

DRAFT

‘Appraisal: River Restoration's Missing Link’

held on the 27th November 2002 at the University of Nottingham, organised by:

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&

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In collaboration with the River Restoration Centre



Supported by the School of Geography, University of Nottingham;
Department of Geography, Queen Mary College, University of London;
Haycock Associates



1) Background

In November 2002 a workshop was organised at the University of Nottingham to discuss the role of appraisal in river restoration. This was organised by Lydia Bruce-Burgess (Environment Agency- formerly of Queen Mary, University of London) and Kevin Skinner (Haycock Associates/University of Nottingham- formerly of Integrated River Services) in collaboration with the River Restoration Centre.

2) Aims of the Workshop

The aim of the workshop was to draw together a select group of academics, policy makers and practitioners to discuss various aspects of this important procedure. Project appraisal is seen here to be a vital component of successful (and hence sustainable) river restoration. Without evaluations at various stages in the restoration protocol we do not know whether the most appropriate methods and techniques are being used and whether schemes have been successful as a result. The main objective of the workshop was to facilitate discussion of the various policy, practical and financial constraints that currently inhibit appraisal procedures from being undertaken on a regular basis. For this purpose the programme was split into 3 main sections. These included an examination of the current status of appraisals in the UK, a review of appraisal techniques and finally an outline of how monitoring and post-project appraisals can be more readily integrated into restoration projects and their results disseminated. This workshop provided a forum where a combination of short presentations and much discussion could provide a more holistic view of appraisal methods. Particular attention was paid to tools currently available to assist the undertaking of appraisals within the fields of geomorphology, ecology and as part of public participation in river restoration projects.

Prior to attending the workshop attendees were asked to provide answers to a short questionnaire. This questionnaire enabled attendees to identify issues which they felt were key in the field of appraisal. The summary results of the questionnaire are illustrated in Table 1. Pertinent questions that individual wished to address were also fed into the discussion sections of each different session (see Table 2).

Table 1. Key Points raised within the Questionnaires

<p>What are the main components of the appraisal process?</p> <ul style="list-style-type: none"> • Baseline survey/collation of existing data – this includes a range of information e.g. habscore, geomorphological assessments, pre- and post-photos, topographic surveys, fluvial audits etc ... • Community involvement • Cost/benefit analysis • Definition of project/scope • Detailed design/ preferred option • Dissemination of results • Empirical assessments of flood defence benefits after major events • Feasibility of options/budget • Identification of problem/objectives/stakeholders • Implementation • Pre and post-project appraisal • Progression towards sustainability appraisal from inception of project to post period
<p>What do you see as the key benefit of appraisal?</p> <ul style="list-style-type: none"> • ‘Best practice’ techniques for river rehabilitation are identified • A system of standardise techniques • Ascertain risk and adjustments • Clearly defined pre-project data to inform project, acting as a baseline for comparing post-project changes • Define dynamics of change in original scheme • Defines what can – and what cannot – be achieved by the project • Effective implementation • Effective monitoring of the methodology and the project itself after completion • Effects of a proposal and its alternatives are understood • Justification for future work • Learn from ‘failures/ what works and what doesn’t /early detection of problems • Longer term impacts • Quality of decision-making is improved • Relevant factors/interested parties are properly considered throughout • Sets out clear objectives • Taking on new projects rather than appraising effects of old ones • Understand how/if specific river/wetland restoration projects have met their original design objectives
<p>What do you see as the key current main constraint?</p> <ul style="list-style-type: none"> • Funding • Identification of the longer-term benefits of river restoration • Lack of knowledge about the most appropriate techniques for different schemes • Lack of scientific/statistical understanding to undertake appropriate baseline monitoring • Lack of support from regulators • Lack of time • Lack of understanding of impacts over wider spatial areas and longer time scales • Lack of understanding of what appraisal constitutes • Learning through post-project appraisal at all sites (rather than representative sites) is limited as a result of the costs of scientific monitoring • Need for appropriate robust, cost-effective appraisal techniques • Obtaining adequate baselines is difficult, without having significant forewarning of the likelihood of a restoration project going ahead • Uncertainty attached to different approaches to river restoration • Unwillingness to publicise project failures

Table 2. Questions addressed in the workshop

<p>Session one</p> <ul style="list-style-type: none"> • How many participants have been involved in projects where appraisals have been an integral? <p>Session two</p>
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- Identify best way for river restoration to be accepted at the strategic and CFMP level
- Identify opportunities/threats presented by the implementation of the water framework directive
- Is this an international problem?
- Has anybody cracked it within the context and constraints of government funding regimes elsewhere?
- What are the implications of the re-structuring of the EA upon restoration work?

Session three

- Can geomorphological audits be used as a means of providing catchment scale information on the physical status of designated rivers?

Session four

- Could RHS be adapted to include spatial flow data to improve its usability for fisheries mapping?
- How do we better integrate morphological and ecological appraisal?

Session five

- Do we need to include floodplain function and processes?
- What are the minimum criteria for a robust appraisal methodology in order to maximise use of resources for environmental benefit?

Session six

- How can we make Post Project Appraisals really useful, i.e. that the lessons really WILL be learned by for future projects?
- How can we undertake appraisal more readily?

Session seven

- What work is undertaken and how do we find out about it?

Session eight

- Are participants now going to incorporate appraisals into work programmes?
- **And finally.....**How do you eat the elephant? – Where does one start?

3) Programme - 27th November - 9:00am for 9:30 start

Welcome Introduction: (9.30-9.40)- Colin Thorne, University of Nottingham

Sessions 1-2 Appraisal: current practice

Chair: Kevin Skinner

Session 1. (9:40-10:20) *Appraisal process and current practice: results of a national investigation into river restoration appraisal techniques* (Lydia Bruce-Burgess, Environment Agency).

Session 2. (10:20-11:00) *Policy and Procedural Requirements* (Andrew Pepper, ATPEC River Engineering)

Tea and Coffee (11:00-11:30)

Sessions 3-5 Appraisal: Components

Chair: Martin Janes

Session 3. (11:30-12:10) *Geomorphological appraisal* (Kevin Skinner, Integrated River Services / University of Nottingham).

Session 4. (12:10-12:50) *Ecological appraisal* (Judy England, Environment Agency).

Lunch break (12:50-13:50)

Session 5. (13:50-14:30) *Public participation and appraisal* (Mark Turner, Mersey Basin Campaign).

Sessions 6-8 Appraisals: post-implementation practice

Chair: Lydia Bruce-Burgess

Session 6. (14.30-15.10) *Monitoring and Post-Project Appraisal Procedure* (Kevin Skinner, Integrated River Services / University of Nottingham)

Tea and Coffee (15:10-15:40)

Session 7. (15:40-16:20) *Dissemination and appraisal advice* (Martin Janes, River Restoration Centre).

Session 8. (16:20-16:30) *Way Forward*

4) Presentation Summaries

SESSIONS 1 & 2: APPRAISAL CURRENT PRACTICE

Session 1: Appraisal process and current practice: results of a national investigation into river restoration appraisal techniques (Lydia Bruce-Burgess, Environment Agency).

Introduction

This presentation briefly examined the results of a national investigation into river restoration appraisal techniques which was undertaken as part of Lydia's PhD research in the department of Geography and QMUL with case support from the Thames Region Environment Agency.

In January 2000 a national investigation into RR appraisal techniques employed in the UK was undertaken. The purpose of this investigation was to:

- Find out whether appraisal had been undertaken;
- And if so the extent of these appraisals;
- Techniques employed during appraisal; and
- Constraints on appraisal.

Prior to undertaking this investigation the RRC's database was first of all utilised to explore the spatial spread of restoration projects, restoration techniques being employed and to see if appraisal was mentioned on any of the projects. From the database it became evident that at that time Thames Region of the EA had undertaken the most RR projects (see Table 3), and the 'main focus' of these restoration projects had been ecological or fisheries, there was, however, little information on appraisal.

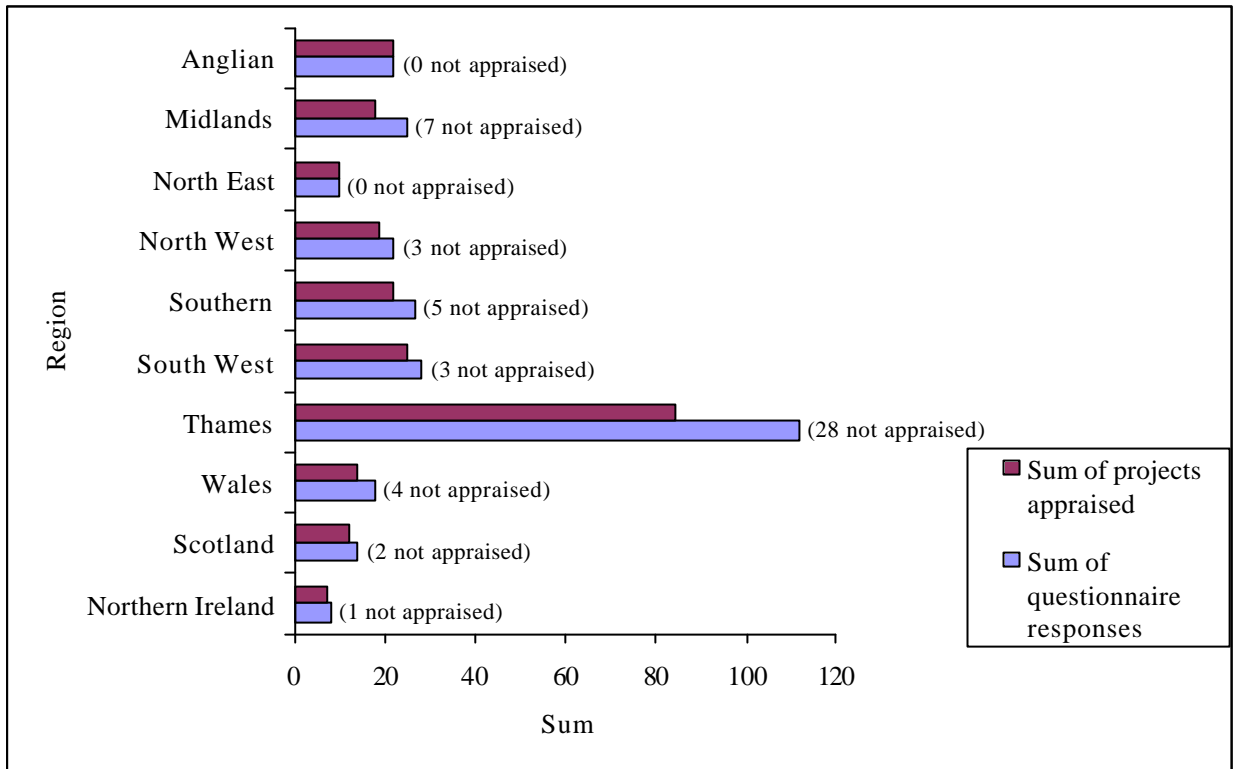
Table 3. Location of UK river restoration projects (sum and %) May 2000

Regions	Sum	%	
Anglian	29	6	} 90% projects in eight EA regions
Midlands	32	6	
North East	24	5	
North West	56	11	
Southern	46	9	
South West	39	8	
Thames	185	38	
Wales	36	7	
Scotland	38	8	
Northern Ireland	9	2	
Sum	494	100	

As a result of this a questionnaire was sent to those listed on this database to yield information on project appraisal. This questionnaire was very short and simple, asking whether appraisal was undertaken in the first instance and if so what techniques were employed. From this questionnaire survey an 80% response rate was achieved.

Out of 286 projects, encouragingly 81% people claimed to have undertaken appraisals. The regional breakdown of project appraisal can be seen in Figure 1.

Figure 1. Regional summary of appraised projects May 2000



Appraisal techniques

The next section of the questionnaire asked respondents to name the different appraisal techniques they employed.

Pre- and post-project photographs were the most commonly employed appraisal techniques, followed by site visits (see Table 4). So although appraisal is being undertaken there appeared to be a preference for using techniques which were cheap and fast over more time consuming appraisals such as RHS or fluvial audits.

Hence, although it was encouraging to see that appraisals were being undertaken the depth of information which could be yielded from these techniques may, however, not be sufficient to yield anything above anecdotal information regarding success rates.

Table 4. Percentage (sum) of all appraisal techniques employed May 2000

Appraisal technique	% (sum)	
Visual	Photos pre-project	79 (184)
	Photos post-project	74 (172)
	Aerial photos	2.4 (2)
	Video	1 (2)
Geomorphological	Channel cross-section measurement	29 (67)
	Delineation of reference reach	8 (19)
	Geomorphological modelling	27 (62)
	Fluvial audit	12 (27)
Habitat	Habscore	3 (7)
	RCS	24 (56)
	RHS	13 (31)
	RIVPACS	10 (24)
	Fisheries survey	35 (82)
	PHABSIM	3 (7)
	SERCON	1 (2)
	Invertebrate- macroinvertebrate survey	6 (14)
	Faunal surveys	3 (6)
	Botanical surveys	10 (24)
Public	Discussion groups	21 (48)
	Public enquiry	6 (13)
	Questionnaire survey	8 (18)
Pollution	Monitoring of contaminated land	5 (10)
	Water quality monitoring	17 (35)
'Other'	Cost Benefit Analysis	18 (43)
	Environmental assessment	30 (71)
	Landscape assessment	30 (69)
	Return monitoring	18 (43)
	Site visit	48 (111)
	RRC audit	9 (22)
	Appraised through academic research	3 (7)
Use of historical records	1 (2)	

Appraisal framework

From this investigation a lack of clear understanding as to what appraisal really comprises was identified. For some people appraisal was seen as the end product of a restoration project - a post-project appraisal. For others appraisal was identified as all encompassing and a process essential from a project's inception through to completion.

Through this research a set of appraisal guidelines were developed (see Figure 2). This appraisal process should enable projects to be planned clearly, so that pre-project goals could be returned to during Post Project Appraisal (PPA) to enable us to learn from projects more than we do at present.

Appraisal Phases:	Appraisal Steps:	Appraisal Output:
Phase 1. Pre-project appraisal data collection	Desk study	- Objective setting
	Site selection	- Set scope of monitoring programme
	Problem definition	- Define success criteria
	Statement of project goals	Adaptive Management
	Securing resources	
Pre-project baseline data collection		
Phase 2. Project design and implementation	Project design	
Construction	- Publicise results of post-project appraisal	
Phase 3. Post-project appraisal and Adaptive Management	Post-project data collection	- Document project success/failure
	Post-project appraisal	- Increase knowledge base
	Project Failure	- Process of refinement and development
	Long term management programme	

Constraints

Part of the questionnaire also explored reasons why appraisals were not undertaken. It was found that:

- Time is a constraint which forces you to spend time on new projects rather than appraisal of completed one
- Money allocated has to be spent in a short window of time with money available for work on the ground but not appraisal studies
- The EA does not have specific funds set aside for river restoration projects let alone appraisal
- Appraisal is a luxury reserved for ‘significant projects’ with anecdotal observations reserved for the remainder
- Restoration is always an ‘improvement’ on the prior degraded state (hence appraisal is not necessary)

Session 2: Policy and Procedural Requirements (Andy Pepper, ATPEC River Engineering)

In engineering schemes is generally accepted that a **pre-project appraisal** is necessary for all projects. This must identify the objectives of a project, and must ensure that the project complies with a hierarchy of policy, plans and strategies that are relevant to that project. It should not require any field data-gathering, but should provide clear scoping limits (geographic, financial and objectives) for the feasibility study.

For any **post-project appraisal** it is necessary to define what it is that is being appraised, and who will use the results of the PPA. The timescale and timing need to be defined, and to ensure a useful PPA it will be necessary to set up monitoring, or at least a comparison between pre- and post-project states.

Different PPA outputs are required by different people, for example:

<i>Funder :</i>	Was value for money achieved? How did funding constraints (funds available and timing of their release) affect the project?
<i>Promoter :</i>	Was the design standard achieved? (e.g. for flood defence schemes was the required standard of protection actually achieved?)
<i>Environment :</i>	Have the mitigation and enhancement measures included in the project succeeded?
<i>Designer :</i>	Was the design appropriate, or could a different design have produced cost-effective additional benefits?
<i>Procurement :</i>	Was the procurement process / form of contract / choice of consultant and contractor appropriate?
<i>Sustainability :</i>	Was the project sustainable, both in terms of design (materials and long-term inputs), construction (plant and methods required) and maintenance (ongoing resource input)?
<i>Organisation :</i>	Was the project organisational structure appropriate? Was there adequate communication between funder / promoter / designer/ contractor / stakeholder?

Timing of a PPA is important. If site records and personal knowledge are needed, then it should be immediately after construction. However, if habitat development and wildlife colonisation are issues, then the PPA should be after several years.

The core purpose of a PPA is to learn from the outcomes of a project, and to feed back the lessons learned. These can be to:

- Inform policy.
- Influence strategies.
- Improve design.

- Identify opportunities for future types of suitable enhancement.

Unfortunately such work is often not considered to be part of a capital scheme, and so funding for a comprehensive PPA is frequently difficult.

Also, experience to date suggests that feedback is managed very poorly, and that only a small proportion of the potential lessons from those PPAs that are carried out, are actually being heeded by those promoting new projects.

SESSIONS 3 TO 5 APPRAISAL: COMPENENTS

Session 3: Geomorphological Techniques (Kevin Skinner, Integrated River Services/University of Nottingham)

General aim: To review geomorphological techniques/data requirements that can be used in the appraisal of river restoration schemes.

A variety of geomorphological techniques can be used in river restoration projects. Techniques are largely associated with pre-project investigations with limited post-project techniques available. The most commonly used pre-project techniques/data include: 1) Catchment Baseline Survey; 2) Fluvial Audit; 3) Reference reach/historical information.

A catchment baseline survey aims to provide a strategic overview of the catchment as well as documenting the current geomorphological status of the river system (Environment Agency, 1998). This is undertaken using 2 main approaches. The first is to use stream reconnaissance (see Thorne, 1998) to detail the state of the river system. Secondly, a broad assessment of the geology, land-use, soils and geomorphology is made through a review of archived information. The approach should use 2 people trained in geomorphology, led by qualified with at least 5 years experience in river management. Approximate costs for the reconnaissance work ranges between £150-350 per person per day (6km-10km per day depending on seasons) and the broad assessment between £300-700.

The fluvial audit is one of the most important geomorphological techniques available. The main objectives of this process are to a) obtain an understanding of the geomorphological state of the project reach paying close attention to sediment transport processes, the impact of flood events and impacts of land use change; b) to provide an understanding of the stability of the project reach, particularly with respect to processes of channel incision and widening; c) to provide a time chart of catchment scale changes to aid the understanding of the historical context of the river (adapted from Environment Agency, 1998). The approach should be undertaken by similarly qualified individuals as with the catchment baseline survey. The costs for undertaking such an investigation range between £3500 and £6000. The two scales relate to the size of the catchment. In smaller catchments a more detailed study is possible,

whereas larger catchments audits tend to focus on the project reach, those up and downstream and selected points around the catchment. An additional £1000-£1500 can be used to have the results written in a more useable form on an interactive CD. This is a good way of disseminating the results to a wider audience.

The use of a reference reach and historical documentation can provide valuable information. In particular, a number of geomorphological parameters can be determined from using a comparable semi-natural reach, historic maps and documentation. This study can be included within either a Catchment Baseline Survey or a Fluvial Audit.

Other useful techniques/information that can be used in the design of restoration schemes are digital terrain models and a geomorphological dynamics assessments (hydraulic geometry and bank assessment).

Post- project techniques are limited to assessing particular success criteria/objectives that were defined in the pre-project phase. For example, sediment dynamics has been investigated through detailed mapping zones of erosion and deposition. One of the most commonly used techniques is repeat photography. It is important that this is undertaken from a fixed point to ensure the same perspective is used. A procedure (the Channel Geomorphology Profiler) is currently being developed to assess the success of schemes in mimicking the habitat diversity found in semi-natural rivers (Skinner, 1999). This also offers the opportunity to assess the schemes relative to one another.

Questions suggested from this overview:

- What techniques should be used in river restoration?
- Are there any new design approaches being developed at the present that could be practicably used with the time constraints involved in river management?
- How could these techniques/results be used in the Water Framework Directive to assess hydromorphology?

References

Environment Agency, 1998, *River Geomorphology: A practical guide*, National Centre for Risk Analysis and Options Appraisal, Guidance Note 18.

Skinner, K.S., 1999, *Geomorphological Post-Project Appraisal of river rehabilitation schemes in England*, Unpublished PhD thesis, University of Nottingham, Nottingham, UK.

Thorne, C.R., 1998, *Stream Reconnaissance Guidebook: Geomorphological Investigation and Analysis of River Channels*, J Wiley and Sons, Chichester, UK, ISBN 0-471-968560, 127p.

**Session 4: Ecological appraisal (Judy England, Environment Agency).
DETAILS TO FOLLOW**

"Ecological appraisal should be integral to any restoration scheme. It enables us to assess the success of the scheme, assess restoration techniques, explain what is happening and allows us to test scientific hypotheses. All assessments should have clear objectives or aims and outcomes should be measured in comparison with a control or reference site. Unforeseen outcomes are often more educational than expected ones. Without evaluation we lose the opportunity to learn about restoration work and move forward."

Session 5: Public participation and appraisal (Mark Turner, Mersey Basin Campaign).

Public participation is central to the work of the Mersey Basin Campaign and its network of River Valley Initiatives. Public participation is increasingly becoming a central part of environmental projects. Society, in general, and funding bodies, in particular, demand that the public is fully engaged in improvement works. Only through active participation can local ownership of projects be achieved and sustainability be delivered.

The Mersey Basin Campaign experience has shown that it is important to balance public participation with other aspects of project delivery: community engagement is not an add-on. It is an integral part of project delivery. Groups to involve in the participation process include:

- Local users of the project site – “the community of interest”.
- Residents who live nearby the project site – “the community of location”.
- Key stakeholders – “the community of ready cash”.

Planning is all-important to the process of public participation. Involvement too early in the process can lead to unfulfilled aspirations; too late can result in a tokenistic approach. The Mersey Basin Campaign experience has shown that “bottom-up” approaches (interviews – there is nothing so good as personal contact – visioning sessions etc) are more effective than traditional “top down” approaches (public meetings etc).

Finally, any public participation approach should be realistic, make the maximum use of the local media and be fun!

SESSIONS 6 TO 8 APPRAISALS: POST-IMPLEMENTATION PRACTICE

Session 6: Monitoring and Post-Project Appraisal (Kevin Skinner, Integrated River Services/University of Nottingham)

General aim: 'To review the needs for Monitoring and Post-Project Appraisals (PPA) of river restoration schemes.'

The two important phases in post-implementation practice are Monitoring and Post-Project Appraisals. These two steps are strongly interrelated and essential for establishing whether projects that have been undertaken, under the auspices of restoration are actually having an improvement in the function, form and ecology of the fluvial system.

The main objectives of monitoring are: 1) to provide data that can be used to assess the success of the project in meeting specific success criteria, and 2) to provide a means for identifying any problems/maintenance issues that have arisen since the implementation of the scheme. Important questions about monitoring centre about the issues of scale, risk and uncertainty, time and frequency. A schematic diagram (see Figure 3) has been developed to illustrate these issues. In a level 1 scheme where there is for example, a small scale project with a low degree of risk and uncertainty in both the outcomes and techniques used, there will be very little need for monitoring of the project. In contrast, in a level 5 scheme which is large scale, and might involve high risks (e.g. being developed on a site of formerly contaminated land) and a high level of uncertainty (use of new or poorly documented techniques) there will be a need to undertake frequent, detailed and lengthy monitoring to establish whether the scheme, and the techniques within it, have been successful. The intermediate levels represent various combinations of scale, risk and uncertainty.

Monitoring of projects forms the basis for evaluating the success of the project in a subsequent Post-Project Appraisal. PPAs are an important, and often neglected, aspect of restoration work. Recent studies suggest a high rate of failure amongst current restoration schemes in the US suggesting that we still have a lot to learn about techniques used in restoration as well as their most appropriate settings. Undertaking Post-Project Appraisals can offer a variety of benefits to restoration practice, namely: 1) to provide an assessment of the effectiveness of the project relative to initial design objectives; 2) to assess the success of different sections and techniques used in the project thus providing documentation that could be used for future restoration design; 3) to enable the identification of areas that are in need of some form of maintenance; 4) to present a means for the dissemination of project results; 5) to offer an opportunity to learn from previous projects. Unfortunately, there are a number of problems with current practice that limit effectiveness of PPAs, namely: 1) catchment baseline studies are often not undertaken; 2) data and information on the project and its immediate environment, at a reach scale, are often absent; 3) projects do not define

their aims and objectives explicitly as success criteria which are amenable to testing through a PPA; 4) monitoring and Post-Project Appraisals are rarely undertaken as part of a coherent restoration strategy; 5) rarely is money set-a-side for both post-project monitoring and appraisal. It is important that these issues are addressed so that appraisals can truly be effective and offer an opportunity to provide valuable information that can be used to inform practitioners of good and bad practice. A Post-Project Appraisal procedure (Figure 4) is outlined below to illustrate important components of post-project appraisals of river restoration schemes.

Questions raised in this talk include:

Monitoring

- How much, at what frequency and what type of monitoring should be undertaken following installation of a restoration scheme?
- Should this be undertaken on every project or a selective amount?

Post-Project Appraisals

- Should Post-Project Appraisals be undertaken, in some shape or form, on all schemes?

General

- Would Monitoring and Post-Project Appraisals become increasingly important in the advent of the Water Framework Directive?
- How could these requirements be adopted in the various agencies responsible for overseeing hydromorphological targets?

Figure 3. Schematic diagram illustrating various monitoring issues

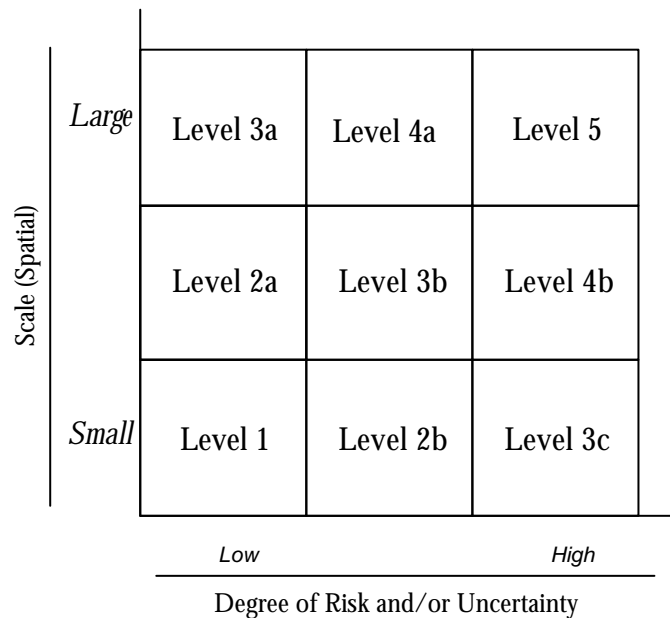
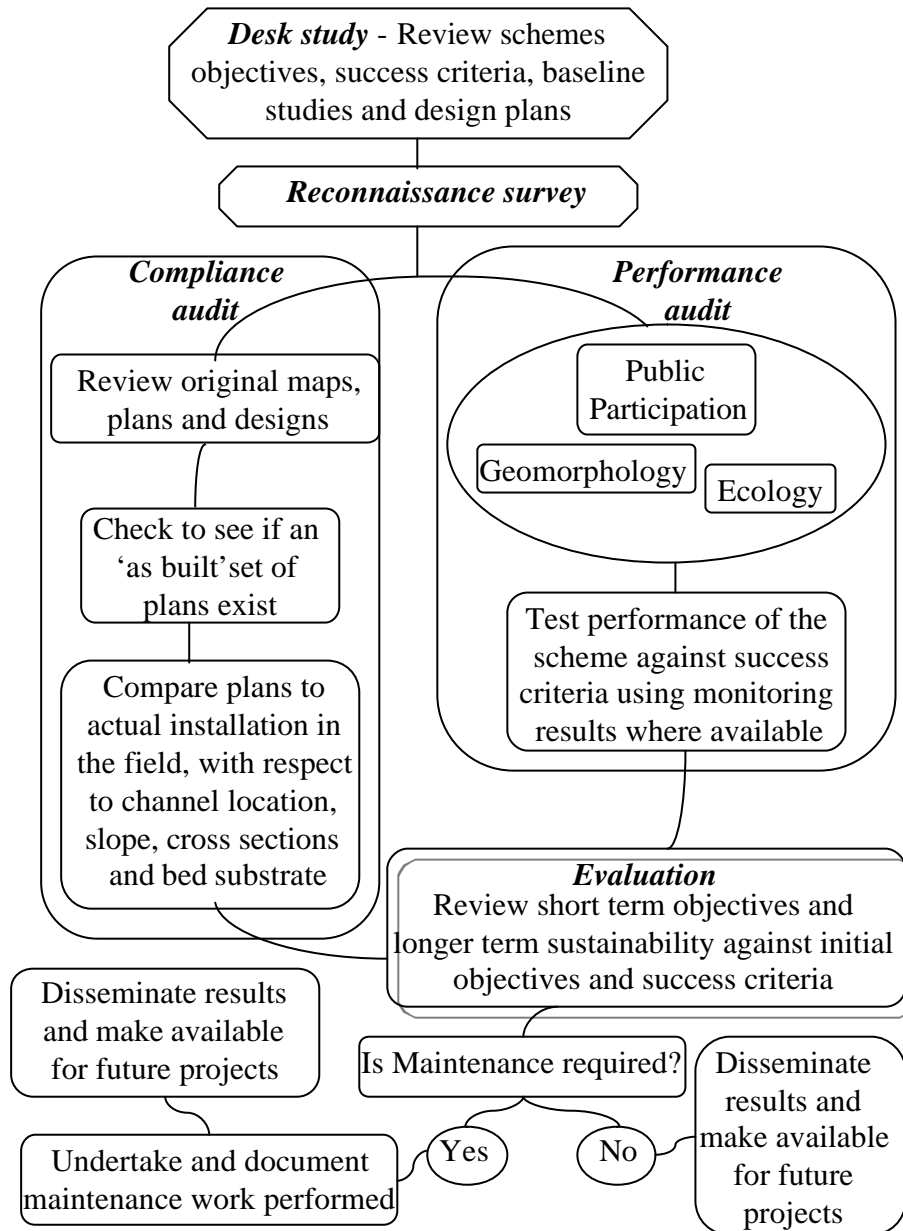


Figure 4. Post-Project Appraisal procedure



(adapted from Skinner, 1999)

References

Skinner, K.S., 1999, Geomorphological Post-Project Appraisal of river rehabilitation schemes in England, Unpublished PhD thesis, University of Nottingham, Nottingham, UK.

Skinner, K.S., Downs, P.W. and Brookes, A., 1998, Geo-hydraulic Diversity Index (GDI) - A method for assessing the sustainability of rivers, in Abt., S.R., Pezeshk, J.Y. and Watson, C.C. (eds.), Water Resources Engineering 98, ASCE, Memphis, Tennessee, USA, Volume 1, 666-671.

Session 7: Dissemination and appraisal advice (Martin Janes, River Restoration Centre). DETAILS TO FOLLOW

RIVER RESTORATION APPRAISAL WORKSHOP:

Aim

To discuss the various aspects of 'appraisal' as it relates to River Restoration in the UK

Objectives

To address the following:

- What is appraisal and why is it necessary?
- Where are we at currently?
- What are the pitfalls of policy/funding/knowledge transfer?
- What methods/types of appraisal are there and what do they do?
- What can we do to take forward research, practice, need etc...?
- Can we propose a basic framework to set as a starting point for others?
- What do we/should we do with 'results'?

Format

Eight sessions of 40 minutes each.

- First 10 minutes -> 'lead-in' by the speaker and key discussion areas
- Last 30 minutes -> discussion

End result

Where we want to get to;

- Higher profile appraisal and wider understanding
- Integration into project scoping and budgeting
- Co-ordinated research areas
- Understanding and integration of different appraisal techniques
- Focus for future discussion
- An outlet for dissemination

5) Key issues raised within the discussion sections

5.1 Constraints to undertaking appraisals

The main constraints to undertaking appraisals in projects were deemed to consist primarily of financial, human resources and associated time factors. The main points were identified as detailed below:

a) Financial

- No specific funds exist within the EA for undertaking appraisals. This has meant that because projects are often funded by flood defence they have become flood defence-centric rather than catchment-based.
- Projects are often dismissed not on technical grounds but because they can not be funded.
- Funding when acquired is often short-term. However, on river restoration projects the funding needs to be longer-term to facilitate monitoring and appraisals. The use of suspension accounts which can be reactivated after 5 years has good potential in this regard.

b) Human and Time

- Finding the staff, time and resources to undertake appraisals is a constraint as river restoration is not a functional priority of the EA.
- The pressure is to undertake new projects rather than appraising old ones due to the nature of funding which has to be spent within the time frame of a financial year.

5.2 Appraisal process structure

As defined in Figure 2 the structure of any appraisal process is critical to its success. Within each of these processes, however, specific steps have been identified that must be taken into account before any appraisal is completed. The choice of appraisal techniques were also acknowledge as being important to ensure that the most appropriate one is used for a specific scheme which is dependent upon the initial rationale for the restoration. Furthermore, the issue of uncertainty of how a project may respond to restoration works, and the importance of considering the risk factor to surrounding areas, especially in terms of economic value and unacceptable flooding, were key points that it was stressed must be evaluated in any appraisal system.

The main criteria identified through the discussion within the workshop for both pre- and post-project assessment of projects are outlined in the following sections.

a) Site selection

- Funding of appraisal requires that a specific site has already been selected.

- Selection of site should be very carefully tied to the objectives of a project.
- Site selection must start at a higher level than the catchment and should first determine priorities at a national level.

b) Pre-project appraisal and data

- It is important to separate pre-project (catchment wide) work from project specific work.
- Since there is always some uncertainty related to the outcome of restoration. Is it therefore better to collect more information and accept a level of redundancy to ensure that this is covered?

c) Objectives and Goal setting

- Few projects communicate objectives well enough to facilitate long-term monitoring.
- It is important to set objectives which are 'clearly defined' so they can be appraised by others at a later date.
- Project objectives need to include both those for the scheme itself and any appraisal.
- Setting clear objectives is key to success.
- Aims and objectives should not be too specific; consider OUTCOME over objectives.
- Objectives set must be appropriate to the assessment of a scheme.
- Some outcomes may well be unexpected so post-project examination is essential.
- Often objectives are set at the reach or channel scale; consideration should also be given to the floodplain or the river corridor.
- At the appraisal stage we need to link the river to its floodplain otherwise we risk missing huge river and floodplain restoration opportunities.
- It is important to ask what the long-term objectives are for our river systems.
- We have a duty of care to provide projects that are driven by and reflect public needs, but also to improve the biodiversity of these systems. These two goals don't always mesh.
- We need to target the objectives of our schemes from a higher, catchment scale, level.
- We need to strike a balance in urban areas where habitat issues are not perhaps important but public consultation is.
- We need to start assessing what are the major objectives on a reach by reach basis. In particular, where should improvements be located in a catchment and for whose benefit should they are being created?

d) Installation

- Poor communication between those installing and those designing projects.

e) Monitoring

- We do not adequately know the timescales for geomorphological dynamics. We need to have benchmarks or else we'll miss major events, so geomorphological tools need to be expanded.
- Some systems respond really quickly, others over 35 years or longer; these temporal responses need to be considered in the scheme's design, monitoring and appraisal.

f) Post-project appraisal

- Need to ensure that the results of PPA are made useful.
- Need to include public views and how they've changed before and after a project.
- PPA should look at all the outcomes, not just compare the objectives, because some things may be totally unexpected.

g) Dissemination

- People do not want to publicise results when a scheme did not perform as well as anticipated.

h) Choice of appraisal techniques

- Is the appraisal technique selected predetermined by the nature of project objectives?
- Just because a technique might be successful in many rivers the appropriateness of that technique for a particular scheme should also be considered.
- The context in which you are applying techniques is very important, so you need to consider the form-process relationship when selecting techniques, and examine the local context.

i) Risk and Uncertainty

- There is considerable uncertainty associated with different scales.
- We still can't fully appreciate the scale of uncertainty that exists so when we are setting aims and objectives for a particular project we need to learn more about previous projects to help determine levels of risk we can accept to achieve our aims.
- Rivers naturally change through time and this is dependant upon the sequence of flows that occur after installation. Consequently, the end result is not a deterministic outcome as there are many parameters over which we have no control.

- Instead of having an objective, deterministic, technocentric view, an alternative might be to use scenario modelling to examine a realistic range of scenarios.
- Rivers naturally change through time and thus we should be designing schemes with this concept in mind. This will need to be defined through identifying acceptable levels of risk.
- We need to define the boundaries of risk, but at the moment we are lacking the baseline data and PPA data to actually say what the boundaries of risk might be.

5.3 The future for appraisal

The key to understanding the success or failure of river restoration schemes lies primarily in the incorporation of well structured appraisal of projects from the beginning, to the end and beyond. It has already been identified above, that the type of appraisal used is dependent upon the original aim and identified outcomes of a project. Nevertheless, since it is acknowledge that some uncertainty will be attached to final restoration outcomes, it is essential that data collected is easily disseminated to those interested in restoration techniques. Only then can future projects become less uncertain and hence more sustainable. The following identifies the main points relating to prioritising and targeting appraisals and ways to ensure that feedback mechanisms are in place that can publicise both successes and failures.

a) Appraisals and restoration projects need to be undertaken more strategically

- We need to collect information at a much higher catchment level for identifying basic morphological problems that are occurring.
- We need to prioritise schemes at a catchment scale, using catchment scale plans and policies, prior to continuing at a scheme level. Through undertaking a catchment scale approach issues relating to long-term climate and land use change can be more effectively addressed.
- Priorities should be determined at a national level before catchment and reach scale issues are addressed.
- It is important to separate pre-project (catchment wide) work from project specific work.
- A more strategic overview is needed for restoration as a whole as well as a protocol for actually undertaking restoration schemes.

b) Prioritising appraisals

- We need to determine where appraisals should be targeted as it is unlikely that appraisals will be commonplace for every project without legislative backing.

c) Targeting appraisals

- Need to target our work more carefully.

- Appraisal programmes need not be highly scientific. This largely depends on what your anticipated outcome is and who will make the decisions at the end of the day.
- There is an argument for concentrating our money and effort on novel techniques or somewhere where we have a particular species that we want to monitor.

d) Effective use of results

- Appraisals results should be made accessible to a wider range of users

e) Feedback mechanisms to publicise successes and failures

- Need structure for disseminating and feeding back results.
- Need PPA outcomes to be supplied back to the original designers of the restoration project.
- A key issue is how we establish whether a project is value for money using the results of a post-project appraisal.
- Feedback is important. If we don't learn from appraisals there is no point to monitoring.

f) Linkages between geomorphology and ecology

- There is a need to join geomorphology and ecology closer together, and a great demand for hydro-geomorphologists.
- This synergy is important in the construction of systems which possess both form and function.

g) Adaptive management

- River restoration should not be the end point of our river management, system resilience and adaptive management should be the main issues that we should be working towards.
- River restoration should be informing the way we manage our rivers.
- If one possesses a robust programme of adaptive management then one could tolerate a lower degree of monitoring since you can adapt rapidly.

5.4 Additional points

The workshop also raised some poignant points that should be considered both about the types of appraisal methods available to date, and most significantly, emphasised the need to improve communication especially between stake holders and local groups that have a vested interest in their environment.

a) Appraising methods as well as projects

- Need to examine the effectiveness of particular techniques in a range of environments. We can then determine, with more certainty, the range of conditions that they can be used in.

b) Communication

- Poor communication between those installing and those designing projects is a serious issue which needs addressing
- Stakeholder dialogue should be present throughout the appraisal
- Feedback is important, if we don't learn from appraisals there is no point to monitoring
- A good project manager is imperative to help incorporate a range of specialists
- It is very important to have technical experts present during public consultation as they can outline the constraints and the parameters that they are working within.
- It is necessary to be aware that people have misconceptions.
- Important to create public ownership set-up local groups who can manage and police their watercourse, this is essential for a restoration project's after care.
- Important to attend inaugural meetings, so decisions which are made about geomorphology and ecology are transferred to the contractor.

6) Summary/ final thoughts

The workshop was successful in bringing together a group of people who have an interest and a belief in the values of appraisal as a necessary part of the restoration process. It provided a good insight into what techniques are currently available to aid project appraisal, particularly in geomorphology, ecology, public participation and policy. Equally the gaps in both techniques, dissemination of information between interested parties and financial and time constraints were acknowledged. It was therefore advocated that it is important that this workshop provides a starting point to ensure that appraisal is considered as an important aspect in future projects. Further discussion is one way forward and potential ways to ensure include:

- Use of river restoration mailbase, to open up the discussion internationally.
- Formation of smaller discussion groups, or wider e-mail discussion groups.
- Create a contact list of particular individuals involved in appraisals who can provide advice on particular projects or more general strategies.

It is equally important that monitoring and post-project appraisal of schemes are, and continue to be, documented following the installation of a scheme.

The main issues that currently restrict both monitoring and appraisals, and their usefulness, appear to be:

- Cost
- Time

- Human resources
- Lack of pre-defined objectives to test schemes
- The lack of a standardised protocol (although potential procedures and approaches have been outlined here)
- Lack of baseline data

There is a need for both monitoring and appraisals (particularly post-project) for river restoration schemes to ensure that we learn from previous projects. The key issues remain centred on how we approach this (with respect to a standardised, but flexible protocol), at what scale this is required (both spatial and temporal) and how we can document the information generated. Answering these questions should be a future focus for statutory bodies and research agendas. This will become more significant within the EU with the requirements of the Water Framework Directive.

If you have any questions/comments on what you have seen in this document please contact the River Restoration Centre at rrc@therrc.co.uk.

Attendees

Organisers

1. Kevin Skinner, Integrated River Services/University of Nottingham
2. Lydia Bruce-Burgess, Environment Agency
3. Martin Janes and Jenny Mant, River Restoration Centre

Additional Presenters

1. Andy Pepper, ATPEC River Engineering Consultancy
2. Judy England, Environment Agency -Thames Region
3. Mark Turner, Mersey Basin Campaign

Attendees

1. Andrew Brookes, Gifford and Partners Ltd.
2. Ronald Campbell, Tweed Foundation
3. Matthew Carter, Environment Agency
4. Richard Copas, Environment Agency
5. Helen Dangerfield, Babtie group
6. Steve Dangerfield, Halcrow Group Ltd
7. Stuart Downward, Kingston University
8. Allan Frake, Environment Agency
9. David Fraser, English Nature
10. David Gilvear, University of Stirling
11. Matthew Hardwick, Posford Haskoning
12. Nick Haycock, Haycock Associates Limited
13. Karen Hills, Atkins Global
14. Caroline Jackson, Binnie Black and Veatch
15. Katherine Leys, Scottish Natural Heritage
16. Nick Lutt, Thames Water Plc
17. Trevor Odell, Environment Agency
18. Michael Oliver, Rivers Agency
19. Harriet Orr, Lancaster University
20. Duncan Painter, Land Use Consultants
21. Steve Rice, Loughborough University
22. Roy Richardson, Scottish Environment Protection Agency
23. David Scranney, Environment Agency
24. Colin Thorne, University of Nottingham
25. Jim Walker, Environment Agency
26. Karen White, Atkins Global