 2003.

At present the initiative is seeking grants from two major funding streams the European Commissions LIFE-Nature stream and Heritage Lottery fund (HLF). The LIFE and HLF funding streams have different aims; actions missing in one of these bids may well be covered by the other stream

#### **Deliverables**

The LIFE project will deliver:

*Strategic river restoration site selection:* A site selection methodology was developed for the project which looked at the cSAC in its entirety to identify the most degraded sites that required restoration. The methodology involved using a combination of River Habitat Survey data, geomorphological data and local knowledge from fishing clubs and the Environment Agency to initially draw-up a short list of degraded sites, followed by an expert panel to priorities these sites.

*River restoration:* The project aims to restore 6 sites on the River Avon cSAC. These sites have different problems which will require a suite of techniques to be used, many of which are novel. These techniques will be demonstrated to the local fishing clubs as well as to the UK and European river restoration community.

*Invasive plant eradication:* A catchment scale invasive plant strategy will be developed for the River Avon. This will be one of the first such strategies to be developed in the UK. Alongside the strategy an invasive plant eradication demonstration area will be set-up to demonstrate the appropriate eradication techniques.

The HLF project will deliver:

*Conservation management:* The project will deliver a set of conservation management programmes that expand on the specific focus of the LIFE project. In this regard the programmes will focus on Biodiversity Action Plan priority habitats and species associated with the river and its immediate floodplain. These programmes will also be located primarily on public land as a requirement of the HLF.

*Public access:* The project will seek to enhance general public access to the river on both private and public land. Access programmes will go further than simply physical access to sites but will seek to engage the public through media, webcams, the internet and other non-physical access options.

*Audience development:* The project will aim to expand the audiences engaged with the river both in terms of sectors (school children, village residents, business etc.) and spatially along the system (for example-access in every parish). Wherever possible this component of the project will recruit volunteers and engage them in training programmes related to the biodiversity of the river.

### **Catchment Scale River Restoration Implications**

The project is developing a methodology for selecting river restoration sites in a catchment context. This process takes a holistic view of the catchment and uses geomorphology, River Habitat Survey, local knowledge (from Fishing clubs and Environment Agency) to prioritise sites. This process could be adapted for many other catchments throughout the UK. The river restoration methods to be carried out on the Avon are aimed at demonstrating a range of techniques applicable to UK chalk streams. The ultimate objective of these restoration sites is to provide the river restoration community with new innovative techniques and novel combinations of established techniques.

### 3.2.6 Sustainable Management of Urban Rivers and Floodplains (SMURF).

**Project Partners:** Environment Agency, University of Birmingham, Staatliches Umweltamt Herten, Severn Trent Water, Kings College London, HR Wallingford, Birmingham City Council, European Community.

**Website:** [www.smurf-project.info/](http://www.smurf-project.info/)

**Date:** 2003-2005

**Aim:** To address water management and land-use planning in the urban environment and in the context of the objectives of the WFD.

#### **Description of project**

The SMURF project aims to develop and implement a demonstration methodology for urban water management that will address water quantity and quality issues in order to improve amenity, ecology and sustainability of the river environment. The upper River Tame catchment in the West Midlands in the UK will be used as a demonstration catchment for the project. This area of the catchment is heavily urbanised, incorporating much of the West Midlands conurbation that includes Birmingham. The river in this section is in a poor ecological state, and is of limited value for the local community. The SMURF project will improve the ecological condition of the river, involve the local community, develop a detailed land-use planning tool and demonstrate how small changes can significantly improve heavily modified watercourses.

#### **Deliverables**

##### *Integrated catchment management and land-use planning tool*

The key deliverable of the project is the development of an integrated catchment management and land-use planning tool. The tool will be developed in a GIS (Geographical Information System) format. This tool will provide information on the full range of water management and land-use planning issues, therefore improving on existing catchment software that is generally aimed towards just one issue. The project will demonstrate how to bring organisations and other key stakeholders together to share data, information and techniques in order to develop an integrated management tool

##### *Transferable environmental indicators for urban river assessment*

At present there is no indicator system designed for urban rivers. Consequently urban rivers are almost always classified as 'bad' by the current indicators. The project will deliver a set of transferable environmental indicators for urban river assessment. The indicators will allow the classification of stretches according to materials, physical habitat and vegetation classification. The proposed system will be based on the River Habitat System (RHS).

##### *Citizen consultation and stakeholder involvement*

The project is being used as an opportunity to trial the practicality of the Environment Agency's emerging plans and policies for the WFD. This includes an extensive citizen consultation to define the local requirements/objective for the future management of the river system and demonstrate the approach used.

### **Catchment Scale River Restoration Implications**

The project, although restricted to urban catchments, will provide new approaches to catchment management. The project does not propose carrying out large scale river restoration, but the tools it will be used as a strategic method for identifying and selecting potential river restoration sites. The primary aim of this tool is to enable land use planners, water managers and policy makers to target resources at the most appropriate areas of the floodplain/river to achieve maximum benefit.

### 3.2.7 Sustainable Wetland Restoration in the New Forest.

**Project Partners:** English Nature, Environment Agency, Forestry Commission, Hampshire County Council, National Trust, RSPB, European Community

**Website:** [www.newforestlife.org.uk/](http://www.newforestlife.org.uk/)

**Date:** 2003 - 2006

**Aim:** To increase the understanding of how to manage the New Forests cSAC hydrology and how to achieve long term effective restoration of the priority habitats which are Riverine Forests, Bog Woodlands, Mires and wet grassland.

#### **Description of project**

The New Forest is located in the South of England, and is designated as cSAC, SPA, SSSI and a RAMSAR site. This project follows on from the 1997-2000 LIFE-Nature project entitled 'Securing Natura 2000 Objectives in the New Forest'. This first project addressed issues associated with the lack of cohesive management programmes in the cSAC. From this it was highlighted that there was a need to better understand and manage the hydrology of the cSAC. This project is addressing these issues.

The project will restore bog woodland, riverine woodland, mires and wet grassland within three of the six main water basins of the New Forest cSAC: Lymington River, Avon Water and Hampshire Avon. These basins contain the greatest proportions of riverine woodland and bog woodland within the cSAC. The greatest threat to these habitats is a lack of a holistic approach to the hydrological networks that support their existence.

#### **Deliverables**

*Habitat restoration:* The project aims at restoring 261 hectares of riverine woodland, 18 hectares of bog woodland, 184 hectares of mires and 141 hectares of wet grassland. The project will also seek to create further suitable conditions for the regeneration of a significant further area of riverine woodland and bog woodland. At the reach scale some river restoration has already been implemented which draws on an understanding of the catchment hydrology and ecology needs.

*Integrated water basin management:* The project aims to establish a mechanism to facilitate and inform an integrated management of the New Forest cSAC water basin.

*Local community participation:* To ensure that the conservation objectives of the priority habitat is supported by the public and cross sections of the local stakeholders.

#### **Catchment Scale River Restoration Implications**

Improving the habitat for specific species is a key objective of this project. However, this runs alongside assessing the catchment hydrology which has wider implications in terms of understanding catchment watercourse dynamics when floodplain and river restoration measures are included.



### 3.2.8 Tamar 2000 Support Project

**Project Partners:** West County River Trust

**Website:** [www.wrt.org.uk](http://www.wrt.org.uk)

**Date:** 1996

**Aim:** Improve the River Tamar and its tributaries by working with farmers, landowners and the wider communities.

#### **Description of project**

The project was based in the River Tamar Catchment in the West Country. The project worked with around 350 farmers to reduce and control diffuse pollution through development of management plans and river restoration. The main philosophy behind the project is to link economic benefits with environmental improvements. This practical approach of the project linking economic benefit to environmental improvements and tackling the cause of environmental decline encouraged farmers to join the scheme. The project allowed the farmers to improve farm capital while benefiting the riparian ecosystem.

#### **Deliverables**

*Farm plans:* Some 250 farmers carried out river habitat and farm profitability improvements through integrated farm and river management plans produced by the projects advisors. This covered around 20,000ha.

*River Survey:* The project surveyed over 200km of main river plus a further 230kms of tributaries.

*River Enhancement:* Over 30km of river bank fencing erected, 79 spawning gravel sites de-silted, and 10kms of river corridor woodland coppiced.

#### **Catchment Scale River Restoration Implications**

The project provides an approach to river restoration that encourages landowners and farmers to become involved in the process and take ownership of the river system through the use of financial incentives and an appreciation of catchment scale pollution issues.

The project has been a great success and now similar projects are being implemented in other catchments including, for example, the Cornwall River Project (see section 3.2.1).

### 3.2.9 Upper Wharfedale Best Practice Project

**Project Partners:** National Trust, English Nature, Yorkshire Dales, Yorkshire Water, University of Newcastle on Tyne, Forestry Commission, DEFRA, Tilhill Economic Forestry, Yorkshire Dales Millennium Trust, National Lottery, European Community.

**Website:** N/A

**Date:** 1998-2002

**Aim:** Demonstrate the principles, techniques and benefits of an integrated way of achieving good land and water management.

#### **Description of project**

The project used the upper catchment of the River Wharfe, located in North Yorkshire (100km<sup>2</sup>), as a demonstration site. The work carried out was based on an ecological approach; protecting habitats and water quality in the catchment, whilst encouraging a move towards more sustainable hill farming, and taking account of social and economic considerations. The project undertook a number of activities, ranging from river restoration work to stock management.

#### **Deliverables**

*Moorland Grip Blocking:* An estimated 42km of grips where blocked during the project. Three techniques were used; straw bales, heather bales and peat dams. The majority of the dams performed well prior to the publication of the report.

*Gill Habitat Regeneration:* The work mainly involved fencing and tree planting to create new native woodland in the gill sites. The planting followed the natural features of the land.

*Hedging:* Hedges were in poor condition, and the restoration project aimed at creating hedges where animals could lie up and obtain protection.

*River Restoration:* the project completed work on a three river restoration schemes. Firstly the project set back a flood bank to create a wetland area. 'Soft' bank engineering was undertaken at several sites to reduce bank erosion. A gravel trap was created to reduce erosion at another site. The river restoration works were undertaken to rehabilitate the river from previous river engineering.

*Stock control methods:* A number of measures were taken to encourage more suitable hill farming. These included the construction and refurbishment of sheep dips, installation of sheep showers, provision of a stock watering facility, erection of river side fencing and effective tree management. These measures ensured a reduction in bank side erosion and an increase in water quality with a reduction in organophosphates diffusing into the river from the sheep dips.

#### **Catchment Scale River Restoration Implications**

This project demonstrates that a catchment scale project needs to have a holistic view of the catchment. The Upper Wharfedale project carried out river restoration works and also restored the hydrology of the moorland, and put in place measures to reduce livestock damage. Without the floodplain works the river restoration would not have been as effective because

sediment loads from erosion by livestock and the moorland erosion would have degraded a lot of the river restoration further downstream.

### 3.2.10 Urban River Basin Enhancement Methods (URBEM).

**Project Partners:** HR Wallingford, New Economics Foundation, Technical University of Dresden, Institut für Ökologische Raumentwicklung Dresden, University of Newcastle - Upon-Tyne - Centre for Land Use and Water Resources Research, Newcastle City Council, Portuguese National Civil Engineering Laboratory, Instituto Superior Técnico - Centro De Sistemas Urbanos e Regionais, Cemagref, Centre for Urban Waters UK, University of Ljubljana - Faculty of Civil and Geodetic Engineering Department for Water Management, Hydrology and Hydraulic Engineering, University of Agricultural Sciences Vienna, European Commission.

**Website:** [www.urbem.net/](http://www.urbem.net/)

**Date:** 2002-2005

**Aim:** To provide a comprehensive framework to facilitate urban watercourse rehabilitation that takes into account the regional variations in modification and use of watercourses across Europe.

#### **Description of project**

The URBEM project will investigate the current state of urban river enhancement as well as the development of new tools, innovative techniques and improved procedures to enhance watercourses in urban areas. The tools will provide planning assistance for the differing, multi-functional uses of urban water courses and their adjacent communities across Europe. The project will provide those involved in urban river rehabilitation the best and most innovative practice with which to develop a comprehensive rehabilitation scheme that will achieve the “maximum ecological potential” requirements of the WFD.

#### **Deliverables**

*New tools to assess the potential for enhancement and rehabilitation of urban watercourses.*  
URBEM will provide a method for assessing the potential of urban rivers for rehabilitation. This tool will integrate physical, chemical, biological, aesthetic, social and economic factors. This integrated approach is aimed at improving the planning and development decision making process.

*Innovative urban watercourse rehabilitation techniques of use on future schemes.*

URBEM will investigate new materials and techniques for incorporation into urban river systems in order to enhance the visual and ecological value. The Project will also investigate methods to incorporate features within schemes to improve water quality, flow regimes, public safety and public access.

*Decision support procedures.*

URBEM will supply planners and environmental authorities with a tool which could be used to justify, prioritise and plan urban river rehabilitation schemes in the future.

*Increase in application of ecological concepts for urban watercourse rehabilitation.*

New methods for assessing the ecological status of watercourses will be applied and tested on a selection of the project’s urban watercourse study sites.

### **Catchment Scale River Restoration Implications**

The Project will provide river managers with a comprehensive ‘tool kit’ aimed at aiding decision making in urban catchments. It should also provide a new suite of techniques for urban river restoration and new methods for assessing the ecological status of urban rivers. The tools produced by the project will significantly contribute to the field of urban river restoration which has specific issues associated with it. It should also enable river restoration to be increasingly integrated into the urban planning process.

### 3.2.11 Wise Use of Floodplains: Cherwell Catchment Restoration

**Project Partners:** Agence de l'Eau, Birdwatch Ireland, Centre for Ecology and Hydrology, English Nature, Environment and Heritage Service, Environment Agency, Institution Interdepartementale pour Terrotoire et de l'Environnement, Conseil Regionale de Poitou Garonne, River Agency, RSPB, SEPA, SNIFFER, Thames Water, WWF.

**Website:** [www.floodplains.org](http://www.floodplains.org)

**Date:** 1999-2002

**Aim:** To demonstrate how reconnecting floodplain wetlands with river channels can contribute to the sustainable management of the water resources within the river catchment.

#### **Description of project**

The Cherwell Catchment is a sub-catchment of the River Thames. The catchment is 906 km<sup>2</sup> and is predominantly rural. The River Cherwell, like many rivers in the UK has been significantly modified to enhance drainage of the floodplain in the 1820s. The floodplain is isolated from the river by embankments and is drained by pumps and gravity systems.

The project was tasked with modelling the hydrology of the Cherwell Catchment to seek to simulate the hydrological responses of different restoration scenarios. Identifying the conditions at a pre-engineered state was a necessary starting point for this modelling exercise.

#### **Deliverables**

*Planform and cross sections of pre-engineered watercourse:* This was a very complex task as there was a lack of data on the channel dimensions prior to the engineering works in the 1820s. A number of geomorphological techniques were used to provide guidance for the restoration design.

*Likely values and ranges of channel and floodplain roughness:* These values were determined from palaeobotanical evidence supported by field reconnaissance.

#### **Catchment Scale River Restoration Implications**

The project demonstrates approaches to assessing the historical hydrology of a catchment prior to engineering works. The project provides catchment managers with methodologies and techniques to derive pre-engineering watercourse cross sections and roughness values. This will allow future Catchment Scale River Restoration projects to be informed about the historical characteristics of the river, and therefore help provide some templates about what river restoration in a particular catchment is aiming to achieve.

### 3.2.12 The Ythan Project

**Project Partners:** Aberdeenshire Council, Forest Enterprise, Formartine Partnership, Macaulay Land use Research Institute, the River restoration Centre, Scottish Environment Protection Agency, Scottish Natural Heritage, Ythan District Fishing Board.

**Website:** [www.ythan.org.uk/](http://www.ythan.org.uk/)

**Date:** 2001-2005

**Aim:** To involve local people in protecting, restoring and enhancing the river Ythan.

#### **Description of project**

The project was undertaken in the River Ythan Catchment situated in Aberdeenshire, East Scotland. The catchment was the first large scale Nitrate Vulnerable Zone in Scotland and suffers from several river degradation issues. The project involved local people in decisions and actions designed to limit the environmental deterioration of the catchment. The project was designed to evaluate the hypothesis that bringing local people together to find common a solution to specific issues, would culminate in better targeting and integrating of actions. The idea of encouraging the local community to share ownership and development of the project is an innovative approach.

#### **Deliverables**

*Local community participation conceptual model:* The model aims to describe the way in which local communities and national agencies can work together on land management issues in river catchments.

*River restoration partnership work:* This has brought together anglers, walkers, local residents and national agencies to select and manage restoration work on key sections of the river which are currently degraded. The restoration works although limited to small areas within the catchment have aimed to enhance the ecological status of the river and its habitat.

*Agricultural benefits:* Working with farmers and land managers to increase application of agri-environment schemes. This element of the project aims to combine ecological and business benefits for farmers/land managers.

#### **Catchment Scale River Restoration Implications**

This project has demonstrated techniques that can be used to empower the community to enhance the river, and become aware of the need for a catchment approach to river restoration.



## Chapter 4. Assessment of interest, tools and strategies

Whilst this review of large scale river restoration projects in the UK has identified 12 projects which fulfil the selection criteria of being catchment or sub-catchment in approach and contain elements of river restoration principles it did not identify any projects that addressed all the aspects necessary for a fully integrated Catchment Scale River Restoration project as defined in section 2.1. Nevertheless some techniques and approaches which could be used in the development of a Catchment Scale River Restoration project were identified.

### 4.1 Focus of project interest

The projects between them provide a good indication of the wide range of areas which need to be considered for a fully integrated catchment restoration project (as shown in Table 2). Together they cover the main 'focal areas' that should inform such an integrated approach yet, none include all these elements. The discussion below outlines the main areas covered by each project and whilst it is recognised that some projects touch on other areas but these aspects are not seen as the main driver of the project).

#### 4.1.1 Biodiversity

Five projects mainly concentrated on biodiversity. However, different approaches were taken. In the case of the RAAVI and The New Forest Projects key sites within the catchments have been targeted with the aim of providing environmental improvement throughout the river network. In contrast the Cornwall Rivers Project, Tamar 2000 and the Ythan Project all have concentrated on delivering biodiversity enhancement through engagement with landowners and thereby encouraging simple restoration techniques to be adopted primarily via economic incentives. Whilst both approaches are valid in terms of enhancing the environment, neither exhibit a truly integrated approach where restoration of the catchment is strategically developed.

#### 4.1.2 Water quality

In some parts of the UK water quality continues to be a key concern whether it be as a result of issues such as fine sediment being deposited within the river system from unsustainable farming practices, acidification from local forestry or urbanisation. Within the projects reviewed five included water quality issues whilst also evaluating the value of river restoration options. In the cases of the community driven Tamar, Cornwall and Ythan Projects the aim was to provide practical solutions to help improve the water quality, through discussion, to encourage changes in land management practices (especially buffer zones and fencing watercourses). In the case of the Cree Valley, woodland management was the key concern, and whilst not directly addressing in-channel river restoration there are certainly some important concepts to consider here in terms with linking land management to river restoration to improve water quality. Overall, the above were targeting landuse change in the catchment and potentially provide useful models of how to achieve this (see section 4.2). The Mersey Basin Campaign has, however, also tackled the issue of water quality. It too targets landuse but much of the catchment is heavily urbanised and hence brings with it a whole range of issues not necessarily addressed within the other projects outlined here.

### **4.1.3 Sustainable land management**

Sustainable land management is one of the primary objectives of the Upper Wharfedale and Cree Valley Catchment Projects. The Upper Wharfedale project and Cree Valley catchment projects both concentrated on sub-catchments with the emphasis on hill farming techniques to enhance moorlands and reduce the negative impacts of commercial forestry respectively. Both were set-up as demonstration projects to provide examples of innovative techniques. The Erne Catchment Project needed to address the complexities associated with cross-border issues and thus focused on developing a framework geared to achieving Sustainable land management through public engagement in the decision making.

### **4.1.4 Urban regeneration**

There are three projects primarily driven by urban regeneration. The Mersey Basin, SMURF and URBEM projects, together combine a mixture of research, practical works and strategy. In the case of the Mersey Basin Campaign it could be argued that it is the most developed urban project but even so, river restoration is only a small part of the initiative and primarily the domain of the River Valley Initiatives which form part of this overarching project. Nevertheless, this project has emphasised, through practical support and solutions, the importance of catchment scale projects taking account of the various facets required to achieve sustainable catchment management.

The URBEM project is poised to deliver technical products that will assist in decision making in an urban catchment for selecting, restoring and appraising river restoration. As such it is envisaged that when complete it will provide a valuable structure for implementing the WFD in urban areas. The SMURF project complements the URBEM project with the delivery of decision making tools including transferable environmental indicators for urban river assessment (see section 4.2)

### **4.1.5 Flood risk management**

The Parrett project was born out of the recognition that the catchment is prone to flashy flood events and hence there was a need to provide a long term sustainable approach to flood management. This involves looking at the issues in the upper catchment to address the flood risk concerns of urban areas downstream. One of the key strategies is to develop a coherent approach to land management which is more sympathetic to the hydrological nature of the catchment.

### **4.1.6 Hydrological/geomorphological processes**

Two projects have focused on these processes namely the Cherwell and the New Forest Rivers projects. Both recognised the need to reconnect the floodplain to the river system. In the case of the Cherwell project a methodology has been developed to assess the historic hydrology of the site to demonstrate what river restoration should be aiming to recreate under an 'ideal' scenario. This may not be feasible in all locations (as was borne out though the results of this project). Nevertheless, the implications for looking at this aspect of hydrology

in the light of the requirements of the WFD should not be overlooked. The New Forest project in contrast, has already completed some reach scale river restoration and is now researching the impacts of this on the catchment hydrology and is aiming to establish the effect of wet woodland in the upper part of the catchment.

#### **4.1.6 Raising awareness**

With the implementation of the WFD drawing nearer, public participation and awareness is becoming higher on the agenda when considering how best to tackle the issues of individual catchments. This issue has been tackled within some of the projects and key lessons are certain to be learnt specifically from the Ythan, the Mersey Basin Campaign and the SMURF projects.

#### **4.1.7 Summary**

The above projects provide positive steps forward towards a fully integrated Catchment Scale River Restoration project. However, it is interesting to note that the two disciplines least focused upon in the context of these projects are flood risk management and hydrology/geomorphology (see Table 2). The possible reasons for this are discussed in section 4.3 of this report but first, it is necessary to evaluate the tools that have been developed within these projects.

## ***4.2 Tools, Strategies, and work-on-the-ground***

The projects reviewed between them do, potentially provide a series of tools and catchment-wide strategies which should help to develop an integrated Catchment Scale River Restoration framework. Table 3 provides a summary of the tools and approaches taken.

### **4.2.1 Demonstration sites ( work on-the-ground)**

Most of the projects have taken the view that practical demonstration sites of river restoration techniques should be incorporated into the project. Examples of these which have already been completed include 'soft' engineering work carried out in the Upper Wharfedale project and the reinstatement of old river channels in the New Forest LIFE project. Similarly, the Cornwall Rivers, Tamar 2000, Cree Valley and the Ythan projects have all embarked on small scale restoration works under the banner of a catchment scale project, whilst the Parrot catchment project has re-connected sections of its floodplain, reduced the height of the banks in a few places and is intending to plant wet woodland to demonstrate its value as a sustainable solutions to off-set flood risk issues. Each of these 'on-the-ground' restoration works relate to specific drivers (as shown in Table 2) and hence have not necessarily included the best restoration technique for all aspects of the catchment.

The SMURF project has not yet completed any work on-the-ground but is intending to complete some small scale projects, but here again the sites chosen have not considered within the context of the catchment as a whole but rather on an opportunistic basis. In contrast, one of the aims of the RAAVI project is to demonstrate that reaches chosen for restoration have been identified on a strategic catchment value basis.

#### 4.2.2 Tools

A number of tools have been developed within these projects. Some computer decision tools have been developed to assist catchment scale managers. These include site selection tools for urban and rural rivers (URBEM, RAAVI) and a GIS land-use planning package within the SMURF project aimed at developing a way forward for assessing the impact of future redevelopment in the floodplain.

Public participation approaches, where engagement with key stakeholders is a key element have been developed to a high level especially within the Ythan and SMURF projects. The Cornwall River and the Tamar 2000 projects have also viewed audience participation as an important concept and developed tools with the function of influencing farmers and through on-the-ground strategies encouraged more sustainable agricultural practices aimed at improving the state of the watercourses.

Only one project has developed a way forward for evaluating how changing the hydrology of a watercourse through restoring it to a pre-engineered state might affect flood peaks, and whilst the outcome of the Cherwell catchment project suggested that full catchment restoration would not be advisable within that particular catchment because of the changes which have occurred since parts have been engineered, nevertheless it shows the potential of such a model in helping to inform where and when within the a catchment context, it is most appropriate to carry out restoration projects at a range of scales.

#### 4.2.3 Strategies

Some of the projects included in this review have focused on developing strategies rather than specific tools. These recognise that in order to manage catchments effectively a long-term time span is required to effectively manage catchments. Each has merit in its own right yet none on their own directly focuses on river restoration as the way forward. In the case of the Parrett Catchment for example a 50 year forward planning approach fits well with the recommendations for the current CFPMs but as with most strategies they are unable to deliver little more than a vision statement due to limited funding stands.

Table 2: Table of primary focus of projects

Project	Biodiversity	Water Quality	Sustainable Land Management	Urban Regeneration	Flood Risk Management	Hydrology / Geomorphology	Raising Awareness
Cornwall Rivers Project	Y	Y	Y				
Cree Valley Catchment Project		Y	Y				
Mersey Basin Campaign		Y		Y			Y
Parrett Catchment Project					Y		
RAAVI	Y						Y
SMURF				Y			Y
Sustainable Wetland Restoration in the New Forest.	Y					Y	
Tamar 2000 Project	Y	Y					
Upper Wharfedale Project			Y				
URBEM				Y			
Wise use of Floodplains: Cherwell Catchment						Y	
Ythan Project	Y	Y					Y
<b>Total number of projects addressing each concept as a primary focus</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>4</b>

Table 3 Tools and Strategies

Project	Tool	Strategy	Scientific Research	Work on ground	Primary Driver for on-the-ground demonstration sites
Cornwall Rivers Project	Farm Plans Catchment Plans			Y	Improve water quality (and fisheries habitat)
Cree Valley Catchment Project		Minimising Forestry Impacts		Y	Improve water quality
Mersey Basin Campaign		Action Groups		Y	Improve biodiversity and aesthetic quality
Parrett Catchment Project		50 year strategy		Y	Alleviate flood risk
RAAVI				Y (long-term objective)	Improve biodiversity
SMURF	GIS land use planning tool Environmental Indicators Citizen Consultation Package			Y (long-term objective) (limited)	Improve biodiversity and aesthetic quality (Limited)
Sustainable Wetland Restoration in the New Forest.		Water basin management plan Geomorphology of floodplain forests		Y	Improve biodiversity
Tamar 2000 Project	Farm Plans			Y	Improve water quality (and fisheries habitat)
Upper Wharfedale Project			Y	Y	Improving land management
URBEM	Potential river rehabilitation assessment tool GIS based decision support tool		Y	N	
Wise use of Floodplains: Cherwell Catchment	Hydrological modelling of pre-engineered watercourse		Y	N	
Ythan Project	Local Community Participation model			Y (Limited)	Fish passage and biodiversity

### **4.3 Discussion**

The aim of this review was to establish if a project already exists, that incorporates an integrated framework for restoring rivers by assessing holistic catchment processes and evaluating the constraints imposed by human activity. This has been shown not to be the case. Where on-the-ground enhancement measures have been carried out as part of a catchment project, the results for the most part, have been piecemeal, reach based, improvements designed for a particular purpose (e.g. to improve the local habitat for a specific species, or ease fish passage). Whilst this review does not dispute the merits of such initiatives, the potential for achieving much better results for all communities (both human and ecologically based) must lie in considering, where possible, the benefit of river improvements to the catchment as a whole.

A number of 'tools' (for the purpose of this discussion this term includes models, techniques and strategies) have now been developed. There is little doubt that these would assist in the development of a Catchment Scale River Restoration framework. As identified here, some of these have been developed as part of specific projects' aims and objectives, yet others have initially been devised for other purposes (e.g. evaluating the ecological value, or assessing the geomorphological status of specific reaches at a particular point in time (RHS and Fluvial Audits) and the IRBMP which incorporates a GIS system aimed at identifying potential restoration sites. In addition, the value of existing directives as discussed in section 2.3 of this review, UK catchment flood management plans and the work of the Scottish and Northern Ireland appraisal groups must not be overlooked as providing a good starting point for evaluating the most appropriate actions for improving the UK's watercourses.

What is missing though, in terms of Catchment Scale River Restoration, is a clear way forward that enables river restoration to be completed in a more systematic way such that a range objectives are addressed and where opportunities and constraints can be identified early so that potential difficulties can be tackled at the outset, thus enabling a priority list of enhancement measures be drawn up that, together, benefit the catchment as a whole.

At present enhancement options still tend to be reach driven in the context of a specific requirement rather than evaluating the implications of these projects in the wider catchment context. Discussion with some of the project managers of the catchment scale projects discussed within this review back up this evaluation especially in the cases where even relatively small amounts of on-the-ground river enhancements have been included. The Ythan project, for example identified the difficulties that are likely to be encountered when bringing together the range of stakeholders involved in a river catchment (Morris *submitted 2005*). Similar difficulties have been encountered as part of the SMURF project, which has found that local constraints have prevented the implementation of best practice demonstration sites even though there is high degree of enthusiasm from community groups.

Over the last 10 years the value of river enhancement/restoration has become high on the agenda as there is a growing requirement to improve the watercourses of the UK for a range of target species. This enthusiasm has, at times, resulted in the implementation of local initiatives, sometimes instigated by well intentioned but inexperienced individuals (e.g. small-scale lowering of the banks to reconnect the river to the floodplain or installing gravel riffles in a reach without considering the wider implications of completing such works). In some cases these enhancement measures maybe fully justified, but the precise benefit for the



catchment as whole or, indeed sub-catchment, is at present very sketchy. Most of the projects reviewed here do not have significant monitoring strategies and equally there was little discussion about how the projects might be assessed both for pre- or post-project appraisal. With the imminent implementation of the WFD now would seem an appropriate time to include a strong recommendation that pre- and post- project appraisal is should be completed within a catchment scale restoration framework

Within the constraints of this review it is not feasible to propose a detailed catchment scale restoration framework; indeed this would require further research of projects outside the UK such as those completed on the Skerjn in Denmark and those presently being completed along the Rhine (see for example Middelkoop and van Haselen 1999; National Forest and Nature Agency 1999) where it is known that examples of projects that focus on River Restoration as the main driver have been more definitively addressed. If is recognised however, that local legislation will very different to that within the UK and hence a direct transfer of these frameworks is unlikely to be an appropriate way forward although lessons can still be learnt.

In addition to completing a wider scope of literature, there would need to be to a commitment to evaluating the tools already developed within other projects in more detail. Only then can their appropriateness for a range of catchment types, locations, and sizes be defined.

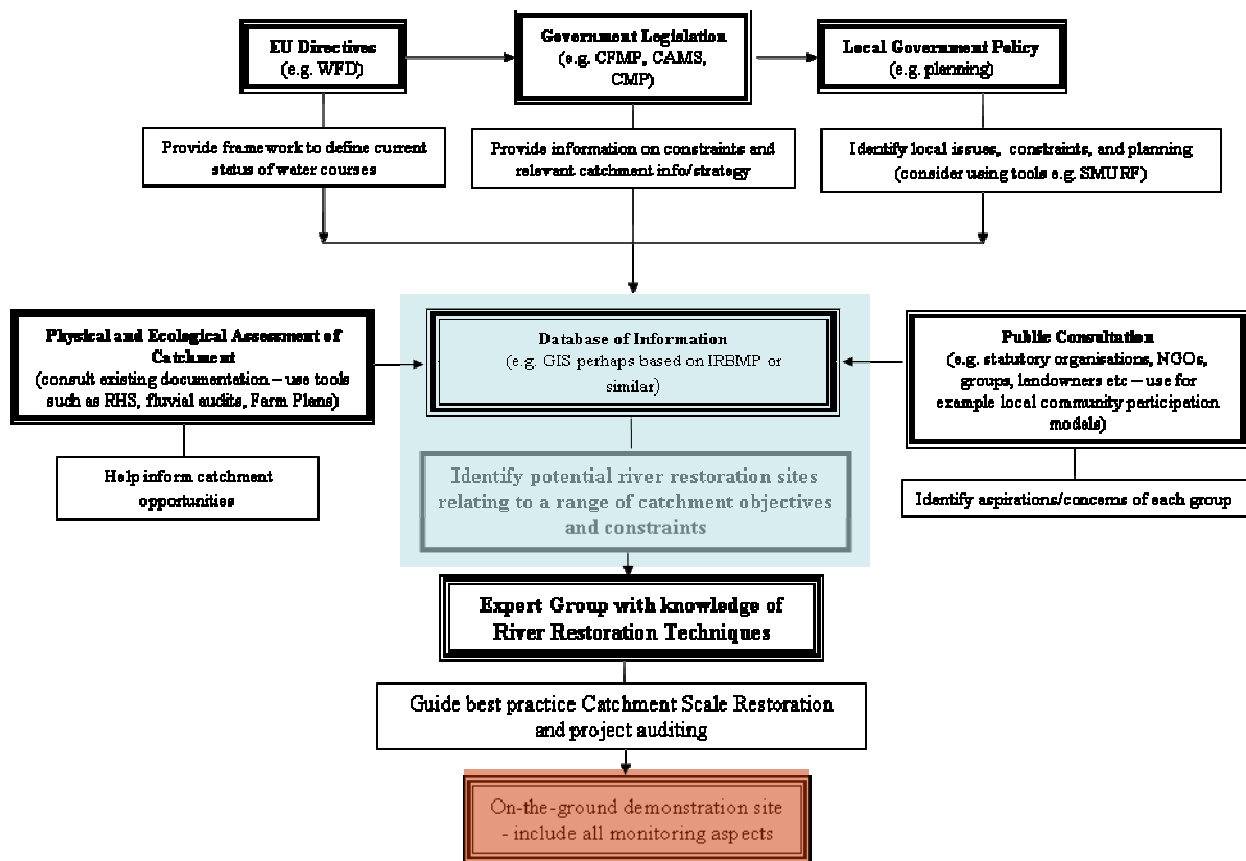


Figure 1 Preliminary suggestion for Catchment Scale River Restoration Framework

Figure 1 however, aims to show how such a framework might be developed in the context of existing policy, plans and tools. The Ripon (Laver and Skell) project has not been discussed within the body of the text of this review since it is still extremely early days in its conception. Furthermore, it is first and foremost a DEFRA capital funded flood defence scheme. Nevertheless, the RRC now has an advisory role within this project. The aim of this involvement is to encourage its develop in such a way that it can be demonstrated that by taking account of the wider issues of the catchment (e.g. hydrology and current landuse policy) ecologically sound measures can be introduced that both mitigate against flooding where necessary in the catchment and maximise ecological potential. If successful, this project should help to show how river restoration opportunities can go hand in hand with improving flood defences. Whether or not the approached used will provide the basis of a Catchment Scale River Restoration framework remains to be seen.

## Chapter 5. Conclusions and Recommendations

### 5.1 Conclusions

Of the 12 projects reviewed in detail none could be deemed Catchment Scale River Restoration projects, as defined by the RRC's definition stated in section 2.1. Furthermore, for the majority of these projects, river restoration is not the overarching rationale behind them. However, the development of a range of tools, approaches and methods has been demonstrated, that could be adapted or used in their entirety to help implement a Catchment Scale River Restoration framework.

Between them these projects have highlighted the complexity surrounding the discipline of river restoration, shown the variety, yet equally valid ways of looking at a catchment and exemplified the inordinate amount of local issues, UK policy, and EU directives that must be taken into account and adhered to in order to achieve best practice Catchment Scale River Restoration.

The WFD identifies the need to protect and enhance the status of aquatic ecosystems. Clearly Catchment Scale River Restoration provides a way forward to deliver this. Therefore there is now the need to establish a framework which brings together all the relevant tools and policy. This can then be used to produce guidance notes on how best to transfer theory into practical demonstration. Only then through such practical demonstration can catchment scale processes be shown to link to appropriate use of restoration techniques.

### 5.2 Future Recommendations

It is now a requirement of the WFD, that all member states have completed plans and have detailed objectives of how they intend to tackle improving the ecological status of their rivers. It is the view of the RRC (and others) that to achieve high ecological status Catchment Scale River Restoration will need to be an integral part of this process.

This short review has brought together a large amount of information not previously assessed in the context of Catchment Scale River Restoration. Through this process the need to pull together all the various pieces of guidance in order to develop an integrated river restoration framework has been advocated. In summary it is recommended that the following aspects are brought together.

#### 5.2.1 More detailed review of projects and tools

Time constraints have meant that neither every catchment scale project in the UK could be reviewed in details, nor could projects from outside the UK be assessed. Furthermore, due to the recent surge of interest in catchment scale issues it is predicted that there will continue to be a number of new projects in the future.

*Action:* Review world-wide literature and keep up to date with appropriate projects.

### 5.2.2 Joined up policy and tools

Currently there are a number of catchment scale statutory plans such as Catchment Flood Management Plans (CFMP's) and Catchment Abstraction Management Strategies (CAMS). The usefulness of the recommendations from these plans should not be underestimated and hence they need to be carried out in association with other catchment scale initiatives rather than as isolated initiatives. The implementation of the Water Framework Directive should make this more feasible. Similarly, tools and strategies have been developed to help explain the impact of a range of drivers, many of which could be valuable in developing a framework.

*Action:* Review and gain a good understanding of all policy and tools to show how they can help to inform best practice Catchment Scale River Restoration. Set up a comprehensive database aimed at stating at what point, within which catchments and in what order each policy document/tools are to be used.

### 5.2.3 Guidance (framework)

Joining up policy and tools as outlined above, is an essential element of demonstrating best practice Catchment Scale River Restoration. It is recognised that there is already a whole series of plans, policy and tools that already exists but at present no simple framework exists that enables good practice river restoration to be completed in the context of the catchment scale.

*Action:* RRC, and other relevant NGOs to work together with the statutory organisations to produce comprehensive guidance notes on Catchment Scale River Restoration that aims to bring together all existing relevant documentation.

### 5.2.4 On the ground demonstration

River restoration, by its very nature relies on demonstration of its principles on-the-ground. What is now required is an opportunity to demonstrate principles through a project that aims to take into account of all plans, policy and tools relevant at a catchment level and hence help develop and show the significance of adhering to an appropriate framework.

*Action:* The RRC through its function of dissemination of information it provides is in the ideal position to bring together the primary elements of this project, highlight the lessons learnt and use this information to help start to formulate an appropriate framework.

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## Appendix. List of all Projects Reviewed.

Table 4: Summary of all projects review.

Project	Commissioned by/ Date commissioned	Primary Driver	Type of Project	Objectives		Is the project catchment scale?	Included River Restoration
Central Rivers partnership	Staffordshire County Council 1999	Sustainable development of the area.	Strategy	Initially a land use strategy: <ul style="list-style-type: none"> <li>• Regenerate the river corridor and improve its quality,</li> <li>• Provide opportunities for diversification of farming income,</li> <li>• Increase recreational opportunities</li> <li>• Increase habitat provision</li> </ul>	<ul style="list-style-type: none"> <li>• Revision of planning guidance</li> <li>• Public consultation</li> <li>• Habitat creation, including river restoration</li> <li>• Countryside stewardship to encourage farmers to diversify</li> </ul>	Long Reach	Y (Proposed)
Parrett Catchment Flood Management Plan	Environment Agency 2003	Flood Defence	Strategy	Sustainable Flood Risk Management : <ul style="list-style-type: none"> <li>• Define flood risks</li> <li>• Identify future risks</li> <li>• Consider future land use</li> <li>• Protect and enhance the environment</li> <li>• Identify priority actions</li> </ul>	Numerous flood defence measures both 'hard and 'soft'.	Catchment	N
Parrett Catchment Project Action Strategy	Wise Use of Floodplains 2001	Integrated catchment management	Strategy	<ul style="list-style-type: none"> <li>• Develop an integrated catchment management plan,</li> <li>• Develop sustainable approach to flood management,</li> <li>• Provide measures for modifying land-use,</li> <li>• Develop integrated rural development.</li> </ul>	<ul style="list-style-type: none"> <li>• Wise use of floodplains GIS system</li> <li>• Land &amp; Water management pilot studies</li> <li>• Technical reports to provide a better understanding of the catchment.</li> </ul>	Catchment	Y (Limited)
Forth Catchment Project	Wise Use of Floodplains Project 1999	Flood Defence and Diffuse Pollution	Strategy	<ul style="list-style-type: none"> <li>• Demonstrate methods to apprise the economic social and environmental effects of floodplain restoration</li> <li>• Determine how EU policy should change</li> <li>• Facilitate on the ground restoration</li> </ul>	<ul style="list-style-type: none"> <li>• Workshops for stakeholders and local community to examine opportunities for future floodplain options.</li> <li>• Creation of a catchment management forum for integrated management planning.</li> </ul>	Catchment	?

Project	Commissioned by/ Date commissioned	Primary Driver	Type of Project	Objectives	Tools	Catchment / Sub-catchment Scale	Included River Restoration
Fens Floodplain Project	Wise Use of Floodplains Project 1999	Water Resources and Biodiversity	Strategy	To develop a strategy for sustainable wetland restoration	<ul style="list-style-type: none"> <li>Fens Water Forum established</li> <li>'Vision' map developed</li> <li>Wet Fen Strategy initiated</li> <li>Revision of planning guidance</li> </ul>	Reach	N
Earne Catchment Project (Wise Use of Floodplains Project)	Wise Use of Floodplains Project 2000	Water Quality	Strategy	To examine complexities of cross boarder catchment planning concerning nutrient management and sustainable land management.	<ul style="list-style-type: none"> <li>Catchment Forum Established</li> <li>Planning policy reviewed and modified</li> <li>Catchment scale Agri-environment impact assessment</li> </ul>	Catchment	N
Spey Catchment Management Plan	Spey Fisheries Board, SEPA, SNH, Highland and Moray Councils 2003	Water framework Directive  cSAC designation	Strategy	To set out a strategic framework for the wise and sustainable use of the water resource, and for the protection and enhancement of water quality and natural heritage within the Spey catchment.	<ul style="list-style-type: none"> <li>Stakeholder consultation</li> <li>Public consultation</li> </ul>	Catchment	?
Dee – Ken Catchment Management Plan	SEPA 2002	Water framework Directive	Strategy	Develop an agreed plan to for catchment management to encourage the enhancement of biodiversity and water resource whilst balancing the economic and social concerns.	<ul style="list-style-type: none"> <li>Stakeholder consultation</li> <li>Compiling action points</li> </ul>	Catchment	(proposed)
Tweed Catchment Management Plan	Tweed Forum 2003	Water framework Directive	Strategy	<ul style="list-style-type: none"> <li>Integrate the different administrative, planning and regulatory systems within the Tweed catchment.</li> <li>Conserve enhance and where approve restore the total river environment through effective land and resource planning across the Tweed catchment.</li> </ul>	<ul style="list-style-type: none"> <li>Stakeholder consultation</li> <li>Public consultation</li> <li>Compiling 7 strategic aims to be taken forward.</li> </ul>	Catchment	(proposed)
Loch Lomond Catchment Management Plan	SEPA, SNH, Scottish Water, Loch lomond trust 2003	Water framework Directive	Strategy	Influence the management of the Loch Lomond catchment to improve and maintain water quality, conserve water resources, and protect the biodiversity	<ul style="list-style-type: none"> <li>Stakeholder consultation</li> <li>Public consultation</li> <li>Compiling 75 separate actions.</li> </ul>	Catchment	(proposed)
Economic and Practicalities of Washland Creation in the Somerset Levels	DEFRA 2003	Sustainable Flood Defence	Research	<ul style="list-style-type: none"> <li>Identify the range of benefits accruing from floodwater storage.</li> <li>Determine eth feasibility of approaches, funding mechanisms and practicalities.</li> </ul>	<ul style="list-style-type: none"> <li>Case studies</li> <li>Informal surveys with landowners / land managers.</li> </ul>	Catchment	N

Project	Commissioned by/ Date commissioned	Primary Driver	Type of Project	Objectives	Tools	Catchment / Sub-catchment Scale	Included River Restoration
Upper Wharfedale Best Practice Project	Upper Wharfedale partnership 1998-2002	Demonstration site for best practice	On the ground	Demonstrate the principles, techniques and benefits of an integrated way of achieving good land and water management.	Floodplain and river restoration techniques.	Sub catchment	Y
Wye Habitat Improvement Project	Wye Foundation	Fisheries	On the ground	Restore economically viable wild brown trout fisheries by introduction of bank habitat management.	Fencing to reduce erosion De-shading via coppicing	Reach	Y
URBEM	HR Walligford (carrying out work) Funded by EC 2002	Water Framework Directive	Research	To provide a comprehensive framework to facilitate urban watercourse rehabilitation that takes into account the regional variations in modification and use of watercourses across Europe.	<ul style="list-style-type: none"> <li>New tools to assess the potential for enhancement and rehabilitation of urban watercourses.</li> <li>Innovative urban watercourse rehabilitation techniques of use on future schemes.</li> <li>Decision support procedures.</li> <li>Increase in application of ecological concepts for urban watercourse rehabilitation.</li> </ul>	Catchment	N
Smurf: Integrated Catchment Management and land use planning	SMURF partnership Funded by LIFE 2003	Water Framework Directive	Research	To improve land use planning and water management in heavily urbanised and degraded environments	<ul style="list-style-type: none"> <li>Extensive citizen consultation</li> <li>Develop a GIS catchment planning tool.</li> </ul>	Catchment	Y (limited)
Ythan Project	Ythan partnership Funded by LIFE 2001	Sustainable Land Management	On the ground	Project aims to take a community based approach to developing sustainable land management.	<ul style="list-style-type: none"> <li>Working with local communities</li> <li>Farm demonstration site</li> <li>Selective River Restoration</li> <li>Work with farmers to develop nutrient budgets</li> </ul>	Catchment	Y
				•			

Project	Commissioned by/ Date commissioned	Primary Driver	Type of Project	Objectives	Tools	Catchment / Sub-catchment Scale	Included River Restoration
West Water Demonstration site	WWF	Demonstration site for best practice	On the ground	To promote a greater awareness of the need for sympathetic management of the river.	Working with landowners to restore the river on there land	Reach	Y
Severn Vyrnwy Land Management Initiative	Partnership	Sustainable Farming Practice on the Floodplain	On the ground	<ul style="list-style-type: none"> <li>Assist farm business to develop towards delivering more sustainable land management</li> <li>Increase wildlife diversity</li> </ul>	<ul style="list-style-type: none"> <li>Stakeholder Forum</li> <li>Farm business development</li> <li>Novel model agri-environment scheme</li> </ul>	Reach	N
TAMAR 2000 Project	West Country Rivers Trust 1996	Water Quality, Fisheries	Practical	Improve the River Tamar's water quality for fisheries interests	<ul style="list-style-type: none"> <li>Farm Management Plans</li> <li>River Enhancement techniques</li> </ul>	Catchment	Y
River Avon / Avon Valley Initiative	River Avon / Avon Valley Initiative Partnership 2003	Biodiversity	On the ground	The restoration of the river Avon and its associated habitats.	<ul style="list-style-type: none"> <li>Strategic restoration of the river Avon cSAC and the Avon Valley SPA, and wider associated habitats.</li> <li>Encouraging involvement of local residents in the river restoration process through volunteers and targeted training programmes.</li> <li>Developing a range of education and public awareness initiatives to improve understanding of the Avon system</li> <li>Improving access to the river through</li> <li>Monitoring to learn from successes and problems and reporting these results.</li> </ul>	Catchment	Y (proposed)
Etrick Floodplain Habitat Enhancement	Borders Forest Trust	Floodplain habitat degradation	On the ground	Restore woodland, scrub, meadow and forest habitat in the floodplain	<ul style="list-style-type: none"> <li>Management agreements with farmers and Forest Enterprises</li> <li>Increase public access</li> </ul>	Reach	N
					<ul style="list-style-type: none"> <li></li> </ul>		

Project	Commissioned by/ Date commissioned	Primary Driver	Type of Project	Objectives	Tools	Catchment / Sub-catchment Scale	Included River Restoration
New Forest River Project	New Forest LIFE partnership	Biodiversity	On the ground	<ul style="list-style-type: none"> <li>to restore the priority interest features of the New Forest cSAC and their supporting adjacent habitats in accordance with the cSAC Management Plan;</li> <li>to establish their long term sustainability through the development of a mechanism which ensures the integrated management of the main water basins;</li> <li>the creation of suitable conditions for the regeneration of a significant further area of priority habitat.</li> </ul>	<ul style="list-style-type: none"> <li>River Restoration</li> <li>Floodplain Restoration</li> <li>Water Basin Management Forum</li> </ul>	Catchment	Y
Ribble –WFD pilot study	Environment Agency	Water Framework Directive		<ul style="list-style-type: none"> <li>To test current European guidance on public participation and river basin planning.</li> <li>To test the Environment Agency's own WFD guidance in the Ribble area before implementation across England and Wales.</li> <li>Develop a 'Prototype' River basin management plan for the Ribble in 2007, which will contribute to the North West's River Basin District Management Plan.</li> </ul>		Catchment	N
Avon Landcare Initiative	Environment Agency	Diffuse Pollution	On the ground	To reduce diffuse pollution in the Avon System.	A Landcare tool kit for farmers and landowners to promote best soil management practice	Sub catchment	N
UK Rivers Restoration Project (Skerne and Cole)	Partnership 1994	Best practice	On the ground	To demonstrate how state of the art restoration techniques can be applied to re-create natural ecosystems in damaged river corridors.	<ul style="list-style-type: none"> <li>River Restoration</li> <li>Dissemination of best practice guidance</li> </ul>	Reach	Y
Sankey Now River Valley Project (limited information available)	1995	River improvements	Practical	To improve Sankey Brook, its tributaries and floodplain through building involvement of the community and improving the water quality of the river.	<ul style="list-style-type: none"> <li></li> </ul>		?
Integrated River Basin Management Project	1997	Data Analysis of Catchment	Research / Strategy	To develop a GIS based model to assess catchment based issues.	<ul style="list-style-type: none"> <li>A comprehensive GIS tool</li> </ul>	Catchment	N
LIFE in UK Rivers Project (management plan)	2000	Biodiversity	Strategy	To develop conservation strategies for 7 cSAC rivers in the UK including the The Afon Teifi , River Edean, Endrick Water and River Avon	<ul style="list-style-type: none"> <li>Stakeholder participation</li> </ul>	Catchment	Limited

Project	Commissioned by/ Date commissioned	Primary Driver	Type of Project	Objectives	Tools	Catchment / Sub-catchment Scale	Included River Restoration
Cree Valley Catchment	Cree Valley Catchment Partnership	Sustainable land use management	On the ground	To demonstrate sustainable forestry to protect water quality and aquatic biodiversity <ul style="list-style-type: none"> <li>To exchange information between a wide range of partner organisations and experts in Britain, Sweden and beyond.</li> <li>To identify best practice in catchment management</li> <li>To identify best practice in aquatic and riparian habitat improvement</li> </ul>	<ul style="list-style-type: none"> <li>Catchment planning and inventory package available to partner organisations on a shared Geographic Information System (GIS) and to the general public via the Internet.</li> <li>A CD Rom and booklet describing agreed best practice in catchment management and habitat improvement</li> <li>13 physical demonstrations of land and water management in the Cree catchments and further demonstrations in the Viskan catchment</li> <li>conferences</li> </ul>	Catchment	Y
Humberhead Levels 'Value for Wetness' Project	Countryside Agency	Sustainable water management	Strategy, On the ground	To identify a more sustainable approach to long-term water management which balances the economic, social and environmental needs of the area.	<ul style="list-style-type: none"> <li>Land use trails to gain a better understanding of the inter relationship between water management, land use, social benefits and environmental conservation.</li> <li>Water network interdependency maps</li> <li>Consultation with key bodies to identify optimal policy mechanisms</li> <li>Promoting findings to all level of Government.</li> </ul>	Sub-Catchment	N

Project	Commissioned by/ Date commissioned	Primary Driver	Type of Project	Objectives	Tools	Catchment / Sub-catchment Scale	Included River Restoration
River Ugie Voluntary Initiative River Ugie Wetland project	The Voluntary Initiative SNH	Water Quality	Strategic & Practical	Provide advice and best practice measures to reduce the amount of pesticide entering the river.	<ul style="list-style-type: none"> <li>Newsletters to all framers in catchment</li> <li>Information booklets</li> <li>Farm visits from agronomists</li> <li>Creating buffer strips</li> <li>Carrying out nutrient budgets</li> </ul>	Catchment	N
WiseUse of Floodplain : River Cherwell Catchment	Wise use of floodplain	River & Floodplain Restoration	Research	To demonstrate how reconnecting floodplain wetlands with river channels can contribute to the sustainable management of the water resources within the river catchment.	<p>Planform and cross sections of pre-engineered watercourse:</p> <p>Likely values and ranges of channel and floodplain roughness:</p>	Catchment	N
NOLIMP Little info	2002	Water quality and the Water Framework Directive	Research	To demonstrate how the water Framework Directive can be implemented regarding procedural, management and practical aspects.		Reach	N
Mersey Basin Campaign	1985	Urban economic rejuvenation	Strategic & Practical	To address the problem of water quality and associated landward dereliction on a river catchment.	<ul style="list-style-type: none"> <li>River Valley Initiatives</li> </ul>	Catchment	Catchment
Cycleau – Our Rivers Project  Little info	2003	Water Resources in the coastal zone	Practical	<p>Cycleau aims to:</p> <ul style="list-style-type: none"> <li>Find innovative ways of managing and improving the water environment.</li> <li>Share knowledge and experience of water management.</li> <li>Involve local communities in the management of local rivers.</li> </ul>	<p>New techniques for :</p> <ul style="list-style-type: none"> <li>water de-contamination</li> <li>dredging and dealing with sedimentation</li> <li>securing farmer participation in addressing diffuse pollution</li> <li>developing a technical resource centre</li> </ul>	Catchment	?